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Gertie F. Marx, M.D., a founding SOAP member, died in New York on Sunday, January 25, 2004 after a brief illness. Gertie, as she preferred to be called by everyone she met, influenced the development and safety of obstetric anesthesia in her own unique way for more than 40 years. The influence she had within SOAP and the impact her leadership and generosity will continue to have on obstetric anesthesia research is substantial.

Gertie Florentine Marx was born February 13, 1912 in Frankfurt-am-Main, Germany. She attended Medical School at the University of Frankfurt, but by 1936 it became obvious to her that it would be prudent to leave her homeland. She relocated to Bern, Switzerland where she finished her medical studies, graduating with an M.D. degree from the University of Bern the following year. Soon thereafter, Gertie moved to the United States and settled in New York City.

After successfully completing the National Board examinations and the New York State Boards, Gertie was fortunate to receive the offer of an internship from New York's Beth Israel Hospital in 1939 when a male physician who had accepted the position canceled at the last minute. Fortunate, because every other hospital to which she had applied had replied that they would like to have taken her but had no facilities to accommodate a woman.

Unlike the situation at the University of Frankfurt, where more than 30 percent of Gertie's classmates were female, women medical students and physicians were a rarity in American hospitals in the 1940s. In fact, Gertie was the only female among the 24 interns at Beth Israel in 1939. Intern incomes were extremely lower for women-and Eric Reiss, who married Gertie in 1940 would, as often as allowed, supplement the family income by donating blood at the going rate of $35 plus money for a steak dinner. In contrast, Gertie's salary was only a few dollars more per month! These blood donations were performed by the direct method, where the donor occupied a gurney next to the recipient and blood was transferred directly.

During her internship Dr. Marx developed an interest in anesthesiology. This interest was the result initially of her being relegated to helping out in anesthesia during her surgery rotation when it was recognized that she lacked the strength to provide adequate exposure with surgical retractors. She gained wide experience administering a variety of anesthetics during this time and fell in love with the specialty. The next July, she became the first anesthesiology resident in the recently approved program at Beth Israel Hospital. After completion of her residency in 1943, Gertie joined the attending staff on which she remained until 1955. She introduced caudal block to Beth Israel after learning the technique from Dr. Bob Hingson at the US Public Service Hospital. These blocks were performed with malleable needles that were taped in place. Soon after becoming board certified, Gertie became director of obstetric anesthesia and began devoting most of her time to the subspecialty.

In 1955, Dr. Marx was recruited by Louis R. Orkin, M.D., the founding chairman, to the fledgling Department of Anesthesiology at the Albert Einstein College of Medicine in the Bronx. She remained there for the next forty years. Her rise through the academic ranks was remarkable for a woman in those days; she was appointed full professor in 1970 and retired as Emeritus Professor.

Gertie's academic output was prodigious. She authored more than 150 original articles, scores of book chapters, and many abstracts. She edited or co-edited four textbooks and was the founding editor of the Obstetric Anesthesia Digest. She has presented every eponymous lecture in the field of obstetric anesthesia, and has been visiting professor in departments on five continents. Gertie received a special Award of Merit from the New York State Society of Anesthesiologists in 1986 and the Distinguished Service Award of the American Society of Anesthesiologists in 1988. She is also the recipient of the Gold Medal from the Obstetric Anaesthetists' Association in Great Britain and, in 1993, received the College Medal of the Royal College of Anaesthetists in London.

Dr. Marx was one of the founding members of SOAP, the Society for Obstetric Anesthesia and Perinatology. Gertie took me to my first SOAP meeting when I was her fellow. I well remember her telling me "If you really want to be an obstetric anesthesiologist, you have to join SOAP and attend the meetings." She was right. Gertie was not only a SOAP member but also a very active participant in the scientific program. She could often be easily heard, if not easily seen, commenting on a just-presented abstract. Her criticism was always constructive, always well received by the frequently nervous presenter, and delivered with warmth. She loved teaching, enjoying molded residents, and felt very proud when one of her students did well in academic anesthesiology. The SOAP Board of Directors, in recognizing these traits, created the Gertie Marx section of the annual meeting wherein resident studies are presented and compete for an award. Gertie was one of the judges of this section and it gave her a good deal of pleasure.

When the Obstetric Anesthesia and Perinatology Endowment Fund (OAPEF) was created, Gertie recognized the importance of a well-funded entity that could support research into obstetric anesthesia. Thereafter she became an important donor to this endeavor and urged others to do likewise. The size of the corpus is in no small part due to her generosity. OAPEF became her favorite charity, and rather than memorials or other honors after her death, she wanted donations to be made in her name to the foundation.

Gertie Marx deservedly received many honors during her lifetime. She had a long, productive, inspiring career. She influenced thousands of physicians and others who provide care for pregnant women and their babies in many parts of the world. She was known far and wide as "the mother of obstetric anesthesia." Despite all the accolades and attention, in her own mind she was just an anesthesiologist doing what she could to improve maternal safety and access to quality labor analgesia, and teaching others to do the same.

You have our gratitude Gertie. Vale.

Gerard M. Bassell
Accreditation & Designation
The Society for Obstetric Anesthesia and Perinatology is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Workshop on High Risk OB Care
The Society for Obstetric Anesthesia and Perinatology designates this educational activity for a maximum of 4 credits in category 1 credits toward the AMA Physician’s Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

36th Annual Meeting
The Society of Obstetric Anesthesia and Perinatology designates this educational activity for a maximum of 21 credits in category 1 of the AMA Physician’s Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

Mission of SOAP
The purpose of this Society is to provide a forum for discussion of medical problems unique to the peripartum period and to promote excellence in medical care, research and education in anesthesia, obstetrics, and neonatology.

Mission of SOAP Program Committee
The mission of the Society’s Program Committee is to provide anesthesiologists, obstetricians, and other physicians and members of related allied health specialties with the knowledge that will reinforce past learning as well as disseminate new concepts, practices, and skills involving anesthesia and analgesia for the pregnant woman.

Goals of the SOAP 2004 Program
1. To provide ongoing CME activities designed to teach our audience how to best provide analgesia for labor and anesthesia for cesarean delivery and other procedures during pregnancy and postpartum period;
2. To provide an Annual Scientific Meeting to the members as a forum for discussion that includes the opportunity for expression of new clinical insights, presentation of research in progress with discussion of ways to enhance that research, clinical applications of research and courses that will enhance the practice of obstetrical anesthesia;
3. To provide a forum for discussions dealing with specific issues that will enhance the effectiveness and cost efficiency of obstetrical anesthesia and analgesia;
4. To provide information and a forum for discussion on subjects which have been requested by members of the previous annual meeting and via needs assessment requests.

Educational Format
CME activities may include the following formats: Plenary sessions, debates, lectures, poster discussions, oral abstracts, problem-based learning, and skill-set workshops.

Participants in the SOAP 2004 Program
Attendance shall be open to all health practitioners, provided that they have registered for the meeting. CME credit will only be offered to MDs, DOs or equivalent. A Verification of Participation form must be turned in to SOAP at the conclusion of the meeting. The form is available within this syllabus and also online.
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MAY 12–16, 2004
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8. Did not receive disclosure information prior to printing. Disclosure will occur prior to presentation.

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<td>Samuel C. Hughes, MD</td>
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<td>Rakesh V. Vadera, MD, FRCA,</td>
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<td>Steve Holets, RT</td>
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<td>Mark T. Keeghan, MD</td>
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<tr>
<td>Klaus Kjaer, MD</td>
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</tbody>
</table>
Faculty

Pamela J. Angle, MD  
Sunny Brook and Women’s  
College Hospital  
Toronto, Ontario, Canada

Valerie A. Arkoosh, MD  
Drexel University  
College of Medicine  
Philadelphia, PA

G. M. Bassell, MD  
Wesley Medical Center  
Wichita, KS

Yaakov Beilin, MD  
Mount Sinai School of Medicine  
New York, NY

David J. Birnbach, MD  
University of Miami  
School of Medicine  
Miami, FL

Brenda A. Bucklin, MD  
University of Colorado  
Health Science Center  
Denver, CO

Jodie L. Buxbaum, MD  
Drexel University  
College of Medicine  
Philadelphia, PA

William R. Camann, MD  
Brigham & Women’s Hospital  
Department of Anesthesia  
Boston, MA

David C. Campbell, MD, MSc, FRCPC  
Royal University Hospital  
Saskatoon, Saskatchewan, Canada

Brendan Carvalho, MB  
BCh, FRCA  
Stanford Medical Center  
Stanford, CA

Sheila E. Cohen, MB, ChB  
Stanford University Hospital  
Stanford, CA

Malachy O. Columb, FRCA  
University Hospital  
Manchester, United Kingdom

Chantal Crochetiere, MD  
Ste. Justine Hospital  
Montreal, Quebec, Canada

Robert D’Angelo, MD  
Forsyth Medical Center  
Winston-Salem, NC

M. Joanne Douglas, MD, FRCP  
British Columbia Women’s Hospital  
Vancouver, British Columbia, Canada

Sunil Eappen, MD  
Brigham & Women’s Hospital  
Boston, MA

James C. Eisenach, MD  
Wake Forest University  
School of Medicine  
Winston-Salem, NC

Roshan Fernando, FRCA  
Consultant Anesthesiologist  
Royal Free Hospital  
London, United Kingdom

Caroline Grange, MB  
Oxford  
United Kingdom

Stephen H. Halpern, MD  
Sunny Brook and Women’s  
Health Science Center  
Toronto, Ontario, Canada

Gary Hankins, MD  
University of Texas Medical Branch  
Galveston, TX

Andrew P. Harris, MD, MHS  
Johns Hopkins University  
Baltimore, MD

Joy L. Hawkins, MD  
University of Colorado Hospital  
Denver, CO

David L. Hepner, MD  
Brigham & Women’s Hospital  
Boston, MA

Philip Hess, MD  
Beth Israel Deaconess  
Medical Center  
Boston, MA

Annual Meeting  
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M. Joanne Douglas, MD, FRCP  
(Chair)  
British Columbia Women’s Hospital  
Vancouver, British Columbia, Canada

Lee S. Perrin, MD (Vice Chair)  
St. Elizabeth’s Medical Center  
Boston, MA

William R. Camann, MD  
Brigham & Women’s Hospital  
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Robert D’Angelo, MD  
Forsyth Medical Center  
Winston-Salem, NC

Samuel C. Hughes, MD  
San Francisco General Hospital  
San Francisco, CA

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University of Arizona  
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McCallum R. Hoyt, MD, MBA
Central Maine Medical Center
Greene, ME

Samuel C. Hughes, MD
San Francisco General Hospital
San Francisco, CA

Steve Hole, RT
Department of Respiratory Therapy
Mayo Clinic
Rochester, MN

Klaus Kjaer, MD
Weill Medical College of
Cornell University
New York, NY

Ruth Landau Cahana, MD
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Barbara L. Leighton, MD
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Robert S. McKay, MD
Wesley Medical Center
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Holly A. Muir, MD, FRCPC
Duke University Medical Center
Durham, NC

Ken Murry, RT
Department of Respiratory Therapy
Mayo Clinic
Rochester, MN

Kenneth E. Nelson, MD
Wake Forest University School of Medicine
Winston-Salem, NC

Geraldine O’Sullivan, MD, FRCA
St. Thomas Hospital
London, United Kingdom

Craig M. Palmer, MD
University of Arizona
Health Sciences Center
Tucson, AZ

Peter H. Pan, MD
Wake Forest University School of Medicine
Winston-Salem, NC

Donald H. Penning, MD, MSc, FRCPC
Johns Hopkins University
Baltimore, MD

Lee S. Perrin, MD
St. Elizabeth’s Medical Center
Boston, MA

Elizabeth A. Peter, MD
British Columbia Women’s Hospital
Vancouver, British Columbia, Canada

Felicity Platt, MD
Hammersmith Hospital
London, United Kingdom

Linda S. Polley, MD
University of Michigan
Medical System
Ann Arbor, MI

Alex F. Pue, MD
Sharp Mary Birch Hospital/Women’s
San Diego, CA

Ruben Quintero, MD
St. Joseph’s Hospital
Tampa, FL

Jaya Ramanathan, MD
University of Tennessee
College of Medicine
Memphis, TN

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St. Thomas’ Hospital
London, United Kingdom

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Cedars-Sinai Medical Center
Los Angeles, CA

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Montefiore Medical Center
Albert Einstein School of Medicine
Briarcliff Manor, NY

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Stony Brook, NY

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Elmhurst Hospital
Elmhurst, NY

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Brigham & Women’s Hospital
Boston, MA

Richard M. Smiley, MD, PhD
Columbia University
New York, NY

Lawrence C. Tsen, MD
Brigham & Women’s Hospital
Boston, MA

Rakesh B. Vadera, MD, FRCA, FFARCC
University of Texas Medical Branch
Galveston, TX

Richard N. Wissler, MD, PhD
University of Rochester Medical Center
Rochester, NY

Kathryn J. Zuspan, MD
University of Minnesota
Minneapolis, MN

Wednesday Workshop Faculty

Maya S. Suresh, MD
Baylor College of Medicine

From the Mayo Clinic
Rochester, MN or Jacksonville, FL:

Barry A. Harrison, MBBS

Mark T. Keegan, MD

Edwin H. Rho, MD

Gerard S. Kamath, MD

Robert Albright, DO

Gurinder M.S. Vasdev, MD
Verification of Participation

SOAP 36th Annual Meeting – May 12-16, 2004
Sanibel Harbour Resort and Spa, Ft. Myers, Florida

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I certify that I am claiming the number of hours I actually spent in the educational activity.

Signature of Attendee __________________________ Date: __________________________

From the Physician’s Recognition Award Information Booklet for CME Providers: Certificates for AMA Physician’s Recognition Award category 1 credit should only be given to physicians. Certificates should be provided after physicians complete the educational activity so they can document participation. Certificates should only be given for the actual credit claimed and earned by the physician.
# Scientific Program

## WEDNESDAY, MAY 12, 2004

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00 - 10:00 am</td>
<td>Executive Committee</td>
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<tr>
<td>10:00 am - 3:00 pm</td>
<td>Board of Directors Meeting</td>
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<tr>
<td>12:00 n - 6:00 pm</td>
<td>Registration</td>
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<td>12:00 n - 5:00 pm</td>
<td>Poster Mounting</td>
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<tr>
<td>2:00 - 6:00 pm</td>
<td><strong>Workshop on High Risk OB Care</strong> (By Ticket Only - Limited Registration)</td>
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<td><em>Barry A. Harrison, MBBS; Gurinder M.S. Vasdev, MD</em></td>
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<tr>
<td>6:00 - 8:00 pm</td>
<td>SOAP Opening Reception</td>
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## THURSDAY, MAY 13, 2004

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<tr>
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<tr>
<td>6:30 am</td>
<td>Registration</td>
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<tr>
<td>7:00 - 7:45 am</td>
<td>Breakfast with Exhibitors; Posters</td>
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<tr>
<td>7:45 - 8:00 am</td>
<td>Opening Remarks and Welcome - <em>M. Joanne Douglas, MD, FRCP; Richard N. Wissler, MD, PhD</em></td>
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<tr>
<td>8:00 - 9:30 am</td>
<td><strong>Gertie Marx Symposium</strong> (6) - Moderator: <em>Geraldine O’Sullivan, MD, FRCA</em></td>
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<td>Judges: <em>Yaakov Beilin, MD; Stephen H. Halpern, MD; McCallum R. Hoyt, MD, MBA; Joy L. Hawkins, MD; G.M. Bassell, MD</em></td>
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<tr>
<td>9:30 - 9:45 am</td>
<td><strong>Distinguished Service Award</strong> - Awarded to <em>Sheila E. Cohen, MB, ChB</em></td>
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<td>Presenter: <em>Richard N. Wissler, MD, PhD</em></td>
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<tr>
<td>9:45 - 10:15 am</td>
<td>Coffee with Exhibitors; Posters</td>
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<tr>
<td>10:15 - 11:30 am</td>
<td><strong>Oral Presentations #1</strong> (5) - Moderator: <em>Kenneth E. Nelson, MD</em></td>
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<tr>
<td>11:30 am - 12:30 pm</td>
<td><strong>Pro/Con Debate: MLAC Studies: More Ups than Downs?</strong></td>
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<td>Moderator: <em>Ruth Landau Cahana, MD</em></td>
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<td><strong>Pro:</strong> <em>Malachy O. Columb, FRCA</em></td>
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<td><strong>Con:</strong> <em>Robert D’Angelo, MD</em></td>
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<tr>
<td>12:30 - 1:30 pm</td>
<td>Lunch with Exhibitors</td>
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<tr>
<td>1:30 - 2:30 pm</td>
<td><strong>What’s New in Obstetrics? Neonatal Encephalopathy and Fetal Monitoring</strong></td>
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<td></td>
<td>Introduction: <em>Rakesh B. Vadhera, MD, FRCA, FFARC</em></td>
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<td><em>Gary Hankins, MD</em></td>
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<td>2:30 - 3:30 pm</td>
<td><strong>Zuspan Award Symposium</strong> (4) - Moderator: <em>Barbara L. Leighton, MD</em></td>
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<td>Judges: <em>Elizabeth A. Peter, MD; Holly A. Muir, MD, FRCPC; Steven S. Schwalbe, MD; Divina J. Santos, MD</em></td>
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<tr>
<td>3:30 - 4:00 pm</td>
<td>Coffee with Exhibitors; Posters</td>
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<tr>
<td>4:00 - 6:00 pm</td>
<td><strong>SOAP Business Meeting - Awards Presentation</strong> - <em>Richard N. Wissler, MD, PhD</em></td>
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### Scientific Program

**FRIDAY, MAY 14, 2004**

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<th>Time</th>
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<tr>
<td>6:00 - 7:00 am</td>
<td>Fun Run/Walk</td>
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<tr>
<td>6:30 am</td>
<td>Registration</td>
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<tr>
<td>7:00 - 8:00 am</td>
<td>Breakfast with Exhibitors</td>
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<td>8:00 - 9:00 am</td>
<td><strong>Oral Presentations #2 (4)</strong> - Moderator: Felicity Plaat, MD</td>
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<tr>
<td>9:00 - 10:00 am</td>
<td><strong>What’s New in Neonatology? Laser Umbilical Cord Surgery for Twin-Twin Transfusion</strong></td>
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<td>Introduction: Sunil Eappen, MD</td>
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<td>Ruben Quintero, MD</td>
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<td>10:00 - 10:30 am</td>
<td>Coffee with Exhibitors</td>
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<tr>
<td>10:30 - 11:30 am</td>
<td><strong>Poster Review #1</strong> - Brenda A. Bucklin, MD</td>
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<tr>
<td>11:30 - 12:30 pm</td>
<td><strong>IV and Spinal Drugs for Labor Pain: Fact and Fiction?</strong></td>
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<td></td>
<td>Moderator: Felicity Reynolds, MD, FRCA, FRCOG</td>
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<td></td>
<td>James C. Eisenach, MD, Sheila E. Cohen, MB, ChB</td>
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<tr>
<td>12:30 - 12:45 pm</td>
<td>Questions and Discussion</td>
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<tr>
<td>Afternoon</td>
<td>SOAP Golf and Tennis; Water Sports, etc. (Golf Tournament begins at 1:00 pm)</td>
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**SATURDAY, MAY 15, 2004**

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<tbody>
<tr>
<td>6:30 am</td>
<td>Registration</td>
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<tr>
<td>7:00 - 8:00 am</td>
<td>Breakfast with the Experts - Moderator: B. Scott Segal, MD</td>
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<td></td>
<td>Jodie L. Buxbaum, MD, Brendan Carvalho, MB, BC, FRCA, Chantal Crochetiere, MD; Roshan Fernando, FRCA; David L. Hepner, MD; Caroline Grange, MB; Klaus Kjaer, MD; Craig M. Palmer, MD; Linda S. Polley, MD; Alex F. Pue, MD; Michael Sanchez, MD; Rakesh B. Vadhera, MD, FRCA, FFARC</td>
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<tr>
<td>9:15 - 9:45 am</td>
<td>Coffee Break</td>
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<tr>
<td>9:45 - 10:45 am</td>
<td><strong>Poster Review #2</strong> - Pamela J. Angle, MD</td>
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<tr>
<td>10:45 - 11:45 am</td>
<td><strong>Fred Hehre Lecture</strong> - Samuel C. Hughes, MD</td>
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<td>11:45 - 1:00 pm</td>
<td>Lunch on Your Own</td>
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<tr>
<td>1:00 - 2:25 pm</td>
<td><strong>Panel Discussion: “Practical SOAP Labor Analgesia” Alternatives to Conventional Epidural and CSE Analgesia in Labor</strong> - Moderator: David J. Birnbach, MD Valerie A. Arkoosh, MD; Tracie A. Saunders, MD; Kathryn J. Zuspan, MD; William R. Camann, MD</td>
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<tr>
<td>2:25 - 2:35 pm</td>
<td>Coffee Break in the Room</td>
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<tr>
<td>2:35 - 4:00 pm</td>
<td><strong>Best Paper Presentations</strong> (6) - Moderator: Lee S. Perrin, MD</td>
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<td>Judges: Andrew P. Harris, MD, MHS; David C. Campbell, MD, MSc, FRCPC; Jaya Ramanathan, MD; Robert S. McKay, MD</td>
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<tr>
<td>4:00 - 5:00 pm</td>
<td><strong>Research Hour</strong> - Richard M. Smiley, MD, PhD; Philip Hess, MD</td>
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<tr>
<td>6:00 -11:00 pm</td>
<td><strong>SOAP Banquet</strong></td>
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Scientific Program

SUNDAY, MAY 16, 2004

6:30 am  Registration

7:00 - 7:30 am  Breakfast

7:30 - 8:30 am  Pro/Con: Ephedrine, Rather Than Phenylephrine, is the Vasopressor of Choice to Prevent and Manage Spinal-Induced Hypotension
   Moderator: Donald H. Penning, MD, MSc, FRCPC
   Pro: Alison J. MacArthur, MD  Con: Edward T. Riley, MD

8:30 - 9:30 am  Poster Case Reports: You did what? The Best Case Reports of the Year! - Peter H. Pan, MD

9:30 - 10:00 am  Questions and Discussion

10:00 am  ADJOURNMENT

SOAP wishes to thank the following Exhibitors for their support of the 2004 Annual Meeting:

Exhibitors:

B. Braun Medical Inc.
Baxter Healthcare Corp.
BD Consumer Healthcare
Elsevier
GlaxoSmithKline
IMD
Smiths Medical
Tri-Med Physician Supplies, Inc.
NOTES
Scientific Program

WEDNESDAY, MAY 12, 2004

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12:00 n - 6:00 pm Registration

12:00 n - 5:00 pm Poster Mounting

2:00 - 6:00 pm Workshop on High Risk OB Care (By Ticket Only - Limited Registration)
  Barry A. Harrison, MBBS; Gurinder M.S. Vasdev, MD

6:00 - 8:00 pm SOAP Opening Reception

THURSDAY, MAY 13, 2004

6:30 am Registration

7:00 - 7:45 am Breakfast with Exhibitors; Posters

7:45 - 8:00 am Opening Remarks and Welcome - M. Joanne Douglas, MD, FRCP;
  Richard N. Wissler, MD, PhD

8:00 - 9:30 am Gertie Marx Symposium (6) - Moderator: Geraldine O’Sullivan, MD, FRCA
  Judges: Yaakov Beilin, MD; Stephen H. Halpern, MD; McCallum R. Hoyt, MD, MBA;
  Joy L. Hawkins, MD; G.M. Bassell, MD

9:30 - 9:45 am Distinguished Service Award - Awarded to Sheila E. Cohen, MB, ChB;
  Presenter: Richard N. Wissler, MD, PhD

9:45 - 10:15 am Coffee with Exhibitors; Posters

10:15 - 11:30 am Oral Presentations #1 (5) - Moderator: Kenneth E. Nelson, MD

11:30 am - 12:30 pm Pro/Con Debate: MLAC Studies: More Ups than Downs?
  Moderator: Ruth Landau Cahana, MD
  Pro: Malachy O. Columb, FRCA  Con: Robert D’Angelo, MD

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1:30 - 2:30 pm What’s New in Obstetrics? Neonatal Encephalopathy and Fetal Monitoring
  Introduction: Rakesh B. Vadhera, MD, FRCA, FFARC
  Gary Hankins, MD

2:30 - 3:30 pm Zuspan Award Symposium (4) - Moderator: Barbara L. Leighton, MD
  Judges: Elizabeth A. Peter, MD; Holly A. Muir, MD, FRCPC; Steven S. Schwalbe, MD;
  Divina J. Santos, MD

3:30 - 4:00 pm Coffee with Exhibitors; Posters

4:00 - 6:00 pm SOAP Business Meeting - Awards Presentation - Richard N. Wissler, MD, PhD
Workshop on High Risk OB Care

Wednesday, May 12
2:00 - 6:00 pm

Workshop syllabus available for participants.

Upon completion of the workshop, all participants will have played an active role in the evaluation of clinical problems and developed insights into the skills necessary in the diagnosis and resuscitation of high-risk obstetrics. Specifically the participant will be able to:

• Diagnose acute respiratory failure in pregnancy and apply the latest techniques of mechanical ventilation in severe asthma and acute respiratory distress syndrome;

• Evaluate diagnostic methods of pulmonary embolism in pregnancy and the latest advances in its treatment;

• Critically evaluate the role of echocardiography and the pulmonary artery catheter in the diagnosis and management of the parturient in heart failure;

• Assess the impact of cardiac arrest in pregnancy and how to apply BCLS and ACLS algorithms in pregnancy;

• Identify the parturient at risk from maternal hemorrhage and apply the physics of arterial and intravenous catheters and rapid infuser devices to the clinical problem of massive hemorrhage;

• Utilize bedside coagulation testing to determine the optimum use of blood products in maternal hemorrhage;

• Recognize the causes of acute renal failure and the problems of chronic renal failure in pregnancy. Determine the appropriate use of continuous dialysis therapies in renal failure in pregnancy;

• Recommend appropriate therapies for hypertensive disorders of pregnancy;

• Apply clinical judgement and skills to difficult airway scenarios to the parturient that you "cannot intubate".
NOTES
Gertie Marx Symposium

Moderator: Geraldine O’Sullivan, MD, FRCA
Judges: Yaakov Beilin, MD; Stephen H. Halpern, MD;
McCallum R. Hoyt, MD, MBBA; Joy L. Hawkins, MD; G.M. Bassell, MD

Thursday, May 13
8:00 - 9:30 am

SOAP A1   THROMBOCYTOPENIA, THROMBOELASTOGRAPHY AND PREGNANCY, AN IN VITRO MODEL
S. K. Chau, M. Columb, G. Lyons;
St. James University Hospital, Leeds, United Kingdom

SOAP A2   NEONATAL EFFECTS OF MATERNAL ANALGESIA AND SEDATION WITH FENTANYL AND MIDAZOLAM
M. A. Froelich, T. Euliano, D. Caton;
University of Florida, Gainesville, FL
Grant Research Disclosure: University of Florida, General Research Center

SOAP A3   PAIN TOLERANCE IN PREGNANCY
A. J. Fuller, E. Lin, A. Mathusamy, B. Carvalho, M. Angst, B. Golianu, E. T. Riley;
Stanford University, Stanford, CA

SOAP A4   A COMPARISON OF SCOPOLAMINE PATCH AND ONDANSETRON IN THE TREATMENT OF INTRATHecal MORPHINE INDUCED NAUSEA AND VOMITING
N. O'Rourke, M. Walsh, J. Carabuena, E. Cappiello, S. Segal, M. Harnett;
Brigham and Women's Hospital, Boston, MA

SOAP A5   COMPARISON OF SKIN DISINFECTANTS FOR EPIDURAL PLACEMENT IN LABORING PARTURIENTS
K. I. Stewart, S. A. Shaw, D. C. Campbell;
University of Saskatchewan, Saskatoon, SK, Canada

SOAP A6   THE PLATELET FUNCTION ANALYZER (PFA-100) DOES NOT PREDICT BLOOD LOSS DURING DELIVERY IN WOMEN WITH SEVERE PREECLAMPSIA
University of Texas Southwestern Medical Center, Dallas, TX

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
Distinguished Service Award Presentation

Presenter: Richard N. Wissler, MD, PhD

Thursday, May 13
9:30 - 9:45 am

Sheila E. Cohen, MB, ChB
2004 Distinguished Service Award
NOTES
Oral Presentations #1

Moderator: Kenneth E. Nelson, MD

Thursday, May 13
10:15 - 11:30 am

SOAP A7 FACTORS INFLUENCING USE OF NEURAXIAL LABOUR ANALGESIA
Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada,
Kunin-Lunenfeld Applied Research Unit, Baycrest Centre for Geriatric Care, Toronto, ON, Canada,
Centre for Health Economics and Policy Analysis, McMaster University, Toronto, ON, Canada

SOAP A8 CHRONOBIOLOGY OF INTRATHECAL FENTANYL FOR LABOR ANALGESIA
P. H. Pan, S. Lee, L. Harris;
Wake Forest University, Winston-Salem, NC

SOAP A9 INTRATHECAL HYDROMORPHONE AND BUPIVACAINE FOR STAGE I LABOR ANALGESIA
The University of Texas Health Science Center at San Antonio, San Antonio, TX

SOAP A10 THE EFFECT OF A RAPID CHANGE IN THE AVAILABILITY OF PATIENT CONTROLLED EPIDURAL ANALGESIA ON MANPOWER REQUIREMENTS
N. O'Rourke, M. Harnett, B. S. Segal, D. L. Hepner;
Brigham and Women's Hospital, Harvard Medical School, Boston, MA

SOAP A11 DETERMINATION OF THE EFFICACY OF PCEA ALONE COMPARED TO PCEA + CIEA USING AMBULATORY EPIDURAL LABOR ANALGESICS
D. C. Campbell, T. W. Breen, S. Halpern, H. Muir, R. Nunn;
University of Saskatchewan, Saskatoon, SK, Canada, Duke University, Durham, NC, University of Toronto, Toronto, ON, Canada, Dalhousie University, Halifax, NS, Canada

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
Pro/Con Debate: MLAC Studies: More Ups than Downs?

Moderator: Ruth Landau Cahana, MD
Pro: Malachy O. Columb, FRCA
Con: Robert D’Angelo, MD

Thursday, May 13
11:30 am - 12:30 pm

Following this Session, the learner will be able to:

1. Discuss the use of MLAC Studies in determining ideal drug doses for labor analgesia;

2. Discuss the limitations of these types of studies.
Malachy O. Columb, FRCA  
*University Hospital*  
Manchester, United Kingdom  

**Pro: 'The Ups'**

**What is MLAC?**

The minimum local analgesic concentration (MLAC)$^{1-6}$ model was designed to evaluate the concentration-response relationships of local anaesthetic drugs for epidural analgesia in the first stage of labour. This allows the determination of the median effective concentration (EC50) or dose (ED50) of a local anaesthetic in a clinical scenario. The concept is similar to what have been developed previously for inhalation and intravenous anaesthetic agents namely; minimum alveolar concentration (MAC) and minimum infusion rate (MIR) respectively. The concept has been extended to study intrathecal$^{8-13}$ pharmacodynamics.

**Why do it?**

It is now clear that most previous research has been above the 95th centile for efficacy for concentrations (EC95) and doses (ED95), at the top of the concentration or dose-response curve$^{14}$ where subtle differences will be missed or apparently similar efficacies misinterpreted. The technique of up-down sequential allocation is used to determine MLAC. Using this technique, testing is eventually concentrated around the EC50 or the MLAC where differences in potency and performance characteristics are better defined. The local anaesthetic sparing abilities and interactions of drugs or analgesics$^{15-23}$ can readily be quantified using this design.

**How do you do it?**

This study design estimates the MLAC, EC50 or ED50 using a relatively small number of subjects. This kind of study design uses the technique of up-down sequential allocation where the concentrations or doses for subsequent patients are varied according to the response of the previous patient. Dosing intervals are fixed and usually set at between 0.5 to 2 standard deviations. This design is more efficient at estimating the ED50 than traditional dose-response designs, because it focuses the testing of doses in the immediate vicinity of the ED50. A sequence from first MLAC study$^1$ is shown in the Figure and demonstrates the simple principle involved.
Figure. The minimum local analgesic concentration of epidural bupivacaine is plotted with 95% confidence interval.

Is it relevant to dose-response curves?

It has been suggested,\textsuperscript{24} that because dosing is centred at ED50, that there is little information regarding the slope of the dose-response relationship. In fact testing at one standard deviation above and below the ED50 corresponds to the ED16 and ED84 point estimates, which essentially are the limits of the most linear part of the cumulative dose-response plot. So in effect up-down designs actually concentrate testing where the slope is most defined. Errors in testing at extreme values receive more weight in usual regression analyses, which then are more likely to lead to incorrect estimates of slope.

It has also been suggested\textsuperscript{24} that knowledge of the ED50 gives little information on the likely relationships at ED95 and that dose-response curves may approximate or even crossover. Whilst anything is possible, a pharmacological principle is that; \textit{drugs which act via the same receptor or mechanism have parallel dose-response curves}. Therefore, drugs with different slopes act via different mechanisms, are usually chemically distinct and from different classes!

\textbf{What can we conclude about drugs that have different ED50s?}

Since pharmacological potency is defined as; \textit{the measure of the dilution in which the drug is effective, characterized by EC50 (molar)}, then we can state that the drugs have differing potencies. They therefore do not occupy the same dose-response distribution and by definition are not bioequivalent.

\textit{MLAC means median!}

It has been argued\textsuperscript{24} that only ED95 should really only of interest. Whilst this at first seems logical, it is a criticism that must apply then to more than 95% of all published research, not just dose-response designs! MLAC, EC50 and ED50 are simply only pharmacological descriptors for the \textit{measure of central tendency} of a distribution. Mathematically these are essentially the same as the means or medians of virtually every other study design. So for example in local anaesthetic toxicity studies,\textsuperscript{25-27} these simply compare the mean or median tolerated doses and thus are essentially ED50 estimates, although not overtly described as such! So using the above logic we should really only be interested in the ED05, or even ED01, to avoid toxicity! Means, medians, EC50s and ED50s are compared routinely simply because as measures of central tendency, they can be defined with the best precision and so have the greatest power in determining significance or concluding bioequivalence.

\textit{Differences in MLAC.}

As labour pain is a subjective and dynamic process it is clearly difficult to standardize. Hence differences in MLAC estimates and relative potencies are not surprising and I have previously presented heterogeneity issues\textsuperscript{28-30} to the Society. Similar issues apply to most areas of research when trying to quantify and control for variability, not excluding human toxicity studies. In trying to investigate relative potencies it appears intuitive that motor block should be more robust than analgesic efficacy in the parturient as it will be less affected by the
processes and progression of labor. Although MLAC studies have been criticized for making snapshot assessments, this feature has clearly been pivotal to our understanding of pharmacodynamics. Also the model has been extended\textsuperscript{35} to study longer-term effects using the MLAC\textsubscript{infusion} methodology.

**Clinical and obstetric relevance**

The clinical relevance of MLAC estimates is therefore similar to MAC and MIR. As the MLAC represents a high degree on analgesia at 10/100mm on the visual analogue pain scale (VAPS) it follows up to 80% of subjects have satisfactory analgesia at VAPS <40, with 85% achieving a reduction of at least 20 in VAPS. It is then logical that only those 1:5 subjects who appear resistant to such doses or concentrations should then be exposed to higher doses thus reducing the overall risk of systemic toxicity. It has also been shown recently\textsuperscript{31} that analgesic requirements measured using MLAC are greater in parturients who go on to develop dysfunctional labor requiring obstetric intervention.

**Conclusion**

The MLAC up-down sequential allocation model represents the first systematic application of dose-response pharmacodynamics to regional anaesthesia. It is a simple model that is being continually used in a variety of diverse clinical settings. It has been used in dose finding with the estimation of local anaesthetic potencies, the quantification of interactions among analgesics, the elucidation of theoretical and mechanistic issues and the influences of obstetric factors on analgesic requirements. A summary of the contributions to date from the numerous MLAC type studies is detailed below:

*Have we learned anything? The ups!*

- Estimation of epidural analgesic EC50 and EC95 for bupivacaine in labour\textsuperscript{1}
- Differentiation of analgesic from anaesthetic potency ratios\textsuperscript{1}
- Estimation of the epidural EC50s for chloroprocaine, ropivacaine and levobupivacaine\textsuperscript{2-7}
- First recognition of the expressed formulation\textsuperscript{5} issue with levobupivacaine
- Estimation of the epidural local anaesthetic sparing effects of drugs such as fentanyl, sufentanil, clonidine and epinephrine on bupivacaine, chloroprocaine, levobupivacaine and ropivacaine\textsuperscript{15-23}
- Estimation by the intrathecal minimum local analgesic dose (MLAD)\textsuperscript{8} of the bupivacaine sparing effects of fentanyl
- Determination of factors influencing bupivacaine requirements, including a three-fold increase in bupivacaine requirement during the first stage of labour\textsuperscript{29, 31-33}
- Epidural concentration rather than dose-dependent pharmacodynamics\textsuperscript{2}
- Intrathecal concentration rather than dose-dependent pharmacodynamics\textsuperscript{11}
- Insights into the roles of larger volumes and dilutions\textsuperscript{2, 11}
- Epidural is better than intravenous fentanyl\textsuperscript{18, 34-35} in reducing bupivacaine requirements
- Ropivacaine is 40% less potent than bupivacaine\textsuperscript{3, 4} for epidural analgesia
Estimation of therapeutic indexes\(^4\) and relative therapeutic ratios; the relative therapeutic ratio may favour bupivacaine compared to ropivacaine for central nervous toxicity

Levobupivacaine may be 13% less potent\(^5\) for epidural analgesia than the racemate

Levobupivacaine may be 19% more potent than ropivacaine\(^6,7\) for epidural analgesia

Epidural ropivacaine is 66% the potency of racemic bupivacaine\(^36\) for motor block

Epidural levobupivacaine is 86% the potency of racemate\(^37\) for motor block

Intrathecal ropivacaine is 83% the potency of levobupivacaine\(^9\) for motor block

Concept of low, intermediate and high potencies for pipecoloxyldines\(^38\)

Epidural sufentanil is 6 times the potency of fentanyl\(^39\)

Intrathecal sufentanil is 4 times more potent than fentanyl\(^12\)

Prostaglandin induced labour has greater analgesic requirements\(^33\)

Parity\(^20, 40-41\) does not independently affect local anaesthetic requirements

Dystocia increases MLAC\(^31\)

CSE does not reduce epidural bupivacaine requirements\(^42\) compared to epidural analgesia

Sensory-motor separation; depends on where and how it is quantified\(^37\)

References


17. Polley LS, Columb MO, Wagner DS, Naughton NN. Dose dependent reduction of the minimum local analgesic concentration (MLAC) of bupivacaine by sufentanil for epidural analgesia in labor. Anesthesiology 1998;90626-632.
31. Panni MK, Segal S. Local anesthetic requirements are greater in dystocia than in normal labor. Anesthesiology 2003;98:957-63.


What’s New in Obstetrics?
Neonatal Encephalopathy and Fetal Monitoring

Introduction: Rakesh B. Vadhera, MD, FRCA, FFARC

Speaker: Gary Hankins, MD

Thursday, May 13
1:30 - 2:30 pm

At the conclusion of this lecture, you will be able to:

1. Discuss the genesis of neonatal encephalopathy and cerebral palsy;

2. Know the criteria to define asphyxia during the intrapartum period that is sufficient to result in cerebral palsy.
NOTES
Zuspan Award Symposium
Awarded by Perinatal Resources Inc.

Moderator: Barbara L. Leighton, MD
Judges: Elizabeth A. Peter, MD; Holly A. Muir, MD, FRCPC; Steven S. Schwalbe, MD

Thursday, May 13
2:30 - 3:30 pm

SOAP A12  PRE-LABOR MATERNAL SERUM INTERLEUKIN-6: A POTENTIAL SCREENING TEST FOR FEVER AFTER EPIDURAL ANALGESIA
L. Goetzl, S. P. Raine, J. Rivers, D. J. Tewarid, M. Mastrangelo, M. S. Suresh;
Baylor College of Medicine, Houston, TX

SOAP A13  SIMULATOR TRAINING FOR OBSTETRICAL CRISIS MANAGEMENT: AN EFFECTIVE MEANS OF PROMOTING TEAMWORK
S. G. Parekh, L. Leffert, D. B. Raemer, R. Gardner, T. B. Walzer, M. Pian-Smith;
Massachusetts General Hospital, Boston, MA, Center for Medical Simulation and Dept. of Anesthesia and Critical Care, Massachusetts General Hospital, Boston, MA, Center for Medical Simulation and Dept. of Obstetrics and Gynecology, Brigham and Women's Hospital, Boston, MA

SOAP A14  IDENTIFICATION AND CHARACTERIZATION OF PROTEINOMIC BIOMARKERS FOR SEVERE PREECLAMPSIA IN CEREBROSPINAL FLUID
Yale New Haven Hospital, New Haven, CT, Brigham & Women's Hospital, Boston, MA

Oral Presentation within Zuspan Award Symposium

SOAP A15  OBSTETRIC ANESTHESIA EDUCATION-FROM LABOR ROOMS TO THE UNITED NATIONS AND WORLD HEALTH ORGANIZATION
B. Kodali, R. Luthra, W. Camann;
Brigham and Women's Hospital, Boston, MA, Springfield Hospital Campus Medical Building, Springfield, MA

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
<table>
<thead>
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<th>Time</th>
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<tr>
<td>6:00 - 7:00 am</td>
<td>Fun Run/Walk</td>
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<td>6:30 am</td>
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<td>7:00 - 8:00 am</td>
<td>Breakfast with Exhibitors</td>
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<td>8:00 - 9:00 am</td>
<td>Oral Presentations #2 (4) - Moderator: Felicity Plaat, MD</td>
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| 9:00 - 10:00 am | What’s New in Neonatology? Laser Umbilical Cord Surgery for Twin-Twin Transfusion  
  Introduction: Sunil Eappen, MD  
  Ruben Quintero, MD |
| 10:00 - 10:30 am | Coffee with Exhibitors                      |
| 10:30 - 11:30 am | Poster Review #1 - Brenda A. Bucklin, MD    |
| 11:30 - 12:30 pm | IV and Spinal Drugs for Labor Pain: Fact and Fiction?  
  Moderator: Felicity Reynolds, MD, FRCA, FRCOG  
  James C. Eisenach, MD; Sheila E. Cohen, MB, ChB |
| 12:30 - 12:45 pm | Questions and Discussion                    |
| Afternoon    | SOAP Golf and Tennis; Water Sports, etc. (Golf Tournament begins at 1:00 pm) |
Oral Presentations #2

Moderator: Felicity Plaat, MD

Friday, May 14
8:00 - 9:00 am

SOAP A16  EARLY LABOR NEURAXIAL ANALGESIA DOES NOT INCREASE THE INCIDENCE OF CESAREAN DELIVERY
Northwestern University, Chicago, IL

SOAP A17  IS ROUTINE USE OF CSE FOR CAESAREAN SECTIONS JUSTIFIED?
N. Walton, S. Nikolic, R. Sashidharan;
The Royal London Hospital, London, United Kingdom

SOAP A18  CRYSTALLOID PRE-LOADING VS. POST-LOADING FOR THE PREVENTION OF HYPOTENSION WITH SPINAL ANESTHESIA FOR CESAREAN DELIVERY
A. Beclere Hospital, Clamart, France, Foch Hospital, Suresnes, France

SOAP A19  THE EFFICACY OF A PROPHYLACTIC EPIDURAL BLOOD PATCH IN THE PARTURIENT AFTER DURAL PUNCTURE WITH A 17 GAUGE EPIDURAL NEEDLE
B. Scavone, R. J. McCarthy, S. Sherwani, E. Yaghmour, J. T. Sullivan, R. Marcus, C. A. Wong;
Northwestern University Feinberg School of Medicine, Chicago, IL

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
What’s New in Neonatology?
Laser Umbilical Cord Surgery for Twin-Twin Transfusion

Introduction: Sunil Eappen, MD

Speaker: Ruben Quintero, MD

Friday, May 14
9:00 - 10:00 am

Objectives for Twin-Twin Transfusion Syndrome Lecture:

1. Pathophysiology of Twin-Twin Transfusion Syndrome/Staging of TTTS;

2. Benefit/Risk ratio for therapy for Twin-Twin Transfusion Syndrome;

NOTES
What’s New in Neonatology?
Laser Umbilical Cord Surgery for Twin-Twin Transfusion

Ruben Quintero, MD
St. Joseph's Hospital
Tampa, FL

Twin-twin transfusion syndrome (TTTS) appears to result from a net unbalanced flow of blood between two fetuses in a monochorionic gestation. In the classic model, an artery from one twin supplies a placental cotyledon, which in turn, is drained by a vein to the co-twin. Thus, blood is shunted from one twin, the donor; and transfused to the co-twin, the recipient, through placental vascular anastomoses. Despite the high frequency of occurrence of vascular anastomoses in monochorionic placentation, TTTS occurs only in 5.5-17.5% of monochorionic gestations.

Selective Laser Photocoagulation of Communicating Vessels (SLPCV) is a procedure we have developed that can effectively treat TTTS. The procedure is based on three fundamental assumptions: 1. The syndrome is due to the presence of vascular communications between fetuses in a monochorionic gestation. 2. Obliteration of these vessels can halt the pathophysiologic process. 3. Deep and superficial communications alike can be severed at the level of the surface of the placenta. The surgical procedure is accomplished by endoscopically assessing the placental surface in its entirety, identifying the umbilical cord of the recipient twin and systematically following the vessels that emerge or lead into this cord. The technique allows precise identification of the communicating vessels while sparing normally perfused areas of the placenta. SLPCV effectively transforms a monochorionic gestation into a functional dichorionic placentation, thus avoiding post-mortem feto-fetal hemorrhage in cases of single fetal demise. This beneficial effect of SLPCV should contribute to minimize the incidence of cerebral palsy in fetuses with TTTS.
NOTES
Poster Review #1

Moderator: Brenda A. Bucklin, MD
Friday, May 14
10:30 - 11:30 am

SOAP A26
THE EFFECT OF INTRATHECAL COX INHIBITORS ON ACUTE PAIN FROM UTERINE CERVICAL DISTENSION
D. Du, J. C. Eisenach, C. Tong;
Pain Mechanism Lab, Wake Forest University School of Medicine, Winston-Salem, NC

SOAP A27
THE BEHAVIORAL RESPONSE TO UTERINE CERVICAL DISTENSION IN RATS
C. Tong, D. Conklin, D. Du, J. C. Eisenach;
Pain Mechanism Lab, Wake Forest University School of Medicine, Winston-Salem, NC

SOAP A28
A SURVEY OF SOAP MEMBERSHIP REGARDING INFORMED CONSENT DURING LABOR
P. J. Balestrieri, U. T. Barry, C. Grubb, C. Ascarì, R. Blank;
University of Virginia, Charlottesville, VA

SOAP A29
ETHNICITY AND PARITY CONTRIBUTE TO PAIN PERCEPTION DURING LABOR
C. Clifford, A. S. Habib, E. M. Lockhart, P. Harris, H. A. Muir;
Vanderbilt University Medical Center, Nashville, TN, Duke University Medical Center, Durham, NC

SOAP A30
A COMPARISON OF THE NURSES VERSUS THE PATIENTS’ ASSESSMENT OF PAIN SCORES DURING LABOR: THE INFLUENCE OF ETHNICITY
Duke University Medical Center, Durham, NC, Vanderbilt University Medical Centre, Nashville, TN

SOAP A31
DIFFERENTIAL PERCEPTIONS OF PAIN AND COMFORT DURING LABOR
P. J. Balestrieri, C. Ascarì, Z. Zuo, R. S. Blank, C. Grubb, U. T. Berry;
University of Virginia, Charlottesville, VA

SOAP A32
HEALTH PROVIDERS’ PERCEPTIONS OF PARTURIENT EXPERIENCES RELATED TO NEURAXIAL LABOUR ANALGESIA
Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada, Kunin-Lunenfeld Applied Research Unit, Baycrest Centre for Geriatric Care, Toronto, ON, Canada, Department of Research Design & Biostatistics, Sunnybrook & Women’s College Health Sciences Centre, University of Toronto, Toronto, ON, Canada, North York General Hospital, North York, ON, Canada, Toronto East General Hospital, Toronto, ON, Canada, Mount Sinai Hospital, Toronto, ON, Canada

SOAP A33
IDENTIFYING MAJOR COMPONENTS OF QUALITY NEURAXIAL ANALGESIA
Department of Anesthesia, Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada, Department of Obstetrics & Gynecology, Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada, Kunin-Lunenfeld Applied Research Unit, Baycrest Centre for Geriatric Care, Toronto, ON, Canada, Department of Clinical Epidemiology and Biostatistics and Member, Centre for Health Economics and Policy Analysis, McMaster University, Hamilton, ON, Canada

SOAP A34
EXPLORING LABOUR PAIN MEASUREMENT
Department of Anesthesia, Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada, Department of Obstetrics & Gynecology, Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada, Kunin-Lunenfeld Applied Research Unit, Baycrest Centre for Geriatric Care, Toronto, ON, Canada, Department of Clinical Epidemiology and Biostatistics and Member, Centre for Health Economics and Policy Analysis, McMaster University, Hamilton, ON, Canada

SOAP A35
FEASIBILITY STUDY EXAMINING THE USE OF 19G EPIDURAL NEEDLES AND 23G EPIDURAL CATHETERS FOR LABOR ANALGESIA
P. J. Angle, A. V. Morgan, N. Purdie;
Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
SOAP A36
IN VITRO VALIDATION OF 23G EPIDURAL CATHETER PERFORMANCE USING STANDARD INFUSION PUMP APPARATUS
N. L. Purdie, P. J. Angle;
Department of Anesthesia, Women's College Hospital, 76 Grenville Street, Toronto, ON, Canada

SOAP A37
PREVENTION OF PRURITUS FOLLOWING NEURAXIAL OPIOID ANALGESIA FOR CESAREAN SECTION: A SYSTEMATIC REVIEW
N. L. Purdie, P. J. Angle;
Women's College Hospital, Toronto, ON, Canada

SOAP A38
IS NITROUS OXIDE AN EFFECTIVE ANALGESIC FOR LABOR? A SYSTEMATIC REVIEW
J. E. KRONBERG, D. E. THOMPSON;
University of Toronto, Toronto, ON, Canada

SOAP A39
DETERMINATION OF THE EFFECTIVE DOSE OF REMIFENTANIL FOR PATIENT-CONTROLLED ANALGESIA IN LABOUR: A PILOT STUDY
University of British Columbia, Vancouver, BC, Canada

SOAP A40
COMPARING THE PAIN REPORTED BY TWO LOCAL ANESTHETIC INFLTRATION TECHNIQUES WITH EPIDURAL PLACEMENT IN PARTURIENTS: WHEAL VS. DART
D. J. Bell, H. A. Muir, M. D. Payne, J. D. Reynolds, J. R. Schultz;
Duke University Health System, Durham, NC, North Carolina Department of Health and Human Services, Raleigh, NC

SOAP A41
A COMPARISON OF ULTRASOUND IMAGING VS. CONVENTIONAL LANDMARKING TO IDENTIFY THE L3-4 INTERSPACE IN TERM PARTURIENTS
J. J. Popoff, S. Reid;
Department of Anesthesiology & Pain Medicine, University of Alberta, Edmonton, AB, Canada, Department of Anesthesiology & Pain Medicine, Grey Nuns Hospital, University of Alberta, Edmonton, AB, Canada

SOAP A42
EPIDURAL NEOSTIGMINE WITH CLONIDINE TO INITIATE LABOR ANALGESIA
F. A. Roelants, V. Mercier, E. Zinga Rico, S. Dusmenil, P. M. Lavand'homme;
Université catholique de Louvain, Brussels, Belgium

SOAP A43
DOES HIGH EPIDURAL INFUSION RATE INCREASE THE INCIDENCE OF C-SECTION
K. Chaudhuri, J. Solis-Estrada, P. Heller, S. Chaudhuri;
Texas Tech University Health Sciences Center, El Paso, TX

SOAP A44
COMPARISON OF EPIDURAL AND COMBINED SPINAL-EPIDURAL ANALGESIA FOLLOWED BY PATIENT CONTROLLED EPIDURAL ANALGESIA DURING LABOR
O. A. SEZER, B. GUNAYDIN;
Gazi University, Ankara, Turkey

SOAP A45
INTRATEHICAL MORPHINE REDUCES BREAKTHROUGH PAIN DURING LABOR EPIDURAL ANALGESIA
A. Vasudevan, P. E. Hess, C. E. Snowman, S. D. Pratt;
Beth Israel Deaconess Medical Center, Brookline, MA

SOAP A46
A COMPARISON OF BUTORPHANOL AND MEPERIDINE FOR LABOR ANALGESIA
K. E. Nelson, J. C. Eisenach;
Wake Forest University, Winston-Salem, NC
Other Disclosure: Supported in part by NIH NS41386

SOAP A47
NALMEFENE FOR OPIOID-INDUCED PRURITUS IN LABOR
C. T. GRUBB, P. J. BALESTRIERI, S. G. PRAKALAPAKORN, H. B. MCANALLY;
University of Virginia, Charlottesville, VA

SOAP A48
PATIENT-CONTROLLED EPIDURAL ANALGESIA (PCEA) DURING LABOR: A COMPARISON OF BASAL RATES
C. T. GRUBB, P. J. BALESTRIERI, C. X. LIN, P. H. TING;
University of Virginia, Charlottesville, VA

SOAP A49
WITHDRAWN

SOAP A50
SUPRASTERNAL DOPPLER ESTIMATION OF CARDIAC OUTPUT FOLLOWING INTRAVENOUS FLUID PRELOADING FOR CESAREAN SECTION UNDER SPINAL ANESTHESIA
P. Tamiiselvan, R. Fernando, J. Bray, M. Sodhi, M. Columb;
Royal Free Hospital, London, United Kingdom, South Manchester University Hospital, Manchester, United Kingdom

SOAP A51
PRELOADING VS. POSTLOADING OF COLLOID FOR THE PREVENTION OF HYPOTENSION AFTER SPINAL ANESTHESIA FOR CESAREAN SECTION
C. Brummel, F. Mercier, A. Fuller, A. Mathusamy, S. Lipman, S. E. Cohen, E. T. Riley;
Stanford University School of Medicine, Stanford, CA, A. Becleire Hospital, Clamart, France

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
SOAP A52
EFFECT OF ENOS GENETIC POLYMORPHISM ON HYPOTENSION AND TREATMENT RESPONSE DURING SPINAL ANESTHESIA FOR CESAREAN SECTION

SOAP A53
FETAL AND MATERNAL EFFECTS OF BOLUS OF METARAMINOL OR EPHEDRINE DURING SPINAL ANESTHESIA FOR CESAREAN DELIVERY
M. M. Cardoso, A. R. Amaro, E. T. Yamaguchi, M. C. Rosa, M. A. Torres; Hospital e Maternidade Santa Joana/ Hospital das Clínicas-FMUSP, Sao Paulo, Brazil, Hospital e Maternidade Santa Joana, Sao Paulo, Brazil

SOAP A54
NITROUS OXIDE ANXIOLYSIS FOR CESAREAN SECTION
M. C. Vallejo, C. J. Shepherd, B. Kaul, H. Finegold, R. C. Romeo, G. L. Mandell, S. Ramanathan; University of Pittsburgh, Pittsburgh, PA

SOAP A55
ETHNICITY AND INCREASED INCIDENCE OF ELECTIVE CESAREAN
J. J. Gonzalez, J. R. Schultz, T. E. Spahn, H. A. Muir, W. D. White, J. D. Reynolds; Duke University Medical Center, Durham, NC

SOAP A56
DOES ETHNICITY INCREASE THE INCIDENCE OF GENERAL ANESTHESIA FOR CESAREAN SECTION?
J. J. Gonzalez, T. E. Spahn, H. A. Muir, W. D. White, J. D. Reynolds, J. R. Schultz; Duke University Medical Center, Durham, NC

SOAP A57
DOES PARTNER PRESENCE IN THE OPERATING ROOM DURING REGIONAL ANESTHESIA REDUCE PATIENT ANXIETY?
L. Wang, M. Prabhu, A. R. Tait; University of Michigan Health Systems, Ann Arbor, MI

SOAP A58
SHOULD ANESTHESIA CARE PROVIDERS BE PRESENT DURING DELIVERY?
K. E. Nelson, B. B. Clyne; Wake Forest University School of Medicine, Winston-Salem, NC

SOAP A59
PATIENT PREFERENCES REGARDING CESAREAN SECTION ANESTHESIA OUTCOMES
B. Carvalho, A. Macario, S. Lipman, A. D. Muthusamy, A. Fuller, C. Brummel, S. E. Cohen; Stanford University Medical Center, Stanford, CA

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
IV and Spinal Drugs for Labor Pain: Fact and Fiction?

Moderator: Felicity Reynolds, MD, FRCA, FRCOG
Sheila E. Cohen, MB, ChB; James C. Eisenach, MD

Friday, May 14
11:30 am - 12:30 pm

Following this Session, the learner will be able to:

1. Discuss the basic science surrounding the use of opioids for labor analgesia;

2. Discuss the practical aspects of this information for the obstetric anesthesiologist.
Spinal and IV Drugs for Labor Pain: Fact and Fiction

Sheila E. Cohen MB, ChB; James C. Eisenach, MD

Stanford University and Wake Forest University Schools of Medicine

Spinal Drugs for Labor Pain

Epidural local anesthetics (LA) with opioids provide good labor analgesia but may be inadequate for advanced or rapidly progressing labor. Even with dilute LA solutions, motor block can develop and intensify with prolonged infusions. The introduction of intrathecal (IT) administration of opioids two decades ago promised analgesia without sensory, sympathetic or motor block and appeared ideal for labor analgesia.

Which drugs should work best? Laboratory Science

Pain from the first stage of labor originates from afferent terminals in the lower uterine segment and cervix. These afferents intermingle with sympathetic efferents in the hypogastric chain and sympathetic chain and enter the spinal cord through the dorsal roots at the T10 to L1 dermatomes. Unlike somatic afferents, these visceral afferents terminate, not only in the superficial dorsal horn, but quite deep in the dorsal horn, surrounding the central canal, and even in the ventral horn. In rats, labor results in spinal cord neuronal activation, as measured by immunostaining for the immediate early gene, cfos, in the low thoracic and upper lumbar spinal cord, both superficially and deep.

Opioids are known to work after spinal injection primarily by inhibiting neurotransmitter release from afferent terminals in the spinal cord. The anatomic difference in the central terminals of somatic versus visceral afferents suggests that spinally administered opioids must be capable of diffusing deep into the dorsal horn to treat the first stage of labor, but only superficially to treat somatic pain, which is the predominant pain source after cesarean section.

Based on their differences in lipid solubility, one might predict that sufentanil and fentanyl would be more effective at rapidly penetrating the spinal parenchyma than morphine, and would therefore be more effective analgesics for the first stage of labor after spinal injection. Laboratory studies are somewhat contradictory in this regard. On the one hand, intrathecal fentanyl exhibits a more rapid onset of analgesia than morphine in rats, suggesting more rapid penetration in the cord. On the other hand, studies in pigs show, perhaps, paradoxically, that morphine penetrates more extensively into the dorsal horn than more lipid soluble agents.

Non-opioid adjuvants have been shown to enhance the effect of spinal opioids in animals. Local anesthetics interact synergistically with opioids to produce antinociception to visceral stimuli, as do α2-adrenoceptor agonists such as clonidine. Epinephrine reduces clearance of opioids by reducing local spinal cord blood flow.

Which drugs work best in clinical practice?

Morphine: Single-shot spinal morphine, 0.5-2 mg, was studied for labor analgesia in the 1980s, with disappointing results. Analgesia was slow in onset (15-60 min), required 1-2 h to reach peak effect and was often incomplete and required supplementation for delivery. Duration ranged from 6-8 h with doses <1mg to 10-14 h with 1-2 mg doses. Although hypotension and sensory block were absent, pruritus, nausea, vomiting, urinary retention and sedation were common, and respiratory depression was a risk with larger doses. Interest in this
technique waned until 1989, when Leighton et al. described "rapid onset of profound, prolonged analgesia" after injection of IT morphine 0.25mg with fentanyl 25µg. In fact, complete analgesia lasted only 2-4 h, with most patients subsequently requesting epidural blocks. Despite these drawbacks, some practitioners adopted this technique maintaining that in-house anesthesiologist supervision was unnecessary. Troublesome pruritus, nausea and vomiting necessitated treatment with multiple drugs, and patients often delivered in pain after the initial injection had worn off. Additional spinal or IV opioids were sometimes given to maintain analgesia, further increasing the risk of respiratory depression. Small doses of bupivacaine, clonidine or other spinal agonists modestly prolong IT morphine analgesia, but not to a degree sufficient for most labors. Combined spinal-epidural (CSE) techniques have largely rendered single-dose IT morphine obsolete for labor, although it may have a place in countries where no anesthesiologists are available to provide labor analgesia.

Lipid soluble opioids: In contrast to morphine, these provide far superior labor analgesia with fewer side effects. Fentanyl and sufentanil produce rapid onset (3-6 min) of intense first stage labor analgesia with a duration (that is somewhat dose-dependent) of 60-120 min, transient segmental sensory changes, and no motor block. Camann demonstrated excellent labor analgesia with sufentanil 10 µg, whereas the same dose IV or epidurally provided minimal pain relief. Honet et al. titrated meperidine, fentanyl and sufentanil via a microspinal catheter (subsequently withdrawn by the FDA) to provide analgesia throughout labor. Repeated doses lasted from 82-104 min with all agents, however LA supplementation often was necessary in advanced labor. This probably is due to the intense somatic pain experienced at this stage rather than to tachyphylaxis, as we similarly found that single-dose sufentanil, 10 µg, failed to provide analgesia in some patients who received the drug close to delivery. Although meperidine provides more intense analgesia, its local anesthetic action causes undesirable motor blockade. Clinical dose-ranging studies of IT sufentanil for labor have found a ED\textsubscript{50} of about 2-4 µg and an ED\textsubscript{95} of 9-15 µg, whereas comparable values for fentanyl were an ED\textsubscript{50} of 14-18 µg and an ED\textsubscript{95} of 20-30 µg. Sufentanil thus is approximately four times as potent as fentanyl (at the ED\textsubscript{50} level); it has a more rapid onset (by 2-3 min) and a slightly longer duration (25-50 min), although it may cause more pruritus.

Spinal Drug Combinations: Bupivacaine, 1-2.5 mg added to fentanyl or sufentanil improves the onset, quality and duration of analgesia, with no additional side effects and no or minimal impact on motor block. Epinephrine, clonidine and neostigmine also have been added to IT opioids (with or without bupivacaine), with variable and modest effects on analgesia, and often an increase in side effects. In general, combining additional spinal agonists with fentanyl or sufentanil speeds onset but adds only about 30-60 min to duration of analgesia, an insignificant time relative to the length of most labors. [Morphine added to IT fentanyl and bupivacaine does not reliably prolong analgesia, but may improve the efficacy of subsequent epidural analgesia.] The main benefit of combining agents is to decrease opioid doses (by 50% or more) and thus decrease annoying or dangerous opioid side effects (see below). Use of low-dose opioid-LA mixtures is now routine and appears to have markedly decreased the incidence of serious complications. Disadvantages to mixing multiple (>2) drug "cocktails" include the potential for infection, errors in measurement of small drug volumes, and increased costs. Unless delivery is imminent, when a single-shot spinal with a combination of drugs may suffice, a CSE technique is preferable to allow initiation with small or moderate doses of drugs and flexible management of subsequent analgesia or anesthesia.

References:

References: (cont’d)


Sia ATH, Chong JL, Chiu JW. Combination of intrathecal sufentanil 10µg plus bupivacaine 2.5 mg for labor analgesia: Is half the dose enough? Anesth Analg 1999;88:362-6.


Ummenhofer WC, Arends RH, Shen DD, and Bernards CM. Comparative spinal distribution and clearance kinetics of intrathecally administered morphine, fentanyl, alfentanil, and sufentanil. Anesthesiology 2000;92:739-753.


Respiratory Depression and Side Effects with IT Opioids

Laboratory Science
Lab studies have focused much more on analgesic rather than side effects of spinal opioids. However, the extent of distribution of spinal opioids, which determines many central side effects, has been considerably studied. As with laboratory study of drug penetration in spinal cord, study of dermatomoral spread of lipid soluble opioids has yielded conflicting results. On the one hand, lumbar epidural injection of sufentanil results in rapid appearance of sufentanil in cisternal CSF at concentrations greater than those in plasma, indicating rapid movement in CSF. On the other hand, intrathecal injection of sufentanil in pigs results in negligible concentrations in CSF beyond 4 or 5 dermatomes, suggesting this drug does not move extensively in CSF. Experimental studies in humans with repetitive CSF sampling support the former laboratory studies that lipid soluble drugs do move rapidly and extensively in CSF.

Clinical Experience
Rapid, extensive cephalad spread of agents within the CSF explains many side effects of IT labor analgesia including respiratory depression, sedation, high sensory level, pruritus, nausea and vomiting. This was expected with the hydrophilic morphine, but not with the lipophilic opioids. However, several case reports have described severe respiratory depression after IT fentanyl or sufentanil, with or without morphine. This occurred 10-25 min after injection, and within 5 min when IV opioids had previously been given. Even when overt respiratory depression is absent, subclinical dose-related effects on respiration have included: depression of the ventilatory response to CO₂; increased end-tidal CO₂; and occasional decreased SpO₂, particularly when IV opioids had been given. Other complications have included profound hypotension, high sensory level with facial numbness, dysphagia, dyspnea, aphasia and mental changes.

Lipophilic opioids clearly are not restricted to the spinal cord. In fact, a supraspinal effect may contribute to the excellent analgesia. [Although hyperbaric solutions may decrease pruritus, analgesia is adversely affected]. Several factors may facilitate excessive cephalad spread in clinical practice:

1) Most IT opioid/LA mixtures are hypobaric relative to CSF; this encourages cephalad spread when blocks are performed with the patient sitting.
2) The mechanical "volume" effect of fluid (drug or saline) injected epidurally in a CSE can increase the level of block within 10 min of spinal injection
3) Epidural drugs (e.g. a test-dose) can diffuse into the CSF via even a small dural hole and will increase sensory block and brain drug concentrations.
4) Most patients with reported problems have been short (<157 cm). Is the distance between injection site and the brainstem an important factor?

There are potential risks with all IT opioids mandating close surveillance in all cases. Complications with lipophilic opioids occur early, but should resolve with good clinical management and narcotic antagonists. In contrast, problems after IT morphine are often delayed, persistent, refractory to treatment, and occur at times when patients are in a low-acuity setting. Use of the lowest effective opioid doses has the greatest impact on safety.
References:


Ummenhofer WC, Arends RH, Shen DD, and Bernards CM. Comparative spinal distribution and clearance kinetics of intrathecally administered morphine, fentanyl, alfentanil, and sufentanil. Anesthesiology 2000;92:739-753.

Intravenous Drugs for Labor Pain

A1. Efficacy of IV opioids for labor analgesia - Clinical Science

Although morphine and meperidine are widely used for labor analgesia, they are remarkably ineffective at decreasing VAS pain scores. Disadvantages, particularly with meperidine, include maternal sedation and respiratory depression, as well as neonatal respiratory depression and prolonged neurobehavioral effects. Fentanyl is shorter-acting and may be preferable, but large doses have similar potential to cause neonatal depression. The unique properties of remifentanil (rapid onset, potency, ultra-short duration and rapid metabolism) should make it ideal for obstetric practice. Accumulating data have confirmed its analgesic efficacy in labor relative to other opioids and nitrous oxide. However, the ideal delivery system (IV-PCA, continuous infusions, or both) and timing of administration relative to contractions remain elusive. Significant placental transfer does occur (UV/MA ratio: 0.88), but the UA/UV ratio of 0.29 suggests either rapid fetal metabolism and/or a large fetal volume of distribution. Neonatal depression generally has been absent in clinical studies, although fetal heart rate changes and a case of neonatal chest wall rigidity have been reported. Provided expert resuscitation is available, fetal risk should be negligible. Maternal safety may be a greater concern, particularly in view of large individual variations in drug requirements. Decreased oxygen saturation has been reported in studies where parturients breathed room air. As with other opioids, sedation, dizziness, nausea, vomiting and pruritus can occur.

Remifentanil is more effective in labor than other opioids. But is it practical? What monitoring is necessary and who should do it? What are the equipment and labor costs of this technique? Can it be administered by non-physician personnel? Until these questions are answered, remifentanil will remain a drug used occasionally, "off-label," with close monitoring, when regional analgesia is contraindicated or refused.

A2. Laboratory Science

Although visceral pain has been studied extensively for the last 15 years, only in the last 2-4 years have there been studies of nociception from the lower uterine segment and cervix, the source of pain from the first stage of labor. Distension of the uterine cervix results in firing of afferents in the hypogastric nerve with receptive fields in the cervix, induction of c-fos expression in the lower thoracic and upper lumbar spinal cord dorsal horn, and reflex guarding of the abdominal musculature. In the behaving animal, uterine cervical distension results in behaviors consistent with pain, and these same behaviors are present during uterine contractions during labor in the rat. These data suggest that distension of the uterine cervix in the rat is painful.

To date, only studies in nonpregnant animals have been published. Systemic opioids are capable of producing antinociception to uterine cervical distension, but only in relatively large doses. Interestingly, circulating estrogen decreases such antinociception from µ-, but not κ-opioid receptor agonists.

References:


References: (cont’d)


What is the Future of Techniques for Effective Labor Analgesia?

Clinical Science
Relieving labor pain is challenging and complex. Physiological, pharmacological, psychological, social, cultural and economic factors all are important. Variations in analgesic requirement depend on the stage and rate of progress of labor, and individual variation and expectations among parturients. Discussions of regional analgesia have focused on relief of uterine pain (T10-L1) during the first stage, and birth canal pain (S1-5) during the second stage of labor. However, it is obvious that back-ache and pain from compression of the bladder, rectum and pelvic wall structures cause considerable discomfort in most women throughout much of labor. Patient satisfaction is similarly complex, and relates more to expectations than to perfect pain scores. Anxiety can affect perception of pain (and perhaps uterine contractility), yet this supra-spinal component of suffering during labor remains poorly understood. Success is most likely with a compassionate, multi-faceted approach, individualized to respond to each patient's needs.

Laboratory Science
Laboratory studies focus on a better understanding of the neurophysiology of uterine cervical afferents and the effect of pregnancy and labor on local changes in the uterine cervical milieu in order to identify appropriate and novel targets for pharmacologic treatment of the pain of the first stage of labor. Peripheral afferent terminals in the uterine cervix are sensitive to inhibition by κ-, but not µ-opioid receptor agonists, suggesting that peripherally restricted drugs acting on κ-opioid receptors might be effective to treat pain from the first stage of labor. Spontaneous labor is preceded by increases in cervical expression of cyclooxygenase, leading to increased local production of prostaglandins, recruitment of immune cells, and local inflammation. This results in turn in disorganization of collagen and softening of the cervical tissue to allow dilatation in response to uterine contractions.

The spinal cord pharmacology of inhibition of responses to uterine cervical distension has been relatively little studied. Intrathecal m-opioid receptor agonists produce antinociception which, unlike systemic administration, is not reduced by circulating estrogen. Intrathecal clonidine produces antinociception to uterine cervical distension, but only in doses producing hypotension, similar to clinical findings. Studies of inhibition of spinal cord cyclooxygenase suggests that COX2 is the appropriate enzyme to target.
References:


Shin SW and Eisenach JC. Intrathecal morphine reduces the visceromotor response to acute uterine cervical distension in an estrogen-independent manner. Anesthesiology 98;20303:1467-1471.
Scientific Program
SATURDAY, MAY 15, 2004

6:30 am    Registration

7:00 - 8:00 am     Breakfast with the Experts - Moderator: B. Scott Segal, MD
   Jodie L. Buxbaum, MD; Brendan Carvalho, MB, BCh, FRCA; Chantal Crochetiere, MD;
   Roshan Fernando, FRCA; David L. Hepner, MD; Caroline Grange, MB; Klaus Kjaer, MD; Craig M. Palmer, MD;
   Linda S. Polley, MD; Alex F. Pue, MD; Michael Sanchez, MD; Rakesh B. Vadhera, MD, FRCA, FFARC

   Lawrence C. Tsen, MD

9:15 - 9:45 am    Coffee Break

9:45 - 10:45 am   Poster Review #2 - Pamela J. Angle, MD

10:45 - 11:45 am  Fred Hehre Lecture - Samuel C. Hughes, MD

11:45 - 1:00 pm   Lunch on Your Own

1:00 - 2:25 pm    Panel Discussion: “Practical SOAP Labor Analgesia” Alternatives to Conventional
   Epidural and CSE Analgesia in Labor - Moderator: David J. Birnbach, MD
   Valerie A. Arkoosh, MD; Tracie A. Saunders, MD; Kathryn J. Zuspan, MD; William R. Camann, MD

2:25 - 2:35 pm    Coffee Break in the Room

2:35 - 4:00 pm    Best Paper Presentations (6) - Moderator: Lee S. Perrin, MD
   Judges: Andrew P. Harris, MD, MHS; David C. Campbell, MD, Msc, FRCPC;
   Jaya Ramanathan, MD; Robert S. McKay, MD

4:00 - 5:00 pm    Research Hour - Richard M. Smiley, MD, PhD; Philip Hess, MD

6:00 - 11:00 pm   SOAP Banquet
NOTES
Breakfast with the Experts

Moderator: B. Scott Segal, MD

Experts:
Jodie L. Buxbaum, MD
Brendan Carvalho, MB, BCh, FRCA
Chantal Crochetiere, MD
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Linda S. Polley, MD
Alex F. Pue, MD
Michael Sanchez, MD
Rakesh B. Vadhera, MD, FRCA, FFARC

Saturday, May 15
7:00 - 8:00 am

Following this Session, the learner will have:

1. Reviewed the management of a complex case;

2. Learned the steps that need to be undertaken to determine the most appropriate management.
The Gerard W. Ostheimer Lecture: 
What’s New in Obstetric Anesthesia?

Introduction: William R. Camann, MD

Speaker: Lawrence C. Tsen, MD

Saturday, May 15
8:15 - 9:15 am

Following this Session, the learner will be able to:

1. Identify published contributions from the 2003 calendar year relevant to obstetric anesthesia.

2. Critically evaluate the implications of these contributions on the provision of clinical anesthetic care or the conduct of research for the obstetric patient.

Gerard W. Ostheimer, MD
1940-1995
The Gerard W. Ostheimer Lecture:
What’s New in Obstetric Anesthesia?

Lawrence C. Tsen, MD
Assistant Professor in Anaesthesia
Harvard Medical School
Department of Anesthesiology, Perioperative and Pain Medicine
Brigham & Women's Hospital, Boston MA
"The great tragedy of Science - the slaying of a beautiful hypothesis by an ugly fact." Thomas H. Huxley (1825 - 1895)

This index was produced through a combination of search techniques. Foremost, a hand search of the table of contents of each 2003 issue of the following journals was performed.

**Anesthesia Journals**

**Obstetrics & Gynecology Journals**

**General Medical Journals**
- JAMA, New England J Medicine, Lancet, Science

In addition, Pub Med, All Science Citation Index, and Lexis/Nexis web searches were performed for various keywords related to obstetric anesthesiology.

Almost all contributions in this index (even letters) are accompanied by a short synopsis. If I misinterpreted or missed a tasty piece of literature (especially yours), for this I claim ignorance or inexperience and extend my apologies! Thanks to all authors for your contributions to our collective learning and to my own mentors who, despite working with limited substrate, have engendered an enthusiasm for reading the literature. I hope this index assists your own research and/or clinical efforts and contributes to improved outcomes for the special patients that we serve.

**ARTICLES**

**The Pregnant Patient, the Fetus, and the Newborn**

**Assisted Reproductive Technologies**

**Coexisting Disease**
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- Autonomic Dysfunction
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- Hematologic
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- Hypertension
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- Local Anesthetic Allergy
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   Low Birth Weight
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   Umbilical Cord Issues
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Physiologic Alterations in Women/Pregnancy
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Malpresentation
Multiple Gestation
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Termination of Pregnancy
VBAC

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  - Maternal Position
  - Maternal Satisfaction
  - Obstetric Management
  - PCEA
  - Pharmacology
  - Physiology
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  - Retained Placenta
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Pharmacology
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Research
Websites/Books/Leaflets/Journal Announcements
ARTICLES

THE PREGNANT PATIENT, THE FETUS, AND THE NEWBORN

Assisted Reproductive Technologies


3. Nassar AH, Usta IM, Rechdan JB, Harb TS, Adra AM, Abu-Musa AA. Pregnancy outcome in spontaneous twins versus twins who were conceived through in vitro fertilization. Am J Obstet Gynecol 2003; 189:513-8. IVF twins are more likely to be delivered by cesarean and have a higher incidence of preterm birth and have longer nursery stays.

4. Schieve LA, Tatham L, Peterson HB, Toner J, Jeng G. Spontaneous abortion among pregnancies conceived using assisted reproductive technology in the United States. Obstet Gynecol 2003; 101:959-67. 62,228 clinical pregnancies from 1996-1998 US clinic data noted that the risk of spontaneous abortion does not appear higher; however older women using their own eggs still need to consider than their risk is quite high.

5. Klein J, Pena JE, Thornton MH, Sauer MV. Understanding the motivations, concerns, and desires of human immunodeficiency virus 1-serodiscordant couples wishing to have children through assisted reproduction. Obstet Gynecol 2003; 101:987-94. Couples were aware of risks and understood that their child might contact HIV.

6. de La Rochebrochard E, Thonneau P. Paternal age ≥40 years: an important risk factor for infertility. Am J Obstet Gynecol 2003; 189:901-5. Retrospective, multinational study of 6188 European women selected randomly; paternal age is a factor!

7. Jones HW. Multiple births: how are we doing? Fertil Steril 2003; 79:17-21. Editorial suggests that the issue of multiple births needs to be addressed by the medical societies, and perhaps the legislative process.


9. Gleicher N. Modern obstetrical and infertility care may increase the prevalence of disease: an evolutionary concept. Fertil Steril 2003; 79:249-52. Selective review of literature suggesting that evolutionary barriers to reproduction had lead to an increased prevalence in diseases.


Coexisting Disease

Aging


Autonomic Dysfunction


Cardiac


21. Mulder BJ, Bleker OP. Valvular heart disease in pregnancy. N Engl J Med 2003; 349:1387. Letter following Reimold article noting that the review did not include the critical need to observe these parturients in the early (<72hr) puerperium.


31. Webster JA, Self DD. Anesthesia for pericardial window in a pregnant patient with cardiac tamponade and mediastinal mass. Can J Anaesth 2003; 50:815-8. G2P1 parturient at 29 wks with acute cardiac tamponade and an anterior mediastinal mass in late pregnancy underwent a GA for creation of the window, then underwent regional at a later date for a vaginal delivery!


35. Thaman R, Varnava A, Hamid MS, et al. Pregnancy related complications in women with hypertrophic cardiomyopathy. Heart 2003; 89:752-6. Report of 127 consecutively referred women with this entity; suggest most tolerate pregnancy well, however, planned delivery and monitoring necessary. Moreover, states epidural analgesia should continued to be used cautiously.


Connective Tissue


Endocrine


Gastrointestinal

45. Alstead EM, Nelson-Piercy C. Inflammatory bowel disease in pregnancy. Gut 2003; 52:159-61. IBD may lead to SGA babies; more research needed.


**Hematologic**


Kuczkowski KM. Labour-induced sickle cell crisis in a previously asymptomatic parturient with sickle cell disease. Anaesthesia 2003; 58:1044-5. Letter reporting case of a parturient with sickle cell disease with first vaso-occlusive crisis during labor.


Samama CM. Should a normal thromboelastogram allow us to perform a neuraxial block? A strong word of warning. Can J Anaesth 2003; 50:761-3. Editorial to letter below suggesting that TEG for clinical decision making regarding neuraxial blockade should be discouraged at this time.

Frolich MA, Gibby G, Mahla ME. Thromboelastography to assess coagulation in the thrombocytopenic parturient. Can J Anaesth 2003; 50:853. Letter describing two cases of TEG being used to decide whether neuraxial blockade was appropriate.


70. Fattorutto M. Evaluation of platelet aggregation in flow and platelet aggregometry during pregnancy. Br J Anaesth 2003; 90:252; author reply 252. The PFA-100 needs to be validated in comparison with aggregation tests.


76. Prochazka M, Happach C, Marsal K, Dahlback B, Lindqvist PG. Factor V Leiden in pregnancies complicated by placental abruption. Bjog 2003; 110:462-6. FVL was not associated with placental abruption in this retrospective case control study of 102 women vs. 2371 prospectively collected controls; however, venous thrombosis was increased in women with placental abruption, indicating thrombophilias.
78. Pegoraro RJ, Hira B, Rom L, Moodley J. Plasminogen activator inhibitor type 1 (PAI1) and platelet glycoprotein IIIa (PGIIIa) polymorphisms in Black South Africans with pre-eclampsia. Acta Obstet Gynecol Scand 2003; 82:313-7. Neither the 4G allele of the plasminogen activator inhibitor Type 1 nor the PLA2 allele of the platelet glycoprotein IIIa have any significant role as risk factors in the patho-etiology of pre-eclampsia in Black South Africans.

79. Hira B, Pegoraro RJ, Rom L, Moodley J. Absence of Factor V Leiden, thrombomodulin and prothrombin gene variants in Black South African women with pre-eclampsia and eclampsia. Bjog 2003; 110:327-8. Genotyping was performed in 100 patients with pre-eclampsia and 100 normotensive pregnant controls to detect the G or A allele at residue 506 of the Factor V gene, and the C or T allele at residue 455 of the thrombomodulin gene. No relationship was found.


82. Guasch Arevalo E, Suarez Cobian A. [Platelet count and hematic punction with epidural block in obstetrics]. Rev Esp Anestesiol Reanim 2003; 50:130-4. Retrospective review of 1,168 obstetric patients given regional blocks for labor. Seventy-two bloody punctures were observed, for an incidence of 6.16%, and the incidence was significantly higher in the group of patients with over 350,000 platelets/mm3 (p < 0.05).

83. Al-Kouatly HB, Chasen ST, Kalish RB, Chervenak FA. Causes of thrombocytopenia in triplet gestations. Am J Obstet Gynecol 2003; 189:177-80. Review of 126 triplet pregnancies from 1993-2001 observed that thrombocytopenia was most likely to be related to preeclampsia than gestational changes.

84. Webert KE, Mittal R, Sigouin C, Heddle NM, Kelton JG. A retrospective 11-year analysis of obstetric patients with idiopathic thrombocytopenic purpura. Blood 2003; 102:4306-11. Retrospective study of 119 pregnancies noted. During delivery, 44 women (37.3%) received epidural analgesia without complications, with most having a platelet count between 50 and 149 x 10^9/L.


Hepatic


Hypertension


Immunologic


94. Jacobsen AF, Qvigstad E, Sandset PM. Low molecular weight heparin (dalteparin) for the treatment of venous thromboembolism in pregnancy. Bjog 2003; 110:139-44. Observational study in 20 pregnant women with acute venous thromboembolism notes that dalteparin may be used for the treatment (with a 10-20% higher dose than non-pregnant) of acute venous thromboembolism in pregnancy.

Infection


100. Birnbach DJ, Meadows W, Stein DJ, Murray O, Thys DM, Sordillo EM. Comparison of povidone iodine and DuraPrep, an iodophor-in-isopropyl alcohol solution, for skin disinfection prior to epidural catheter insertion in parturients. Anesthesiology 2003; 98:164-9. Cultures obtained in 60 parturients prior to, immediately following antisepsis and just prior to removal of the catheter, suggest that DuraPrep is better than providone iodine in the number of positive skin cultures immediately after disinfection and in combating bacterial regrowth and colonization.


103. Eldor J. Local anaesthetic antibacterial activity. Anaesthesia 2003; 58:926-8; discussion 928. Letter suggests that manufacturers should declare the limited antibacterial activity of their drugs. Response by Astra Zeneca suggests clinical setting is different.


Local Anesthetic Allergy


Lymphatic


Musculoskeletal


Neoplasm


Neurologic


118. Buettner A. Anaesthesia for caesarean section in a patient with spinal muscular atrophy. Anaes Intens Care 2003; 31:92-4. Case report of primigravid woman with spinal muscular atrophy Type III (Kugelberg-Welander syndrome). Elective caesarean section was performed at 38 weeks gestation under spinal anaesthesia.


Orthopedic


129. Russell R, Comara S. Regional blocks for delivery in women with scoliosis or previous spinal surgery. International Journal of Obstetric Anesthesia 2003; 12:308-10. Letter reviews case series of 57 deliveries in 45 women with scoliosis or prior spinal surgery where very few cases of epidural or spinal difficulty were noted.

130. Villevieille T, Mercier FJ, Benhamou D. [Is obstetric epidural anaesthesia technically possible after spinal surgery and does it work?]. Ann Fr Anesth Reanim 2003; 22:91-5. Retrospective analysis of 31 parturients with previous spine surgery notes technical and analgesic failures in 18%; authors conclude, not surprisingly, that epidural techniques appear to be less reliable in this patient group.

Pain


Psychiatric

132. Johnson RC, Slade P. Obstetric complications and anxiety during pregnancy: is there a relationship? J Psychosom Obstet Gynaecol 2003; 24:1-14. Review of recent work in the field; on balance the evidence reviewed suggests that a general association between anxiety and obstetric complications per se does not exist, but specific types of anxiety, such as psychosocial stress, family functioning, or fear of childbirth may have associations with specific complications, such as prolonged labor or Cesarean section

133. Pinto N, Koren G. Research on maternal and fetal safety after exposure to antidepressants in utero. Am J Obstet Gynecol 2003; 189:1810-1; author reply 1811. Letter suggests that these studies are difficult and should include findings of registries.

Renal

134. Gyenge CC, Bowen BD, Reed RK, Bert JL. Mathematical model of renal elimination of fluid and small ions during hyper- and hypovolemic conditions. Acta Anaesthesiol Scand 2003; 47:122-37. Renal response to the provision of fluids and blood loss modeled in a 70kg man. For the very interested reader only!

Respiratory


141. Bracken MB, Triche EW, Belanger K, Saftlas A, Beckett WS, Leaderer BP. Asthma symptoms, severity, and drug therapy: a prospective study of effects on 2205 pregnancies. Obstet Gynecol 2003; 102:739-52. Cohort study of 873 pregnant women with asthma vs 1333 without asthma; No effect of asthma symptoms or severity was found on preterm delivery; however, use of oral steroids and theophylline reduced gestational length.

142. Bromilow J, McCormick A. A novel role for magnesium? Anaesthesia 2003; 58:1246-7. Letter highlights case of asthmatic parturient for c/s under CSE who was treated with magnesium only to assist asthma.

**Substance Abuse**


148. Kuczkowski KM. Caesarean section in a cocaine-intoxicated parturient: regional vs. general anaesthesia? Anaesthesia 2003; 58:1042-3. Letter notes case of parturient where regional anesthesia was used following acute crack cocaine use.


Trauma


Vascular


Complementary and Alternative Medicine


162. Seibel MM. A guest editorial: complementary and alternative medicine and women's health--time to catch up! Obstet Gynecol Surv 2003; 58:149-51. Editorial notes need to be familiar, ask patients and establish referral patterns for CAM practitioners.
Fetus

Fetal Monitoring


165. Esen UI. Fetal distress and the 30-minute rule. Anaesthesia 2003; 58:1249. Letter suggests that the 30 min rule is based on arbitrary and unscientific data.


167. Elimian A, Lawlor P, Figueroa R, Wiecek V, Garry D, Quirk JG. Intrapartum assessment of fetal well-being: any role for a fetal admission test? J Matern Fetal Neonatal Med 2003; 13:408-13. Irrespective of the definition of reactivity, women with a non-reactive fetal admission test were more likely to be delivered by Cesarean section, to have fetal distress resulting in Cesarean section and to have a longer neonatal hospital stay.


169. Kitlinski ML, Kallen K, Marsal K, Olofsson P. Gestational age-dependent reference values for pH in umbilical cord arterial blood at term. Obstet Gynecol 2003; 102:338-45. A physiologic linear decline of umbilical artery pH with gestational age at term was found in an evaluation of 24,390 term singleton vaginal deliveries with an Apgar score of 9 or greater. Authors suggest a gestational age adjusted umbilical artery pH reference should be used, and will result in fewer diagnoses of cord academia than a stationary cutoff of pH of less than 7.10.

Fetal Surgery


173. Strumper D, Durieux ME, Gogarten W, Van Aken H, Hartleb K, Marcus MA. Fetal plasma concentrations after intraamniotic sufentanil in chronically instrumented pregnant sheep. Anesthesiology 2003; 98:1400-6; discussion 5A-6A. Fetal lamb absorbs intraamniotic sufentanil and achieves significantly greater plasma concentrations than the ewe; suggests may be a potential approach for fetal analgesia following in-utero fetal surgery.


Maternal Infection, Fever and Neonatal Sepsis Workup


180. Banerjee S, Steer PJ. The rise in maternal temperature associated with regional analgesia in labour is harmful and should be treated. International Journal of Obstetric Anesthesia 2003; 12:280-4. Proposer of debate (see below) suggests the need for better studies, and potentially treatments to avoid temperature increases.

181. Irestedtz L. The rise in maternal temperature associated with regional analgesia in labour is harmful and should be treated. International Journal of Obstetric Anesthesia 2003; 12:284-6. Opposer of debate (see above) suggests causal relationship has not been established.


Newborn Behavior


Breast Feeding


190. Radzyminski S. The effect of ultra low dose epidural analgesia on newborn breastfeeding behaviors. J Obstet Gynecol Neonatal Nurs 2003; 32:322-31. Two groups of neonates in this study. One group was born to mothers who received epidural analgesia, and one group was born to mothers who received no pain medication for labor. Both groups were observed for initial breastfeeding behaviors using the Premature Infant Breastfeeding Behavior Scale following birth and at 24 hours. No differences were observed.

Cerebral Palsy


192. Willoughby RE, Jr., Nelson KB. Chorioamnionitis and brain injury. Clin Perinatol 2002; 29:603-21. Retrospective case-control study noting that exposure to intrauterine infection was not an independent risk factor for CP in very premature infants when gestational age and other confounders were tightly controlled.


Low Birth Weight


Macrosomia


200. Boulet SL, Alexander GR, Salihu HM, Pass M. Macromomic births in the United States: determinants, outcomes, and proposed grades of risk. Am J Obstet Gynecol 2003; 188:1372-8. As analyzed in linked live birth and infant death cohort files from 1995-7 in the US after 37 wks gestation, macrosomia >4000 g is useful for increased risks of labor and newborn complications, >4500 g is more predictive of neonatal morbidity, and >5000 g may be a better indicator of infant mortality risk.

Meconium Aspiration


Morbidity

203. Gherman RB, Ouzounian JG, Satin AJ, Goodwin TM, Phelan JP. A comparison of shoulder dystocia-associated transient and permanent brachial plexus palsies. Obstet Gynecol 2003; 102:544-8. Retrospective case-control analysis from a national registry noted that there is no significant difference in antepartum and intrapartum characteristics which ultimately resulted in either a transient or a permanent injury.

Mortality

204. Gould JB, Qin C, Marks AR, Chavez G. Neonatal Mortality in Weekend vs Weekday Births. Jama 2003; 289:2958-62. California linked data from infant birth and death certificates. Neonatal mortality increased from 2.8/1000 births to 3.12/1000 births on weekends, but after adjusting for birth weight, the increase was not statistically significant.


Pharmacology


211. Thorp JA, O'Connor M, Belden B, Etzenhouser J, Hoffman EL, Jones PG. Effects of phenobarbital and multiple-dose corticosteroids on developmental outcome at age 7 years. Obstet Gynecol 2003; 101:363-73. Combined antenatal exposure to Phenobarbital and repetitive steroid therapy was not associated with adverse effects on intelligence, achievement, behavior, or head circumference at 7 yrs of age.

Respiratory Distress

212. Elimian A, Figueroa R, Spitzer AR, Ogburn PL, Wiencek V, Quirk JG. Antenatal corticosteroids: are incomplete courses beneficial? Obstet Gynecol 2003; 102:352-5. 125 neonates between 23-34 wks gestation noted that an incomplete course of antenatal corticosteroids is associated with a reduction in the need for vasopressors, rate of intraventricular hemorrhage, and neonatal death.

Resuscitation/Evaluation

213. Burlingame JM, Esfandiari N, Sharma RK, Mascha E, Falcone T. Total antioxidant capacity and reactive oxygen species in amniotic fluid. Obstet Gynecol 2003; 101:756-61. Interesting study suggests that antioxidants are present in the amniotic fluid at least as early as the second trimester and increase with gestational age. Reactive oxygen species are not necessarily present.

Umbilical Cord Issues


216. Lotgering FK, Bishai JM, Struijk PC, et al. Ten-minute umbilical cord occlusion markedly reduces cerebral blood flow and heat production in fetal sheep. Am J Obstet Gynecol 2003; 189:233-8. Autoregulation of cerebral blood flow was lost within 4 minutes of occlusion, probably as a result of hypoxia, combined with hypotension. A reduction in cerebral heat production preceded and exceeded the reduction in blood flow perhaps suggesting an active down-regulation of cerebral metabolism. Recovery of cerebral blood flow and heat production to control values was incomplete for more than 60 minutes after restoration of umbilical flow.
Non-Obstetric Surgery during Pregnancy

217. ACOG Committee Opinion Number 284, August 2003: Nonobstetric surgery in pregnancy. Obstet Gynecol 2003; 102:431. This one paragraph opinion states that there are "no data to allow us to make specific recommendations”, but states that a team approach (anesthesia, obstetrics, surgery) is necessary for the optimal safety of the woman and her baby.


Pharmacologic Alterations in Women/Pregnancy


222. Grewal S. To refuse or not to refuse, that is the question? Anaesthesia 2003; 58:715; author's reply 715. Letter with reply noted by S. Yentis discussing reduction of syntocinon dose.

223. Sato N, Tanaka KA, Szlam F, Tsuda A, Arias ME, Levy JH. The vasodilatory effects of hydralazine, nicardipine, nitroglycerin, and fenoldopam in the human umbilical artery. Anesth Analg 2003; 96:539-44. The noted agents used to treat acute hypertension have no adverse effects on umbilical artery tone; however, in larger concentrations (> 10-5 M), fenoldopam may produce contraction of the umbilical artery.


Physiologic Alterations in Women/Pregnancy


Placental Issues


OBSTETRIC ISSUES AND IMPLICATIONS

Complications-Obstetric

Abdominal Pregnancy


Amniotic Fluid Embolism


Hemorrhage

251. Friedman Z, Berkenstadt H, Preisman S, Perel A. A comparison of lactated ringer's solution to hydroxyethyl starch 6% in a model of severe hemorrhagic shock and continuous bleeding in dogs. Anesth Analg 2003; 96:39-45. Non-pregnant animal model observed that fluid resuscitation to a target mean arterial blood pressure of 60 mmHg during uncontrolled bleeding resulted in larger oxygen delivery and smaller systemic lactate concentrations when hydroxyethyl starch 6% was used in comparison to LR.


258. Caliskan E, Dilbaz B, Meydanli MM, Ozturk N, Narin MA, Haberal A. Oral misoprostol for the third stage of labor: a randomized controlled trial. Obstet Gynecol 2003; 101:921-8. In a trial of 1474 women, oral misoprostol alone was as effective as oxytocin but less effective than oxytocin + methylergonovine or misoprosol.


Hyperemesis Gravidarum

265. Lagiou P, Tamimi R, Mucci LA, Trichopoulos D, Adami HO, Hsieh CC. Nausea and vomiting in pregnancy in relation to prolactin, estrogens, and progesterone: a prospective study. Obstet Gynecol 2003; 101:639-44. Lower levels of prolactin and a trend for high levels of estradiol were correlated with n/v at any time during pregnancy until the 27th wk.

266. Rosen T, de Veciana M, Miller HS, Stewart L, Rebarber A, Slotnick RN. A randomized controlled trial of nerve stimulation for relief of nausea and vomiting in pregnancy. Obstet Gynecol 2003; 102:129-35. 21 day trial during first trimester notes in 187 that nerve stimulation therapy is effective in reducing nausea/vomiting and promoting weight gain in symptomatic women.


Maternal Mortality


Multiple Gestation


Neurologic Injury


277. Whiteside JL, Barber MD, Walters MD, Falcone T. Anatomy of ilioinguinal and iliohypogastric nerves in relation to trocar placement and low transverse incisions. Am J Obstet Gynecol 2003; 189:1574-8; discussion 1578. Courses of iliohypogastric and ilioinguinal nerves mapped from 11 adult female cadavers note that surgical sites below the level of the anterior superior iliac spine have potential for ilioinguinal or iliohypogastric injury.

Ovarian Hyperstimulation Syndrome


Pain


PIH/Preeclampsia


289. Dyer RA, Els I, Farbas J, Torr GJ, Schoeman LK, James MF. Prospective, randomized trial comparing general with spinal anesthesia for cesarean delivery in preeclamptic patients with a nonreassuring fetal heart trace. Anesthesiology 2003; 99:561-9; discussion 5A-6A. 70 parturients with severe preeclampsia (160/110) randomized to spinal versus general for cesarean delivery. Maternal hemodynamics were similar, but spinal anesthesia required more ephedrine and was associated with lower umbilical artery pH and base deficits.


291. Santos AC, Birnbach DJ. Spinal anesthesia in the parturient with severe preeclampsia: time for reconsideration. Anesth Analg 2003; 97:621-2. Editorial for the following article suggests that spinal anesthesia may be an appropriate choice for women with severe preeclampsia having a cesarean delivery.


300. Cotter AM, Molloy AM, Scott JM, Daly SF. Elevated plasma homocysteine in early pregnancy: a risk factor for the development of nonsevere preeclampsia. Am J Obstet Gynecol 2003; 189:391-4; discussion 394-6. 71 cases of nonsevere preeclampsia sampled at approx 15 wks noted an increased homocysteine level compared to normal controls.


303. Isler CM, Magann EF, Rinehart BK, Terrone DA, Bass JD, Martin JN, Jr. Dexamethasone compared with betamethasone for glucocorticoid treatment of postpartum HELLP syndrome. Int J Gynaecol Obstet 2003; 80:291-7. Prospective with some randomized patients (n= 36) noted that dexamethasone was superior.


305. Isler CM, Barrilleaux PS, Rinehart BK, Magann EF, Martin JN, Jr. Postpartum seizure prophylaxis: using maternal clinical parameters to guide therapy. Obstet Gynecol 2003; 101:66-9. 503 patients prospectively followed; clinical criteria, when compared to arbitrary protocols, can shorten the duration of postpartum magnesium sulfate for seizure prophylaxis.

306. Chipchase J, Peebles D, Rodeck C. Severe preeclampsia and cerebral blood volume response to postural change. Obstet Gynecol 2003; 101:86-92. In normotensive (n = 13), and pregnancy induced hypertensive (n=9) a fall in median cerebral blood volume was noted; conversely in preeclamptic women a median rise in cerebral blood volume was noted.

307. Scott JR. Magnesium sulfate for mild preeclampsia. Obstet Gynecol 2003; 101:213. Editorial notes the inadequate power of article below; but suggests should be preserved for a future meta-analysis.

308. Livingston JC, Livingston LW, Ramsey R, Mabie BC, Sibai BM. Magnesium sulfate in women with mild preeclampsia: a randomized controlled trial. Obstet Gynecol 2003; 101:217-20. 222 women with mild preeclampsia to magnesium or placebo; no major impact on disease progression noted. However, as stated above, the study is under-powered.


311. Macarthur A. Best evidence in anesthetic practice: prevention: magnesium sulfate reduces the risk of eclampsia in women with pre-eclampsia. Can J Anaesth 2003; 50:1035-8. Commentary reviews the 2 major studies (as above); notes that abnormal cerebral perfusion caused by these agents may be important in future investigations and clinical considerations.

313. Subtil D, Goeusse P, Puech F, et al. Aspirin (100 mg) used for prevention of pre-eclampsia in nulliparous women: the Essai Regional Aspirine Mere-Enfant study (Part 1). Bjog 2003; 110:475-84. 3294 nulliparous women between 14 and 20 wks randomized to 100 mg aspirin vs. placebo; found aspirin does not reduce incidence of pre-eclampsia, however, it did result in an increase in bleeding complications.

314. Subtil D, Goeusse P, Houfflin-Debarge V, et al. Randomized comparison of uterine artery Doppler and aspirin (100 mg) with placebo in nulliparous women: the Essai Regional Aspirine Mere-Enfant study (Part 2). Bjog 2003; 110:485-91. 1853 nulliparous women between 14 and 20 wks gestation randomized to a uterine Doppler examination between 22 and 24 wks or take a placebo. Women with abnormal Doppler waveforms received 100 mg of aspirin daily through 36 wks. Despite an observed sensitivity in screening for pre-eclampsia, routine uterine Doppler analysis could not be recommended, as aspirin was ineffective.


317. Hazra S, Waugh J, Bosio P. 'Pure' pre-eclampsia before 20 weeks of gestation: a unique entity. Bjog 2003; 110:1034-5. Just when you believed that the pre-20 wk timeframe was safe….this case report describes the first case of pre-eclampsia at 18 wks gestation not associated with triploidy, trophoblastic disease or antiphospholipid syndrome.


**Perineal Trauma/Lacerations**

321. Williams A. Third-degree perineal tears: risk factors and outcome after primary repair. J Obstet Gynaecol 2003; 23:611-4. Authors made no comments on epidural techniques as cause (for once!), but noted that regional and general techniques are often required (76%) for their repair.

322. Gupta N, Kiran TU, Mulik V, Bethel J, Bhal K. The incidence, risk factors and obstetric outcome in primigravid women sustaining anal sphincter tears. Acta Obstet Gynecol Scand 2003; 82:736-43. Retrospective database analysis noted fetal macrosomia and doctor conducted deliveries were independent risk factors for anal sphincter tears; also suggested that "spinal analgesia at delivery' was associated (as were use of forceps, being postdates, etc. etc.).
Preterm Labor


326. Low JA, Killen H, Derrick EJ. Antepartum fetal asphyxia in the preterm pregnancy. Am J Obstet Gynecol 2003; 188:461-5. Fetal asphyxia in pregnancies that are delivered preterm is present frequently before labor, as noted by nonstress tests, fetal heart rate monitoring and biophysical profiles.


331. Sakai M, Sasaki Y, Yamagishi N, Tanebe K, Yoneda S, Saito S. The preterm labor index and fetal fibronectin for prediction of preterm delivery with intact membranes. Obstet Gynecol 2003; 101:123-8. The preterm labor index was similar to the fetal fibronectin assay in its ability to predict preterm delivery in 185 women with preterm labor and intact membranes.


334. ACOG Practice Bulletin. Clinical management guidelines for obstetrician-gynecologist. Number 43, May 2003. Management of preterm labor. Obstet Gynecol 2003; 101:1039-47. The purpose of this document is to present the various methods proposed to manage preterm labor and the evidence for their roles in clinical practice. Despite the numerous management methods proposed the incidence of preterm birth has changed little over the past 40 years. Uncertainty persists about the best strategies for managing preterm labor.

336. ACOG Committee Opinion. Use of progesterone to reduce preterm birth. Obstet Gynecol 2003; 102:1115-6. Opinion notes that limited data exists, but appears to support the use in women with a documented history of previous spontaneous birth at less than 37 wks gestation.

337. Winkler M. Role of cytokines and other inflammatory mediators. Bjog 2003; 110 Suppl 20:118-23. Nice review of these mediators on cervical softening and dilation during chorioamniotic infection.


339. Friese K. The role of infection in preterm labour. Bjog 2003; 110 Suppl 20:52-4. Good review suggesting that bacterial vaginosis and intruterine infection are believed to be important risk factors for preterm delivery.


Pulmonary Embolism


Retained Placenta


345. Jha S, Chiu JW, Yeo IS. Intravenous nitro-glycerine versus general anaesthesia for placental extraction--a sequential comparison. Med Sci Monit 2003; 9:CS63-6. Case report of a 34-year-old gravida 4, para 3 parturient with retained placenta and postpartum haemorrhage on two consecutive deliveries who had the placenta successfully removed manually by the same surgeon under general anaesthesia versus fentanyl and nitro-glycerine on the first and second deliveries, respectively.


Surprise Delivery of Infant


**Umbilical Cord Issues**


351. Bythell V. Cord prolapse demands general anaesthesia. International Journal of Obstetric Anesthesia 2003; 12:287-9. Proposer of debate (see below) notes that although improved fetal outcome with speedier delivery of these infants is insufficient, we should continue to facilitate delivery as promptly as possible.


**Uterine Rupture**


**Critical Care for the Obstetric Patient**

357. Zeeman GG, Wendel GD, Jr., Cunningham FG. A blueprint for obstetric critical care. Am J Obstet Gynecol 2003; 188:532-6. Prospective study evaluating admissions to an obstetric intermediate care unit and obstetric admissions to a medical/surgical ICU. Suggests that an intermediate care unit decreases admissions to a med/surg ICU, and should be a considered option for tertiary care centers.


Obstetric Management Issues

Birth Centers


Breech


370. Bujold E, Boucher M, Rinfret D, Berman S, Ferreira E, Marquette GP. Sublingual nitroglycerin versus placebo as a tocolytic for external cephalic version: a randomized controlled trial in parous women. Am J Obstet Gynecol 2003; 189:1070-3. 99 patients randomized to 2 sublingual sprays of 400 µg nitroglycerin or placebo; nitroglycerin was less successful (48% vs 63%).


**Cervical Cerclage**


375. Odibo AO, Elkousy M, Ural SH, Macones GA. Prevention of preterm birth by cervical cerclage compared with expectant management: a systematic review. Obstet Gynecol Surv 2003; 58:130-6. Meta-analysis notes trend towards cervical cerclage reducing preterm births before 34 weeks in use, however, no improvement in neonatal mortality and an increase in postpartum fever were observed.

**Cesarean Delivery**


378. Bost BW. Cesarean delivery on demand: what will it cost? Am J Obstet Gynecol 2003; 188:1418-21; discussion 1421-3. 1 year cost data from not-for-profit community hospital suggest cesarean on demand should have little impact on overall costs; discussion following this by other individuals detail other implications.


383. Nygaard I, Cruikshank DP. Should all women be offered elective cesarean delivery? Obstet Gynecol 2003; 102:217-9. Editorial suggests that it is "ill advised to routinely give all prenatal patients the choice of their desired mode of delivery".


385. Joseph KS, Young DC, Dodds L, et al. Changes in maternal characteristics and obstetric practice and recent increases in primary cesarean delivery. Obstet Gynecol 2003; 102:791-800. Recent increases in primary cesarean delivery rates are a consequence of increasing maternal age (>35) weight (>70kg), and weight gain during pregnancy (>20kg).

386. Wilkes PT, Wolf DM, Kronbach DW, Kunze M, Gibbs RS. Risk factors for cesarean delivery at presentation of nulliparous patients in labor. Obstet Gynecol 2003; 102:1352-7. Case control, chart review study of 325 nulliparous patients presenting in labor at term with singleton vertex fetus with cesarean (study subjects) or vaginal (controls) delivery. Suggests within 2 hrs of admission, slow cervical dilation change, fetal station, as well as maternal weight, gestational age, and preeclampsia, are independent variables that increase cesarean delivery.


389. Danielian P, Nikolaou D. The unfacts of "request" caesarean section. Bjog 2003; 110:784; author reply 784-5. Letter suggests that the available evidence suggests that any claim of knowing whether vaginal versus elective cesarean delivery is safer is not justified.


**Feeding during Labor**


392. O'Sullivan G, Scrutton M. NPO during labor. Is there any scientific validation? Anesthesiol Clin North America 2003; 21:87-98. Author concludes that current evidence suggests that solids and semi-solids should be avoided once a woman is in active labor or requests analgesia but allow a carefully audited introduction of isotonic drinks.
**Induction of Labor**


394. Johnson DP, Davis NR, Brown AJ. Risk of cesarean delivery after induction at term in nulliparous women with an unfavorable cervix. Am J Obstet Gynecol 2003; 188:1565-9; discussion 1569-72. Retrospective study of 2647 nulliparous women undergoing induction noted that a significantly increased risk of cesarean delivery, especially when the Bishop score is less than or greater/equal to 5 (31.5% vs. 18.1%).


**Instrumental Delivery**

397. Sadan O, Ginath S, Gomel A, et al. Vacuum application through a nonfully dilated cervix: a viable option. Arch Gynecol Obstet 2003; 268:281-3. Case control cohort study of 39 women with vacuum deliveries through a nonfully dilated cervix larger than 9 cm and station of the head at S or more +2 cm. Based on predefined criteria, vacuum extraction through a nonfully dilated cervix is a viable alternative to emergency cesarean section and is apparently not associated with higher maternal or infant morbidity.

**Intrapartum Care**


403. ACOG committee opinion number 286, October 2003: patient safety in obstetrics and gynecology. Obstet Gynecol 2003; 102:883-5. Elements of safety for patients are discussed; communication and system error identification are discussed.

Malpresentation

405. Buhimschi CS, Buhimschi IA, Malinow AM, Weiner CP. Uterine contractility in women whose fetus is delivered in the occipitoposterior position. Am J Obstet Gynecol 2003; 188:734-9. Laboring women generate normal intrauterine pressure despite an occipitoposterior fetal position. Also comments that malpresentation is not the result of epidural use.


Multiple Gestation


409. Williams KP, Galerneau F. Intrapartum influences on cesarean delivery in multiple gestation. Acta Obstet Gynecol Scand 2003; 82:241-5. Retrospective analysis of 10 yr, 967 consecutive twin pregnancies with a gestational age >/=32 weeks with twin A presenting as a vertex and eligible for vaginal delivery were reviewed. A number of influences discussed, however, authors concluded that the presence of an epidural technique reduced the likelihood of a cesarean section.


Postpartum Care


Termination of Pregnancy

412. Keder LM. Best practices in surgical abortion. Am J Obstet Gynecol 2003; 189:418-22. Review noted that the majority of first trimester surgical abortions are done under paracervical block; suggests that addition of sedation improves patient satisfaction but "does not significantly affect pain ratings".

413. Barnett EH. Witnesses testify on first of five abortion bills. The Oregonian. Salem, OR, 2003:B04. Testimony on bills including the two cited below.


**VBAC**


418. Mankuta DD, Leshno MM, Menasche MM, Brezis MM. Vaginal birth after cesarean section: trial of labor or repeat cesarean section? A decision analysis. Am J Obstet Gynecol 2003; 189:714-9. A model that suggests if additional pregnancies after cesarean were wished for, a trial of labor had a 50% or greater chance of success.


420. Delaney T, Young DC. Spontaneous versus induced labor after a previous cesarean delivery. Obstet Gynecol 2003; 102:39-44. Retrospective review of 3746 patients with one prior cesarean notes that induced labor is associated with higher rate of early postpartum hemorrhage, cesarean delivery, and neonatal ICU admission.

**OB ANESTHETIC ISSUES AND IMPLICATIONS**

**Analgesia for Labor and Delivery**

**Alternative Techniques**


423. Cyna AM. Hypno-analgesia for a labouring parturient with contra-indications to central neuraxial block. Anaesthesia 2003; 58:101-2. Letter suggests that hypnotherapy works, however, the patient utilized Entonox during labor!

424. Leeman L, Fontaine P, King V, Klein MC, Ratcliffe S. Management of labor pain: promoting patient choice. Am Fam Physician 2003; 68:1023, 1026, 1033 passim. Editorial to the two articles below (interesting that editorialist is also the author of the two articles!) which suggests that parturients, family practitioners and hospitals are actively dissuaded from using alternative pain relief modalities.


group, pretest, posttest use of ice massage of the acupressure energy meridian point large intestine 4 (LI4) to reduce labor
pain during contractions; an effect was suggested.


430. Chung UL, Hung LC, Kuo SC, Huang CL. Effects of LI4 and BL 67 acupressure on labor pain and uterine contractions in
the first stage of labor. J Nurs Res 2003; 11:251-60. The study suggests in 127 randomized paturients that LI4 and BL67
acupressure may lessen labor pain during the active phase of the first stage of labor. There were no verified effects on uterine
contractions.

Clin J Pain 2003; 19:187-91. randomized, unblinded, controlled study. One group received acupuncture (N = 106); another
did not (N = 92). A second control group (N = 92), drawn from the labor ward protocol, consisted of patients who met the
eligibility criteria for the study and were matched to the "no acupuncture" group by parity, but who had not been offered the
opportunity to take part. Meperidine was given to 11% of the acupuncture group, 37% of the no acupuncture group (P <
0.0001), and 29% of the control group.

Wochenschr 2002; 114:391-5. Case control of 140 women who wanted a water birth. A statistically significant decrease in
the use of medical analgesia (p = 0.0001) and oxytocin (p = 0.002) was observed in women who had water births. No
difference in neonatal parameters.

433. Spellerberg E, Smidt-Jensen SL. [A retrospective analysis of the results of obstetric acupuncture at Frederiksberg Hospital].
Ugeskr Laeger 2003; 165:1023-7. Retrospective study notes acupuncture to be effective during labor by parturients and
midwives.


435. Geissbuhler V, Eberhard J. [Alternative obstetrics: bed, chair or tub? Have alternative birthing methods become established?].
Ther Umsch 2002; 59:689-95. Article suggests that nonpharmacologic alternatives are common to obstetrics.

**Ambulation**


with uncomplicated pregnancies in spontaneous labor between 36-42 weeks of gestation or scheduled for induced labor
randomized to ambulatory and non-ambulatory. All were given intermittent epidural injections of 0.1% ropivacaine with 0.6
microg/ml sufentanil for analgesia during labor. No significant differences in mode of delivery, consumption of local
anesthetic, or oxytocin requirement, but shorter duration (173.4+-/109.9 min vs. 236.4+-/130.6 min; P=0.001) in ambulating
parturients.

**Anatomy**

Anesthesiology 2003; 99:1359-63. Nonpregnant, mixed ages and gender; 690 patients evaluated by MRI. A safety margin of
2-4 vertebral bodies and intervertebral spaces between conus medullaris and tuffier's line exists regardless of gender or
presence of transitional vertebra. However, closer with age and palpation of subcutaneous fat must be considered.
Shiroyama K, Izumi H, Kubo T, Nakamura R. Distance from the skin to the epidural space at the first lumbar interspace in a Japanese obstetric population. Hiroshima J Med Sci 2003; 52:27-9. Prospective examination of 95 parturient women found a correlation of body weight with epidural space distance was the highest of the physical factors ($r^2 = 0.800$, $p = 0.0001$), and a simple regression equation was formulated to aid in predicting SE distance: "SE distance (cm) = 0.05 x body weight (kg) + 0.36".

**Benefit of Anesthesia**


**Breastfeeding**


**Breech Delivery**


**CSE Technique**


**Equipment**


Beilin Y, Hossain S, Bodian CA. The numeric rating scale and labor epidural analgesia. Anesth Analg 2003; 96:1794-8. In a post hoc analysis of three previous studies with mixed parity women noted that the use of a verbal numeric rating scale correlated with desire for additional analgesic medication.


**Epidural Techniques**


455. Zwissler B. Regional anesthesia and analgesia for labor and delivery. N Engl J Med 2003; 348:1818-20; author reply 1818-20. Letter to Eltzschig article emphasizing that epidural analgesia is very unlikely to have any clinically relevant effect on cesarean delivery.


458. Gadalla F, Lee SH, Choi KC, Fong J, Gomillion MC, Leighton BL. Injecting saline through the epidural needle decreases the iv epidural catheter placement rate during combined spinal-epidural labour analgesia. Can J Anaesth 2003; 50:382-5. Injecting saline 10 mL through the epidural needle prior to epidural catheter placement in 100 women requesting CSE with intrathecal opioid, noted to decrease venous catheter placements.


460. Lang SA. Identification of the epidural space: air or saline? Can J Anaesth 2003; 50:860-1; author reply 861-2. Letter suggests air is a good technique but technique and judgment required.

461. Errando CL. Identification of the epidural space: air or saline? Can J Anaesth 2003; 50:861; author reply 861-2. Letter suggests that volume of air is important to sequelae.

462. Sobue K, Tsuda T, Yumoto M, Nakagawa T, Nakano M, Katsuya H. Skin analgesia with lidocaine tape prior to epidural blockade. Can J Anaesth 2003; 50:95-6. Use of lidocaine tape (18 mg lidocaine 60% in a 30.5x50 mm film) prior to epidural blockade is effective in decreasing pain of insertion.


467. Lee BB, Chen PP, Ngan Kee WD. Status of obstetric epidural analgesia services in Hong Kong public hospitals: postal questionnaire survey. Hong Kong Med J 2003; 9:407-14. Compared to 1995, the availability has increased but still not 24/7 at all hospitals; overall epidural analgesia rate 15% (8-20% range).


**Fetal Effects**


474. Hill JB, Alexander JM, Sharma SK, McIntire DD, Leveno KJ. A comparison of the effects of epidural and meperidine analgesia during labor on fetal heart rate. Obstet Gynecol 2003; 102:333-7. Cohort study of 200 women with epidural compared to 156 women with meperidine PCA; Incidence and type of FHR deceleration were not significantly different between methods within 40 minutes of initiation (41% meperidine, 34% epidural exhibited decelerations).

475. Soncini E, Grignaffini A, Anfuso S, Cavicchioni O. [Epidural analgesia during labour: maternal, fetal and neonatal aspects]. Minerva Ginecol 2003; 55:263-9. Prospective comparative study of epiduralized versus control parturients suggests with the use of intermittent bolus of ropivacaine (0.2%) + Fent, no differences in delivery modalities or neonatal outcomes were noted.

**Fluid Preloading**

477. Kubli M, Shennan AH, Seed PT, O'Sullivan G. A randomized controlled trial of fluid pre-loading before low dose epidural analgesia for labour. International Journal of Obstetric Anesthesia 2003; 12:256-60. 168 parturients randomized to 7mL/kg Hartmann's solution vs. no-preload prior to low dose epidural (0.1%B 15 mL + fentanyl 2 µg/mL). No differences noted in decrease in MAP, proportion dropping >20%, or FHR changes. ; 350 participants in each group needed to exclude type 2 error.

**Forceps Delivery**


479. Carroll TG, Engelken M, Mosier MC, Nazir N. Epidural analgesia and severe perineal laceration in a community-based obstetric practice. J Am Board Fam Pract 2003; 16:1-6. Retrospective cohort study of 2,759 patients noted 65 of 634 had an epidural placement and severe perineal lacerations. Concluded that epidural analgesia was associated with an increase in severe perineal trauma, but as a result of an associated threefold increased risk of instrument use. Instrument use in vaginal delivery more than tripled the risk of severe perineal laceration.

**Maternal Education**


481. Stewart A, Sodhi V, Harper N, Yentis SM. Assessment of the effect upon maternal knowledge of an information leaflet about pain relief in labour. Anaesthesia 2003; 58:1015-9. Parturients receiving the OAA leaflet (n=37) improved their knowledge over those receiving the standard booking information (n = 39).


483. Olayemi O, Aimakhu CO, Udoh ES. Attitudes of patients to obstetric analgesia at the University College Hospital, Ibadan, Nigeria. J Obstet Gynaecol 2003; 23:38-40. A Structured questionnaire administered to 1,000 antenatal patients notes awareness of obstetric analgesia is relatively low (only 10% were aware of epidural analgesia); however, a high proportion of patients would accept analgesia in labour if offered.

**Maternal Position**

484. Soetens FM, Meeuwis HC, Van der Donck AG, De Vel MA, Schijven MP, Van Zundert AA. Influence of maternal position during epidural labor analgesia. International Journal of Obstetric Anesthesia 2003; 12:98-101. Dosing of catheter with 0.125% bupivacaine 10mL with 1:800,000 epi + sufenta 7.5 µg in 77 women randomized to the left lateral or 15 degree left tilt positions. The 15 degree lateral tilt resulted in better bilateral sensory blockade at 20 and 30 min; however, supine hypotensive syndrome occurred in 3 patients (vs. none in other group) in this position.


Maternal Satisfaction

487. Elkadry E, Kenton K, White P, Creech S, Brubaker L. Do mothers remember key events during labor? Am J Obstet Gynecol 2003; 189:195-200. 60% of mothers (277 women with median of 10 wks since delivery, mean age 26yrs) could not recall accurately at least one major labor management event. Studies that rely on recall are likely to have high error rates. (NB. No anesthetic variables).

Obstetric Management

488. Roberts CL, Raynes-Greenow CH, Upton A, Douglas ID, Peat B. Management of labour among women with epidural analgesia. Aust N Z J Obstet Gynaecol 2003; 43:78-81. Survey of delivery suites in New South Wales (NSW) that annually provide at least 100 epidurals to 'standard primipara'. Epidural rates among 'standard primipara' at these hospitals ranged from 14 to 85% (median 46%). Continuous epidural infusion was the most commonly used technique (63%). For 'standard primipara' with an epidural 62% of units usually augmented labour with oxytocin, 89% discontinued the epidural in second stage and 67% had policies of delayed pushing.

PCEA

489. Boselli E, Debon R, Duflo F, Bryssine B, Allaouchiche B, Chassard D. Ropivacaine 0.15% plus sufentanil 0.5 microg/mL and ropivacaine 0.10% plus sufentanil 0.5 microg/mL are equivalent for patient-controlled epidural analgesia during labor. Anesth Analg 2003; 96:1173-7. Ropivacaine 0.10% + sufentanil 0.5 µg/mL via PCEA for labor analgesia is equally effective as ropivacaine 0.15% + 0.5 µg/mL. A 30% local anesthetic sparing effect and a 40% reduction in cost was also observed, however, no change in motor block or side effects were observed.

490. Ledin Eriksson S, Gentele C, Olofsson CH. PCEA compared to continuous epidural infusion in an ultra-low-dose regimen for labor pain relief: a randomized study. Acta Anaesthesiol Scand 2003; 47:1085-90. 80 parturients randomized to CEI with ropiv 1 mg/ml + sufent 0.5 µg/ml at 6 ml/h or PCEA with 4 mL demand doses with a 20 min lockout. PCEA consumed 33% less study solution with no differences in pain relief, efficacy, side effects or obstetric outcome.

Pharmacology


495. Arakawa M, Aoyama Y, Ohe Y. Block of the sacral segments in lumbar epidural anaesthesia. Br J Anaesth 2003; 90:173-8. 27 Nonpregnant patients given L4-5/L5-S1 blocks with 17 mL of agent suggests the addition of epinephrine and bicarbonate increases pain thresholds at S1 and S3 segments and decreases onset time.


499. Roelants F, Rizzo M, Lavand'homme P. The effect of epidural neostigmine combined with ropivacaine and sufentanil on neuraxial analgesia during labor. Anesth Analg 2003; 96:1161-6. Neostigmine (4 µg/kg) + ropivacaine 10 mg provided equivalent initial labor epidural analgesia to ropivacaine 20 mg; however was less effective than sufentanil 10 µg + ropivacaine 10 mg in terms of potency and duration.


502. Connelly NR, Parker RK, Pedersen T, et al. Diluent volume for epidural fentanyl and its effect on analgesia in early labor. Anesth Analg 2003; 96:1799-804. 60 laboring primigravid women receiving 3 mL epidural test dose of 1.5% lidocaine + 1:200K epi with 100 µg fentanyl in 2 mL, 10 mL, or 20 mL volume. When placed approx at 5cm, volume in which fentanyl given does not affect onset or duration of block or ability to ambulate.

503. Panni M, Segal S. New local anesthetics. Are they worth the cost? Anesthesiol Clin North America 2003; 21:19-38. Authors conclude that the large difference in cost cannot currently justify the use of these new agents in the obstetric setting.

504. Hart EM, Ahmed N, Buggy DJ. Impact study of the introduction of low-dose epidural (bupivacaine 0.1%/fentanyl 2É g.mL-1) compared with bupivacaine 0.25% for labour analgesia. International Journal of Obstetric Anesthesia. 2003; 12:4-8. Retrospective analysis of 300 parturients all receiving intermittent boluses, half receiving 0.25% bupiv versus 0.1% bupiv + fent 2 µg/mL 10mL. Concluded low dose reduces incidence of instrumental deliveries and bladder catheterization, but increases anesthetic interventions.

506. Polley LS, Columb MO. Ropivacaine and bupivacaine: concentrating on dosing! Anesth Analg 2003; 96:1251-3. Editorial on article below noting the difficulties in meta-analyses noting the importance of attention to relative potencies of local anesthetics.


510. Shin SW, Eisenach JC. Intrathecal morphine reduces the visceromotor response to acute uterine cervical distension in an estrogen-independent manner. Anesthesiology 2003; 98:1467-71; discussion 6A. Intrathecal morphine reduced the visceromotor reflex response to UCD in a dose-dependent manner that was unaffected by estrogen treatment.


513. Teoh WH, Sia AT. Hyperbaric bupivacaine 2.5 mg prolongs analgesia compared with plain bupivacaine when added to intrathecal fentanyl 25 microg in advanced labor. Anesth Analg 2003; 97:873-7. 37 nulliparous parturients noted hyperbaric formulation had longer median duration (122 min; 80-120 min) vs. (95 min;75-125 min).

514. Mather LE, Cousins MJ. The site of action of epidural fentanyl: what can be learned by studying the difference between infusion and bolus administration? The importance of history, one hopes. Anesth Analg 2003; 97:1211-3. Editorial queries whether the question is truly dichotomous, ie. Spinal or supraspinal only.

515. Ginosar Y, Riley ET, Angst MS. The site of action of epidural fentanyl in humans: the difference between infusion and bolus administration. Anesth Analg 2003; 97:1428-38. 10 nonpregnant volunteers in randomized crossover design to receive epidural bolus or infusion; authors conclude that for the dose range evaluated, epidural fentanyl acts predominantly at the spinal sites when given as a bolus, and supraspinal sites when administered as an infusion.

516. Ginosar Y, Columb MO, Cohen SE, et al. The site of action of epidural fentanyl infusions in the presence of local anesthetics: a minimum local analgesic concentration infusion study in nulliparous labor. Anesth Analg 2003; 97:1439-45. 48 women received epidural bupiv 0.125% 20-30mL then randomized to IV or epidural fentanyl 30 µg/h. MLAC then performed. Authors conclude that a marked increase in potency for epidural route.

517. Lacassie HJ, Columb MO. The relative motor blocking potencies of bupivacaine and levobupivacaine in labor. Anesth Analg 2003; 97:1509-13. 60 parturients in labor randomized to MLAC with epidural bupiv or levobupiv demonstrates levo provides less potent motor block.


521. Polley LS, Columb MO, Naughton NN, Wagner DS, van de Ven CJ, Goralski KH. Relative analgesic potencies of levobupivacaine and ropivacaine for epidural analgesia in labor. Anesthesiology 2003; 99:1354-8. 105 parturients at = 7cm dilated randomized to epidural with levo or ropiv in a MLAC study. Ropiv:levobupiv potency ratio 0.98; no difference in motor effects.

522. Benhamou D, Ghosh C, Mercier FJ. A randomized sequential allocation study to determine the minimum effective analgesic concentration of levobupivacaine and ropivacaine in patients receiving epidural analgesia for labor. Anesthesiology 2003; 99:1383-6. 94 parturients = 5cm dilated randomized to epidural with levo or ropiv in a MLAC study. Levo found to be 19% more potent than ropiv but similar sensory, motor and safety.

523. Castro C, Tharmaratnam U, Brockhurst N, Tureanu L, Tam K, Windrim R. Patient-controlled analgesia with fentanyl provides effective analgesia for second trimester labour: a randomized controlled study. Can J Anaesth 2003; 50:1039-46. 3 fentanyl PCA regimens compared with morphine PCA; no difference with respect to pain, however, morphine had highest side effects. Fent 50 µg q 6 min lockout had satisfactory analgesia.


527. Fernandez C, Sala X, Plaza A, Lopez A, Celemín M, Gomar C. [Epidural anesthesia with ropivacaine vs. bupivacaine in continuous perfusion for the treatment of labor pains]. Rev Esp Anestesiol Reanim 2003; 50:70-6. The analgesic efficacy and extent of motor block of 0.125% ropivacaine or 0.125% bupivacaine by continuous epidural perfusion in 60 ASA I-II women, each carrying a single fetus at full term and in spontaneous labor. Ropiv group required more boluses (NS), and motor block was greater in the Bupiv group (p < 0.05).


**Physiology**


532. Reynolds F. Fetal and maternal lactate increase during active second stage of labour (what about the effect of maternal analgesia?). Bjog 2003; 110:86. Letter suggesting the benefit of epiduralized labor having less severe metabolic acidosis and lower lactate levels at birth, and poses the question: Shouldn't the possible benefits to the baby of a maternal epidural be disclosed?


Progress of Labor


535. Reynolds F, Russell R, Porter J, Smeeton M. Does the use of low dose bupivacaine/opioid epidural infusion increase the normal delivery rate? International Journal of Obstetric Anaesthesia 2003; 12:156-163. Almost 600 parturients of mixed parity randomized to 0.0625% bupivacetanias fent 2.5 µg/mL or sufentan 0.25 µg/mL versus 0.125% bupiv. No increase in normal delivery rate with low dose infusion.


537. Plunkett BA, Lin A, Wong CA, Grobman WA, Peaceman AM. Management of the second stage of labor in nulliparas with continuous epidural analgesia. Obstet Gynecol 2003; 102:109-14. Randomizing approximately 200 nulliparous parturients with low dose bupivacaine 0.0625% with fentanyl 2 µg/ml to push immediately on full cervical dilation or to wait until a "strong urge" to push, the investigators found no difference in the time spent pushing (approximately 60 min), mode of delivery, or neonatal or maternal morbidity. However, "delayed" group only waited an average of 10 minutes longer.

538. Kuczkowski KM. Combined spinal-epidural analgesia and cervical dilation: Is there an association? Acta Anaesthesiol Scand 2003; 47:1305. Letter describes 2 multiparous women with rapid cervical dilation after CSE; queries if this can be a physiologic effect of the technique as previously reported in nulliparous patients.

539. Lewis NL, Plaat F, Qureshi AM. Syntocinon and 'epidurals' in labour--which comes first? Anaesthesia 2003; 58:1249-50. Nice letter reviews 500 consecutive mixed parity parturients. Notes that in 302 women who received regional analgesia and syntocinon augmentation of labor, 62% had the syntocinon already planned or in progress. Authors conclude epidural analgesia is not solely responsible for high rates of augmentation.

540. O'Connell MP, Hussain J, Maclellan FA, Lindow SW. Factors associated with a prolonged second state of labour--a case-controlled study of 364 nulliparous labours. J Obstet Gynaecol 2003; 23:255-7. Retrospective case control study of nulliparous women with a second stage less and more than 2 hours' duration. Shorter second stage of labour noted in patients significantly younger (mean age 23.2 vs. 24.9 years) with significantly smaller babies (mean weight 3315 g vs. 3463 g); longer labors were not surprisingly significantly associated with oxytocin and epidural use. The intervention rate did not rise above 50% until the second stage exceeded 5 hours duration. The fetal outcome was good in both groups of patients.
541. Wadland LP, Sveigaard AL, Jensen AG. [A study of labor pain experiences, knowledge of epidural pain relief and satisfaction with pain relief]. Ugeskr Laeger 2003; 165:4527-30. Retrospective study with epiduralized parturients (339) versus controls (6868) suggesting epidural has an effect on instrumental deliveries.

Retained Placenta

Spinal Technique

Termination of Pregnancy

Test Dose

546. Dalal P, Reynolds F, Gertenbach C, Harker H, O'Sullivan G. Assessing bupivacaine 10 mg/fentanyl 20 µg as an intrathecal test dose. International Journal of Obstetric Anesthesia 2003; 12:250-5. 42 patients: 20 scheduled for elective cesarean section via spinal and 22 for labor via epidural. Both groups received B 10 mg + F 20 µg either spinal or epidurally. At 4 minutes, the presence of warm toes and motor or sensory block were seen only in the spinal groups.


Timing of Placement
549. Carvalho B, Coghill J. Vaginal examination: a requirement before calling the anaesthetist? Br J Anaesth 2003; 90:402. Letter authors suggest that vaginal examination should be done immediately before placement to assist selection of labor analgesia.

Volatile Agents

Anesthesia for Cerclage Placement


Anesthesia for Cesarean Delivery

General Anesthesia


564. Jenkins JG, Khan MM. Anaesthesia for Caesarean section: a survey in a UK region from 1992 to 2002. Anaesthesia 2003; 58:1114-8. Use of regional anesthesia has increased dramatically for cesarean over the time period; authors site concern regarding limited trainee exposure to GA.

Lateral Tilt

565. Mendonca C, Griffiths J, Ateleanu B, Collis RE. Hypotension following combined spinal-epidural anaesthesia for Caesarean section. Left lateral position vs. tilted supine position. Anaesthesia 2003; 58:428-31. 87 parturients randomized to full or 12 degree left lateral after CSE in seated position; less early hypotension in full lateral group, however, when turned supine, developed hypotension; overall 80 vs. 90% hypotension respectively. Ephed requirements overall similar. 3 in full lateral position needed activation of epidural catheter.


568. Bamber JH, Dresner M. Aortocaval compression in pregnancy: the effect of changing the degree and direction of lateral tilt on maternal cardiac output. Anesth Analg 2003; 97:256-8. Brief report on 33 third trimester parturients placed in 7 positions with bioimpedence cardiography measurements. Full left lateral recumbent position has the optimal cardiac output; movement from left 5 to 12.5 degree had little advantage.

569. Siegmueller C. A simple device as a guide to 15 degrees tilt during Caesarean section. Anaesthesia 2003; 58:934. Letter described a weight suspended from the left edge of the OR table which just reaches the group with at 15 degrees tilt. Photo.

570. Law AC, Lam KK, Irwin MG. The effect of right versus left lateral decubitus positions on induction of spinal anesthesia for cesarean delivery. Anesth Analg 2003; 97:1795-9. 60 parturients placed in decubitus positions for placement of hyperbaric bupiv (2.2 mL 0.5%) + 15 µg fent, then immediately placed in 20 degree left lateral position, shows no difference in levels, vasopressor use, or complications.

Oxygenation

571. Edmark L, Kostova-Aherdan K, Enlund M, Hedenstierna G. Optimal oxygen concentration during induction of general anesthesia. Anesthesiology 2003; 98:28-33. Routine induction of general anesthesia in 36 non-pregnant women using 80% oxygen instead of 100% caused minimal atelectasis (recorded by computed tomography), but the time margin (303 ± 59 vs. 411 ± 84 s) before <90% oxygen saturation was significantly shortened.

572. Levy DM. F1O2 at emergency caesarean section. International Journal of Obstetric Anesthesia 2003; 12:140. Letter notes disagreement with authors (below); states insufficient evident to recommend optimal Fi02 for cesarean delivery under GA.

Pruritis


Postoperative Nausea and Vomiting

577. Nortcliffe SA, Shah J, Buggy DJ. Prevention of postoperative nausea and vomiting after spinal morphine for Caesarean section: comparison of cyclizine, dexamethasone and placebo. Br J Anaesth 2003; 90:665-70. 50 mg of cyclizine, an antiemetic, lessened the incidence and severity of n/v after bupiv 0.5% 2mL + fent 10 µg + 0.2 mg MSO4 better than dexamethasone 8mg or placebo.


579. Numazaki M, Fujii Y. Reduction of emetic symptoms during cesarean delivery with antiemetics: propofol at subhypnotic dose versus traditional antiemetics. J Clin Anesth 2003; 15:423-7. 100 parturients randomized to placebo, propofol 1mg/kg/hr, droperidol 1.25 mg or metoclopromide 10 mg. All non-propofol groups received intralipid placebo. Propofol, droperidol, and metoclopromide were equally effective (20% incidence nausea, retching, or vomiting) vs. 60% in placebo group.

Postoperative (Cesarean) Pain Management


584. Lowder JL, Shackelford DP, Holbert D, Beste TM. A randomized, controlled trial to compare ketorolac tromethamine versus placebo after cesarean section to reduce pain and narcotic usage. Am J Obstet Gynecol 2003; 189:1559-62; discussion 1562. 44 parturients randomized to PCA (morphine, hydromorphone, or meperidine!) with 2 q 6hr doses of ketorolac vs. placebo notes ketorolac effective for reduction of postoperative cesarean pain.

585. Duale C, Frey C, Bolandard F, Barriere A, Schoeffler P. Epidural versus intrathecal morphine for postoperative analgesia after Caesarean section. Br J Anaesth 2003; 91:690-4. CSE with 6mg hyper bupiv + sufenta 5 µg with additional epidural lido. 2mg epid vs. 0.075 mg spinal morphine noted VAS pain scores and additional morphine consumption over 24 hrs was higher in spinal group.

**Postoperative Shivering/Hypothermia**


**Regional Anesthesia**

589. Choi DM, Kliffer AP, Douglas MJ. Dextromethorphan and intrathecal morphine for analgesia after Caesarean section under spinal anaesthesia. Br J Anaesth 2003; 90:653-8. The addition of 60 mg oral dextromethorphan did not augment bupiv 0.75% 1.2-1.6 ML + fent 10 µg + 0.05, 0.1, or 0.2 mg MSO4. Decreased N/V with dextromethorphan groups.


591. Cooper DW. Intrathecal diamorphine or intrathecal fentanyl to supplement spinal anaesthesia for cesarean section? Br J Anaesth 2003; 90:107. Letter suggests fentanyl is superior due to lower risk of dosing error and contamination. Authors disagree.

592. Ngan Kee WD, Lee A. Multivariate analysis of factors associated with umbilical arterial pH and standard base excess after Caesarean section under spinal anaesthesia. Anaesthesia 2003; 58:125-30. Concludes that ephedrine should not be used before delivery, uterine incision-to-delivery times should be minimized, and alpha-agonists should be used to minimize the magnitude and duration of hypotension.


595. Saravanan S, Robinson AP, Qayoum Dar A, Columb MO, Lyons GR. Minimum dose of intrathecal diamorphine required to prevent intraoperative supplementation of spinal anaesthesia for Caesarean section. Br J Anaesth 2003; 91:368-72. The ED95 in 200 parturients note that 0.4 mg of intrathecal diamorphine is required to prevent intraoperative supplementation during spinal (hyperbaric 0.5% 12.5mg) anesthesia for C/S. Time to first request for analgesia, N, V, pruritis increase with dose.

596. Tortosa JC, Parry NS, Mercier FJ, Mazoit JX, Benhamou D. Efficacy of augmentation of epidural analgesia for Caesarean section. Br J Anaesth 2003; 91:532-5. Retrospective analysis of 194 parturients using lido 2% + epi for extension of an existing epidural noted general anesthesia and sedation required in 2.6% and 13.9%, respectively. Concludes augmentation of existing epidural for cesarean is reliable and effective.

597. Gautier P, De Kock M, Huberty L, Demir T, Izidorczic M, Vanderick B. Comparison of the effects of intrathecal ropivacaine, levobupivacaine, and bupivacaine for Caesarean section. Br J Anaesth 2003; 91:684-9. 90 parturients randomized to bupiv 8mg, L-bupiv 8mg, and Ropiv 12 mg (all with 2.5 µg sufenta) noted effective anesthesia in 97%, 80% and 87%, respectively. Concludes spinal racemic bupiv + sufenta remains an appropriate choice for C/S.


602. Meininger D, Byhahn C, Kessler P, et al. Intrathecal fentanyl, sufentanil, or placebo combined with hyperbaric mepivacaine 2% for parturients undergoing elective cesarean delivery. Anesth Analg 2003; 96:852-8, table of contents. 100 parturients randomized to 5 intrathecal groups: 60 mg mepivacaine (2%) + fentanyl (5 or 10 µg) or sufentail (2.5 or 5 µg). Mepiv is appropriate for elective cesarean delivery; the addition of narcotics markedly improved postoperative analgesia.

603. Cooper DW, Mowbray P. Can choice of vasopressor therapy affect rostral spread of spinal anaesthetic? Anesthesiology 2003; 98:1524. Observation and retrospective analysis suggesting that cervical level from CSE for cesarean delivery was lowest when hypotension was prevented with intravenous infusions of phenylephrine and highest with ephedrine.

604. McAndrew CR, Harms P. Paraesthesiae during needle-through-needle combined spinal epidural versus single-shot spinal for elective caesarean section. Anaes Intens Care 2003; 31:514-17. Seventeen of forty-six (37%) women in the needle-through-needle CSE group and four of forty-three (9%) in the SSS group had paraesthesiae upon spinal needle insertion (P < 0.05, Chi-squared test). No patient had persistent neurological symptoms at postoperative day one.

605. Arakawa M, Aoyama Y, Ohe Y. Efficacy of 1% ropivacaine at sacral segments in lumbar epidural anesthesia. Reg Anesth Pain Med 2003; 28:208-14. Nonpregnant patients randomized to lido 2%, lido 2% + epi + bicarb, and Ropiv 1% via lumbar epidural. Lido + epi + bicarb had significantly faster and higher pain thresholds at S1 and S3. 1% Ropiv may be inadequate at sacral levels at 20 min.

607. Faccenda KA, Simpson AM, Henderson DJ, Smith D, McGrady EM, Morrison LM. A comparison of levobupivacaine 0.5% and racemic bupivacaine 0.5% for extradural anesthesia for caesarean section. Reg Anesth Pain Med 2003; 28:394-400. 62 parturients undergoing cesarean randomized to epidural 25 mL levobupiv 5% vs. bupiv 5%. Similar block characteristics noted.


**Timing of Delivery**

610. O'Regan M. Delivery times for caesarean section at Queen Elizabeth Central Hospital, Blantyre, Malawi: is a 30-minute 'informed to start of operative delivery time' achievable? Anaesthesia 2003; 58:756-9. In a "developing world" urban teaching hospital, the 30 min decision to delivery time was reached in 69% of the time where an immediate threat to the lie of the mother or fetus was noted.

611. Yentis SM. Whose distress is it anyway? 'Fetal distress' and the 30-minute rule. Anaesthesia 2003; 58:732-3. Editorial observes that the indications for emergent cesarean should be continuously scrutinized; these indications lead to "chronological nit-picking".

612. McCahon RN, Catling S. Time required for surgical readiness in emergency caesarean section: spinal compared with general anaesthesia. International Journal of Obstetric Anesthesia 2003; 12:178-182. Observational retrospective study indicates that the average time for readiness was 15.4 min (range 2-44) versus 27.6 min (range 13-55 min) for general versus regional, respectively.


**Vaspressors**


615. Adsumelli RS, Steinberg ES, Schabel JE, Saunders TA, Poppers PJ. Sequential compression device with thigh-high sleeves supports mean arterial pressure during Caesarean section under spinal anaesthesia. Br J Anaesth 2003; 91:695-8. 50 parturients randomized to SCD 50 mmHg versus without had a 20% decrease in MAP 52% vs. 92% following 12 mg bupiv, 0.2 MS04, 10 µg fent.


617. Davies P, Howells H. Hypotension following combined spinal epidural anaesthesia. Anaesthesia 2003; 58:932; author reply 932-3. Letter suggests that placing parturients in full lateral position following CSE for cesarean delivery is a pointless to prevent hypotension; author Collis replies disagreement.


Anesthesia for Tubal Ligation


Complications-Anesthesia

Airway


623. Ovassapian A. Management of failed intubation in a septic parturient. Br J Anaesth 2003; 91:154; author reply 154-5. Letter suggests a number of intubations techniques that need to be learned and applied to the parturient, including the use of face mask ventilation during RSI. Response by authors of a 2002 case report agree.


627. Vaughan RS. Extubation--yesterday and today. Anaesthesia 2003; 58:949-50. Editorial querying what position (head down left lateral versus flat supine or head up positions) is best for extubation (non pregnant).


634. Gupta S, Pareek S, Dulara SC. Comparison of two methods for predicting difficult intubation in obstetric patients. Middle East J Anesthesiol 2003; 17:275-85. 372 obstetric patients undergoing elective or emergency cesarean under GA. When used as a predictor of difficult laryngoscopy sensitivity, specificity and positive predictive value for modified Mallampati test were 60%, 97.6% and 65% respectively and for Wilson risk sum they were 36%, 98.5% and 64% respectively, but when both tests were combined as predictors (with either of tests positive) sensitivity improved to 100% while specificity was marginally decreased to 96.2% and positive predictive value (64.8%) remained almost the same.

Allergy


Aspiration Prophylaxis


641. Mearns C, Elliott J. Midwives putting the pressure on...? Anaesthesia 2003; 58:297-8. Letter cites testing of members of theatre staff and concludes that no difference exists in the effectiveness of cricoid pressure applied by frequent vs. nonfrequent users, especially with inadequate training techniques.

643. Haslam N, Syndercombe A, Zimmer CR, Edmondson L, Duggan JE. Intragastric pressure and its relevance to protective cricoid force. Anaesthesia 2003; 58:1012-5. 100 consecutive patients studied with intragastric pressure manometry noted that 20N of force is sufficient to protect paralyzed patients from regurgitation.

644. Wilson NP. No pressure! Just feel the force. Anaesthesia 2003; 58:1135-6. Use of plunger of 20 mL syringe withdrawn to 20 mL mark with end occluded with an obturator. Depressing to 10 mL requires 30 N of force.

**Cardiac Arrest**

645. Pollard JB. High doses of local anaesthetic during spinal anaesthesia may increase the risk of life-threatening vagal reactions. Br J Anaesth 2003; 90:525-6; author reply 526. Letter commenting on vagal predominance with high spinal levels; reply suggests can occur with even low or moderate doses of meds.


647. Krishnam, Mallick A. Air in the epidural space leading to a neurological deficit. Anaesthesia 2003; 58:292-3. Letter noting ST segment depression during CS. Cardiac enzymes negative. Authors ask are we treating the patient or the ECG?


649. Lefrant JY, Muller L, de La Coussaye JE, et al. Hemodynamic and cardiac electrophysiologic effects of lidocaine-bupivacaine mixture in anesthetized and ventilated piglets. Anesthesiology 2003; 98:96-103. The alterations of ventricular conduction parameters are greater with 4mg/kg bupivacaine than with a mixture of 16 mg/kg lidocaine + 4 mg/kg bupivicaine; hemodynamic parameters, however, were similarly altered.


652. Polley LS, Santos AC. Cardiac arrest following regional anesthesia with ropivacaine: here we go again! Anesthesiology 2003; 99:1253-4. Editorial commenting on first reports of cardiac arrest with ropivacaine for surgical regional anesthesia (lumbar plexus and lower extremity blocks in nonpregnant individuals- not included); Suggests the need for more reliable injection and monitoring techniques for these types of blocks.

Drug Error


Drug Exposure


Equipment


657. Sturgess JE, Browne D. Complication of the combined spinal epidural technique 1. Anaesthesia 2003; 58:486; discussion 487. Letter. RapID extra-length pencil point spinal needle, 26G. Authors noted acute needle deformity during apparently atraumatic insertion.


Hearing Impairment


665. Letter indicating a case in a parturient that tinnitus can occur with a dural puncture and deserves attention. Resolved with a blood patch more slowly than headache.

666. Hardy PA. Transient hearing loss with labour epidural block. Anaesthesia 2003; 58:1041. Letter notes that the mechanism is straightforward but not often reported.
High Spinal


Hypoglycemia


Hypotension


Inadequate Anesthesia


Infection

672. Hearn M. Epidural abscess complicating insertion of epidural catheters. Br J Anaesth 2003; 90:706-7; author reply 707. In high risk patients (immunosuppression, diabetes, cancer, underlying infection, in ICU), epidural sites should be evaluated even after catheter removal.


682. Hebl JR, Horlocker TT. You're not as clean as you think! The role of asepsis in reducing infectious complications related to regional anesthesia. Reg Anesth Pain Med 2003; 28:376-9. Editorial reiterates the concerns articulated with the article below; also mentions the convening of ASRA Consensus Conference on The Infectious Risks Associated with Regional Anesthesia (March 2004).

683. Yentur EA, Luleci N, Topcu I, Degerli K, Surucuoglu S. Is skin disinfection with 10% povidone iodine sufficient to prevent epidural needle and catheter contamination? Reg Anesth Pain Med 2003; 28:389-93. 67 nonpregnant patients underwent epidural placement following 10% povidone-iodine disinfection; a significant number of skin surface, epidural needles and catheters cultures were positive for colonization.


**Intravenous Toxicity**

688. Stewart J, Kellett N, Castro D. The central nervous system and cardiovascular effects of levobupivacaine and ropivacaine in healthy volunteers. Anesth Analg 2003; 97:412-6. Levo and ropiv found to produce similar CNS and CV effects when infused in volunteers at equal concentrations (0.5%), mg doses, and infusion rates.


692. Groban L. Central nervous system and cardiac effects from long-acting amide local anesthetic toxicity in the intact animal
model. Reg Anesth Pain Med 2003; 28:3-11. Review of animal models of these local anesthetic toxicities and extrapolates to
the clinical setting.

693. Groban L, Butterworth J. Lipid reversal of bupivacaine toxicity: has the silver bullet been identified? Reg Anesth Pain Med

sec successful only when lipid (vs. saline) infusion was given 10 min after internal cardiac massage.

Letter suggests use of dedicated syringes and placement of epidural meds to avoid use in the IV.

Nausea/Vomiting

2003; 97:62-71. Nonpregnant individuals, however, good resource for management of these two entities.

2003; 98:530-47. Nonpregnant individuals under a variety of blocks, however, includes good information on intrathecal and
epidural medications and risk of PONV.

Neurologic Injury

Nice review article with recommendations.

highlighting need to be vigilant prior to and after blockade. Elderly patient reported.

700. Eldor J. Whitacre spinal needle vs. Eldor spinal needle regarding the incidence of transient neurologic symptoms. Acta
Anaesthesiol Scand 2003; 47:635-6. Letter suggesting that TNS symptoms should more carefully acknowledge needle type.

Suggests air in the epidural space, confirmed by CT, resulted in sensory deficit in buttock, leg, and foot which resolved over
9 days.

2003; 90:402-4; author reply 403-4. Letter suggests TNS was the result of sequential full doses of local anesthetics.

703. de Medicis E. Paraplegia in association with spinal/epidural anaesthesia caused by unrecognized vertebral metastasis. Acta
Anaesthesiol Scand 2003; 47:781; author reply 782. Letter questions association between paraplegia by vertebral metastasis
and CSE.

pediatric case that raises relevant issues of performing an epidural following a dural puncture.

705. Rodi Z, Straus I, Denic K, Deletis V, Vodusek DB. Transient paraplegia revealed by intraoperative neurophysiological
monitoring: was it caused by the epidural anesthetic or an epidural hematoma? Anesth Analg 2003; 96:1785-8. Non-pregnant
case report revealing the value of intraoperative neurophysiologic monitoring in revealing an epidural hematoma.


Other Injury


**Prolonged Spinal Anesthesia**


**Pruritis**

728. Mahajan R, Kumar Grover V. Neuraxial opioids and Koebner phenomenon: implications for anesthesiologists. Anesthesiology 2003; 99:229-30. Two case reports (nonpregnant) of a disease process where in persons with certain skin diseases, trauma is followed by new lesions identical to those in diseased skin; this may occur with pruritis following neuraxial opioids.

**Recurrent Anesthesia**


Respiratory Depression

731. Anwari JS, Iqbal S. Antihistamines and potentiation of opioid induced sedation and respiratory depression. Anaesthesia 2003; 58:494-5. Letter. Author suggests chlorpheniramine for treatment of pruritis was responsible for sedation/respiratory depression in parturient who received epidural local anesthetic + fentanyl for post c/s analgesia.


Seizures


Spinal Headache


736. Clark MJ, Sellers WFS. Post dural puncture headache. Anaesthesia 2003; 58:101. Letter notes that neurologists don't yet know the value of non-quinke tip needles. "Today's lumbar puncture may be tomorrow's spinal or epidural anaesthetic on an unwilling patient".


Zimet A. Encourage the use of noncutting needles for diagnostic lumbar punctures. Anesth Analg 2003; 97:303. Letter noting the need for anesthesiologist to share their knowledge of needles with those practitioners doing lumbar punctures.


Ayad S, Demian Y, Narouze SN, Tetzlaff JE. Subarachnoid catheter placement after wet tap for analgesia in labor: influence on the risk of headache in obstetric patients. Reg Anesth Pain Med 2003; 28:512-5. 115 parturients over 5 yrs divided by consecutive assignment after wet tap to epidural replacement, spinal cath removed at delivery, or spinal cath removed 24 hrs after delivery. PDPH most common in epid (81%), spinal removed (31%), or spinal X24 (3%).


Kuczkowski KM, Benumof JL. Once a post-dural puncture headache patient always post-dural puncture headache patient? Acta Anaesthesiol Belg 2003; 54:167-8. Parturient with PDPH x 2; authors suggest prior PDPH may place pt at high risk for future PDPH.

**Urinary Incontinence/Retention**

758. Hershberger JM, Milad MP. A randomized clinical trial of lorazepam for the reduction of postoperative urinary retention. Obstet Gynecol 2003; 102:311-6. 90 nonpregnant women randomized to lorazepam vs. placebo noted no significant difference in postoperative urinary retention after ambulatory gynecologic surgeries (non-pregnant).

759. Rortveit G, Daltveit AK, Hunskaa S. Vaginal delivery parameters and urinary incontinence: the Norwegian EPINCONT study. Am J Obstet Gynecol 2003; 189:1268-74. Although a statistically significant association was found between maternal stress incontinence in later life and birth weight >4000 g and epidural anaesthesia, the effects were too weak to suggest a real link.


**Consent**


764. Ranganathan M, Raghuraman G. Ethical considerations in obtaining consent under anaesthesia. Anaesthesia 2003; 58:1250-1; author reply 1251. Letter suggests errors in judgement in age (16 yo has capacity to decide in UK) and incorrect diagnosis on consent.


**Economics and Staffing**

768. Nyssen AS, Hansez I, Baele P, Lamy M, De Keyser V. Occupational stress and burnout in anaesthesia. Br J Anaesth 2003; 90:333-7. Questionnaire study of 318 Belgium anaesthesists. Anaesthetists have a mean stress level no higher than in other working populations; however, 40.4% of the group suffered from high emotional exhaustion (burnout). The highest rate was in young trainees under 30 years of age.
769. Qureshi AM, Stevens M, Plaat F. Survey of anaesthetic support staff in obstetric units in England and Wales. Anaesthesia 2003; 58:578-82. Postal questionnaire of which 197 (76% response rate) obstetric units replied, indicating that 86% did not have a operating department practitioner/nurse (ODP/N) or resident exclusively for the maternity unit. Midwives in 76% of the units assisted the anaesthetist with the insertion of regional labor blocks.


**Pharmacology**


772. Eisenach JC, Yaksh TL. Epidural ketamine in healthy children--what's the point? Anesth Analg 2003; 96:626; author reply 626-7. Letter raises the issue of the need for preclinical toxicity studies prior to studying an agent within the epidural space.


780. Dogru K, Daligic H, Yildiz K, Sezer Z, Madenoglu H. The direct depressant effects of desflurane and sevoflurane on spontaneous contractions of isolated gravid rat myometrium. International Journal of Obstetric Anesthesia 2003; 12:74-78. In vitro application of 0.5, 1.0, 2.0 MAC desflurane and sevoflurane in gravid rat myometrium. In a dose dependent manner, both agents had tocolytic activity, with such activity starting at 0.5 and 1.0 MAC with desflurane and sevoflurane respectively.
781. Senat MV, Fischer C, Bernard JP, Ville Y. The use of lidocaine for fetocide in late termination of pregnancy. Bjog 2003; 110:296-300. Lidocaine 1% (7-20 mL) was effective via umbilical vein puncture to induce permanent fetal cardiac asystole for fetocide in late termination of pregnancy.


783. Andaluz A, Tusell J, Trasserres O, et al. Transplacental transfer of propofol in pregnant ewes. Vet J 2003; 166:198-204. This study determines the pharmacokinetics of propofol in pregnant ewes in the last third of pregnancy, and placent al transfer and pharmacokinetics in fetuses after the administration of a 6 mg/kg intravenous (i.v.) bolus (phase 1) or a 6 mg/kg i.v. bolus followed by continued infusion of 0.4 mg/kg/min. In ewes, the area under the blood concentration-time curve (AUC) and C(max) (8.6 mg/h/mL and 9.5 mg/mL, respectively) was higher than those of the fetus (1.6 mg/h/mL and 1.19 mg/mL, respectively). The mean half-life was 0.5h in the dam and 1.1h in the fetus.

784. Karsli B, Kayacan N, Kucukyavuz Z, Mimaroglu C. Effects of local anesthetics on pregnant uterine muscles. Pol J Pharmacol 2003; 55:51-6. Exposure on myometrium isolated from pregnant rats to prilocaine, bupivacaine and ultracaine decreased amplitude, duration and integrated area under the contraction curve. In conclusion, the study drugs at higher concentrations decreased contractions of myometrium, but all drugs at higher concentrations elevated the frequency.


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**Physiology**

792. Dolan S, Kelly JG, Huan M, Nolan AM. Transient up-regulation of spinal cyclooxygenase-2 and neuronal nitric oxide synthase following surgical inflammation. Anesthesiology 2003; 98:170-80. Spinal cyclooxygenase and neuronal nitric oxide synthase (NOS) in adult female sheep undergoing midline laparatomy for collection of ova are spinally induced. The findings also suggested a link with these enzymes and superovulatory treatment.

**MISCELLANEOUS**

**Abstracts**


**Education/Residency/Registrar Training**


796. Naik VN, Devito I, Halpern SH. Cusum analysis is a useful tool to assess resident proficiency at insertion of labour epidurals. Can J Anaesth 2003; 50:694-8. Cumulative sum analysis (Cusum) can be used to tracht proficiency; suggests some residents require as many as 75 attempts.


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**Ethics**


802. Walton S. Birth plans and the falacy of the Ulysses directive. International Journal of Obstetric Anesthesia 2003; 12:138-139. Thoughtful letter presents philosophical arguments why going against the Ulysses directive (desire to be bound by original directive) is acceptable.


History


Labor Support

811. Continuous labor support offers big benefits to mothers and babies, has no known downsides; support from non-hospital caregivers reduced risk of cesarean birth by impressive 26%. PR Newswire Association, Inc., 2003. Article covering the "Continuous support for women during childbirth" study by the Cochrane Collaboration, citing the benefit of non-hospital caregivers (below).

812. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. Cochrane Database Syst Rev 2003:CD003766. Fifteen trials involving 12,791 women are included. In general, continuous intrapartum support was associated with greater benefits when the provider was not a member of the hospital staff, when it began early in labour, and in settings in which epidural analgesia was not routinely available.


Medicolegal Issues


Nursing


821. Mahlmeister L. Nursing responsibilities in preventing, preparing for, and managing epidural emergencies. J Perinat Neonatal Nurs 2003; 17:19-32; quiz 33-4. Review of the significant complications related to obstetric epidural with nurse recommendations in preparing for and managing epidural emergencies. Specific responsibilities of nurse managers and educators in competency training, evaluation, and guidance of nurses are also discussed.

Research


Websites/Books/Leaflets/Journal Announcements


838. Quilligan EJ, Zuspan FP. Farewell address from Dr. Quilligan and Dr. Zuspan. Am J Obstet Gynecol 2003; 189:4. Address by our friend in the obstetric community, Dr. F Zuspan.


Poster Review #2

Moderator: Pamela J. Angle, MD
Saturday, May 15
9:45 - 10:45 am

SOAP A68
QUANTITATIVE AND QUALITATIVE RELATIONSHIP OF PLATELETS IN PREGNANCY
N. O'Rourke, S. Lemire, L. C. Tsen, D. Dorfman, S. Datta, B. Kodali;
Brigham and Women's Hospital, Boston, MA

SOAP A69
ANTENATAL HIGH-RISK ANESTHESIA CONSULTATION SERVICE: A REVIEW OVER TWO AND A HALF YEARS
E. Cappiello, N. O'Rourke, W. Camann, M. Hammett;
Brigham and Women's Hospital, Boston, MA

SOAP A70
ENHANCED EPIDURAL LABOR PAIN RELIEF WITH THE ADDITION OF A SPINAL TECHNIQUE
E. Cappiello, N. O'Rourke, S. Segal, L. C. Tsen;
Brigham & Women's Hospital, Boston, MA

SOAP A71
BIRTH PLANS: WHAT IS IMPORTANT TO THE LABORING PARTURIENT?
A. Olufolabi, H. Pan;
Duke University, Durham, NC

SOAP A72
A UNIQUE LOSS OF RESISTANCE SYRINGE FOR EPIDURAL NEEDLE PLACEMENT
E. T. Riley, S. Sundar;
Stanford University School of Medicine, Stanford, CA, Indigo Orb, Inc,
Milpitas, CA
Other Disclosure: Satish Sundar is principal owner of Indigo Orb, Inc. and Edward Riley is the medical director for the company.

SOAP A73
A PRELIMINARY COMPARISON OF 2 FLEXIBLE, WIRE-REINFORCED EPIDURAL CATHETERS FOR LABOR ANALGESIA AND CESAREAN SECTION: ARE 3 EYES STILL BETTER THAN 1?
J. E. Spiegel, A. Vasudevan, P. Hess;
Beth Israel Deaconess Medical Center, Boston, MA

SOAP A74
A 3-DIMENSIONAL MAGNETIC RESONANCE IMAGING MODEL FOR THE ASSESSMENT OF LUMBOSACRAL CEREBROSPINAL FLUID VOLUME
S. Grouper, J. T. Sullivan, T. B. Parrish, M. T. Walker, R. J. McCarthy,
C. A. Wong;
Northwestern University Feinberg School of Medicine, Chicago, IL

SOAP A75
LABOR NEURAXIAL ANALGESIA AND MATERNAL TEMPERATURE
Magee Women's Hospital & University of Pittsburgh, Pittsburgh, PA

SOAP A76
EPIDURAL ANALGESIA AND INTRAPARTUM FEVER: DOES BUPIVACAINE CONCENTRATION MATTER?
S. J. Reid, S. Stetsko;
Grey Nuns Hospital, Edmonton, AB, Canada

SOAP A77
PROPHYLACTIC EPHEDRINE AND FETAL HEART RATE DECELERATIONS AFTER CSE
P. Flood, J. Cleary-Goldman, M. Negron, W. Camann, J. Scott;
Columbia University, New York, NY, Harvard University, Boston, MA

SOAP A78
RELATIONSHIP BETWEEN THE CHANGES IN THE AUTONOMIC NERVOUS SYSTEM AND SOMATOSENSORY BLOCK LEVELS AFTER EPIDURAL ANALGESIA IN LABORING PATIENTS
K. Loo, I. Kaufman, A. Deschamps;
McGill University, Montreal, PQ, Canada, McGill University Health Center, Montreal, PQ, Canada

SOAP A79
COMBINED SPINAL EPIDURAL VERSUS EPIDURALS, ASSOCIATION OF SEVERE FETAL BRADYCARDIA WITH HIGH DISTRESS LEVEL DURING LABOR
J. Nicolet, L. Olivieri, I. Kaufman, A. Deschamps;
McGill University Health Center, Montreal, PQ, Canada

SOAP A80
PREDICTING PROLONGED FETAL HEART DECELERATION WITH INTRATECAL BUPIVACAINE/FENTANYL
R. R. Gaiser, T. G. Cheek, B. B. Gutsche;
University of Pennsylvania, Philadelphia, PA

SOAP A81
EFFICACY OF PROPHYLACTIC EPIDURAL BLOOD PATCH
M. M. Barry, D. Mayer, W. Barry, F. Spielman;
University of North Carolina, Chapel Hill, NC

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
SOAP A82
SHOULD WE OFFER EPIDURAL-PCA ANALGESIA WITH AMBULATION FOR MULTIPARAE FOR LABOR PAIN?
S. Cohen, B. Yanni, C. Pantuck, E. Pantuck, E. Sakr, A. Sakr, V. Bhavsar;
UMDNJ-RWJMS, New Brunswick, NJ
Honorarium Disclosure: AstraZeneca Corporation

SOAP A83
EPIDURAL BLOCK FOR CESAREAN SECTION WITH GRAVITY FLOW TECHNIQUE: DOES THE ADDITION OF EPINEPHRINE TO ROPIVACAINE REDUCE THE INCIDENCE OF EPIDURAL BLOOD VESSEL PUNCTURE?
S. Cohen, A. Sakr, E. Sakr, B. Yanni, R. Samet, O. Fadare, M. Casciano;
UMDNJ-RWJMS, New Brunswick, NJ
Honorarium Disclosure: AstraZeneca Corporation

SOAP A84
IS REGIONAL ANESTHESIA SAFE FOR CESAREAN SECTION IN SEVERE PREGNANCY INDUCED HYPERTENSION?
M. N. Siddiqui, S. Ranasinghe, J. L. Steadman, S. M. Siddiqui, T. Toyama;
Fairview Hospital, Great Barrington, MA, Jackson Memorial Hospital/University of Miami, Miami, FL

SOAP A85
DOES CHLOROPROCAINE INHIBIT THE ACTION OF OPIOIDS?
M. N. Siddiqui, J. L. Steadman, S. M. Siddiqui, J. Ranasinghe, T. Toyama;
Fairview Hospital, Great Barrington, MA, Jackson Memorial Hospital/University of Miami, Miami, FL

SOAP A86
TRENDS IN INTRA-PARTUM BLOOD TRANSFUSION AT PARIS PORT-ROYAL MATERNITY 1995-2003
L. Arnaoult, A. Shaffi, S. Jacqmin, V. Tsatsaris, D. Cabrol, A. Mignon, Y. Ozier;
Anesthesiology Cochin Hospital, Paris, France

SOAP A87
CESAREAN SECTION FOR PLACENTA PREVIA (PP): A 10-YEAR RETROSPECTIVE STUDY
M. Dupont, A. Lanceleur, S. Jacqmin, V. Tsatsaris, D. Cabrol, A. Mignon, Y. Ozier;
Anesthesiology Cochin Hospital, Paris, France

SOAP A88
LABOR EPIDURAL CATHETER-IN-SITU FOR POSTPARTUM TUBAL LIGATION SURGERY - A REVISIT
P. H. Pan, T. Bogard, M. D. Owen, C. Beck;
Wake Forest University, Winston-Salem, NC

SOAP A89
SURVEY OF LABOR IV PCA PRACTICES AMONG SOAP 2003 PARTICIPANTS
P. H. Pan;
Wake Forest University, Winston-Salem, NC

SOAP A90
INTRATHECAL MORPHINE FOR ANALGESIA FOLLOWING POSTPARTUM BILATERAL TUBAL LIGATION
The Duke Women's Anesthesia Research Group;
Duke University Medical Center, Durham, NC

SOAP A91
THE USE OF TRANSCUTANEOUS ACUPOINT ELECTRICAL STIMULATION FOR THE PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING FOLLOWING CESAREAN SECTION WITH NEURAXIAL OPIATES
The Duke Women's Anesthesia Research Group;
Duke University Medical Center, Durham, NC

SOAP A92
URINARY CATHETERIZATION REQUIREMENT DURING LABOR: CAREGIVER BELIEFS AND PRACTICES
P. L. Dalby, E. Chong, A. Tan, K. Golebiewski, B. Kaul;
Magee-Womens Hospital - UPMC, Pittsburgh, PA, Shadyside Hospital - UPMC, Pittsburgh, PA, Presbyterian Hospital - UPMC, Pittsburgh, PA

SOAP A93
THE CESAREAN DECISION TO INCISION INTERVAL AND NEONATAL OUTCOME
C. A. Wong, A. Ernt, P. Toledo, S. Grouper, R. J. McCarthy;
Northwestern University, Chicago, IL

SOAP A94
SUPPLEMENTAL OXYGEN DURING REGIONAL ANESTHESIA FOR CESAREAN DELIVERY
C. M. Palmer, W. Nogami;
University of Arizona Health Sciences Center, Tucson, AZ

SOAP A95
EFFECT OF ANESTHESIA FOR CESAREAN SECTION ON NEONATAL ACID-BASE STATUS
F. REYNOLDS, L. PAY, P. T. SEED;
St. Thomas' Hospital, London, United Kingdom

SOAP A96
INDICATIONS FOR GENERAL ANESTHESIA DURING CESAREAN SECTION
Brigham and Women's Hospital, Harvard Medical School, Boston, MA

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
Poster Review #2 (cont’d)

SOAP A97
SURVEY QUESTIONNAIRE: DIFFICULT AIRWAY MANAGEMENT DURING CESAREAN SECTION AND AVAILABILITY OF AIRWAY EQUIPMENT IN THE LABOR AND DELIVERY (L/D) SUITE
M. S. Suresh, A. Wali, M. Siddiqui, E. Felton, A. Oswald;
Baylor College of Medicine, Houston, TX

SOAP A98
LITTLE MONEY, LITTLE LAW : THE IMPACT OF INTERNET PHARMACIES ON ANTENATAL CARE
Y. Yamamura, G. M. Vasdev, P. A. Southorn, E. Rho;
Mayo College of Medicine, Rochester, MN

SOAP A99
RETENTION OF INTUBATION SKILLS BY FULLTIME OBSTETRIC ANESTHESIOLOGISTS
J. E. Forestner, S. K. Sharma;
University of Texas Southwestern Medical School, Dallas, TX

SOAP A100
VIRTUAL PHARMACOPHORES
R. Glassenberg, S. Glassenberg, D. Hanck, G. Lipkind;
Northwestern University, Chicago, IL, Stanford University, Stanford, CA, University of Chicago, Chicago, IL

SOAP A101
THE INTERACTIVE PLACENTA
R. Glassenberg, J. Glassenberg;
Northwestern University, Chicago, IL, University of Illinois, Urbana, IL

SOAP A102
SIMULATOR TEACHING OF OBSTETRICAL ANESTHESIA FOR MEDICAL STUDENTS
R. C. Romeo, P. L. Dalby, D. J. Davis;
University of Pittsburgh - Magee Womens Hospital, Pittsburgh, PA

SOAP A103
DEVELOPMENT OF A UNIFIED ASSESSMENT TOOL FOR MEASURING RESIDENT PERFORMANCE DURING AN OBSTETRIC ANESTHETIC SCENARIO ON A HIGH FIDELITY HUMAN PATIENT SIMULATOR
M. T. Sproviero, B. M. Scavone, V. J. Siddall, L. Wade;
Northwestern University Feinberg School of Medicine, Chicago, IL

SOAP A104
INCREASES IN CLOT INITIATION AND RATE OF FIBRIN FORMATION ARE RESPONSIBLE FOR AMNIOTIC FLUID-INDUCED HYPERCOAGULABILITY
J. A. Dolak, J. A. Dubsky, J. H. Waters;
The Cleveland Clinic Foundation, Cleveland, OH

SOAP A105
A NOVEL IN VITRO MODEL OF AMNIOTIC FLUID-INDUCED HYPERCOAGULABILITY
J. A. Dolak, J. A. Dubsky, J. H. Waters;
The Cleveland Clinic Foundation, Cleveland, OH

SOAP A106
INTRODUCTION OF AUTOMATED ANESTHESIA RECORD KEEPING (HARDWIRED AND WIRELESS) ON A LABOR AND DELIVERY UNIT
Duke University, Durham, NC

SOAP A107
PHYSICIANS ARE LEAST LIKELY TO APPLY EMERGENCY PROTOCOLS ON A LABOR WARD ACCURATELY
Duke University, Durham, NC

SOAP A108
COMMUNICATION WITH OUR SPANISH SPEAKING PATIENTS - THEIR PERCEPTION OF THE LANGUAGE BARRIER
Duke University, Durham, NC

SOAP A109
OVERCOMING THE LANGUAGE BARRIER IN OBSTETRIC ANESTHESIA PRACTICE: AN ANESTHESIA CARE PROVIDER’S PERSPECTIVE
J. T. Schlitt, A. J. Olufolabi, A. S. Habib;
Duke University Medical Center, Durham, NC

SOAP A110
GESTATION-DEPENDENT ERK PRIMING FOR LABOR IN RAT MYOMETRIUM
Y. Li, C. Gallant, K. G. Morgan;
Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, Boston Biomedical Research Institute, Watertown, MA

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
NOTES
Fred Hehre Lecture

Maternal Mortality: What have we learned and how do we use it?

Samuel C. Hughes, MD

Saturday, May 15
10:45 - 11:45 am

Following this lecture, participants will be able to:

1. Discuss the root causes of maternal obstetric disasters;

2. Consider changes in obstetric anesthesia practice and training to potentially avoid these disasters.

Frederick W. Hehre, MD
Panel Discussion:
“Practical SOAP Labor Analgesia”
Alternatives to Conventional Epidural and CSE Analgesia in Labor

Moderator: David J. Birnbach, MD
Valerie A. Arkoosh, MD; Tracie A. Saunders, MD;
Kathryn J. Zuspan, MD; William R. Camann, MD

Saturday, May 15
1:00 - 2:25 pm

Following this Session, the learner will be able to:

1. Discuss alternatives to epidural and CSE for labor analgesia;
2. Discuss how these might fit into our practice.
Continuous Spinal Labor Analgesia

The development of 28 gauge catheters that can pass through a 22 gauge needle produced a resurgence of interest in continuous spinal analgesia for labor. A continuous technique overcomes many of the limitations of single injections. It allows repeated medication injection during labor and offers the option of rapid conversion to an anesthetic for instrumented vaginal or cesarean delivery. Other potential advantages of continuous spinal analgesia include: dependable catheter placement, less reliance on local anesthetics, the ability to provide analgesia and anesthesia rapidly, minimal drug requirement and symmetrical, bilateral sensory blockade. The unfortunate reports of cauda equina syndrome that followed the widespread introduction of small gauge spinal catheters(1) led the Food and Drug Administration to mandate their removal from the market.(2)

Spinal catheters may predispose to maldistribution of local anesthetic, exposing nerve roots to toxic concentrations of drug. Local anesthetic injected through larger gauge spinal needles disperses widely throughout the CSF. In contrast, drug injected through small-bore spinal catheters pools near the site of injection or flows with gravity. Should a spinal catheter be directed caudally, high concentrations of drug may arise in the region of the cauda equina.(3) Hyperbaric drug appears more likely than isobaric local anesthetics to pool in dependent regions of the spinal cord and damage nerve roots. Hyperbaric 5% lidocaine, in particular, is neurotoxic in some laboratory preparations.(4)

Recently, a multicenter trial evaluating the safety and efficacy of continuous spinal labor analgesia with a 28 gauge catheter has been completed.(5) The results of this study will be discussed in some detail. In sum, the study found the technique, which utilized a continuous infusion of sufentanil with intermittent boluses of 0.25% bupivacaine, to be safe and very effective.

Continuous spinal labor analgesia is a promising technique. Currently, the catheter is under review by the FDA for re-introduction to the market. Additional studies will be required to identify optimal medication combinations and dosing regimens for labor analgesia.

4. Lambert LA, Lambert DH, Strichartz GR. Irreversible conduction block in isolated nerve by high concentrations of local anesthetics. Anesthesiology 1994, 80:1082-93.
NOTES
Tracie A. Saunders, MD
Assistant Professor of Anesthesiology and Obstetrics/Gynecology and Reproductive Medicine
SUNY Stony Brook
University Hospital
Stony Brook, NY

Parenteral Opioid Labor Analgesia

The first use of parenteral opioid labor analgesia (POLA) was in 1853 shortly after the development of the syringe and hollow metal needle. Obstetrical care teams frequently give POLA to parturients who, for whatever reason, are not candidates for regional analgesia. Reasons include patient preference, obstetrical care team or institutional preference, contraindication to regional analgesia, technically impossible placement, previous surgical alteration of the epidural space, lack of available personnel with expertise to perform the regional technique and/or monitor the parturient and the fetus.

Standard requirements for initiation of POLA include: resuscitation drugs and equipment immediately available, monitoring protocols established including appropriate nursing observation, and pulse oximetry. Neonatal healthcare providers must be made aware of the potential for neonatal respiratory depression at the time of delivery and the necessary resuscitation drugs (i.e. naloxone) and equipment must be immediately available.

The Ideal Parenteral Opioid Labor Analgesic

The ideal POLA would have the following features: quick onset of action, eliminates pain, and minimal maternal/fetal side effects. Unfortunately, the ideal POLA (Table 1) does not exist. Therefore, parturient education is extremely important when the decision is made to provide parenteral analgesia to ensure that the parturient does not have unrealistic expectations regarding its efficacy compared to regional techniques. If possible, obstetrical care providers of pregnant women with identified contraindications to regional analgesia should refer their patients for formal anesthesiology consultations long before the parturients present in active labor (i.e. 30 weeks gestation).

Table 1. The Ideal Parenteral Opioid Analgesic For Labor

<table>
<thead>
<tr>
<th>Maternal</th>
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</thead>
<tbody>
<tr>
<td>Quick onset of action</td>
</tr>
<tr>
<td>Minimal maternal respiratory depression</td>
</tr>
<tr>
<td>Minimal maternal postural hypotension</td>
</tr>
<tr>
<td>Eliminates pain</td>
</tr>
<tr>
<td>Minimal emetic effects</td>
</tr>
<tr>
<td>No maternal sedation</td>
</tr>
<tr>
<td>No accumulation/deposition of drug or metabolites</td>
</tr>
<tr>
<td>No effect on uterine activity</td>
</tr>
<tr>
<td>No effect on cervical dilatation</td>
</tr>
</tbody>
</table>
**Fetal**

Does not cross placenta

- No fetal depressant effects (dose, route, timing)
- No change in neonatal neurobehavior status
- No effect on fetal heart tracing (decelerations)
- No effect on fetal O2 Saturation (desaturation)
- No fetal accumulation/deposition of drug or metabolites

**Intermittent Bolus Opioids (IM/IV)**

Meperidine was first used in labor in the 1940s and despite the fact that it has been associated with many adverse fetal and neonatal effects and maternal sedation\(^1\), it continues to be the most commonly used parenteral labor analgesic worldwide. Studies on meperidine have consistently shed doubts on its effectiveness as a labor analgesic\(^2\) and raised concerns about its effects on the fetus\(^3,4\). However, a recent metanalysis concluded that there was no convincing evidence that newer intramuscular opioid agonists and partial agonists (tramadol, meptazinol, diamorphine, pentazocine, nalbuphine, and butorphanol) were better POLAs compared to meperidine.

One small unblinded, randomized, controlled trial (39 women) compared intravenous with intramuscular meperidine. Women in the intravenous group received significantly more meperidine during labor and reported significantly lower levels of pain during labor. Significantly more women in the intramuscular group used supplemental inhalational analgesia (Entenox) (5% vs 40%, \(P = .04\)). There was no difference in side effects, oxytocin augmentation, instrumental deliveries, or neonatal outcomes reported.\(^5\)

Studies have shown, however, that intravenous fentanyl provides more effective labor analgesia (1µg/kg or 100µg every 45-60 min) than meperidine\(^6\).

**Patient-controlled analgesia (PCA)**

The earliest documented use of IV PCA opiates for labor was by Evans, et al. in 1976. In a recent study by Long, PCA tramadol was shown to provide moderate labor analgesia and good patient satisfaction. Tramadol is a centrally acting analgesic synthetic analogue of codeine that binds to mu opiate receptors and inhibits norepinephrine and serotonin reuptake. Labor analgesia provided by meperidine and tramadol is comparable and in a recent study, it was shown that approximately 50% of women rated the analgesia as good. Tramadol is made in Germany and the intravenous formulation is not commercially available in the United States. In another study, meperidine was shown to provide more effective labor analgesia especially in the second stage with less maternal side effects than tramadol.\(^7\)

IV PCA fentanyl has a very promising profile for providing the ideal parenteral labor analgesic. It is well-known with a long track record of safety. It has a rapid onset of action and a relatively short half-life.\(^8\) Fentanyl has no active metabolites to cause neonatal respiratory depression.\(^9\) A recent review of parenteral opioids for labor analgesia by Campbell provides a typical protocol for PCA fentanyl. In this case labor analgesia is initiated with 1-2 µg/kg(100-150µg) of fentanyl followed by PCA fentanyl(Bolus: 50µg; Lockout: 10 min; No 4 hour limit; No Continuous Infusion)\(^10\). Evidence-based data evaluating the use of parenteral alfentanil and sufentanil for labor analgesia is scant. Morley-Forster et al compared PCA fentanyl with PCA alfentanil for labor analgesia and found that PCA fentanyl provided superior labor analgesia with no difference in maternal side effects.\(^11\)
The newest opiate to be used for labor analgesia is remifentanil, an ultra-short-acting drug that was specifically synthesized to be a potent µ-opioid receptor agonist subject to esterase metabolism. Remifentanil has rapid onset - (time to peak effect of 60 to 90 seconds) and rapid offset - times irrespective of the duration of its administration. The half-life of remifentanil is approximately 3 minutes\(^\text{12}\) in non-pregnant patients. When administered to parturients as a continuous intravenous infusion, remifentanil rapidly crosses the placenta and it is quickly metabolized and redistributed in the fetus however there have been no reports of associated increases in newborn respiratory depression, or lower Apgar scores.\(^\text{13,14}\)

Some believe that PCA remifentanil is the best opioid for parenteral labor analgesia \(^\text{15,16}\), but that we should consider only offering it when neuroaxial techniques are contraindicated.\(^\text{15}\) Others have suggested that remifentanil should not be recommended for labor analgesia because of concerns regarding inadequate analgesia and maternal side-effects such as respiratory depression, peripheral oxygen desaturation, sedation, nausea, vomiting, and pruritus.\(^\text{17}\) These side-effects, of course, are no different from any other opioid.

Recently, in a pilot study, Thurlow et al compared PCA remifentanil with intramuscular meperidine for labor analgesia and not surprisingly they found that PCA remifentanil gave better pain relief to parturients than IM merperdine. The authors admit that comparing two different drugs with two different methods of administration limits the clinical usefulness of the study. PCA remifentanil and meperidine were compared for labor analgesia but poor Apgar scores in the meperidine group terminated the study prematurely.\(^\text{18}\)

Blair, et al., evaluated the efficacy, safety, and practicality of using a remifentanil PCA device for labor analgesia in 21 parturients. remifentanil was available in increasing doses (bolus doses 0.25-0.5µg/kg) with or without a background infusion (0.025-0.05 µg/kg/min) with a 2 minute lockout. Using a visual analog scale of 0-10 cm, they found that there was a significant reduction (P<0.05) from baseline pain scores (median=8 cm) to scores at bolus doses (median=5 cm). Fetal heart rate tracings, Apgar scores, and cord blood gas analysis remained satisfactory throughout the study period. They concluded that remifentanil PCA provides safe and effective labor analgesia.\(^\text{19}\)

**Neonatal Respiratory Depression and Naloxone**

Naloxone, a pure opioid antagonist, is currently recommended in the resuscitation of the neonate for reversal of respiratory depression secondary to maternal opiate administration for labor analgesia given within 4 hours prior to delivery. There is a theoretical justification for the potential need for naloxone in the resuscitation of the newborn, however there are no neonatal studies that have evaluated the effects of naloxone on time to spontaneous effective breathing or long term outcome. "The role of naloxone in resuscitation of the newborn needs to be reevaluated both in terms of the scientific basis for its use, its place in the teaching of neonatal resuscitation, and the way naloxone is actually being used in the delivery room."\(^\text{20}\) There is a need for randomized controlled trials to determine if naloxone provides any clinically important benefits in neonates with respiratory depression that may be due to transplacentally acquired opiates.

Naloxone reverses respiratory depression by acting as a competitive µ- antagonist. Its onset of action is within 1-2 minutes after IV administration and within 15 minutes of IM administration. The current recommended dose for neonates is 0.1mg/kg of a 0.4mg/ml or 1.0mg/ml solution given endotracheally or intravenously. Intravenous naloxone in term newborns peaks in the plasma at 5 min with a half-life of 3 hrs, whereas intramuscular naloxone peaks at 30 min and has a prolonged duration of action.\(^\text{21}\) The duration of action of naloxone may be shorter than that of some opioids, which may warrant continued respiratory monitoring for 4 to 6 hours after administration. In the case of maternal opioid addiction naloxone is not recommended as it may precipitate abrupt withdrawal seizures in the neonate, according to the American Academy of Pediatrics.\(^\text{22}\)
A group of physicians in Germany, however, have recommended a small dose of naloxone (0.01 mg/kg) for the treatment of apnea in neonates of mothers who abused opioids during pregnancy. Data are inadequate to suggest removing naloxone as one of several therapeutic options for managing respiratory depression in the delivery room. However, physicians should be aware of the potential risk of rapid withdrawal and be prepared to treat withdrawal in the delivery room.

**Conclusion**

Parenteral opioid labor analgesia has been in existence for over a century and yet we are still searching for the ideal analgesic and the ideal delivery system. It is imperative that research in this area continues with the same enthusiasm and vigor that regional techniques have acquired.

**Bibliography**

Intrathecals (IT) = single-injection spinals for labor analgesia
Panel on Alternatives to Conventional Epidural/CSE Analgesia in Labor
Kathryn Zuspan, MD
Clinical Assistant Professor
University of Minnesota
Minneapolis, Minnesota

The spinal (intrathecal) approach has been around for years however studies in the early 1980s reintroduced its potential as a labor analgesic option. Initial studies looked at using a variety of low dose opioids given as a single intrathecal injection. From these we learned that lipid-soluble opioids provide a more rapid onset of analgesia with fewer side effects. Next came efforts to increase the duration of analgesia. Studies were done looking at continuous spinal analgesia using a spinal catheter and also a combined spinal-epidural technique Studies in the 1990s showed that adding a low dose local anesthetic improved analgesia in the second stage of labor. Today the single-injection intrathecal technique, the continuous spinal technique using a spinal catheter and the combined spinal-epidural technique are all options for labor pain relief. In this handout we are going to focus on the single-injection intrathecal technique.

What’s in a name?
Through its evolution as a labor analgesic technique, the single injection intrathecal has been called by a variety of names. The ASA Guidelines for Regional Anesthesia in Obstetrics refers to this technique as single-injection spinal opioids. In practice and in print the technique has been called single-shot spinals for labor, subarachnoid opiates, intrathecal narcotics (ITN), intrathecal opioids (ITO) and the combined spinal-epidural (CSE) without a catheter. The latter name actually lumps together two different drug delivery techniques, i.e. the spinal and the CSE. In private practice now the most common term seems to be simply Intrathecal (IT). We will use this term for the remainder of this handout.

Why has the term Intrathecal caught on? There are probably a few explanations. First, I think that for patients "intrathecal" more accurately describes the destination of the injection than the term "spinal". It helps clear up the common patient misconception that we insert our spinal needle into the spinal cord. Second, the term Intrathecal (IT) does not limit us to any one class of drugs. Third, it signifies that the procedure was performed with a spinal needle instead of using a spinal needle passed through an epidural needle. Is this an important distinction? Perhaps. Recent studies suggest that some characteristics of the flexible spinal fluid sac are determined by an equilibrium between two forces: the cerebral spinal fluid (CSF) and the subatmospheric epidural pressure. This balance of power is altered differently by the spinal and the CSE techniques. This may have clinical relevance. The resulting subarachnoid blocks may vary between the two techniques. The mechanism is unknown. The introduction of the Tuohy needle into the epidural space and the loss of resistance technique may both have an effect.

A recent study on GYN patients by Goy compared equal subarachnoid doses (10 mg bupivcaine) delivered three different ways: by single injection through a spinal needle, by single injection through a spinal needle placed via CSE (without a catheter), and by single injection through a spinal needle placed via CSE (with an undosed catheter). The two CSE techniques had similar results. However, compared to the spinal technique, the CSE
approach resulted in greater sensorimotor anesthesia, prolonged recovery, greater incidence of hypotension and more vasoconstrictor use. Are differences in outcome also evident with the smaller analgesic doses used for labor? Until we have this answer the Intrathecal and the CSE (using only an intrathecal dose) cannot be considered equivalent.

Use
Does anyone really use this technique? The answer is yes. Hawkins data from the OB Anesthesia Manpower Survey shows that in the early 1990s about 4% of all labor patients received Intratheicals. This statistic was constant for small (<500 deliveries/yr), medium (500-1500 deliveries/yr) and large (>1500 deliveries/yr) labor and delivery units. These numbers are small but the technique was still being developed at that time. Remember also that this pain relief technique is not appropriate for all patients.

By the late 1990s Hawkins survey shows little change in the labor analgesia statistics in large L&D units. Intrathecal use remained constant at 4%, with epidural/CSE use at 62%. Small units however increased their Intratheicals use to 12% while their epidural/CSE use increased from 17% to 30%. So why the upsurge in regional analgesia use in smaller units? This was probably patient driven. Why the disproportionate increase in Intrathecal use in smaller units? Most likely this reflects the fact that many of these units are in smaller, more rural hospitals with low risk OB populations. At many of these hospitals labor analgesia is provided by nurse anesthetists, family practitioners and/or obstetricians with limited skills in regional analgesia. Intratheicals are easier to perform. Patients who once had their pharmacologic pain relief options limited to intravenous medications now had the additional choice of an Intrathecal in advanced labor.

Who qualifies for the Intrathecal?
Not all patients will benefit from the Intrathecal. Women who are not appropriate candidates include patients in early labor, nulliparous patients who may need more than 1-2 hours to "push" in the second stage, patients with a history of prolonged second stage or instrumented delivery, and most high risk patients.

The Intrathecal is appropriate for the patient who is moving through labor quickly with spontaneous vaginal delivery expected in 1-2 hours. One example would be the multiparous patient in active labor at 8 centimeters cervical dilation. Perhaps this patient waited too long to request an epidural. Now she is in the pain of advanced labor with delivery seemingly imminent. She feels like she needs to "push" and is demanding an epidural. There may be little or no time for an epidural to take effect before delivery. This patient may deliver in the next 15 minutes however she will never forget how you failed to provide her requested pain relief. Such a patient is a good candidate for an IT if she has a history of spontaneous deliveries and if delivery is anticipated in the next 1-2 hours.

This time frame represents the duration of pain relief provided by the typical IT doses used today. Appropriate patient selection is essential to the success of this technique. Repeat IT procedures can be done but these may compound the associated risks of the procedure to unacceptable levels. If there is any question about the potential for spontaneous vaginal delivery in the 1-2 hour time frame then another analgesic option should be considered.

In short, the Intrathecal is a relatively easy analgesic technique with fast onset and short duration. The pain relief is time limited since there is no route for redose. Repeating the Intrathecal is possible but compounds the risks.
As a result it is a reasonable option for a small subset of labor patients and deserves a place in the list of options. It is not meant to replace epidurals, continuous spinals or combined spinal-epidurals for the general labor population. Patient selection is paramount as it is with all analgesic techniques.

**Procedure**
Intrathecals are performed using a non-cutting edge, pencil point spinal needle and the standard spinal technique. Early Intrathecals were dosed with preservative-free morphine which proved to have a delayed onset of pain relief and significant side effects even in smaller doses. For Intrathecals today patients receive a single subarachnoid injection typically made up of a small dose of a lipid-soluble opioid (ex: fentanyl 10-25ug or sufentanil 2.5-10 ug) and a small dose of local anesthetic (ex: bupivacaine 1.25-2.5 mg). The procedure takes only a few minutes. Pain relief is almost immediate and lasts 1-2 hours.

Possible complications from Intrathecals are similar to those found with epidurals. These include pruritus, nausea, vomiting, hypotension, urinary retention, uterine hyperstimulation, fetal bradycardia, maternal respiratory depression, and postdural puncture headache. Patient monitoring for the Intrathecal procedure is essentially the same as for epidurals. This means that maternal respirations, blood pressure, heart rate and level of sedation as well as the fetal heart rate should be monitored at regular intervals. Pulse oximetry is needed for patients at greater risk of respiratory compromise. With the present Intrathecal dose (of fentanyl or sufentanil and bupivacaine) monitoring should continue for 2 hours after injection. Surveillance by the analgesia provider and nursing personnel is essential. The analgesia provider must be capable of identifying and treating all possible complications.

**Intrathecal vs. CSE or Epidural**
Why choose an Intrathecal over the traditional epidural or CSE for labor analgesia? Here are some possible reasons. 1) Intrathecals take the least amount of time to completion. For a patient in the throes of advanced labor this is important. Compare the time it takes (for an IT) to place a spinal needle in the subarachnoid space and inject the intrathecal drugs with the time it takes (for a CSE) to identify the epidural space with a Tuohy needle and loss of resistance technique, then to pass the spinal needle and inject the subarachnoid drugs, and then to withdraw the spinal needle and insert and secure the epidural catheter. These few more minutes that the patient is required to sit perfectly still are not easy for the patient even if (with a CSE) the pain is starting to regress. 2) Intrathecals are technically the easiest procedure which means there are fewer potential technical complications. 3) Intrathecals utilize the same technique as spinal anesthesia or spinal taps. This means that a wider group of health care personnel have some proficiency with the necessary skills to do the injection. (Intubation skills are also needed). This is critical in small rural hospitals not staffed by anesthesiologists. Patients deserve pain relief at those hospitals as well. 4) Onset of pain relief is fast. This benefit is shared by all the options except epidurals which require a little more time for onset. 5) Pain relief is good. Patients report satisfaction with all the regional techniques.

Is the CSE catheter an absolute necessity? This is probably the center of the IT vs. CSE debate. The catheter provides a route for redose if delivery is delayed or requires instrumentation. With experience and careful patient selection the anesthesiologist and L&D team can successfully choose appropriate candidates for Intrathecal analgesia. On rare occasion a patient with an Intrathecal may require additional analgesia or anesthesia. Does this justify placing catheters in all patients? With the rare chance that a C-Section may be prolonged should we
be doing CSE instead of spinal anesthesia for all our C-Sections? Anesthesiologists weigh in on both sides of these debates.

What other factors can be considered? Does an unused epidural catheter carry any risk? Possible complications associated with epidural catheters include infection, migration into the subarachnoid space, intravascular migration, epidural hematoma, epidural abscess, shearing of the catheter tip, and a contact dermatitis reaction to the tape used to secure the catheter. These complications occur but are rare. Does the CSE with catheter technique cost more than the Intrathecal technique? This will vary from hospital to hospital. Typically the CSE tray and catheter cost more than a spinal tray though the difference may be small. This difference may add up to significant amounts only if large numbers of patients are involved.

In sum, there are reasons for considering both techniques. The Intrathecal and CSE techniques both have value.

Is there a role for Intrathecals

Intrathecals are a reasonable pain relief option for a defined subset of the laboring population. They are not meant to replace epidurals or combined spinal-epidurals. When sufficient resources are available, all these options should be available.

One size does not fit all. Until the one perfect analgesic for all labor is discovered we need to consider each patient's needs and desires, each hospital's resources, risks and benefits, cost and consequences. There is a place for all the available options in our analgesic war chest. In the real world they are all valued. In the real world Intrathecals play a small but important role.

References

Non-pharmacologic methods of labor analgesia

William Camann, MD
Director, Obstetric Anesthesia
Brigham & Women's Hospital
Harvard Medical School
Boston, Massachusetts

Not every woman in labor needs or wants pharmacologic pain relief or regional analgesic techniques. For centuries, a variety of non-pharmacologic techniques have been used to assist women during labor. To a varying extent, many of these methods are available and becoming increasing utilized in labor units today. Women may have a variety of reasons for choosing (or avoiding) certain interventions or types of birthing experiences. For many of these women, the goal may not be to eliminate or even decrease pain during labor. The "natural-childbirth" patient often presents unique and difficult challenges for the obstetric anesthesiologist, because these patient's goals often seem irrational compared to what we usually do in our customary practice of providing effective and total pain relief. Moreover, many patients who have successfully achieved a non-medicated, but extraordinarily painful, birth are very satisfied, an observation which is also difficult for many anesthesiologists to understand. On the other hand, some patients enter labor with unrealistic expectations, and when pharmacologic analgesia is requested and received, satisfaction may not be ideal, even if the pain relief was excellent. The psychologic and other social dynamics of the natural childbirth population are complex, and often shaped by previous experiences, or a variety of information and (often) misinformation obtained from various non-authoritative sources, such as the internet, books, television, magazines, friends, childbirth education classes, and others. Moreover, the use of regional analgesia is rarely precluded by the use of other non-pharmacologic techniques. Regional analgesic techniques are quite compatible and complimentary to many of the other methods utilized by women in labor.

Hydrotherapy:

Quite simply, hydrotherapy is a fancy word for a shower or bath. Many of us already use these techniques to relieve the various aches and pains we experience in our daily lives. The use of birthing pools/tubs or jacuzzis during labor is becoming more popular in many hospitals and birthing centers in the USA. Immersion in warm water appears to provide a significant degree of comfort to many women in labor. The mechanism of the analgesia is unknown - possibly the buoyancy and the warmth and soothing atmosphere are helpful. In addition, the warmth and flotation may impact upon noxious input with resultant analgesic effects. Contraindications to hydrotherapy in labor include, but are not limited to and vary from hospital to hospital - premature labor, multiple gestation, VBAC, induced labor, active genital herpes or other infections, ruptured membranes and/or the presence of meconium stained amniotic fluid, vaginal bleeding, or any condition requiring continuous fetal heart rate monitoring. In general, a patient with an epidural is not allowed to use a tub or shower. A variety of observational studies have suggested that women who labor in water have faster labors, less perineal tears, less operative deliveries, and less requirement for other analgesics. A recent randomized trial in the UK supported many of these purported benefits of laboring in water.
Safety: There is concern about infectious complications owing to bathing in water during labor. Although anecdotal case reports exist describing such occurrences, several larger studies do not support an elevated incidence of infections among women using hydrotherapy during labor. Temperature of the water should be regulated to near or a few degrees less than body temperature to avoid inadvertent maternal hypo- or hyperthermia.

Hypnotherapy:

There has been a recent surge in the popularity of patients utilizing hypnosis-based techniques for labor analgesia. Hypnobirthing patients typically have taken a course of varying length during pregnancy to prepare for the labor experience. Sometimes a hypnobirthing instructor will accompany the patient during labor, and other times the patient will rely on her learned techniques. Hypnobirthing uses a variety of focusing techniques, guided imagery suggestions, and relaxation audiotapes to achieve a state of relaxation, free of tension and fear. Many of the hypnobirthing techniques involve using words which appear "softer" that our typical terminology, to help relax the mind of the parturient. For example: Uterine "surge", instead of contraction; "pressure/sensation/tightening" rather than pain; membrane "release" rather than rupture; "breathing down", rather than pushing; "birthing companion" rather than coach; and so on. Purported benefits of hypnobirthing include shortened labor, less use of pharmacologic analgesics, improved mother-infant bonding, elimination of hyperventilation, and a relaxed, calm atmosphere during labor and birth. Hypnosis is a useful technique for the motivated patient, and is well-received and popular among its advocates.

Cutaneous sterile water injections:

A little known technique, often advocated by midwives and doulas, is the cutaneous injection of sterile water papules. Several observational as well as randomized trials have confirmed that these injections can provide a moderate degree of analgesia, particularly for "back labor" often associated with a posterior presenting fetus. The analgesia is transient, usually lasting no more than 1-2 hours. The mechanism likely involves some sort of distraction technique, similar to TENS or the gate-control theory. The technique for the injections is to place four small (0.1ml) papules of sterile water in a square pattern several centimeters above the sacrum.

Doulas:

A doula is a woman experienced and professionally trained in labor support. Doulas are usually of lay background, but often have worked as labor nurses, childbirth educators, or in other obstetric areas. They provide the parturient with praise, reassurance, comfort measures, and companionship. The word "doula" is derived from the Greek for "woman servant". Doulas are to be distinguished from labor nurses; they perform no clinical tasks nor do they assist with traditional nursing functions. Doulas are also to be distinguished from midwives or obstetricians, as they perform no medical tasks nor do they assist in the actual physical act of the birth. Labor nurses are frequently required to render care to several patients simultaneously, midwives and obstetricians are generally not in constant attendance with the laboring woman, and even the women's partner, despite love, devotion, childbirth education classes and best intentions, may be of only limited (but certainly not unimportant) help during the actual labor. In fact, one recent randomized trial of hospital-based doulas found that over half the women rated the doula as more useful than their husband during labor.
Many doulas are strongly committed to non-pharmacologic methods of pain control, and many patients who seek doula support are equally committed to attempting a medication-free labor. Nonetheless, an increasing recognition of the importance of emotional support during labor, combined with the ever increasing popularity (and safety) of modern regional analgesic techniques for labor, has resulted in some women requesting doula support even with the intention of receiving regional analgesia in labor. While some doulas will limit their client base to those women who only desire to labor without medications, it is not the role of the doula to make this decision for the woman. Excerpts from the Doulas of North America Code of Ethics and Standards of Practice include: "Doulas do not offer second opinions or give medical advice. Doulas do not make decisions for their clients, they do not project their own values and goals onto the laboring woman. The doula's goal is to help the woman have a safe and satisfying childbirth as she defines it. (Italics added) Many women choose or need pharmacological pain relief. It is not the role of the doula to discourage the mother from her choices. The comfort and reassurance offered by the doula are beneficial regardless of the use of pain medication."

Are doulas necessary if a patient receives an epidural? Relief of pain does not obviate all emotional distress and anxiety during labor. Concerns about welfare of the neonate, length of labor, fear of return of pain, fear and anticipation of the approaching second stage of labor, fear of alterations in body image and loss of dignity during childbirth, among many others, are all valid sources of anxiety, even in the presence of a well functioning epidural analgesic. Support and reassurance, as professionally provided by a doula, can be invaluable to some women in these circumstances. I use the term "epi-doula" to refer to patients who utilize the services of a doula and also receive an epidural.

Nonetheless, doulas can, on occasion, interfere with delivery room routines, and their role needs to be clearly defined in order to facilitate cordial interactions on the labor unit. Some doulas can be very militant about their role and advocacy for their patients. The exact nature of the role of the doula in hospital births is still a matter of much discussion.

**Acupuncture and Acupressure:**

Several trials have demonstrated the efficacy of acupuncture and acupressure for a variety of uses during pregnancy and birth. Acupuncture has been shown to provide relief for hyperemesis during the first trimester. Acupuncture and moxibustion (burning of the artemisa vulgaris (mugwort) near acupoint BL67, the outer corner of the fifth toenail) therapy have been shown in randomized trials to be useful for turning a breech baby to the vertex position. Trials of acupuncture during labor have shown decreased need for other pharmacologic analgesics, and more relaxed and satisfied patients. The mechanism of action is unclear. The problem with most of the acupuncture trials is that sample size is small, and additional larger trials are necessary. Moreover, the use of this modality is largely dependent on a motivated patient, and the availability of trained and licensed acupuncturists. However, the use of some low-tech devices such as the "sea-band" is easy and does not require special training or personnel.

**Position changes, touch, massage, music, aromatherapy:**

A variety of soothing touch and massage techniques may be utilized by the parturient seeking natural childbirth. The literature regarding effects of position changes is conflicting. There is much anecdotal evidence that upright posture, ambulation or activities such as sitting on a birthing ball are beneficial. The nature of the conflict is that it is not clear if these activities are truly analgesic, or if women who are having easier, less painful
labors are more likely to avail themselves of these options. Aromatherapy, or application of scented fragrances and essential oils, is popular among some patients. Certain essences, such as lavender, rose, peppermint, eucalyptus and others can be massaged into the temples or other areas to create a calm and soothing environment. Although little analgesia actually ensues, the effect on stress relief may be significant. These techniques all present little or no risk, and a motivated patient and a capable provider can use these measures to enhance the birth experience. The use of Shiatsu massage can be beneficial to some patients during pregnancy and labor.

**Interactions with epidural analgesia:**

Virtually all of the non-pharmacologic techniques are entirely compatible with a patient who also wishes to receive epidural analgesia during labor. An educated, well-informed patient with a supportive and open-minded caregiver are the best modalities to ensure a safe and comfortable birth. Obstetric anesthesiologists should be conversant with the wide range of popular non-pharmacologic modalities used during pregnancy and labor.

**Selected References:**

8. Hodnett ED, et.al., Effectiveness of nurses as providers of birth labor support in North American hospitals. JAMA 2002; 288:1373-81
9. Camann WR. Doulas - Who are they and how might they affect obstetrical anesthesia practices? ASA Newsletter, October 2000
   (See also: www.dona.org)
11. [www.painfreebirthing.com](http://www.painfreebirthing.com)
12. [www.waterbirth.org](http://www.waterbirth.org)
13. [www.morningsicknesshelp.com](http://www.morningsicknesshelp.com)
Best Paper Presentations

Moderator: Lee S. Perrin, MD
Judges: Andrew P. Harris, MD, MHS; David C. Campbell, MD, Msc, FRCPC; Jaya Ramanathan, MD; Robert S. McKay, MD

Saturday, May 15
2:35 - 4:00 pm

SOAP A20  RANDOMIZED CONTROLLED TRIAL COMPARING PCEA VS PCEA + CIEA ON LABOR OUTCOME USING AMBULATORY EPIDURAL ANALGESICS
D. C. Campbell, T. W. Breen, S. Halpern, H. Muir, R. Nunn;
University of Saskatchewan, Saskatoon, SK, Canada, Duke University, Durham, NC, University of Toronto, Toronto, ON, Canada, Dalhousie University, Halifax, NS, Canada

SOAP A21  ANTEPARTUM CHRONIC EPIDURAL THERAPY (ACET) USING ROPIVACAINE IMPROVES UTEROPLACENTAL BLOOD FLOW IN PREECLAMPSIA AND INTRAUTERINE GROWTH RETARDATION
Y. Ginosar, M. Nadjari, N. Firman, D. Mankuta, E. Anteby, C. Weissman, U. Elchalal;
Hadassah Hebrew University School of Medicine, Jerusalem, Israel

SOAP A22  CONTINUOUS WOUND INSTILLATION AFTER CESAREAN SECTION: LOCAL ANALGESIC EFFECT OF DICLOFENAC
P. M. Lavand'homme, F. Roelants, V. Mercier, H. Waterloos;
Universite Catholique de Louvain, Brussels, Belgium

SOAP A23  FETAL BENEFITS OF PHENYLEPHRINE OVER EPHEDRINE DEMONSTRATED AT CLINICAL EQUIVALENCE
G. R. Lyons, S. Saravanan, M. O. Columb;
St James University Hospital, Leeds, UK, Leeds, United Kingdom, South Manchester University Hospital, Manchester, United Kingdom

SOAP A24  EPIDURAL MORPHINE FOR POST PARTUM TUBAL LIGATION POSTOPERATIVE ANALGESIA
Northwestern University, Chicago, IL

SOAP A25  FETAL RESPONSES TO MATERNAL LAPAROSCOPY AT DIFFERENT GESTATIONAL AGES
J. D. Reynolds, K. Uemura, R. J. McClaine, K. A. Campbell, D. J. McClaine, H. Lacassie, S. W. Eubanks;
Duke University Medical Center, Durham, NC, University of Missouri, Columbia, MO

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
NOTES
Research Hour

Richard M. Smiley, MD, PhD; Philip Hess, MD

Saturday, May 15
4:00 - 5:00 pm

Some of the current and novel research themes in obstetric anesthesia will be presented and discussed. Themes will be based on the research abstracts and posters presented at the current SOAP meeting as well as outside sources. The focus will be on work that utilizes new techniques of investigation or analysis, and work that tries to expand the bounds of current knowledge. The moderators will present a critical appraisal of this work and its future potential for advancing the field. Audience participation is expected and very highly encouraged.

After the session the attendee will:

1. Learn of some of the new techniques and approaches in obstetric anesthesia research;

2. Understand the potential and limitation of new approaches to obstetric anesthesia research;

3. Understand the impact of new research on our knowledge and practice of obstetric anesthesia.
NOTES
6:30 am  Registration

7:00 - 7:30 am  Breakfast

7:30 - 8:30 am  **Pro/Con: Ephedrine, Rather Than Phenylephrine, is the Vasopressor of Choice to Prevent and Manage Spinal-Induced Hypotension**  
Moderator: Donald H. Penning, MD, MSc, FRCPC  
**Pro:** Alison J. MacArthur, MD  
**Con:** Edward T. Riley, MD

8:30 - 9:30 am  **Poster Case Reports: You did what? The Best Case Reports of the Year!** - Peter H. Pan, MD

9:30 - 10:00 am  Questions and Discussion

10:00 am  ADJOURNMENT
Pro/Con: Ephedrine, Rather Than Phenylephrine, is the Vasopressor of Choice to Prevent and Manage Spinal-Induced Hypotension

Moderator: Donald H. Penning, MD, MSc, FRCPC

**Pro:** Alison J. MacArthur, MD  
**Con:** Edward T. Riley, MD

Sunday, May 16  
7:30 - 8:30 am

By the end of this Debate, the audience will:

1. Be aware of the latest information regarding the use of ephedrine and phenylephrine for the prevention and treatment of spinal-induced hypotension during cesarean section;

2. Be able to judge whether one vasopressor is superior to the other.
NOTES
Ephedrine In Obstetrics? The Clinical Data Say No!

Edward T Riley, MD
Associate Professor
Department of Anesthesia
Stanford University School of Medicine

Introduction

The story of the use of ephedrine in obstetric anesthesia is a perfect example of why clinical research is necessary even when the laboratory and animal data clearly demonstrate a drug's superiority. In the case of ephedrine in obstetrics, there is overwhelming animal evidence that it is safer for the fetus than any other pressor and there is even laboratory data that describes a mechanism for why this would be the case. The problem is that there is no clinical evidence that ephedrine is actually superior to other pressors in obstetrics. In fact, there is plenty of clinical data that suggests the opposite, ephedrine may be harmful for the fetus.

Historical Review

The first line of evidence that came out that suggested that ephedrine should be the drug of choice for treating hypotension in obstetric anesthesia comes from the many sheep studies that have been carried out in a number of different laboratories.1,2 These studies took chronically instrumented pregnant ewes in which it was possible to measure uterine artery blood flow and fetal and maternal arterial pH. The studies found that when ephedrine was used to maintain or raise blood pressure, uterine blood flow and fetal pH were maintained. Other pressors (e.g. metaraminol or phenylephrine) tended to decrease fetal pH and uterine blood flow.

Evidence from James Eisenach's lab demonstrated why this was true.3,4 In one experiment, they found:

1. Both ephedrine and metaraminol caused less vasoconstriction of uterine artery samples from pregnant ewes compared to non-pregnant ewes.
2. The exact opposite was true for femoral artery samples. The pressors had a greater effect on the samples from non-pregnant ewes.
3. This means that in pregnant animals, the pressors constricted the femoral artery to a much greater degree compared to the uterine artery. This would tend to enhance uterine blood flow.
4. The difference between the pressors was that the ratio of maximal effect of the drugs in the femoral artery compared to the uterine artery in pregnant animals was 5 for ephedrine and 2 for metaraminol. This means ephedrine will enhance uterine blood flow to an even greater degree than metaraminol.

In another experiment from Eisenach's lab, they found that nitric oxide synthase (NOS) was up regulated in the uterine artery during pregnancy. The elevated levels of NOS decrease uterine artery responsiveness to pressors that cause vasoconstriction. In addition, they found that ephedrine causes the release of NOS. This causes the uterine artery to constrict even less in the presence of ephedrine compared to other pressors.

In summary, animal and lab data clearly demonstrate that ephedrine preserved uterine artery blood flow and fetal pH to a much better degree than other pressors. From this, clinicians concluded that ephedrine was the drug of choice to restore blood pressure in pregnant women.
Umbilical Cord Gas Data

Unfortunately, when we look at how ephedrine performs when used for restoring blood pressure in pregnant women having spinal anesthesia, the data are disappointing. The most relevant clinical outcome in these studies is the umbilical artery pH. This value tells us how well oxygen was delivered and utilized in the fetus just prior to birth. In no study comparing ephedrine with phenylephrine has the ephedrine group had a higher umbilical pH than the phenylephrine group. In a meta-analysis by Lee et al, they found that on average, the umbilical artery pH was 0.03 higher in the women who received phenylephrine rather than ephedrine. This difference is small, but the data suggest that phenylephrine is the better drug to use in this circumstance.

This pattern is consistent for other pressors as well. In another meta-analysis, Halpern's group in Toronto found that any pressor or pressor combination out performed pure ephedrine (data presented at the 2002 SOAP meeting but not yet published). Again, no study ever found ephedrine to be the better drug.

More evidence that ephedrine is not a good drug to use in obstetrics comes from studies that use ephedrine to prevent, rather than treat, hypotension. In all these studies, the authors have found that low doses of ephedrine do not effectively prevent hypotension and that higher doses cause significant acidosis in the neonate.

Metabolic Acidosis

Some experts feel that umbilical artery pH is not a useful outcome measure. A respiratory acidosis in the umbilical cord gas is not predictive of adverse neurological outcomes. However, a metabolic acidosis is predictive of adverse neurologic outcomes. In a recent multivariate analysis of a large data set Ngan Kee et al, found an association between ephedrine use and a metabolic acidosis in the umbilical artery. Although the degree of acidosis did not amount to clinically significant levels, this is a worrisome trend in a population of healthy mothers with normal pregnancies having a cesarean deliveries.

Why Does Ephedrine Cause More Umbilical Artery Acidosis?

If ephedrine improves blood flow to the to the uterus and increases fetal pH in sheep, why is it associated with greater acidosis in the human fetus? I believe the most likely explanation is that ephedrine increases the metabolic rate in the fetus. A study by Cooper et al. offers evidence that this may be the case. They used an index to assess where the umbilical artery acidosis was occurring. They took the pCO2 of the umbilical artery and subtracted the pCO2 of the umbilical vein. They assumed that if this value was large, then the acidosis was being generated in the fetus. What they found was that a low umbilical artery pH was strongly correlated with a high umbilical artery pCO2 minus umbilical vein pCO2 in the ephedrine group. They also found that this index was correlated with ephedrine dose. These data are highly suggestive that ephedrine is increasing the metabolic rate of the fetus.

The Early Fetal Heart Rate Study

One of the strongest data sets available that ephedrine may be harmful to the fetus comes from Sol Shnider's group. The paper was published in 1981. They studied laboring women who received epidural analgesia and ephedrine to prevent or treat hypotension. They found that ephedrine increased the fetal heart rate to tachycardic levels or caused a decrease in variability in over half the patients. Both of these findings were clear signs of fetal distress. Despite this evidence, they assumed that the ephedrine was causing a clinically insignificant change in the fetal heart rate pattern. They assumed that the observed changes were benign because of the wealth of animal data suggesting that ephedrine was the best drug to use in this circumstance.
Why Are The Laboratory/Animal Data Different Than The Clinical Data?

Why do the results from these animal studies differ from the clinical studies in humans? Three possible answers to this question:

1. Human vasculature and placental blood flow are different than what is found in sheep.
2. Maybe ephedrine increases the metabolic rate of humans to a greater degree than it does in sheep. Therefore, the beta-agonist stimulation of the metabolic rate seen in humans is not seen in sheep.
3. Maybe the stress of birth unmasked the stress imposed by ephedrine. In the instrumented sheep model, the drugs are given when the animal was not stressed and this might be why the metabolic rate was unaffected. In humans, the ephedrine was given during labor and delivery or during cesarean delivery. The combination of this stress with the ephedrine increased the fetal metabolic rate.

Clinical Significance

Some experts will say that these minor differences in cord gases and fetal heart rate strips are not clinically significant and that since blood flow is better preserved with ephedrine, that it should remain the drug of choice. However, it is important to remember that these studies were done on perfectly healthy patients having elective cesarean deliveries or in the case of the fetal heart rate study, vaginal deliveries. These patients and their babies are going to do well even if they get a drug that puts greater stress on the fetus. However, the increased acidosis we see with ephedrine is a sign of a net decrease in the oxygen delivery to the fetus (net delivery being the oxygen delivered minus what is used). It does not matter whether there is increased blood flow with ephedrine, what counts is oxygen delivery and utilization and the net sum of oxygen to the fetus is decreased in the presence of ephedrine. When there is fetal distress or a maternal hemorrhage decreases uterine perfusion, giving a drug that will either decrease oxygen delivery or increase oxygen utilization makes no sense. Better to choose a pressor like phenylephrine to treat the blood pressure.

Literature Cited

1. McGrath JM, Chestnut DH, Vincent RD, DeBruyn CS, Atkins BL, Poduska DJ, Chatterjee P: Ephedrine remains the vasopressor of choice for treatment of hypotension during ritodrine infusion and epidural anesthesia. Anesthesiology 1994; 80: 1073-81; discussion 28A
Poster Case Reports:
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Moderator: Peter H. Pan, MD
Sunday, May 16
8:30 - 9:30 am

SOAP A111
A CASE REPORT OF BILATERAL UTERINE ARTERY EMBOLIZATION FOR HIGH FLOW UTERINE ARTERIOVENOUS FISTULA IN A TERM PARTURIENT
C. M. Brummel, A. T. Fuller, S. E. Cohen, E. T. Riley;
Stanford University School of Medicine, Stanford, CA

SOAP A112
HYPERVENTILATION INDUCED TRANSIENT SPASTIC QUADRUPARESIS IN A PARTURIENT IMMEDIATELY PRIOR TO NEURAXIAL ANALGESIA REQUEST
B. A. Craig, M. K. Panni;
Duke University, Durham, NC

SOAP A113
EPIDURAL ANALGESIA FOR VAGINAL DELIVERY IN A PARTURIENT WITH A SPINAL CORD STIMULATOR
K. E. Nelson, J. C. Crews;
Wake Forest University, Winston-Salem, NC

SOAP A114
ANESTHETIC MANAGEMENT OF ELECTIVE CESAREAN SECTION FOR A PARTURIENT WITH KLIPPEL-FEIL SYNDROME
A. Darwich, B. Anderson, G. Mandell, M. Vallejo, R. Romeo;
Univ. of Pittsburgh, Magee-Womens Hospital, Pittsburgh, PA

SOAP A115
EPIDURAL ABSCESS AFTER NEURAXIAL ANALGESIA IN A HEALTHY PARTURIENT
S. B. Greenberg, J. T. Sullivan, C. A. Wong;
Northwestern Univ. Feinberg School of Medicine, Chicago, IL

SOAP A116
DWARFISM, FACTOR V LEIDEN DEFICIENCY, ANTICOAGULATION, AND HISTORY OF DIFFICULT AIRWAY: AN OBSTETRIC ANESTHESIA CHALLENGE!
A. J. Fuller, C. M. Brummel, S. E. Cohen;
Stanford University, Stanford, CA

SOAP A117
SUBARACHNOID HEMORRHAGE MASQUERADING AS POST DURAL PUNCTURE HEADACHE
University of Miami, Miami, FL, Palmetto General Hospital, Hialeah, FL

SOAP A118
TEMPORARY PACEMAKER AND SPINAL ANESTHESIA FOR CESAREAN SECTION IN A PATIENT WITH SPONTANEOUS COMPLETE HEART BLOCK DURING PREGNANCY
J. Raikhelkar, R. Schumann;
Tufts-New England Medical Center, Boston, MA

SOAP A119
ABDOMINAL COMPARTMENT SYNDROME FOLLOWING COMPLETE ABRUPTION OF THE PLACENTA, FETAL DEMISE AND CONSUMPTIVE COAGULOPATHY
A. Zibaitis, R. Schumann;
Tufts-New England Medical Center, Boston, MA

SOAP A120
ANESTHETIC MANAGEMENT OF A 26 KG PARTURIENT WITH KUGELBERG-WELANDER SYNDROME
V. C. Younan, R. Eberle, C. A. DeSimone;
Albany Medical College, Albany, NY

SOAP A121
SEVERE THROMBOCYTOPENIA COMPLICATING VON WILLEBRAND TYPE2B DISEASE
D. L. Hepner, L. C. Tsen;
Brigham and Women's Hospital, Harvard Medical School, Boston, MA

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
Poster Case Reports (cont’d)

SOAP A122
LABOR ANALGESIA IN A PARTURIENT WITH PRIOR HARRINGTON ROD INSTRUMENTATION: IS CAUDAL EPIDURAL AN OPTION?
T. Moeller-Bertram, K. M. Kuczkowski, F. Ahadian;
University of California San Diego, San Diego, CA

SOAP A123
EPIDURAL LABOR ANALGESIA AND POSTPARTUM LUMBOSACRAL NEUROLOGIC DEFICIT: A DILEMMA
J. Hudcova, R. Schumann, J. A. Russell;
Tufts-New England Medical Center, Boston, MA, Lahey Clinic Medical Center, Burlington, MA

SOAP A124
ANESTHESIA FOR CESAREAN SECTION IN A PARTUREINT WITH IHSS, SICK SINUS SYNDROME AND S/P CEREBROVASCULAR ACCIDENT
R. Mehta, P. H. Pan;
Wake Forest University, Winston-Salem, NC

SOAP A125
ANESTHETIC MANAGEMENT FOR EMERGENCY CESAREAN SECTION IN A PATIENT WITH SEVERE DOUBLE VALVULAR DISEASE AND PREECLAMPSIA: A CASE REPORT
J. Waters, M. Maurtua, J. Cywinski, S. Dua;
Cleveland Clinic, Cleveland, OH

SOAP A126
CARDIOMYOPATHY OF PREGNANCY MANAGED IN THE ICU SETTING WITH SLOW INFUSION OF LUMBAR EPIDURAL ANALGESIA
V. H. Ross, M. J. North, P. H. Pan;
Wake Forest Baptist Medical Center, Winston

SOAP A127
EPIDURAL ANAESTHESIA FOR MINOR THORACIC SURGERY IN EARLY PREGNANCY
M. R. Wolmarans, D. Browne;
Norfolk & Norwich University Hospital, Norwich, United Kingdom

SOAP A128
ONDANSETRON-INDUCED MULTIFOCAL ENCEPHALOPATHY WITH EXTRAPYRAMIDAL SYMPTOMS DURING CESAREAN SECTION
J. E. Spiegel, V. Kang, A. Hapgood, L. Kunze;
Beth Israel Deaconess Medical Center, Boston, MA

SOAP A129
IATROGENIC ABSORPTIVE HYPERCALCEMIA IN A PREGNANT WOMAN AND HER TWINS
N. Gupta;
University of Missouri Healthcare, Columbia, MO

SOAP A130
INADVERTENT INTRATHECAL INJECTION OF LABETALOL IN A PATIENT UNDERGOING POSTPARTUM TUBAL LIGATION
P. J. Balestrieri, R. S. Blank, C. T. Grubb, P. H. Ting;
University of Virginia, Charlottesville, VA

SOAP A131
MANAGEMENT OF A PARTURIENT WITH A FONTAN CIRCULATION
G. Shih, S. Myers, K. Mulhern;
Kansas University Medical Center, Kansas City, KS

SOAP A132
PARASPINAL MUSCLE ABSCESS AFTER AN EPIDURAL CATHETER PLACEMENT
E. J. Goodman, J. L. Bartal;
University Hospitals of Cleveland, Cleveland, OH

SOAP A133
LABOR EPIDURAL PLACEMENT IN A WOMEN WITH A SPINAL CORD STIMULATOR
J. L. Hanson, E. Goodman;
University Hospitals of Cleveland, Cleveland, OH

SOAP A134
MATERNAL AND FETAL AUTONOMIC RESPONSE TO EPIDURAL ANALGESIA BY ANALYSIS OF HEART RATE AND BLOOD PRESSURE VARIABILITY: A CASE OF SEVERE FETAL BRADYCARDIA POST-EPIDURAL
A. Deschamps, V. Lash, L. Olivieri, I. Delpech, J. Nicolet;
McGill University Health Center, Montreal, PQ, Canada

SOAP A135
INTUBATING LARYNGEAL MASK AIRWAY (ILMA): A LIFE SAVING RESCUE DEVICE FOLLOWING FAILED TRACHEAL INTUBATION DURING CESAREAN SECTION (CS)
M. S. Suresh, M. Gardner, E. Key;
Baylor College of Medicine, Houston, TX

Abstracts are available online at soap.org and in the May issue of Anesthesiology.
Poster Case Reports (cont’d)

SOAP A136
ANESTHETIC CONSIDERATIONS IN A PARTURIENT WITH POSTURAL ORTHOSTATIC TACHYCARDIA SYNDROME (POTS)
L. Hebbar, J. K. Hutcheson, G. P. Davis, G. M. White;
MUSC, Charleston, SC

SOAP A137
PLANNED CESAREAN DELIVERY IN A PATIENT WITH PLACENTA ACCRETA IN THE INTERVENTIONAL RADIOLOGY SUITE
N. O'Rourke, T. F. McElrath, R. A. Baum, W. Camann, B. Kodali;
Brigham and Women's Hospital, Boston, MA

SOAP A138
VON WILLEBRAND'S DISEASE AND PREGNANCY IS NOT A CONTRAINDICATION TO REGIONAL ANESTHESIA/ANALGESIA
M. James, D. C. Campbell;
University of Saskatchewan, Saskatoon, SK, Canada

SOAP A139
CONTINUOUS SPINAL ANAESTHESIA (CSA) FOR ELECTIVE CAESAREAN SECTION IN A PATIENT WITH PSEUOXANTHOMA ELASTICUM (PXE)
A. M. Walton, A. S. Bullough;
The Great Western Hospital, Swindon, United Kingdom

SOAP A140
THIRD TRIMESTER OF PREGNANCY COMPLICATED BY METASTATIC CHORIOCARCINOMA
K. Deckert, G. Shih;
Kansas University Medical Center, Kansas City, KS

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3:30-4:00 pm  Coffee with Exhibitors; Posters

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