Pro: Failed Spinal is Due to Bad Bupivacaine

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Objective: Upon completion of this presentation, participants will be able to objectively determine causes of failed spinal anesthesia, including bupivacaine chemical alteration.

Summary: The reported incidence of failed spinal anesthesia ranges from 1-4% incidence. The etiology of a failed neuraxial block range from technical to patient-related factors and can have serious clinical consequences often requiring conversion to alternate anesthetic techniques. Ultimately, failed spinal anesthesia can compromise patient safety.

Consequences of failed blocks have significant clinical consequences including redosing of the spinal anesthetic, conversion to general anesthesia, or pain during surgery. Efforts to identify and reduce the incidence of failed neuraxial anesthesia are of utmost importance considering the increased use of these techniques in obstetric cases. Immediate failed spinal resolution includes patient position manipulation, supplemental field block with local anesthesia, supplemental IV sedation, repeat spinal block, and the conversion to general anesthesia which all have added risks and consequences.

Technical failure can result from one of five phases: 1.) lumbar puncture, 2.) intrathecal solution injection, 3.) spreading of drug through the CSF, 4.) drug action on the spinal nerve roots and cord, and 5.) subsequent patient management. The aspiration of CSF both before and after injection is final confirmation that all of the medication was delivered intrathecally and should not result in technical failure.

Identifiable causes of failed spinal reported in the literature include; technical failure, inadequate patient position (i.e. unilateral or patchy block), inadvertent subdural or epidural injection, inadequate intrathecal dose (i.e. inadequate duration), CSF flow maldistribution, defective local anesthetic (i.e. chemical inertness), ineffective mixing of preparations (i.e. precipitate formation and altered pH), human anatomic variability (i.e. spinal stenosis, previous surgery with residual scar formation, congenital arachnoid cyst, dural ectasia, and other barriers to local anesthesia spread such as the posterior septum, lateral denticulate ligament, and "rogue" strands). Other causes of an inadequate block include altered mutations in the voltage gated sodium channel (i.e. receptor genetic variation, polymorphism, diversity), and “Rachi-Resistance” which was named by Sebrechts in 1934. “Rachi-Resistance” is the phenomenon of genetic variation, polymorphism, diversity, and “Rachi-Resistance” which provides adequate anesthesia for the surgical procedure. The BD™ spinal kit label specifically states “protect from freezing.” The bupivacaine product insert recommends storage at 20-25 °C (68-77 °F) because of temperature instability which may render the product chemically inert.

Key Points:

1. The etiology of a failed spinal is most likely multifactorial, dependent on a number of factors ranging from technical to patient-related factors.
2. The aspiration of CSF both before and after injection helps to confirm that all medication was delivered intrathecally.
3. It is important to avoid storage of spinal kits in extreme temperature ranges which may render bupivacaine chemically inert.

References: