Intracranial Bullet Near The Circle of Willis, Is Neuraxial Safe?

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Introduction

- While rare in pregnancy, intact intracranial bullets/fragments can increase the risk of stroke, intracranial hemorrhage, AMS, need for c-section, and adverse neonatal outcomes.

- Parturients with intracranial lesions are frequently assumed to have increased intracranial pressure (ICP), with the potential risk of herniation commonly cited as a contraindication for neuraxial anesthesia.

- Draining lumbar cerebrospinal fluid (CSF) can elevate the pressure gradient between the spinal, supratentorial, and infratentorial compartments, potentially leading to rapid brainstem herniation or obstructive hydrocephalus.[1]

- Typically, neuraxial anesthesia has been seen to be safe in for cesarean or low Valsalva vaginal deliveries in patients that generally did not exhibit clinical symptoms of elevated ICP such as:
  - headache, nausea/vomiting, AMS, seizures, hemiparesis, pupillary abnormalities, imaging findings[2]

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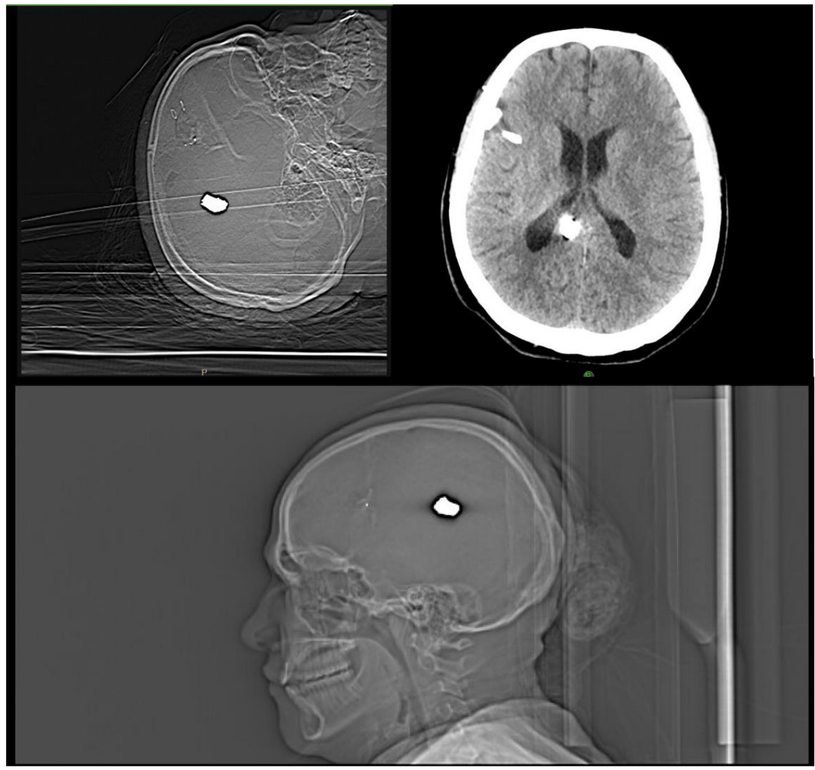
Case Report

29-year-old G1P0 at 39w2d presenting for primary c-section due to seizures secondary to a gunshot wound with intact bullet near Circle of Willis.



- **PMHx:** TBI with intact intracranial bullet, Seizures, Asthma, PTSD, and recent COVID
- **Physical Examination:** No neurological deficits
- **Imaging:** Non-contrast axial head CT months prior revealed significant streak artifact from a retained ballistic fragment in the right parafalcine region at the level just above the corpus callosum, associated encephalomalacia extending to the interhemispheric fissure, ventricles normal in size without hydrocephalus/extraaxial fluid collection, no mass effect/midline shift or signs of intracranial hemorrhage.
- **Labor Course:** Patient underwent uncomplicated spinal anesthesia consisting of 0.75% Bupivacaine, morphine, and fentanyl in the OR. Blood pressure was managed using a phenylephrine infusion.
- Special anesthetic considerations were taken to maintain adequate ventilation and oxygenation to avoid acidosis to prevent appreciable shifts in ICP, while remaining vigilant to any acute changes in mental status.
- **Hospital Course/Outcome:** Fortunately, our patient had a successful cesarean delivery with no immediate maternal or fetal complications.

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Discussion

- One must determine the risks and benefits of neuraxial along with the risk of high Valsalva vaginal deliveries vs cesarean in patients presenting with intracranial lesions prior to induction.
- It is important to remain vigilant and maintain a comprehensive differential when evaluating a laboring patient with an acute change in mental status, particularly in patients with a retained intracranial bullet or lesion such as:
  - Mg overdose, intoxication, hypoglycemia, hypercarbia, hypoxia, stroke, seizure, MI, anemia, sepsis, PRES
- The most reliable indicators of a high risk for impending/existing fatal herniation include a deteriorating mental status, brainstem signs such as:
  - pupillary changes, dysconjugate gaze, facial weakness, swallowing dysfunction, irregular respirations, posturing, recent seizures, papilledema and/or hemiparesis.
- If herniation signs arise, anesthetic considerations include immediate attention to airway, breathing, cerebral, and systemic circulation. Rapid interventions to lower ICP include hyperosmolar therapy, intubation, and hyperventilation targeting a PaCO2 of 25–30 mmHg while obtaining an emergency neurosurgical consult given its high mortality rate.[2]

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References

[1] Metterlein, T., Kuenzig, H., Bele, S., Brawanski, A. and Graf, B.M. (2010), Coma after spinal anaesthesia in a patient with an unknown intracerebral tumour. Acta Anaesthesiologica Scandinavica, 54: 1149-1151. https://doi.org/10.1111/j.1399-6576.2010.02286.x

[2] Leffert, Lisa R. M.D.*; Schwamm, Lee H. M.D.†. Neuraxial Anesthesia in Parturients with Intracranial Pathology: A Comprehensive Review and Reassessment of Risk. Anesthesiology 119(3):p 703-718, September 2013. | DOI: 10.1097/ALN.0b013e31829374c2