



## Usefulness of Ultrasound for the Diagnosis of Epidural Edema and Hematoma in the Puerperium

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### Abstract

Symptomatic epidural hematomas are common in spinal operations. However, in clinical practice, cases have been identified after regional anesthesia in various types of surgeries. It is a medical emergency due to the neurological consequences. Regional anesthesia is the most used procedure during the resolution of pregnancy either by abdominal or vaginal delivery. The utility of ultrasound as an accessible, rapid, low-cost, bedside tool for the diagnosis of epidural hematoma as a complication of obstetric regional anesthesia. The objective of this article is to report the diagnostic utility of ultrasound for the identification of hematoma and epidural edema in two women with neurological symptoms in the immediate puerperium. Obtaining images similar to magnetic resonance imaging.

### Background

Epidural hematomas are manifested by symptoms that may be indistinguishable from herniated disc. Symptomatic epidural hematomas are frequent in spinal operations. However, in clinical practice, cases have been identified following regional anesthesia in various types of surgeries. Asymptomatic, epidural hematoma may occur in 33% to 100% of patients undergoing lumbar decompression surgery [1,2]. The incidence rate of symptomatic postoperative epidural hematoma is 0.1% to 0.24% [3]. A meta-analysis of epidural hematomas showed that the most common cause was idiopathic, followed by using anticoagulant drugs and thirdly spinal procedures in combination with the use of anticoagulants. It represents a medical emergency because the neurological consequences include bowel and bladder dysfunction, saddle anesthesia, sciatica, motor weakness of the lower extremities and sexual dysfunction, which are also seen in cauda equina syndrome [4]. The occurrence of spinal epidural hematoma is exceedingly rare and was first described as a clinical diagnosis by Jackson in 1869 [5]. The diagnosis is made with magnetic resonance imaging with a sensitivity of more than 90%. Regional anesthesia is the most used procedure during the resolution of pregnancy either by abdominal or vaginal delivery. A review of the literature found no reports of the usefulness of ultrasound as an accessible, fast, low-cost, and bedside tool for the diagnosis of epidural hematoma, as a complication of obstetric regional anesthesia. The objective of this article is to report the diagnostic utility of ultrasound for the identification of epidural hematoma and epidural edema in two women with neurological symptoms in the immediate puerperium. Obtaining images like magnetic resonance imaging.

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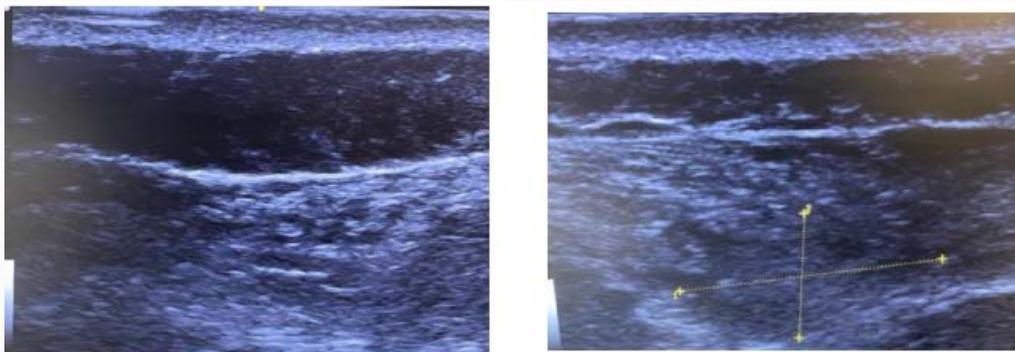
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### Case Series

#### Case 1

A 32-year-old female, 35 weeks pregnant, history of 3 pregnancies, 3 cesarean sections, no chronic disease. Scheduled for cesarean section and obstetric hysterectomy secondary to placental accretism, through regional anesthesia with epidural approach, sterile cleft field is placed, infiltration of skin and subcutaneous cellular tissue, we proceed to the placement of regional anesthesia technical Mixed BPD at L2-L3 level, Tuohy 17, loss of Pitkin + resistance, at the first traumatic attempt, locating peridural space. Whitacre No. 25 needle is introduced, obtaining clear CSF, when starting dose administration, the patient reported pain and paresthesia in both extremities, so the procedure was restarted. Once the epidural space was located, Whitacre needle was introduced, and clear cerebrospinal fluid was obtained. Anesthetic dose was administered with hyperbaric bupivacaine 6.5 mg + sufentanil 5 mcg, morphine 100 mcg and dexmedetomidine 5 mcg without complications. Whitacre needle was removed and a peridural catheter was placed in cephalic direction, permeable without blood or cerebrospinal fluid return, latency 30", extension T6



**Figure 1 and 2:** Shows thickening of the skin and subcutaneous cellular tissue associated with marked hypo echogenicity sub-manager of edema, the epistolar area shows isoechogenic engineering of defined edges of regular contours.

Bromage IV. During the surgical procedure she presented obstetric hemorrhage of 3,200 mL and was admitted to the Intensive Care Unit for hemodynamic monitoring and organic support. Laboratory tests in the first 12 h of stay with blood biometry leukocytes 7,900 cells/mm<sup>3</sup>, hemoglobin 8.1 g/dL, hematocrit 23.7%, platelets 142,000 cells/mm<sup>3</sup>, Tp 10. 8 sec, TPTa 22.3 sec; INR 1.03, sodium 138 mmol/L, potassium 3.5 mmol/L, chlorine 102 mmol/L, calcium 7.4 mg/dL, magnesium 1.9 mg/dL, creatinine 0.5 mg/dL, urea 19 mg/dL. The clinical picture begins 12 h after the surgical procedure with sudden pain in the right lower extremity, intensity 9/10, with limitation of mobility, paresis, and paresthesia at the level of the dermatomal dermatomes T12, L1, L2. Muscle weakness on extension and flexion ¼ in comparison with the left pelvic limb. Ultrasound was performed with general electric Logiq E9 equipment, with a 10 mhz linear transducer; the patient was placed in the left lateral cubitus position and insonation was performed with tracking to 3 intervertebral spaces above the puncture site and 3 below. This technique allows the identification of the following structures: Skin, muscle mass, bone structures, intervertebral spaces, and epidural space. During insonation deformation and amplitude of the epidural space of 4 cm × 1.3 cm is visualized and anechoic image is observed from T12 to L2 subjective of epidural hematoma (Figure 1, 2). The patient is hemodynamically stable for the following hours and requires management with analgesic and gabapentin 300 mg every 12 h. In order to corroborate the diagnosis was requested nuclear magnetic resonance which reports; at the height of L1 and in the interior of the spinal cord a nodular image of 2 cm long hyperintense in the T2

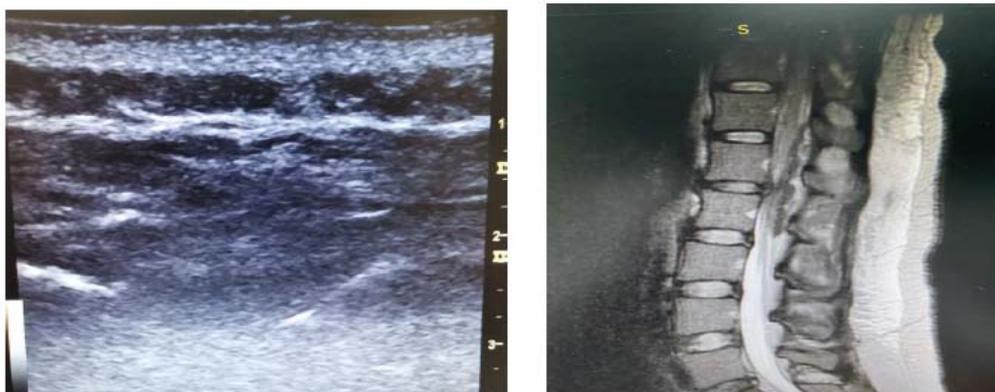
sequence, and in the T1 sequence a hyperintense area is observed, in the subcutaneous cellular tissue an increase in the intensity of the signal is identified in the T2 sequence, the inter somatic discs and vertebral bodies are seen of normal shape, dimensions and signal, with adequate alignment of spinal canal and nerve roots with normal appearance; concluding edema of the medullary epicone of 2 cm of extension, and dorsolumbar subcutaneous cellulitis (Figure 3, 4). The same treatment is continued, and remission of the symptomatology is observed in 7 days.

**Case 2**

A 35-year-old female, gestations 7, deliveries 2, cesarean section 4, abortion 1. Pregnancy of 33.1 weeks. She denies chronic degenerative diseases. Admitted to the surgical unit from the emergency department for diagnosis of total placenta previa with data of placental percretism to the bladder. Kerr type cesarean section was performed with conservative approach for placental percretism, epidural regional anesthesia was given. Male newborn weighing 2,456 grams, size 48 cm, Apgar 7/9 was obtained. Estimated bleeding of 350 ml on the sixth day of hospital stay scheduled for subtotal abdominal hysterectomy, patient with left lateral ulna, asepsis and antisepsis of the lumbar spine is performed, L2/L3 space is located, 60 mg of lidocaine 2% is administered subcutaneously, then tuohy 17 g needle is placed reaching the epidural space at the first attempt, pitkin positive, whitacre 27 g needle is placed, obtaining clear LCR, 10 mg of hyperbaric bupivacaine plus 25 mcg of fentanyl are administered, cephalization and peridural catheter is placed at the second attempt,



**Figure 3 and 4:** Sagittal section with increased signal intensity also in muscular planes, coronal section at the level of the rachis shows hypointense image in T2 that apparently without compromise or displacement.



**Figure 5 and 6:** Shows thickening of skin and subcutaneous cellular tissue associated with marked hypo echogenicity sub-manager of edema, the epistolar zone shows isoechogenic engineering of defined edges of regular contours; extrusion of the disc that generates medullary compression, also hypo intensity of medullary signal as well as its posterior aspect suggests hematoma.

fixed at 12 cm, latency of 5 min is given, obtaining motor and sensitive block until T4, surgical procedure begins, laboratory tests in the first 12 h of stay with blood biometry leukocytes 10,600 cells/mm<sup>3</sup>, hemoglobin 9 gr/dL, hematocrit 29.8%, platelets 195,000 cells/mm<sup>3</sup>, Tp 10.9 sec, TPTa 24.2 sec; INR 1.04, sodium 137 mmol/L, potassium 3.8 mmol/L, chlorine 109 mmol/L, calcium 9.1 mg/dL, magnesium 2.0 mg/dL, creatinine 0.4 mg/dL, urea 27 mg/dL. After regional anesthesia was performed during the surgical event, he presented a hemorrhage of 1300 mL and was admitted to the Intensive Care Unit for monitoring and organic support, During her stay she presented paresis and paresthesia of the right pelvic limb, pain in the right pelvic limb 8/10, ipsilateral osteotendinous reflexes abolished, sensitivity preserved; Ultrasound was performed with general electric Logiq E9 equipment, with a 10 mhz linear transducer, the patient was placed in left lateral cubitus position and insonation was performed with tracing to 3 intervertebral spaces above the puncture site and 3 below, identifying images suggestive of epidural hematoma of approximately 7 cm × 2 cm in rostro caudal direction, L1-L2 (Figure 5). Lumbar MRI was performed, which showed epidural hematoma in early subacute stage of 7.4 cm × 0.7 cm × 1.4 cm in rostro caudal, ventral dorsal and lateral direction respectively, extending from T12 to L2. Dorsal L1-L2 disc annulus bulging dorsal to right medial non-contacting. Tangential fissure of annular fibers. Non-contacting dorsal L5-S1 disc protrusion with tangential fissure of external annular fibers (Figure 6). Due to the neurological deficit, surgical intervention was necessary and drainage of 200 mL of hematic content was performed through laminectomy of L1-L2. The patient was discharged after 8 days of hospital stay with resolution of symptoms.

## Discussion

Neuraxial techniques are used to provide analgesia during labor [6,7] and anesthesia for operative delivery. In a meta-analysis it was noted that in publications after 1990 there is an estimated incidence of epidural hematoma 1 in 168,000 obstetric anesthesia, persistent neurologic injury occurs in 1 in 257,000 and transient neurologic injury 1 in 5,537. In our center these two cases occurred out of 2,502 obstetric anesthetic procedures. (79.9 cases per 100,000 live births). In these cases, acute and severe lumbar pain, radiating to the right lower extremity and paresthesias were the first signs reported by the patients. This clinical picture is like other cases published by Alessandro Svelato [8] in a 44-year-old woman following caesarean

section where epidural hematoma requiring laminectomy was also found. A delay in diagnostic imaging can lead to devastating results, as neurological symptoms and low back pain can be erroneously attributed to epidural infusion of drugs or a prolonged effect of the local anesthetic [9].

The presence of spinal cord compression is an indication for surgery. In the case of transient motor deficit with MRI evidence of epidural hematoma, as in our case, decompression laminectomy within the first 12 h offers the best surgical outcome (3, 15, 16). However, the literature reports cases of good evolution also in the case of surgery performed after 24 h from the onset of symptoms [10]. To avoid chronic complications surgery is an option to improve the results [10]. Ultrasound is a tool that has allowed diagnostic imaging in different clinical scenarios because it can be used in a feasible way, due to its low cost, without major intervention, at the patient's bedside and with immediate results. These cases reflect how using ultrasound of the lumbar spine it is possible to evaluate the epidural space, intervertebral space, bone, and muscle structures as well as the presence of edema and epidural hematoma. This is the first article that explores the usefulness of this diagnostic tool in pregnancy and puerperium.

## Conclusion

Ultrasound examination of the puncture site area in regional anesthesia in women, with symptoms and/or neurological deficits allows the identification of edema and epidural hematomas that help to reduce neurological complications as well as subsequent transient sequel during pregnancy and puerperium.

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