Ultrasound-guided spinal anesthesia in an obese patient

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Rachianesthésie échoguidée chez un patient obèse

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RÉSUMÉ

Nous rapportons le cas d'un patient âgé de 62 ans avec un indice de masse corporelle à 53 aux antécédents de diabète, hypertension artérielle et syndrome d'apnées obstructives du sommeil qui était proposé pour une résection endoscopique de la prostate sous rachianesthésie. La technique classique guidée par les repères anatomiques de surface a été soldée par un échec après plusieurs tentatives. La rachianesthésie a été réalisée avec succès après une seule tentative sous guidage échographique.

Mots-clés

Rachianesthésie, échographie, obésité

SUMMARY

We describe the case of 62-year-old man with a body mass index of 53, hypertension, diabetes mellitus and obstructive sleep apnea that was proposed for transurethral resection of prostate under spinal anesthesia. The surface landmark-guided approach was difficult and was abandoned after many unsuccessful attempts. Spinal anesthesia was achieved in one attempt with ultrasound guidance using the midline approach at the identified level. The trajectory was determined from the transducer angle.

Key-words

Spinal anesthesia, ultrasound, obesity

التخدير عبر العمود الفقري مع توجيه بالصدى عند المريض المصاب بالسمنة

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الكلمات الأساسية: تخدير عبر العمود الفقري – تخطيط بالصدى – سمنة

Regional anesthesia, particularly spinal anesthesia, is an interesting alternative in obese patients [1]. The surface landmarks in these patients are hard to find, making spinal anesthesia technically more difficult. The use of ultrasound guidance can reduce these difficulties as described in many case reports [2-5].

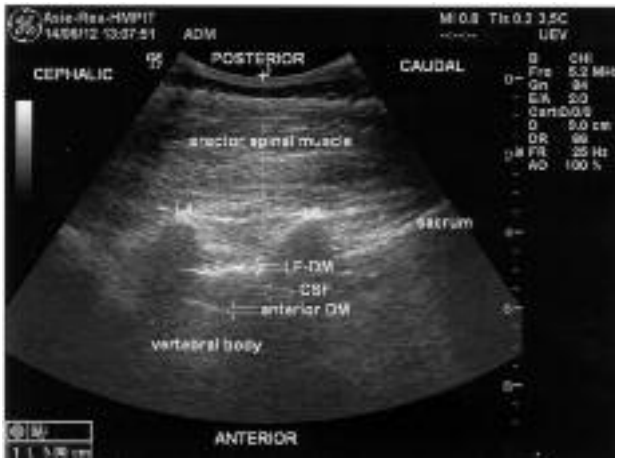
CASE REPORT

A 62-year-old male with a body mass index (BMI) of 53 (weight: 145 Kg; height: 165 cm), hypertension, diabetes mellitus and obstructive sleep apnea was proposed for transurethral resection of prostate. Spinal anesthesia was chosen as the most suitable technique after considering its advantages and disadvantages and after having patient consent. Bony landmarks were not found on palpation, and the landmark-guided approach was abandoned after many unsuccessful attempts.

With the patient in the sitting position, an ultrasonographic view (Logiq7, General Electric; USA) of the lumbar spine was performed. To obtain a paramedian longitudinal view, a 2–5 MHz curved transducer was placed vertically 2 cm lateral to the midline at the level of the base of the sacrum. The sacrum was identified as a hyperechoic line at a depth of 4-5 cm. The transducer was moved cephalad in this plane, and then directed towards midline, to obtain the best view of the lamina of L5 above the sacrum.

The transducer was subsequently positioned to visualize the interspace between the laminae of L4 and L5 by counting the laminae from the sacrum. In this view, the ligamentum flavum-dura mater complex (LF–DM) appeared as double white lines; and the posterior vertebral body (PVB) appeared as a deeper hyperechoic line (Fig. 1).

Figure 1 :



Keeping this interspace in the centre of the image, where the PVB was best visualized, the transducer was rotated 90° and then moved towards the midline. In this transverse view, the patient's midline was confirmed with slight cephalad and caudal movements of the transducer revealing the spinal processes of the vertebrae. The most suitable interspace for spinal needle insertion was determined at the level where the paramedian and midline transverse views provided the best visualization of the LF–DM and the PVB. The most direct needle trajectory for the dural puncture was taken from the skin transducer angle that provided the best view of the LF–DM and PVB in the transverse plane (Fig. 2). We were, also, able to make an estimation of the depth of the LF–DM and PVB.

After skin marking and aseptic preparation, spinal anesthesia was successfully performed in one attempt using the midline approach at the identified level. Using a 25G, 90 mm Whitacre needle (Vygon, France), 0.5% hyperbaric bupivacaine 7.5 mg plus sufentanil 2.5 μg were administered intrathecally providing complete surgical anesthesia. Then, the patient underwent transurethral resection of prostate without any sedation.

Figure 2 :

DISCUSSION

Anesthesiologists are frequently confronted with obese and morbidly obese patients. The perioperative care of the obese patient is challenging, especially regarding airway management with a high risk of failed tracheal intubation [6]. Therefore, regional anesthesia, particularly spinal anesthesia, is an attractive option. However, the surface landmarks in these patients are often indistinct, making spinal anesthesia technically difficult [7, 8]. Multiple case reports showed the utility of ultrasound guidance in neuraxial blockade in patients with difficult spinal anatomy [2-5]. Ultrasound imaging of the lumbar spine in this population may assist spinal anesthesia by determining the correct interspinal space, accurately identifying the midline, and estimating the depth of the dura mater [9]. Systematic ultrasonography using both paramedian and transverse midline planes is, therefore, a potentially useful aid to spinal anesthesia in the obese patient.

Sprung and al. [10] showed that the quality of landmarks was the most significant independent predictive factor of difficulty as measured both by first-level success and number of attempts. The BMI, only objective patient characteristic, was very weakly related to neuraxial block difficulty. Data published by Ellinas and al. [11] showed that the best predictors of neuraxial anesthetic technique difficulty in pregnant patients were back flexion and ease of palpation of bony landmarks. Obesity, as measured by BMI, do not predict technique difficulty directly but predict both difficult palpation and reduced flexion. There has been only one randomized, controlled trial in the literature that showed the utility of ultrasound guidance in neuraxial blockade in patients with difficult spinal anatomy. Grau et al. [9] showed that in 72 parturients in whose labor epidural insertion was presumed to be difficult, 38% were selected based on a BMI of more than 33 kg/m2. The rest had a lumbar spinal deformity (26%) or had previously experienced difficulty with epidural insertion (36%). The epidural puncture was performed by one operator using either the surface landmark-guided technique or an ultrasound-guided technique. They found that the mean number of puncture attempts was significantly lower in the ultrasound group ($P < 0.001$) and the ultrasound technique was associated with significant improvements in pain scores and patient satisfaction.

However, the ultrasound-guided technique is not without limitations. Imaging the vertebral canal on ultrasound (ligamentum flavum, dura mater, and posterior aspect of the vertebral body) can be difficult. In obese patients, structures are often less distinct because of the attenuation of ultrasound waves (they travel a greater distance through tissue). In addition, a phase aberration effect caused by the varying speed of sound in the irregularly shaped adipose layers has been described [12].

In addition, elderly patients may have degenerative spinal disease with narrowed interspinal spaces and interlaminar spaces due to ossification of the interspinal ligaments and hypertrophy of the facet joints, respectively. In such patients, directing an ultrasound beam or needle into the vertebral canal may be physically difficult or impossible. However, even in the most difficult circumstances, ultrasonography can provide potentially useful information on the location of the neuraxial midline and the interlaminar space [13].

CONCLUSION

Pre-procedural ultrasound imaging facilitates the performance of spinal anesthesia in the non obstetric patient with difficult bony landmarks. We think that it is a valuable skill to acquire, especially given the increasing number of obese patients presenting for prostatic surgery or orthopedic surgery of the lower limb.

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