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CASE REPORT
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Spinal epidural hematoma after failed attempt of spinal anesthesia

F. Alevrogianni,
M. Mavrommati,
E. Stavropoulou

"KAT" General Hospital, Athens, Greece

Spinal epidural hematomas (SEH) are rare but serious complications of regional anesthesia, particularly neuraxial techniques. With an annual incidence of one per one million people and occurring in less than 1% of spinal space-occupying lesions, SEH remains a critical concern due to its potential for severe neurological impairment. This case report highlights an 85-year-old woman who underwent surgery for a medial malleolus fracture under general anesthesia after unsuccessful subarachnoid anesthesia attempts. Past medical history included hypertension, dyslipidemia, hypothyroidism, and lumbar stenosis. On the second day post operatively, paraparesis and sensory loss were documented in both lower limbs. Magnetic resonance imaging (MRI) revealed a SEH compressing the spinal cord at the L1 vertebral level. Emergency surgical spinal decompression was performed, resulting in immediate neurological improvement. The patient showed significant recovery and followed rehabilitation protocol. By the three-month follow-up, she was able to walk with assistance. Our case emphasizes the importance of considering SEH in patients presenting with new onset neurological deficits post-surgery, especially following neuraxial anesthesia attempts. Early diagnosis through MRI and timely surgical intervention are key to preventing permanent neurological damage and achieving favorable outcomes.

Επισκληρίδιο αιμάτωμα μετά από αποτυχημένη προσπάθεια υπαραχνοειδούς αναισθησίας

Περίληψη στο τέλος του άρθρου

Key words

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Regional anesthesia techniques, and spinal anesthesia especially, are considered established methods for high surgical risk patients undergoing orthopedic procedures.[1] Spinal epidural hematoma (SEH) represents a rare but potentially devastating complication of central neuraxial blocks following regional anesthesia. Symptomatic SEH accounts for less than 1% of all spinal space-occupying lesions and affects only one per one million people annually. The incidence of SEH after neuraxial anesthesia has historically been approximated to be less than one in 220,000 spinal anesthetics.[2,3]

CASE PRESENTATION

An 85-year-old female patient with a body mass index (BMI) of 28 was urgently admitted to the Orthopedic Department (13.10.2022) due to medial malleolus fracture of the right lower limb after a reported fall from the same height 48 hours before, for surgical treatment. From past medical history, she suffered from hypertension, dyslipidemia, diabetes mellitus, hypothyroidism under medication and lumbar stenosis. At a young age, she had undergone a tonsillectomy. No known allergies were reported and the patient was not receiving antithrombotic treatment. From clinical examination of the affected limb, severe swelling with accompanying blisters on the medial and external malleus were found. The patient also had limited mobility of the ankle joint due to pain.

Routine laboratory testing revealed leukocytosis (white blood cells [WBC]: 11,480/mL) with increased inflammation markers. No coagulation disorders were reported, as confirmed for normal PT, INR, APTT, PLTS values and the patient also had normal hemoglobin and hematocrit values (Hb: 11.88 g/dL, Hct: 36.4%). She underwent a radiological examination (chest, SS, pelvis/hips and long bones) from which no other injuries were found. The presence of blisters was assessed by the internal medicine department and conservative treatment was recommended.

On the eighth day of hospitalization (21.10.2022), after completing antibiotic treatment, she underwent open surgical reduction and internal fixation of the fracture. After the patient's consent, it was decided to operate under regional (spinal) anesthesia. The patient was placed in the lateral decubitus position; a 23G needle was used and medial access at the O3-O4 level was applied. After multiple unsuccessful attempts, the patient was operated on under general anesthesia and immediately postoperatively transferred to the ward for support. On the 2nd postoperative day (23.10.2022),

the patient presented with progressively worsening weakness of the lower limbs and weakness of dorsiflexion of the foot bilaterally. From new laboratory control, no notable changes were found (Hb: 10.7 g/dL, Hct: 32.7%) or indications for hemorrhage and coagulation disorders. Thorough neurological examination, from the hospital's spine department, revealed paraparesis and a decrease in muscle strength, more specifically in the iliopsoas muscles (1/5), quadriceps muscles (1/5), tibialis anterior and gastrocnemius muscles (0/5), as well as impair of the superficial and deep sensibility of the lower limbs, at the level below the knee bilaterally. Lumbar MRI was recommended. Due to the impossibility of performing a magnetic resonance imaging (MRI) on an urgent basis, the patient underwent a computed tomography (CT), which showed an epidural hematoma at the level of L1 (fig. 1), compressing on the spinal cord and subsequently, surgical treatment was recommended. The above finding was also confirmed by an MRI to which he was submitted (fig. 2).

Figure 1. Spinal epidural hematoma at L1 vertebral level on computed tomography (CT).

On the same day, under general anesthesia, the patient underwent surgical drainage of the hematoma and decompression of the spinal cord at the level of the lumbar spine, with a significant improvement in neurological symptoms postoperatively. On 27.10.2022, the surgical team repeated a tomography, which also showed an improvement in the radiological image (fig. 3). On the 7th postoperative day, the patient was transferred to the physical medicine and rehabilitation clinic for further support.

In the current phase (three months later) on a regular follow-up appointment, the patient has been discharged from the hospital and is able to stand up and walk with help.

DISCUSSION

SEH is defined as a collection of blood between the connective tissue, between the vertebrae and the dura mater of the spinal canal. It usually remains asymptomatic, but in rare cases where it compresses the spinal canal, it is associated with potentially devastating neurological consequences, such as sensory disturbances, sphincter incontinence, muscle weakness and even complete paralysis of the affected limbs. Although they may be of spontaneous etiology, they usually occur as a complication of spinal interventions such as lumbar puncture, spinal surgeries and central neuraxial blocks.[1]

Epidemiologically, symptomatic SEH accounts for less than 1% of all spinal space-occupying lesions and affects only one per one million individuals per year. The incidence of SEH after neuraxial anesthesia has historically been estimated to be less than one in 150,000 epidural catheter placements and less than one in 220,000 cases of subarachnoid anesthesia.[1,2] Risk factors include advanced age, female sex, traumatic and multiple puncture

Figure 2. Magnetic resonance imaging (MRI) confirmation of spinal epidural hematoma at L1 level.

Figure 3. Findings after surgical decompression.

attempts for blockade, vascular malformations, chronic anti-inflammatory medication and arterial hypertension.[3,4] Regarding neuraxial techniques, the level of hematoma is usually presented at the level of puncture or up to the highest level of catheter insertion for epidural analgesia.[5] In more rare cases, however, hemorrhagic complications such as intracranial subdural hematoma, in association with the anesthetic technique, have been attributed to caudal displacement of intracranial structures due to low cerebrospinal fluid pressure.[5,6] It is significant to mention, that the most important risk factor for SEH is the presence of a normal or iatrogenic disorder of the coagulation system, such as liver disease, alcoholism, thrombocytopenia, or pharmacological anticoagulation.[7,8] A recent retrospective study also found a substantial increase in SEH after spine surgery in patients with Rh+ blood types, intraoperative blood loss greater than 1 L, hemoglobin level less than 10 g/dL, and international normalized ratio (INR) greater than 2.0 in the first 48 hours.[8,9] Overall, anticoagulation therapy combined with neuraxial analgesia as well as the duration and intensity of anticoagulation therapy have been identified as important aggravating factors for epidural hematoma, in a percentage that reaches 25–30% of cases. In a review of all SEH cases associated with neuraxial anesthesia, 87% of patients had either a hematologic abnormality or a procedure complicated by technical difficulty.[10]

Clinical presentation is consistent with the distribution of the respective neurotome involved due to pressure on the spinal cord or the respective spinal root. Usually, SEH manifest early with acute low back pain, and then muscle weakness (contralateral or bilateral) develops progressively, accompanied by sensory deficits. Depending on the level of hematoma, urinary or fecal incontinence may also occur.[1] Literature findings, in fact, point out that the return of a motor or sensory disorder after the withdrawal of the neuroaxonal blockade is almost pathognomonic of an epidural hematoma and demands immediate investigation. In addition to a complete neurological examination to record neurological signs, a hematological test is needed to rule out a coagulation disorder, which predisposes to bleeding. MRI is the diagnostic imaging modality of choice for spine emergencies, as it allows rapid, noninvasive evaluation of the spine and spinal cord at all levels, delineates the location of an epidural hematoma, and identifies an associated vascular malformation. It also provides information about the extent of the hematoma as well as the degree of compression of the spinal canal. An alternative diagnostic method is CT of the spine, with a high percentage of false negative results.[11,12]

The majority of hematomas appear 36–48 hours after an interventional procedure, and MRI has the potential to highlight the chronological characteristics of the hematoma. In the hyperacute stage (first six hours), the hematoma appears in the same density with respect to the spinal cord on T1 sequence and mildly hyperdense on T2 sequence. In the acute stage (7–72 hours), the hematoma is still isointense on T1 sequence but becomes hypodense on T2. As the methemoglobin concentration increases, the hematoma becomes hyperdense and homogeneous in all sequences.[11] In fact, according to the recent guidelines of the European Society of Anesthesiology and the European Society of Regional Anesthesia for patients receiving anticoagulants who will undergo surgery under regional anesthesia, it is suggested that immediately postoperatively patients must be clinically examined by specialized personnel on a regular basis for at least 24 hours or more if they are at high risk (recommendation 2C) and on neurological signs to undergo MRI, as an examination of choice (recommendation 1C).[12]

Urgent surgical decompression is the treatment of choice in patients with epidural spinal cord hematoma and acute neurological symptoms. Excision of the paired spinous process, followed by drainage of the hematoma. The prognosis for neurological recovery depends mainly on the patient's preoperative neurological status and the duration of neurological dysfunction. According to Wolf's study, the optimal window for surgical treatment is 8 to 36 hours in the presence of paralysis and according to Lawton et al, 12 to 48 hours in the presence of movement disorders.[14,15] It is worth noting, however, that in the guidelines of the European Society of Anesthesiology and the European Society of Regional Anesthesia, published in 2022, the therapeutic window is limited to six hours for surgical decompression, as it is associated with improved neurological outcome.[12] Patients are rarely treated conservatively. The overall mortality rate is 8%.[13]

In conclusion, the possibility of SEH should be considered whenever neurological symptoms occur in the postoperative period, particularly after axonal block, especially in patients with risk factors. The causes are multiple, while the anesthetic technique can be directly or indirectly linked to this complication. MRI is the diagnostic method of choice. Early surgical decompression of the spinal cord is associated with improved patient outcomes.

ΠΕΡΙΛΗΨΗ

Επισκληρίδιο αιμάτωμα μετά από αποτυχημένη προσπάθεια υπαραχνοειδούς αναισθησίας

Φ. ΑΛΕΥΡΟΓΙΑΝΝΗ, Μ. ΜΑΥΡΟΜΜΑΤΗ, Ε. ΣΤΑΥΡΟΠΟΥΛΟΥ

Γενικό Νοσοκομείο Αθηνών «ΚΑΤ», Αθήνα

Αρχεία Ελληνικής Ιατρικής 2025, 42(6):845–848

Το επισκληρίδιο αιμάτωμα της σπονδυλικής στήλης (SEH) αποτελεί σπάνια αλλά σοβαρή επιπλοκή της περιοχικής αναισθησίας, ιδιαίτερα των νευραξονικών τεχνικών. Με ετήσια επίπτωση ένα ανά ένα εκατομμύριο ανθρώπους, τα SEH προκαλούν ανησυχία λόγω της συσχέτισής τους με σοβαρές νευρολογικές επιπλοκές. Το κλινικό περιστατικό αφορά σε μια 85χρονη γυναίκα που υποβλήθηκε σε χειρουργική επέμβαση για κάταγμα έσω σφυρού υπό γενική αναισθησία, μετά από αποτυχημένες προσπάθειες υπαραχνοειδούς αναισθησίας. Το ιατρικό της ιστορικό περιλάμβανε υπέρταση, δυσλιπιδαιμία, υποθυρεοειδισμό και στένωση οσφυϊκής μοίρας. Τη δεύτερη μετεγχειρητική ημέρα εμφάνισε παραπάρεση και διαταραχές αισθητικότητας αμφοτερόπλευρα στα κάτω άκρα. Η μαγνητική τομογραφία (MRI) αποκάλυψε επισκληρίδιο αιμάτωμα με πιεστικά φαινόμενα επί του νωτιαίου μυελού στο επίπεδο του σώματος του σπονδύλου Ο1. Η ασθενής υποβλήθηκε σε επείγουσα χειρουργική αποσυμπίεση της σπονδυλικής στήλης, με άμεση νευρολογική βελτίωση. Στη συνέχεια, παρουσίασε σημαντική ανάκαμψη, υποβλήθηκε σε πρόγραμμα αποκατάστασης και στους 3 μήνες παρακολούθησης μπορούσε να περπατήσει υποβοηθούμενη. Συμπερασματικά, οι ασθενείς με νέα νευρολογικά ελλείμματα μετά τη χειρουργική επέμβαση, ιδιαίτερα μετά από απόπειρες νευραξονικής αναισθησίας, θα πρέπει να διερευνώνται για πιθανό επισκληρίδιο αιμάτωμα. Η έγκαιρη διάγνωση και η άμεση χειρουργική παρέμβαση είναι καθοριστικές για την αποφυγή μόνιμης νευρολογικής βλάβης και τη βελτίωση της έκβασης.

Λέξεις ευρετηρίου: Επιπλοκές περιοχικής αναισθησίας, Επισκληρίδιο αιμάτωμα, Υπαραχνοειδής αναισθησία

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Corresponding author:

F. Alevrogianni, 2a Kalamou street, 145 78 Ekali, Attica, Greece
e-mail: falevrogianni@gmail.com