Pneumocephalus Following Inadvertent Dural Puncture During Epidural Anesthesia: Case Report

Epidural Anestezi Sırasında Yanlışlıkla Yapılan Bir Dural Ponksiyonu Takiben Gelişen Pnömosefalus

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ABSTRACT While applying epidural anesthesia technique, air or saline solutions are used to feel the loss of resistance after passing the flavum ligament. Most of the reported complications during air injection into the epidural space are: compressions on the nerve roots and spinal cord, subcutaneous emphysema, incomplete analgesia, paresthesia, pneumocephalus. Inadvertent air injection into the spinal space during procedure should not be overlooked. We report an inadvertent dural puncture and iatrogenic pneumocephalus case while applying epidural anesthesia for L4-L5 spinal surgery. The second day postoperatively, the cranial CT that performed for the patient's complaints about a severe headache and speech disorder reported air density on the anterior horns of lateral ventricules bilaterally. Clinically the patient's complaints were found compatible with postdural puncture headache (PDPH) rather than pneumocephalus, therapy for PDPH was suggested. Overall, the pneumocephalus as depicted by the previous CT disappered totally. The literature regarding inadvertent pneumocephalus during epidural anesthesia was discussed.

Key Words: Anesthesia, epidural; post-dural puncture headache

ÖZET Epidural anestezi tekniği uygulanırken ligamentum flavumu geçtikten sonra direnç kaybını hissetmek için hava ya da salin solüsyonları kullanılır. Epidural aralığa hava enjeksiyonu sırasında karşılaşılan komplikasyonlar şunlardır: Spinal kord ve sinir köklerinin kompresyonu, subkutan amfizem, tamamlanmayan analjezi, parestezi, pnömosefalus. Bu prosedür sırasında spinal aralığa uygunsuz hava enjeksiyonu gözden kaçırılmamalıdır. Biz L4-L5 spinal cerrahi sırasında epidural anestezi uygularken meydana gelen uygunsuz bir dural ponksiyonu ve iatrojenik pnömosefalusu rapor ettik. Postoperatif 2. günde hastanın ciddi başağrısı ve konuşma bozukluğu nedeniyle yapılan kranial BTde bilateral lateral ventrikül ön boynuzlarında hava rapor edildi. Klinik olarak hastanın şikayetleri pnömosefalustan çok dural ponksiyon sonrası başağrısı (DPSB) ile uyumlu bulunarak, DPSB için tedavi önerildi. Sonuç olarak daha önceki Kranial BT ile tespit edilen pnömosefalus tamamıyle kayboldu. Epidural anestezi sırasında meydana gelen uygunsuz pnömosefalusa yönelik literatur bu vaka aracılığıyla tartışıldı.

Anahtar Kelimeler: Anestezi, epidural; dura ponksiyonu sonrası başağrısı

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Lumbar and lower thoracic spinal surgery can be performed with both general and regional anesthesia safely. In surgeries of the lumbar spine, many centers administer successful epidural and spinal anesthesia.[1]

Anesthesiologists who favor regional techniques, however, believe regional anesthesia reduces blood loss and improves operating conditions by decreasing peripheral venous pressure which reduces venous blood loss in the operative field.[2]

In addition to many advantages of epidural anesthesia, hypotension, local anesthetic toxicity, total spinal anesthesia, lumbar puncture, back pain, and neurologic complications as a result of subdural blockade may be observed.[3-5]

Since the epidural space first described in 1885, more than one method is proposed to identify the epidural space, the most popular one among them is defined by Forestier&Sicard whom determine the loss of resistance by air technique.[6] İnadvertent air injection into spinal space during such procedure although rare, still should not be overlooked.

The present case is a 46-year-old patient undergoing surgery for lumbar disc, while performing the epidural block accidentally postdural puncture developed and postoperatively cranial computed tomography (CT) revealed an iatrogenic pneumocephalus.

CASE REPORT

46-year-old, 90 kg, 180 cm patient without known history of the surgery and anesthesia with complaints about waist and back pain radiating to leg referred to Neurosurgery outpatient clinic. Lumbar magnetic resonance imaging (MRI) identified herniation at the level of L4-L5, causing compression on nerve roots, therefore L4-L5 lumbar disc herniation surgery was planned. Evaluation of the patient before anesthesia no systemic diseases were detected. INR: 1.01%, PT: 12.9 sec measured, we decided to place an epidural catheter in L3-L4 intervertebral space. The patient was taken to the operating room in the sitting position before the operation, epidural block with the loss of resistance technique with air was planned. Before starting to apply neuroaxial blockade patient's blood pressure, heart rate and pheripheric O2 saturation were measured as 130-80 mmHg, 75/min, 98% respectively. After obtaining antiseptic conditions, local anesthetic drug (60 mg 2% lidocain) was used to provide infiltration anesthesia for cutaneous and subcutaneous tissues for the patient in the sitting position. In the meantime, when the patient's vital signs were stable, patient fell dizziness. Patient turned on the lateral decubitus position, First attempt performed by disposable 18-gauge Tuohy needle (18Gx9 cm in BS-6196, Smiths Medical International Limited, Hythe, Kent, UK) within the L3-L4 intervertebral space by loss of resistance technique with air, after a significant loss of resistance had seen, lumbar puncture occured which had confirmed with CSF leakage. With a new disposable 18 gauge Tuohy needle (18Gx9 cm in BS-6196, Smiths Medical International Limited, Hythe, Kent, UK) and with a single succesful attempt within the L2-L3 intervertebral space performed by means of the loss of resistance technique using saline and epidural catheter was placed. As a test dose, 60 mg Lidocaine HCl 2% was administered primarily through epidural catheter, after determining whether the motor block had performed, the patient has been anesthetized by 50 mg levobupivakaine.

Surgery was lasted 1.5 hours during the patient's vital signs (blood pressure: 130-140 mmHg, heart rate: 75-85 min, SpO_2: 97-99%) remained stable. During the operation, an alteration in the patient's consciousness or neurological deficit wasn't observed. At the end of surgery the patient was transferred to the neurosurgery clinic.

Two days after surgery, the patient had complained of headache starting from frontal region radiating to the occipital region which was aggravating in erected position especially by walking. Meanwhile, in neurologic examination a short-term, aimless and meaningless speech of patient were examined, the patient was determined with a minimental test by a neurologist. Obvious signs of dementia wasn't detected, the presence of depression was thought. Postoperatively on the second day, the cranial CT that performed for the patients complaints about a severe headache and speech disorder reported air density on the anterior horns of lateral ventricules bilaterally (Figure 1). At the same day the patient was evaluated by an anesthesiologist and described the headache as 8 with visual analog scale (VAS). Clinically the patient's complaints found compatible with postdural puncture headache (PDPH) rather than

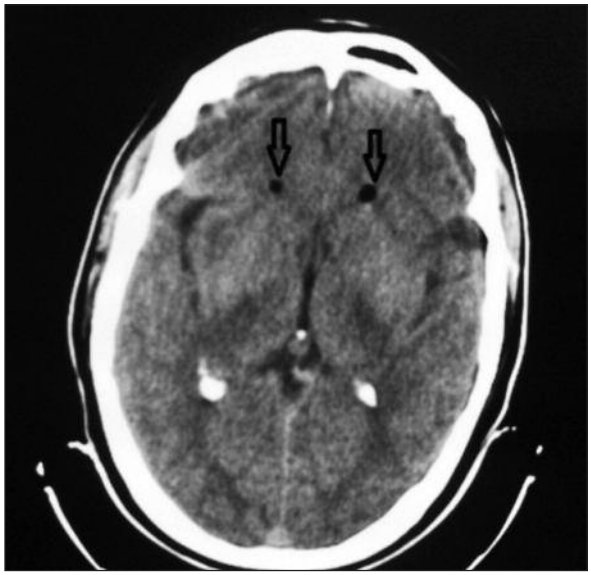

FIGURE 1: Computed tomography of the cranium demonstrating air density on the anterior horns of lateral ventricules bilaterally.

pneumocephalus, therapy for PDPH as 3000 cc /day hidration with saline, theophylline anhydrous 200 mg caffeine uptake, NSAİD (250 mg paracetamol + 50 mg caffeine) 3 times a day and bed rest suggested. Postoperatively on the third day he described his headache as 4 with VAS. Keeping in mind that the patient responded to fluid loading, and analgesic treatment an additional treatment dexketoprofen trometamol 25 mg every 12 hours and waist belt usage proposed. Cranial MRI that performed postoperatively on the sixth day reported as no cranial pathology had been observed. Overall, the pneumocephalus as depicted by the previous CT disappered totally. 10 days after operation he was discharged home with a full well-being.

DISCUSSION

During air injection to the epidural space, various complications including nerve roots and spinal cord compression, retroperitoneal gas collections, subcutaneous emphysema, air embolism, inadequate analgesia, paresthesia and pneumocephalus were defined.[7] Pneumocephalus is a complication that can occur frequently during interventional neuroradiology and neurosurgery operations.[8,9] Although it is relatively rare it may occure after dural puncture.[10]

Reported inadvertent pneumocefalus cases have involved epidural anesthesia and have been attributed to application of the loss of resistance to air technique ascertaining placement of the catheter in the epidural space.[11]

Katz et al. reported a case in which the loss of resistance technique for identification of the epidural space prior to cesarean delivery was implicate, with an unnoticed dural puncture resulting in a severe transient intraoperative neurologic event.[12] Ash et al. identified an ongoing obstetric case of pneumocephalus that started with vomiting and severe headache at the begining of which epidural anesthesia with the loss of resistance technique with air was performed.[3] In this case, the same as in our patient, in the etiology of headache a subarachnoid hemorrhage thought as a priority consideration, after performing cranial CT, pneumocephalus observed. Lin et al. reported severe respiratory depression and loss of consciousness in one case that the loss of resistance technique with air during insertion of the epidural catheter used.[13]

Considering all these cases, the most important aspects of the patient's symptoms such as vomiting, headache, respiratory depression happened following epidural catheter placement on the operating room during surgery. However, severe headache in our patient emerged postoperatively on the second day. For this reason, while evaluating the etiology of the headache PDPH takes precedence rather than proven pneumocephalus. Aida and colleagues compared meningeal puncture headache with the loss of resistance technique with air or saline, the authors detected the incidence was higher in the air group compared with the saline group.[14]

However for our patient the real reason of the headache was dural puncture headache, after the research of the literature, in the cases with the regional anesthesia attempts a serious headache, altered consciousness is necessarily indicate the pneumocephalus as a considered complication.

As a conclusion, during the identification of epidural space with the loss of resistance technique by air, by the means of an inadvertent dural

puncture, air inlet occured to subdural and intrathecal space, and thus led to pneumocephalus. Our experience confirms that during epidural block with the loss of resistance to air technique for epidural space identification the possibility of iatrogenic pneumocephalus should not be overlooked. During the interventions to locate the epidural space with the loss of resistance technique it may indeed be safer and therefore advantageous to use saline rather than air.

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