

Application of cervical epidural blood patch for spontaneous cerebrospinal fluid leaks: Two case reports

Spontan beyin omurilik sıvısı kaçaqlarında servikal epidural kan yaması uygulaması: İki olgu sunumu

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ABSTRACT

Spontaneous cerebrospinal fluid (CSF) leaks are uncommon but significant causes of orthostatic headaches, often resulting from dural injuries. Although lumbar epidural blood patches (EBPs) are commonly used to treat such leaks, cervical EBPs are rarely performed due to the higher risk of complications, including spinal cord injury. This case series presents two patients with spontaneous cervical CSF leaks successfully treated with cervical EBPs under fluoroscopic guidance. The first case involved a 24-year-old female who presented with a two-month history of severe orthostatic headaches and tinnitus and a Visual Analog Scale (VAS) score of 8. After a cervical EBP with 3 mL of autologous blood, her symptoms resolved. The second case describes a 55-year-old male with a history of radiotherapy who presented with a VAS score of 10 and a four-month history of orthostatic headaches. A cervical EBP using a total of 6 mL of blood led to complete symptom resolution. Both cases highlight the efficacy and safety of cervical EBPs when performed with careful imaging guidance and minimal blood volumes. These findings suggest that this approach should be considered in cases of refractory cervical CSF leaks.

Keywords: Cervical epidural blood patch, fluoroscopic guidance, spontaneous intracranial hypotension.

Spontaneous spinal cerebrospinal fluid (CSF) leaks are a relatively uncommon condition, with most cases arising due to dural puncture during spinal surgery, diagnostic procedures like myelography, or spinal penetrating injuries causing dural

ÖZ

Spontan beyin omurilik sıvısı (BOS) kaçaqları, nadir görülen ancak dural yaralanma sonucu gelişebilen ve ortostatik baş ağrısına neden olabilen önemli bir durumdur. Lomber seviyede epidural kan yamaları (EKY) bu tür kaçaqların tedavisinde yaygın olarak kullanılsa da, servikal EKY'ler omurilik yaralanması da dahil olmak üzere yüksek komplikasyon riski nedeniyle nadiren uygulanmaktadır. Bu olgu serisinde, floroskopi rehberliğinde uygulanan servikal EKY ile başarılı bir şekilde tedavi edilen iki spontan servikal BOS kaçağı hastası sunuldu. İlk olgu, iki aylık şiddetli ortostatik baş ağrısı ve tinnitus öyküsü ile başvuran ve Görsel Analog Skalası (VAS) skoru 8 olan 24 yaşında bir kadın hastayı içermektedir. Üç milliliter otolog kan kullanılarak yapılan servikal EKY sonrası semptomları tamamen geriledi. İkinci olgu ise radyoterapi öyküsü bulunan, VAS skoru 10 olan ve dört aydır süregelen ortostatik baş ağrısı ile başvuran 55 yaşında erkek hastayı tanımlamaktadır. Toplam 6 mL kan kullanılarak uygulanan servikal EKY semptomların tamamen düzelmesini sağladı. Her iki olgu da dikkatli görüntüleme rehberliğinde ve minimal kan hacimleriyle gerçekleştirilen servikal EKY'lerin etkinliğini ve güvenliğini vurgulamaktadır. Bu bulgular, dirençli servikal BOS kaçaqları durumunda bu yaklaşımın dikkate alınması gerektiğini önermektedir.

Anhtar sözcükler: Servikal epidural kan yaması, floroskopi rehberliği, spontan intrakraniyal hipotansiyon.

lacerations.^[1] These injuries result in intracranial hypotension, manifesting as headaches with typical orthostatic features, which worsen upon standing and are relieved in the supine position.^[2] In such cases, sealing the leakage site is crucial, and the preferred

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Doi: 10.5606/agri.2026.81

Received: November 18, 2024 | **Accepted:** July 07, 2025 | **Published online:** September 25, 2026

Cite this article as: Rumeli S, Bakır M, Turhan G, Ertargın M, Yalin MR. Application of cervical epidural blood patch for spontaneous cerebrospinal fluid leaks: Two case reports. Agri 2026;38(4):298-301. doi: 10.5606/agri.2026.81.

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treatment modality is the application of an epidural blood patch (EBP).^[3]

Cervical spontaneous dural leaks are rarer compared to those occurring at lumbar levels, and there is considerable reluctance to use EBP in cervical regions due to the associated risk of neurological complications.^[4] Potential complications include facial nerve paralysis, changes in mental status, subdural hematomas, transient bradycardia, nerve root compression, and chemical meningitis. Additionally, spinal cord injuries may occur during cervical or thoracic EBPs.^[5] The utilization of fluoroscopic imaging during the procedure helps confirm the placement of the needle in the epidural space and provides visualization of blood distribution, enhancing safety and effectiveness.^[6] However, the literature on optimal levels and blood volume for cervical EBPs remains limited.^[3]

In this report, we present two cases of spontaneous cervical CSF leaks treated with EBP. These cases demonstrate the clinical approach, imaging techniques, and outcomes of cervical EBP, adding to the limited body of knowledge on this treatment modality.

CASE REPORT

Case 1– A 24-year-old female patient presented with a two-month history of severe headaches and tinnitus, with a pain intensity rated as 8 on the

Visual Analog Scale (VAS). The headaches, described as throbbing and predominantly occurring in the occipital and frontal regions, worsened significantly upon standing and partially subsided with bed rest. Initial conservative treatment, including fluid therapy, bed rest, and analgesic medication, provided only limited relief. The patient had no significant family history, aside from her father's diabetes mellitus and hypertension, and she had no prior history of trauma or surgery. Upon physical examination, no abnormalities were detected in her systemic or neurological assessments. Intracranial hypotension was suspected based on her symptoms, prompting cranial magnetic resonance imaging (MRI). The MRI revealed bilateral subdural effusions in the parietal lobes and other features consistent with intracranial hypotension. A computed tomography (CT) myelogram was subsequently ordered, which identified contrast leakage at the C1-C2 intervertebral space, confirming the presence of a CSF leak.

Given the ineffectiveness of conservative measures and the specific site of the leak, we decided to proceed with a cervical EBP. Under fluoroscopic guidance, an 18-gauge Tuohy epidural needle (Egemen International; TMT Tıbbi Medikal Malz. San. ve Tic. A. Ş. İzmir, Türkiye) was introduced via an interlaminar approach at the C6-C7 vertebrae, as shown in Figure 1a. The loss-of-resistance technique was used to identify the epidural space, which was

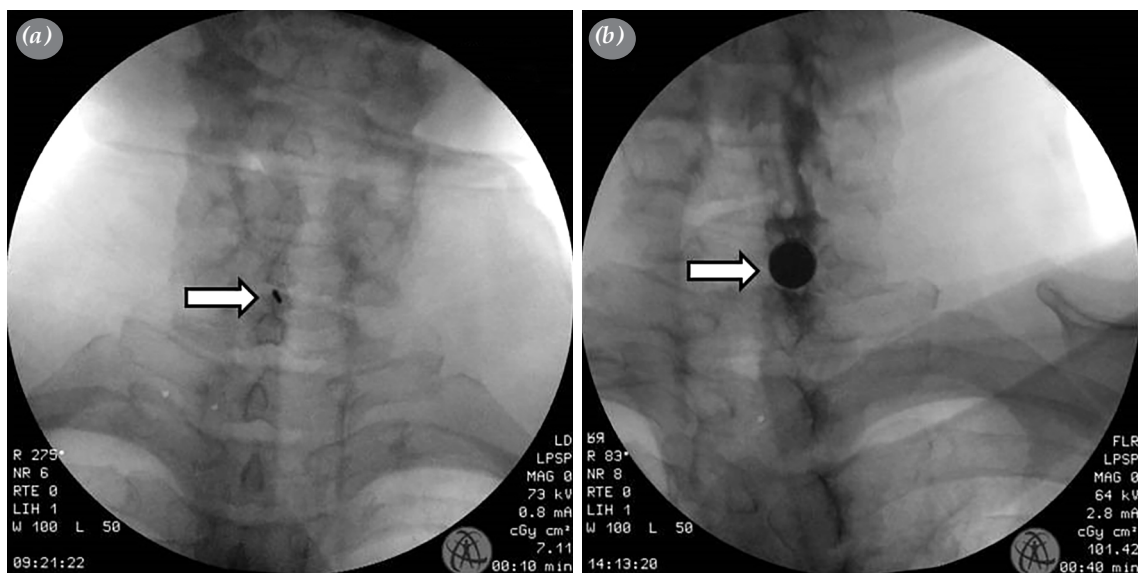


Figure 1. (a) Fluoroscopic image showing the placement of the epidural needle at the C6-C7 level in a 24-year-old female. (b) Fluoroscopic image showing the epidural needle placement at the C6-C7 level in a 55-year-old male. Contrast dye is used to confirm correct positioning before injecting the blood patch.

confirmed by the injection of 1 mL of contrast dye, showing spread to the C1-C2 level. Based on these findings, we proceeded with the injection of 3 mL of autologous blood, drawn from the patient's antecubital vein. The patient reported immediate improvement, with a reduction of her pain intensity to a VAS score of 0-1 within 1 h of the procedure. After 24 h of bed rest, her orthostatic headache and tinnitus resolved, and she was discharged from the hospital. A follow-up cranial MRI performed two months later revealed no pathological findings, confirming the successful treatment of the CSF leak. A written informed consent was obtained from the patient for publication of this case report.

Case 2– A 55-year-old male was referred to our clinic with a four-month history of orthostatic headaches and tinnitus, with a VAS score of 10 when standing. His medical history included diabetes mellitus, hypertension, coronary artery bypass graft surgery, and tonsillectomy with postoperative radiotherapy for malignancy. Following radiotherapy, he developed severe headaches. The MRI findings revealed subdural hygroma, dural thickening, and increased contrast enhancement, with a CSF leak identified at the C6-C7 level. The patient was initially treated with intravenous theophylline, reducing his VAS score from 10 to 4. Based on imaging and clinical response, a cervical EBP was performed at the C6-C7 level under fluoroscopy, as shown in Figure 1b. A total of 6 mL of autologous blood was injected. The patient experienced complete resolution of his headaches post-procedure, with a VAS score of 0. At his five-day follow-up, the patient reported that his tinnitus resolved, and no complications were noted. A written informed consent was obtained from the patient for publication of this case report.

DISCUSSION

These two cases highlight the successful treatment of spontaneous cervical CSF leaks using cervical EBP. Both patients, despite differences in age, medical history, and clinical presentation, achieved complete resolution of symptoms with minimal blood volumes and without significant complications. Lumbar EBPs are the most common, as they carry fewer risks than cervical or thoracic EBPs. However, when the leak is located at a higher spinal level, as in our case, lumbar injections may be ineffective. In such cases, direct cervical or thoracic injections are recommended.^[7] Jung et al.^[8] recommended volumes of 12 to 40 mL for lumbar EBPs, 11 to 20 mL for thoracic EBPs, and 6 to 13 mL

for cervical or cervicothoracic levels. However, large volumes increase the risk of complications, including infection, meningitis, arachnoiditis, and muscle weakness.^[9] In a recent case series of 59 patients undergoing CT guided cervical EBP, symptomatic relief was achieved in 76.3% after the first procedure, with minimal complications limited to transient neck pain, highlighting the safety and effectiveness of this targeted approach in treating spontaneous intracranial hypotension.^[10] In our first case, the spread of 1 mL of contrast dye to the target area confirmed that 3 mL of blood was sufficient for effective treatment without complications. This reinforces the notion that small volumes can be effective in cervical EBPs, reducing the risk of complications such as spinal cord compression, infection, or arachnoiditis. The difference in injected blood volume between the two cases can be explained by the patients' responses during the injection procedure. In our practice, the volume of autologous blood is determined according to the patient's sensation of fullness and pain during the injection, with the aim of achieving an effective seal while avoiding unnecessary discomfort or complications.

Imaging plays a crucial role in both diagnosis and differential diagnosis. Cranial MRI is commonly used to detect signs of intracranial hypotension, such as dural thickening, subdural fluid collections, herniation of the brain parenchyma, and venous engorgement.^[11] In cases of CSF leaks, CT myelography, MRI with CSF flow sequences, and radioisotope cisternography are useful in localizing the site of the leak.^[12] In our first case, the CT myelogram effectively demonstrated the C1-C2 leak. For the second case, MRI revealed a CSF leak at the C6-C7 level.

Our findings align with those from Karabakan et al.,^[13] who reported improved spinal MRI findings in a pediatric case after administering an EBP. In both studies, MRI was essential for visualizing the reduction of extradural CSF collections and the resolution of anatomical abnormalities following the procedure.

Conservative treatment options, including bed rest, hydration, and the use of an abdominal corset, are typically first-line approaches.^[14] Pharmacological treatments, such as corticosteroids, intravenous caffeine, acetazolamide, and theophylline, may also be considered.^[15] When conservative measures fail to provide symptom relief, an EBP is usually indicated. The success rate of EBPs in resolving CSF leaks is

high, but proper technique and careful consideration of the blood volume injected are essential to minimize complications.^[16]

In conclusion, in patients with spontaneous dural CSF leaks, it is critical to accurately localize the site of the leak for appropriate management. When conservative treatment fails, EBP should be strongly considered. Cervical EBP can be performed safely if necessary precautions are taken, including the use of fluoroscopic guidance and contrast dye to confirm correct needle placement and blood distribution. Low blood volumes, carefully monitored through imaging, can provide effective treatment while minimizing the risk of complications.

Author Contributions

Ş.R., M.B.: Contributed to the idea and concept of the study, clinical management of the cases, data collection and/or processing, literature review, and writing of the manuscript; G.T., M.E., M.R.Y.: Contributed to data collection and/or processing, literature review, and critical review of the manuscript; Ş.R., M.B.: Provided control and supervision throughout the study and critically reviewed the manuscript. All authors read and approved the final version of the manuscript.

Conflict of Interest

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

AI Disclosure

The authors declare that artificial intelligence (AI) tools were not used, or were used solely for language editing, and had no role in data analysis, interpretation, or the formulation of conclusions. All scientific content, data interpretation, and conclusions are the sole responsibility of the authors. The authors further confirm that AI tools were not used to generate, fabricate, or 'hallucinate' references, and that all references have been carefully verified for accuracy.

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