Role of Neurosurgery in Spontaneous Intracranial Hypotension: Initial Experience with Epidural Blood Patch in Nepal

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Abstract

Introduction: Spontaneous intracranial hypotension (SIH) is an underrecognized cause of secondary headache resulting from spinal cerebrospinal fluid leakage. It typically presents with orthostatic headache and characteristic imaging findings. Herein, we report two cases of SIH treated with epidural blood patch in Nepal.

Case Presentation:Case 1: A 55-year-old female presented with orthostatic headache, neck stiffness, and nausea. MRI brain showed features of Spontaneous intracranial hypotension (Bern score 7), and spine MRI demonstrated positive spinal longitudinal epidural collection. She underwent fluoroscopy-guided epidural blood patch (18–20 mL), resulting in immediate symptom relief and complete improvement at 3 months.

Case 2: A 45-year-old male presented with a 10-day history of orthostatic headache and cognitive clouding. MRI findings were consistent with Spontaneous intracranial hypotension (Bern score 9) with spinal longitudinal epidural collection positivity on spine imaging. Following fluoroscopy-guided epidural blood patch, he showed rapid clinical improvement with no symptomatic recurrence at 3-month follow-up.

Conclusion: To our knowledge, these cases represent first documented case of Spontaneous intracranial hypotension treated with epidural blood patch in Nepal. This report highlights not only the presence of this condition in our population but also the feasibility and effectiveness of epidural blood patch. It underscores the need for increased awareness and collaboration among clinicians to recognize and manage spontaneous intracranial hypotension patients in Nepal.

Keywords: Spontaneous intracranial hypotension, epidural blood patch, CSF leak, orthostatic headache.

Introduction

Spontaneous intracranial hypotension (SIH) is characterized by low cerebrospinal fluid (CSF) pressure typically presenting with orthostatic headache, which improves on lying down.[1] Patients may also experience neck pain or stiffness, nausea, vomiting, tinnitus, double vision, and occasionally a reduced level of consciousness.[2] SIH can lead to significant morbidity, prolonged disability, and, in rare instances, severe neurological deterioration including reduced consciousness and coma.2 The underlying cause is usually a spontaneous spinal CSF leak which arise from three main mechanisms: ventral dural tears (type 1), lateral dural nerve root sleeve tear (type 2), or CSF-venous fistulas (type 3).[1,3]

SIH has an estimated incidence of 5 per 100,000 person-years.[4] According to the International Classification of Headache Disorders (ICHD-3), the diagnosis of SIH requires either a low CSF opening pressure (<6 cm CSF) on lumbar puncture or characteristic radiological findings on brain or spinal imaging.[5] However, low opening pressure has been reported in only a minority of confirmed cases. Consequently, diagnosis relies characteristic imaging findings on brain and spine MRI, including pachymeningeal enhancement and spinal longitudinal epidural collection (SLEC).[6]

Epidural blood patch (EBP) is considered the first-line invasive treatment when conservative measures fail.[6] Despite increasing global recognition, SIH remains underreported in Nepal. Here, we present two cases successfully managed with EBP, representing one of the initial neurosurgical experiences in the country.

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Case Reports

Case 1

A 55-year-old female presented with severe orthostatic headache, neck stiffness, and nausea. MRI brain showed features suggestive of SIH (Figure 1A), with a Bern SIH score of 7.7

Fat supressed T2W MRI -spine demonstrated SLEC positivity (Figure 1B).

Under sterile conditions, an epidural blood patch was performed using a 20G Tuohy needle under fluoroscopic guidance at L3-4 level (Figure 1C).The epidural space was confirmed with contrast injection, and 18-20 mL of autologous blood was injected.

The patient experienced immediate symptomatic relief. He was maintained in the Trendelenburg position for six hours post-procedure. By the following day, he was ambulatory without headache. At 3-month follow-up, he remained asymptomatic.

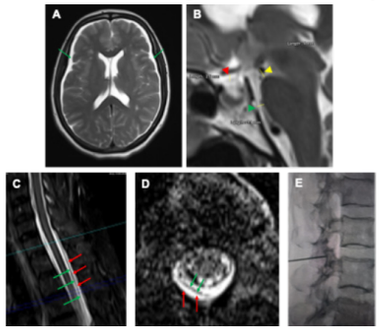

Figure 1. A) Axial T2-weighted MRI shows subdural effusion (green arrow). B) Sagittal T2-weighted MRI reveals effacement of the suprasellar (red arrowhead, pathologic ≤4 mm), prepontine cisterns (green arrowhead, pathologic ≤5 mm) and reduced mamillopontine distance (yellow arrowhead, pathologic ≤6.5 mm). C and D) Saggital and Axial T2-weighted fat-suppressed images demonstrate dorsal epidural CSF collection (red arrow) . The posterior dura is clearly delineated on both sagittal and axial views (green arrow). E) Fluoroscopic guided placement of needle at epidural space. at L3-L4 level.

Case 2

A 45-year-old male presented with a 10-day history of severe orthostatic headache associated with a sense of mental clouding. MRI brain demonstrated features consistent with SIH (Figure 2A), and the Bern SIH score was 9.[7] Fat supressed T2W MRI -spine revealed a SLEC positive (Figure 2B).

A fluoroscopy-guided epidural blood patch was performed using the same technique (Figure 2C). Post-procedure, she was maintained in the Trendelenburg position for six hours.

The patient showed marked improvement and was able to ambulate without headache the next day. At 3-month follow-up, she had complete resolution of symptoms.

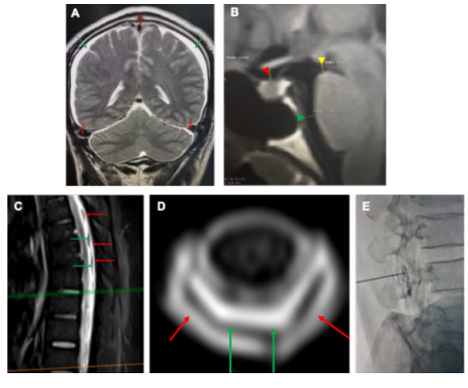

Figure 2. A) Coronal T2-weighted MRI shows subdural effusion (green arrow) and venous engorgement (red arrow). B) Sagittal T2-weighted MRI reveals effacement of the suprasellar (red arrowhead, pathologic ≤4 mm), prepontine cisterns (green arrowhead, pathologic ≤5 mm) and reduced mamillopontine distance (yellow arrowhead, pathologic ≤6.5 mm). C and D) Saggital and Axial T2-weighted fat-suppressed images demonstrate dorsal epidural CSF collection (red arrow) . The posterior dura is clearly delineated on both sagittal and axial views (green arrow). E) Epidural spread of injected blood and contrast during the blood patch procedure.

Discussion

Our cases demonstrated that fluoroscopy-guided epidural blood patch can achieve clinical improvement in patients with SIH. In both instances, the diagnosis was established based on MRI findings, including features of brain sagging reflected by high Bern SIH score and the presence of spinal longitudinal epidural fluid collection. To our knowledge, this is the first reported case of SIH treated with EBP in Nepal. These observations emphasize not only the efficacy of EBP but also the expanding role of neurosurgeons in the diagnosis and management of SIH.

The diagnosis of SIH relies primarily on clinicoradiological correlation. Brain MRI serves as the initial investigation, demonstrating characteristic features of brain sagging including subdural collections, pachymeningeal enhancement, engorged venous sinuses and pituitary hyperemia.[7] These findings reflects compensatory changes due to CSF volume depletion. The Bern SIH score is useful tool to stratify the likelihood of an underlying spinal CSF leak.[7] Once SIH is suspected, spine MRI is performed to detect spinal longitudinal epidural collection (SLEC), which indicates a spinal CSF leak.[8] Advanced imaging modalities such as conventional dynamic myelography, digital subtraction myelography or dynamic CT myelography are often required for accurate leak localisation, particularly in refractory cases.[9–11] In our series, both patients were diagnosed based on brain and spine MRI findings alone, and dynamic examination was not necessary due to favorable clinical response following treatment.

Management of SIH follows a stepwise approach. Conservative measures (bed rest, hydration, caffeine) may offer temporary relief but are rarely definitive. EBP is the first-line invasive treatment, providing rapid improvement with a good safety profile, though long-term efficacy varies.[12] Early symptom relief is largely because of a tamponade effect that transiently restores CSF dynamics, along with a delayed sealing effect. A subset of patients remains refractory and requires targeted surgical or endovascular intervention. In our series, both patients achieved complete resolution following EBP without the need for further treatment.

Surgical management is the definitive treatment for patients with SIH who do not respond to conservative therapy and EBP. Once the site of CSF leakage is accurately localised, the operative strategy is determined by the type and location of the leak. Ventral dural tears (Type 1) typically require a posterior approach with mobilisation of the spinal cord, followed by repair of the dural defect using sutures or grafts, either artificial or autologous.[13] In contrast, lateral leaks (Type 2) are generally managed via an extrathecal approach, where prolapsed arachnoid at the nerve root axilla is either repositioned intradurally or used to reinforce the dura, which is then sutured and supported with an extradural wrap. Surgical repair has been shown to result in symptomatic improvement in up to 95% of

cases.[14] In patients with CSF–venous fistulas (Type 3), epidural blood patching is less effective compared to other types of leak. Definitive treatment typically involves surgical ligation of the fistula or transvenous embolization of the draining vein, both of which have demonstrated good outcomes.[15]

In the context of Nepal, where SIH remains underrecognized, close collaboration between neurologists, neurosurgeons, and radiologists is crucial to ensure timely diagnosis and appropriate management. Neurosurgery has an evolving and integral role across the treatment spectrum of SIH—from minimally invasive percutaneous procedures such as EPB to definitive surgical repair of dural defects in refractory cases. Strengthening awareness, imaging capabilities, and interdisciplinary coordination will be key to recognize and manage SIH patients in Nepal.

Conclusion

To our knowledge, these cases represent first documented experiences of SIH treated with EBP in Nepal. This report highlights not only the presence of this condition in our population but also the feasibility and effectiveness of EBP. It underscores the need for increased awareness and collaboration among clinicians to recognize and manage SIH patients in Nepal.

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Conflict of Interest

No any conflict of interest.

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