



## Case report

## Suspension of the spinal dura mater to the corpectomy cage with tack-up sutures for bleeding control and prevention of epidural hematoma: Operative technique

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## ABSTRACT

**Introduction:** Postoperative spinal epidural hematoma (PSEH) is a rare complication of spinal surgery that requires surgery in very few patients. Unless prompt diagnosis and intervention is performed, neurologic deficits and mortality may occur depending on the localization of the PSEH.

**Aim:** In this report, we present a case that underwent tack-up suture technique with the suspension of the spinal dura mater to the corpectomy cage for bleeding control and prevention of epidural hematoma.

**Case study:** A 70-year-old male patient was admitted with paresis on the right arm. MRI showed protrusion and grade 2 spondylolisthesis at C3–C4, obliteration of anterior cerebrospinal fluid column caused by osteophytes at C4–C5–C6, and loss of intervertebral disc height and degenerative fusion at the same level. C4–C5 anterior corpectomy and instrumentation was performed. Two hours after surgery, neurologic deficits developed and an epidural hematoma was detected on MRI. The patient underwent a revision surgery and hemostasis was achieved by the suspension technique. Neurologic deficits recovered postoperatively. Postoperative MRI showed the suspension of dura like a tent and no hematoma in the epidural space.

**Results and discussion:** Prevention of PSEH in addition to prompt diagnosis and surgical intervention is highly important for the prevention of adverse outcomes. In our case, we achieved successful hemostasis by suspending the dura to implanted instrument in the paravertebral region.

**Conclusions:** Suspension of the dura with tack-up sutures can be a useful technique for the prevention of PSEH and risk of cord compression.

## 1. INTRODUCTION

Postoperative spinal epidural hematoma (PSEH) is a classic but rare complication of spinal surgery.<sup>1–7</sup> Although the real incidence of PSEH is unknown, it is predicted to be around 0.2% after all spinal procedures.<sup>1,3,8–11</sup> PSEH is believed to arise from a rich epidural venous plexus.<sup>12–13</sup> Moreover, it may also result from massive bleeding after decompression of the ossification of the posterior longitudinal ligament (PLL).<sup>2,14</sup>

The prognostic factors for PSEH include multiple-segment surgeries, history of spinal surgeries, instrumentation, duratomy, prolonged operative time, systemic diseases, smoking and alcohol abuse, preoperative coagulopathy, preoperative non-steroidal anti-inflammatory drug intake, intraoperative massive hemorrhage, old age, Rh<sup>+</sup> blood groups, an intraoperative hemoglobin level of less than 10 g/dL, and increased pre- and perioperative international normalized ratio (INR) levels.<sup>2–5,7,9,15,16</sup>

Spinal cord compression and neurological symptoms that require surgery are seen in very few patients with PSEH. Although most of the PSEH cases remain asymptomatic, the disease may result in rapidly-progressive cauda equina syndrome, quadriplegia, respiratory disorders and even death by the time it becomes symptomatic. PSEH should be suspected in the patients presenting with postoperative neurologic deficits or with worsened symptoms.<sup>2,11</sup> Prompt diagnosis and surgical drainage of the hematoma is of prime importance for maximum neurological recovery.<sup>2,3</sup>

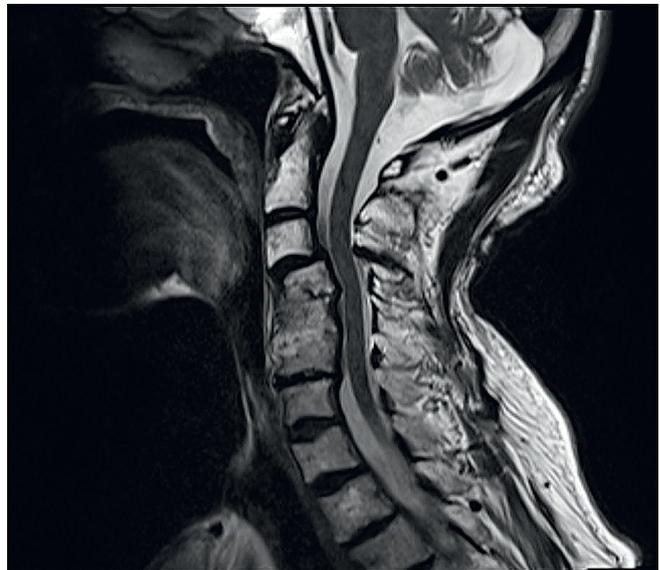
## 2. AIM

In this report, we present a case that underwent tack-up suture technique with the suspension of the spinal dura mater to the corpectomy cage for bleeding control and prevention of epidural hematoma.

## 3. CASE STUDY

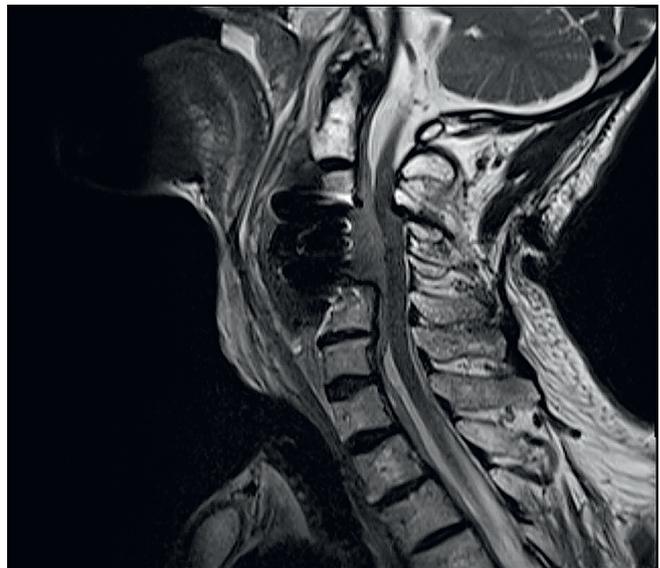
A 70-year-old male patient was admitted with a one-month history of weakness, pain, and paresthesia in the right arm. Patient history revealed that the patient had undergone obstructive lung disease, permanent tracheostomy and larynx carcinoma five years ago, and medically well-controlled hypertension. On neurologic examination, paresis was detected and the muscle strength was 4/5 in the right wrist and 3/5 in the forearm, arm, and shoulder (ASIA). Laboratory parameters including coagulation tests were within normal ranges. On cervical MRI, T2-weighted images showed protrusion and grade 2 spondylolisthesis at C3–C4, obliteration of anterior cerebrospinal fluid (CSF) column caused by osteophytes at C4–C5–C6, and loss of intervertebral disc height and degenerative fusion at C4–C5–C6 (Figure 1).

The procedure was initiated by corpectomy. After C4–C5 corpectomy, active epidural bleeding was detected and was controlled by hemostatic materials. A C3–C6 anterior spinal

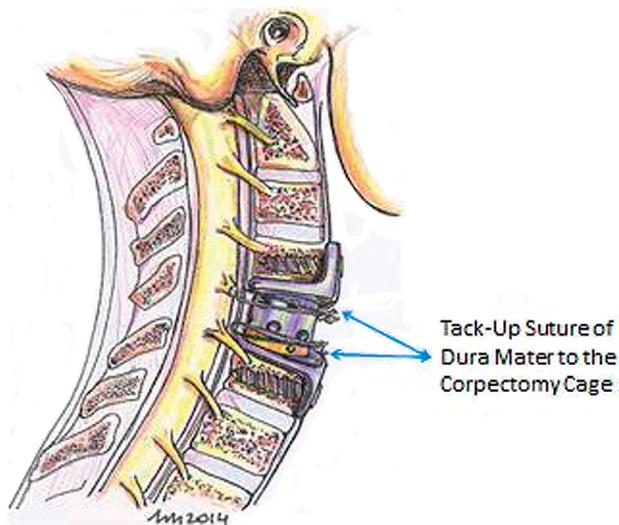


**Figure 1. Preoperative T2 weighted cervical sagittal MRI image: Protrusion and grade 2 spondylolisthesis at C3–C4, obliteration of anterior cerebrospinal fluid column caused by osteophytes at C4–C5–C6, and loss of intervertebral disc height and degenerative fusion at C4–C5–C6.**

fusion was performed with self-plated titanium elevator cage filled with putty bone graft. The operative time was approximately 120 minutes and total blood loss was 400 mL. The patient was not awakened due to respiratory problems and hypertension and thus was transferred to the intensive care unit for controlled awakening. Two hours after the operation, painless quadriparesis was detected and thus an emergency MRI was performed. T1- and T2-weighted images showed the impression of an epidural hematoma extending between C2 and C6 and causing massive cord compression (Figure 2).



**Figure 2. Postoperative T2-weighted cervical sagittal MRI image: The impression of an epidural hematoma extending between C2 and C6 and causing massive cord compression.**



**Figure 3.** The tack-up suture technique.



**Figure 4.** Postoperative T2-weighted cervical sagittal MRI image (after the tack-up suture): Dura mater at the corpectomy site was suspending like a tent both proximally and distally.

A revision surgery was performed under emergency conditions. The previous incision was opened and the paravertebral hematoma was exposed and aspirated. Subsequently, the cage was removed and the hematoma leading to severe compression of the cord was aspirated. Spinal cord pulsation was absent. Vertical duratomy was performed. Spinal cord pulsation was restored after the drainage of high-pressure CSF. Subsequently, bleeding from the venous plexi in both epidural spaces was detected and thus primary duraplasty was performed. Although the bleeding was lessened by controlling the coagulation with bipolar cauters and the bleeding

with hemostatic materials, the bleeding was not controlled completely and continued to leak from the epidural veins. The proximal and the distal aspects of the dura mater were fixed with 5/0 suspension sutures (Figure 3). The bleeding in the epidural space was controlled by clamping the suspension sutures. The cage was reinserted under fluoroscopic guidance. The proximal and distal sutures were fixed to each other above the cage. The procedure was ended after achieving hemostasis. A repeat MRI showed that the hematoma was completely evacuated and the dura mater at the corpectomy site was suspending like a tent both proximally and distally (Figure 4). The neurological deficits that developed after the primary surgery were significantly improved.

#### 4. RESULTS AND DISCUSSION

Symptomatic PSEH is a rare complication of spinal surgery with a reported incidence of 0.1%–0.2%. It is also a major complication of spinal decompression surgery and may be inevitable in some cases.<sup>1–4</sup> Due to its proximity to the dura and neural tissues, it can lead to serious morbidity and mortality unless prompt diagnosis and surgical evacuation is performed.<sup>16</sup> Therefore, prevention of PSEH in addition to prompt diagnosis and surgical evacuation is highly important for the prevention of adverse outcomes.<sup>2,3,6</sup>

Studies reporting on PSEH have mainly focused on the incidence, risk factors, operative timing, and outcomes of the disease. Moreover, to our knowledge, these studies have made no significant contribution to the literature except for presenting data on the prevention of PSEH occurring after primary or revision surgery and routine hemostatic methods.<sup>3,17</sup> Most common method recommended for the hemostasis of bleedings including the bleedings arising from posterior longitudinal ligament are bipolar cauterization and application of systemic or local hemostatic agents.<sup>3,17</sup> Another method for preventing PSEH is placing a drain on the incision site. However, the use of this method remains controversial since there are several studies maintaining that this method does not prevent the PSEH and even can be risk factor for PSEH<sup>2,9</sup> and some others suggest that there is no effectivity of this method.<sup>3,8</sup>

The dura mater is usually suspended to the skull after the excision of massive intracranial lesions and craniotomy and craniectomy procedures. In such conditions, dural tack-up sutures are used to prevent epidural hematoma.<sup>19,20</sup> Suspension of the dura to the bone narrows the space where epidural hematoma may occur, thereby preventing the compression of neural tissues by possible hematoma formation.<sup>19</sup> In our case, we performed this technique in the spinal region to prevent PSEH development. We fixed the dural tack-up sutures to the instrument although it is fixed to the bone in cranial interventions. By doing so, we not only controlled the severe bleeding but also prevented the risk of bleeding in early postoperative period that might lead to cord compression. To our knowledge, there has been no study in the literature reporting on the application of this technique in spinal surgeries.

## 6. CONCLUSIONS

The main concern on PSEH should be the prevention of the disease rather than the prognostic factors and the treatment methods of the disease. Suspension of the dura with tack-up sutures can be a useful technique for the prevention of PSEH and risk of cord compression. We used this method in the anterior cervical region but we believe that it can also be performed in all the anterior and posterior procedures such as corpectomy and laminectomy that allow suturing of the dura and the use of instruments.

### Conflict of interest

None declared.

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