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Case study

How to address cerebrospinal fluid leakage following ossification of the posterior longitudinal ligament surgery

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ABSTRACT

Background: Primary dural repair in ossification of posterior longitudinal ligament (OPLL) surgery via anterior is challenging because of limited space. Based on several years of our experiences, we present our concept for addressing cerebrospinal fluid (CSF) leakage following dural tear during anterior OPLL surgery.

Methods: We reviewed the medical records of 65 patients who underwent anterior OPLL surgery from 2003 to 2014. We included 7 patients whose operation records described dural tear followed by CSF leakage. Primary dural repair could not be performed in 6 patients because of ragged tear and limited space. We managed them with our own strategy: simple cover with an artificial dura, collagen sponge and/or fibrin glue on defect site; anatomical layer-by-layer repair without either subfascial or CSF drain, and early ambulation.

Results: Of 7 patients, wound problems developed in 2 patients. Wound aspiration and antibiotic treatment was done without wound compression in one patient, and simple irrigation followed by anatomical layer-by-layer re-closure was done in the other patient without either bed rest or lumbar drainage.

Results: Pseudomeningoceles were detected in 4 patients, including 2 patients who had wound problems. However, all pseudomeningoceles were absorbed spontaneously or stabilized on follow-up images without interventions such as bed rest, lumbar drain or wound compression.

Conclusions: Without interference of pressure equilibrium between intradural and extradural space, the defect site would heal and close. After that, the isolated pseudomeningocele would be spontaneously absorbed after certain period of time.

1. Introduction

CSF leakage following dural tear is not uncommon in spine surgery, even though the incidence is not clear [1–3]. The risk of CSF leakage in ossified posterior longitudinal ligament (OPLL) surgery is especially high because adhesion of the dura to the ossified PLL is common [4,5]. CSF leakage can cause several complications, such as headache, delayed wound healing, meningitis, infection and pseudomeningocele [2,6,7]. Hence, there have been many studies that suggest how to manage CSF leakage effectively [3,6,8].

Primary watertight repair at the dural tear site is the best treatment for CSF leakage [9–12]. However, there are often situations in which a primary dural repair seems impossible, especially in the anterior resection of OPLL [13]. Thus, many other repair strategies have been described, such as repair site augmentation with fibrin glue, thrombotic adjuvant agent or polyethylene glycol; collagen matrix sponge onlay use; and various flap techniques using muscles and omentum [10,14–17]. In addition, postoperative interventions, such as bed rest, fluid restriction, lumbar drain, and repeated aspiration with direct compression, are commonly supplemented in most institutions [2,18]. Even though various strategies to manage dural tear have been suggested, there has been no standardized recommendation to manage an irreparable dural defect followed by CSF leakage in spine surgery.

We have managed CSF leakage following irreparable dural defect with our own strategy for several years. Our strategy is as

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Table 1
Demographics and clinical and surgical data for cases with CSF leakage.

No.	Age	Sex	Diagnosis	Initial operation	Aspects of dural defect	Durotomy treatment	Postoperative course
1	49	M	T3–5 OPLL	T4 total & T3, 5 partial corpectomy and T3–5 fusion	T4 ragged dural tear	Surgicel® and fibrin glue	Pseudomeningocele formed but stabilized without any complication on 6 months F/U image
2	65	F	C3–4 OPLL	C3,4 partial corpectomy and cage insertion	C3–4 ragged dural tear	Fibrin glue	Pseudomeningocele formed but spontaneously absorbed
3	50	M	C5–6 OPLL	C5,6 corpectomy and bone graft	C5,6 ragged dural tear	Primary dural repair	Emergency operation d/t epidural hematoma
4	68	F	C6–7 OPLL	C6–7 discectomy and cage insertion	C6–7 ragged dural teal	Fibrin glue	Wound healing without complication
5	57	M	C2–5 OPLL	C4,5 corpectomy and bone graft	C6 ragged dural tear	Artificial dura covering on defect site with fibrin glue	Antibiotics after wound aspiration without wound compression
6	45	F	C5–6 OPLL	C5 partial corpectomy and OPLL removal	C5 ragged dural tear	Fibrin glue	Wound healing without complication
7	67	M	C4–5 OPLL	C4,5 corpectomy and bone graft	C5 ragged dural tear	Tachocomb® + fibrin glue	Antibiotics after wound exploration

follows: simple cover with an artificial dura, collagen sponge and/or fibrin glue on defect site; anatomical layer-by-layer repair without either subfascial or lumbar drain, and early ambulation. Based on our experiences in anterior resection of OPLL, we present schematically how to address CSF leakage in OPLL surgery and suggest a management algorithm.

2. Materials and methods

After obtaining approval from our Institutional Review Board (No. 1609-058-791), we retrospectively reviewed the medical records of 65 patients who underwent anterior resection of OPLL at our institute from 2003 to 2014.

We included patients whose operative records described dural tear followed by CSF leakage. We also reviewed postoperative images such as CT or MRI to evaluate whether pseudomeningocele was formed or not and how pseudomeningocele changed. All operations were performed by 2 surgeons. When a dural tear occurred during surgery, but a primary repair was practically impossible due to poor accessibility, the defect site was covered with an artificial dura or collagen sponge coated with human coagulation factors followed by fibrin glue (Greenplast; Green Cross, Yongin, Korea) application to further reinforce the repair. If CSF leakage was

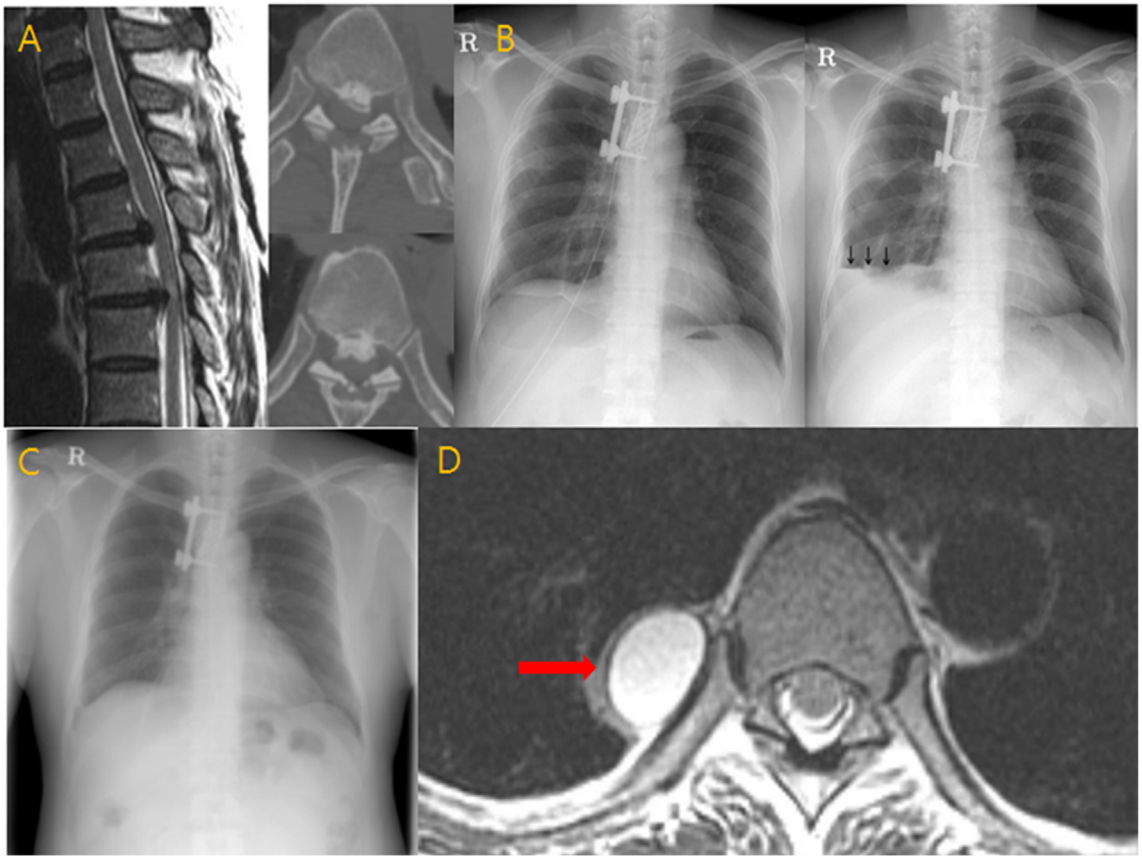

Fig. 1. *Case 1;* (A): Preoperative MRI and CT which showed cord compression with signal change and OPLL (B): Chest X-ray image two weeks after surgery and immediately before removing the chest tube due to pleural effusion (left). Two days after chest tube removal. Newly formed pleural effusion is observed (arrows) (right). (C): Two weeks after re-insertion of the chest tube. (D): 6 months postoperative MRI. The pseudomeningocele was stabilized.

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