Case report

Delayed extensive lumbar sub-dural effusion following discectomy – Clinical imaging and case report

Arun-Kumar Kaliya-Perumal<sup>a,b,c</sup>, Meng-Ling Lu<sup>b,d</sup>, Fu-Cheng Kao<sup>a,b</sup>, Chi-Chien Niu<sup>a,b,*</sup>

<sup>a</sup>Department of Orthopaedic Surgery, Spine Division, Bone and Joint Research Centre, Chang Gung Memorial Hospital, Taoyuan 333, Taiwan
<sup>b</sup>College of Medicine, Chang Gung University, Taoyuan 333, Taiwan
<sup>c</sup>Department of Orthopaedic Surgery, Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research, Melmaruvathur, Tamil-Nadu 603319, India
<sup>d</sup>Department of Orthopaedic Surgery, Spine Division, Chang Gung Memorial Hospital, Kaohsiung 833, Taiwan

Received 20<sup>th</sup> of October 2016    Accepted 31<sup>st</sup> of October 2016
© Author(s) 2017. This article is published with open access by China Medical University

1. Introduction

Subdural effusion occurring in the lumbar region was earlier described in 1973 [1]. It can be described as subdural loculation or collection of cerebrospinal fluid (CSF) in the dura – arachnoid interface. Incidental durotomy during lumbar spine surgery is a commonly reported complication and a primary repair by direct suturing is widely recommended [2-4]. Rarely, patients may develop delayed CSF leak even if there was no dural tear noticed during initial surgery. Such CSF leak can be attributed to an unrecognized dural tear or to a de novo delayed dural tear [5]. This report depicts a rare occurrence of subdural effusion coupled with a large pseudomeningocele, late after initial satisfactory lumbar decompression surgery. We portray its unique imaging characteristics and a novel approach to management.

2. Case Report

A 55-year-old male was initially encountered with clinical and radiological indications for lumbar decompression surgery. A mini open discectomy through left L4/L5 laminotomy was performed. Intraoperative and initial post-operative period was uneventful and patient improved symptomatically. He developed recurrent radicular symptoms, 3 months following initial surgery. Symptoms included frequent headache and dizziness associated with difficulty in walking. Clinical examination revealed a positive straight leg raising test on left side with no neurological deficit. A 5 × 5 cm palpable cystic swelling was present in the previous...
Incidental durotomies may remain undiagnosed when there is no obvious CSF leak, especially if the arachnoid membrane is intact. It may later open due to an increased intradural pressure during recovery [6]. Rarely, a de novo delayed dural tear can occur late after surgery due to a bony spicule projecting into the spinal canal that erodes and punctures the dura [5, 7]. During the initial surgery in our patient, we did not notice any CSF leakage. So, the later presentation may be due to a missed tear or a de novo delayed dural tear, but neither of it can be predicted nor substantiated [5]. Chronic CSF leak causes symptoms of headache and dizziness [8, 9]. Presence of associated radicular symptoms imply the possibility of canal stenosis. If stenosis is not due to a recurrent disc, other lesions inside the spinal canal such as subdural hematoma, subdural effusion, subdural hygroma or arachnoid
ground tissues (Fig. 3).

Symptomatic improvement in our patient was noted with no complaints of headache or dizziness in the days following surgery. Straight leg raising test was negative on both sides on the first postoperative day. Neurological status remained normal. Rehabilitation protocols were well tolerated and the patient was discharged on the 5th Postoperative day. A review was scheduled every week in the first postoperative month and every month thereafter until final follow up. Patient was back to full functional status by 3 months and remained asymptomatic for rest of the follow up with no clinical or radiological recurrence.

3. Discussion

Incidental durotomies may remain undiagnosed when there is no obvious CSF leak, especially if the arachnoid membrane is intact. It may later open due to an increased intradural pressure during recovery [6]. Rarely, a de novo delayed dural tear can occur late after surgery due to a bony spicule projecting into the spinal canal that erodes and punctures the dura [5, 7]. During the initial surgery in our patient, we did not notice any CSF leakage. So, the later presentation may be due to a missed tear or a de novo delayed dural tear, but neither of it can be predicted nor substantiated [5]. Chronic CSF leak causes symptoms of headache and dizziness [8, 9]. Presence of associated radicular symptoms imply the possibility of canal stenosis. If stenosis is not due to a recurrent disc, other lesions inside the spinal canal such as subdural hematoma, subdural effusion, subdural hygroma or arachnoid
ground tissues (Fig. 3).

Symptomatic improvement in our patient was noted with no complaints of headache or dizziness in the days following surgery. Straight leg raising test was negative on both sides on the first postoperative day. Neurological status remained normal. Rehabilitation protocols were well tolerated and the patient was discharged on the 5th Postoperative day. A review was scheduled every week in the first postoperative month and every month thereafter until final follow up. Patient was back to full functional status by 3 months and remained asymptomatic for rest of the follow up with no clinical or radiological recurrence.

3. Discussion

Incidental durotomies may remain undiagnosed when there is no obvious CSF leak, especially if the arachnoid membrane is intact. It may later open due to an increased intradural pressure during recovery [6]. Rarely, a de novo delayed dural tear can occur late after surgery due to a bony spicule projecting into the spinal canal that erodes and punctures the dura [5, 7]. During the initial surgery in our patient, we did not notice any CSF leakage. So, the later presentation may be due to a missed tear or a de novo delayed dural tear, but neither of it can be predicted nor substantiated [5]. Chronic CSF leak causes symptoms of headache and dizziness [8, 9]. Presence of associated radicular symptoms imply the possibility of canal stenosis. If stenosis is not due to a recurrent disc, other lesions inside the spinal canal such as subdural hematoma, subdural effusion, subdural hygroma or arachnoid
ground tissues (Fig. 3).

Symptomatic improvement in our patient was noted with no complaints of headache or dizziness in the days following surgery. Straight leg raising test was negative on both sides on the first postoperative day. Neurological status remained normal. Rehabilitation protocols were well tolerated and the patient was discharged on the 5th Postoperative day. A review was scheduled every week in the first postoperative month and every month thereafter until final follow up. Patient was back to full functional status by 3 months and remained asymptomatic for rest of the follow up with no clinical or radiological recurrence.
cyst should be considered [10-14].

Repeating the MRI study is necessary for diagnosis in these cases [10-12]. MRI presentation as seen in our patient showing extensive anterior translation with monotonous linear arrangement of rootlets was never illustrated in the past. The xanthochromic appearance of fluid from the subdural space may be due to a previous hematoma which ultimately became lysed [15]. Some authors describe that there is no virtual space between the dura and the arachnoid membrane but their interface is filled with neurotheelial cells [16]. These neurotheelial cells can break due to mechanical forces, thus giving way for a subdural space to be formed where CSF can enter [17]. CSF entering here can dissect open the space and become extensive as in our patient.

Recognising this condition in an MRI is very important because just draining the pseudomeningocoele and closing the dural defect will not relieve the pressure symptoms caused due to the subdural effusion. The effusion needs to be adequately drained, also the dura along with arachnoid membrane needs to be repaired to prevent re-seepage of CSF into this space. Care should be taken not to tensely bring the dural ends together as it may further tear the dura. It is for this purpose we used a polyester urethane patch as a dural substitute so that the need for bringing the dural ends together is overcome [18]. We additionally augmented our repair with a fibrin sealant [19, 20].

4. Conclusion

This report depicts a rare complication following satisfactory lumbar decompression surgery. Delayed CSF leak causing subdural effusion or other complications cannot be predicted if the initial surgery was uneventful. Intraoperative meticulous handling of dura may prevent such complications. Repeating MRI study is the only key to diagnosis. Direct repair of the dural defect is highly recommended for a better prognosis.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

REFERENCES

[1] Derakhshan I, Kaufman B. Subdural effusion of cerebrospinal fluid after lumbar puncture. A source of error in chemical analysis of CSF. Arch Neurol. 1973; 29: 127.
[2] Wolff S, Kheirredine W, Riouallon G. Surgical dural tears: prevalence and updated management protocol based on 1359 lumbar vertebra interventions. Orthop Traumatol Surg Res. 2012; 98: 879-86.
[3] Tafazal SI, Sell PJ. Incidental durotomy in lumbar spine surgery: incidence and management. Eur Spine J. 2005; 14: 287-90.
[4] Guerin P, El Fegou A, Obeid I, Gille O, Lelong L, Luc S, et al. Incidental durotomy during spine surgery: incidence, management and complications. A retrospective review. Injury. 2012; 43: 397-401.
[5] Khazim R, Dannawi Z, Spacey K, Khazim M, Lennon S, Reda A, et al. Incidence and treatment of delayed symptoms of CSF leak following lumbar spinal surgery. Eur Spine J. 2015; 24: 2069-76.
[6] Kalevski SK, Pevv NA, Haritonov DG. Incidental Dural Tears in lumbar decompressive surgery: Incidence, causes, treatment, results. Asian J Neurosur. 2010; 5: 54-9.
[7] Brookfield K, Randolph J, Eismont F, Brown M. Delayed symptoms of cerebrospinal fluid leak following lumbar decompression. Orthopedics. 2008; 31: 816.
[8] Mokri B. Spontaneous low pressure, low CSF volume headaches: spontaneous CSF leaks. Headache. 2013; 53: 1034-53.
[9] Lay CM. Low Cerebrospinal Fluid Pressure Headache. Curr Treat Options Neurol. 2002; 4: 357-63.
[10] Chang KC, Samartzis D, Luk KD, Cheung KM, Wong YW. Acute spinal subdural hematoma complicating lumbar decompressive surgery. Evid Based Spine Care J. 2012; 3: 57-62.
[11] Cho EJ, Jeon K, Kim YH, Moon DE. Occurrence of a spinal intradural arachnoid cyst after epiduroscopic neural decompression. Korean J Anesthesiol. 2013; 65: 270-2.
[12] Sakai T, Sairyo K, Bhatia NN, Miyagi R, Tamura T, Katoh S, et al. MRI changes of the spinal subdural space after lumbar spine surgeries: report of two cases. Asian Spine J. 2011; 5: 262-6.
[13] Wang CJ, Kung SS, Howling SL. Traumatic lumbar spinal subdural hematoma—a case report. Kaohsiung J Med Sci. 2001; 17: 576-8.
[14] Singleton WG, Ramnarine D, Patel N, Wigfield C. Post-operative spinal subdural extra-arachnoid hygroma causing cauda equina compression: a report of two cases. Br J Neurosurg. 2012; 26: 429-31.
[15] Edlow JA, Bruner KS, Horowitz GL. Xanthochromia. Arch Pathol Lab Med. 2002; 126: 413-5.
[16] Reina MA, De Leon Casasola O, Lopez A, De Andres JA, Mora M, Fernandez A. The origin of the spinal subdural space: ultrastructure findings. Anesth Analg. 2002; 94: 991-5, table of contents.
[17] Jankowizt BT, Atteberry DS, Gerszten PC, Karausky P, Cheng BC, Faught R, et al. Effect of fibrin glue on the prevention of persistent cerebral spinal fluid leakage after incidental durotomy during lumbar spinal surgery. Eur Spine J. 2009; 18: 1169-74.
[18] Raul JS, Godard J, Arbez-Gindre F, Czorny A. [Use of polyester urethane (Neuro-Patch) as a dural substitute. Prospective study of 70 cases]. Neurochirurgie. 2003; 49(2-3 Pt 1): 83-9.

[19] Esposito F, Angileri FF, Kruse P, Cavallo LM, Solari D, Esposito V, et al. Fibrin Sealants in Dura Sealing: A Systematic Literature Review. PLoS One. 2016; 11: e0151533.

[20] Miscusi M, Polli FM, Forcato S, Coman MA, Ricciardi L, Ramieri A, et al. The use of surgical sealants in the repair of dural tears during non-instrumented spinal surgery. Eur Spine J. 2014; 23: 1761-6.