Isolated abducens nerve palsy due to cerebrospinal fluid leakage following lumbar discectomy: a rare clinical entity

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Abstract

Background and importance Cerebrospinal fluid (CSF) leakage can cause abducens nerve palsy which is such a rare complication after spine surgery.

Clinical presentation A 48-year-old man was diagnosed with isolated abducens nerve palsy due to CSF leakage by inadvertent dural tearing after lumbar discectomy. We performed primary dural repair of CSF leakage and 1 week after, the diplopia and headache disappeared with complete resolution of CSF leakage. We will also review the clinical features and outcomes of three cases that have been reported in the literature.

Conclusion This rare complication of spinal surgery helped us to discuss appropriate therapeutic strategies for the early surgical management of cranial nerve palsy following CSF leakage.

Keywords Abducens nerve palsy · Spinal surgery · Dural tearing · Cerebrospinal fluid leakage

Introduction

Cerebrospinal fluid (CSF) leakage itself is a well-known complication after cerebral or spinal transdural surgery [1].

However, abducens nerve palsy following spinal surgery has been extremely rare in that there have been only three cases [2, 3] reported as far we know, two of which were treated by conservative management and another by surgical repair. The authors describe this rare complication of spinal surgery focusing on the advantage of early surgical management.

Clinical presentation

A 48-year-old man visited the emergency room (ER). He had undergone discectomy 14 days before visiting our hospital due to radiating pain produced by a herniated disc of L5–S1. He presented with 11-day history of severe postural headache and diplopia aggravated during his right gaze. He also complained of a three-day history of painless fluid collection beneath an existing surgical scar on his low back. Neurological examination revealed limitation of the lateral gaze of the right eye which had newly developed after the previous operation. Lumbar magnetic resonance imaging (Fig. 1) showed a large amount of CSF leakage extending to the paraspinal muscle and subcutaneous layer. Brain computed tomography (CT) and laboratory test showed no abnormality. After nine gaze photo series (Fig. 2a) confirmed the limitation of the lateral gaze of his right eye, he was diagnosed with isolated abducens nerve palsy by inadvertent dural tearing.

Primary dural repair was conducted. Because of the extensive fluid collection beneath the previous incision, the same incision as the one made from the previous operation was used to find the dehiscence of muscle layers. Beneath the aspirated cavity at the level of L5–S1, the dural sac was revealed with the absence of ligamentum flavum and remnant epidural fat which should have been removed

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Fig. 1 Magnetic resonance image (MRI) shows herniated disc compressing S1 root at L5–S1 disc level (a). Postoperative MRI reveals severe fluid collection on the discectomy site due to cerebrospinal fluid (CSF) leakage (b)

Fig. 3 Intraoperative microscopic photograph showed CSF leakage on the previous laminectomy site, arrows indicated the herniated arachnoid membrane through the dural defect (arrow head)

during the previous operation. Further, CSF was pouring out into the epidural space though two points of the dural tears with herniation of the arachnoid membrane (Fig. 3).

Fig. 2 Medical nine gaze photographs showed limitation of lateral gaze of right eyeball suggesting right abducens nerve palsy (note arrows) (a). 1 week after the revision, the diplopia and headache disappeared with complete resolution of CSF leakage (note arrow heads) (b)

Table 1 Abducens nerve palsies associated with CSF leakage following spinal surgery

Authors	Causative surgery	Location of CSF leakage	Ongoing CSF leakage	Onset of diplopia	Treatment modality	Time spent to achieve complete remission
Nakagawa et al. [3]	Removal of spinal tumor	C1–C2	Not identified	3 days postop.	Conservative	1 year
Cho et al. [2]	Posterior fusion	L4–S1	Not identified	2 days postop.	Conservative	5 weeks
Thomas et al. [6]	Lumbar discectomy	L4–L5	Identified	1 week postop.	Surgery (dural repair)	2 weeks
This case	Microscopic discectomy	L5–S1	Identified	3 days postop.	Surgery (dural repair)	1 week

A watertight closure of the dural tears was performed. His postural headache significantly decreased immediately after the operation. Finally 1 week after surgery, the diplopia and headache completely resolved (Fig. 2b).

Discussion

CSF leakage after spinal surgery can be encountered frequently and is usually self-limiting; however, CSF leakage can cause abducens nerve palsy with the development of secondary traction force induced by sagging or downward displacement of the brain by the loss of CSF buoyancy [4, 5]. The conservative management for CSF leakage includes an epidural blood patch, percutaneous placement of fibrin sealant, IV hydration, bed rest, and NSAIDs [5]. They have been introduced to be more advantageous than surgical management because they do not require invasive localization of the exact leakage point of CSF and because in most patients, such cranial nerve deficits tend to resolve spontaneously. However, outcomes have been poorly studied and no management strategies have been established due to the rarity of cases.

Abducens nerve palsy caused by CSF leakage following spinal surgery is such a rare complication that there have been only three cases [2, 3, 6] reported, two of which were treated by conservative measure for CSF leakage and another by surgical repair (Table 1). They all occurred within 1 week after spine surgery but complete recovery was not successful within 5 weeks after conservative management, whereas it took less than 2 weeks for complete recovery after surgical repair.

Generally, the conservative management for the CSF leakage has been introduced to be more advantageous than surgical treatment because they do not require invasive localization of the exact leakage point and because usually in most patients, such cranial nerve deficits tend to resolve spontaneously. However, considering the long-term period needed for resolution of diplopia, which is generally longer

then 4 weeks [2, 3], the authors propose that active treatment for dural repair could be a good option of treatment in the light of inducing early recovery. This can be more advantageous because there may be very obvious leakage points that do not require much effort to find due to the existence of a recent surgical site as in this case. Early exploration and repair can be helpful in cases with this complication given that early recovery without cranial nerve dysfunction is preferable.

Conclusion

A case of abducens nerve palsy due to CSF leakage during lumbar discectomy is described and was well resolved by immediate surgical repair.

Conflict of interest None of the authors has any potential conflict of interest.

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