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## Cranial fat dissemination following fat grafting for lumbar dural tear: First case report in the literature

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### ABSTRACT

**INTRODUCTION AND IMPORTANCE:** Dural tear and cerebrospinal fluid (CSF) leak is among the most common complications in lumbar spine surgery. Although primary dural suturing is the preferred method for repair, this is not always achievable specially with ventrolateral tears. Autologous fat grafting is one of the oldest and effective methods for dural repair which can also be used along with other methods of repair. This case report highlights a unique post spinal surgery complication with comment on how to avoid it. To our knowledge, this has not been previously reported in the literature.

**CASE PRESENTATION:** The authors report a sixty-seven-year-old male with lumbar pseudomeningocele and cranial fat dissemination following fat grafting for non suturable lumbar dural tear. This was demonstrated on magnetic resonance imaging (MRI) after her presented with low-pressure headache.

**CLINICAL DISCUSSION:** Intraoperative dural tear is one of the most common complications in spinal surgery. Methods for optimal dural repair including fat grafting have been described but the choice still heavily dependent on the surgeon's preference and experience. Fat graft can migrate leading to potential undesirable further complications like hydrocephalus and aseptic meningitis.

**CONCLUSION:** Cranial fat dissemination following fat grafting for lumbar dural tear should be recognized as a post-operative complication in lumbar spine surgery. It should be considered in case of hydrocephalus or aseptic meningitis post dural fat grafting. Surgeons should utilize adjunct methods to minimize its incidence.

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## 1. Introduction

Autologous fat grafting is one of the most effective methods for intraoperative dural repair. It can be used as an additional layer of sealing with primary dural suturing or with other adjunct methods in non suturable ventrolateral dural tear (DT). Post-operative cranial fat dissemination has been described in many settings including ruptured epidermoid, fat grafting after skull base surgeries and following insertion of baclofen pump. We present a unique case of asymptomatic cranial fat dissemination following fat grafting for lumbar DT highlighting this rare complication and its potential sequelae. This case report has been reported in line with the SCARE Criteria [1].

*Abbreviations:* CSF, cerebrospinal fluid; DT, dural tear; MRI, magnetic resonance imaging.

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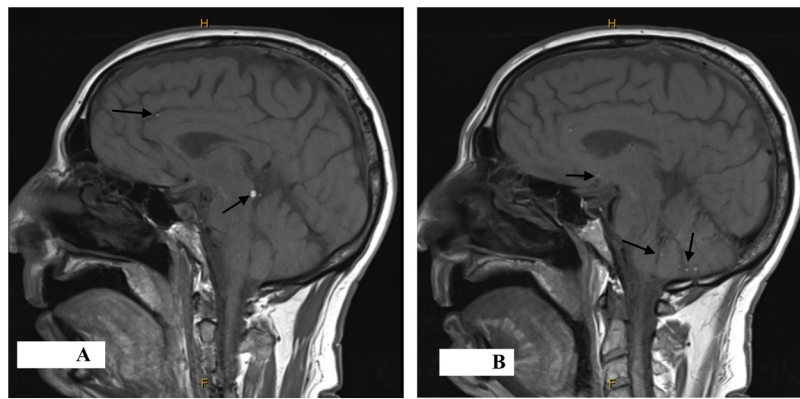
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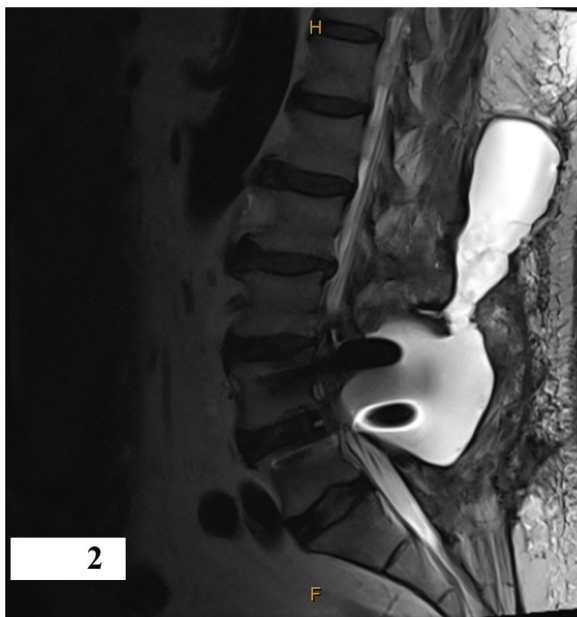
## 2. Presentation of case

The authors present a sixty-seven-year-old male who underwent L4/5 transforaminal lumbar interbody fusion for chronic lower back pain and bilateral radicular pain. He had previous L4/5 laminectomy eight years prior. Intraoperatively, extensive scarring was found and approximately six millimetres non-suturable ventrolateral DT was encountered. An autologous fat graft augmented by onlay hydrogel was utilized for repair followed by 2 days of bed rest. He was discharged five days post operatively with no symptoms or signs of CSF leak. His surgery was performed by a senior neurosurgeon.

He presented a week later to the outpatient clinic after he was reviewed by his general practitioner for routine wound review where he reported persistent low-pressure headache with no symptoms or signs of meningitis. His wound healed well without cutaneous CSF leak. He was admitted to the hospital for investigation given the known intraoperative CSF leak. As he had no past history of preoperative headache and the fact that he had intraoperative dural tear with CSF leak, dural graft failure with pseudomeningocele was thought to be the most likely underlying aetiology. Other differential diagnosis included subdural



**Fig. 1.** A,B: Post-operative T1 Sagittal MRI demonstrating fat globules in the sulcal and cisternal subarachnoid spaces.



**Fig. 2.** Post-operative T2 sagittal MRI demonstrating large lumbar pseudomeningocele.

hematoma, pneumocephalus and aseptic meningitis. MRI brain and spine were organized to further delineate the exact aetiology.

MRI brain and full spine demonstrated cranial subarachnoid dissemination of fat globules [Fig. 1A,B] that was confirmed on MRI fat suppression sequence and large lumbar pseudomeningocele [Fig. 2]. No other cranial or spinal lesions were detected that could be the source of the fat dissemination. He had previous brain computed tomography for chronic headache related to paranasal sinusitis and no evidence of fat was detected denoting the new post-operative incidence of the fat dissemination.

He underwent surgical exploration where part of the fat graft was found to be dislodged away from the dura with obvious CSF leak. Given its ventrolateral location, this DT was not amenable to primary repair and accordingly onlay collagen matrix graft was utilized with another fat graft and hydrogel for augmentation. Muscle approximation and watertight fascial closure was achieved. A single dose of intraoperative antibiotic was given as per our unit protocol (Cephazolin 1g IV). He was mobilized after two days of bed rest and remained asymptomatic on his clinic follow up.

Despite undergoing a second surgery, he was satisfied with his clinic outcome as his headache completely subsided.

### 3. Discussion

Intraoperative spinal durotomy with CSF leak is among the most common complications in lumbar spine surgery. Its incidence varies in the literature, ranging from 5.5% to 9% for primary lumbar spine surgeries to as high as 13.2%–21% for revision surgeries [2].

Multiple risk factors have been identified including age, corticosteroids, revision surgery, multilevel surgery, fusion versus decompression, posterior approach versus anterior approach and ankylosing spondylitis versus degenerative disease [3,4].

A large retrospective database analysis by Ram Alluri et al. demonstrated 1.46 times increased risk of venousthromboembolism and six times increased risk of meningitis with CSF leak [5]. Compressive radiculopathy and subdural hematoma have been also reported with dural tear and CSF leak [6,7].

Although primary dural suturing is the method of choice, it's not always achievable especially with ventrolateral tears. In addition to fat, muscle and fascia grafting, several sutureless techniques have emerged including fibrin glue, collagen matrix and hydrogels with nearly similar rate of effectiveness.

Autologous fat grafting is still widely used given less risk of infection and being water impermeable with effective sealing properties. Different methods have been also described for fat grafting, but this depends on with surgeon's preference, location and size of the dural tear [8,9]. Fat grafting can also be used with other methods for multilayer dural repair.

According to our knowledge, cranial fat dissemination has not been described in the literature in the setting of fat grafting for intraoperative dural tear. It has been reported following insertion of intrathecal baclofen pump and with fat grafting following skull base surgery [10,11]. Our unique case represents the first reporting of such complication in the literature.

Although fat migration following grafting for dural tear can be asymptomatic as in our case, it carries risks that have been previously reported with cranial fat dissemination like aseptic meningitis and hydrocephalus [12–15].

### 4. Conclusion

Cranial fat dissemination following grafting for dural tear should be recognized at a specific complication after lumbar spine surgery. Surgeons should be aware of such entity in symptomatic patient and given the risk of aseptic meningitis and hydrocephalus, clinical and radiological follow up may be required.

To avoid such undesirable complication, the authors recommend using fascia or collagen matrix graft as an intervening layer between the dura and the fat graft in sizeable non suturable dural tear.

**Declaration of Competing Interest**

The authors have no conflict of interest to be declared.

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**Ethical approval**

This case report is exempted from ethical approval as per our institution.

**Consent**

Written informed consent was obtained from the patient's guardian for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Author contribution**

Ibrahim Alhendawy: Conceptualization, methodology and writing.

Darius Tan: Review and editing.

Bob Homapour: Supervision, final review and approval for submission.

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The authors verify that this case report has not been published previously and is not under consideration for publication elsewhere. The authors also verify that this publication is approved by all authors and by the responsible authorities at our institution, and if accepted, it will not be published elsewhere in the same form.

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