A Different Operative Approach for the Excision of an Incidental Sacral Perineural Cyst: Case Report

Rastlantısal Sakral Perinöral Kist Eksizyonu İçin Farklı Operatif Yaklaşım: Vaka Takdimi

SERHAT ERBAYRAKTAR, BÜLENT TEKİNSOY, ÜMİT DURSUN ACAR

Dokuz Eylül University School of Medicine, Departments of Neurosurgery (SE, ÜDA) and Radiology (BT), İzmir, Turkey

Running Title: Defect Closure With Clips In Perineural Cyst

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Abstract: Perineural cysts are usually asymptomatic and rarely require surgical treatment. This report describes a case that required surgical removal and an innovative method of defect closure. A sacral foraminal perineural cyst was detected incidentally on magnetic resonance imaging in a patient with a symptomatic L5-S1 disc herniation. At surgery, the cyst was found to be restricting normal movement of the right S1 nerve root, and compressing the root during lumbar spine extension. The cyst was incised to identify its contents, and was subsequently excised; however, the dural defect was on the anteromedial side of the nerve root and it was impossible to adequately secure watertight closure by suturing. To address this problem, the two edges of the defect were approximated and three small titanium clips were applied. The patient was symptom-free postoperatively, and the clips did not reduce the diagnostic value of repeat magnetic resonance images of the lumbosacral spine. This report illustrates that some cases of perineural cyst require innovative intraoperative strategies. The use of small titanium clips during spinal surgery does not necessarily compromise postoperative magnetic resonance imaging.

Key Words: Magnetic resonance imaging, perineural cyst, surgical treatment

Özet: Perinöral kistler nadiren cerrahi tedavi gerektiren ve sıklıkla da asemptomatik olan lezyonlardır. Semptomatik L5-S1 disk herniasyonu olan bir hastada bir sakral perinöral kist operasyon alanına doğru yer değiştirdi. Bu yer değiştiren kist sadece sağ S1 sinir kökünün serbestçe kaymasını sınırlandırmakta aynı zamanda da hastanın bel omurgası ekstansiyona getirildiğinde kökü sıkıştırmaktaydı. Bu nedenle perinöral kist içerisinin tanımlanması amacı ile açılmasını takiben çıkarıldı. Ancak kökün ön-iç yüzünde kalan dura açıklığının su geçirmez şekilde sütüre edilmesi gerçekleştirilemedi. Açıklığın iki kenarının yaklaştırılmasını takiben arka arkaya dizilecek şekilde üç adet küçük boy titanyum klip yerleştirilmesi ile ancak dura açıklığı kapatalabildi. Hastanın operasyon sonrası dönemde şikayetleri geçmiş olup lumbosakral omurganın manyetik rezonans ile görüntülenmesinin de tatmin edici düzeyde olduğu görüldü. Bu olgu aracılığı ile insidental perinöral kistlere yönelik yaklaşımların bazen operasyon sırasında değişebileceğini ve ayrıca omurga cerrahisinde küçük boyutlu titanyum kliplerin kullanılmasının da manyetik rezonans ile operasyon sonrası görüntülemeyi etkilemeyebileceğini vurgulamak istedik.

Anahtar Kelimeler: Cerrahi tedavi, manyetik rezonans, perinöral kist

INTRODUCTION

Perineural cysts (PNCs) of the lumbosacral region tend to be asymptomatic and are usually incidental findings (1). On magnetic resonance (MR) myelograms (14), these cysts appear as well-defined masses that are hyper- or isointense relative to cerebrospinal fluid (CSF). Some cases of PNC are associated with low-back pain, sciatica, or chronic perineal pain (3). Theoretically, lowering the intracystic pressure should resolve any associated symptomatology (2). However, it is difficult to decide whether surgery is indicated because the symptomatic effects of the cyst are often not clear, and unnecessary surgery may lead to pain and neurological deterioration (3).

In this report, we present the case of a patient with L5-S1 disc herniation in whom a sacral PNC was detected incidentally. The cyst was operated because it was interfering with the nerve root during lumbar spine extension, and closure of the defect required use of an innovative technique.

CASE REPORT

A 41-year-old woman with right hip and leg pain was admitted to the Neurosurgery Department. She had experienced similar problems 11 months earlier, and the acute pain had responded to conservative therapy at that time. The patient had developed intermittent paresthesia afterward and physical therapy was prescribed, but this did not completely resolve the issue. Two months prior to admission, the patient had fallen on the stairs and the right leg pain had recurred.

Neurologic examination revealed a positive leg-raising test on the right side and a sensory deficit in the right S1 dermatome. MR imaging demonstrated posterolateral disc protrusion at the L5-S1 level on the right, and a cystic lesion distinct from the disc and located near the right S1 nerve root (Figure 1a and 1b). Surgical exploration was recommended, and the patient was operated on 25 August 2000.

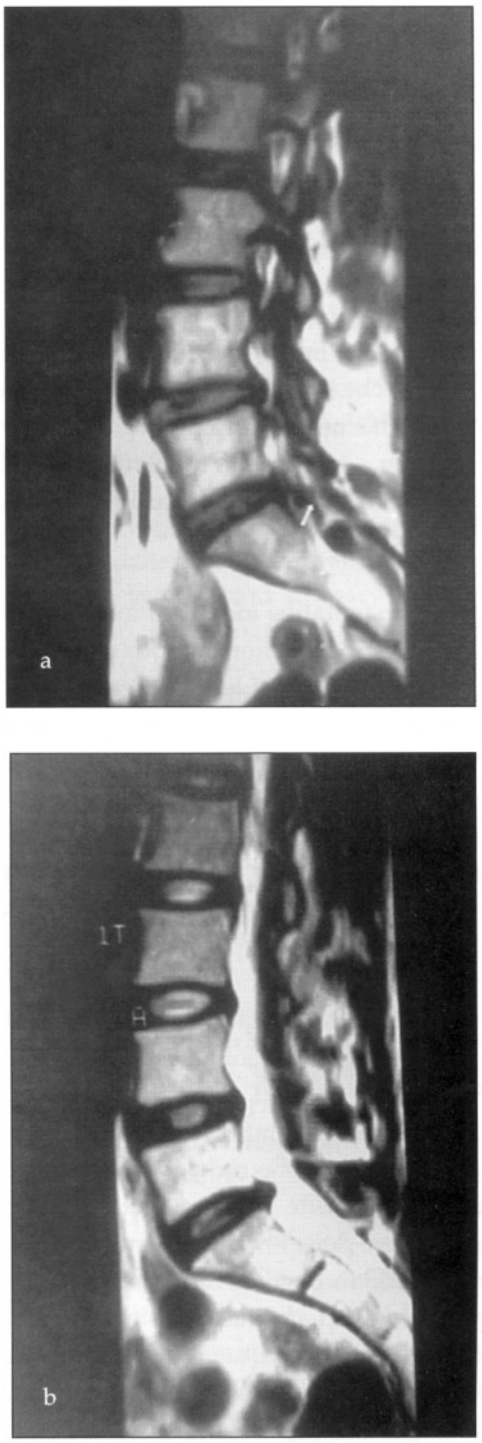


Figure 1:
a) T1-weighted sagittal magnetic resonance image (TR: 500 ms, TE: 20 ms).
The image shows a homogeneous, low-intensity, well-delineated, 8 mm-diameter cystic lesion in the region of the distal right S1 nerve root (arrow).
b) T2-weighted sagittal magnetic resonance image (TR: 2600 ms, TE: 81 ms).
Note the subligamentous protrusion of the L5-S1 disc.

The L5-S1 disc was approached via a right partial hemilaminectomy. The disc was observed protruding posterolaterally beneath the intact posterior longitudinal ligament and compressing the right S1 nerve root. After the disc tissue was evacuated, foraminotomy was performed to relieve the remaining tension on the right S1 nerve root. As the foramen was gradually unroofed, a large spherical lesion of expanded dura (approximately 10 mm diameter) began to bulge more and more from the site. The lesion was enclosing the S1 nerve root within the neural foramen. The appearance was mimicing a neurinoma involving the right S1 nerve root, but its soft and easily compressible nature indicated PNC.

Based on tentative identification of the lesion as a benign cystic dilatation anterior to the S1 nerve root, we initially decided to leave it intact. However, when the surgical table was flattened so that the patient's lumbar spine was extended, the cyst became trapped by surrounding bony structures and the increased tension caused it to compress the S1 root against the wall of the foramen (Figure 2a). In light of this, we decided to incise the lesion to explore its contents and investigate the integrity of the right S1 nerve root. Incising the lesion longitudinally identified it as a PNC. After the nerve root fibers were identified intradurally, we excised the excess dural sleeve tissue. The cystic dilatation originated from the anteromedial side of the right S1 nerve root; thus, once the excess tissue was removed, the edges of the dural sleeve defect migrated anteromedially. It was impossible to oversew the cyst wall safely in this relatively deep and narrow site. The size and location of the defect indicated that a small piece of muscle and fibrin glue were going to be inadequate for watertight closure. To solve this problem, we placed three small titanium clips on the two approximated edges of the defect, one after the other, taking care to preserve the nerve root fibers (Figure 2b). Before finishing the operation, the surgical table was flattened again to evaluate the patient in neutral position. With the cyst removed, the right S1 nerve root was able to glide freely back and forth through the foramen.

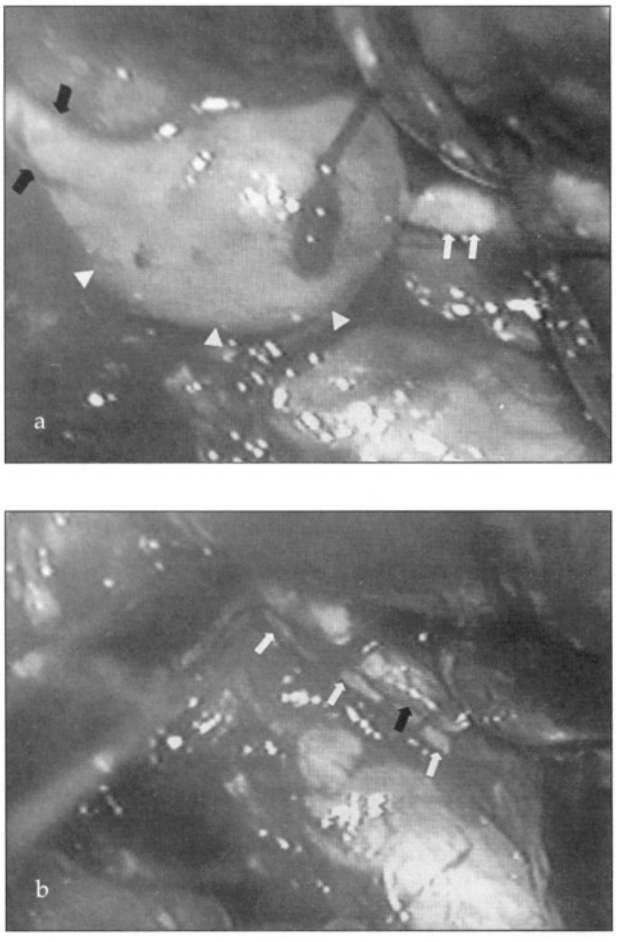
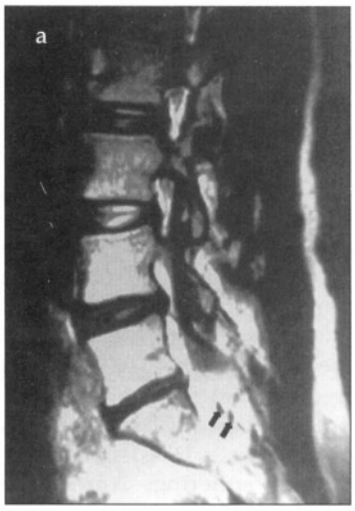


Figure 2:
a) Changing the patient's spine position to neutral by flattening the surgical table caused the perineural cyst and the involved right S1 nerve root to become trapped within the bony neural foramen. (Empty arrows = right S1 nerve root; arrowheads = perineural cyst; filled arrows = unroofed foramen)
b) Excision of the cyst decompressed the distal part of the right S1 nerve root and made it visible. (Empty arrows = right S1 nerve root; filled arrow = titanium clip)

The patient's leg pain disappeared in the immediate postoperative period. Histopathologic examination of the specimen revealed some degenerated nerve fibers adhered to the cyst wall. Repeat MR imaging of the operative site at 2 months post-surgery gave a clear view of the right S1 nerve root, showed complete removal of the PNC, and confirmed decompression of the right spinal nerve root at the L5-S1 disc level (Figure 3a and 3b). At her most recent re-check in June 2002, the patient had no complaints and showed no neurological deficits.



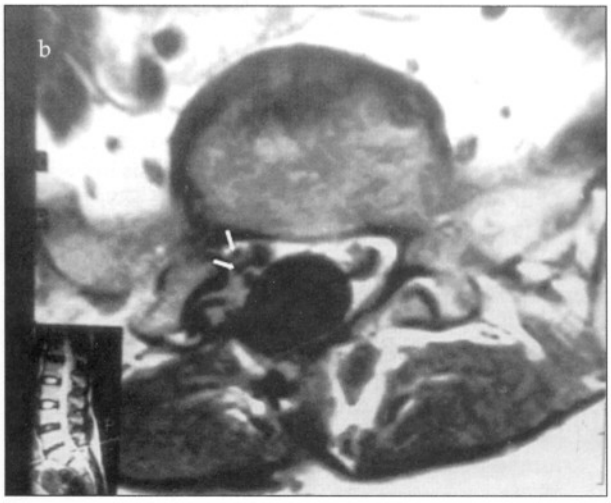


Figure 3:
a) T2-weighted sagittal image (TR: 3130 ms, TE: 117 ms, ST: 5 mm)
The applied titanium clips (arrows) are visible as well-delineated hypointensities parallel to the trajectory of the right S1 nerve root.
b) T1-weighted axial image (TR: 700 ms, TE: 25 ms, ST: 5mm)
The right S1 nerve root and the adjacent hypointensities representing the titanium clips (arrows) are clearly visible in the right lateral recess.

DISCUSSION:

In spinal surgery cases, anomalies of the lumbosacral nerve roots can make diagnosis difficult and cause problems intraoperatively (12). The most frequent of these abnormalities (incidence rate 1-2% for both) are conjoined nerve roots emerging from the dural sac, and PNCs in the transition area of the dural and arachnoid root sac invading the perineurium of the spinal nerve (4,11,12). In both these conditions, the involved nerve root can easily become entrapped within the bony environment, either by a herniated disc or due to the anatomy of the lesion itself (8,9,12). In the conjoined root anomaly, the bifid root is firmly fixed in the lateral recess between the two pedicles (5). In PNC, the nerve root is gradually compressed by the expanding cyst due to hydrostatic and pulsatile forces of the CSF within the lesion (2,3). Such anomalous roots become highly susceptible to any further stress, so that mild disc herniation, relative stenosis of bony structures, and even movement of the spine may induce symptomatology.

The differential diagnoses for these two common anomalies are intraforaminal neurinoma (6), ganglion cyst (7), and primary hydatid cyst (10). Computerized tomography (11), metrizamide myelography (4,14), and MR imaging (1) are all useful tools for detecting these lesions. Recently, MR myelography has been accepted as an adjunct to conventional imaging techniques (14).

Our patient had disc herniation, and PNC was detected incidentally on preoperative MR imaging. Wide exposure with hemilaminectomy, unroofing of the lateral recesses, and wide foraminal decompression is recommended to fully ascertain the nature of these cysts (1,5). However, there is controversy over how to best manage these lesions (2,3,14). Many surgeons advocate decompression of the PNC with partial/total excision (3,13) or lumboperitoneal shunt insertion (2,15), especially in cases with radicular extrinsic compression.

Magnetic resonance imaging of our patient indicated only a small PNC in the right S1 foramen, and this suggests that it would have been appropriate to leave the lesion untouched after disc decompression and foraminotomy were completed. However, upon unroofing the foramen we found a very large cyst bulging into the operative field, and noted that the lesion was stretching the right S1 nerve root as well. We also noted that nerve compression gradually increased as the surgical table was flattened, since the entrapped cyst was preventing the normal gliding motion of the right S1 nerve root. We suspected that this restriction might induce symptomatology, and thus decided to excise the PNC.

The two main difficulties encountered during resection of the cyst wall were preserving the attached nerve fibers and oversewing the cyst wall. We inadvertently severed a few tiny degenerated fibers that must have been pushed toward the cyst wall by chronic pressure from the lesion. Also, it was evident that the PNC originated from the anteromedial aspect of the distal nerve root. After cyst removal, the edges of the dural defect were widely separated in their anteromedial location, and were in a relatively deep and narrow site that made manipulation awkward. In order to avoid damaging the nerve root fibers and to prevent postoperative CSF leakage due to problematic suturing, we everted the two edges of the dural defect slightly and closed them with three small titanium clips.

The main limitations of this technique are the risk of clip slippage and problems with restricted nerve root movement in the foramen, which could lead to symptoms. In addition, the clips could potentially interfere with interpretation of MR imaging rechecks. In our case, the patient had been free of sciatica for almost 2 years postoperatively at the time of writing. We found that the clips posed no problems with respect to reading postoperative MR images, even in the area of the right S1 nerve root.

CONCLUSION:

A PNC may require surgical excision if the lesion is compressing nervous structures or restricting gliding of the nerve root through the foramen. These potential problems can be checked intraoperatively by positioning the surgical table so the spine is in flexed and extended positions. When it is not possible to suture a dural defect during spinal surgery, application of titanium clips is a good alternative. This method does not seem to compromise the diagnostic quality of post-surgical MR images.

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Correspondence: Serhat Erbayraktar, M.D.
Dokuz Eylül Üniversitesi Tıp Fak.
Nöroşirürji Anabilim Dalı
35340 Balçova, İzmir-Turkey
Phone: +90/ 232/ 2595959
Fax : +90/232/2590541
E-mail: serhatbayrak@ttnet.net.tr

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