EDITORIAL

Use of anterior lumbar discectomy and interbody fusion in the management of recurrent lumbar disc herniation and cauda equina syndrome**Paul M. Arnold, MD**

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TAN et al. present a small case series⁷ of 3 patients who had previously undergone lumbar discectomy and now present with recurrent herniation and cauda equina syndrome (CES). All 3 patients were treated with an anterior lumbar discectomy and fusion (ALDF). The patients experienced a nice recovery of their symptomatology, with resolution of their bowel and bladder dysfunction and improvements in lower-extremity radiculopathy. The authors noted that the anterior approach was not detrimental to visualizing and decompressing the nerve roots, and scar tissue that would have been encountered via a posterior approach was avoided.

While the patients in this limited series fared well with this surgical treatment, it is not clear whether ALDF should be adopted for widespread use for this clinical problem. Most patients can be adequately treated for recurrent herniation, even in the setting of CES, with a posterior approach.^{2,4} While scar tissue is often present, the disc material can usually be adequately resected. There is certainly a higher risk of durotomy in cases of revision lumbar discectomy, but this is far from a given, and it is usually a manageable problem. In the setting of CES, the disc is often herniated centrally or may migrate beyond the disc space, and the anterior approach may be inadequate for allowing visualization and retrieval of the disc and achieving adequate neural decompression.

There are several other issues to consider when deciding on a surgical approach for this particular clinical scenario. An anterior approach virtually necessitates the use of a fusion, while this is not necessarily true with a laminectomy or laminotomy. The posterior approach allows for this option without committing the surgeon to this step. In

fact, most studies advocate a repeat discectomy without fusion when performing a second lumbar discectomy.^{2,4,6} Performing a fusion compels the surgeon to follow the patient for a longer period after surgery, reviewing periodic radiographs to assess fusion status and being on the lookout for the development of adjacent-segment disease.

Complications from both anterior and posterior approaches are well known, although those from an ALDF are often more serious. These include ureteral or vascular injury, which can have more dire consequences than a durotomy or excessive nerve root retraction. Managing complications arising from an anterior approach often requires significant medical resources, and it is often associated with both increased length of stay and increased costs. However, a recent study consisting of 6 patients undergoing ALDF for recurrent herniation (in a non-CES situation) showed no complications and successful disc removal and fusion.⁸ Total disc replacement has also been advocated as treatment for recurrent herniated lumbar disc.³

Finally, an anterior approach usually requires the services of an access surgeon; contacting one may delay care in this emergency situation. It is also likely that some patients may have had previous abdominal surgery, making the technical aspects of the procedure more complicating, obviating the potential advantages of this approach.

There are several reasons why laminectomy with or without fusion remains the preferred approach, including predictable complications; surgeon familiarity; ability to achieve decompression, even with disc migration; no automatic fusion; and no need for an access surgeon. While an ALDF may be the optimal approach in certain instances,^{1,5,8} at this time it should not be considered to of-

fer clinical equipoise to a posterior operation, a point with which the authors of the current series are in agreement.

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References

1. Choi JY, Choi YW, Sung KH: Anterior lumbar interbody fusion in patients with a previous discectomy: minimum 2-year follow-up. **J Spinal Disord Tech** 18:347–352, 2005
2. Ebeling U, Kalbarczyk H, Reulen HJ: Microsurgical reoperation following lumbar disc surgery. Timing, surgical findings, and outcome in 92 patients. **J Neurosurg** 70:397–404, 1988
3. Glenn JS, Yaker J, Guyer RD, Ohnmeiss DD: Anterior discectomy and total disc replacement for three patients with multiple recurrent lumbar disc herniations. **Spine J** 11:e1–e6, 2011
4. Herron L: Recurrent lumbar disc herniation: results of repeat laminectomy and discectomy. **J Spinal Disord** 7:161–166, 1994
5. Mamuti M1, Fan S, Liu J, Shan Z, Wang C, Li S, Zhao F: Mini-open anterior lumbar interbody fusion for recurrent lumbar disc herniation following posterior instrumentation. **Spine (Phila Pa 1976)** 41:E1104–E1114, 2016
6. O'Sullivan MG, Connolly AE, Buckley TF: Recurrent lumbar disc protrusion. **Br J Neurosurg** 4:319–325, 1990
7. Tan KA, Sewell MD, Markmann Y, Clarke AJ, Stokes OM, Chan D: Anterior lumbar discectomy and fusion for acute cauda equina syndrome caused by recurrent disc prolapse: report of 3 cases. **J Neurosurg Spine** [epub ahead of print July 14, 2017]. DOI: 10.3171/2017.1.SPINE16352]
8. Vishteh AG, Dickman CA: Anterior lumbar microdiscectomy and interbody fusion for the treatment of recurrent disc herniation. **Neurosurgery** 48:334–338, 2000

Disclosures

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Response

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The points cited by Dr. Arnold are well taken. We would like to stress that we are not advocating the wide-

spread use of ALDF for the treatment of acute CES due to recurrent disc herniation. The usual treatment option for first-time recurrent disc herniation is indeed a standard posterior revision discectomy. It can be argued that even with additional recurrences, further revision posterior discectomy remains feasible. Although the results of revision discectomy for recurrent disc herniation can be comparable to primary discectomy,⁸ inferior results in patients undergoing repeated discectomies for recurrent disc herniation have also been reported.^{2,5} Dr. Arnold acknowledges that there is certainly a higher risk of durotomy with revision posterior discectomy. While durotomies can be managed uneventfully, they can also lead to suboptimal outcomes. Dissecting through scar tissue within the spinal canal, particularly in the context of multiple recurrences, would be increasingly difficult and pose a higher risk of neural injury.

Österman et al. showed that patients who have one reoperation after lumbar discectomy are at greater risk of requiring further spinal surgery.⁵ With each subsequent recurrence, the risk of segmental instability increases, and therefore fusion may be a worthwhile consideration.^{3,7} We suggest that if one has opted for fusion of the pathological segment in recurrent disc herniation, and, as in our report, in cases of acute CES due to massive recurrent disc herniations, ALDF may be a very good option. Anterior discectomy also removes the risks associated with retraction and handling of the cauda equina. While a successful revision posterior discectomy has the advantage of a shorter follow-up period, it can also be said that a successful fusion eliminates the possibility of further recurrence at the involved segment. If a posterior fusion is performed, the need for radiological follow-up is the same as that of an ALDF.

We certainly do not underestimate the potential for complications in anterior lumbar surgery, especially since not all spine surgeons are familiar with the anterior approach. However, our small case series suggests that surgeons experienced with anterior lumbar surgery can achieve good outcomes in this context with minimal risk. We have acknowledged that in units where anterior lumbar approaches are not frequently performed, access surgeons may be required, making this method less feasible in the emergency situation requiring acute cauda equina decompression. This, however, is an unlikely problem in units where anterior lumbar approaches are frequently carried out. The Nottingham experience⁶ and the senior author's experience⁴ in this regard concur with the experiences of Vishteh and Dickman⁹ and Choi et al.¹ Nevertheless, it is important to choose the appropriate case in which to apply this surgical option.

Dr. Arnold rightly points out that sequestered fragments may be a problem. However, in the senior author's experience, sequestered or extruded fragments can usually be extracted through the annular defect from within the disc space. The herniated disc fragment can be extracted without entering the scarred canal. The main exception, when this technique would be unsuitable, is when the fragment extends right behind the vertebral body. This is easily determined by assessing the preoperative MR images.

References

1. Choi JY, Choi YW, Sung KH: Anterior lumbar interbody fusion in patients with a previous discectomy: minimum 2-year follow-up. **J Spinal Disord Tech** **18**:347–352, 2005
2. Fritzell P, Knutsson B, Sanden B, Strömqvist B, Hägg O: Recurrent versus primary lumbar disc herniation surgery: patient-reported outcomes in the Swedish Spine Register Swespine. **Clin Orthop Relat Res** **473**:1978–1984, 2015
3. Greenleaf RM, Harris MB, Bono CM: The role of fusion for recurrent disk herniations. **Semin Spine Surg** **23**:242–248, 2011
4. Griffiths-Jones W, Stokes O, Chan D, Budd H: Complications of the anterior approach to the lumbar spine. **Global Spine J** **2015**:A179, 2015 (Abstract)
5. Österman H, Sund R, Seitsalo S, Keskimäki I: Risk of multiple reoperations after lumbar discectomy. **Spine (Phila Pa 1976)** **28**:621–627, 2003
6. Quraishi NA, König M, Booker SJ, Shafafy M, Boszczyk BM, Grevitt MP, et al: Access related complications in anterior lumbar surgery performed by spinal surgeons. **Eur Spine J** **22 Suppl 1**:S16–S20, 2013
7. Stambough JL: An algorithmic approach to recurrent lumbar disk herniation: evaluation and management. **Semin Spine Surg** **20**:2–13, 2008
8. Suk KS, Lee HM, Moon SH, Kim NH: Recurrent lumbar disc herniation: results of operative management. **Spine (Phila Pa 1976)** **26**:672–676, 2001
9. Vishteh AG, Dickman CA: Anterior lumbar microdiscectomy and interbody fusion for the treatment of recurrent disc herniation. **Neurosurgery** **48**:334–338, 2001