Editorial

Lumbar discectomy: has it got any ill-effects?

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Lumbar discectomy is the most commonly performed surgical procedure for the treatment of patients with lumbar radiculopathy caused by prolapsed disk (1). It is considered a valid treatment option when the symptoms do not respond to conservative care for at least 8–12 weeks (2). Surgery should be performed earlier, instead, in the presence of neurological motor deficits or in case of patient's desire to go back, as quicker as possible, to normal daily activities (e.g., professional athletes or persons with a very social or working busy life). On the contrary, the surgical treatment should be performed as an emergency in case of cauda equine symptoms. Surprisingly, from the literature emerges that the long-term outcome in operated patients is similar to those treated conservatively (3). Weber *et al.* (4) compared, in a randomized controlled trial (RCT), the surgical versus conservative treatment for lumbar disc herniation. They reported a statistically significant greater level of improvement for the surgical group in the first 4 years. While there was no difference in outcome at 10 years follow-up. Similar results were found also by other authors (5,6). A Cochrane review performed in 2007 by Gibson *et al.* (7), regarding the long-term effects of surgical treatment, concluded that no clear results were found. The same finding emerged from the RCT of Osterman *et al.* (8) as well. Among the different surgical options, undoubtedly, microsurgery is the preferred choice with a special attention to the new techniques like minimally invasive surgery (MIS) or endoscopic techniques developed with the aim of decreasing at the minimum the surgical aggressiveness and keeping as normal as possible the involved anatomy (9). Another important point, discussed in the literature, is the necessity or not to try to remove a large amount of the disk. The preferred tendency, nowadays, seems to be the removal, only, of the part of protruded disk (10) without the necessity of a more aggressive surgery. The so called sequestrectomy. A study from Thomé *et al.* (11) on the amount of disk removal concluded that only removing the protruded part, does not seem to entail a higher rate of early recurrence compared with microdiscectomy and early outcome demonstrated a trend toward superior results when sequestrectomy is performed. So, they concluded that, although long term follow-up data were mandatory, sequestrectomy could have been an advantageous alternative to standard microdiscectomy. Another study by Azarhomayoun *et al.* (10) reported that sequestrectomy and standard microdiscectomy were associated with similar effects on pain after surgery, recurrence rate, functional outcome and complications rate.

Although microdiscectomy is considered a very effective and safe operation with a very high success rate, its accomplishment is not without risks. As matter of fact we have to remember iatrogenic nerve root damage, scar tissue formation, infection, disc prolapsed or symptomatology recurrence as well as the possibility of onset of secondary mechanical instability which may require a further operation by means of fusion. This instability situation may be due to the first operation or it can be the result of the ongoing degenerative process which involves that patient and, therefore, it would have happened anyway despite any treatment given. It is also possible that the instability

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onset might have been accelerated by the operation itself. Undoubtedly, the anatomical presence of the disc is a very important mechanism for spine stability as well as the maintenance of the spinal lordosis which can, ultimately, help in keeping a good biomechanical spinal working situation. Once a disc is degenerated and/or removed we often, assist to the development of a focal segmental kyphosis which might determine a spinal rearrangement of the alignment in terms of biomechanical situation. Thus, the removal of a "simple" lumbar disk might determine the beginning of a more complex situation which can bring, with time, to recurrent pathology or even spinal instability and sagittal imbalance.

As matter of fact, in the past few years, some papers have been published on the incidence of a second operation and even on the necessity of performing a spinal fusion after the original lumbar discectomy. In 2003, a study performed in the Finnish population by Osterman *et al.* (12) found some very interesting data. Patients with one reoperation after lumbar discectomy had a 25.1% cumulative risk of further spinal operations in a 10-year follow-up. This risk was decreased in patients in whom the time interval between the initial disc operation and the first revision was more than a year and in patients older than 50 years. They found that performing spinal fusion as the first reoperation was associated with a significant reduced risk of further surgery. The authors commented that, the need for an early reoperation might have reflected the severity of the underlying disease process, the difficulties in surgical technique, or a poor surgical selection of the patients. Some years later, another paper by Heindel *et al.* (13), reported an overall 4-year reoperation rate of 12.2% after single level discectomy with a 5.9% rate of lumbar fusion within 4 years. Patient who had received a re-exploration discectomy within 2 years of the index procedure had gone on to receive a lumbar fusion at a rate of 38.4% within 4 years after the re-exploration discectomy. In 2018, Castillo *et al.* (14) published a paper on the rate of lumbar fusion after an initial operation for lumbar discectomy. The authors conducted, retrospectively, a population-size study, in order to assess the risk of undergoing lumbar fusion in patients who had already undergone lumbar discectomies and compared this to the risk of lumbar fusion in the general population with no previous lumbar discectomy. They extracted, using ICD-9 (International Classification of the Diseases, 9th revision) codes from the Truven Healthcare Analytics Marketscan Research Database, 223,291 patients who underwent discectomies from the years 2003 to 2015 and 489,975 patients, with a previous lumbar ICD-9 diagnosis code who have also been enrolled in the database for at least 10 years. The entire identified patients were followed up for a 10-year period. They found a fusion rate between 1.69% (after 1-year time frame from discectomy) and 8.50% (at 10-year time frame from discectomy). When they compared the two cohorts, the fusion rates were 12.5% for the discectomy group and 4.19% for the non-discectomy group. These rates yield a statistical significant difference between the fusion rate of the two groups, by the Pearson Chi-squared test ($P<0.0001$). Therefore, they concluded that people who had a lumbar discectomy procedure were 2.97 times more likely to undergo a lumbar fusion than those who, with a lumbar diagnosis had not undergone a lumbar discectomy in the past. Most likely, it stands to reason, the difference would be even greater when comparing the discectomy population to a population without a lumbar diagnosis. These results were very similar to those found by Osterman *et al.* (12) first and Heindel *et al.* (13) later. These last authors, however, had enrolled a smaller number of patients. Always from the literature it emerges also, that in patients treated with lumbar discectomy the reoperation rate (subsequent lumbar discectomy, laminectomy or fusion) occurs at a rate ranging from 5% to 25% (15-17) with the preferred surgical technique being not standardized. A survey in 2014 among 445 spine surgeons in the United States, found that recurrence disk herniation was most commonly treated with a second discectomy by the most senior surgeon (18), while 69% of surgeons would be in disagreement in what to do in case of twice recurrent lumbar disk herniation.

The study of Castillo *et al.* (14) is certainly very important because it involves a very large number of patients followed for a long period. However, its main limitations are that the data are retrospective and being taken from a database they may not be representative of the entire population. Furthermore, there is a lack of clinical data being not possible to identify information's like the spinal level, the operated side, the severity of the disease or the clinical outcome as well as the radiological images and the type of the surgical methods used (open discectomy with loops; microdiscectomy, MIS, endoscopy). With such data collection, we are also unable to determine for each patient the indication for surgery and therefore cannot state whether reoperations were performed because of progression of disease, iatrogenic instability or for entirely unrelated pathology like a subsequent trauma. In addition, the study does not examine multilevel procedures.

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Another point to keep in mind is that the clinical outcome cannot be determined using an insurance database. So, a patient who have changed region or with recurrence of the symptoms who chooses not to seek additional treatment will look the same as a patient with complete resolution or as a patient who switched insurance provider. Some patients may even be receiving lumbar fusion in a different level than where they had received their initial lumbar discectomy. Also, the surgeon specific thresholds for proceeding to fusion may be another important bias. Dispute all these raised points, there is no doubt that the value of this paper is to enhance the shared decision-making process by providing surgeons and patients with data of the frequency and nature of reoperations after one of the most commonly performed spine surgery. Being no doubts that a certain percentage of patients after a simple microdiscectomy will undergo, in the next few years, a further operation and possibly a spinal fusion too. Further studies are needed regarding the best treatment algorithm in patients with *de novo* or recurrent lumbar disk herniation in order to evaluate who may benefit more from surgery or from conservative care. Therefore, a multicentre study is warranted. For the moment we can use the available information to better counsel our patient by providing surgeons and patients with valuable data regarding the frequency and nature of reoperations after discectomy, keeping in mind that the outcome with microdiscectomy is good in the short and medium term; that both surgical and non-surgical treatment of symptoms associated with lumbar disc herniation have similar long term outcomes and that regression of herniated disc may happen, spontaneously, in around 60% of patients (19) and that, fortunately, the majority of patients will improve without surgery and only around 15% undergo surgery for disc protrusion within 6 months (20).

Perhaps with the use of a less traumatic surgical technique for disc removal like the endoscopy (21,22) and in particular with the percutaneous transforaminal endoscopic discectomy (9) better results and a minor rate of redoing operation might be achieved.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

References

1. Deyo RA, Weinstein JN. Low back pain. N Engl J Med 2001;344:363-70.
2. Koes BW, van Tulder MW, Peul WC. Diagnosis and treatment of sciatica. BMJ 2007;334:1313-7.
3. Cherkin DC, Deyo RA, Loeser JD, et al. An international comparison of back surgery rates. Spine (Phila Pa 1976) 1994;19:1201-6.
4. Weber H. Lumbar disc herniation. A controlled, prospective study with ten years of observation. Spine (Phila Pa 1976) 1983;8:131-40.
5. Hahne AJ, Ford JJ, McMeeken JM. Conservative management of lumbar disc herniation with associated radiculopathy: a systematic review. Spine (Phila Pa 1976) 2010;35:E488-504.
6. Jacobs WC, van Tulder M, Arts M, et al. Surgery versus conservative management of sciatica due to a lumbar herniated disc: a systematic review. Eur Spine J 2011;20:513-22.
7. Gibson JN, Waddell G. Surgical interventions for lumbar disc prolapse: updated Cochrane Review. Spine (Phila Pa 1976) 2007;32:1735-47.
8. Osterman H, Sund R, Seitsalo S, et al. Risk of multiple reoperations after lumbar discectomy. Spine (Phila Pa 1976) 2003;28:621-7.
9. Tacconi L, Baldo S, Merci G, et al. Transforaminal percutaneous endoscopic lumbar discectomy: outcome and complications in 270 cases. J Neurosurg Sci 2018. [Epub ahead of print].
10. Azarhomayoun A, Chou R, Shirdel S, et al. Sequestrectomy versus conventional microdiscectomy for the treatment of lumbar disc herniation: a systematic review. Spine (Phila Pa 1976) 2015;40:E1330-9.
11. Thomé C, Barth M, Scharf J, et al. Outcome after lumbar sequestrectomy compared with microdiscectomy: a prospective randomized study. J Neurosurg Spine 2005;2:271-8.
12. Osterman H, Seitsalo S, Karppinen J, et al. Effectiveness of microdiscectomy for lumbar disc herniation: a randomized controlled trial with 2 years follow-up. Spine (Phila Pa 1976) 2006;31:2409-14.
13. Heindel P, Tuchman A, Hsieh PC, et al. Reoperation Rates after single-level lumbar discectomy. Spine (Phila Pa 1976) 2017;42:E496-501.
14. Castillo H, Chintapalli RTV, Boyajian HH, et al. Lumbar discectomy is associated with higher rates of lumbar fusion. Spine J 2018. [Epub ahead of print].

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15. Son IN, Kim Yh, Ha KY. Long-term clinical outcomes and radiological findings and their correlation with each other after standard open discectomy for lumbar disc herniation. J Neurosurg Spine 2015;22:179-84.
16. Hirabayashi S, Kumano K, Ogawa Y, et al. Microdiscectomy and second operation for lumbar disc herniation. Spine (Phila Pa 1976) 1993;18:2206-11.
17. Soliman J, Harvey A, Howes G, et al. Limited microdiscectomy for lumbar disc herniation: a retrospective long-term outcome analysis. J Spinal Disord Tech 2014;27:E8-13.
18. Mroz TE, Lubelski D, Williams SK, et al. Differences in the surgical treatment of recurrent lumbar disc herniation among spine surgeons in the United States. Spine J 2014;14:2334-43.
19. Bozzao A, Gallucci M, Masciocchi C, et al. Lumbar disc herniation: Mr imaging assessment of natural history in patients treated without surgery. Radiology 1992;185:135-41.
20. Vroomen PC, de Krom MC, Knottnerus JA. When does the patient with disc herniation undergo lumbosacral discectomy? J Neurol Neurosurg Psychiatry 2000;68:75-9.
21. Tacconi L, Bobicchio P. Recurrent Disc Prolapsed: Is the Endoscopic Approach Useful? Our Experience. Open Access J Neurol Neurosurg 2018;7:555706.
22. Tacconi L, Bobicchio P. L5-S1 Disk Prolapse: Pure Endoscopic Approach: Our Experience. Open Access J Neurol Neurosurg 2018;7:555708.

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