

# Surgical treatment of discogenic sciatica

Mahdi Sharif-Albouseini, MD, Vafa Rahimi-Movaghar, MD.

## ABSTRACT

يعد تقييم الحالة الفيزيائية، والنفسية، والاجتماعية، بالإضافة إلى تقييم طبيعة العمل من الأمور الضرورية أثناء تشخيص وعلاج المرضى المصابين بعرق النسا قرصي المنشأ. قد يتم إجراء عملية استئصال الجزء المنفتق من القرص لبعض المرضى المصابين بعرق النسا من جراء انفتاق الأقراص القطنية والذي تعذر على التدخل الغير جراحي لمدة 6-8 أسابيع شفاؤه، أو من جراء الإصابة بمتلازمة ذيل الفرس. وقبل إجراء العملية الجراحية يجب عمل العديد من الاختبارات والصور للجهاز العصبي. لقد أثبتت العملية الجراحية كفاءتها في تقليل مدة النقاهة بنسبة تصل إلى 50% وذلك بالمقارنة مع العلاج الغير جراحي، غير أنه لم يتم حتى الآن تحديد أفضل الإجراءات المتبعة في مثل هذه العمليات الجراحية. تمنع الحدود في الدراسات والأبحاث التي تقوم بتقييم مدى فعالية إجراء العمليات الجراحية عن طريق الجلد من الوصول إلى حلول نهائية حول هذا الموضوع. تحدث المضاعفات بعد العملية الجراحية في حوالي 1-3% من المرضى، غير أنه عند اختيار المرضى بالطريقة الصحيحة قد يحصل الفشل بنسبة تقل عن 10%. تشمل الحالات التي يحدث فيها فشل العملية الجراحية كلاً من: انفتاق الأقراص المتكرر، والتليف، كما يعد حدوث متلازمة جراحة الظهر الفاشلة من التحديات التي تواجه الجراحين.

The evaluation of physical, psychological, social, and occupational factors are recommended in patients with discogenic sciatica. Surgical discectomy may be considered in selected patients with sciatica due to lumbar disc herniations that fail to resolve with conservative management for at least 6-8 weeks, or in patients with cauda equina syndrome. An appropriate pre-operative work up including neuroimaging is necessary. Surgery has been shown to be highly effective; shortening the time to recovery by around 50% compared to nonsurgical treatment. Whether one specific surgical procedure is better than other remains uncertain. Methodological limitations of studies evaluating the efficacy of percutaneous methods prevent ultimate conclusions. Post-operative complications occur in 1-3% of cases. If patients are appropriately selected, failures happen in less than 10% of cases. The most common modes of failure include recurrent disc herniation and fibrosis. Failed back surgery syndrome is also a challenge for spinal surgeons.

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From the Sina Trauma and Surgery Research Center (Sharif-Albouseini), Department of Neurosurgery, (Rahimi-Movaghar), Tehran University of Medical Sciences, Tehran, Iran.

Address correspondence and reprint request to: Dr. Vafa Rahimi-Movaghar, Associate Professor of Neurosurgery, Sina Trauma and Surgery Research Center, Sina Hospital, Hassan-Abad Square, Imam Khomeini Avenue, Tehran University of Medical Sciences, Tehran, 11365-3876, Iran. Tel. +98 (915) 3422682. Fax. +98 (216) 6757009. E-mail: v\_rahimi@sina.tums.ac.ir

The precise definition of sciatic neuralgia is “pain in the distribution of the sciatic nerve due to pathology of the nerve itself.”<sup>1</sup> However, in routine practice it is defined as “pain in the lumbar region radiating down into the leg.” Sciatica is a set of symptoms rather than a specific diagnosis. Although several etiologies including lumbar canal or foraminal stenosis and (less often) tumors or cysts have been described as the etiologies of sciatica, it is caused by a herniated lumbar disc in approximately 90% of cases.<sup>2,3</sup> Despite the definite role of intervertebral disc herniation in the development of sciatica, the exact mechanism has not yet been fully elucidated. Herniated nucleus pulposus (NP) has been shown to provoke a strong inflammatory response around the affected nerve root, which is a likely source of pain. The pathophysiology of discogenic sciatica may be best explained by a combination of inflammation, an upregulated immune response, and mechanical deformation of the nerve.<sup>2</sup> This review focuses on a small subgroup of patients with discogenic sciatica who require surgical treatment, and discusses different issues such as indications and timing of surgery, comparison of treatment results, recurrence and infection rates.

**Indications of surgery in discogenic sciatica.** Surgery is indicated in selected patients with sciatica due to lumbar disc herniations that fail to recover with conservative management.<sup>1</sup> It has been suggested that the outcome of lumbar discectomy depends more on patient selection rather than the chosen surgical method. Patients with pain

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but without considerable motor deficit or sphincter dysfunction usually recover within one month. Thus, conservative modalities should be attempted first in these patients and discectomy be considered only for refractory cases.<sup>2</sup> Peul et al<sup>3</sup> recommended that patients be considered for surgery if they cannot tolerate the pain, have an unacceptability slow rate of recovery when conservative measures have been attempted and in patients who want to minimize recovery time. A study reviewing 4036 lumbar discectomies demonstrated that severe discogenic sciatica, profound motor weakness, and cauda equina syndrome were the best indications for surgery.<sup>2</sup> While cauda equina syndrome and acute severe and/or progressive paresis are indications for immediate surgery, elective surgery is the choice for unilateral sciatica.<sup>4</sup> In 2005, The American Association of Neurological Surgeons suggested the following criteria for surgery:<sup>5</sup> Limitation of normal activity or quality of life; Impairment due to back and leg pain; Progressive development of neurological deficits, such as leg weakness or numbness; Loss of normal bowel and bladder function; Difficulty in standing or walking; Ineffectiveness of conservative modalities including medication and physical therapy.

**Timing of surgery.** The best timing of surgery has yet to be defined.<sup>6</sup> After a thorough evaluation of physical, psychological, social, and occupational factors, surgery may be offered to patients with one of the following findings: failure of conservative treatment for at least 6-8 weeks,<sup>4</sup> persistent radicular pain,<sup>7</sup> and severe leg pain, and disability particularly combined with the inability to sit.<sup>3,8</sup> On the other hand, uncertainty around the optimal timing of surgery for sciatica probably results in the large variation in the frequency of low back surgery. However, there may be no long-term outcome differences between surgical and conservative treatment, and most guidelines suggest considering surgery for patients with leg pain that persists more than 6-8 weeks.<sup>3</sup> The major advantage of early surgery for patients is more rapid relief of leg pain, reassurance of recovery, and earlier return to normal activities.<sup>3,8</sup> Because of the difference in absenteeism from work, faster recovery makes early surgery more cost-effective compared with prolonged conservative management.<sup>9</sup> On the other hand, patient expectations appear to be important predictors of outcomes, and eliciting them may help physicians identify patients more likely to benefit from discectomy for sciatica.

**Constitutes of the preoperative workup.** Before surgery, appropriate imaging (namely, MRI or CT myelogram) is necessary to confirm the exact location of the disc herniation. Those patients who are candidates for surgery should have the appropriate preoperative laboratory tests and consultation with cardiology, internal medicine, or anesthesia if indicated.

**Surgical approaches.** Surgical treatment includes removal of the extruded or protruded disc material, visualizing the nerve root, and decompressing any foraminal stenosis.<sup>4</sup> However, many surgeons feel that surgery for a lumbar disc herniation involves removal of more of the disc than only the extruding or protruding part. Proper surgical technique helps prevent complications. Below is a list of several surgical approaches aid in minimizing the risk of harming vital structures.<sup>10</sup>

1. **Fenestration.** This can be performed unilaterally or bilaterally, depending on the location of the disc herniation and the symptoms. Interlaminar lumbar discectomy by fenestration without widespread laminectomy is an effective and reliable technique for appropriately selected patients with an L4-L5 or L5-S1 disc herniation.<sup>11</sup>

2. **Hemilaminectomy.** An option for patients with unilateral symptoms, particularly if fenestration does not provide sufficient exposure.<sup>12</sup>

3. **Laminectomy.** Recommended for patients with bilateral symptoms and disc herniations that cannot be completely removed from a unilateral approach.

4. **Laminoplasty.** This is recommended for children due to concern for instability associated with laminectomy.

5. **Lumbar fusion.** In complicated cases of discopathy with unstable spine due to spondylolisthesis or in patients with a previous history of laminectomy and facetectomy, definitive surgical treatment is often a 360-degree fusion.<sup>13</sup> It is a procedure in which the bone graft is placed both in the disc space (interbody fusion) and over the transverse processes (posterolateral fusion), with the goal of creating a solid union between 2 vertebrae. Instrumentation is frequently used to improve fusion rates.

In comparing the above-mentioned procedures, whether one specific surgical approach is better than others remain unclear.<sup>7</sup> Less invasive modern methods may have an advantage over traditional laminectomy by minimizing post-operative pain and the potential for instability.<sup>14</sup> When there are findings of definite nerve-root compression, simple disc excision may be sufficient. Fusion may be considered in cases with severe disc degeneration after failure of conservative modalities or in patients for recurrent disc herniation or revision surgery.

**Surgical procedures.** *Open.* General endotracheal anesthesia is preferred, though spinal or local techniques can also be used. Because of the need for muscle retraction, short acting muscle relaxants should be administered. The knee-chest position is the most common positioning method used. Prone positioning on a Jackson spine table or with rolls placed under the iliac crests and chest

is also possible. In severely obese patients, the lateral decubitus position is also an option. A midline incision is utilized, and dissection down to the spinous processes is performed. The paraspinal muscles are elevated off the lamina, the spinal level is confirmed, and a laminectomy is performed. After exposure of the nerve root, the herniated disk material is removed to decompress the affected root. If the root is well decompressed, it should be pulsatile. In far lateral disk herniations, a unilateral complete facetectomy may be required. A systematic review showed that conservative discectomy (removal of only the extruded fragment with little invasion of the disc space) was preferable to aggressive discectomy (removal of disc material from within the disc space in addition to the herniated material) as it was associated with shorter operative time, more rapid return to work, and a reduced incidence of long-term low back pain.<sup>15</sup> However, conservative discectomy was associated with a higher incidence of recurrent disc herniation. Interbody fusion in discopathy using metal implants is a logical solution to prevent secondary stenosis of the vertebral canal and intervertebral instability.<sup>16,17</sup> To treat severe disc degeneration at one level in the young patient, lumbar disc prosthesis is offered as an alternative to lumbar arthrodesis. It has been found in some studies to enable more rapid and superior functional results.<sup>18</sup> The dynamic neutralization system is a safe and efficient alternative to spinal arthrodesis in selected cases of degenerative lumbar spinal instability.<sup>19,20</sup> This flexible stabilization system utilizes pedicle screws connected by elastic rods to control motion in any plane. The system re-stabilizes unstable segments without involving the intervertebral discs and facet joints. The segments remain mobile within a controlled range permitting limited motion of the arthrodesed lumbar vertebrae.<sup>21</sup> Tubular discectomy is another procedure for discogenic sciatica. The major difference between tubular and conventional discectomy is that tubular discectomy utilizes a transmuscular approach rather than a subperiosteal dissection. In this method, a guidewire is inserted percutaneously to the inferior part of the lamina, and its location is confirmed using fluoroscopy. Then, dilators of increasing diameter are inserted sequentially over the guidewire. The tubular retractor is then inserted over the final dilator.<sup>22</sup> Recurrence rates following this technique are comparable to conventional open discectomy.<sup>23</sup> In addition, tubular and open discectomy are associated with similar levels of muscle injury.<sup>24</sup> Studies comparing the tubular system with conventional microdiscectomy did not show any statistically significant improvement in the Roland-Morris Disability Questionnaire score. Other studies have found that tubular discectomy did not result in improved outcomes and are associated with worse outcomes on some measures.<sup>25</sup> In addition,

tubular discectomy resulted in less favorable results in patients with self-reported leg pain, back pain, and recovery.<sup>22,26</sup>

*Percutaneous.* Neurosurgeons have developed minimally invasive spinal surgical techniques that have recently gained popularity.<sup>27</sup> As an alternative to laminectomy for the treatment of sciatica, percutaneous discectomy offers the benefit of faster patient recovery, shorter hospital stays, the option of local or regional anesthesia and a decreased risk of fibrosis or arachnoiditis. The Coblation Spine Wand is a percutaneous, minimally invasive interventional nucleoplasty technique for plasma disc decompression.<sup>28,29</sup> Nucleoplasty has been suggested as an effective therapy for chronic, discogenic back pain.<sup>30</sup> Coblation refers to the low frequency radio waves (100 kHz) used to carve channels into the disc by causing larger molecules to disintegrate into gases. This creates a hollow channel leaving the surrounding soft tissue intact.<sup>31</sup> The Coblation technique is used to decompress the disc adjacent to a herniation resulting in an indirect decompression of the surrounding nerve roots. There are no published clinical trials assessing the Coblation technique yet.<sup>32</sup> Percutaneous laser disc decompression (PLDD) should not be considered as an alternative to open surgery for lumbar discopathy. It is most often administered to patients who are not candidates for surgery. These patients often have chronic pain related to minor disc extrusions. The PLDD can be administered as a last attempt at minimally invasive treatment prior to surgical intervention.<sup>33</sup> Posterolateral transforaminal selective endoscopic discectomy and radiofrequency thermal annuloplasty are used to interrupt the annular defect pain sensitization process thought to be responsible for lumbar discogenic pain.<sup>13</sup> This microendoscopic discectomy technique is associated with lower post procedure levels of Interleukin-6, C-reactive protein, and creatine kinase relative to open discectomy suggesting less procedure related inflammation and muscle injury.<sup>34</sup> Thermal annular interventions have been developed to provide a minimally invasive treatment for discopathy. Multiple techniques utilized are intradiscal electrothermal therapy, radiofrequency annuloplasty, and intradiscal biacuplasty. However, these treatments continue to be controversial, coupled with a small number of evidence. Intradiscal electrothermal therapy offers relief in almost one-half of chronic discogenic low back pain patients. There is minimal evidence supporting the use of radiofrequency annuloplasty and intradiscal biacuplasty.<sup>35</sup> Anterior approaches to the lumbosacral spine are becoming common in spine surgery. For example, transabdominal percutaneous lumbar discectomy has been shown to be a safe and effective procedure for the removal of disc herniations at the L5-S1 level when total bowel

preparation is performed.<sup>36</sup> Laparoscopy, originally developed and commonly used by general surgeons, is now being utilized by spine surgeons to assist with discectomy and anterior fixation application.<sup>37</sup>

**Comparison of treatment results (How does surgery compare to nonoperative management?).** Routine conservative modalities often fail to sufficiently relieve the pain caused by lumbar radiculopathy.<sup>7,13</sup> Bed rest, systemic glucocorticoid therapy, spinal manipulation, bracing, spinal traction, and physical therapy have no proven effects on the outcome of sciatica.<sup>7</sup> Surgical options vary greatly in surgical invasiveness as well as outcome.<sup>13</sup> The randomized controlled trial by Arts and colleagues<sup>25</sup> compared 2 methods of treatment for sciatica (tubular and conventional microdiscectomy). Conventional microdiscectomy showed significantly improved primary functional outcomes (measured by the Ronald-Morris Disability Questionnaire [RDQI]) at one year. In addition, secondary outcome measures (visual analog scale for leg and back pain) were improved. Although the authors could not determine the reasons for these results, they noted that the participating neurosurgeons had broad experience in both techniques. Most neurosurgeons likely had more experience with

conventional microdiscectomy due to its long history of use in the management of symptomatic disk herniation. McLoughlin and Fourney<sup>38</sup> analyzed the learning curve of minimally invasive lumbar microdiscectomy and found that increasing the number of operations was associated with a decrease in the operation time to 60 minutes or less. However, in the study by Arts et al,<sup>25</sup> some of the surgical times for the minimally invasive approach were longer than 60 minutes (mean operation time [SD], 47 [22 minutes]). For a less experienced surgeon, soft tissue manipulation, and damage, blood loss, dural tear, and the potential for reherniation or incomplete discectomy are likely greater. Another confounding variable may be related to the level of disc pathology as the L5-S1 interspace was more frequently operated on using open techniques (67% versus 57% [ $p < 0.05$ ]).<sup>39</sup> The L5-S1 interspace is larger and more accessible and therefore technically easier to decompress than the L4-L5 level.<sup>40</sup> Nevertheless, operative results may be related to the patient's psychological profile and their active participation in treatment. Jacobs et al<sup>41</sup> analyzed the value of the previous studies comparing the invasive versus non-invasive treatment (Table 1).<sup>3,41-45</sup> Surgery is clearly effective, shortening the time to recovery

**Table 1** - A summary of conventional approaches and minimally invasive techniques with, where possible, their results.

Surgical approaches	Subtypes	Author	Definition	Short and long term results
Conventional approaches	Surgery versus conservative care	Peul et al, 2008 <sup>3</sup>	Subperiosteal dissection in surgery	Better pain relief at 3 months for early surgery. No difference in disability. Faster time to recovery for early surgery. No differences at one and 2 years for recovery
	Surgery versus conservative care	Weinstein et al, 2006 <sup>45</sup>	Subperiosteal dissection in surgery	No differences at 2 years on any outcome parameters
	Surgery versus conservative care	Osterman et al, 2006 <sup>43</sup>	Subperiosteal dissection in surgery	More rapid relief of leg pain at 6 weeks. No differences at 2 years, leg pain, back pain, and disability
	Surgery versus conservative care	Buttermann et al, 2004 <sup>42</sup>	Epidural steroid injection versus microdiscectomy	Greater decrease in leg pain at 3 and 6 months for microdiscectomy. No differences at one, 2 and 3 years for leg pain
	Tubular discectomy	Arts et al, 2009 <sup>22</sup>	Transmuscular approach	Similar or worse outcome comparable to conventional open discectomy
Minimally invasive techniques	Coblation Spine Wand (Nucleoplasty)	Al-Zain et al, 2008 <sup>30</sup>	Low frequency radio waves (100 kHz) used to carve channels into the disc by causing larger molecules to disintegrate into gases	Effective therapy. Percutaneous approaches maybe decrease the risks of fibrosis and reduce postoperative wound infections
	Laser disc decompression	Sobieraj et al, 2004 <sup>33</sup>	Percutaneous laser	Is not an alternative to open surgery, suitable for minor disc extrusions
	Selective endoscopic discectomy	Chao et al, 2007 <sup>34</sup>	Endoscopic surgery	May be safer with lesser complication rates than conventional surgery and less procedure related inflammation and muscle injury
	Intradiscal electrothermal therapy	Helm et al, 2009 <sup>35</sup>	Intradiscally applied heat has been used to treat discogenic pain	Relief in almost one-half of chronic discogenic low back pain patients

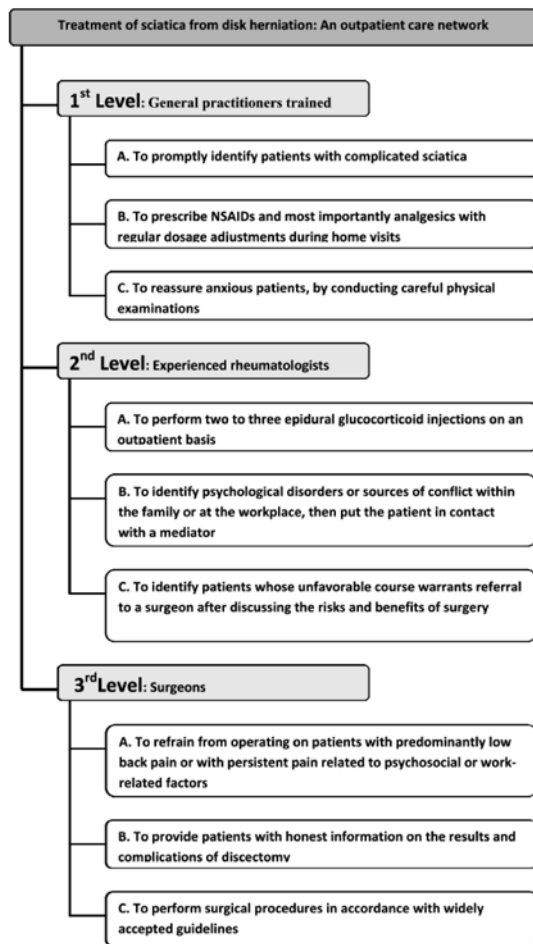
by around 50% compared to nonsurgical treatment.<sup>7,46</sup> Patients who receive surgery early achieve faster relief of symptoms compared to patients who undergo a prolonged course of conservative management.<sup>47</sup> Clinical results were similar between groups at one year and these did not change during the second year.<sup>6</sup> In an observational cohort of 743 patients, those receiving surgery showed significantly improved pain and function relative to those treated with conservative measures over 4 years of follow-up.<sup>48</sup> A Cochrane review reported that surgical discectomy for patients with sciatica due to lumbar disc prolapse gives more rapid relief from the acute attack than conservative treatment, although the long-term outcomes are still uncertain.<sup>49</sup> Since the treatment effects of early surgery are gone after 6 months, well informed patients should decide whether and when to have surgery.<sup>3</sup> Plasma disc decompression compared to fluoroscopy-guided transforaminal epidural steroid injections resulted in decreased pain, better quality of life and a reduced probability of a secondary procedure at 2 years of follow-up.<sup>28</sup> When considering the surgical alternatives and their associated risks, costs, and outcomes, lumbar epidural steroid injections are a reasonable nonsurgical option in carefully selected patients.<sup>49</sup> Gibson et al<sup>50</sup> reported better results with disc surgery than with chemonucleolysis in patients with severe sciatica of at least 4 weeks duration.

**Postoperative complications.** Overall, the rate of complications following discectomy is relatively low.<sup>7</sup> A study on 28,395 patients who underwent lumbar laminectomy for discogenic radiculopathy showed an incidence of 157 per 10,000 major complications. In addition to the complications described below, failure of pain relief in the early postoperative period may result from wrong level surgery or failure to sufficiently decompress the nerve root. Approximately 90% of surgical treatment failures can be attributed to poor patient selection, but no widely accepted consensus exists on the appropriate indications for surgery.<sup>51</sup> For the first time, Danon-Hersch et al<sup>51</sup> assessed the indications for low back surgery and demonstrated that the use of appropriate selection criteria can considerably improve patient outcomes. Delayed failures can be related to recurrent disc herniation or epidural fibrosis, which can be detected by MRI. Injuries to the bowel and cauda equine have been reported, and lesions to retroperitoneal blood vessels may lead to hemorrhagic shock after disc surgery.<sup>52</sup> Fetal irradiation is likely if percutaneous discectomy is performed in the pregnant mother. Seizure after percutaneous endoscopic lumbar discectomy has also been reported.<sup>53</sup>

**Fibrosis.** Fibrosis is the formation of extradural fibrotic tissue, which is primarily derived from surgically damaged annulus fibrosus or from the injured

surface of the erector spinae muscles. In the normal process of wound healing after lumbar spinal surgery, fibrotic tissue replaces normal epidural fat by fibroblast migration. In contrast to epidural fat, which allows the dura and nerve roots to move without compression or tethering, fibrotic tissue formed peridurally can bind the dura and nerve roots to surrounding structures and thereby cause compression or stretching of the nervous structures.<sup>54,55</sup> The incidence of peridural fibrosis has been found to be as high as 24% in patients with failed back surgery syndrome. Fibrosis has been associated with a poorer outcome in lumbar disc surgery, although its role in the generation of symptoms is not yet clear.<sup>56</sup> Differentiation between recurrent herniation and fibrosis is not possible with x-ray, myelography, or CT. However, CT following intravenous contrast infusion may demonstrate differentiation of recurrent disc herniation from extradural scarring. The fibrotic tissue can also be visualized by MRI.<sup>57</sup> The use of gadolinium contrast allows the differentiation of fibrosis and recurrent herniation. Fibrosis is actually associated with a higher rate of pain medication use than recurrent disc herniation. Percutaneous discectomy decreases the risks of fibrosis, but does not eliminate it.<sup>30</sup> Several synthetic and natural materials have been evaluated to prevent or reduce postoperative peridural scar formation in both animal and human studies. One is ADCON-L (a combination of marginally water-soluble artificial sugars), which is an implantable device and acts as a resorbable barrier to epidural fibrosis. It reduces the probability of fibrosis after lumbar laminotomy and discectomy without impacting the healing of the surrounding tissues. It also decreases the incidence of activity-related pain and improves the straight-leg-raise examination scores. Disc removal using microsurgical procedures eliminated postoperative hematoma and subsequent perineural fibrosis in dogs. A 1.9% solution of sodium hyaluronate can prevent fibrosis after unilateral lumbar laminotomy, annular fenestration, and nucleotomy in dogs.

**Infection rates.** The incidence of infection requiring intravenously administered antibiotics after discectomy has been reported as 30.7 per 10,000. Dural tear and infections are the most frequent perioperative complications.<sup>58</sup> During percutaneous lateral discectomy, the small incision made in the annulus may not allow adequate drainage in the presence of infection resulting in an increased likelihood of spread to the adjacent vertebral endplates. Minimally invasive spinal surgery techniques may reduce postoperative wound infections.<sup>59</sup> Nevertheless, disc space infections and adjacent vertebral osteomyelitis have been reported after percutaneous lateral discectomy. Also, a spondylodiscitis was reported after percutaneous discectomy. A case of



**Figure 1** - Schematic illustration of sciatica treatment.

chronic discitis and vertebral osteomyelitis caused by *Salmonella typhimurium* following laser decompression has been reported. Cho et al<sup>60</sup> reported a rare case of spondylodiscitis due to *Candida parapsilosis* in a 70-year-old woman who underwent a lumbar discectomy on L5-S1 2 months prior, and presented with persistent back and leg pain.

**Recurrence rates.** The rate of recurrence varies in the literature from 5-15% and depends on the size of the annular defect and morphology of the disc herniation.<sup>61,62</sup> The incidence of recurrent disc herniation is higher in younger patients,<sup>63</sup> and in non-obese patients with a relatively lower body mass index.<sup>23</sup> A review of the literature showed a higher rate of recurrent disc herniation after limited discectomy compared with aggressive discectomy,<sup>64</sup> and Kim et al<sup>63</sup> reported a higher recurrence rate for protruded discs compared to extrusions or sequestrations. Microendoscopic discectomy may be a safer and more effective approach than conventional open microdiscectomy for the treatment of recurrent lumbar disc herniation.<sup>65</sup> Complication rates may also be lower with endoscopic methods, though this remains to be proven.<sup>66</sup>

**Failed-back surgery syndrome.** Failed back surgery syndrome is a well-known and feared outcome of spine surgery. Its etiology is likely multifactorial and is thus poorly understood.<sup>67</sup> It is defined as unsatisfactory long-term relief of symptoms following spine surgery. It is more common in patients who have undergone multiple surgeries, in those who have undergone one or more lumbar operations for disc herniation, and in patients with complex decompression and/or stabilization surgery.<sup>68</sup> This syndrome can be related to several causes, including misdiagnosis, inappropriate surgical indications, poor surgical technique, intraoperative error, spondylodiscitis, fibrosis, and/or recurrent pathology.<sup>67,60</sup> It remains a significant challenge for spinal surgeons to treat.<sup>70</sup>

Conducting a meta-analysis is the best way to carry out research on the surgical treatment of discogenic sciatica. However, we presented a review on the therapeutic indications in the discogenic sciatica management. We also reported a list of the various techniques of surgical treatment, in conjunction with the selection criteria for each of them. We discussed the single issues, organizing these like questions. In fact, this article focuses on many issues that concern the problem of sciatica and its protocol of treatment.

In conclusion, a multidisciplinary approach with careful evaluation of physical, psychological, and environmental factors are ideal. Then, surgery may be offered to patients with one of the following findings: failure of conservative treatment for at least 6-8 weeks, persistent radicular pain and severe leg pain, and disability particularly combined with the inability to sit. For the management of low back pain, the use of patient-focused approaches combining best evidence and clinical expertise is suggested. This approach for sciatica can be presented as a schematic illustration shown in Figure 1. Surgical approaches focus on decompressing neural impingement. Nonsurgical interventions range from selective nerve root blocks for pain relief to multidisciplinary rehabilitation programs geared toward improving function. At 2-year follow-up in a randomized trial, Rasmussen et al<sup>71</sup> reported that epidural methylprednisolone improved recovery after discectomy for herniated disc disease without any apparent side effects.

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