

Return to Sports Activities after Lumbar Disc Herniation Surgery: A Review

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How to cite this paper: López, I.U.S., Hernández, E.E.G., Pradel, R.A., Murguía, J.A.B., Barrera, J.A.M., Anchondo, T.K.G. and Betancourt, E.R. (2025) Return to Sports Activities after Lumbar Disc Herniation Surgery: A Review. *Open Journal of Modern Neurosurgery*, **15**, 37-47.
<https://doi.org/10.4236/ojmn.2025.151005>

Received: November 5, 2024

Accepted: January 10, 2025

Published: January 13, 2025

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Abstract

Background: Lumbar disc herniation is a common injury among athletes, especially those who practice disciplines with repetitive flexion movements, twisting and axial loading on the spine, such as weightlifting, gymnastics, hockey and American football. In refractory cases to conservative treatment, microscopic discectomy or full endoscopic discectomy are used as surgical options to relieve pain and restore patient functionality. However, the ideal time for a return to sports activities remains a matter of debate due to variations in recovery times and risks of complications associated with each technique. **Methods:** A review was conducted, including articles published in the last 33 years (1991-2024), as it was the earliest date matching our search criteria. Clinical studies, systematic reviews, meta-analyses, and clinical guidelines were included. **Results:** The most common complications when returning to sport prematurely include recurrence of the hernia, persistent pain (VAS leg 7 or higher after surgery) and reduced physical performance. The return to full activity rate of patients who underwent microdiscectomy reaches up to 90%, while the endoscopic technique shows a success rate that reaches 99%. Return to play meantime was 5.19 months (range 1.00 - 8.7 months) and mean time of 4.6 months (range 2 - 8 months) with Microdiscectomy and full endoscopic discectomy respectively. **Conclusions:** There is no unanimous consensus on the exact timing of return to sport due to variability in recovery times and clinical outcomes. In both techniques, evidence highlights the need for a multidisciplinary approach that integrates surgeons, physical therapists and trainers to optimize recovery and ensure a safe return.

Keywords

Lumbar Disc Herniation, Microdiscectomy, Lumbar Endoscopy, Return to

1. Introduction

Lumbar disc herniations represent one of the most common causes of lower back pain and radiculopathy in the active population, especially in particularly demanding individuals such as athletes. This condition occurs when a portion of the *nucleus pulposus* of the intervertebral disc protrudes, compressing the nerve roots and generating symptoms such as pain, weakness and numbness in the lower extremities [1]. In refractory cases to conservative treatment (rehabilitation, postural advice, specific training, epidural injection, among others), surgical options such as microdiscectomy and lumbar endoscopy have been established as effective procedures to relieve symptoms and restore the patient's functionality. However, the recovery process and the ideal time to return to sports activity remain the subject of debate in the current scientific literature [2].

The incidence of disc herniation in athletes is significant, particularly in disciplines that involve repetitive flexion and rotation movements or intense loads, such as weightlifting, rugby, gymnastics and American football. Lumbar disc herniation is a frequent cause of lower back pain in athletes, and these cases can require surgical management due to persistent pain and functional limitation. However, the decision to return to physical activity after surgery carries risks, including recurrence of the hernia, chronic pain and possible reduction in physical performance [2].

Microdiscectomy has been considered the gold standard treatment for this pathology, due to its results in pain reduction and improving mobility in the short term. More recently, the endoscopic technique has gained popularity due to its less invasive approach, associated with a shorter recovery time and reduced post-operative complications. However, evidence on the ideal time of returning to physical activity and the drop-off rates between both techniques is still limited and requires constant updating.

Early return to sports may increase the risk of complications, but prolonged inactivity could also negatively affect the athlete's performance. For this reason, current guidelines attempt to balance optimal tissue recovery with the need to maintain the patient's athletic condition [2].

This review aims to analyze the most recent recommendations and evidence on the appropriate return to sports after lumbar disc herniation surgery, comparing the two predominant surgical techniques: microdiscectomy and endoscopy. In addition, statistics on the prevalence of this injury in the sports field will be presented and the risks and complications associated with returning to physical activity will be assessed.

2. Methodology

A systematic review of the literature was conducted to assess the return to sport

activities after a lumbar disc herniation procedure. We consulted the following sources: Databases: PubMed, Cochrane Library, Spine, Journal of Neurosurgery: Spine, American Journal of Sports Medicine. We selected the following Keywords and MeSH terms: Microdiscectomy, Endoscopy, Lumbar disc herniation, Sports-related injury, Return to sport, Return to play, Postoperative recovery, Complications, Athletic performance, Spine surgery outcomes. The following combinations: “Lumbar disc herniation AND return to sport” “Microdiscectomy AND athletes”, “Endoscopic lumbar surgery AND recovery”, “Complications AND lumbar disc hernia surgery”. The main focus of our research is athletes or physically active individuals. We ensured updating by including articles published in the last 5 years (2019-2024) but we also include other earlier relevant studies published since 1991 as well as clinical studies, systematic reviews, meta-analyses and clinical guidelines in English. We believe that this update had to be made in order to establish more precise results, considering the increasing number of endoscopic procedures in the last 5 years. For the purpose of this study, we did not include studies in pediatric or geriatric populations not related to sport and spine surgeries not related to lumbar hernias. We also excluded patients reporting pain associated with any other source of back or leg pain such as deformity, any facet joint disease, congenital or systemic diseases such as scoliosis or any other bone pathology, patients who underwent lumbar interbody fusion or any other procedure besides lumbar disc removal. Our team believes that the exclusion of these categories had to be made since our main focus is the comparison between these two procedures in physically active individuals who developed lumbar disc herniation as a consequence of practicing a sport.

3. Results

3.1. Sports with High Prevalence of Lower Back Hernias

American football is known for its intense physical contact and strength demands that can lead to lower back injuries, including herniated discs. In soccer, players face a high risk of developing lower back problems due to the nature of the sport, which includes quick turns and changes of direction. In basketball, frequent jumping and lateral movements can cause stress on the lower back, increasing the likelihood of hernias [2].

Gymnastics, especially in disciplines that require extreme extensions and flexions, is associated with an increase in lower back injuries, including hernias. Ice hockey involves frequent collisions and sudden movements, which can result in lower back injuries.

The technique and physical effort involved in weightlifting can put considerable stress on the spine, increasing the risk of lower back hernias. Some disciplines, especially those that require fast jumping or running, are linked to lower back injuries.

Lack of proper technique in sports such as weightlifting can increase the risk of injury, athletes with weak core muscles are more likely to suffer lower back

injuries, just like an abrupt increase in training load without proper preparation can lead to overloads and injuries [3]-[6].

3.2. Incidence Statistics

It is estimated that between 20% and 30% of the general population may have a lumbar hernia, although this percentage may be higher in athletes due to the nature of their physical activity [7].

Sports that involve repetitive movements, or sudden twisting, such as tennis, soccer, golf and weightlifting, are particularly likely to cause herniated discs. In these sports, hernias usually occur at the L4-L5 and L5-S1 levels of the lumbar spine, which are the most mobile and vulnerable areas.

One specific study analyzed 25 athletes with low back pain and a herniated disc compared to a pain-free control group. The results showed that athletes with a herniated disc performed worse on tests of flexibility, balance and strength, indicating a significant impact on their physical performance [8].

A broader analysis shows that lumbar injuries can represent up to 23.5% of all injuries in certain sports groups, making them one of the most common injuries [9].

3.3. Sports Prone to Lumbar Hernia

Lumbar disc herniation is one of the most common causes of back pain in athletes. A study reported that of 31 Olympic athletes examined with magnetic resonance imaging (MRI) who presented with lower back pain, 58% of athletes were found to have an element of disc displacement. Sports that require repetitive movements of flexion, twisting and loading on the spine present a higher risk of injury [9] (**Table 1**). A high incidence has been documented in:

- Weightlifting: Constant overload increases intradiscal pressure
- Gymnastics: Repetitive lumbar flexion, extension and rotation predispose to disc degeneration.
- American football and rugby: Frequent collisions and sudden changes of direction affect lumbar stability.
- Golf and tennis: Rapid and unilateral twisting of the spine increases the risk of hernia.

These sports also present a high risk of falling if they are resumed without complete rehabilitation, given the intense load to which the spine is subjected during their practice [10].

A cross-sectional study surveyed 32 professional Japanese baseball players in order to find the specific causes of lumbar back pain among the players. The most frequent causes among the players in their 20s ($n = 21$) were lumbar disc herniation (57%) and spondylosis (24%). 50% of players with spondylosis had adult onset. Players in their 30s ($n = 11$) most commonly presented discogenic pain (55%) as well as lumbar disc herniation and facet joint arthritis (each 18%). Incidence of lumbar intervertebral disc degeneration was significantly higher in

players in their 30s (91%) than those in their 20s (14%), as was the incidence of Schmorl nodes and Modic type 1 changes [19].

Table 1. Lumbar spine injuries in sports and treatment outcomes.

Sport	Epidemiology	Prognosis
American football	Up to 30.9% of injuries are lumbar spine related. 28% of lumbar injuries are disc herniations. Avulsions and spondylosis, and are also prevalent. [10]	Surgical repair of disc herniation may have return to play advantages. The outcomes with microdiscectomy and non-surgical treatments are almost similar. [10]
Basketball	10.2% of all injuries involve the lumbar spine. These include, lumbar disc degeneration and lumbar contusions. 7.9%, and 0.9% respectively. [10]	Surgery for disc herniation resulted in a decreased performance during the first season post-injury. Pre-injury skill returned during the second and third season post-surgery. [10]
Soccer	In professional soccer, 4% to 6% of lumbar and thoracic injuries have been reported in European leagues and up to 9% in international tournaments. [11]	Lumbar microdiscectomy offers only short-term benefits compared with nonoperative patients. This explains why in the absence of a progressive neurologic deficit or intractable pain, surgery is recommended after exhaustive treatment. [11]
Ice hockey	The lumbar spine is the most common site of injury. 40% of these were in men and 28.3% in women. The most common being pain/contusion/spasm while only 2% corresponded to lumbar disc herniation. [12]	Surgical repair of disc herniations was associated with decreased return to play rates. Return to baseline level of performance during 2nd-3rd season post-injury. [13]
Dance	Disc herniations correspond to 1.8% of total injuries especially in pediatric groups. Lumbar spine injuries as a whole, correspond to 11.7% of total injuries. [14]	46% of injured dancers had to limit up to half of the activity. 5% of injured dancers needed to limit more than half of their activity. [15]
Gymnastics	Evidence of disc degeneration is as prevalent as 75% in elite athletes. [16]	These injuries are well managed non-surgically. [17]
Weightlifting	Lumbar spine is one of the most common complaints with incidence rates of 40.8%. Muscle strains and intervertebral disc bulge or herniation being the most common ones. [18]	Surgeons recommend avoiding, often permanently weightlifting (35.7%) of the time. The return to high levels of activity is considered a major risk factor for disc herniation recurrence by 25.8% of surgeons. [18]
Baseball	89.5% of players report lower back pain during their career. 35.1% and 22.8% of players showed signs of L5/S1 or L4/L5 disc degeneration respectively. [19]	Hitters and infielders had faster return to play time with nonsurgical interventions whereas there was no difference for pitchers. [19]

3.4. Common Complications after Surgery in Athletes

The original injury may not have fully healed or the return to physical activity may be premature, which can lead to a relapse or new injuries in the same affected area. Infections at the surgical site are a significant concern, especially if the athlete does not follow proper postoperative care guidelines, such as lack of movement during recovery, which can result in joint stiffness, limit mobility, and affect performance [20].

Inactivity during the recovery process can cause muscle atrophy, which affects the strength and endurance needed for sports. Internal scarring can limit the range of motion and cause pain, which can affect long-term sports performance. In some cases, intense exercise after surgery can trigger cardiovascular problems, especially if the athlete has pre-existing conditions, and a premature return to sports can increase the risk of secondary injuries due to compensations in technique or muscle weakness [20].

3.5. Complications of Early Return to Sport

One of the main challenges when defining the appropriate time to return to sports activity is to avoid postoperative complications. Among the most frequent complications are:

- Recurrence of the hernia: The literature shows recurrence rates that range between 5% and 15%, being more common in patients who return to intense activities prematurely.
- Epidural fibrosis: This is a possible consequence of microdiscectomy, which can generate chronic pain and limit mobility.
- Residual or chronic pain (VAS leg 7 or higher after surgery): It may be due to persistent damage to the nerve roots or an unresolved inflammatory process.
- Reduced physical performance: Prolonged interruption of physical activity can negatively affect athletic condition, which can generate frustration and anxiety in athletes.

Evidence also suggests that excessively prolonged inactivity can have a negative impact on the athlete's overall recovery, affecting their performance and increasing the risk of new injuries due to physical deconditioning [21] [22].

3.6. Rehabilitation and Progression towards Physical Activity

In both microdiscectomy and endoscopy, the return to sport is not a linear process but involves progressive phases. Early rehabilitation includes mobility exercises and strengthening of the core muscles, while the intermediate phase focuses on improving proprioception and lumbar stability. Finally, the advanced phase incorporates exercises specific to the sport practiced always under medical and physiotherapeutic supervision.

Recent recommendations emphasize the individualization of return to sport protocols, considering factors such as the type of surgery, clinical evolution, and the demands of the sport practiced. In general, athletes who follow a structured

rehabilitation protocol have lower rates of falls and complications compared to those who return without adequate preparation [22] [23].

3.7. Postoperative Recommendations and Success Rates between Both Surgical Techniques

3.7.1. Microdiscectomy

A retrospective review of microscopic lumbar discectomy results for 60 cases in professional and Olympic athletes indicated that the average time from surgery to return to play was 5.2 months with a range of 1 to 15 months with an 88% return to full activity (53 of 60 cases) and that when applying this technique an initial period of rest is recommended, followed by early mobilization to avoid stiffness. Generally, it is suggested to avoid intense physical activities for at least 4 to 6 weeks. Physiotherapy is started early to improve strength and flexibility, which helps in functional recovery. Analgesics and anti-inflammatories are prescribed to manage postoperative pain [24].

The reported success rate is high, reaching up to 91.4% in comparative studies. This procedure is effective in relieving pain and improving physical function in a short postoperative period [25].

A systematic review and meta-analysis found that 663 out of 799 (83%) elite athletes diagnosed with lumbar disc herniation that underwent lumbar discectomy returned to play within a mean time of 5.19 months (range 1.00 - 8.7 months) but with no statically significant difference against non-operative treatment (251 out of 208, 81.5%, odds ratio 1.39; $P = 0.46$) with a mean time of 4.11 months (range 3.60 - 5.70 months) [26].

3.7.2. Endoscopic Surgery

Endoscopic surgery is considered the least invasive spine surgery that's why some authors consider it the ideal surgical intervention regarding professional athletes. A case report reviewed 5 baseball players who underwent endoscopic lumbar surgery and all of them returned to the game within 3 months postoperatively [27].

One specific study analyzed 10 athletes who underwent full endoscopic discectomy, and the results showed that all players (100 %) could return to their original performance after a mean time of 4.6 months (range 2 - 8 months) with no peri-operative complications.

Patients typically experience a quicker recovery, with less postoperative pain and a reduction in the use of pain medications [28].

4. Discussion

Sports that require repetitive movements of flexion, twisting and loading on the spine present a higher risk of injury [9]. These sports also present a high risk of falling if they are resumed without complete rehabilitation, given the intense load to which the spine is subjected during their practice [10].

The most recent studies show that microdiscectomy, considered the gold standard for several decades, allows for effective pain relief and improved functionality in patients in relatively short periods of time. However, it involves a more invasive

intervention which translates into longer recovery times and longer postoperative restrictions. A period of 3 to 6 months is generally recommended before resuming sports activities with progressive and controlled incorporation depending on the type of sport, and some studies show no statistically significant difference against non-operative treatment [24].

There are no prospective studies on the examination of connective tissue discectomy with typical micro lumbar discectomy or minimally invasive procedures and these precise limitations make analyses challenging in the area. Spine surgery encompasses inherent risks, including wound complications, infections, potential paralysis, or rarely even blindness from ocular pressure in the prone position. Therefore, if these risks can be avoided with nonoperative management while achieving similar return to play outcomes, then this should be a strong consideration for athletes deciding on their treatment plan [25] [26].

On the other hand, lumbar endoscopy has gained popularity thanks to its minimally invasive nature, which translates into shorter hospital stays, less postoperative pain and a faster recovery compared to translaminar microsurgical techniques. However, most of these studies did not talk about professional athletes, and the peer-reviewed literature is sparse on this subject. Some studies suggest that patients treated with this technique can resume light sports in 6 to 8 weeks and return to more demanding competitions in 12 to 16 weeks, but most of these are only case reports with significantly less population than the microdiscectomy studies [27] [28].

5. Conclusions

Despite the advantages of microdiscectomy and endoscopy, there is no unanimous consensus on the exact timing of return to sport due to variability in recovery times and clinical outcomes. However, the general trend shows that patients undergoing endoscopy may benefit from an earlier return, while those with microdiscectomy may require more time to minimize the risk of complications. Although the endoscopic technique is still in development, there is no information as extensive or accurate as the micro-depression technique. The complexity of the surgical approach should be based on patient characteristics, injury selection and the demands of the sport being played.

Current data highlight the importance of a multidisciplinary approach to safe return to sport, involving surgeons, physical therapists and athletic trainers in designing a comprehensive recovery plan. In addition, patient education about risks and realistic expectations regarding postoperative performance is crucial to prevent relapses and achieve successful recovery. Although both microdiscectomy and endoscopy are valid options, the choice of technique and the planning of return to sport must be personalized, considering the patient's evolution and the specific demands of their sporting discipline.

Conflicts of Interest

The authors have no conflict of interest.

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