

## [ Orthopaedic Surgery ]

## Return to Golf After Lumbar Fusion

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**Background:** Spinal fusion surgery is being increasingly performed, yet few studies have focused on return to recreational sports after lumbar fusion and none have specifically analyzed return to golf.

**Hypothesis:** Most golfers successfully return to sport after lumbar fusion surgery.

**Study Design:** Case series.

**Level of Evidence:** Level 4.

**Methods:** All patients who underwent 1- or 2-level primary lumbar fusion surgery for degenerative pathologies performed by a single surgeon between January 2008 and October 2012 and had at least 1-year follow-up were included. Patients completed a specifically designed golf survey. Surveys were mailed, given during follow-up clinic, or answered during telephone contact.

**Results:** A total of 353 patients met the inclusion and exclusion criteria, with 200 responses (57%) to the questionnaire producing 34 golfers. The average age of golfers was 57 years (range, 32-79 years). In 79% of golfers, preoperative back and/or leg pain significantly affected their ability to play golf. Within 1 year from surgery, 65% of patients returned to practice and 52% returned to course play. Only 29% of patients stated that continued back/leg pain limited their play. Twenty-five patients (77%) were able to play the same amount of golf or more than before fusion surgery. Of those providing handicaps, 12 (80%) reported the same or an improved handicap.

**Conclusion:** More than 50% of golfers return to on-course play within 1 year of lumbar fusion surgery. The majority of golfers can return to preoperative levels in terms of performance (handicap) and frequency of play.

**Clinical Relevance:** This investigation offers insight into when golfers return to sport after lumbar fusion surgery and provides surgeons with information to set realistic expectations postoperatively.

**Keywords:** lumbar spine; aging athlete; golf; handicap; return to play

Golf remains a popular recreational activity with nearly 25 million Americans participating.<sup>17,31</sup> To date, no definitive link between golfing and accelerated deterioration of the spine has been established. However, extreme biomechanical forces on the spine have been long associated with the modern golf swing.<sup>6-8,15,35</sup> The flexing, twisting, and extension of the lower back place the spine through a wide range of motion and may result in spinal symptoms.<sup>7</sup> As a result, mechanical strategies have been proposed to prevent low back pain in golfers with varying success.

Back pain is a relatively common entity in amateur golfers.<sup>16,20-22,24,25,28,32,33</sup> Hosea and Gatt<sup>16</sup> demonstrated that the

golf swing can produce loads on the lumbar spine of up to 8 times the body weight. Moreover, amateurs experience even greater forces in the lumbar spine than professional golfers, which is likely related to poor swing mechanics.<sup>25</sup> The increasing frequency of play and practice by golfers may then accentuate the mechanical stresses experienced by the spine. These abnormal forces lead to pain emanating from muscular strain, herniated discs, and spondylosis.<sup>16</sup> Ultimately, a subset of golfers who become symptomatic and have clinically significant degenerative changes in their spine may require surgical intervention.

Spinal fusion surgery can have good clinical outcomes in appropriately selected patients.<sup>5,11,13,26,34</sup> Increasing numbers of

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patients with active lifestyles undergo spinal surgery with the goal of returning to a normal lifestyle and resumption of recreational activities. With the large numbers of patients with symptomatic lumbar disorders, clinicians frequently encounter golfers who are candidates for lumbar fusion. Spinal fusion alters spinal range of motion and kinematics, which may ultimately affect the golf swing.<sup>19</sup> The clinical implications of this are not well understood, however. To date, there are no available clinical or biomechanical studies investigating load or torque to failure of instrumentation during the golf swing after lumbar fusion. Most surgeons remain guarded about return to play, with concern for excessive motion and strain on the lumbar spine.

A large group of spine surgeons were surveyed to determine when golfers could return to play after several different types of spine surgery.<sup>1</sup> Most surgeons indicated they would allow patients to return to golf at 6 months after lumbar fusion; however, shorter times were recommended for competitive golfers.

The aim of this investigation was to determine if golfers return to play after lumbar spinal fusion. Specifically, the time until return to play, as well as the effect on quality and quantity of play once the player returns, were assessed.

## METHODS

The institutional review board of Rush University approved this study. A study population was identified by electronic medical record. A comprehensive list of patients who underwent 1- or 2-level lumbar spinal fusion surgery at a large academic institution by a single surgeon from January 2008 to October 2012 was obtained. All patients had the diagnosis of degenerative lumbar spine pathology (eg, spinal stenosis, spondylolisthesis, degenerative disc disease). Patients with nondegenerative conditions were excluded (eg, tumor, infection, trauma). Lumbar fusion was performed by 1 of 3 surgical approaches: open, anterior, or minimally invasive transforaminal lumbar interbody fusion. The following inclusion criteria were then applied: age  $\geq 18$  years, 1- or 2-level primary lumbar fusion surgery, and at least 1 year of postoperative follow-up. Patients were excluded if they filed a worker's compensation claim. Patients were advised that they could begin golf practice with gentle swinging of clubs at 4 months postoperatively if symptoms allowed, and absent reproduction of spinal symptoms, could return to course play at 6 months.

The study population was administered unvalidated surveys that were mailed and returned, filled out in follow-up clinic visits, or completed over the telephone, based on patient's availability. The study population was administered a specifically designed golf survey (Appendix A, available online at <http://journals.sagepub.com/doi/suppl/10.1177/1941738116680200>). This survey aimed to assess aspects of their golf game before and after lumbar fusion. All data management and statistics were conducted with Microsoft Excel: Mac 2011 (Microsoft Corp).

Table 1. Baseline characteristics

Age, y, mean $\pm$ SD	57.0 $\pm$ 14.0
Sex, % (n)	
Female	73.5 (25)
Male	26.5 (9)
Golfing ability, % (n)	
Recreational	91.2 (31)
Competitive experience	8.8 (3)
High school	5.9 (2)
College	3.1 (1)
Preoperative handicap, % (n)	
0-9	11.7 (4)
10-20	38.2 (11)
>20	29.4 (10)
No handicap	23.5 (8)
Preoperative frequency of play, % (n)	
<5 times a season	50.0 (17)
~Once per month	8.8 (3)
2-4 times per month	23.5 (8)
>4 times per month	17.6 (6)
Golf play affected by spinal pain? % (n)	
Yes	79.4 (27)
No	20.6 (7)
Decision for surgery influenced by golf? % (n)	
Yes	47.1 (16)
No	52.9 (18)
Surgical procedure, % (n)	
Open posterior fusion	50.0 (17)
Anterior lumbar fusion	35.3 (12)
MIS TLIF	14.7 (5)
Postoperative physiotherapy, % (n)	
Yes	94.1 (31)
No	5.9 (2)
Unreported	3.0 (1)
Reoperations, % (n)	0.0 (0)

MIS TLIF, minimally invasive surgery transforaminal lumbar interbody fusion.

Table 2. Return to sport

Return to Practice, % (mo)	Return to Play, % (mo)
6.5 (0-3)	6.5 (0-3)
3.2 (3-6)	0 (3-6)
54.8 (6-12)	45.2 (6-12)
35.5 (>12)	48.4 (>12)

## RESULTS

### Demographics and Postoperative Results

Of the 353 subjects identified who met study inclusion criteria, 200 (56.7%) responded to the questionnaires. Of these, 34 patients were golfers and included in the study. Detailed demographic information can be found in Table 1. Postoperative results can be found in Tables 2 and 3.

### Subgroup Analysis

In order to further elucidate the effects of spinal surgery on return to golf, the patients were stratified into subgroups defined by surgical approach: open, minimally invasive, and anterior (Table 4). The frequency of play postoperatively was compared with the preoperative frequency within each subgroup. In the open subgroup (n = 17), 13 patients (76.5%) played the same amount or more often, and 4 patients (23.5%) played less often. The minimally invasive subgroup (n = 5) showed that 3 patients (60%) played the same amount or more often, and 2 patients (40%) played less often. The anterior subgroup (n = 12) demonstrated that 10 patients (83.3%) played the same amount or more often, and 2 patients (16.7%) played less often. Additionally, the changes in player handicaps were also evaluated within each subgroup. Of the open subgroup (n = 8), 3 (37.5%) reported worse handicaps, whereas 5 (62.5%) had no change or improved their handicap. In the minimally invasive group (n = 3), all 3 patients reported the same or an improvement in their handicap. With regard to the anterior subgroup (n = 4), all patients had either the same or an improved handicap.

## DISCUSSION

With the influence of healthy lifestyles, preventive medicine, and better treatments, people are living longer and demanding high-activity levels of sport. Golf is a sport that is growing in interest and participants in the United States and worldwide.<sup>17,31</sup> Fusion surgery is also being performed more frequently in the United States.<sup>2,29</sup> The implications on not only the return to play after these procedures but also the ability to return to a prior level of function are issues that are poorly understood to date.

Despite the prevalence of low back pain in golfers, it can typically be managed nonsurgically.<sup>12,14,18,27</sup> Eighty percent of patients in this cohort were limited in their golfing frequency

Table 3. Return to play after 1 year

	% (n)
Amount of play (N = 34)	
<1 time/month	50.0 (17)
1 time/month	8.8 (3)
2-4 times/month	23.5 (8)
>4 times/month	17.6 (6)
Frequency of play (N = 33 <sup>a</sup> )	
Decreased	24.2 (8)
Same	60.6 (20)
Increased	15.2 (5)
Decreased play related to back or leg pain? (N = 8)	
Yes	50.0 (4)
No	50.0 (4)
Change in handicap (N = 15 <sup>b</sup> )	
Worsened	20.0 (3)
Improved	33.3 (5)
Same	46.7 (7)
Impact of surgery by playing characteristic (N = 22 <sup>c</sup> )	
Driving distance decreased	50.0 (11/22)
Consistency decreased	22.7 (5/22)
Accuracy decreased	9.0 (3/22)
Postoperative golf lessons or golf-specific rehabilitation? (N = 34)	
Yes	8.9 (3)
No	91.1 (31)

<sup>a</sup>One patient did not respond to this question.

<sup>b</sup>Nineteen patients did not have a registered preoperative golf handicap.

<sup>c</sup>Twelve patients did not respond to this question.

and ability because of their back symptoms preoperatively. Moreover, nearly 50% invoked this impairment as a reason in their decision to undergo spinal surgery. Although not specifically quantified in this study, a majority of patients electing to undergo surgery question the timing and ability of return to play before they make their final decision. These are challenging questions to answer because ability to return to the former level of play can be influenced by many variables, including pain, stiffness, exercise tolerance, loss of mobility, and psychological limitations.

Table 4. Return to play characteristics by surgical approach (%)

	Decreased	Same	Increased
Frequency			
Open (17)	23.5	58.8	17.7
MIS (5)	50.0	50.0	—
Anterior (12)	16.7	66.7	16.6
Handicap <sup>a</sup>			
Open (8)	37.5	25.0	37.5
MIS (3)	33.3	66.6	—
Anterior (4)	25.0	75.0	—

MIS, minimally invasive surgery.

<sup>a</sup>A decrease in handicap reflects an improvement in skill level. Nineteen patients did not have a registered preoperative handicap.

For sports other than golf, there is considerable literature for return to play after lumbar fusion surgery, which has guided many surgeons' judgment for how to address this question in golfers.<sup>1,9,10,23,28,30</sup> Following studies evaluating the surgical treatment of spondylolisthesis, many authors have used 6 to 12 months as a conservative timetable.<sup>28</sup> Other surgeons cite specific criteria that must be met after spondylolisthesis surgery, such as pain-free lumbar extension, performance of a 1-legged stork test, and having improved hamstring flexibility before patients may gradually resume playing.<sup>23</sup> More than 500 spine surgeons were surveyed for return-to-play criteria after all different types of spinal surgery (fusion and nonfusion) in a variety of hypothetical patient ages, skill sets, and sexes.<sup>1</sup> Six months was the most common time that patients were allowed to return to golf after a 1-level lumbar fusion. However, all surgeons tended to allow earlier return to sport in athletes.

In the current study, half of all patients had returned to on-course play by 1 year postoperatively. Moreover, the majority of golfers returned to at least their preoperative level in terms of performance (handicap) and frequency of play. Of those patients who had not returned to golf at 1 year, less than a third of patients indicated that their back or leg pain was the limiting factor in their returning to play. Specific details of why these patients did not return were not fully elucidated in this study and it is uncertain if they ultimately returned to play at a later date.

There are several limitations to this study. First, though it allowed for control for surgical technique and surgical preferences, examining one surgeon's patients has its inherent limitations, which may limit generalizability. The questionnaire used in this study was not validated and therefore may incompletely reflect the impact of surgery on these patients. Furthermore, surveys were performed retrospectively and are thus subject to recall bias. Moreover, the survey response rate

was only 56%, though this does compare favorably with published response rates of 30% to 60% in the literature.<sup>3,4</sup> However, if a significant number of nonresponders were golfers, this could have had a significant influence on the results and analysis. The sample size was also small, making it impossible to fully elucidate the differences between the types of lumbar fusions performed and their effect on outcome. A higher response rate may have made it possible to capture more golfers from the group of nonresponders; unfortunately, data are not available on the nonresponder group. Last, long-term data including hardware failure, pseudarthrosis, and reoperation rates were not available in this study.

In this cohort, patients were significantly disabled by their preoperative symptoms, but the majority were able to successfully return to golf within 1 year after fusion surgery.

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