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Original Article

CORRELATION BETWEEN LONG SEGMENT LUMBAR/LUMBOSACRAL FUSION WITH SACROILIAC JOINT DYSFUNCTION: A DOUBLE CENTERED LONG-TERM CLINICAL OUTCOME

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Abstract

After spinal fusion surgery, sacroiliac joint (SIJ) pain has lately attracted attention as a cause of low bac k pain. There are two risk factors for postoperative SIJ pain: lumbosacral fusion and long segment lumbar fusion. lumbosacral fusion has a very significant incidence of SIJ pain in multiple-segment lumbar fusion. Furthermore, the development of SIJ pain in such circumstances may be early. Patients who had multiple-segment lumbar fusion at Sohag and Fayoum Universities between November 2013 and January 2018 were included in the study. The overall number of eligible patients was 191, with 64 developing postoperative low back pain. Seventeen of them reported new-onset SIJ pain. Using Japanese Orthopedic Association (JOA) ratings, we evaluated postoperative SIJ pain development, duration from surgery to SIJ pain beginning, and postoperative treatment results in SIJ pain patients. The incidence of new-onset SIJ pain was correlated with the lumbar fusion group and the lumbosacral fusion group. SIJ pain was substantially more common with lumbosacral fusion group (28.6%) than with lumbar fusion group (4.7%). The lumbar fusion group had a mean time of onset of SIJ pain of 9.43±1.32 (3-16) months after surgery and the lumbosacral fusion group had a mean time of onset of 3.64±2.65 (2-11) months after surgery, demonstrating that incidence occurred substantially sooner in the lumbosacral fusion group. The mean JOA score in the lumbar fusion group increased considerably from 4.45 at the time of onset to 9.87 at the time of final follow-up; however, in the lumbosacral fusion group, it improved from 5.17 at the time of onset to 7.21 at the time of final follow-up, showing no significant improvement. In this study, we Correlate postoperative SIJ pain with two risk factors (long segment lumbar fusion (>2) levels and lumbosacral fusion).

Keyword: *Sacroiliac joint, Lumbar, Lumbosacral, Fusion, Back pain.*

1. Introduction

Lumbar spinal fusion has long been the preferred treatment for a variety of lumbar disorders, and it has been shown to have superior clinical results than conservative treatment. However, despite meticulous patient screening, past studies show that the failure rate of this treatment ranges from 5% to 30%. Low back pain (LBP) is a common complication after surgery or as a new onset illness that can be difficult to be treated. LBP following lumbar fusion can be caused by iliac graft harvesting, adjacent segment disease (ASD), or pseuda-rthrosis, [1-4]. Many studies have linked the sacroiliac joint as a cause of chronic low back and limb pain in 10% to 27% of cases [5,6]. The prevalence of sacroiliac dysfunction in a cohort with LBP following

lumbosacral fusion is unclear. Mechanical strain, iliac crest bone grafting, or a misdiagnosis of SIJ syndrome can all aggravate the underlying pathophysiology of SIJ syndrome. SIJ has a distinct anatomical feature that is not present in other diarthrodial joints. It has fibrocartilage, hyaline cartilage, and a posterior capsule discontinuity. Many ridges and depressions on the articular surfaces help to reduce movement and increase stability [7-9]. When compared to the male sacrum, the sacrum of the female pelvis is broader, more uneven, less curved, and more backward slanted. The joint is encircled by strong ligaments, and even little movements might cause discomfort. The SIJ biomechanics are put under a lot of strain during lumbar fusion surgery. The comparable phenomena of neighboring segment illness may accentuate this [10,11]. Reporters explored several approaches in the care of uncomfortable SIJ, including as non-surgical management, which includes drug theray, physiotherapy, pelvic belts, intra-articular injections techniques, radiofrequency, and prolotherapy. Despite neuroaugmentation has been recorded, it is a rare operation. Surgical alternatives comprise open arthrodesis, which can be accomplished posteriorly or anteriorly, and, more lately, minimally invasive surgeries, or percutaneous procedures of the SIJ [9]. Lumbar fusion and lumbosacral fusion are both risk factors for SIJ pain after surgery [2,12,13]. We looked into SIJ pain following multiple-segment (>2 levels) lumbar fusion, concentrating on the differential between non-fused and fused sacrum instances. We expected that when multiple-segment fusion and fusion to the sacrum were done at the same time, the incidence of SIJ discomfort would rise.

2. Patients and Methods

Between November 2013 and January 2018, we evaluated all patients who had multiple-segment lumbar fusion (>2) for the occurrence of discomfort originating from the SIJ joint in the neurosurgery departments of Sohag and Fayoum Universities. Indications, levels, fusion procedures, and postoperative sequale (improvement of symptoms and complications including infection, peudoarthrosis, hardware failure, and ASDs) were all evaluated. Patients who reported no preoperative clinical SIJ pain were eligible for enrolment in the current trial. All of the surgeries used posterior spinal instrumentation without iliac graft harvesting. When the L5/S intervertebral disc wedged laterally or stenosis of the foramens at L5/S was found, we performed sacral fusion. Patients with serious comorbidities, such as highly uncontrolled diabetes or severe osteoporosis, were excluded from this research. Patients having iliac crest grafts, those who have had more than one spinal procedure, those who are obese (body mass index greater than 40 percent), and those who have a systemic condition such as coagulopathy were also excluded from our study. All patients were evaluated clinically and radiologically. A complete medical history is taken, as well as a thorough physical examination that includes compression test, Patrick's test, and sacral sulcus tenderness [7]. Paients were diagnosed with SIJ pain according to Murakami et al. [6] criteria. Patients were followed up on for two years after surgery. In this study, we looked at the incidence of SIJ pain after multiple-segment lumbar fusion, the time between fusion surgery and the development of SIJ pain, and the treatment results of SIJ pain patients after fusion surgery. Following lumbar fusion, all SIJ pain patients were treated conservatively. In addition, nonsteroidal anti-inflammatory medications (NSAIDs), attachment of the pelvic belt, physiotherapy, and a therapeutic SIJ blocks were administered to all patients. The current study was carried out in accordance with the Helsinki Declaration

3. Results

There were 80 males (41.9% of the total) and 111 women (58.1 %). Lumbar fixation was performed on 128 patients (67%), whe-

reas lumbosacral fixation was performed on 63 patients (32.98 %). The average age was 65.0±5.53 (46-75) years in lumbar fixation group and 68.6±9.11 (46-77) in lumbosacral fixation group. Body mass index (BMI) ranges from 16.2 to 34.5 % in Lumbar fixation and 17.1 to 40.8 % in lumbosacral fixation based on weight in kilograms, height in meter, age, and gender, tab. (1) Preoperative symptoms were improved in all patients. Twenty-six patients (11.98 %) were missing in follow-up out of 217. Our study comprised 191 eligible patients who met our research requireements. SIJ pain occurred in 12.6 % of 191 patients after surgery and was detected in 24 (34.8 %, 24/69) of 69 patients with postoperative newly produced LBP. However, after dividing the patients into two groups, lumbar fusion (non-fused sacrum) and lumbosacral fusion (fused sacrum), the incidence of SIJ pain was 4.7% (6/128 patients) and 28.6% (18/63 patients) in the both groups respectively, tab. (2) & fig. (1). The lumbar fusion group had a mean time of onset of SIJ pain of 9.43±1.32 (3-16) months after surgery, while the lumbosacral fusion group had a mean time of onset of SIJ pain of 3.64±2.65 (2-11) months, indicating that the fixed fusion group had SIJ pain incidence significantly earlier than the lumbar fusion group, tab. (2). Changes in the JOA score were used to assess the therapy outcome. The lumbar fusion group's treatment outcomes showed that the mean score improved considerably from 4.45 at the start to 9.87 at the end of the study. Despite the fact that the mean score in the lumbosacral fusion group improved from 5.17 at the start to 7.21 at the end of the study, the difference was not statistically significant. In the lumbosacral fusion group, the rate of improvement was much lower, fig. (2).

Table (1) Demographics data of the studied group.

	lumbar fusion	**lumbosacral fusion**
Number	128	63
Age in years	65.0±5.53 (46-75)	68.6±9.11 (46-77)
Gender(male/female)	59/69	21/42
Body mass index (BMI)	16.2 to 34.5 %	17.1 to 40.8 %
Mean Follow-up period (months)	8-24(14.47±5.8)	10-24(16.22±5.36)

Table 2. Development of SIJ pain in both surgical groups.

		lumbar fusion	**lumbosacral fusion**
No.		128	63
SIJ pain	Incidence	6	18
	Incidence rate	4.7%	28.6%
	onset Duration	9.43±1.32 (3-16)	3.64±2.65 (2-11)

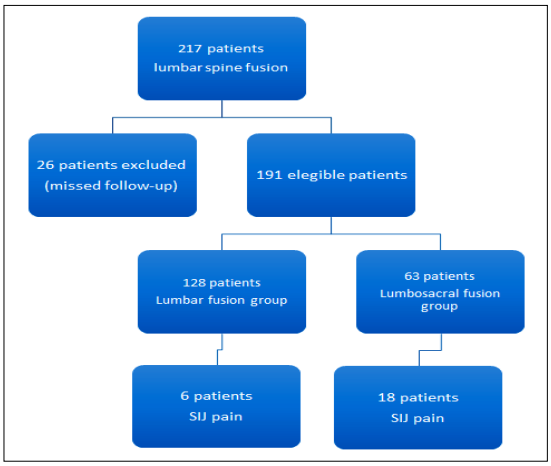

Figure (1) Patients flow chart

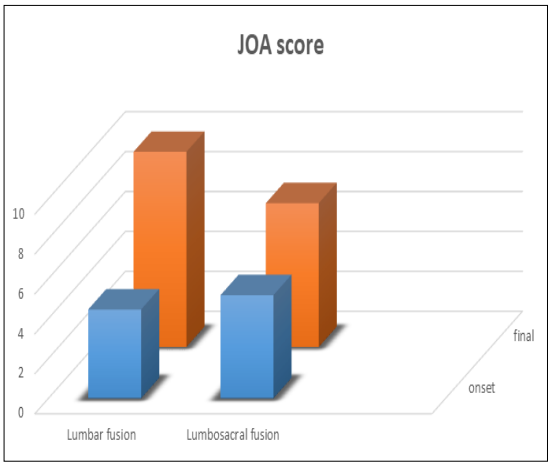

Figure (2) Changes in the JOA score in both surgical groups

4. Discussion

The reasons of LBP following surgical fusion of lumbar spine are well-known, such as pain at iliac bone donor site and ASD, although it is less obvious that many instances are caused by SIJ pain, and only a little is written about this [1, 3,14]. After surgical fusion of lumbar spine, SIJ pain has been documented to be the cause of LBP at a rate of 16.2 %-43.0 % [14,15]. The rate in this research was 28.9%, which is comparable with earlier investigations. In the literature, there is a significant disparity in the incidence of SIJ dysfunction after lumbar fusion procedures. Lee, et al. [4] found that only 12% of patients suffer postoperative SIJ dysfunction, but Unoki, et al. [16] found that 64% of patients experience postoperative SIJ dysfunction. This is consistent with our findings, which showed that SIJ dysfunction emerged in (12.6 % 24/191) of cases after surgery. Colò, et al. [17] analyzed the literature and found 13 papers that revealed a 37 ±28.5% incidence of postoperative SIJ dysfunction in 1498 patients who had lumbar fusion operations [4,15]. So even though our results support the notion that the SIJ plays a significant role in pain that persists after lumbar fusion, as demonstrated by Maigne, et al. [18], other structures including the iliolumbar ligament or the piriformis muscle cannot be ruled out as probable sources of pain since they are functionally associated [19], which is not clear in our study or in the majority of earlier reports. By a thorough examination and the absence of radiological evidence. SIJ is next to the fusion segment in the sacrum [10], which might result in LBP following lumbar spinal fusion. Ha, et al. [9] utilized computed tomography to look at the rate of SIJ degeneration after fusion of lumbar spine and found that the lumbosacral fusion group had a rate of 75 %, which was substantially greater than the lumbar fusion group (38.2%). Despite the fact that Maigne, et al. [18] observed no significant differences, they stated that SIJ pain was more common in patients who had lumbar fusion including the sacrum than in those who did not. The significance of the numbers of fusing segments is unknown. According to some experts, the more the number of vertebrae engaged, the higher the stress pressures on the neighboring segment, increasing the likelihood of joint degeneration. Other researchers, on the other hand, disagreed with these results. Ha, et al. [9] found no link between SIJ dysfunction and the numbers of fused lumbar vertebrae. Lee et al. reported that 40% of the cases that developed SIJ degeneration had only one segment involved in the fixation [4]. In different dynamic motions of the trunk, excessive studies declared the size and scope of angular motion of the sacrum and stresses range along SIJ after lumbosacral fusion were compared to an intact model, concluding that lumbar fusion ends with rises in angular motion and stresses along the SIJ articular surfaces [20,21]. Iatrogenic insult to the joint or any nearby nerves was thought to be a possible cause of SIJ pain following lumbosacral fusion, but it was ruled out through trials and procedures. SIJ pain can be caused by hardware in very uncommon circumstances. Iatrogenic SIJ syndrome caused by the rod and screw head of percutaneous pediclular fusion at the L5–S1 level, for example, was documented by Ahn and Lee [20]. Furthermore, the pointed tip of the rod and laterally positioned screw head may cause irritation to the iliac crest and endanger the SIJ, causing persistent SIJ discomfort. In our cases, this scenario was also ruled out. In this study, we examined the incidence of postoperative SIJ pain after lumbar fusion or lumbosacral fusion in patients with more than two segments fusion. We discovered that the rate was considerably greater in the lumbosacral fusion group, demonstrating that sacral fusion is a risk factor for SIJ pain incidence. A number of clinical publications on diagnostic injections of sacroiliac joint

pain following lumbar/lumbosacral fusion have been reported by Katz, et al. [3] on 34 patients, Maigne, et al, [18] on 61 patients, De Palma, et al, [1] on 28 patients, and Liliang, et al. [14] on 130 patients, but in our work, we did injection for both diagnostic and therapeutic purposes, However, no prior research has looked at the therapy of SIJ pain following lumbar fusion. In our study, we discovered that 57% of studied patients improved quickly after local injection. This was mostly owing to the local anaesthetic effect, and about 95 % of the patients experienced adequate improvement as a result of the steroid phase, as previously documented by other researchers [1,11]. Murakami, et al. [6] investigated periarticular SIJ block on conservatively treated patients and stated that the mean JOA score before treatment was 5.0, the mean JOA score after treatment was 11.7, and the rate of recovery was 96%. Despite there is a broad range in distinguishing the function of SIJ in syndrome of the failed back surgery, ranging from 4.7 % to 18 % in numerous datasets [3,22,23], we believe incidence is higher. In our study, 34.8 % (24/69) is higher than all prior reported results, indicating that greater research and attention should be paid to SIJ conduct.

5. Conclusion

Lumbar fixation surgery alters the lumbar spine's biomechanics, increasing the likelihood of SIJ dysfunction. Increased BMI, sacral fusion, and multilevel fixation are all potential risk factors. Conservative therapy is the initial line of defense and is successful in many situations. Sacroiliac joint injection with methylprednisolone and local anesthetics is an essential therapy option that provides great transient pain relief.

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