ORIGINAL ARTICLE

Assessment of the development of sacroiliitis after lumbarsurgeries

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Abstract

Background: ***One postoperative consequence that keeps patients from being satisfied following surgery is sacroiliac pain, which happens after lumbar surgeries.***

Aim and objectives: ***To better understand the incidence of sacroiliac joint dysfunction after lumbar surgeries.***

Patients and methods: ***Patients who had lumbar surgeries were the subjects of this prospective and retrospective investigation. Every case was operated on at the hospitals of Al-Azhar University.***

Results: ***As regard Type of Pain, it was Left SIJ radiating to buttocks in 15(41.7%) patients, Right SIJ radiating to buttocks in 8(22.2%) patients, Bilateral SIJs radiating to buttocks in 10(27.8%) patients, Bilateral SIJs & lower lumbar region in 1(2.8%) patient, and Left SIJ, lower lumbar, and upper lumbar in 3(8.3%) patients of patients with SIJ dysfunction. Regarding SIJ dysfunction in imaging, it was found in 9(9%) patients. All patients studied had positive results from at least one clinical provocation test: 34(34%), 32(32%), 26(26%), and 34(34%) for the sacral thrust test, Patrick test, Yeoman test, and compression test.***

Conclusion: ***Lumbar fusion surgeries may change the biomechanics of the spine, which increases the risk of SIJ dysfunction, which is the major causes of post-operative back discomfort.***

Keywords: Assessment; development; Sacroiliitis; Lumbar surgeries

1. Introduction

In recent years, the link between sacroiliitis and lower back surgery has come to light. Back discomfort, either new or ongoing, is a common complaint from patients following surgery. To prevent this type of problem, it is essential to thoroughly evaluate the SIJ prior to surgery.[1]

The female pelvic sacrum differs from the male sacrum in several ways, including width, unevenness, lack of curvature, and backward inclination. When comparing SIJ in men and women, it is clear that the former experience more mobility, stresses/loads, and strains on the pelvic ligaments. Due to the presence of strong ligaments surrounding the joint, even a slight movement might cause discomfort. There is a lot of strain on the SIJ biomechanics from lumbosacral operations.[2]

The lack of unequivocal proof in history, physical examination, or radiographs makes a precise diagnosis of sacroiliac joint dysfunction (SIJD) all the more challenging. Additionally, the symptoms can be caused by other frequent disorders such as facet syndrome or disc herniation. The SIJ block is the recommended method for diagnosing SIJD, as there is no generally accepted reference standard. Having said that, the SIJ block isn't practical for practitioners without training in intra-articular injections, and it's also not cost-effective.[3]

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Because of these factors, practitioners have begun to rely on physical examinations in the hopes that SIJD can be diagnosed even with negative results. When verifying a diagnosis of SIJD, it is advisable to use motion palpation tests along with at least three provocation tests.[3]

The aim of this study is to find out how lumbar surgeries affect the emergence of new sacroiliac joint dysfunction was the primary motivation for this research.

2. Patients and methods

Lumbar surgery patients were the subjects of this retrospective and prospective research. The operating rooms at Al-Azhar University Hospitals were used for every single case.

Inclusion criteria:

Individuals scheduled for lumbar surgeries between April 2023 and April 2024 who did not exhibit any sacroiliac pain on preoperative imaging or in clinical assessments.

Exclusion criteria:

Individuals experiencing sacroiliac pain prior to surgery.

Method: The patients underwent:

Complete history taking:

Name, age, parity, place of residence, profession, smoking status, length of complaint, and other pertinent personal habits, review of the patient's most recent complaint, personal history of medication sensitivities, previous medical and surgical history, including details about any discomfort you've experienced and how long it lasted after each procedure.

As part of the overall evaluation, the following tests were administered: distraction, thigh thrust, compression, sacral thrust, Gaenslen's, standing flexion, Gillet, and Shimpi Prone.

Investigational Studies:

Checks for liver and renal function, complete blood count (CBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and PT, PTT, and INR before and after surgery.

Radiological investigation:

Pre-operative images included magnetic resonance imaging (MRI) and plain X-ray of the lumbar region. Post-operative images included plain X-ray or CT of the sacroiliac joint region to detect bone erosions, joint space alterations, subchondral sclerosis, and ankyloses.

Outcome Measurements and Follow-up:

After surgery, and in the follow-up period, patients were asked to rate their level of sacroiliac joint discomfort using a visual analogue scale (VAS). Provocation tests, such as Patrick's test (also known as FABER test) were used to exam sacroiliac joint dysfunction. Patients were evaluated at 1 month, 3 months, and 6 months post operative.

Ethical consideration:

All participant information is treated with the utmost confidentiality. All participants were informed of the study's goals, methodology, and risk-benefit analysis prior to their enrollment. Furthermore, i made sure to get informed consent.

Statistical Analysis:

Statistics Package for the Social Sciences (SPSS) version 25 was used for data analysis. Frequency and percentage were used to express the qualitative data. The median and interquartile range (Median with IQR) or mean±standard deviation (Mean±SD) were used to express continuous quantitative data. The mean, or average, of a set of discrete integers is its central value, calculated as the sum of all the values divided by the total number of values. One way to look at the dispersion of a group of numbers is by using the standard deviation (SD). A small standard deviation (SD) suggests that the values are clustered around the set's mean, whereas a large SD suggests that the values are more dispersed. Median: The midpoint; calculated by sorting the data points in descending order and selecting the midpoint (or, in the case of two midpoints, by averaging them). The statistical dispersion, or the spread of the data, can be measured by the IQR, or inter-quartile range. The discrepancy between the data's 75th and 25th percentiles is what it is characterized as. The probability, denoted as P-value, was deemed significant when<0.05, extremely significant when<0.001, and inconsequential when>0.05.

3. Results

Fifty-two men and 48-women who underwent surgical lumbar fixation with transpedicular screws were the subjects of this prospective and retrospective investigation. Every case was operated on at the hospitals of Al-Azhar University.

Table 1. Demographic data in all studied patients.

DEMOGRAPHIC DATA			ALL PATIENTS (N=100)
SEX	Males	52	52.0%
	Females	48	48.0%
BMI	Normal	51	51.0%
	Overweight	35	35.0%
	Obese	14	14.0%
AGE	Mean±SD		42.9±8.6
	Min-max		21-63

Table 2. Post-operative data in all studied patients.

POST-OPERATIVE DATA			ALL PATIENTS (N=100)
INCIDENCE OF SACROILIAC DYSFUNCTION	No	65	65.0%
	Yes	35	35.0%
VAS SCORE	Mean±SD		3.1±2.2
	Min-max		1-9
ESR	Mean±SD		14.3±6.6
	Min-max		3-34
CRP	Mean±SD		4.9±3.9
	Min-max		0-19

Table 3. Comparison of patients with and without sacroiliac joint dysfunction as regard demographic data:

DEMOGRAPHIC DATA		SACROILIAC JOINT DYSFUNCTION				STAT. TEST	P-VALUE
		No (n=65)		Yes (n=35)			
SEX	Males	38	58.5%	14	40.0%	X2=3.1	0.08 NS
	Females	27	41.5%	21	60.0%		
AGE	Median (IQR)	41(36-47)		47(41-52)		U=852	0.04 S

Table 4. Comparison of patients with and without sacroiliac joint dysfunction as regard pre-operative data.

PRE-OPERATIVE DATA		SACROILIAC JOINT DYSFUNCTION				STAT. TEST	P-VALUE
		No (n=65)		Yes (n=35)			
BMI	Normal	33	50.8%	18	51.4%	X2=2.02	0.36 NS
	Overweight	25	38.5%	10	28.6%		
	Obese	7	10.8%	7	20.0%		
ESR	Median (IQR)	11(8.5-14)		11(9-14)		U=1101	0.79 NS
CRP	Median (IQR)	3(2-4)		3(2-5)		U=1074	0.64 NS
FIXATION	No	39	60.0%	11	31.4%	X2=7.4	0.006 S
	Yes	26	40.0%	24	68.6%		
FIXATION LEVEL	1 level	21	80.8%	12	50.0%	X2=5.3	0.02 S
	>1 level	5	19.2%	12	50.0%		

U:Mann Whitney U test. NS:P>0.05 is considered non-significant.

X2:Chi-square test. S:P<0.05 is considered significant.

This table shows, no statistically significant(P=0.36) difference between patients with and without SIJ dysfunction as regard BMI; in patients without SIJ dysfunction, 33-patients (50.8%) were normal, 25-patients (38.5%) were overweight and 7(10.8%) patients were obese. While in patients with SIJ dysfunction, 18(51.4%) patients were normal, 10(28.6%) patients were overweight and 7(20%) patients were obese.

Regarding pre-operative ESR, there was no statistically significant difference(P=0.79) between patients with and without SIJ dysfunction.

Regarding pre-operative CRP, there was no statistically significant difference(P=0.64) between patients with and without SIJ dysfunction.

a difference in fixation between patients with and without SIJ impairment that is statistically significant(P=0.006). There were 26(40%) patients with fixation and 39(60%) patients without fixation among patients without SIJ impairment. There were 24(68.6%) patients with fixation and 11(31.4%) patients without fixation among patients with SIJ dysfunction.

a difference in fixation level between patients with and without SIJ impairment that is statistically significant(P=0.02). Five (19.2%) patients had more than one level fixation, while 21(80.8%) patients had one level fixation in patients without SIJ dysfunction. Twelve (50%) patients with SIJ dysfunction had one level fixation, and twelve (50%) patients had multiple levels fixation.

Table 5. Comparison of patients with and without sacroiliac joint dysfunction as regard post-operative data:

POST-OPERATIVE DATA		SACROILIAC JOINT DYSFUNCTION		U	P-VALUE
		No (n=65)	Yes (n=35)		
VAS SCORE	Median (IQR)	2(1-2)	5(5-7)	0	<0.001 HS
ESR	Median (IQR)	11(8-13)	21(17-25)	146	<0.001 HS
CRP	Median (IQR)	3(2-5)	6(4-10)	492	<0.001 HS

This table shows, high statistically significant increased postoperative VAS score in patients with SIJ dysfunction (Median=5, IQR=5-7) when compared with that of patients without SIJ dysfunction (Median=2, IQR=1-2).

High statistically significant increased postoperative ESR in patients with SIJ dysfunction (Median=21, IQR=17-25) when compared with that of patients without SIJ dysfunction (Median=11, IQR=8-13).

High statistically significant increased postoperative CRP in patients with SIJ dysfunction (Median=6, IQR=4-10) when compared with that of patients without SIJ dysfunction (Median=3, IQR=2-5).

Table 6. Multivariate logistic regression analysis for studied data as a predictive risk factors of sacroiliac joint dysfunction in all studied patients.

	B	SE	P-VALUE	ODDS	95% CI	
AGE	0.043	0.026	0.093	1.04	0.993	1.099
SEX	0.747	0.427	0.080	2.11	0.914	4.876
DM	0.747	0.552	0.176	2.11	0.716	6.227
HTN	0.318	0.545	0.559	1.37	0.473	3.999
IHD	-0.498	1.174	0.672	0.61	0.061	6.072
SMOKING	-0.755	0.611	0.217	0.47	0.142	1.557
BMI	0.165	0.290	0.569	1.18	0.668	2.084
PRE-OPERATIVE ESR	0.014	0.061	0.818	1.01	0.899	1.144
CRP	0.088	0.116	0.448	1.09	0.870	1.369
FIXATION	1.186	0.443	0.008	3.3	1.372	7.806
FIXATION LEVEL	1.435	0.644	0.026	4.2	1.19	14.8

B:Regression coefficient, SE:Standard error, CI:Confidence interval.

This table shows that, the following parameters were predictive risk factors for sacroiliac joint dysfunction using multivariate logistic regression analysis:

Fixation:(95%CI=1.372-7.806), B=1.186, SE=0.443, P=0.008, odds=3.3. In other words, among the individuals in the study, those who have fixation had a 3.3-fold higher chance of experiencing sacroiliac joint disease.

Fixation level: odds=4.2, 95% CI= 1.19-14.8, B=1.435, SE=0.644, P=0.026. In other words, compared to patients with one level fixation, those with multiple levels fixation have 4.2 times the risk of developing sacroiliac joint dysfunction.

Case presentation:

A male patient 56-years free medical history complain from severe low back pain and leg pain

for one year and diagnosed as spondylolisthesis L5-S1 and L3-4 disc prolapse. Fixation was done by rods and transpedicular screw L3-4-5-S1 and discectomy of L3-4 disc and laminectomy of L3-4-5. screws polyaxial 45x6.5.

The preoperative assessment of SIJ was free bilateral while the postoperative back pain improved then pt started to complaint of new pain over rt sacroiliac joint after 6-weeks VAS (8). Patient show pain reduction VAS (2) post injection.

PREOPERATIVE IMAGES:

Figure 1. Sagittal MRI LSS T2 showing spondylolisthesis l5-s1.

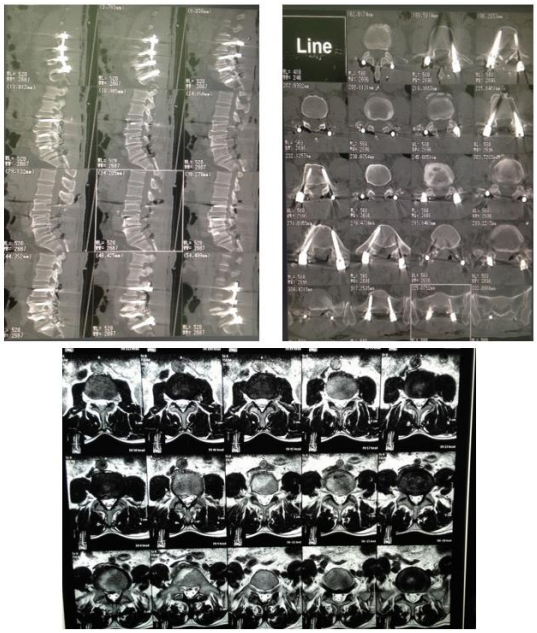

Figure 2. Axial MRI LSS.

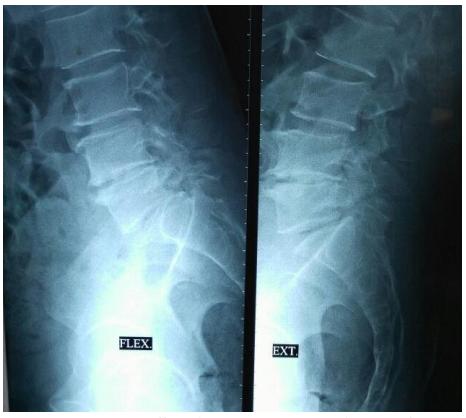

Figure 3. X-Ray flexion-Ex tension shows L5-s1 spondylolisthesis.

POSTOPERATIVE IMAGES:

Figure 4. CT- LSS AP, lateral views show fixation L3,4,5, S1.

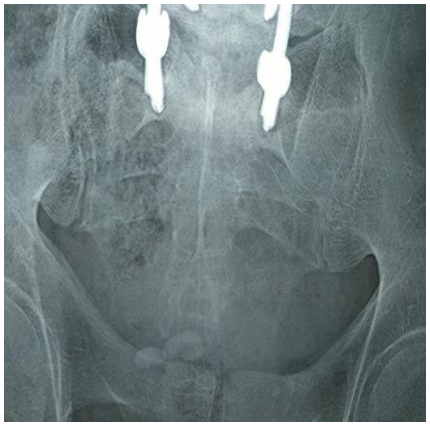

Figure 6. X-Ray sacroiliac joint(postoperative).

4. Discussion

The current study found that, based on demographic information about the patients, 52 of the patients were male and 48 were female. In terms of age, the range was 21–63 years, with a mean of 42.9±8.6 years.

The results of the current study were in agreement with Youssef et al.,[4] They sought to assess the responsiveness to intra-articular SIJ

injection and describe the incidence of new-onset SIJ pain following lumber surgery. According to the results of this prospective study, which involved 41-patients in total, the mean age was 46.29±11.08 years, and 53.7% of the patients were male and 46.3% were female.

Regarding comorbidities and risk factors, we revealed that there were 16(16%) patients with DM, 17(17%) patients with HTN, 4(4%) patients with IHD, and 18(18%) patients were smokers in all studied patients. Our findings, in line with Youssef et al.,[4] found that 29.3% were smokers.

Concerning pre-operative data, out of all the patients in the study, we discovered that 51 patients had a normal BMI, 35 patients were overweight, and 14 patients were obese. The pre-operative ESR ranged from 4 to 21 with a mean of 11.6±3.4. The pre-operative CRP ranged from 0 to 9, with a mean of 3.3±1.8. Regarding fixation, there were 50 patients who were fixated and 50 patients who were not; 33 patients had one level of fixation, and 17 patients had many levels of fixation.

The results of the current study were in line with Koheil et al.,[5] indicated that 19(40%) patients had L4-L5-S1 fixation, 17(36%) patients had L5-S1 fixation, and 11(23%) patients had L4-L5 fixation. Of the 47-patients, 33(70%) experienced pain on the side opposite to the initial discomfort, and 14(30%) experienced pain on the side opposite to the original pain.

Regarding post-operative data, we found that 35 patients out of all the patients in the study had sacroiliac dysfunction (SIJ). The post-operative VAS score ranged from 1 to 9, with a mean of 3.1±2.2. The post-operative ESR ranged from 3 to 34, with a mean of 14.3±6.6. The post-operative CRP ranged from 0 to 19, with a mean of 4.9±3.9.

The results of the current study were in concordance with Koheil et al.,[5] claimed that the visual analogue scale (PVAS) for postoperative pain decreased from 7.3±2.1 to 3.3±1.4 in 47 patients who had sacroiliitis.

In terms of pain kind, 15(41.7%) patients had left SIJ radiating to their buttocks, whereas 8(22.2%) patients had right SIJ radiating to their buttocks, bilateral SIJs radiating to buttocks in 10(27.8%) patients, bilateral SIJs & lower lumbar region in 1(2.8%) patient, and left SIJ, lower lumbar, and upper lumbar in 3(8.3%) patients with SIJ dysfunction.

The results of the present study were in concordance with Salah et al.,[6] revealed that the most common types of pain were bilateral SIJs and lower lumbar area in three (12%) patients, right SIJ radiating to buttocks in four (16%) patients, and left SIJ radiating to buttocks in six (24%) patients.

As regard SIJ dysfunction in imaging, it was found in 9(9%) patients of all studied patients. This came in accordance with Eldin et al.,[7] found that six patients' sacroiliac joint x-rays showed sclerosis, while 38-patients' x-rays showed normal.

Regarding clinical provocation tests, 34-patients had positive sacral thrust tests, 34-patients had positive Patrick tests, 32-patients had positive Yeoman tests, 32-patients had positive compression tests, and 26-patients had positive Gillet tests across all patients under study.

This came in accordance with Eldin et al.,[7] revealed that in terms of clinical provocation testing, 34 patients had positive Yeoman tests, 32 had positive Faber tests, and 38 had localized sacroiliac joint soreness.

Patients with and without SIJ dysfunction did not differ statistically significantly(P=0.08) in terms of sex, according to our study; among patients without SIJ dysfunction, there were 38 men and 27 women. In contrast, there were 21 female patients and 14-male patients with SIJ dysfunction. Patients with SIJ dysfunction were statistically significantly older (median=47, IQR=41–52) than those without SIJ dysfunction (median=41, IQR=36–47) years.

Our results, in concordance with Salah et al.,[6] revealed that 15(37.5%) patients did not develop SIJ dysfunction, whereas 25 (62.5%) patients did. Following lumbar fusion procedures, the average age of patients with SIJ dysfunction was 48±8.4 years, with a range of (34-62). Males made up 40% (6/15) of the negative group and 56% (14/25) of the positive group.

We found no statistically significant difference in smoking, diabetes, hypertension, or IHD between patients with and without SIJ dysfunction. According to the current study, Guan et al.,[8] showed that there was no statistically significant difference in diabetes, hypertension, or smoking between patients with and without SIJ dysfunction.

We found no statistically significant difference in BMI, pre-operative ESR, or pre-operative CRP between patients with and without SIJ dysfunction. A statistically significant difference in fixation between patients with and without SIJ impairment (P=0.006). A statistically significant(P=0.02) distinction in fixation level between patients with and without SIJ dysfunction.

Our study can be supported by Salah et al.,[6] found a statistically significant difference in fixation level between patients with and without SIJ impairment(p=0.033). Our findings are at odds with those of the 25 individuals who experienced SIJ dysfunction; of these, 15 were obese, 7 were overweight (28%), and 3 were within the normal BMI range (12%). A statistically significant difference was found between the groups when

comparing the numerical values of BMI (p=0.034).

As compared to patients without SIJ dysfunction (Median=2, IQR=1-2), our study found that patients with SIJ dysfunction had a significantly higher postoperative VAS score (Median=5, IQR=5-7). Patients suffering from SIJ dysfunction had a significantly higher postoperative ESR (Median=21, IQR=17-25) compared to those without SIJ dysfunction (Median=11, IQR=8-13). Compared to patients without SIJ dysfunction, patients with SIJ dysfunction had significantly higher levels of C-reactive protein (CRP) after surgery (Median=6, IQR=4-10).

The present study can be supported by Kurosawa et al.,[9] found that the good-outcome group had considerably lower pre- and postoperative VAS scores compared to the poor-outcome group(P<0.05).

The following statistics pertain to the fixation variable in the multivariate logistic regression analysis:(B=1.186, SE=0.443, P=0.008, odds=3.3, and 95%CI=1.372-7.806). In other words, compared to people without fixation, those with it are 3.3 times more likely to get sacroiliac joint trouble. Measure of fixation:(B=1.435, SE=0.644, P=0.026, odds=4.2 and 95%CI=1.19-14.8). Thus, in the examined population, the likelihood of sacroiliac joint dysfunction is 4.2 times higher in patients with several levels of fixation compared to those with a single degree of fixation.

The current study can be supported by Yan et al.,[10] who found that 10.8% of cases of sacroiliac joint dysfunction involved three or more segments fixed, which was considerably higher than the rates of single segment fixation (3.8%) and two segment fixation (4.1%) (P<0.01).

4. Conclusion

After lumbar stabilization surgery, the biomechanics of the spine are disrupted, which increases the prevalence of SIJ dysfunction and sacroiliitis, two major causes of postoperative back pain, which are well-documented. In addition, we found that compared to patients with a single degree of fixation, those with several levels had a substantially higher risk of sacroiliac joint dysfunction. Further studies and long-term follow-up studies are warranted to validate these findings.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

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There are no conflicts of interest.

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