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Sacroiliitis management after Lumbar and lumbosacral Fusion Surgeries

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Sacroiliac joint is a primary source of pain in about a quarter of chronic low back pain cases; nevertheless, there are many controversies regarding the best method for the diagnosis of sacroiliac joint pain (SIJP). The aim of study is reducing sacroiliitis in a lumbar fusion patient with persistent post-surgical low back pain, through accomplishing the objectives which are identification of the risk factors of sacroiliitis in a lumbar and lumbosacral fusion patients with persistent postsurgical low back pain and to identify a reliable test for diagnosis of sacroiliac syndrome after lumbar fusion surgeries. A Prospective cohort study was conducted at Neurosurgery Department, Faculty of Medicine, Zagazig University involving 32 patients who underwent lumbar or lumbosacral fusions were evaluated for SIJ pain including patients with reported pain below the L5, over the posterior aspect of one or both SIJs, with or without leg pain. The mean of their age was 35 years and 54.3% of them were female and 45.7 % of them were males. There is a high significant difference between Pre-operative and Post-operative according to VAS and CT in each group. 70.6% of Sacroiliitis cases who underwent injection improved while 29.4% did not improved. There is no significant difference between the two studied groups according to intraoperative data. Sacroiliac joint is a possible source of persistent or new onset pain with failed back surgery syndrome after lumbosacral fusion. Sacroiliitis can result from a variety of causes after lumbar and lumbosacral fusion, and therefore clinical diagnosis, imaging studies and treatment may be difficult.

Keywords: Sacroiliac joint pain, Lumbosacral fusion, sacroiliitis

INTRODUCTION

Sacroiliac joint (SIJ) is the largest axial joint in the body, with an average surface area of 17.5 cm². The SI joint is most often characterized as a large, auricular-shaped, diarthrodial synovial joint. The potential for vertical shearing is present in approximately 30% of SI joints, owing to the more acute angulation of the short, horizontal articular component (El Rafei et al. 2018 ; Poilliot et al. 2019). SIJ has gained increased attention as a source of persistent or new pain after lumbar/lumbosacral fusion. The pathophysiology of SIJ pain may be increased mechanical load,

iliac crest bone grafting, or a misdiagnosis of SIJ syndrome (Yoshihara, 2012). Pain generated in the SIJ or surrounding structures can present as low back pain, sacral pain, pelvic pain, or gluteal pain. Patterns of somatic referred SIJ pain have been identified and can vary significantly. Numbness, popping, clicking, or groin pain can occur (Van Leeuwen et al.2016). The most common referral patterns for SIJ pain were found to be radiation into the buttock (94 %), lower lumbar region (72%), lower extremity (50%), groin area (14%), upper lumbar lesion (6%), and abdomen (2%) with 12 % reporting foot pain

(Christiansen et al. 2017). Thus, there is evidence of good diagnostic validity of positive responses to a threshold of three SIJ provocation tests to identify SIJ pain (Dengler et al. 2019). Imaging studies show more frequent degeneration of the SIJ in patients with lumbar/lumbosacral fusion than in patients without such fusion. Using injection tests, it has been shown that SIJ pain is the cause of persistent symptoms in a considerable number of patients after fusion surgery (Howard et al. 2011). Surgical outcomes of SIJ fusion include a high percentage of patients who had lumbar/lumbosacral fusion or surgery before, although well-controlled clinical studies are necessary to assess the efficacy of surgical treatment. Taking these findings into consideration, the possibility that the SIJ is the source of pain should be considered in patients with failed back surgery syndrome after lumbar/lumbosacral fusion (Yoshihara, 2012). Additionally, no imaging studies consistently provide findings that are helpful in diagnosing primary SIJ pain. Radiographs are the most cost-effective technique for imaging the SIJ. At least 24.5 % of asymptomatic patients and there is currently no recommended radiographic view or series of views to evaluate the SIJ (Chahal et al. 2018). Therefore, the present study aimed for reducing sacroiliitis in a lumbar fusion patient with persistent post-surgical low back pain, through accomplishing the objectives which are identification of the risk factors of sacroiliitis in a lumbar and lumbo-sacral fusion patients with persistent postsurgical low back pain and to identify a reliable test for diagnosis of sacroiliac syndrome after lumbar fusion surgeries.

MATERIALS AND METHODS

A prospective Cohort study of 32 patients who underwent lumbar or lumbosacral fusions were evaluated for SIJ pain and carried out at Neurosurgery Department, Faculty of Medicine, Zagazig University.

Inclusion criteria:

Patients who above 18 years old with reported pain below the L5, over the posterior aspect of one or both SIJs, with or without leg pain, and with a distribution compatible with an SIJ origin. Patients who exhibited positive findings on at least three of the following provoking tests. All patients with pain meeting the diagnostic criteria and respond to diagnostic blocks for SIJ pain. The presence of one or more of the following CT findings: sclerosis, erosion, osteophyte, joint

space narrowing, intraarticular bone fragment, and subchondral cyst. Format references as per journal style (Christiansen et al. 2017).

Exclusion criteria:

Patients who are less than 18 years with pain located midline or with symmetrical pain above the level of L5, patients with clear nerve root compression signs, patients with spinal tumors, with systemic infections, with recent fractures in the lumbar spine region, with proven osteoarthritis of the hip.

VAS score for back pain:

The clinical outcome was assessed using a pain score based on a 10-point Visual Analog Scale (VAS; range, 1–10). VAS score of 1 was defined as no pain and a score of 10 was defined as the worst pain imagined by the patient. The patients assessed the pain outcome subjectively. The VAS score was measured before surgery and 3 months 6 months after surgery.

Radiological Diagnosis:

Pelvis X ray A-P and lateral viewed to assess level of fixation and changes in sacroiliac joint. CT pelvis to find criteria of sacroiliac syndrome like sclerosis, erosion, osteophyte, joint space narrowing, intraarticular bone fragment, and subchondral cyst.

Techniques:

All the imaging studies was done post operatively and 3,6 months postoperatively to be compared with those preoperatively done. Blocks were considered the gold standard for the diagnosis of sacroiliac syndrome and could be also an effective method of treatment. Simple blocks or double blocks can be used. Only blocks allow a correct appreciation of the frequency of sacroiliac syndrome in a population of patients suffering from persistent low back pain after lumbar fusion confirming that the sacroiliac joint could be the source of residual pain. A different operative position was used in lumbar spinal surgery, depending on the type of the procedure. Therefore, release procedures allow for easier mobilization of the vertebra and thus facilitate realignment of the spine. The release maneuvers can be performed by posterior and/or by anterior approach involving different anatomical structures.

All included patients was followed clinically and radiologically 3, 6 months post operatively.

Statistical analysis

Analysis of data was done using Statistical Program for Social Science version 20 (SPSS Inc., Chicago, IL, USA). Qualitative variables were compared using chi-square (χ^2) test or Fisher's exact test when frequencies were below five. Pearson correlation coefficients were used to assess the association between two normally distributed variables. When a variable was not normally distributed, A P value < 0.05 is considered significant.

RESULTS

The present study showed 12 patients are 8 female and 4 male and their age range from 40 to 50 years and BMI between 20 to 30. These 5 patients are 3 female and 2 male and their age

range from 50 to 60 years and BMI between 25 to 33. There is no significant difference the studied groups according to demographic data (Table 1).

The attainable data showed a high significant difference the studied groups according to post-operative data (Table 2).

Concerning VAS, there is high significant difference between Pre-operative and Post-operative according to VAS in each group (Table 3).

The obtained results of CT showed a high significant difference between Pre-operative and Post-operative according to VAS in each group (Table 4).

Regarding intraoperative data, there is no significant difference between the two studied groups (Table 5).

Table 1: Comparison between the studied groups according to demographic data

	Total (n = 32)		Management Sacroiliac group				Test of Sig.	P
			Not improved (n = 23)		Improved (n = 9)			
	No.	%	No.	%	No.	%		
Sex								
Male	15	45.7	10	42.4	5	55.6	$\chi^2=$ 0.490	0.484
Female	17	54.3	13	57.6	4	44.4		
Age (years)								
Min. – Max.	35.0	-61.0	35.0	-60.0	41.0	-61.0	t= 0.672	0.505
Mean \pm SD.	47.80	\pm 6.55	47.39	\pm 6.93	48.85	\pm 5.60		
Median (IQR)	48.5 (42.0 –51.0)		47.0 (41.0 –51.0)		50.0 (45.0 –51.0)			
BMI (kg/m ²)								
Min. – Max.	19.0	-34.0	19.0	-34.0	21.0	-34.0	t= 1.299	0.201
Mean \pm SD.	29.26	\pm 4.22	28.76	\pm 4.32	30.54	\pm 3.82		
Median (IQR)	31.0 (28.0 –32.0)		31.0 (27.0 –31.0)		31.0 (29.0 –34.0)			

χ^2 :Chi square test, t: Student t-test, p: p value for comparing between studied groups

Table (2): Comparison between the studied groups regard post-operative data

Post-operative data	Total (n = 32)		Management Sacroiliac group				Test of Sig.	P
			Not improved (n = 23)		Improved (n = 9)			
	No.	%	No.	%	No.	%		
VAS								
Min. – Max.	0.0	-8.0	0.0	-8.0	4.0	-7.0	U= 57.50*	<0.001*
Mean \pm SD.	2.89	\pm 2.90	1.85	\pm 2.75	5.54	\pm 0.88		
Median (IQR)	3.5 (0.0 –60.0)		0.0 (0.0 –4.0)		6.0 (5.0 –6.0)			
X –RAY								
0	32	100.0	23	100.0	9	100.0	-	-
CT Post 3 months								
Grade 0	15	45.7	15	65.2	0	0.0	$\chi^2=$ 17.424*	MCp= <0.001*
Grade I	11	34.8	5	21.7	6	66.7		
Grade II	6	19.6	3	13.1	3	33.3		
CT Post 6 months								
Grade 0	15	45.7	15	65.2	0	0.0	$\chi^2=$ 18.476*	MCp= <0.001*
Grade I	0	0.0	0	0.0	0	0.0		
Grade II	11	34.8	5	24.2	6	66.7		
Grade III	5	17.4	3	12.1	2	22.2		
Grade IIII	1	2.2	0	0.0	1	11.1		

χ^2 : Chi square test, U: Mann Whitney test, MC: Monte Carlo, *: Statistically significant at $p \leq 0.05$

Table 3: Comparison of VAS between Pre and Post-operative in both groups

VAS	Pre-operative	Post-operative	Z	P
Total (n = 46)				
Min. – Max.	0.0 –0.0	0.0 –8.0	4.402*	<0.001*
Mean \pm SD.	0.0 \pm 0.0	2.89 \pm 2.90		
Median (IQR)	0.0	3.5 (0.0 –60.0)		
Not improved (n = 33)				
Min. – Max.	0.0 –0.0	0.0 –8.0	3.108*	0.002*
Mean \pm SD.	0.0 \pm 0.0	1.85 \pm 2.75		
Median (IQR)	0.0	0.0 (0.0 –4.0)		
Improved (n = 13)				
Min. – Max.	0.0 –0.0	4.0 – 7.0	3.241*	<0.001*
Mean \pm SD.	0.0 \pm 0.0	5.54 \pm 0.88		
Median (IQR)	0.0	6.0 (5.0 –6.0)		

Z: Wilcoxon signed ranks test, *: Statistically significant at $p \leq 0.05$

Table (4): Comparison of CT between Pre and Post-operative in both group

CT	Pre-operative		Post 3 months		Post 6 months		χ^2	MCp
	No.	%	No.	%	No.	%		
Total (n = 32)								
Grade 0	32	100.0	15	45.7	15	45.7	76.249*	<0.001*
Grade I	0	0.0	0	0.0	0	0.0		
Grade II	0	0.0	11	34.8	11	34.8		
Grade III	0	0.0	5	17.4	5	17.4		
Grade IIII	0	0.0	0	0.0	1	2.2		
Not improved (n = 23)								
Grade 0	23	100.0	15	65.2	21	63.6	30.895*	<0.001*
Grade I	0	0.0	5	21.7	0	0.0		
Grade II	0	0.0	3	13.1	8	24.2		
Grade III	0	0.0	0	0.0	4	12.1		
Grade IIII	0	0.0	0	0.0	0	0.0		
Improved (n = 9)								
Grade 0	9	100.0	0	0.0	0	0.0	52.247*	<0.001*
Grade I	0	0.0	6	66.7	0	0.0		
Grade II	0	0.0	3	33.3	6	66.7		
Grade III	0	0.0	0	0.0	2	22.2		
Grade IIII	0	0.0	0	0.0	1	11.1		

χ^2 : Chi square test, MC: Monte Carlo, *: Statistically significant at $p \leq 0.05$

Table (5): Comparison of intraoperative data between studied groups

Intraoperative Data	Total (n = 32)		Management Sacroiliac group				χ^2	P
			Not improved (n = 23)		Improved (n = 9)			
	No.	%	No.	%	No.	%		
Preventive measures								
Used	32	100.0	23	100.0	9	100.0	–	–
Level of Fixation								
One	11	34.8	7	30.4	4	44.4	1.033	FE _p = 0.328
Multiple	21	65.2	16	69.6	5	55.6		
Intraoperative S1 fixation								
No	14	43.5	9	39.4	5	55.6	0.793	0.373
Yes	8	56.5	18	60.6	4	44.4		

χ^2 : Chi square test, FE: Fisher Exact, p: p value for comparing between the studied groups

DISCUSSION

The present study was conducted on patients who underwent lumbar or lumbosacral fusions were evaluated for SIJ pain including patients with reported pain below the L5, over the posterior aspect of one or both SIJs, with or without leg pain. All patients with pain meeting the diagnostic criteria and respond to diagnostic blocks for SIJ pain, the presence of one or more of the following CT findings: sclerosis, erosion, osteophyte, joint space narrowing, intraarticular bone fragment, and subchondral cyst and patients who above 18 years old. This study aimed for reducing sacroiliitis in a lumbar fusion patient with persistent post-surgical low back pain.

Patients in the current study were divided into 2 groups according to the improvement as 71.7% of cases showed no improvement while 28.3% of cases showed improvement. There is no significant difference the studied groups according to age, sex and body mass index (BMI). The mean of their age was 35 years and 54.3% of them were female and 45.7 % of them were males. The mean of BMI was 29. Our results are supported by study of Unoki et al., (2016) as they reported that there was no significant difference the studied groups according to age and sex. In Simillary, Liliang et al., 2009 found that their mean age was 63.4 (standard deviation) 13 years (range, 35–85 years). Their mean BMI was 24.6 4.0 (range, 19–40).

Our results are supported by study of Ha et al. (2008) who reported that an almost doubled prevalence of degenerative changes in SIJ after fusion compared to the control group (75 vs. 38.2%). Furthermore, degenerative changes in the SIJ were found in all patients belonging to the lumbosacral fusion group, whereas these changes were present only in 64% of patients with lumbar arthrodesis. Authors described that incidence of SIJ degeneration is higher in patients who underwent fusion down to S1 level than in patients in whom fusion is down to L5.

Our results are in agreement with Gu et al. (2016) who compared between preoperative VAS score and postoperative VAS score after 4 years, there was a significant difference ($P < 0.001$). The mean VAS score reduced from 6.01 ± 3.56 preoperatively to 4.33 ± 2.31 at 48 months after operation. As well, Kancherla et al. (2017) who recorded a clinical results from minimally invasive SIJ fusion in patients with primary sacroiliitis and sacroiliitis after thoracolumbar fusion They conclude that while women and those with a prior

history of lumbar instrumentation may be at increased risk of having SIJ dysfunction requiring surgical intervention, it was not found to affect postoperative functional outcomes when compared to the non-instrumented group.

Moreover, Guan et al. (2018) who concluded that, incidence of SIJP increases in patients with lumbar stenosis compared with lumbar disk herniation and spondylolisthesis. Lumbar fusion surgery and multiple operative segments seem to be interdependent risk factors for the postoperative SIJP.

Although the risk of developing SIJ degeneration is unclear, the results indicate that pain and degeneration of SIJ develop more often in patients undergoing lumbosacral fusion regardless of the number of melting segments. the iliac crest graft also has a negative effect on SIJ and induces joint degeneration, even if there has been no damage to SIJ during graft procedure. Therefore, it is recommendable for the surgeon to consider the degeneration and pain of SIJ before and after postoperative thoracolumbar/lumbosacral fusion, following the patients over time.

CONCLUSION

Sacroiliac joint is a possible source of persistent or new onset pain with failed back surgery syndrome after thoracolumbar/lumbosacral fusion. Sacroiliitis can result from a variety of causes after lumbar and lumbosacral fusion, and therefore clinical diagnosis, imaging studies and treatment may be difficult.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

AUTHOR CONTRIBUTIONS

All author contributed in all parts of the paper.

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