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ORIGINAL ARTICLE

Work Return in Patients with Pelvic Ring Fractures Stabilized with Open Reduction and Internal Fixation Referred to Relevant Hospitals of Ahvaz Jundishapur University of Medical Sciences from 2012 to 2015

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ABSTRACT
Despite the high rate of open reduction and internal fixation (ORIF) performed on patients with hip fractures, only 60% of patients show good or excellent clinical results. In our study, we assess the percentage of returning to work and the factors affecting it. The present study is a retrospective study which assesses patients with pelvic ring fractures treated with open reduction and internal fixation surgery during the years 2012 to 2015 in Ahwaz. In our study, we evaluated functional outcome by means of Majeed score. All the data analysis was done using SPSS (v.18). The mean Majeed score for grading the functional outcome of patients was 64 ± 16.2, which indicated relatively good results after the procedure. All patients with type (A) fractures returned to their previous jobs. Also, none of the participants with type B fractures were disabled, whereas 48% of patients with type C fractures were forced to change their jobs.Approximately 22% of patients with type C fracture become disabled and lose their jobs and independence. So, an appropriate management can be effective in their rehabilitation.

Keywords: *Majeed score, Open Reduction and Internal Fixation, Functional outcome, Radiological outcome*

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INTRODUCTION

Pelvic ring fracture is an uncommon injury which affects 3 to 8.2 % of all trauma cases. Hip fractures account for 1-3% of all skeletal fractures and 2% of cases of hospitalization in the orthopedic ward. An increased incidence of hip fractures is seen in two age groups, among 20-40 year olds and older than 65 years [1-3]. Despite the ability to manage hip fractures, the related mortality rate is still close to 10% and is commonly due to hemorrhage while sepsis is the leading cause of late mortality [4-6]. Studies have shown the efficiency of the use of external fixators in anterior and lateral compression injuries. However, this method is not appropriate for the control of unstable pelvic ring fractures with posterior displacement. Based on observations and extended studies on the treatment of unstable pelvic ring fractures, the use of internal fixator algorithms can be a suitable treatment to improve functional outcomes and reduce the mortality and morbidity associated with these injuries [7, 8]. The use of ORIF is the gold standard in unstable pelvic fractures that require isolated posterior fixation as well as in

anterior/posterior pelvic ring fractures [9]. Despite the high rate of ORIF performed on patients with hip fractures, only 60% of patients show good or excellent clinical results. In many cases, permanent functional impairment includes genitourinary and neurological complications [4]. Stabilizing unstable pelvic ring fractures in the early hours of hospitalization seems to improve long-term results and survival rates. The pattern of the injury, age of the patient, the amount of displacement associated with fractures, unstable hemodynamic monitoring, early fixation, and early rehabilitation are factors related to long-term performance in unstable pelvic ring fractures [1, 10]. The evaluation of the results of ORIF surgery performance is possible by assessing gait and kinetic variables [11]. This assessment also provides important information to design an appropriate rehabilitation program after surgery, and thus has a role in long-term effects and the rate of patients' work return. The aim of this study was to assess work return in patients with pelvic ring fractures who underwent open reduction and internal fixation in hospitals affiliated to Ahvaz Jundishapour University of Medical Sciences.

MATERIALS AND METHODS

This retrospective study included patients with pelvic ring fractures treated with open reduction and internal fixation surgery during the years 2012 to 2015 in hospitals of Ahwaz Jundishapour University of Medical Sciences. All patients with pelvic ring fractures who underwent open reduction and internal fixation were enrolled. Any patients who were absent during the follow-up period or died for any reason other than skeletal injuries were excluded. All information including age, sex, cause of trauma, associated injuries (neurological injuries, genitourinary injuries, intra-abdominal hemorrhage, internal organ damage, and brain and spinal cord damage), type of fracture (type A, B, C) [4] and the site of fractures were derived from patients' archived hospital records. Patients were followed for at least one year after discharge. In the last appointment, patients were assessed in terms of function, radiological findings and percentage of work return (the same job or a new job). Radiographic outcome of fixation was evaluated by plain x-ray from three views (anterior-posterior, oblique) to observe the obturator and iliac, and was graded based on the maximum posterior or anterior displacement in proportion to the pelvic ring's damage site. The grades used were: "excellent" for 0 to 5 mm displacement, "good" for 6 to 10 mm displacement, "fairly good" for 11 to 15 mm displacement, and "weak" for cases with more than 15 mm displacement or nonunion defined cases. The performance results were graded by Majeed Functional Score [11]. Majeed Functional Score system includes a number of questions in seven specific categories. These categories include pain, work, sitting, sexual intercourse, walking aids, walking gait and walking. Obtained scores ranged from 0 to 100. Scores higher than 85 were categorized as "excellent", 70 to 84 were categorized as "good", 55 to 69 were categorized as "fair", and scores lower than 55 were considered as "weak". Variables were compared in two groups of patients who returned to their original work and those unable to return to their main jobs. Malingering was also considered.

Statistical Analyses

Statistical analysis of all the data was performed using SPSS (V.18). P values of less than 0.05 were considered significant. Descriptive analysis for continuous variables was presented as mean ± standard deviation and for qualitative variables as ratio and percentage. To compare quantitative variables between groups, T-test and ANOVA or their equivalent nonparametric tests, Mann-Whitney and Kruskal-Wallis, were used. Chi square test was used to determine the differences between groups.

RESULTS

In the present study, of all patients with pelvic ring fractures who underwent open reduction and internal fixation and were evaluated, 39 patients' data met the inclusion criteria and were analyzed. Table 1 shows patients' descriptive data. The mean age of subjects was 42.2 ± 15.1 and the age difference between genders was not significant. The mean Majeed score for grading the functional outcome of patients was 64 ± 16.2, which indicated relatively good results after the procedure. When evaluated by the type of fracture, the highest Majeed score was seen in fracture types A and B (80 and 71, respectively), which were considered good, whereas for patients with type C fractures, who formed the majority of patients, a score of 59 or "fair" was achieved. The difference between Majeed scores between the types of fractures was significant (P value = 0.02). 42% of female and 61.5% of male participants were forced to change jobs and 11.5% and 23% (respectively) were disabled after injury and surgery. All patients with type (A) fractures returned to their previous jobs. Also, none of the participants with type B fractures were disabled. However, 48% of patients with type C fractures were forced to change their jobs. According to the results, the fracture site in all patients with disabilities was in the posterior pelvic ring. 19.4% of patients who had posterior pelvic ring fractures were disabled but none of the patients with anterior pelvic ring fractures showed disabilities after surgery. Most patients (60%) who did not have related

injuries returned to their previous jobs and none were disabled. 21% of patients with related injuries showed disabilities after surgery. Work return was calculated in subgroups by each variable.

Table 1: Demographic, clinical characteristics and outcomes 1 year after ORIF operation

Variable	N (%)
gender	
Male	26(66.7)
Female	13(33.3)
Age	42.2±15.1
Majeed score	64±16.2
Type of fracture	
A	3(7.7)
B	9(23.1)
C	27(69.2)
Site of fracture	
Anterior Ring	8(20.5)
Posterior Ring	31(79.5)
Radiologic outcome	
Great	5(12.8)
Good	17(43.6)
Fair	12(30.8)
weak	5(12.8)
Functional outcome	
Great	2(5.1)
Good	16(41)
fair	10(25.6)
weak	11(28.2)
Associated damage	
Yes	29(74.4)
No	10(25.6)
Back to work	
Previous Job	13(33.3)
Change of Job	20(51.3)
Disable	6(15.4)

Table 2: Effects of understudy variables on returning to work in patients undergoing ORIF surgery

	Return to work			
Variables	Previous Job (%)	Change of Job (%)	Disable (%)	P value
gender				
Male	11(42.3)	12(46.2)	3(11.5)	0.21
Female	2(15.4)	8(61.5)	3(23.1)	
Age	32±11	43±12.4	62.3±9.6	0.001
Majeed score	76.4±9	64.2±10.5	36.1±8	0.001
Type of fracture				
A	3(100)	0	0	
B	2(22.2)	7(77.8)	0	0.042
C	8(29.6)	13(48.1)	6(22.2)	
Site of fracture				
Anterior Ring	2(25)	6(75)	0	0.239
Posterior Ring	11(35.5)	14(45.2)	6(19.4)	
Radiologic outcome				
Great	5(100)	0	0	
Good	7(41.2)	10(58.8)	0	0.0001
Fair	1(8.3)	8(66.7)	3(25)	
weak	0	2(40)	3(60)	
Functional outcome				
Great	2(100)	0	0	
Good	9(56.2)	7(43.8)	0	0.0001
fair	1(10)	9(90)	0	
weak	1(9.1)	4(36.4)	6(15.4)	
Associated damage				
Yes	7(24.1)	16(55.2)	6(20.7)	0.05
No	6(60)	4(40)	0	

As shown in Table 2, patients' age, mean Majeed score, type of fracture, radiological and performance findings as well as related injuries were factors affecting patients' return to work. According to the analytical results of the study, radiographic and functional outcomes were significantly different in fracture type subgroups (A, B, C) (P value ≤0.05). Conversely, the fracture site had no significant effect on radiological and functional outcome after surgery. Results of the Kruskal-Wallis test showed a significant difference between fracture type subgroups in terms of Majeed score (P value = 0.026), however the difference between fracture sites (Anterior Ring and Posterior Ring) was not significant, (Mann-Whitney U Test, P value ≥0.05).

DISCUSSION

Hip fractures are one of the most challenging injuries in terms of treatment and results. Usually, related injuries are seen in these types of fractures and extended periods of rehabilitation and work return are expected [1, 12]. In this study, patients were followed for one year after surgery and the effects of relative factors (age, sex, type and site of fractures, and associated injuries) on the rate of work return, disabilities, and functional and radiological outcomes were evaluated. Previous studies have examined the functional outcome of patients with pelvic ring fracture [2, 13, 14]. Like previous studies [1, 15, 16] , in the present study, most of the patient are young men (67%). In our study, the percentage of work return (previous work or new jobs) was 84% and only 15.4% of patients showed disability-related work limitations that was lower than previous study [3]. Results of a systematic review conducted by Papakostidis as well as the study of Aprato in Italy are consistent with our results [15, 17]. The relationship between the type of fracture and work return and rehabilitation was significant in our study contrasting the results of Gabbe and Aprato (15, 18). Our results showed that postoperative functional outcomes' rating was relatively good. According to the findings, all patients with anterior ring fractures were able to return to work but 75% of them were forced to change their jobs. In line with previous investigations [1], in the majority of patients (29 of 39 patients), related injuries were seen, which significantly worsened the patients' functional outcome (P value = 0.003). Our study showed better radiological outcomes compared to functional outcomes, and these results indicated a significant difference between these outcomes (P value =0.001). A study by Mardanpour et al. [1] in Kermanshah did not show a significant difference between these variables. In our study, associated injuries significantly altered the performance results but had no significant effect on radiographic outcomes, which was similar to the results of the study by Kabak and colleagues [13]. Like previous studies [19], there was obvious association between radiological and functional outcomes in our study while other studies didn't show it [8, 20]. Majeed score use as a reflection of patient efficiency. We also calculated functional outcome by means of Majeed score that is lower than former research [12].

In conclusion, recovery period after the pelvic ring fracture is prolonged, especially after high-energy traumas. Also, appropriate management can have effects on functional results. A limitation of this study was the small number of patients. Therefore, studies with larger sample sizes and longer follow-up periods, which calculate the mean time for work return, seem necessary.

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AUTHORS' CONTRIBUTIONS

All authors contributed equally in planning and carrying out this project.

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