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An evaluation of functional outcome in elderly patients with proximal humeral fractures treated conservatively

Konservatif takip edilen ileri yaş proksimal humerus kırıklı hastaların fonksiyonel sonuçlarının değerlendirilmesi

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Ethics Committee Approval: This study was approved by the Amasya University Non-Invasive Clinical Research Ethics Committee on 05/15/2020 with the project number 15386878-044. All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.
Etik Kurul Onayı: Bu çalışma Amasya Üniversitesi Non-İnvaziv Klinik Araştırmalar Etik Kurulu tarafından 05/15/2020 tarihinde 15386878-044 proje numarası ile onaylanmıştır. İnsan katılımcıların katıldığı çalışmalardaki tüm prosedürler, 1964 Helsinki Deklarasyonu ve daha sonra yapılan değişiklikler uyarınca gerçekleştirilmiştir.

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Abstract

Aim: The relationship between radiological data and the clinical outcomes in elderly patients with incomplete proximal humeral fractures treated conservatively is limited and controversial in the literature. We aimed to report the short-to-mid-term results of the radiological data and functional outcome in these patients.

Methods: A total of 114 patients over 65 years of age, diagnosed with unilateral isolated incomplete proximal displaced humerus fractures, and treated conservatively, were recruited in the study. Demographic characteristics, radiological data and clinical scores of all patients were recorded. Fractures were classified according to the Neer classification. Functional evaluation of patients was performed via Quick-Disabilities of Arm, Shoulder, and Hand (Quick-DASH) and Visual Analog Scale (VAS).

Results: Mean VAS and Quick-DASH scores of the patients were 3.6 (1.4) and 34.5(13.7), respectively, both of which changed significantly as the number of the parts of fracture increased (P=0.02 and P=0.04, respectively). The VAS and the Quick-DASH scores were significantly higher in females (P=0.02 and P=0.03, respectively), similar among the smokers (P=0.58 and P=0.41, respectively), and significantly higher in diabetic and osteoporotic patients (P<0.001 and P=0.39, respectively).

Conclusion: Functional outcomes after conservative follow-up in patients over 65 years of age with incomplete proximal humerus fractures are good in most patients. Therefore, conservative treatment can be an option regardless of the fracture type in elderly patients with incomplete proximal humeral fractures.

Keywords: Proximal humerus fractures, Conservative treatment, Elderly patients

Öz

Amaç: Literatürde radyolojik veriler ile klinik sonuçlar arasındaki bilgiler sınırlı ve tartışmalıdır. Konservatif tedavi edilen inkomplet proksimal humerus kırığı olan ileri yaş hastalarda radyolojik veriler ile fonksiyonel sonuçlarının kısa-orta dönem sonuçlarını incelemeyi amaçladık.

Yöntem: Çalışmamıza, konservatif olarak tedavi edilen, tek taraflı izole, inkomplet proksimal humerus kırığı tanısı almış 65 yaş üstü 114 hasta dahil edildi. Tüm hastaların demografik özellikleri, radyolojik verileri ve klinik skorları kaydedildi. Kırıklar Neer sınıflamasına göre sınıflandırıldı. Fonksiyonel sonuçların değerlendirmesi Quick-Disabilities of Arm, Shoulder, and Hand (Quick-DASH) ve Visual Analog Scale (VAS) ile yapıldı.

Bulgular: Hastaların VAS skorları ortalama 3,6 (1,4) ve Quick-DASH skorları ise 34,5 (13,7) idi. VAS ve Quick-DASH skorlarındaki fark sırasıyla kırığın parça sayısı arttıkça istatistiksel olarak anlamlıydı (P=0,02, P=0,04). VAS ve Quick-DASH skorları, kadınlarda sırasıyla istatistiksel olarak anlamlı daha yüksekti (P=0,02, P=0,03). Sigara içen grupta VAS ve Quick-DASH skorları sırasıyla istatistiksel olarak anlamlı değildi (P=0,58, P=0,41). VAS ve Quick-DASH skorları, diyabet ve osteoporozlu hasta grubu lehine sırasıyla istatistiksel olarak anlamlıydı (P<0,001, P=0,39).

Sonuç: Tam deplasmanı olmayan 65 yaş üstü humerus proksimal kırıklı hastaların konservatif takip sonrası ağrı ve fonksiyonel sonuçlar çoğu hastada iyidir. Bu nedenle ileri yaş proksimal humerus kırıklı hastalarda konservatif tedavi kırık tipinden bağımsız olarak bir seçenek olabilir.

Anahtar kelimeler: Proksimal humerus kırıkları, Konservatif tedavi, İleri yaş hastalar

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Introduction

Humerus fractures account for 4-5% of all fractures, and are the third most common after hip and Colles' fractures in elderly osteoporotic patients after a fall [1,2]. They are observed in approximately 260 of every 100 000 people a year, especially between the ages of 80 and 89 years. Around 80% of the cases are women and 87% are osteoporotic patients of older age who received low energy trauma [3]. Minimal displacement and/or angulation is observed in 85% of incomplete proximal humerus fractures and these patients are treated conservatively [4]. Functional outcomes after conservative treatment are often sufficient, but some patients are likely to feel residual pain [5]. The displacement of the diaphysis diameter by more than 50% and varus or valgus malposition of more than 20 degrees of the head-shaft angle are acknowledged as surgical treatment indications. There is not compelling evidence regarding whether conservative or surgical treatment is superior, especially in osteoporotic elderly patients [4, 6]. Surgical treatment may not always provide satisfactory results, even in elderly patients with incomplete proximal humerus fractures who absolutely required it. Due to the comorbid conditions of the patients, surgery can be risky, and surgical complications such as implant failure, nonunion, and infections may occur [7]. In the literature, conservative treatment is recommended instead of surgical treatment in elderly patients with incomplete proximal humerus fractures with angulation and/or displacement within acceptable limits [8-10].

Based on the limited literature, it wouldn't be wrong to argue that the relationship between the radiological data (displacement percentage, malposition of the fracture, and the number of parts of the fracture) and the clinical outcomes is controversial. Therefore, more studies examining the effect of radiological data and functional outcomes in elderly patients with incomplete proximal humerus fractures over 65 years of age are needed. Patients with surgical indications are excluded in the most studies. In the present study, however, we also included patients with incomplete proximal humeral fractures who did not accept surgical treatment or who could not be treated surgically due to high risk. In this study, we intended to examine the short-to-mid-term results of the radiological data and clinical results of elderly patients with incomplete proximal humeral fractures who had conservative treatment indications and could not be surgically treated.

Materials and methods

We recruited patients over 65 years of age, who were followed conservatively with a diagnosis of incomplete proximal humerus fracture between January 2015 and April 2019 in our outpatient clinic of Amasya University Sabuncuoğlu Şerefeddin Training and Research Hospital and whose fracture union was completed at the end of radiological examinations. Exclusion criteria included patients under 65 years of age, those with severe cognitive dysfunction who could not answer given questionnaires, those who died during the study period, patients with completely displaced fractures, and additional injury to the fractured extremity. Three patients were excluded from the study due to weakness in the fractured side because of cerebrovascular disease, two patients, due to a history of wrist fracture in the same extremity, and three patients, due to inadequate cooperation. Finally, a total of 114 patients whose fracture union was completed in radiographic evaluation at the time of last follow up, who were scheduled for surgery but could not be operated due to high risk (ASA 4) and/or the patient's disapproval were included. Demographic (age, gender, dominant extremity, smoking, diabetes, and osteoporosis diagnosis), radiological data, functional, and pain scores of all patients were recorded. Fractures were evaluated via direct anteroposterior (AP) radiography and 3D computed tomography (CT) at the time of admission and classified into one, two, three, and four parts according to the Neer classification [11]. All patients were followed up using the Velpeau bandage. The bandage was left in place between 4-6 weeks, depending on the patient's age and fracture type. We started passive pendulum exercises at intervals after the first week. At the end of the second week, active-assisted exercises were usually initiated as part of the home rehabilitation process. Depending on the patient's age and fracture healing, the Velpeau bandage was removed in 4-6 weeks, and active shoulder rum exercises were initiated.

Clinical evaluation of patients with a follow-up period of at least 1 year, along with Quick-Disabilities of Arm, Shoulder, and Hand (Quick-DASH) and Visual Analog Scale (VAS) scoring were assessed without measuring the radiological data of the fracture during evaluation [12]. According to the Quick DASH scale, the results were interpreted as mild if <25, moderate if 25-50, severe if 50-75, and most severe if > 75 [13]. According to the VAS scale, the results were assessed as painless (0), mild (1-3), moderate (4-6), and severe (7-10) [14].

Statistical analysis

SSPS version 22.0 statistical package program (SPSS Inc., Chicago, IL, United States of America) was used for statistical analysis of all data obtained. Whether Quick-DASH and VAS scores showed normal distribution was evaluated by the Kolmogorov Smirnov test. Independent sample t-test and Mann Whitney U tests were used for normally and non-normally distributed parameters, respectively. $P<0.05$ was considered statistically significant.

Results

A total of 114 patients with a mean age of 78 (7.7) years were included in our study. Among them, there were 75 (65.8%) females and 39 (34.2%) males. The right extremity was affected in 58 (50.9%) patients, and the left extremity was affected in 56 (49.1%) patients. Sixty-three (55.3%) patients had fractures in the dominant extremity. While less than 50% fracture displacement was observed in 80 (70.2%) patients, more than 50% fracture displacement was observed in 34 (29.8%) patients. According to the Neer classification, 75 (65.8%), 28 (24.6%), and 11 (9.6%) of the fractures were 2, 3 and 4-part fractures, respectively. The mean follow-up period of the patients was 29 (13) months. Fifteen patients (13.2%) were smokers, nine (7.9%) were diabetic, and forty-three (37.7%) were osteoporotic (Table 1).

The mean VAS and Quick-DASH scores were 3.6 (1.4) and 34.5 (13.7), respectively, both of which changed significantly as the number of the parts of fracture increased

(*P*=0.02 and *P*=0.04, respectively). The VAS and the Quick-DASH scores were significantly higher in females (*P*=0.02 and *P*=0.03, respectively), similar among the smokers (*P*=0.58 and *P*=0.41, respectively), and significantly higher in diabetic and osteoporotic patients (*P*<0.001 and *P*=0.39, respectively). Both scores were insignificantly higher in fractures in the dominant extremity (*P*>0.05) (Table 2).

Table 1: Demographic characteristics of patients

	n = 114	
Age*	78	(7.0)
Gender**		
Male	39	(34.20)
Female	75	(65.80)
Injury side**		
Right	58	(50.90)
Left	56	(49.10)
Displacement **		
>%50	34	(29.80)
<%50	80	(70.20)
Dominant Arm (Injury side) **	63	(55.30)
Parts of fracture **		
2 – part	75	(65.80)
3 – part	28	(24.60)
4 - part	11	(9.60)
Duration (months)***	29.3	(13.7)
Smoking**	15	(13.20)
Diabetes mellitus **	9	(7.90)
Osteoporosis **	43	(37.70)

n: Total cohort, * mean (standard deviation) age at the time of the survey, ** Number of patients (%), *** mean time (standard deviation) since fracture

Table 2: Relationship between patients' demographic characteristics and clinical scores

	n	Quick-DASH score		*P*-value	VAS score		*P*-value
		Mean	SD		Mean	SD	
Total	114	34.50	(13.73)		3.68	(1.45)	
Gender							
Male	39	30.65	(13.83)	0.033*	3.28	(1.35)	0.028*
Female	75	36.50	(13,33)		3.89	1.46	
Dominant Arm							
Yes	63	35.55	(12.61)	0.290	3.77	(1.36)	0.435
No	51	33,19	(15.03)		3.56	(1.56)	
Parts of fracture							
2 - Part	75	29.29	(11.81)	0.020*	3.14	(1.21)	0.040*
3 - Part	28	41.01	(11.05)		4.35	(1.16)	
4 - Part	11	53.45	(7.23)		5.63	(1.28)	
Smoking							
Yes	15	32.23	(14.97)	0.413	3.46	(1.45)	0.586
No	99	34.84	(13.58)		3.71	(1.45)	
Diabetes mellitus							
Yes	9	58.12	(2.97)	<0.001*	6.33	(0.70)	<0.00*
No	105	32.47	(12.32)		3.45	(1.26)	
Osteoporosis							
Yes	43	38.20	(13.80)	0.039*	4.09	(1.46)	0.039*
No	71	32.26	(13.29)		3.43	(1.40)	

n: Total cohort, **P*<0.05 values were considered statistically significant

Discussion

In the present study, pain and functional results of patients with unilateral isolated incomplete proximal humerus fractures over 65 years of age were evaluated. Patients had an adequate level of functional satisfaction in VAS scores (mean: 3.6 (1.4)), and moderate functional satisfaction in Quick-DASH scores (mean: 34.5 (13.7)). The reason why these results were acceptable in the elderly patients in our study may be related to the fact that elderly patients do not require a full glenohumeral motion, and normal shoulder joint function is not expected for daily activities, as stated previously in the literature [15].

The management of elderly patients with proximal humerus fractures is yet to be fully revealed, and it is challenging for orthopedic surgeons. If the fracture is minimally comminuted and/or displaced, it is treated conservatively [16,17], but the management of complex fractures is controversial. Although surgical treatment is generally recommended for patients with complex fractures, there is evidence to suggest that conservative treatment results are published [10,11,18-20]. In these studies, some authors reported that conservative treatment in complex fractures is a valid option for elderly patients, although the treatment does not ensure complete functional recovery [8,9,21,22]. Also, in different studies conducted by Zyto et al. [10,23], it is argued that conservative treatment is an alternate option despite lower functional scores and non-anatomic reduction of fractures in the last follow-up of patients.

The literature postulates that the effects of the number of parts of the fracture and the patient's age on the functional results of the patient are controversial. Hanson et al. reported that the number of parts of the fractures affects functional results [8]. Additionally, Court-Brown et al. [15] stated that patient age is another important factor affecting the functional scores of the patient. In another study, it has been shown that functional results are related to fracture type, but not age and follow-up period [17]. Yuksel et al. [21] reported that the number of fragment of fractures did not affect the functional status of the patient, but the results were better in patients under 65 years of age. In our study, although there was a statistically significant relationship between the number of parts of the fracture, pain and functional results of the patient, pain and functional results were satisfactory in all patients. The hemiarthroplasty option recommended in 4-part humerus fractures in the literature is also controversial. Although Neer recommends hemiarthroplasty in 4-part proximal humerus fractures, some authors did not find adequate shoulder movement and functional results after arthroplasty [24,25].

There has been no consensus on the rehabilitation program of patients with proximal humeral fractures who were conservatively treated [8,9,21,22]. The hanging cast, shoulder sling, or Velpeau bandage can be used in conservative follow-up. Although the hanging cast was considered to provide distraction in the fracture line, the results were not as expected. The superiority of the results of the studies on this subject has not been proven [11,26]. Therefore, we followed our patients with Velpeau bandage and recommended an exercise program.

Limitations

In the current study, we have two important limitations. The first one was that we could not compare the patients who required surgical treatment but were followed up conservatively to those who underwent surgery for the same fracture type. The second one was that our study results include short-medium term results, but long term results are not reported. Further research is required to investigate this topic.

Conclusion

Functional outcomes after conservative follow-up in patients over 65 years of age with incomplete proximal humerus fracture are good in most patients. Therefore, conservative treatment can be an option regardless of the fracture type in elderly patients with incomplete proximal humeral fractures.

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