Original article

Diagnostic value of clinical examinations in confirming fracture of elbow bones

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Abstract:

Introduction: Fractures and elbow dislocation are one of the most common injuries at different ages, especially in childhood and younger. Its approach to emergency centers is to perform such tests in a diagnosis of fractures or depression. Due to the high volume of the occurrence of such a disaster and its probable occurrence, especially in age groups and occupations, the study of radio graphics in any joint damage not only entails a high cost to the system of treatment, but also the consequences of radiation exposure to the patient. The purpose of this study was to evaluate the value of diagnosis of extension, supination, ecchymosis, hematoma and local tenderness in elbow injury in patients referred to Imam Khomeini Hospital in Sari..

Methods: This study is a prognosis test that evaluates the clinical findings of physical examination and imaging results in predicting elbow bone fractures in patients aged between 18 and 60 who suffer from blunt trauma referring to the emergency department of Imam Hospital. Initially, the first examinations of the patient's joint wound were assessed by assessing the range of motion including extension, supination, and pronation, as well as the presence of localized tenderness in radial head, ulna and epicondyle hemorrhoids, and examining the presence of ecchymosis and hematoma in the articular region by the expert Emergency medicine is done, the results of the examinations are recorded in the questionnaire form. Then, the standard geometry of the elbow joint is requested and the results are analyzed separately by the two radiologists. After collecting and entering the data, SPSS software version 18 was analyzed.

Findings: In this study, 85 patients (74.2%) were male and 36 female patients (29.8%) were referred to the emergency department of Imam Khomeini hospital in Sari, from 121 patients with blunt elbow trauma. The highest frequency was over the age of 50 years (25.6%).
The most frequent causes of injuries were pedestrians (57.9%). Extension limitations in the elbow joint were the most frequent among the patients, and the lowest observed sign was also in localized sensitivity in the epicondyle site of the bone arm. The greatest fracture was observed in the radius of the elbow joint, which was seen in 19.8% of the subjects. The least fracture in the proximal bone marrow was observed in 5% of the patients referred. The specificity and sensitivity values for extensions of 49.1 and 69.7 were calculated.

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Conclusion: We conclude that patients with a recent injury to the elbow who are not able to extend the elbow joint predict with specificity and high sensitivity of the fracture of the elbow bones and also increase the clinical suspicion of the doctor without the use of Para clinic (radiography) In contrast to other examinations, such as hematoma and ecchymosis, there is less diagnostic value to predict the fracture of the elbow joint bones.

Keywords: Radiography, clinical findings, elbow joint

Introduction:

Fractures and elbow dislocation are one of the most common injuries of different ages, especially in childhood and young age, which occurs mainly during exercise or falling from height or fall from the level of the par. During a game, for example, falling from a skate or a collision or collapse occurs during a football (1, 2).

The injuries mentioned are divided into several categories: joint dislocation, distal humerus fracture, proximal radial and ulna, or a combination of the above. In addition, the types of fractures inside and outside the joint surface are also defined that the first one can be accompanied by partial or complete lesions (1,3).

Dislocation of elbow joint or radial radial head, can occur as a single injury or in combination with a fracture, in the forearm of the radial head and neck fractures, while the typical and non-typical damage of montagia has its own definition Damage to this area (4-6).

The most common approach in emergency centers in such cases is to perform a graph in several different modes (at least two faces) to diagnose fractures or depression. Considering the high volume of the occurrence of such a disaster and its probability of occurrence, especially in certain age groups and occupations, such as professional athletes, no radiographic examination of any impact on the joint, regardless of severity, mode of entry and post-traumatic status It only adds a lot to the treatment system, but the consequences of exposure to the radiation one or more times are also imposed on the patient (2,7,8).

During previous studies, although there has been a sporadic study of joint swelling and reduction of the range of motion, general conclusions have not been given on the total amount of post-traumatic evidence, especially ecchymosis and hematoma (9).

Although the patient's age, his physical condition, and a brief history of how the injury to the elbow could contribute to the overall understanding of the severity of the injury, but the absence of any specific academic criteria for the diagnostic procedures for joint damage, led us to consider during the study. Based on the detailed position after injury and the comparison of extension, supination, pronation, ecchymosis, hematoma and localized tenderness with routine findings in emergency centers, decide on the methodology for predicting injury.

Obviously, the significance of the relationship of any of the manifestations mentioned with bone injury or depression, its applicability to the presupposition of probable bone prediction in patients with blunt elbows trauma, will occur; the prognosis of the blow will be proven, and in ultimately, might be able to define criteria for taking elbow graphs.

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Methods:

This study is a prognosis test that will determine the clinical findings in predicting bone fractures in elbow joints in patients aged 18-60 years old with blunt trauma referring to emergency department of Imam Khomeini Hospital in Sari.

Patients aged 18-60 years with a blunt elbow trauma who referred to the Emergency Center of Imam Khomeini Hospital in Sari were included.

Exclusion criteria:

Dissatisfaction with participation in the study, previous fracture of the elbow, previous deformity in the elbow joint, inflammatory and inflammatory disease of the elbow, neuromascular disease, shock, GCS <14, distractive pain, gastric bypass after completion of the study. According to the study Pilot experiments performed in emergency department on 100 patients with multiple distressing trauma patients had 45 cases of trauma in the elbow region.

Initially, the first examinations of the patient's joint wound were assessed by assessing the range of motion including extension, supination, and pronation, as well as the presence of localized tenderness in radial head, ulna and epicondyle hemorrhoids, and examining the presence of ecchymosis and hematoma in the articular region by the expert Emergency medicine is done, the results of the examinations are recorded in the form of a questionnaire we have already provided. Then, the standard geometry of the elbow joint is requested and the results are reviewed and interpreted separately by the two radiologists.

After collecting and entering data, SPSS software version 18 was used to test the percentile frequency, standard deviation (SD), and Mean, and to examine the relationship between other variables from the chi square - test and the diagnostic test of sensitivity and specificity as well as rock curves (to determine the sensitivity of the diagnostic method to the standardized standard). In all calculations, $p < 0.05$ will be considered as a significant level.

Findings:

121 patients suffering from blunt elbow trauma and referred to the emergency department at Imam Hospital in Sari were ranked according to age in eight categories, with the highest incidence of over 50 years old (25.6%). 85 were male patients (70.2%) and 36 female patients (29.8%).

Based on the cause of the damage, they were divided into 6 groups of car, motorcycle, pedestrians and collisions with vehicles, direct impact, collapse and other mechanisms. The most frequent rate was for pedestrians (57.9%). The study showed that among the patients, limitation of extension in the elbow joint was the most frequent among the patients, and the smallest observed sign was also in localized sensitivity in the epicondyle site of the bone arm.

The results showed that among the patients, the greatest fracture was observed in the radius of the elbow radius, which was seen in 19.8% of the subjects. The least fracture in the proximal bone marrow was observed in 5% of the patients referred.

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Logistic analysis of data shows that in examining each of the clinical factors at the error level of 0.05, the restriction of extension in the elbow joint, flexion restriction in the elbow, limitation of pronation in the elbow, supination restriction in the elbow joint and ecchymosis in the site. The elbow joint has a significant relationship with fracture. The values for specificity and sensitivity are calculated for each variable.

Discussion:

Elbow damage is one of the most common complaints of adults and children referring to the traumatic emergency, and about 2-3% of the causes are due to the emergency department, most of whom are placed under radiography for examination of fractures, About 30-40% of these people are clearly fractured in terms of clinical examination and do not need to perform graphing, and on the other hand, some studies show that about 10% of fractures are not detected despite the possibilities and taking pictures (10,11).

There are standardized standards for the relationship between clinical examinations of lesions and fractures on the knees and ankles, and from years ago, studies have been done on the use and importance of the type of clinical findings and manifestations of injury for fracture suspect and requests for radiography, and then confirmation of diagnosis on the knees and ankles. For example, in a study published in 1991, 32 standardized clinical variables such as ecchymosis, movement constraints, swelling and localized tenderness in various ankle sections, such as internal and external moles, tibia and fibula distal, and other parts The anatomical ankle has been evaluated and evaluated by an emergency medicine specialist prior to the request of radiography in over 750 patients suffering from ankle blunt trauma, such as falling, ankle sprain, and an accident with the vehicle. The provided form was entered. Then, standard ankle and foot radiographs were performed on these patients. Of these patients, 70 had a serious malleolus fracture and 32 had severe fractures in midfoot (12). Data analysis showed that the percentage of evaluable factors in the clinical examination, such as movement constraints, incontinence of foot weight, local swelling in different ankle parts, such as internal and external malleolus, and bone tenderness in proximal fibula, external males and There is statistically significant difference between the two groups in patients with serious fracture in malleolus and non-fracture. However, the percentage of ecchymosis, soft tissue tenderness and swelling in the pathway of the anterior thalo fibular ligaments and the anterior ankle joint in both groups with serious fracture in malleolus and non-fracture is statistically different.

Similar analyzes were performed on serious fractures in midfoot and non-fracture groups. The results of this analysis also showed that the percentage of occurrence of clinical examination criteria, such as ecchymosis, bone tenderness in the metatarsal region was significantly higher in the five groups with significant fracture compared to those who did not have fractures. However, the criteria for intolerance to weight loss on foot and bone tenderness in the buccal area of the hiccoboid and navicular are not different in

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the two groups (12,13). Similar studies have been done in this field, and even the first criteria for lower limb injuries repeatedly evaluated repeatedly (10).

Hawsworth and Freeland and Docerty et al. examined the inability to extend the elbow. They found that limitation in prediction of fracture in prediction of high sensitivity (97.7% -7.7%) predicted. In this study, the sensitivity of the test was 7.69% which is similar to other studies (14,15).

In two studies, more entry criteria were used and a small population entered the study. For this reason, the study has a different sensitivity to this study. In the study of Hawskworth and Freeland, the examination was divided into two general categories (active and Patio). In addition, any disease with elbow injury was included at any time, while in this study, each elbow injury that was taken up to a maximum of 24 hours (14,15). In a large retrospective study, Appleboan and his elbow extension extras have been identified as a tool to rule out elbow fractures. The study included more than 2,000 participants, and included 2 adults and children. The secondary objective was to investigate the presence of fracture in radiography or the need for follow-up (16).

Of the 778 children who participated in this study, 37% of them had complete elbow extension. Their sensitivity was 93.7%, the specificity of elbow extension was 54.8%, and the negative predictive value was 93.7%, all of which the results of this study were higher.

Given that these studies differed in terms of entry and exit criteria, therefore, they may affect the indexes and, given that the scientific definition of extension was similar in the two studies, the same results were obtained (16).

In a recent study, Lennon et al. found interesting findings based on logistic regression analysis (17).

They found that flexion and normalization of normal sputum with a high sensitivity to normal and non-FX radiography.

Therefore, they suggested that patients with normal range motion in normal motor motion range predict normal radiography, and the high sensitivity of the restriction in ROM is the presence of fracture in the elbow, in addition, the tenderness of the sensitivity and specificity point for prediction of fracture recovery he does not give.

Also, in this study, variables such as localized sensitivity in the open epicondyle site and hematoma of the elbow joint were studied, which was statistically significant with fracture. Since these variables have not been studied in other studies, it seems that future studies can confirm this finding and use it to predict the fracture of the elbow bones.

In the study of Baker et al., The sensitivity and specificity of the range of elbow range in elbow damage were studied, which was examined in most of the four variables (18).

Conclusion:

This research focuses on assessing the diagnostic value of clinical diagnosis and biopsy in the diagnosis of bone fractures in the elbow joint and compares it with similar parameters in Para clinic. This study showed that although some clinical examinations, such as amplitude and extension, have a high diagnostic sensitivity to other clinical examinations, compared with the results of

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the graph, Para clinic is still a golden standard in the hospital for diagnosis. Such damage is at a higher level. However, the extent to which clinical suspicious clinical examinations can be used in special situations such as emergency rooms, in particular the crowded and overweight patients, and in order to accelerate the process of work and waste of time, will require further studies and study of larger populations in Different treatment centers can be used to repeat such results, with high probability of diagnosis under direct orthopedic consultation and speeding up diagnostic and therapeutic procedures in emergency patients.

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Tables and Charts:

Table 1. Gender distribution of patients

percent	frequency	
2.70	85	male
8.29	36	female
0.100	121	total

Table 2. Distribution of patient age

percent	frequency	
7.4	9	Less than 20
14.0	17	21-25
11.6	14	25-30
9.9	12	31-35
12.4	15	36-40
6.6	8	41-45
12.4	15	46-50
25.6	31	More than 50
100.0	121	total

Table 3. Frequency distribution of cause of injury

percent	frequency	Cause of damage
.8	1	Others

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3.3	4	Fall
1.7	2	Car
.8	1	Direct blow
57.9	70	pedestrian
35.5	43	Motorcycle
100.0	121	Total

Table 4. Distribution of Clinical Symptoms in Patients with Blunt Trauma Referring to Emam Hospital, Sari Hospital

yes		**no**		**Clinical Examination Variable**
percent	**frequency**	**percent**	**frequency**	
61.2	74	38.8	47	Extension limit on elbow joint
30.6	37	69.4	84	Limitation of flexion in the elbow joint
38.8	47	61.2	74	Pronation limitation in the elbow joint
24.0	29	76.0	92	Suppression limit on the elbow joint
43.0	52	57.0	69	Sensitivity to the local touch in the radius of the bone
14.0	17	86.0	104	Sensitivity to the local touch at the epicondyle site of the bone
36.4	44	63.6	77	Hematoma at the site of the elbow joint
21.5	26	78.5	95	Ecchymosis at the site of the elbow joint

Table 5. Distribution of fracture type in patients with blunt trauma referring to emergency department of Imam Hospital, Sari

yes		**no**		**Type of injury**
percent	**frequency**	**percent**	**frequency**	
19.8	24	80.2	97	Fracture of the radius of the joint of the elbow

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5.0	6	95.0	115	Fracture of the distal bone of the arm
7.4	9	92.6	112	Proximal fracture of the radius of the bone
3.3	4	96.7	117	Proximal fracture of the ulna
7.4	9	92.6	112	Combination fracture of the arm bone

Table 6. Relationship between Proximal Bone Fracture Radius and Clinical Findings in Patients with Blunt Trauma Referring to Emam Hospital, Sari Hospital

Sensitivity	specificity	95.0% C.I.for EXP(B)		odds ratio	P-Value	Bone fx				Clinical exam	
						yes		no			
		Upper	Lower			percent	frequency	percent	frequency		
69.7	49.1	4.672	1.053	2.218	.036	30.3	20	49.1	27	no	Extension limit on elbow joint
						69.7	46	50.9	28	yes	
40.9	81.8	7.237	1.341	3.115 .867	.008	59.1	39	81.8	45	no	Limitation of flexion in the elbow joint
						40.9	27	18.2	10	yes	
59.1	85.5	20.788	3.464	8.486	.000	40.9	27	85.5	47	no	Propagation limitation in the elbow joint
						59.1	39	14.5	8	yes	
34.8	89.1	11.726	1.627	4.368	.003	65.2	43	89.1	49	no	Suppression limit on the elbow joint
						34.8	23	10.9	6	yes	
100.0	.0	1.961	.462	.952	.893	57.6	38	56.4	31	no	Sensitivity to the local touch in the radius of the bone
						42.4	28	43.6	24	yes	
34.8	80.0	4.918	.931	2.140	.073	65.2	43	80.0	44	no	Local

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						34.8	23	20.0	11	yes	allergic sensation in proximal bone ulna
87.9	16.4	1.971	.252	.705	.505	87.9	58	83.6	46	no	Sensitivity to the local touch at the epicondyl site of the bone
						12.1	8	16.4	9	yes	
42.4	70.9	3.839	.840	1.796	.131	57.6	38	70.9	39	no	Hematoma at the site of the elbow joint
						42.4	28	29.1	16	yes	
30.3	89.1	9.624	1.310	3.551	.013	69.7	46	89.1	49	no	Echymosis at the site of the elbow joint
						30.3	20	10.9	6	yes	

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