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## ANALYSIS OF THE LONG-TERM RESULTS AFTER PRACTICE IN PATIENTS WITH PROXIMAL HUMERUS FRACTURE

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**Relevance of the topic.** Fractures of the proximal part of the humerus account for 5-6% among injuries to the human musculoskeletal system, up to 50 of per 100,000 inhabitants, however, according to statistics from the last 30 years, this pointer has been observed to grow several times. Usually, injuries of this type occur mostly in older (over 50-60 years old) patients, most often against the background of osteoporosis, and according to the mechanism of injury, they occur as a result of a low-energy injury.

In injuries of the proximal part of the humerus, the mechanism of cross-linking of the shoulder girdle is disrupted, and it becomes difficult to restore the functional activity of the shoulder joint. As a result of research by scientists, in addition to restoring the anatomical axis and length of the humerus in fractures of the proximal part, the idea is being pushed forward that it is necessary to restore the normal anatomical attachment points of the rotator cuff of the proximal part of the humerus, otherwise, as a result of fractures, it will not be possible to restore the full functionality of the shoulder joint.

Fractures of this type lead to subacromial impingement syndrome and limitation of range of motion in the shoulder joint, resulting in pain syndrome for many years and a significant impact on patients' lifestyle.

Development of new less-injury methods of osteosynthesis in proximal epimetaphyseal fractures of the humerus, which, not only ensures reliable fixation of bone fragments, but also completely restores its anatomy, remains one of the urgent tasks of modern traumatology. In recent years, using less-injury bone-top plates in a closed manner with specialized implants have been increasingly competing with blocking intramedullary osteosynthesis. An analysis of the available literature shows that in fractures of the proximal part of the humerus, there is not enough data on the use of extramedullary osteosynthesis methods to reposition bone fragments in a closed way and achieve sufficient stability.

**The purpose of the study.** Improving the results of treatment by developing a extramedullary minimally invasive method in fractures of the proximal part of the humerus.

**Material and examination methods.** 105 patients with one- and multiple-fragment fractures of the proximal part of the humerus were taken into this practise in Republican Scientific Center of Emergency Medical Care of Bukhara branch.

According to the gender of patients, 45 patients were men and 60 patients were women. The duration of injury was on average  $6.2 \pm 1.4$  days (from 3 to 8 days). All patients underwent standard clinical and radiological examination methods before practise.

The Neer (1970) classification was used in order to assess the severity of the injury and the condition of the bone fragments due to the observation of multiple fragmented fractures in patients (Table 1).

**Table 1. Division of patients with proximal humerus fractures according to the Neer classification**

		One fragment	Two fragment	Three fragment	Multiple fragment
Fracture of the humerus from the anatomical collum anatomicum		10 (9,5%)	7 (6,7%)	-	-
Fracture of the humerus from the collum chirurgicum		12 (11,4%)	13 (12,4%)	25 (23,9%)	30 (28,6%)
Fracture of the tuberculum majus		-	-	-	-
Fracture of the tuberculum minus		-	-	-	-
Breakouts	Front	-	5 (4,7%)	-	-
	Back	-	-	3 (2,8%)	-

As can be seen from table 1, most of the patients fell into the category of fracture of the humerus from the collum chirurgicum, which 12 (11.4%) had one fragment, 13 (12.4%) had two fragments, and 25 (23.9%) had three fragments and the remaining 30 (28.6%) were diagnosed with multi-fragment fractures. Patients who were taken for all the research work were offered a surgical procedure. Patients were examined in the research work, divided into 2 groups: in the main group – in 65 patients in order to reduce the invasiveness of the surgery for fractures of the proximal part of the humerus, surgery method - supraosseous osteosynthesis using a minimally invasive plate and to achieve adequate reposition of bone fragments using an easy, less-injury external repositioning device, which was developed in our clinic, was performed. Comparative group - 40 patients, in which the treatment methods were repositioning of bone fragments and treatment in a plaster bandage, open repositioning of bone fragments and fixation with screws, and osteosynthesis of bone fragments with the help of bone plates in the traditional way.

We considered the period after surgery to be "long-term", and evaluated the results obtained by analyzing the results of the constant scale (Constant Shoulder Score) indicators, which made it possible to assess the clinical and functional capabilities and rotator function of the shoulder joint.

**Research results.** In total, in 105 patients, muscle electroneuromography of shoulder was carried out and the results obtained were analyzed.

**Table 2. Analysis of the results of the assessment of the clinical and functional capabilities of the shoulder joint on the constant scale (Constant Shoulder Score)**

Clinical criteria	Scores	Groups		
		Main group (n=65)	Comparative group (n=40)	P
<b>Pain</b>	0	0	0	
	5	0	3 (7,5%)	
	10	6 (9,2%)	7 (17,5%)	
	15	59 (90,8%)	30 (75%)	
M±m		14,2±0,75	11,4±1,5	<0.01****
<b>Activity level</b>	Yes(2) No(0)	65/0	28/12	
	Yes(4) No (0)	60/5	30/10	
	Yes (4) No (0)	63/2	26/14	
M±m		9,3±0,65	7,4±1,4	<0.02***
<b>Level of arm lift</b>	2	0	0	
	4	0	0	
	6	0	2 (5%)	
	8	9 (13,8%)	12 (30%)	
	10	56 (86,2%)	26 (65%)	
M±m		8,9±0,9	7,2±1,7	>0.05*
<b>Force of extension (0,5 kg)</b>	0	0	0	
	2	0	0	
	5	0	0	
	8	0	1 (2,5%)	
	11	0	3 (7,5%)	
	14	0	2 (5%)	
	17	3 (4,6%)	2 (5%)	
	20	6 (9,2%)	4 (10%)	
	23	8 (12,3%)	8 (20%)	
	25	48 (73,9%)	20 (50%)	
M±m		23,7±1,7	18,9±1,4	<0.001*****
<b>Movement capacity</b>				
<b>Bending</b>	0	0	0	
	2	0	0	
	4	0	3 (7,5%)	
	6	0	5 (12,5%)	
	8	8 (12,3%)	8 (20%)	
	10	57 (87,7%)	24 (60%)	
M±m		9,2±0,64	7,7±1,3	<0.05**
	0	0	0	



<b>Stretching</b>	2	0	0	
	4	0	2 (5%)	
	6	0	6 (15%)	
	8	9 (13,8%)	12 (30%)	
	10	56 (86,2%)	20 (50%)	
M±m		8,8±1,4	6,9±1,1	>0.05*
<b>External rotation</b>	2	0	0	
	4	0	0	
	6	0	6 (15%)	
	8	11 (16,9%)	16 (40%)	
	10	54 (83,1%)	18 (45%)	
M±m		8,9±1,1	7,1±1,7	<0.02***
<b>Internal rotation</b>	0	0	0	
	2	0	0	
	4	0	1 (2,5%)	
	6	2 (3,1%)	7 (17,5%)	
	8	6 (9,2%)	9 (22,5%)	
	10	57 (87,7%)	23 (57,5%)	
M±m		8,9±0,78	7,2±1,5	<0.02***
<b>Constant Scale in Total:</b>				
Difference between healthy and injured hands: >30 – bad		0	0	
21-30 – satisfactory		0	4 (10%)	
11-20 – good		7 (10,8%)	12 (30%)	
<11 –excellent		58 (89,2%)	24 (60%)	
Maximum 100 points.		93,7±2,8	80,9±4,7	<0.001*****

Note! \* - the results are unreliable. \*\* - the results are weakly reliable. \*\*\* - the results are moderately reliable. \*\*\*\* and \* \* \* \* \* - the results are highly reliable.

According to Table 2, long - term results after practice in patients with fractures of the proximal part of the humerus were evaluated according to the constant scale (Constant Shoulder Score) criteria-pain, level of activity, level of arm lift, force of extension, flexion in the shoulder joint, stretching, internal and external rotation. A comparative analysis of the results obtained was carried out.

"Pain" syndrome was defined in most 59 (90.8%) of the 65 main group's symptoms by "no pain" criteria, and in the remaining 6 (9.2%) by "moderate pain" criteria. In the comparative group, however, the number of patients according to the "no pain" criterion was 30 (75%) people, "moderate pain" – 7 (17.5%) and "severe pain" - 3 (7.5%). In the ratio of points, there is a criterion of reliability in the results obtained ( $P<0.01$ ).

In the long after-practice periods, a significant increase in the "activity level" of patients in the main group in high indicators (above 90%) was found, and in the

comparative group in 25-35% of cases, the level of activity was very slow, and the results obtained set a high reliability criterion ( $P < 0.02$ ).

When we evaluated the mobility of the upper limb in patients according to the "level of hand raising" criterion, it was found that 56 (86.2%) patients could lift it from the head to the top, and 9 (13.8%) patients could lift it up to the ear pad, while in the comparative group, in contrast, the indicators according to the above criteria were significantly lower and 2 (5%) patients were found to be able to lift it up to the neck. The reliability criterion was not determined in the results ( $P > 0.05$ ).

In the post-practice period, the upper limb shoulder area muscle strength was assessed by applying loads, in which the patients of the main group were able to move their hand away with a load of 10-12 kg, while in the comparative group there was a significant shortage of patients who could stretch their hands with a load of 10-12 kg. In 6 (15%) patients, it was found that they could extend their arm with a load of 3.5-7.5 kg.

The possibility of movement in the shoulder joint was assessed using the indicators of the criteria "bending", "stretching", "internal rotation", "external rotation" in the shoulder joint.

When we analyzed the indicators of the "bending" criterion in the shoulder joint, it was found that in the main group, the level of bending in the patients was 120-180 degrees, in the comparative group, the patients with this indicator were less than in the main group, and in 8 (20%) patients, the bending in the shoulder joint was 60-120 degrees. Weak degree of reliability was determined in the results ( $P < 0.05$ ).

The analysis of indicators of the degree of "stretching" of the upper limb in the shoulder joint showed 151-180 degrees in 56 (86.2%) cases of 65 main group patients and 121-150 degrees in the remaining 9 (13.8%) patients. In the comparison group, 20 (50%) patients had 180-151 degrees, 12 (30%) patients 121-150 degrees, 6 (15%) patients 91-120 degrees and 2 patients (5%) of 61-90 degrees were identified in clinical cases. The mean score was  $8.8 \pm 1.4$  in the main group and  $6.9 \pm 1.1$  in the comparative group, and reliability criterion was not determined ( $P > 0.05$ ).

Most patients on "external rotation" in the upper limb shoulder joint showed high performance in points, the average obtained score was  $8.9 \pm 1.1$  in the main group and  $7.1 \pm 1.7$  in the comparative group, and the results obtained set a high level of reliability criterion ( $P < 0.02$ ).

According to the implementation of the "internal rotation" movement in the shoulder joint, 57 (87.7%) patients were able to carry their hands "up to between the shovels", 6 (9.2%) – "up to the XII vertebrae" and the remaining 2 (3.1%) patients to the III lumbar spine. In the comparative group, it was found that there were significantly fewer patients by the above criteria and 1 (2.5%) patients could carry up to a "lumbosacral joint", a criterion of high reliability was determined in the difference of results ( $P < 0.02$ ).

After the analysis of all clinical criteria, the sum of the points was determined. A comparative analysis of the results of the average value was conducted in these patients, taking into account the results of their healthy limbs, in which the difference in 58 (89.2%) patients of the main group smaller than "<11" was "excellent" and in the remaining 7 (10.8%) people the score difference was "11-20" and was assessed as

a "good". In the comparative group, however, "excellent" was found in 24 (60%) people, "good" in 12 (30%) and satisfactory (difference 21-30 points) in 4 (10%) patients. In the main group, the sum of points was  $93.7 \pm 2.8$ , in the comparative group  $80.9 \pm 4.7$ , and in the results obtained, a criterion of high degree of reliability was determined ( $P < 0.001$ ).

#### Conclusions:

1. The actuality of fractures of the proximal part of the humerus is explained not only by its high frequency of occurrence, but also by the fact that it can cause early disability after a number of treatment methods.

2. Comparative analysis of long-term clinical and functional results after various treatment methods for fractures of the proximal part of the humerus shows a number of positive and advantageous aspects of supraosseous osteosynthesis surgery with a minimally invasive plate using an external distraction device developed in the clinic. It can be considered as one of the rational methods of modern traumatology.

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