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ALGORITHM FOR THE SELECTION OF TREATMENT TACTICS FOR ACROMIAL END INJURIES OF THE CLAVICLE.

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Abstract:

The authors have developed an algorithm and device for the treatment of damage to the acromial end of the clavicle. The developed algorithm for surgical treatment tactics and a device for treating damage to the acromial end of the clavicle has been introduced into practice. The results of treatment of 120 patients with fractures and fracture-dislocations of the acromial end of the clavicle, treated with various types of osteosynthesis, were studied. The results of surgical treatment of clavicle fractures were monitored for up to one year after removal of the device. Errors and complications in the applied options for surgical treatment of the clavicle are analyzed. Comparative assessments are given for each used variant of clavicle osteosynthesis. It was revealed that external osteosynthesis with the developed device against the background of the application of the developed algorithm for choosing a treatment method had the greatest positive results. (94.3%),

Keywords: damage to the acromial end of the clavicle, surgical treatment algorithm, evaluation of treatment results.

IMPORTANCE. Based on the information given in the literature, dislocation of the acromial end of the clavicle (AEC) occurs in 6.7% to 26.1% of all dislocations of skeletal bones, and fractures are much less common [1,2,3]. AEK injuries are more common in young and able-bodied people between 20-50 years of age[4,5]. First of all, it is most common in men engaged in physical labor and sports [2]. In 4.2-5.0% of cases, clavicle fractures are accompanied by damage to the ligamentous apparatus of the acromioclavicular joint. According to modern literature sources, dislocations of the acromial end of the clavicle (AEC) occupy the 3rd place in frequency among all dislocations in the structure of injuries to the locomotor system.

Specialists have long known the method of closed reduction of the clavicle with transarticular fixation of the ACC with pins. Osteosynthesis with pins is easy to perform and is certainly low-traumatic, which is why it has found many supporters [9,10]. However, the method has such disadvantages as the need to use external immobilization in the postoperative period, migration and fractures of the pins, and the impossibility of eliminating tissue interposition [10]. Many authors began to use more massive fixators in the form of various rods to eliminate the disadvantages of osteosynthesis with pins [11]. Despite this, their use in practice did not solve the problem of migration of the metal structure. Many specialists widely used bone plates, various metal structures and their modifications, L-shaped fixators, fixators in the form of brackets for osteosynthesis of the acromioclavicular joint [8,9,10]. Fade G.E., Scullion J.E., (2002) [11] developed a hook-shaped plate for fixation of the acromial end of the clavicle. However, despite the above advantages, the hook-shaped plate has a number of disadvantages, such as long-term trauma to the acromion by the distal part of the plate. In this regard, many authors recommend observing such patients and removing the structure no later than 3 months [5,7]. The most common method of fixing the ACC with a hook-shaped plate is also a rigid method that is highly traumatic and requires a repeat operation to remove the implant. When using it, a high frequency of recurrent ACC dislocation, migration and fractures of the fixator is noted. Both surgical and conservative methods of treating this pathology are widely presented in the literature. The number of unsatisfactory results of surgical treatment reaches 17% [4,6]. Despite the widespread prevalence of clavicle injuries, there is still no single tactic in choosing a treatment method.

PURPOSE OF THE STUDY: To develop an algorithm for choosing tactics for treating injuries to the acromial end of the clavicle that allows optimizing surgical treatment in patients with injuries to the acromial end of the clavicle.

MATERIAL AND METHODS. A total of 120 patients with fractures and fracture-dislocations of the acromial end of the clavicle were examined. They underwent surgical treatment in the clinic of the Republican Specialized Scientific and Practical Center for Traumatology and Orthopedics from 2019 to 2024. The age of the patients ranged from 18 to 60 years. There were 82 men (68%), 28 women (22). Based on the classification of acromial end damage to the clavicle by

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S. Rockwood, we developed an algorithm for choosing the tactics of treating acromial end damage to the clavicle. (DGU No. 387. 01.06.2024) The program is designed to select the tactics of treating acromial end damage to the clavicle. and allows you to determine the optimal surgical intervention for each specific type of damage.

The algorithm of diagnostics and selection of treatment tactics is carried out in the following order:

- All patients with damage to the acromial end of the clavicle are delivered to the emergency department;
- Patients with damage to the ACJ present: Complaints: pain, which is accompanied by swelling in the upper part of the shoulder;
- Symptoms: during palpation to assess the presence and severity of pain, dysfunction of the upper limb, limitation of movement in the shoulder joint.
- Diagnostics of damage to the acromial end of the clavicle: clinical and radiological. MRI, MSCT studies;
- Radiography bilateral panoramic radiographs with load and axial radiographs are reliable methods for assessing damage to the acromioclavicular joint;
- Ultrasound to detect the presence of a complete or partial rupture of the AC ligament, the presence of hematomas in the articulation area, the condition of the surrounding vessels;
- MRI - allows you to differentiate ligament sprains from ligament ruptures and fascia damage, as well as identify concomitant intra-articular pathologies of the shoulder joint;

The choice of treatment method depends on the nature of the damage to the acromial end of the clavicle.

The choice of treatment method was based on the classification of damage to the acromial end of the clavicle by S. Rockwood. This made it possible to determine the optimal surgical intervention for each specific type of damage.

The algorithm for choosing a treatment method based on the S. Rockwood Classification is as follows:

Type I - Mild sprain of the AC, localized tenderness and swelling, limited range of motion due to pain. Treatment: Sling bandage for a week, medication.

Type II - The capsule and the AC are partially torn. X-ray, ultrasound and MRI are performed. Treatment: Plaster cast for 2 weeks. Plastic surgery is not indicated in these cases.

Type III - Rupture of the capsule, AC and CC, subluxation of the clavicle. Performed: X-ray, ultrasound and MRI. Surgical treatment: Closed reposition with subsequent wrapped fixation with pins or screws, open plastic surgery of the acromioclavicular joint.

Type IV- damage (complete rupture) of the AC, X-ray, ultrasound and MRI are performed. Surgical treatment. Splinting of the joint with a hook plate without opening the joint and plastic surgery of the ligaments of the clavicular-acromial joint.

Type V - rupture of the entire AC of the acromioclavicular joint. The following is performed: X-ray, ultrasound and MRI. Surgical treatment: splinting of the joint with a hook plate, plastic surgery of the ligaments of the acromioclavicular joint is supplemented by plastic surgery of the coracoclavicular ligament. Resection of the acromial end of the clavicle is justified only if it is impossible to eliminate the dislocation.

Type VI – in case of dislocation, there is a displacement of the distal end under the coracoid process behind the biceps tendon. This type of injury is extremely rare and is usually associated with other injuries and requires surgical intervention.

We have developed a device for the treatment of fractures of the acromial end of the clavicle. (FAP 2022 0214 09.06.2022)

The device for the treatment of dislocations and fractures of the acromial end of the clavicle is made in the form of a plate with holes, and: one end of the plate is rounded, and the opposite end is made with three teeth with pointed ends, two of which are made symmetrically perpendicular to the axis of the plate, and the third is made in the longitudinal direction.

We divided patients with clavicle injuries into a main and control group depending on the method of surgical treatment, and performed an analysis in each group separately.

Patients in the main group (n=35) were operated on using our algorithm for selecting treatment tactics using an external device (FAP 2022 0214 09.06.2022)

and in the control group (n=85) - using the traditional generally accepted technique (intramedullary osteosynthesis with a needle). Both groups were equivalent in terms of gender, age, and type of fractures. The age of patients ranged from 16 to 64 years. The average age in the main group was 31.2±11.19 years, in the control group - 32.1±10.8 years. A new method of external osteosynthesis of the clavicle has been developed and used in the Uzbek Scientific and Practical Center for Traumatology and Orthopedics (RSPMCTO) since 2021.

When assessing the results of treatment of clavicle injuries, we used the modified Constant-Murley Shoulder questionnaire. The results of the questionnaire based on the modified Constant-Murley Shoulder questionnaire were assessed as follows: 0-3 points – good; 3-6 points – satisfactory; 7 or more points – unsatisfactory.

Pain	Баллы
No	0

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During physiological physical exertion	1
With significant physical exertion	2
At minimal loads or at rest	3
Limitation of movement in adjacent joints	
No restrictions	0
Restrictions that do not interfere with the usual way of life and professional activity	1
Restrictions that lead to changes in the usual way of life	2
Rough restrictions	3
Soft tissue condition	
Norm, "normal" postoperative scar	0
Mild swelling, edema, increasing after physical activity	1
Swelling at rest	2
Hypertrophic postoperative scar, skin maceration	3
Satisfaction with the cosmetic result	
Yes	0
No	1
Психологический комфорт	
Yes	0
No	1
Numbness in the collarbone area or along the anterior-upper surface of the shoulder	
Yes	1
No	0
Total	

The examination of patients in the late postoperative period involved mandatory clinical examination, questionnaires and radiographs. Results and discussion. Using the proposed osteosynthesis method in the treatment of clavicle fractures, we compared the immediate and late results of surgical treatment in 120 patients with fractures of this localization. Analysis of the length of hospital stay showed that before the operation, patients in both groups were treated equally, and there were differences in the duration of treatment after surgery. The examination of patients in the late postoperative period involved mandatory clinical examination, questionnaires and radiographs. We conducted a comparative analysis of the immediate and late results of osteosynthesis of clavicle fractures for a period of 3 months to 1 year. The study of patients with clavicle damage was carried out according to generally accepted standards using the modified Constant - Murley Shoulder questionnaire at 3, 6 and 12 months after osteosynthesis.

Results of osteosynthesis within 3 months (short-term results). In patients in the control group, where the standard osteosynthesis technique was used, good results were obtained in 76 cases (89.4%), and in the main group - in 33 (94.3%). Unsatisfactory results in the control group were noted in 9 patients (10.6%), in the main group - in 2 patients, which amounted to 5.7% of the total (n = 60). The number of good results in the main group was 33 (94.3%), while the number of satisfactory and unsatisfactory results was 2 (5'7%). The control group is represented by the following results: good results were obtained in 76 cases (89.4%), satisfactory and unsatisfactory results - in 9 cases (10.6%). It should be noted that the difference between satisfactory and unsatisfactory results in the main and control groups was 12% (n=14), which once again proves the effectiveness of the proposed osteosynthesis method over conventional intramedullary osteosynthesis with a pin.

Thus, analyzing the results of osteosynthesis (n=120) of clavicle fractures, we came to the following conclusions:

1. The algorithm is based on the classification of S. Rockwood and allows us to determine the optimal variant of surgical intervention for each specific variant of injury. The proposed algorithm for choosing a treatment strategy for patients with fractures and fracture-extrusions of the acromial end of the clavicle

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allows us to determine the optimal variant of surgical intervention to provide specialized and highly qualified assistance to victims. The program can be used in practical medicine, in particular in traumatology, when providing emergency care to victims in the conditions of a shock operating room of the admission department.

2. A new method of extracorporeal osteosynthesis of the clavicle has been developed and introduced into clinical practice, which ensures uniform distribution of the stabilizing effect at the fracture site, through mutual compression, and eliminates screw migration in the postoperative period until its complete consolidation and has advantages over the standard technique.

3. A comparative analysis of the treatment results for patients with clavicle damage was conducted according to generally accepted standards - using the modified Constant-Murley Shoulder questionnaire at 3, 6, 12 months after osteosynthesis. The difference in the number of satisfactory and unsatisfactory results was 12% of their total, which proves the effectiveness of the proposed algorithm and osteosynthesis method over traditional treatments.

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