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Fracture of the Odontidous Process of the Cii Vertebra: Principles of Treatment in Emergency Medical Care

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Abstract: The article presents the data of examination and treatment of 16 patients with injuries of the odontoid process of the CII vertebra, aged from 25 to 45 years. The main types of injury were traffic accidents and falls from height. Of the 16 examined patients, 12 patients underwent immobilization of the cervical spine using the Halo apparatus. 4 patients underwent surgical treatment - fixation of the fracture of the odontoid process of the CII vertebra with a spongy screw. In all cases, a good result was achieved. Conclusions: in case of fractures of the odontoid process without displacement, conservative treatment can be carried out using the Halo apparatus. Fractures with displacement are an indication for surgical treatment - fixation of the fracture with a spongy screw.

Keywords: fracture, odontoid process CII, spine, Halo apparatus, fixation.

Introduction

Craniovertebral injuries are considered to be one of the most severe spinal injuries (3). According to many authors (1,2,4), fractures of the odontoid process of the CII vertebra occur in 8 to 18% of all cervical spine fractures.

The causes of a fracture of the odontoid process are a fall from a height, a blow to the frontal region, excessive flexion and extension of the cervical spine (in a traffic accident) and a rotational mechanism of injury development.

Fractures of the odontoid process of the CII vertebra are most common in young people, in people of working age - from 25 to 45 years. In fractures without displacement, neurological symptoms usually include pain in the upper cervical spine, limited movement. Fractures of the odontoid process with displacement of bone fragments lead to compression of the caudal parts of the medulla oblongata, which causes the development of severe neurological symptoms, and in some cases, death.

Diagnostic methods of research are radiography, MSCT and MRI of the cervical spine. In order to determine the type of fracture, the proposed classifications of L.D. Anderson and R.T. Alonzo (1974) and A.A. Lutsik, N.K. Ratkin (1998) are widely used, which divide fractures of the odontoid process into types taking into account the presence or absence of displacement and the direction of displacement.

Thus, the high frequency of occurrence of fractures of the odontoid process of the CII vertebra with displacement of bone fragments often leads to death. In this regard, timely diagnosis using modern research methods and the introduction of new surgical methods of treatment into neurosurgical practice is one of the urgent problems of neurosurgery.

Materials and research methods.

In the neurosurgical department of the Andijan branch of the RNCEM there were 16 patients with a fracture of the odontoid process of the CII vertebra. The age of the patients ranged from 20 to 45 years. Among the examined patients, there were 12 men (75.0%) and 4 women (25.0%). When distributed by the mechanism of injury: a road traffic injury as a result of a collision was detected in 11 (68.7%) patients and a fall from a height in 5 (31.2%) patients. During the clinical and neurological examination, 2 patients (12.5%) had signs of a functional disorder of the spinal cord, which was manifested by tetraparesis. In the remaining 14 (87.5%) cases, the main complaints of patients were

pain in the cervical spine, increased pain with active movements and limited movement in the cervical spine. During palpation, pain was noted at the level of injury, tension of the paravertebral muscles. All patients underwent MSCT examination of the cervical spine upon admission to the hospital, which revealed a fracture of the odontoid process of the CII vertebra. In 2 cases (12.5%), a slight displacement of the odontoid process was noted, and in the remaining 14 cases (87.5%), the fracture was without displacement.

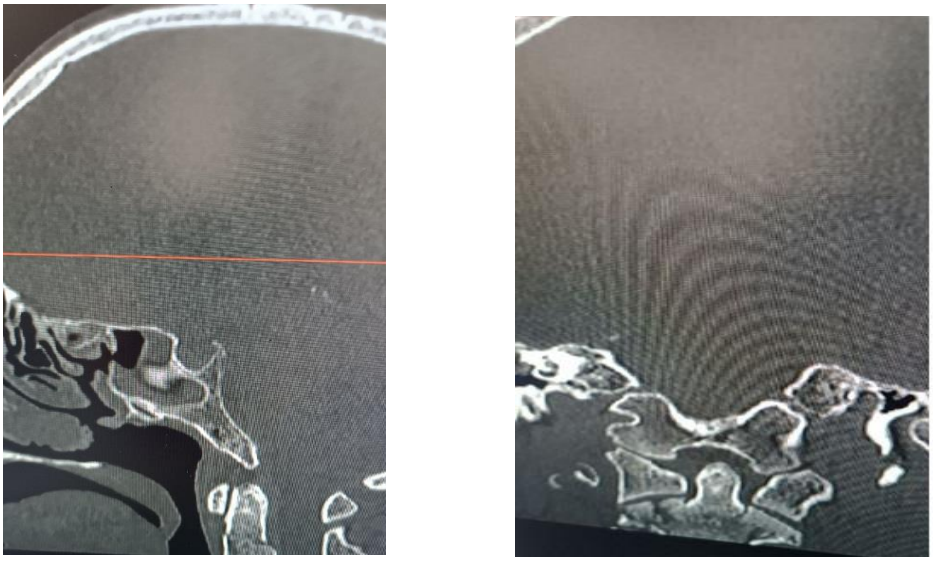

Fig.1.MSCT image of a fracture of the odontoid process of the CII vertebra without displacement.

Table 1.Results of MSCT examination of patients.

MSCT signs of fracture	men		women		total	
	abs	в %	abs	в %	abs	в %
Fracture without displacement	11	68,7	3	18,8	14	87,5
Fracture without displacement	1	6,2	1	6,2	2	12,4

Treatment. Based on the obtained research data, conservative and surgical treatment was performed. Conservative treatment by installing the Halo apparatus was performed in 12 (75.0%) patients, with a period of immobilization of 3 months.

Surgical treatment was performed in 4 (25.0%) patients. Indications for surgery were:

1. Signs of a fracture of the odontoid process of the CII vertebra;
2. Neurological disorders;
3. Fracture with displacement;
4. Possible aggravation of neurological disorders.

Since 2023, a method of fixing a fracture of the odontoid process with a cancellous screw has been introduced into neurosurgical practice.

Surgical technique: under general anesthesia, after appropriate skin preparation, a transverse skin incision is made along the anterior surface of the neck, up to 4 cm long. Blunt soft tissue is separated and the anterior edge of the II-III cervical vertebrae is reached. Under interoperative control using an image intensifier, a spongy screw is inserted through the vertebral body into the odontoid process and the fracture is fixed. Wound sutures. Iodine. Aseptic dressing.

Example: patient Yu, 27 years old. He was brought to the emergency department of the AF RRCEM with complaints of pain and limited movement in the cervical spine.

From the anamnesis: cervical spine injury as a result of a traffic accident. The ambulance staff took the patient to the hospital from the scene of the accident. In the emergency department, the patient was examined by a neurosurgeon and a neuropathologist. An MSCT study of the cervical spine was performed. According to the results of the MSCT study, a fracture of the odontoid process of the CII vertebra was revealed. The patient was hospitalized in the neurosurgical department.

Objective examination: at the time of examination, the patient is conscious. The skin and visible mucous membranes are pale pink. The musculoskeletal system is unchanged. Breathing is independent, respiratory rate is 18-20 times per minute. Heart sounds are muffled, rhythmic. Pulse is 84 beats / min. Blood pressure is 110/70 mm Hg. The abdomen is soft, painless. The liver and spleen are not enlarged. Physiological functions are normal.

Neurological status: conscious, answers the questions correctly. Oriented in time and space. Pupils OD = OS, photoreaction is preserved. Facial expressions are preserved. Phonation is not impaired. No sensory disturbances were detected. Muscle strength in the limbs = 4-4.5 points. Tendon reflexes BR, TR, PR, AR D=S are evoked. There are no pathological foot signs.

Locally: the skin on the back of the neck is clean. Palpation reveals pain at the level of the CII-CIII vertebrae. Cervical lordosis is smoothed. Tension of the paravertebral muscles is noted.

Fig. 2. Fracture of the base of the odontoid process of the CII vertebra without displacement.

According to the classification of Anderson and Alonzo (1974), the fracture corresponds to type II.

After the examination, the patient underwent surgery. The operation was fixation of the fracture of the odontoid process of the CII vertebra with a cancellous screw.

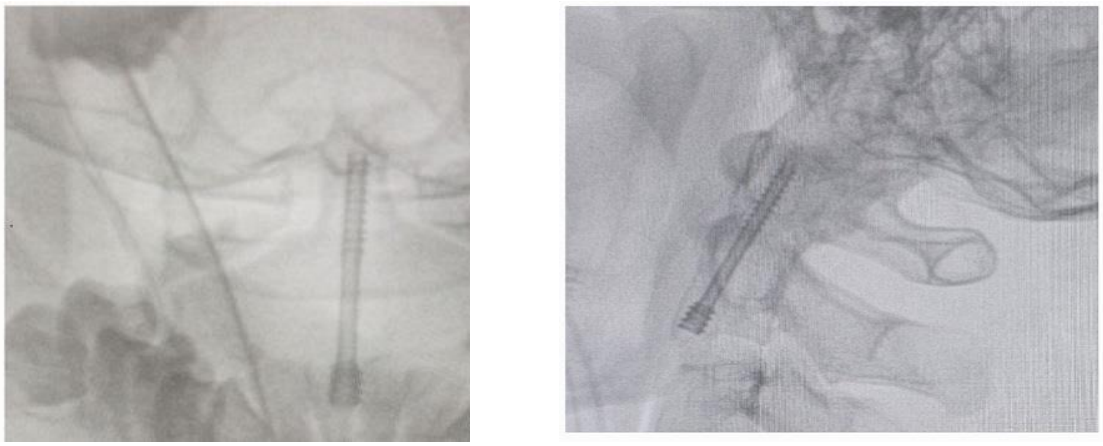

Fig. 3. Postoperative view of the CII odontoid process fracture fixation with a cancellous screw (frontal and lateral projection).

The postoperative period was uneventful. The patient was discharged home on the 8th day to continue treatment at his place of residence under the supervision of a neurologist.

Results. The postoperative period was uneventful and without complications in all operated patients. The patients were prescribed antibiotics, vascular, analgesic and general tonic drugs in the postoperative period. Complete disappearance of pain syndrome was noted. Regression of neurological disorders (group E according to Frankel, 12 points according to the JOA scale). The patients were activated on the 2-3 day after the operation. After healing of the postoperative wound, the sutures were removed on the 7-8 day and the patients were discharged to continue treatment in an outpatient setting at their place of residence. Control MSCT studies after 3 and 6 months showed satisfactory position of the screws.

Conclusions.

1. All patients with suspected spinal injury should be taken to specialized neurosurgical departments.
2. Patients should be examined using MSCT and MRI in order to determine the nature and type of spinal fracture. 3. In case of fractures of the odontoid process of the CII vertebra without displacement and neurological deficit, the Halo device can be used for immobilization for a period of 3 months.
3. Fixation of the odontoid process fracture with a spongy screw ensures reliable fixation of the fracture, prevents possible neurological complications and reduces the duration of inpatient treatment of patients.

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