ANTERIOR SCREW FIXATION IN AXIS FRACTURE TIP II (CASE REPORT)

C. ROŞCA [1], ANA IOANA TĂTĂRAN[2]

[1] Emergency Clinical Hospital;of Sibiu, [2] University Hospital of North Staffordshire, UK

Keywords: *axis dens, screw fixation, cervical orthosis*

Abstract: *The cervical spine is particularly susceptible to traumatic injury because this area is an extremely mobile one. The direction of impact and the mechanism of injury dictate the type of cervical spine injury. Tip II axis fracture, an unstable fracture, is treated with anterior osteosynthesis using screw fixation. Traction is contraindicated because of this severe instability and potential for injury to vertebral arteries and spinal cord. Rigid immobilization of the cervical area in cervical orthosis after operation is necessary.*

Cuvinte cheie: *proces odontoid, fixare cu şurub, orteză cervicală*

Rezumat: *Coloana cervicală este în mod special susceptibilă la leziuni traumatice, deoarece este o zonă cu o mare mobilitate. Direcţia de acţiune a forţei de impact şi mecanismul leziunii vor genera un anumit tip de leziune a coloanei cervicale. Tratamentul fracturii de axis tip II, tip instabil de fractură, se realizează prin introducerea pe cale cervicală anterioară a unui şurub prin baza procesului odontoid. Tracţiunea externă este contraindicată datorită instabilităţii focarului de fractură şi a riscului de leziune a arterelor vertebrale sau a măduvei spinării. Postoperator imobilizarea rigidă a coloanei cervicale cu orteză este necesară.*

CASE REPORT

The cervical column consists of seven vertebrae and may be divided, from anatomical and functional point of view, in: upper cervical spine C_1-C_2 and lower cervical spine C_3 - C_7.

The first two cervical vertebrae have some unique anatomical features due to the specific functions they perform: head rotation relative to the column, movement between the atlas (first cervical vertebra) and the axis (second cervical vertebra).

The axis (C_2) has a transversely elongated body and from its upper facet leaves the odonthoid apophyses - vertical projection by which the joint with the atlas is done. The tooth has an anterior articular facet that articulates with the anterior arch of the atlas, and a posterior articular facet coming into contact with the transverse ligament. The powerful ligaments (apical ligament, transverse ligament, alar and yellow ligaments) limit the rotation of the head in atlanto - axial articulation to a maximum 45^0. Articular processes are located some above the others. The upper ones are located on both sides of the odontoide apophyses and the lower ones are outsided. The part between the two pairs of articular processes is called the isthmus - or surgical pedicle – and it is the most vulnerable part in upper cervical trauma (1).

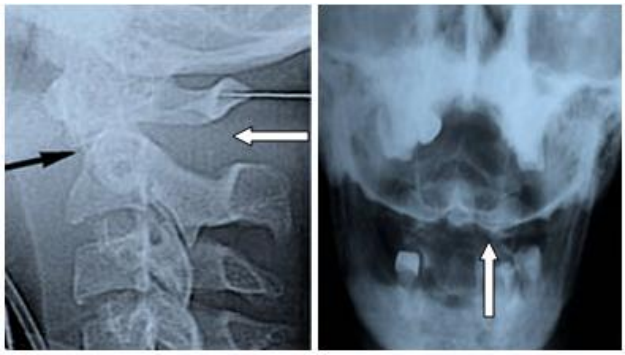
Anatomical features of the axis explain the different types of fractures that may occur at this level. Thus the presence of the odontoid process and the atlas joint between this and the atlas make rotation of the head possible. At the atlas – axis joint level the rotation movement has the highest magnitude, the lateral flexion movement is absent and the extension movement is limited to 10^0 (2).

Fractures of the axis (C_2) can be classified as follows:

- Odontoid fracture;
- Type I (parceling)
- Type II (from the tooth basis)
- Type IIA (burst fractures of the tooth)
- Type III (through the body axis)
- Hangman fracture: Wood - Jones fracture
- Other fractures: fractures of the spinous process, lateral mass or vertebral body (3).

I will present the following clinical case, admitted by the Emergencies Room of Sibiu: I.H., a 39 years old man, suffered a neck injury by falling from height. At admittance in the hospital he accused neck pain, neck stiffness, and motor deficit widened in the upper limbs (motor deficit was greatly reduced in the legs) and hypoesthesia confined to the cervical area (C_1 - C_4). Radiological examination revealed a displaced fracture of the odontoid process at the base of the process and widening of the space between the spinous apophyses C_1 - C_2 (Fig. 1).

Figure no. 1. Fracture of the odonthoid - type II – I.H. aged 39



[1]Corresponding Author: C. Roşca, Spitalul Clinic Judeţean de Urgenţă Sibiu, Bulevardul Coposu nr 2-4, Sibiu, România; e-mail: lusu1rosca@yahoo.com; tel +40-745647542

Articol received on 12. 08. 2010 and accepted for publication on 21.09.2010
ACTA MEDICA TRANSILVANICA December 2010; 2(4)288-289

The fracture was very unstable and required internal stabilization (4). Being a young patient, we opted for anteriorly cervical intervention by introducing a screw retainer through the C_2 vertebral body and the odonthoid basis. Thus, both the anatomic fracture reduction and perfect fixation of the fractured zone is achieved. Postoperatively, external immobilization was maintained by cervical orthosis for 6 weeks in order to limit lateral flexion and not jeopardize internal fixation, until the primary callus was formed. Neurological deficit worsened slightly during the first 48 hours post-traumatical, the patient being under external temporary restraint, thus defending the need for surgery for internal stabilization of the fractured zone. Thus, the third day post-traumatic, surgey was performed and internal stabilization was accomplished through anterior approach and placing a compaction screw through the vertebral body and the odonthoid. Main stages of surgery are shown in the following pictures (Fig. 2):

Figure no. 2. Osteosynthesis with compaction screw - I. H. aged 39

Evaluation according to ASIA / IMSOP scale shows the following:

EVALUATION SHEET OF THE PATIENT WITH SPINE FRACTURE

First name....I Last name: ....H Age.....39 Nr. FO...1340/2009

Radiological diagnosis: fracture with displacement of odonthoid process

Neurological assessment

Tabelul nr. 1. Motor score MS (0-5)

Level	day 1	day 2	preoperatively	postoperatively	discharge	3 months
C_5	2	1	1	1	3	4
C_6	2	1	1	1	3	4
C_7	2	2	2	2	3	4
C_8	2	2	2	2	3	4
T_1	2	2	2	3	4	4
L_2	3	3	3	3	4	5
L_3	3	3	3	3	4	5
L_4	3	3	3	4	4	5
L_5	4	3	3	4	4	5
S_1	4	3	3	5	5	5

Postoperative immobilization was maintained with cervical orthosis for 2 weeks. At 3 months postoperative, neurological recovery was almost complete

Table no. 2. Sensitive score SS (0-2)

Level	Day 1	Day 2	preop.	postop.	3months	Level	Day 1	Day 2	preop.	postop.	3 Months
C_2	0	0	0	0	1	T_8	2	2	2	2	2
C_3	0	0	0	0	1	T_9	2	2	2	2	2
C_4	0	0	0	0	1	T_{10}	2	2	2	2	2
C_5	0	0	0	0	1	T_{11}	2	2	2	2	2
C_6	1	1	1	1	2	T_{12}	2	2	2	2	2
C_7	1	1	1	1	2	L_1	2	2	2	2	2
C_8	1	1	1	1	2	L_2	2	2	2	2	2
T_1	1	1	1	1	2	L_3	2	2	2	2	2
T_2	1	1	1	1	2	L_4	2	2	2	2	2
T_3	1	1	1	1	2	L_5	2	2	2	2	2
T_4	1	1	1	1	2	S_1	2	2	2	2	2
T_5	1	1	1	1	2	S_2	2	2	2	2	2
T_6	2	2	2	2	2	S_3	2	2	2	2	2
T_7	2	2	2	2	2	S_{4-5}	2	2	2	2	2

Neurological	day 1	day 2	preoperatively	postoperatively	Discharge	3 months
SM	**27**	**23**	**23**	**28**	**37**	**45**
SS	**40**	**40**	**40**	**40**	**45**	**51**
ASIA/IMSOP	**C**	**C**	**C**	**C**	**D**	**D**

Conclusion: anterior abord with the compaction screw ensures good stability in the fracture focus and keeps the rotation at the atlas-axis joint functional, thereby reducing risks of occipito-cervical rigidity, secondary in the healing process. Postoperatively, the patient must be kept under observation in an intensive care unit for 24 hours. Then he is applied a rigid cervical orthosis that will be worn for 6 weeks.

REFERENCES

1. Arnold H. Menezes MD. Principles of spinal surgery. 1996; 2(2); 769 – 799.
2. Arseni C. Panoza Gh. Patologie vertebro-medulară cervicală. Ed. Didactică şi Pedagogică, Bucureşti 1981; (3); 348 – 359.
3. Lennarson P. Mostafavi H. Management of type II dens fractured, a case-control study. Spine 2000; 25(4); 1234 – 1237.
4. Papilian V. Anatomia omului. Ed. Didactică şi pedagogică Bucureşti 1974; 1(1); 20 – 28.