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Odontoid Fractures

K, bouaita.l,atroune.s,benallage
Neurosurgery department cherchell hospital algeria
Neuroplasticity and glials tumors laboratory

Abstract:
Odontoid process' fracture is the most common post-traumatic upper cervical spine fracture, the classification of these fractures, proposed in 1974 by Anderson & D'Alonzo, remains the most widespread because of its simplicity and its prognostic value. This retrospective study includes 35 patients treated for odontoid fracture in our neurosurgery department at the EHS of Cherchel between 2015 and 2021. The circumstances of the trauma were dominated by road accidents .The clinical presentation was dominated by neck pain in 100% of cases, 06 cases with tetra paresis. All the patients were previously explored by a simple x-ray of the cervical spine, a CT scan and a cervical MRI. According to Anderson and Alonzo classification, 35 patients classified as Anderson Alonzo Type II (25 type IIB cases and 10 type IIC cases). Seven patients had other associated spine injuries. The associated lesions are: fracture of the posterior arch of C1 in one patient, fracture of the D5 vertebra, a multiple trauma patient, non-displaced C7 fracture, extradural hematoma, and lower limb fracture.The choice of therapeutic strategy in odontoid fractures depends on the type of fracture according to the Anderson and Alonzo classification, and that of Roy Camille. The surgical techniques were: anterior direct osteosynthesis reduction of the odontoid (15), posterior transarticular C1 C2 screwing type Magerl (3) or anterior type Vaccaro (1), posterior C1C2 arthrodesis type Harms (14), occipitocervical arthrodesis (2). The overall complication rate for the series was 28%. We achieved a 95% consolidation rate with this technique within an average of five months. A good preoperative radiological study of the lesions and a mastery of the various surgical techniques make it possible to offer to the patient the most appropriate treatment. clés words: odontoide fractures, osteosynthesis, posterior c1c2 arthrodesis, harms, magerl.

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I. Introduction :

Odontoid process' fracture is the most common post-traumatic upper cervical spine fracture, accounting for up to 18% of cervical spine fractures; it is dreadful because of the risks of pseudarthrosis and the neurological complications that it entails.

The circumstances of occurrence may vary according to the age of the patient: it is usually a violent trauma in young subjects, of various circumstances (road accidents, falls, assault). In the elderly, odontoid fractures can be caused by minimal trauma (falls).

The classification of these fractures, proposed in 1974 by Anderson & D'Alonzo, remains the most widespread because of its simplicity and its prognostic value (1).

The odontoid process articulates with the posterior face of the anterior arch of C1, this union is reinforced by the presence of a complex of ligaments, mainly the transverse ligament preventing the odontoid tilt and whose rupture may modify the surgical attitude.

The surgical treatment of unstable odontoid fractures (type II OBAR and HTAL) has now evolved with several techniques whose characteristics should be comprehended to determine their place in the range of therapeutic possibilities today (2,4,5).

Several types of atlanto-axial instability may justify surgical fixation. The arthrodesis instrumented by screwing the lateral masses of C1 and isthmuses of C2 described by Harms is a demanding technique but allows lasting stabilization (4,5,6).

We present our results and surgical technique, concerning 35 patients.

II. Patients And Method:

This retrospective study includes 35 patients treated for odontoid fracture in our neurosurgery department at the EHS of Cherchel between 2015 and 2021.

III. Results:

The average age was 38.5 years (18 to 85). The median follow-up in our study was 3.1 years (4.1 months-8.5 years). In our series there was a clear predominance of males with a sex ratio of 7/2. The circumstances of the trauma were dominated by road accidents (15 cases).

The clinical presentation was dominated by neck pain in 100% of cases, 06 cases with tetra paresis (17% of cases).

All the patients were previously explored by a simple x-ray of the cervical spine, a CT scan and a cervical MRI.

According to Anderson and Alonzo classification, 35 patients classified as Anderson Alonzo Type II (25 type IIB cases and 10 type IIC cases). Seven patients had other associated spine injuries. The associated lesions are: fracture of the posterior arch of C1 in one patient, fracture of the D5 vertebra, a multiple trauma patient, non-displaced C7 fracture, extradural hematoma, and lower limb fracture. The choice of the approach and the surgical technique was made according to the site of the fracture, the orientation of the fracture line, the age of the patient, the necessary time to take charge and the integrity or not of the transverse ligament (2, 9).

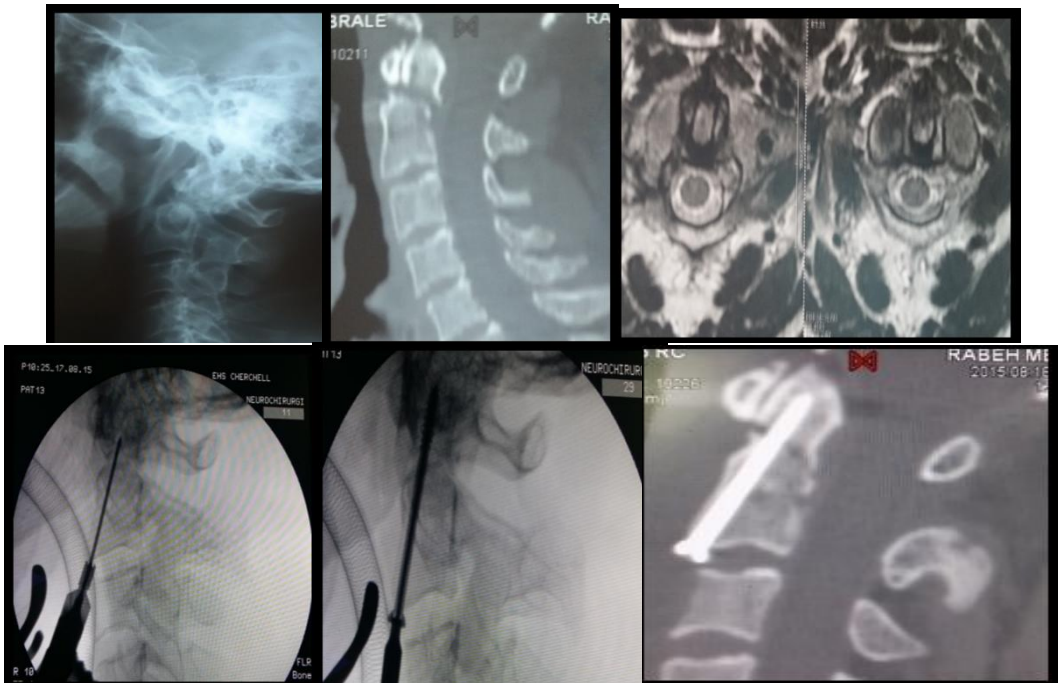
- Anterior fixation: 15 cases by (anterolateral pre-SCM, IIB without rupture of the LT)
- Posterior osteosynthesis: 20 cases (IIC, horizontal line with a large displacement, IIB with broken LT, advanced age or long management period)

The surgical techniques were: anterior direct osteosynthesis reduction (screwing) of the odontoid (15), posterior transarticular C1 C2 screwing type Magerl (3) or anterior type Vaccaro (1), posterior C1C2 arthrodesis type Harms (14) , occipitocervical arthrodesis (2).

Mortality was zero (no intraoperative incident).

Postoperative morbidity is marked by:

- No worsening of the neurological symptoms
- Two cases of postoperative infection (one patient resumed by surgery, adapted ATB).
- Equipment unraveling (post-traumatic).



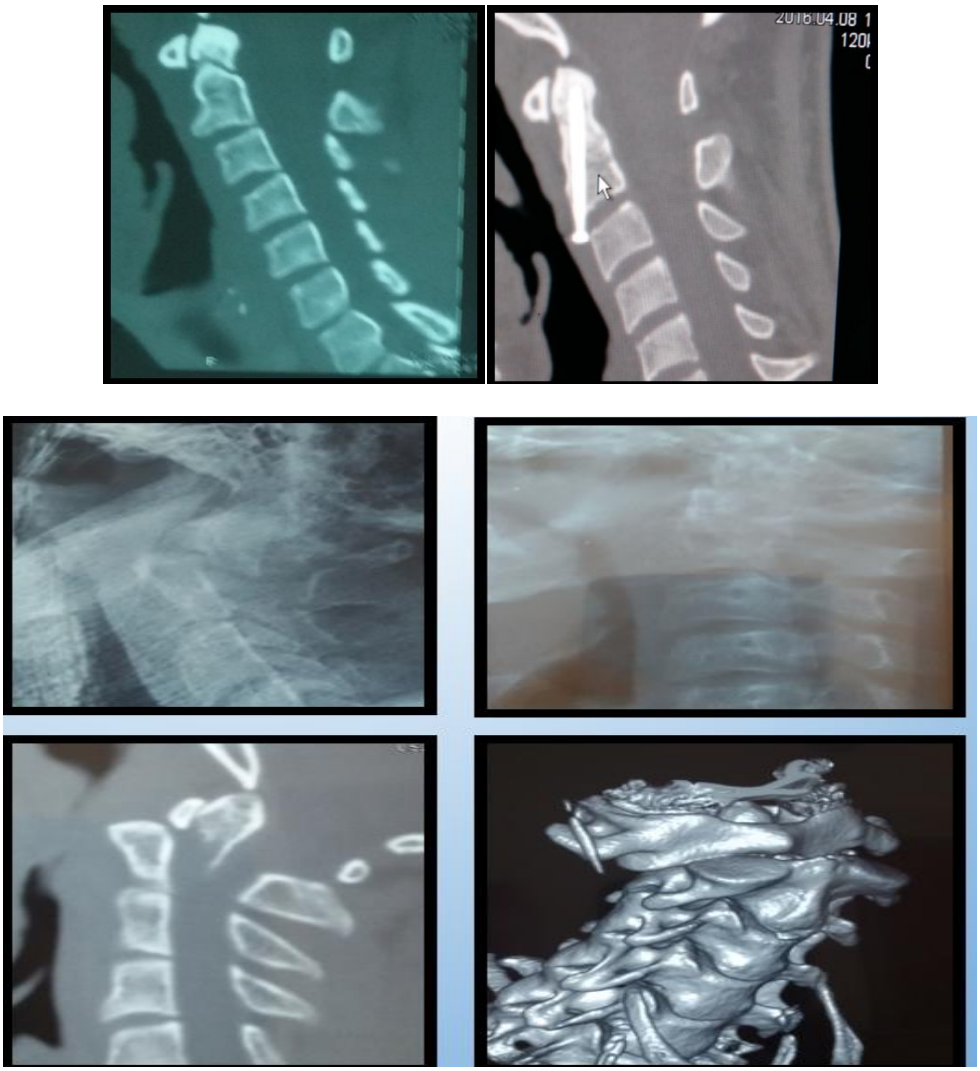


Fig1 : • Anterior fixation(vissage).

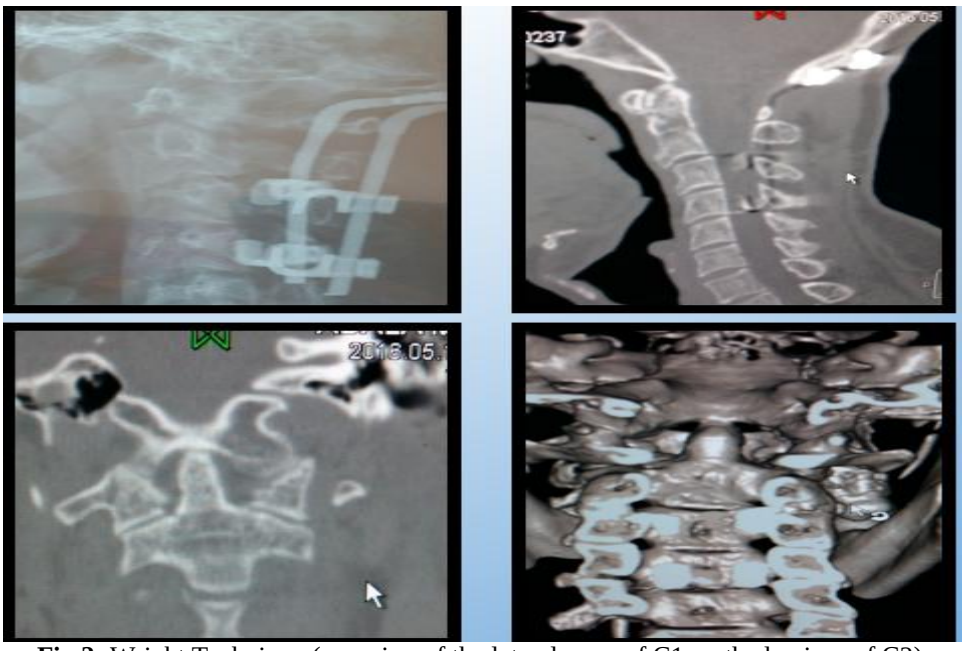


Fig 2: Wright Technique (screwing of the lateral mass of C1 on the laminas of C2)

Fig 3: Goel and Harms Technique (C1-C2 fixation)

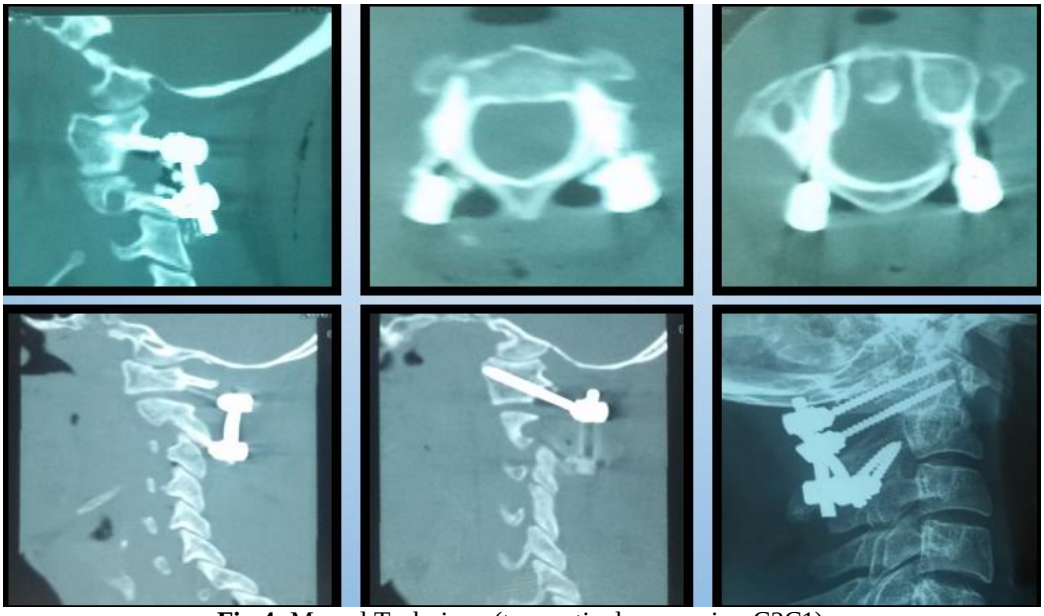
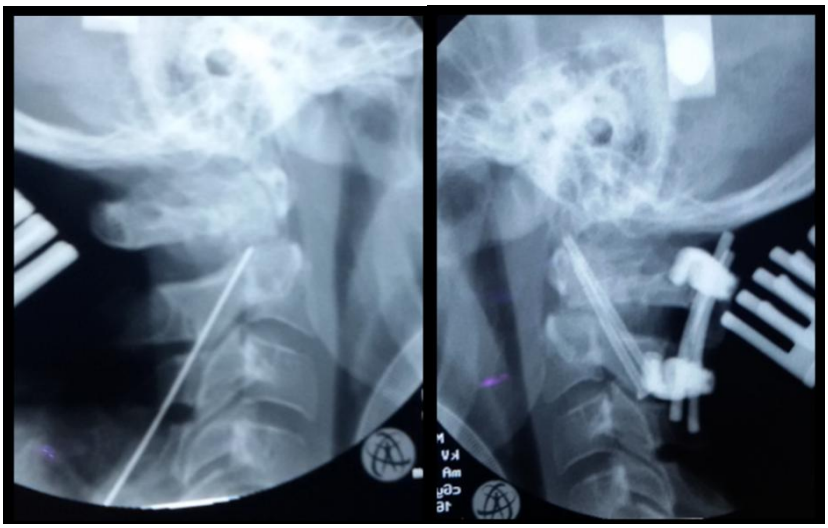


Fig 4: Magerl Technique (transarticular screwing C2C1)



The overall complication rate for the series was 28%, including pseudarthrosis, at a median follow-up of 11 months.
The median follow-up in our study was six years (four months to eight years). We did not find any intraoperative complications. We achieved a 95% consolidation rate with this technique within an average of five months.
Consolidation was assessed by a three months CT scan. We have used a 4.5mm diameter cannulated screw with a short thread in all of the patients.

IV. Discussion:

The choice of therapeutic strategy in odontoid fractures depends on the type of fracture according to the Anderson and Alonzo classification (2), and that of Roy Camille (8,9,10,11,12,13,14).

The direct screwing of the odontoid, which restores the anatomy of the odontoid, remains the first-line technique for reducible fractures. It allows rapid stabilization of the fracture, preserves C1-C2 rotation and exhibits a fusion rate of approximately 90% (2,9,10,11,12).

The indication of this technique depends on the type of fracture and the integrity of the transverse ligament, it would be offered only to recent OBAR type fractures (2,9,10).

In second intention, the posterior fixation techniques are indicated when the dental screwing is not possible, the technique of Goel and Harms remains the technique most used by the majority of the authors. Harms posterior C1C2 arthrodesis allows fixation of unreduced fractures. Finally, occipito-cervical arthrodesis is used as a last resort because of its greater morbidity (2,4,5,6,12,14,15).
Wright's technique can be used if the C2 pedicles are small and do not allow trans-pedicle screwing of C2 (6,15).
The Magerl technique can be a therapeutic choice if the lateral mass of C1 does not allow the installation of an osteosynthesis material at this level; this technique offers a high fusion rate but nevertheless presents a fairly high risk of vertebral artery injury and therefore directly depends on the surgeon's learning curve (16,17).

Neurological complications are 2 to 27% (worsening the vital and functional prognosis)(19,20,21,22,23,24).
The vascular risk is 1.3 to 5.8% (improved by the generalization of anterior fixation techniques) (21,24).

V. Conclusion:

The odontoid fracture is a formidable lesion, its surgical management is well codified and depends directly on the type of the lesion according to the classification of Anderson and D'Alonzo and that of Roy Camille.
A good preoperative radiological study of the lesions and a mastery of the various surgical techniques make it possible to offer to the patient the most appropriate treatment.

Anterior screwing has become the method of choice for the osteosynthesis of unstable OBAR-type odontoid fractures.

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