One Stage Transoral Odontoidectomy and Posterior Fixation in Odontoid Fracture; Technical Note

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Abstract: In this paper, we report a traumatic atlanto-axial subluxation (odontoid peg fracture type II) which is treated by one- stage transoral decompression and posterior fixation.

Key words: Transoral approach, odontoid resection, occipito-cervical fixation

INTRODUCTION

Atlanto-axial subluxation is a dangerous condition resulting from a number of pathological processes. The first case who had subluxations of the upper cervical spine described by Sir Charles Bell in 1824. Since that time a lot of experience has shown that subluxations of the upper cervical spine are rare but dangerous complication of a variety of conditions (6).

Trauma and rheumatoid arthritis are most common causes but conditions can result from congenital defects tumors, infections and iatrogenic (2, 10).

In the past various methods of fusion and decompression have been developed. With improved visualisation and experience more and more may be amenable to surgical correction.

CASE REPORT

A 34 years old male was first admitted in April 1992 with a traffical accident causing craniocervical trauma. His main complaint was the pain on the neck with movements. Neurological examination was normal. Plain α-ray film showed that he had a type II fracture of the odontoid. A halo-west brace was applied to the patient and after taken appointment for CT and dynamic MRI. On the sagittal reconstruction of the CT was seen non-fusion of odontoid fracture (Fig.1). On the dynamic MRI was seen medullar compression by the process especially at the flexion of the neck (Fig.2-3). We decided to perform for stabilisation with transoral odontoidectomy and occipito-cervical fusion by Ransford Loop. In the preoperative period, routine analysis of patient was performed. Additionally

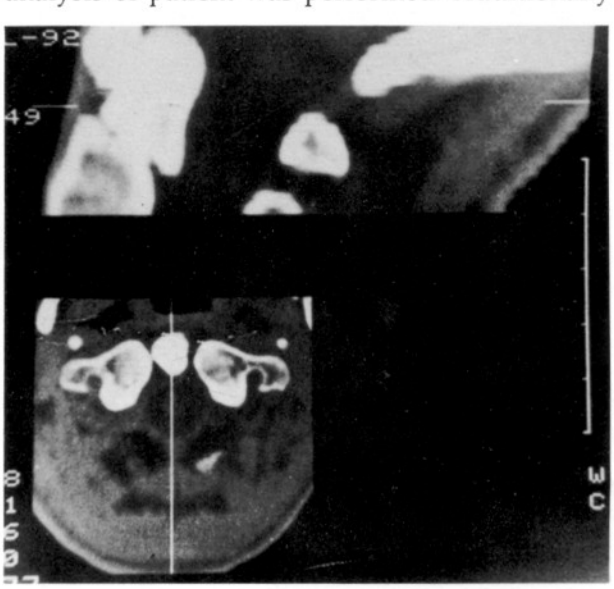

Fig.1: Sagittal reconstruction of craniovertebral junction, CT image showing non-fusion of odontoid fracture.

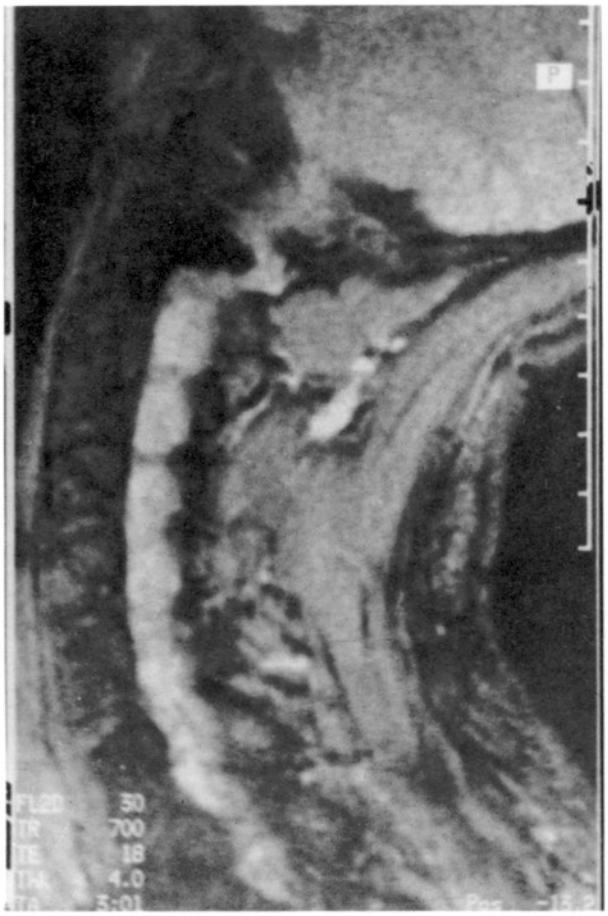

Fig.2: Magnetic resonance image showing marked brain-stem and cord compression by odontoid peg.

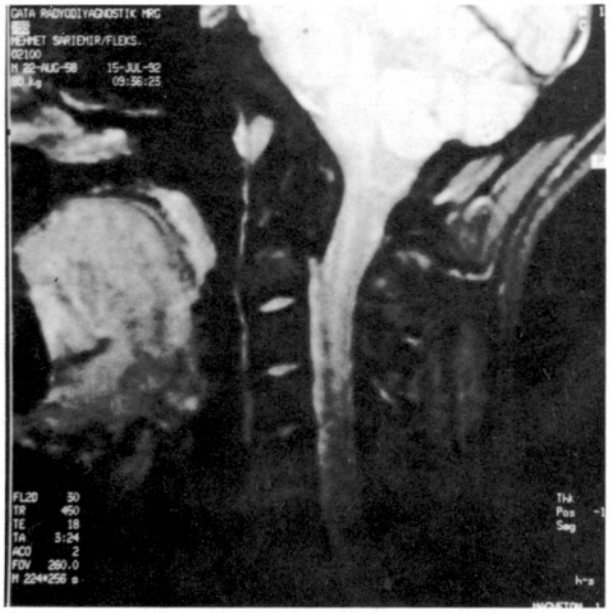

Fig.3: Dynamic magnetic resonance image showing unstable odontoid peg.

microbiological flora of nose and throat were examined. Opening limits of mouths and mobility of neck were carried prior to surgery.

Anesthesia:

Patient's head was held in neutral position to minimise head and neck movement. Nasotracheal intubation was performed with direct laryngoscopy. During the most difficult parts of the surgical decompression, the patient should breathe spontaneously, first because it is the most reliable guide to medullary compression, and secondly because extradural venous bleeding may thereby be reduced. After surgery, the patient breathed through a CPAP circuit for 48 hours until extubation.

Surgical Technique :

Positioning: We have chosen the left lateral park-bench position because of one stage transoral and posterior approach (Fig. 4). In this way we provided one-stage chance for anterior and posterior approaches under the same anesthetics. The head was held in a Mayfield skull clamp. Care is taken to place the pins to allow access both anteriorly and posteriorly. Tilting the table laterally allows optimal positioning for the patient and surgeon. During the posterior fixation, the lateral table tilt is reversed and the neck is placed in the slight flexion but without changing the overall alignment. The lateral position presents the surgeon with unfamiliar anatomical relationships, both from the front and from the back, but the position saves much operating time and is better tolerated by the patient.

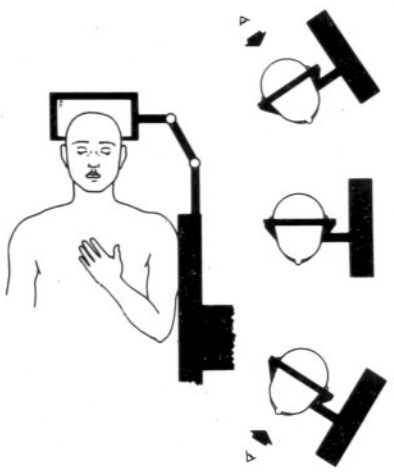

Fig.4: The diagram illustrates the advantages of the lateral position which allows both transoral and posterior exposure, while maintaining craniocervical fixation.

Transoral Surgery :

Crockard transoral retractor was applied than with the auxiliary equipment uvula and nasotracheal tube were retracted (Fig.5).The tissue of soft palate was infiltrated by the local anesthetic (Lidocaine) injection to reduce of the bleeding. Protuberance of first cervical vertebra (C1) has been feelt middline. Ventral pharyngeal incision was used from the anterior rim of the foramen magnum down to body of C2. incision when through the mucosa and muscle of the Longus Colli. Pharyngeal retractor was applied. By helping of the drill, arch of the C1 and odontoid peg were excised. Especially of the right lateral place was seen a big bone fragment which was buried into the spinal cord (Fig.6). This fragment was extracted. After the finishing middline decompression the bone in the both of two lateral area and upper part was decompressed by air drill and Kerrison Rongeur. Following the decompression two layer closure was performed by 3/0 vicryl. The operation table was sided again to perform the posterior stabilisation.

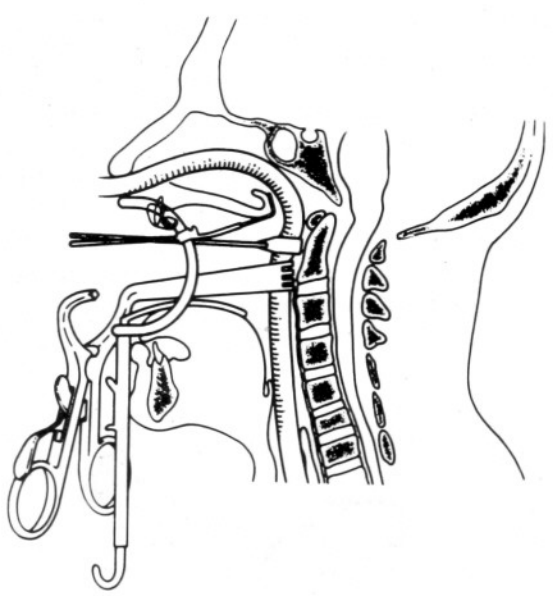

Fig.5: The transoral surgical route, without the use of a tracheostomy or division of the soft palate is possible with appropriate retraction.

Posterior Fixation :

By the classical middline incision suboccipital area and the arch of C1,C2 and C3 vertebras were exposed. Four 3 mm. Burr Holes were made in the occiput. Enough ligamentum flavum was removed over the cervical vertebras to allow the easy passages of wires. We used Hartshill-Ransford Loop for occipito-cervical fusion. The loop as held in plains

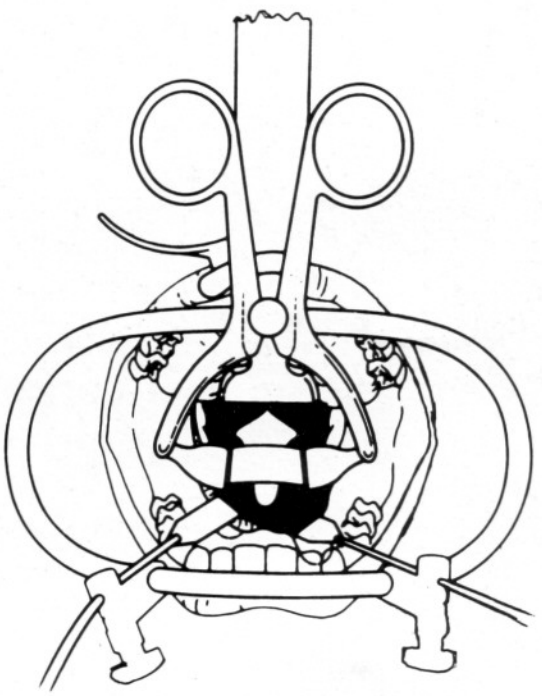

Fig.6: In the view through the mouth, C1 and the odontoid peg are exposed.

with occipital and sublaminar wires on each side. Details of our post-operative care are given at Table-I. İn early post-operative period, there wasn't any neurological deficit and complication. Control X-Ray graphies were perfect (Fig.7). 20 months later there wasn't any complication and complaint.

Table-I :Transoral surgery; Post-operative management.

		Days
Airway	Until swelling subsides	2-5
Ventilation	Depending on blood gases	1-2
Nasogastric tube	Prevent regurgitation fluids	1-2
	Nutrition	2-5
Nil by mouth		5
Mouth care		7-10
Mobilisation	With soft collar	2-3
intravenous fluids	Avoid overload	2-3
Analgesia	Morphine infusion (0,5mg/hr; reduce if respiration below 10/min)	1-2
Metoclopramide	10mg, every 6 hr	2-3
Cimetidine	400mg, 12 hr	5-7
Antibiotics	Flucloxicillin + Metranidazole	5

DISCUSSION

Patients with anterior pathology in the atlanto-axial region who present as neurological emergencies require urgent brain-stem decompression. Anterior decompression remains the only alternative to progressive tetraplegia and a fatal outcome. Technological advances namely, the operating

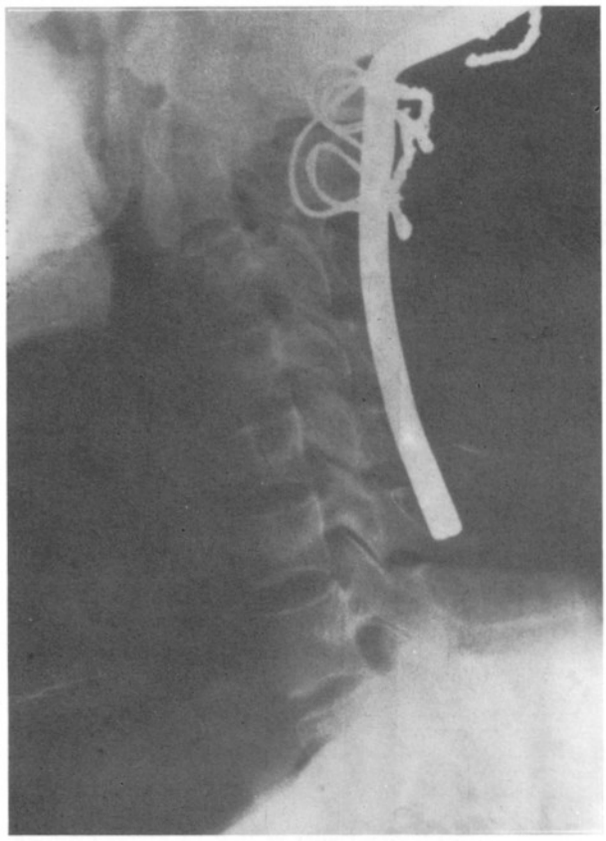

Fig.7: Countoured fixation (Hartshill-Ransford Loop) provides secure occipitocervical fixation. The loop is held in place with occipital and sublaminar wires as shown in lateral X-Ray.

microscope, high-speed drill and extra-long surgical instruments have eliminated difficulties and allowed the transoral approach to become a relatively simple and safe operation. Recent works have emphasised the value of transoral anterior decompression (1,3,5,6,12).

Although there are many cause, atlanto-axial subluxation is an important clinical conditions because of mortality and morbidity, which need urgent operation if there is a neurological deficit. Trauma and rheumatoid arthritis are most common causes, but the condition can result from congenital defects, or infections (9).

Either acutely or chronicle, trauma at the craniocervical junction may lead compromise of the neuroaxis of and intermittent nature, as when there is fusion the bone units in an abnormal fashion reducing the AP diameter.

In the chronic situation, mild trauma associated with previous developmental anomaly, such as assimilation of the atlas, platybasia, or the Clippel-Feil deformity, will cause long tract signs (6,10).

Before the surgical procedures, radiographic studies which are lateral craniocervical X-Ray graphies, CT and MRI must be compared in flexion and extension.

Some early experiences about anesthesia for transoral surgery have been documented by Marks (11). But the current protocol is that used by Dr.Ian Calder (4).

Transoral decompressive surgery for the treatment of extradural ventral middline pathology involving the dense, the anterior arch of C1 and Lower clivus doesn't fully destabilise the spine; however this operations may potantiated incipient pathological instability. The primary determinants of instability are the extend of the pathological bone destruction, ligamentous weakling and operative bone removal (8). Therefore one-stage combined transoral decompression and posterior fixation by an anatomically contoured loop have been recommended.

The method of head fixation in Mayfield skull clamp and the lateral position avoid hazardous movement of the neck during the stabilisation period, following transoral surgery. Additionally, it has been provided an advantage to use transoral decompression and posterior techniques in one-stage under the same anesthetic.

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