

Successful management of traumatic cervical spondyloptosis with incomplete neurological deficit in a child: A case report

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Manuscript Body

Introduction

Spondyloptosis is a condition in which there is complete slippage of one vertebral body over the corpus of the adjacent one [1]. It's correspond to the Grade V of Meyerding's classification of spondylolisthesis [2]. This pathology is more common in the lumbar region of the spine but subaxial cervical spondyloptosis is extremely rare. It can be seen after trauma, or in the course of neoplastic or congenital diseases [3]. Traumatic cervical spine spondyloptosis (TCS) is one of the least discussed forms of cervical spine traumatism because of its rarity and the gravity of patient's condition, limiting good management. Moreover, there is a lack of data reporting, especially in developing countries [2]. Management of cervical spondyloptosis represents a challenge to all spine care specialists. Here we report a case of post-traumatic posterior C5–C6 spondyloptosis with incomplete neurological deficit which was managed successfully by anterior approach.

Case history/ examination

A 14-years-old male patient was transferred to the surgery department of Sourô Sanou teaching hospital from a peripheral hospital after falling from a tree 15 hours ago. He complained of neck pain with weakness in all four limbs. A cervical collar was applied before the transfer. He was conscious and vital parameters such as respiratory rate, pulse rate, blood pressure and oxygen saturation were within normal limits. Neurological examination revealed a tetraparesia below the level of C5. Muscle power in all four limbs was Grade 3/5 except both deltoids where muscle power was normal. Skin sensation, bladder and bowel function were preserved. Her preoperative American Spinal Injury Association (ASIA) Impairment Scale was D. There were no associated injuries to the chest, abdomen and pelvis.

Methods (Diagnosis, investigations and treatment)

Diagnosis and Investigations: Computed tomography of the neck objectified a posterior C5–C6 spondyloptosis allowed by a bipedicular fracture of C6 [Figure 1A-B]. An anterior spondylolisthesis of C7-T1 with bipedicular fracture of C7 were also found. No facet joint dislocation was present. Two fragments were detached from C6 and C7 body and reduced the spinal canal. There was a C5 anterior body fracture. Magnetic resonance imaging was not available.

Treatment: Surgical intervention was done by anterior approach only seven days after the trauma without preoperative cervical traction. The patient underwent a two level cervical corpectomy (C6–C7) with iliac crest fusion and rigid plate fixation. Patient was placed at supine position under general anesthesia. Oblique incision along the medial border of the right sternocleidomastoid muscle was given. After reaching to the

injured area, the traumatized vertebral bodies of C6 and C7 were removed using Kerrison rongeur and bone-gouge forceps. The injured posterior longitudinal ligament was also removed and complete decompression of the cord was achieved. Tricortical iliac crest bone graft was placed in the corpectomy defect after applying manual traction. A rigid plate was fixed from C4 to T1 with two screws on C4, one screw on the bone graft and two screws on T1 [Figure 2A-B]. Corporeal fracture of C5 didn't allow to put screws there.

Conclusion and Results (Outcome and follow-up)

No new neurological deficit was noted after surgery. Cervical collar was applied and seven days after surgery, muscular power improved to Grade 5/5 in both lower limbs. Patient was discharged home on the 10th post-operative day. He recovered completely after 2 months (Normal muscle strength in all limbs). At the operated area, an intervertebral fusion was noted at the third month follow - up with intact implant assembly [Figure 3A-B].

Discussion

The term spondyloptosis is made of spondylo and ptosis words and is used when the vertebrae slips and falls down totally in front of lower corpus from its original anatomical level [3]. It is more common in the lumbar spine than in the cervical spine and can be seen following birth trauma, congenital conditions of the cervical spine (like absent cervical pedicles or corticated defect in pars interarticularis), neoplastic diseases (like neurofibromatosis or aneurysmal bone cyst) and after vehicle or diving trauma [4]. Traumatic cervical spine spondyloptosis is a very rare entity and is considered the most severe form of cervical spine injuries [5]. A systematic review published in 2023 was reported only 66 cases [2]. The incidence of cervical spine spondyloptosis is probably underestimated basing on the fact that most of patients present this severe lesion haven poor outcomes limiting the good management and so the presentation of the cases. This lack of data reporting is more pronounced in developing countries [1]. The etiology of his spondyloptosis was a fall from a tree. Falls from trees related traumas are rarely reported in literature. But, they are public health problems in developing countries where their frequency is still important. These falls concern particularly children with mean age of 14 years [6].

Traumatic Cervical Spondyloptosis (TCS) is an unstable injury due to complete distrupction of all ligamanter structures involving three columns [5]. The case described in this report was a posterior form of spondyloptosis and located at the C5–C6 level. Concerning location, approximately two-third of all fractures, and three-fourth of all dislocations involve the subaxial cervical spine [7]. Dislocations occur most commonly at C5–C6 and C6–C7 levels [8]. This segment of the spine is highly vulnerable to injury as it is greatly mobile and at the proximal end it carries the weight of the head. Moreover, it has to bear great amount of force in acceleration and deceleration injuries [8]. Posterior form of TCS, as in our case is very rare and it is seen in only 10% of cases. The anterior slippage of the superior vertebrae (anterolisthesis) is the dominated form in more than 83% of cases; whereas only one case (1.5%) of laterolisthesis was reported [2].

Clinical presentation varies in the literature. According to Khelifa and *al* ., one-third of reviewed patients are received initially without any neurologic deficit and one-third with incomplete motor deficit, whereas only 36% of patients are totally paralytic [2]. Our patient had an incomplete neurological deficit. It may explain by the pattern of lesion. In fact, there was a total rupture between anterior and posterior elements (bipedicular fracture) at the level of C6 and C7. That led to a spontaneous decompression of the spinal canal.

Concerning medical imaging, computed tomography (CT) is important to identify a spondyloptosis with the associated bone lesions and to plan management strategy. Exploring arterial posttraumatic lesions with either angiography or angio-CT must be done to research vertebral artery lesions (pseudoaneurysm, dissection). Magnetic Resonance Imaging (MRI) is very useful in detecting associated soft tissues lesions, especially spinal cord compression, ligamentous rupture, and disk hernia, which led surgeons to prefer starting with anterior decompression before posterior reduction or stabilization [5]. Magnetic Resonance Imaging was not available in our hospital, but computed tomography haven permitted to establise the diagnosis of cervical spondyloptosis with ventral compression of spinal cord. Angio-CT sequences was not available also.

The ultimate goal of treatment in cervical spondyloptosis is to obtain anatomic alignment, neural decompression, and to prevent further instability with a solid fusion [9]. Like any other instable cervical spine lesions, it is an emergency. But our case is managed nine days after the trauma. This delay is due to the fact that costs of health care are borne by the family and they took time to gather surgical kit. Management of cervical spondyloptosis in case of incomplete injury or normal neurological status at presentation represents a challenging clinical scenario for the clinician.

There is no definite consensus when it comes to the management of TCS. Concerning preoperative closed cervical traction, some authors think that it could compromise neurologic function by compression of the spinal cord. This compression would be due to retropulsion of the disc into the spinal canal during traction [3,10]. However, other reports think that cervical traction can be safely implemented in spondyloptosis patients because spinal canal was decompress by fractures of the posterior elements [4,11]. In our case there was anterior compression of spinal cord by bone fragment. So closed cervical traction was not indicated due to risk of neurological deterioration.

Surgical management options described in the literature ranging from a simple anterior or posterior approach to 540-degree fusion [12]. An anterior and posterior fusion is the standard management due to greater realignment and stabilization being achieved in unstable injuries, with all ligamentous structures involving the three columns [4]. No significant differences were observed between the anterior-only, posterior-only, and 360deg repair groups regarding immediate postoperative ASIA grade and ASIA grade at the end of the follow-up period [13]. In our case, we have indicated ventral surgery in accordance with the location of the compression. Some authors have demonstrated that anterior-only fusion might suffice in selected patients with cervical spondyloptosis [14,15].

Our patient had an excellent short-term neurologic and functional recovery. This supports the view that anterior ventral surgery alone can be used with success in the management of cervical spondyloptosis in selective cases.

Conclusion

Traumatic cervical spondyloptosis is a rare injury and can involve children. Clinical presentations varied to neurologically intact to quadriplegia. Computed tomography is the imaging exploration of choice in developing countries where Magnetic Resonance Imaging (MRI) was difficult to access. Presently, no consensus is present regarding the best treatment for spondyloptosis. Satisfactory clinical and good outcome can be obtained by anterior cervical corpectomy and fusion in some cases.

KEYWORDS: Trauma, Spine, Neurosurgery, Pediatric.

Authorship Contribution

Author 1: Ousmane OUATTARA (corresponding author): Conceptualization of the original idea and writing – original draft

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