



Clinical Study

Post-traumatic cervical spondyloptosis: A rare entity with multiple management options



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ABSTRACT

Post-traumatic cervical spondyloptosis is a rare condition associated with high energy injuries, and to our knowledge only case reports are available. There are no universally accepted treatment paradigms for these cases and management is individualised according to the case and surgeon preference. We retrospectively analysed our management and clinical outcomes of this condition. From January 2007 to August 2014 we treated eight patients with cervical spondyloptosis at our institute. Only two patients had no neurological deficits; all the remaining patients had partial cord injury. Seven were treated surgically with preoperative traction followed by anterior cervical discectomy and fusion with fixation in three patients, and combined anterior and posterior fusion and fixation in four. Depending on the presence of anterior compression by a disc an anterior first or posterior first approach was advocated. All four combined anterior and posterior fusion and fixation patients needed to be turned more than once (540°). There was no neurological deterioration in any of the patients, as they either improved or remained stable neurologically. Post-traumatic cervical spondyloptosis is a challenging entity to manage. Surgery can be done safely with good clinical and radiological outcome and needs to be tailored to the individual patient.

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1. Introduction

Spondyloptosis is a severe form of spine dislocation in which the spondyloptotic vertebral body is dislocated either anterior or posterior to the subjacent vertebral body (>100% subluxation). Post-traumatic spondyloptosis was first described by Bhojraj et al. [1] Spondyloptosis of the cervical spine is relatively rare in comparison with that of the lumbar spine, and is generally associated with total cord injury [2]. This type of injury represents compressive extension stage 5 and distractive flexion stage 4 of Allen's classification of cervical spine injuries [3]. Various treatment options are available, including instrumented and non-instrumented fusion as well as an anterior, posterior or combined approach. Due to the rarity of this entity, there is no clear consensus on the management of these injuries.

We present a series of eight patients with post-traumatic cervical spondyloptosis managed at our institute. Seven patients were treated surgically; the remaining patient was neurologically intact and presented to us 8 months after trauma. Patients were assessed in follow-up visits and bone fusion was confirmed with imaging.

2. Materials and methods

This is a retrospective study of traumatic subaxial cervical spondyloptosis patients treated at our Institute from January 2007 to August 2014. The patients were identified from our computerised database and operation theatre register. Subsequently the case files were procured from our medical records department. Data regarding demographic features, mode of injury, clinical presentation, treatment given, neurological status at discharge, complications and follow-up details were all entered in an Excel spread sheet (Microsoft, Redmond, WA, USA). Neurological status was clinically assessed using the American Spinal Injury Association (ASIA) impairment scale preoperatively, postoperatively and at follow-up visits. The details of traction applied before surgery and the surgical procedure were extracted from case files. Preoperative imaging (radiographs, CT scan and/or MRI) was reviewed. The level of injury, status of the posterior elements, disc prolapse and cord signal changes were analysed. The follow-up details were obtained from the files. Postoperative imaging and follow-up imaging were studied. Clinical outcome was assessed after comparing the preoperative, postoperative and follow-up ASIA scores.

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3. Results

3.1. Clinical and radiological features

Eight patients (seven men and one woman) satisfied our study inclusion criteria. Their age ranged from 24 to 64 years (median 45). The mode of injury was road traffic accident in two patients and fall from height or fall while carrying a heavy weight over the head in six patients. Two patients were intact neurologically (ASIA Grade E) at presentation. The remaining six patients sustained incomplete spinal cord injury (Table 1). All patients were investigated with radiographs, CT scans and MRI of the cervical spine (Fig. 1). The level involved was C6–C7 in five and C7–T1 in three patients. Posterior elements were fractured in all patients. Facet fracture, joint disruption, locking of facets and pedicle fractures were seen in varying combinations (Table 2). MRI showed cord signal changes in three patients and cord contusion in one. Cord was normal and without any focal signal changes in four patients, while disc bulge and prolapse causing anterior cord compression was seen in three.

3.2. Surgery

Seven patients underwent surgical intervention while one patient refused surgery. All surgical patients were put in Gardner-Wells traction preoperatively. Traction was applied for several days (range 3–20). Initial weight applied was 2–3 kg followed by gradual increase by 2 to 3 kg over several days. Complete reduction of spondyloptosis was achieved in three patients; these patients underwent an anterior cervical approach, discectomy and fixation with plate and screws. There was partial reduction of spondyloptosis in traction in another three patients. These patients also underwent an anterior cervical approach and discectomy. Reduction was attempted intraoperatively but failed; subsequently the facets were approached posteriorly and were drilled, and reduction was achieved. Posterior fusion was completed with lateral mass screws and rods followed by anterior fusion and fixation with iliac crest graft and plate and screws. In the seventh patient preoperative reduction could not be achieved with traction. The facets were drilled through an initial posterior approach. The patient then underwent an anterior cervical approach for discectomy, achieving complete reduction of spondyloptosis followed by fusion and fixation with iliac crest graft and plate and screws. He was again turned and posterior lateral mass fixation was carried out.

All surgeries were performed in one sitting. None of the patients showed any deterioration in power postoperatively. Three patients improved by one ASIA grade before discharge. The other four surgical patients remained the same neurologically. One patient had an intraoperative cerebrospinal fluid leak which was managed with lumbar drainage, and the wound healed well.

Postoperative imaging was suggestive of complete reduction of spondyloptosis with good alignment in six patients while partial reduction was achieved in one.

Follow-up was available in four of the seven surgical patients. Mean follow-up duration was 11.7 months. Postoperative radiographs showed fusion in three patients.

4. Illustrative patients

4.1. Patient 1

A 50-year-old woman presented with a history of a gunny bag falling onto her from a rooftop. She subsequently developed neck pain and weakness in all four limbs. At presentation to our emergency department 8 hours after injury, she had neurological deficits with ASIA Grade C paraparesis of the lower limbs with bilateral hand grip weakness. CT scan showed C6–C7 spondyloptosis with bilateral facet locking and fracture of the posterior elements. An immediate MRI was obtained which showed spinal cord signal change without prolapsed disc. She was put in traction and complete reduction could be achieved after adding 5 kg of weight. Subsequently she underwent an anterior cervical approach C6–C7 discectomy and fusion with iliac crest graft using plate and screws. Her postoperative period was uneventful. Neurologically she remained the same as her preoperative status and CT scan showed complete reduction. At 24 month follow-up, she had improved to ASIA Grade E. Radiographs showed a maintained spine alignment with good bone fusion and intact hardware (Fig. 2).

4.2. Patient 5

This 64-year-old man had a history of benzodiazepine and nicotine dependence with dysthymia. He sustained a fall from his own height due to giddiness and subsequently developed neck and left shoulder pain. At presentation, he was ASIA Grade D. CT scan showed C7–T1 spondyloptosis with fracture of posterior elements of C7 and D1 vertebrae. MRI showed disc bulge and cord compression with no cord signal changes. He was put in traction with an incremental increase to 10 kg but no reduction was seen

Table 1
Clinical and radiological data of patients with traumatic cervical spondyloptosis

Patient	Age	Sex	Mode of injury	ASIA Grade at presentation	Injury level	CT scan	MRI
1	50	F	Fall of heavy object over head	C	C6–C7	B/L facet fracture and locking, L pedicle fracture	Cord signal changes, no disc prolapse
2	40	M	RTA	C	C7–D1	L facet fracture and joint disruption, R pedicle fracture	Cord signal changes, disc bulge
3	40	M	RTA	D	C7–D1	B/L facet joints intact, B/L pedicle fracture	Minimal cord signal changes, disc prolapse
4	45	M	Fall from bullock-cart	E	C6–C7	R facet fracture and joint disruption, L pedicle fracture	No signal changes, no disc prolapse
5	64	M	Fall from height	D	C7–D1	R facet fracture and joint disruption, L pedicle fracture	No signal changes, no disc bulge
6	24	M	Fall from height due to electrocution	D	C6–C7	B/L pedicle fracture, R facet fracture, joint disruption	Signal changes, disc bulge present
7	45	M	Fall with load over head	C	C6–C7	B/L facet fracture, locking and joint disruption, R pedicle fracture	Signal changes, disc prolapse present
8	55	M	Fall with load over head	E	C6–C7	Facets normal, B/L pedicle fracture	No signal changes, no disc prolapse

B/L = bilateral, F = female, L = left, M = male, R = right, RTA = road traffic accident.

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