Journal of Clinical Neuroscience 41 (2017) 150–153

Contents lists available at ScienceDirect

Journal of Clinical Neuroscience

journal homepage: www.elsevier.com/locate/jocn

Technical note

Cervical vertebral body fracture with ankylosing spondylitis treated with cervical pedicle screw: A fracture body overlapping reduction technique

Haemin Chon [a], Jin Hoon Park [b,*]

[a] Department of Neurological Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
[b] Department of Neurological Surgery, Gangneung Asan Hospital, University of Ulsan College of Medicine, Gangneung, Republic of Korea

ARTICLE INFO

Article history:
Received 10 June 2016
Accepted 3 April 2017

Keywords:
Ankylosing spondylitis
Reduction
Cervical vertebrae
Fracture
Cervical pedicle screw

ABSTRACT

We describe a patient with ankylosing spondylitis (AS) with cervical spinal fracture treated with cervical pedicle screw placement (CPS) through a single posterior approach.

A 43-year-old male patient with AS visited our emergency centre due to paralysis following a trauma. Coronal reconstructed cervical spine computed tomography (CT) scan showed a C5 oblique fracture, and the bilateral pedicles were separated superiorly and inferiorly. The sagittal reconstructed CT image revealed bamboo spine and C5 vertebrae body fracture. Hyperextension between the fractured segments of the C5 body was noted because the fracture gap was anteriorly open. Magnetic resonance imaging (MRI) showed cord compression and injury at the C4–5 level.

CPS was performed at the C3–6 levels. Because the left and right pedicles were displaced superiorly and inferiorly, dual compressions between the left C5 and left C6 pedicle screws and between the right C5 and right C4 pedicle screws were performed. Decompression at the C4 and C5 levels was performed after identifying good alignment. This posterior fusion surgery was performed for two hours. After surgery, the radiograph showed complete reduction and fracture gap apposition. The patient was rehabilitated, and his muscle strength improved. Postoperative CT and X-rays revealed complete fracture site fusion and correct CPS position.

Considering increased morbidity of long-level or -duration surgery, our fracture body overlapping technique using CPS and posterior only approach seems to be a possible and good surgical method in traumatic cervical fracture with AS.

1. Introduction

Cervical spinal surgery for ankylosing spondylitis (AS) is associated with trauma or sagittal deformity correction [1–15]. AS-related fractures are frequently more severe and highly unstable compared with cervical fractures in the healthy population. The broken "bamboo spine" behaves similarly as a long-bone fracture, and the long lever arms are extremely unstable with associated higher risk of neurological deterioration [16–18].

Owing to its highly unstable characteristics, the appropriate initial treatment for traumatic cervical spinal fracture with AS is crucial. Although the surgical treatment of AS spinal fracture is very different from that for a usual cervical spine fracture, the treatment guidelines are sparse [2,19–21]. The general surgical consensus for this disease is long-level posterior fixation and anterior bony apposition through proper reduction or an additional anterior graft [1,21]. However, surgical morbidity related with long-duration surgery or multiple approaches should be considered [1,22–25].

We previously demonstrated the safety and efficacy of the subaxial pedicle screw placement (CPS) only through the posterior approach, even in the traumatic cervical fracture or dislocation [26–29]. Here, we describe an AS patient with cervical spinal fracture treated with CPS through a single posterior approach.

2. Technique presentation

A 43-year-old male patient visited our emergency centre with paralysis after a trauma one day prior. He was diagnosed with AS 9 years prior based on findings such as HLA B27 positivity and syndesmophytes on a spine radiograph. He was consuming medication, which included nonsteroidal anti-inflammatory drugs, methylprednisolone and methotrexate. On examination, his muscle strength showed grade 0 in all extremities, except the left leg.

* Corresponding author at: Department of Neurological Surgery, Gangneung Asan Hospital, University of Ulsan College of Medicine, 38, Bangdong-gil, Sacheon-myeon, Gangneung-si, Gangwon-do, Republic of Korea. Fax: +82 33 610 4960.
E-mail address: grandblue@gnah.co.kr (J.H. Park).

http://dx.doi.org/10.1016/j.jocn.2017.04.012
0967-5868/

Left leg muscle strength was grade 3, and approximately 50% sensation was preserved below the T4 dermatome level. Anal tone and bulbocavernous reflex were also preserved.

The coronal reconstructed cervical spine computed tomography (CT) scan showed C5 oblique fracture and bilateral pedicles were separated, i.e., the left and right pedicles were in the superior and inferior segments, respectively. Sagittal reconstructed CT image revealed bamboo spine and C5 vertebrae body fracture. Hyperextension between fractured segments of the C5 body was noted because the fracture gap was anteriorly open. T2-weighted magnetic resonance sagittal image showed cord compression and injury at the C4–5 level (Fig. 1).

Posterior cervical fusion using CPS and open reduction were planned immediately. CPS with free-hand technique from C3–6 was performed after exposure. The whole procedure was performed as described previously [26]. The screw entry point was determined by the notch level in the sagittal plane, and medial to the lateral border of the superior articular process, by one-quarter of its width in the axial plane. A small pilot hole was made at the entry point with a 1.8-mm diameter match head-type burr. A 2.5-mm diameter, curved pedicle probe was slowly inserted vertically to the global lamina plane with a medial trajectory through the cortical hole, and the probe tip was placed at the thick medial cortical pedicle wall. The tip of the pedicle probe was then pushed medially, with movement in an upward and downward direction to locate the cancellous channel of the pedicle. Upon locating the cancellous channel, the medially directed force of the probe led to an insertion depth of approximately 30 mm. After forming a track with the curved probe, a ball tip probe palpation was performed. Subsequently, a straight pedicle probe (2.5 mm diameter) was inserted to make the track wider and straight. This process also increased the ease of subsequent ball tip probe insertion, tapping, and screw placement. The depth of the ball tip probe was measured. After tapping with a 3.5-mm diameter tap, a screw with a 4.0 mm diameter was inserted. Pedicle screw insertion on C5 was performed more carefully because of the C5 body fracture. Reduction was attempted after identifying a safe pedicle screw position with intraoperative X-ray [28] and rod connection. Because the left and right pedicles were displaced superiorly and inferiorly, dual compressions between the left C5 and left C6 pedicle screws and between the right C5 and right C4 pedicle screws were performed (Fig. 2). X-ray identification was performed again after the reduction attempt. Decompression through total laminectomy of the C4 and C5 was performed after identifying good alignment. Subsequently, posterolateral fusion and closure were performed. The operation interval was two hours.

X-ray showed complete reduction and fracture gap apposition after surgery. He was rehabilitated, and both his lower and left upper extremity muscle strength improved to grade 4, and right upper extremity muscle strength improved to grade 2 postoperatively at 12 months. Postoperative 4-month CT and X-rays also

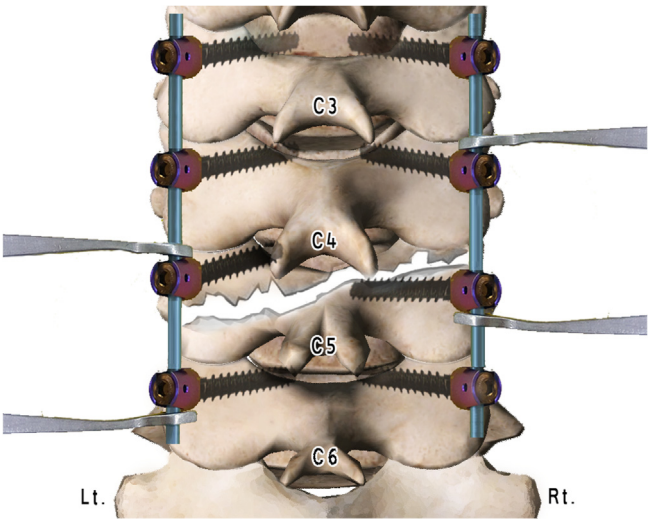

Fig. 2. Schematic image of fractured C5 body overlapping reduction technique: considering left down coronal oblique fracture line, the left C5–6 and right C4–5 simultaneous compressions are necessary.

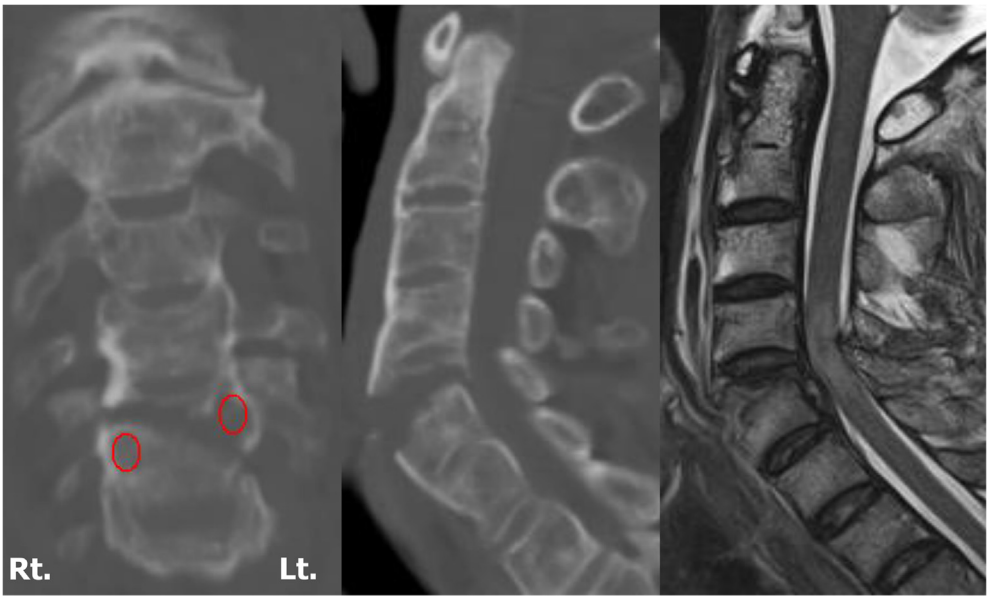

Fig. 1. Coronal reconstructed cervical spine CT scan shows C5 oblique fracture, and the bilateral pedicles are separated; i.e., the left pedicle is in the superior segment, and the right pedicle is in the inferior segment (Red circles). Sagittal reconstructed CT image reveals bamboo spine and C5 vertebrae body fracture. Hyperextension between fractured segments of C5 body is noted because the fracture gap was anteriorly opened. T2-weighted magnetic resonance sagittal image shows cord compression and injury at the C4–5 level.