ELSEVIER

CrossMark

The Spine Journal 14 (2014) e1–e5

THE SPINE JOURNAL

Case Report

Pediatric cervical spondylolysis and American football

Timothy B. Alton, MD*, Amit M. Patel, MD, Michael J. Lee, MD, Jens R. Chapman, MD

Department of Orthopaedics and Sports Medicine, University of Washington, 325 9th Ave., Box 359798, Seattle, WA 98104, USA

Received 14 June 2012; revised 25 June 2013; accepted 19 September 2013

Abstract

BACKGROUND CONTEXT: Cervical spondylolysis (CS) is a rare condition and is even more uncommon in pediatric patients. It is characterized by a disruption of the articular mass at the junction of the superior and inferior facet joints and often is diagnosed incidentally. The C6 level is most commonly involved, and the cause of CS remains unknown. There are no recommendations in the literature regarding activity modification in patients with CS and no discussion as to risks of participation in American football or other contact sports.

PURPOSE: To report a case of C6 bilateral cervical spondylolysis with bicuspid spinous process and to discuss radiographic/clinical findings and issues related to participation in contact sports and minimizing the risk of spinal cord injury.

STUDY DESIGN/SETTING: Case report with 6 months clinical/radiographic follow-up

METHODS: Radiographic description, clinical findings, and current review of the literature.

RESULTS: A pediatric patient presented with a bilateral C6 cervical spondylolysis and bicuspid spinous process after an American football–related minor cervical spine trauma. Findings on radiographs indicated that the spondylolysis appeared to be chronic in nature, without evidence of instability. The patient and his family were educated on ways to decrease the risk of spinal cord injury with contact sports, after which the patient was allowed to participate fully in sports without restrictions or adverse events.

CONCLUSION: Pediatric cervical spondylolysis is a rare condition, the cause of which remains debated. Although there is theoretical risk, more than 1.5 million youth participate in American football annually, and there have been no reported cases of significant spinal cord injury in patients with CS from football or other contact sports.

Keywords: Cervical spondylolysis; Pediatric; American football; Spinal cord injury; Prevention

Background

Cervical spondylolysis is a rare condition, with approximately 100 cases reported in the literature, only 25% of which occur in the pediatric population. The diagnosis is frequently made incidentally on a routine radiographic evaluation or after minor trauma. The pathophysiology responsible for this condition remains controversial. There are currently no guidelines regarding conservative management of this condition in children and return to contact sports.

Case report

A 12-year-old boy was playing American football as a defensive lineman and sustained an axial neck injury after tackling the ball carrier at the line of scrimmage. Immediately after impact, he felt posterior cervical pain without radicular pain or extremity weakness. He did not lose consciousness. He was able to walk off the field on his own accord, even returning to pain-free competitive play, completing the game.

FDA device/drug status: Not applicable.

Author disclosures: ***TBA:*** Nothing to disclose. ***AMP:*** Nothing to disclose. ***MJL:*** Research Support: AOSpine (D, Paid directly to institution); Grants: AHRQ (Coinvestigator) (F, Paid directly to institution); Fellowship Support: AOSpine (E, Paid directly to institution); Consulting: Stryker Spine (C), L&K Biomed (None), Lilli (None). ***JRC:*** Speaking/Teaching Arrangements: UCSF (B), University of Utah (B); Trips/Travel: AO Spine (B); Board of Directors: AO Spine NA (C); Endowments: H.J. Wyss Foundation (H, Paid directly to institution); Research Support: AO Spine NA (D, Paid directly to institution); OREF (E, Paid directly to institution); Fellowship Support: AO Spine NA (E, Paid directly to institution), Omega (E, grant, Paid directly to institution/employer).

The disclosure key can be found on the Table of Contents and at www.TheSpineJournalOnline.com.

* Corresponding author. Department of Orthopaedics and Sports Medicine, University of Washington, 7201 6th Ave. NE, #102, Seattle, WA 98115, USA. Tel.: (206) 744-4930; fax: (206) 744-3227.

E-mail address: altont@uw.edu (T.B. Alton)

1529-9430/$ - see front matter
http://dx.doi.org/10.1016/j.spinee.2013.09.037

The patient was evaluated in clinic the next week. He denied neurologic symptoms and had no pain. Findings of his physical examination confirmed normal neurologic and motor function. His neck was nontender to palpation with full active and passive range of motion.

Radiographic review of the patient's cervical spine revealed a bilateral C6 spondylolysis with Meyering grade 1 anterolisthesis of C6 on C7. Flexion/extension lateral radiographs failed to show instability between the C5 and C6 vertebral bodies (Fig. 1). These findings were confirmed with computed tomography (CT; Fig. 2) and magnetic resonance imaging (MRI; Fig. 3). This condition appeared to be chronic as noted by the corticated, smooth surfaces of the spondylolysis on CT scan and absence of soft-tissue swelling on MRI. MRI also failed to show neoarticulation synovial hypertrophy or hypertrophy of the ligamentum flavum. The C6 spinous process was bifid. Cord compression was not noted on imaging.

The patient and his parents were counseled on the baseline risk of cervical spine injury in American football. An extensive discussion was held with the patient and his parents regarding the risks of continuing to play American football. They were informed of the theoretical increased risk of neurologic injury based on biomechanical studies demonstrating increased cervical mobility with spondylolysis. Imaging at the time of discussion did not demonstrate instability. In addition, an extensive search in the English-language scientific literature did not yield any reports of cervical spondylolysis resulting in spinal cord injury in pediatric patients as a result of high-impact activities like American football. To date, the increased risk, although logical, has not been demonstrated.

Given that the patient was asymptomatic at the clinical visit and even shortly after the injury, allowing him to return to the game, we believed that spondylolysis was most likely an incidental finding. The decision was made jointly by the treating physician, family, and patient to allow the patient to return to normal activities of life, to include active competition in contact sports without limitation. It was recommended that the patient have yearly flexion-extension radiographs of his cervical spine to the age of 18 years to assess dynamic instability or lack there of. If any symptomology should develop that indicated the need for additional imaging, such as neck pain, electrical sensations, or burning or tingling to the upper extremities, studies would be obtained at that time. The patient completed the remainder of the season without incident, returned to normal active living, and was symptom free at his 6-month follow-up visit.

Discussion

Incidence/characterization of pathology

A rare condition, cervical spondylolysis was first described by Perlman and Hawes in 1951 [1]. Approximately 100 cases have been reported in the literature, and only 25% of these involve children [2]. Cases of lumbar spondylolysis are much more common, with a prevalence of up to 5% of the population [3]. Cervical spondylolysis is characterized by a disruption of the articular mass at the junction of the superior and inferior facet joints [4] and is commonly diagnosed incidentally or after minor cervical trauma. The most commonly affected level is the sixth cervical vertebra [4–9], but this condition has been reported in all cervical levels except C1 [10].

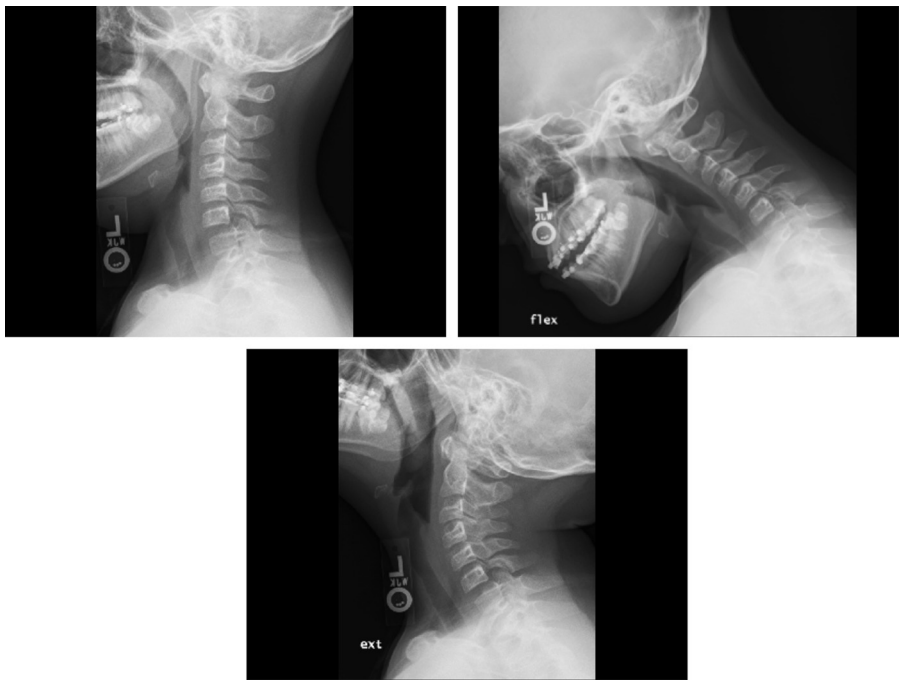

Fig. 1. Plain radiographs of cervical spine (Top Left: lateral, Top Right: flexion, Bottom: extension).