

Unusual Mechanism Of Chance Fracture In An Adult

M Todkar

Citation

M Todkar. *Unusual Mechanism Of Chance Fracture In An Adult*. The Internet Journal of Orthopedic Surgery. 2005 Volume 3 Number 1.

Abstract

Transverse fractures of vertebral arch or Chance fractures are associated with lap-type seat belt use. In 1948, Chance (1) first described a transverse fracture of the vertebral arch produced by a hyper flexion injury of the spine. Since that time, the Chance fracture is noted to be an unusual lesion in adults, very rarely described in the paediatric patient (2). The fracture is most frequently associated with injuries sustained while wearing lap-type seat belts (3,4,5). This case reports a 30 year-old male who sustained a lumbar Chance fracture as a result of fall from height.

CASE REPORT

A thirty year-old male fell from a height of 20 feet. He sustained close fracture of both calcanei, open fracture of left tibia and complained of pain in lumbar area. Palpation revealed tenderness in lumbar region. His neurological examination was normal. Radiographs and CT scan revealed a transverse fracture of L2, demonstrating split posterior elements and progressing anteriorly into body of vertebra, as seen in the lateral X-ray of lumbar spine.

For this fracture, L1 – L3 fusion was carried out using metal cage from an anterior approach and posterior instrumentation was added using pedicular screws. External fixator was applied for open fracture of tibia and fracture calcaneum was fixed internally on one side and other treated conservatively.

DISCUSSION

The Chance fracture consists of a horizontal splitting of the spinous process and of the neural arch of vertebra, ending in an upward curve which usually reaches upper surface of the vertebral body and no lateral displacement or rotation of the fracture fragments (1, 4). The fracture has been reported in children to involve first, second, third and fourth lumbar vertebrae (2, 6,7). The mechanism of injury is hyper flexion of spine over a fulcrum. Howland et al (6) and Hubbard (7) described Chance-type fracture of lumbar vertebra in paediatric and adolescent age groups produced by lap-type seat belt acting as a fulcrum across the spine at the time of injury. Smith and Kaufer (5) reported a series of 20 patients with transverse fractures of lumbar spine following injury while wearing lap-type seat belts. They hypothesised that

mechanism of injury is one of sudden deceleration, such as occurs with automobile crash or fall. With hyper flexion of the spine over a fulcrum such as a seat belt, the force is displaced anteriorly and lies at point of contact between fulcrum and the abdominal wall. This subjects all of the components of spine to tension stress. The result is a disruption of the ligaments of posterior elements of spine or a transverse fracture of posterior elements. The same type of injury may occur in a fall when the anterior abdominal wall comes in contact with some object such as a tree limb or fence, which acts as a fulcrum and forces the body into acute flexion (4). Production of a Chance fracture in a fall over an object acting as a fulcrum has been theorized but not commonly reported in adults or children (5).

Our patient in the report fell from height of 20 feet. There was no history of an object acting as a fulcrum involved in the fall. The calcaneal fracture implies that the first contact with the ground was the feet and that the acute flexion of the spine was a likely sequence from that which resulted in fracture as a result of failure of bone in tension.

Figure 1



The recognition of Chance fracture is dependent on high index of suspicion when the history of injury and clinical examination are suggestive of hyper flexion injury of spine. Patients presenting with bruises over lower abdomen must be investigated carefully. A palpable tender gap over spinous process may be the first indication of a flexion-distraction

injury. The incidence of neurological complications in flexion-distraction injuries is low in patients who do not frankly dislocate. These injuries may be associated with life threatening intra-abdominal injuries that require immediate attention. Lateral radiographs of the spine will confirm the diagnosis.

Definitive treatment of these injuries depends upon the anatomic structures involved and the amount of displacement. Lesions occurring entirely through osseous elements can be managed in hyperextension orthoses. When the only osseous injury involves the pars interarticularis, these are best managed with open reduction and internal stabilization since pars has little of cancellous bone. Injuries that primarily result from ligament damage need to be addressed with open reduction and internal stabilization since ligaments will not heal adequately to provide stability if treated closed.

Our patient had no back pain at three months follow up. The bilateral calcaneal fractures and the fracture of tibia also healed well. He required no rehabilitation and returned to work at fourteen weeks from the injury.

CORRESPONDENCE TO

Manoj Todkar 17 Girdlestone Close Headington Oxford
OX3 7NS Tel: 07792404268 E-mail: mtodkar@hotmail.com

References

1. Chance GQ. Note on a type of flexion fracture of the spine. *Br J Radiol* 1948; 21:a452-a453.
2. Blasier RD, LaMont RL. Chance fracture in a child: A case report with nonoperative treatment. *J Paediatr Orthop* 1985;5:92.
3. Rogers LF. The roentgenographic appearance of transverse or Chance fracture of spine: The seat belt fracture. *Am J Roentgenol Radium Ther Nucl Med* 1971;111:844-889.
4. Horal J, Nachemson A, Scheller S. Clinical and radiological long term follow-up of vertebral fractures in children. *Acta Orthop Scand* 1972;43:491-503.
5. Smith WS, Kaufer H. Patterns and mechanism of lumbar injuries associated with lap-seat belts. *J Bone Joint Surg Am.* 1969 Mar;51(2):239-54.
6. Howland WJ, Curry JL, Buffington CB. Fulcrum fractures of the lumbar spine. *JAMA* 1965;193:140.
7. Hubard DD. Injuries of spine in children and adolescents. *Clin Orthop* 1974;100:56-65.

Author Information

Manoj Todkar

Nuffield Orthopaedic Centre