Scheuermann’s disease is a developmental abnormality of the spinal column, which is named after Holger Werfel Scheuermann, who in 1921, described changes in the vertebral endplates and disc spaces that can occur during development and lead to kyphosis of the thoracic spine. The other synonyms are: Vertebral epiphysitis, Osteochondritis of the vertebral end plates and Adolescent kyphosis. The condition, which affects both sexes equally, usually begins at puberty, having peak incidence from 15 to 16 years. The mid and lower thoracic spine is the region most commonly affected with the apex of the curve typically between the T6 and T10 levels of the spine, with several adjacent vertebrae being involved. Rarely, Scheuermann’s kyphosis may also occur in the thoracolumbar spine or in the lumbar spine[1]. Scheuermann’s kyphosis does not spread and is not really a ‘disease’ but develops from defective anterior endochondral ossification. It appears that either anterior extension occurs after the completion of posterior growth or the forces that produce abnormal anterior growth were not active in the posterior direction[2]. This origin is further supported by the presence of the condition in the earliest known bipedal hominid species, Australopithecus Afarensis[3]. Residual wedging in late cases may be indistinguishable from that caused by a previous compression fracture. The ring apophysis may be displaced by discal herniation, seen as a triangular fragment of bone adjacent.
to the end plate. The intrusion of prolapsed thoracic discs into the spinal canal and narrowing of the canal at the apex of the curve can, in relatively few instances, cause myelopathic symptoms. As improvement is slow and consolidation may take several years, the kyphotic deformity becomes progressively more fixed in position. Scheuermann's disease is occasionally confused with tuberculous spondylitis; however, the appearance of the discs, the wedging of the vertebrae and the absence of bone destruction should readily distinguish one from the other. Other infectious discitis destroy bone adjacent to the narrowed interspace. The absence of nuclear intrusions, usually affecting several segments is important.

**Clinical Examination**

A normal spine viewed laterally shows a continuous smooth arc from the sacrum to the cervical area when the patient bends forward. However, the kyphotic patient will show a hump or angulation in the middle or lower thoracic area. Tight hamstrings and pectoral muscles are commonly seen in this disorder.

**Diagnostic Criteria**

(a) Irregular vertebral end plate.

(b) Narrowing of the intervertebral disc space.

(c) Three adjacent vertebrae wedged 5° or more.

(d) An increase in the normal thoracic kyphosis above 45° taken by Cobb's method in a lateral radiograph of the thoracic spine.

(e) Thoracolumbar kyphosis >30 deg (thoracolumbar spine is normally straight).

**Radiology**

A standing lateral film is taken at 2m Film Focus Distance with the patient's arms kept horizontally. The affected vertebral bodies show an undulant superior and inferior surface with (or with out) Schmorls nodes and surrounding sclerosis (Fig 1). Other findings may include loss of intervertebral disc height, wedging of the anterior portion of the vertebral bodies, and prolapse of large foci of intervertebral disc tissue anteriorly (Fig 2). This may lead to formation of a limbus vertebra as a result of exension of the extruded anterior discal material beneath the apophysial centers of ossification, separating them from the vertebral body[4]. Synostosis of one vertebral body with its neighbour may also occur. Some scoliosis may be present and a small paraspinal bulge is occasionally seen at the level of the lesion. The radiographic picture tends to remain static for a while and recovery is often incomplete and various degrees of irregularity and wedging of thoracolumbar vertebrae may be permanant. Indeed, evidence of old adolescent kyphosis is one of the most frequent abnormalities seen in spinal radiographs. Discography shows a disc filled with contrast medium, which extends between the vertebral body and the detached fragment of bone. Changes at MR imaging reflect changes seen on plain skiagrams (and at discography). The affected disc is narrowed and usually shows a loss of signal indicating dehydration. The disc is seen to herniate into the end plate defect and beneath the non-fused ring apophysis [5].

**Aeromedical Concerns**

At entry level Scheuermann's disease if detected radiologically disqualifies a candidate from entry into the Air Force. Moreover, the wedging that accompanies this disease is in itself incompatible with flying duties. The problem of disposal could arise when the deformity is minimal and thus undetected at entry and later detected during investigation of back pain in a trained aircrew. Aviation stresses in the form of Hight Gz loading,
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(encountered during ejection and combat maneuvers in fighter flying) and vibration (which is encountered in rotary wing aircraft and fixed wing during low-level flying) could aggravate and exacerbate the disease process resulting in early degenerative changes and or complications. Asymptomatic cases must be given adequate time for observation in a ground category and thereafter gradually relighted. The ability of such a diseased spine to withstand the forces of ejection in a fighter aircraft aircrew must be addressed. The centre of gravity for the upper segment of our body lies in front of the spine; with increase in the curvature of the thoracolumbar spine, the centre of gravity will shift further forwards, which will increase the likelihood of flexion compression fracture. Thus aircrew with rigid dorsal kyphosis and wedging would be unfit for ejection seat aircraft. Skiagrams of the dorsal spine were not part of the protocol for evaluation earlier and cases of Scheuermann's disease could have been missed at entry. However the same is now mandatory as per the IAP 4303 3rd Edition[6].

References


6. Indian Air Force Publication(IAP) 4303 3rd edition. (Manual of Medical Examination) 2003 Section 6.9.1

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Answers to Aviation Quiz

1-b, 2-c, 3-b, 4-a, 5-c, 6-b, 7-d, 8-a, 9-a, 10-a, 11-a, 12-a, 13-d, 14-d, 15-a, 16-b, 17-c, 18-b, 19-b, 20-a