

The Classic

Kyphosis Dorsalis Juvenilis

HOLGER WERFEL SCHEUERMANN

Holger Werfel Scheuermann (1877-1960) a Danish surgeon serving in Copenhagen published this report in 1921, during the period before the osteochondroses—then know as osteochondritis—were considered similar pathological entities. It appeared near the end of an era when orthopedic disease or surgical eponyms were a mark of distinction. "Scheuermann's disease" entered the list immediately.

E.M.B

Spinal deviations, appearing during puberty, show several cases representing a definite entity morphologically deserving special interest. I am referring to the fixed dorsal kyphosis, a true sagittal deformity different from the postural hunch-back which can be corrected actively.

While working in a Danish Home for Crippled Children, I studied 105 patients with dorsalis kyphosis of which 60 showed complete stiffening and 45 with third degree of lateral motion. This deformity was first described by Schanz in 1911, who coined the term "apprentice kyphosis" or "kyphosis muscularis" considering muscular insufficiency its cause. It has nothing in common with the Kuemell's traumatic kyphosis, or the kyphosis described by Bechterew or Strümpell-Marie. I was surprised about the absence of descriptions in the various ortho-

pedic standard works of a kyphosis which cannot be explained as a simple progression of a "round back." In the orthopedic textbook of Lange, 1914, Spitzzy described occupational kyphosis as a postural deformity, an increasing normal dorsal kyphosis rarely getting worse. Similarly Tubby and Schuelthess only mention this condition briefly explaining it as tissue insufficiency "affecting bones, ligaments and muscles as well." Schuelthess, 1917, considered all kyphotic changes as a congenital entity, while autopsies from older patients were labelled senile forms. In my experience the specific kyphosis dorsalis occurs only between the age of 15-17 almost exclusively affecting boys. (88% and only 12% girls.) The period of increasing growth spurt during puberty with the apex around 16 followed by strenuous physical work points to this specific etiology with the majority represented by farmworkers.

The development of a painful deformity extends over a period from 2-3 months to 6-12 months. As an illustration of a typical

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FIG. 1. Holger Weifel Scheuermann (1877-1960).

case I am reporting a 16-year-old farmhand who, in the course of 3 months after heavy work, loading and shoveling clay, developed pain in the area of the 12th dorsal and 1-2 lumbar vertebra with a fixed kyphosis not responding to corrective measures and showing radiologically 3 wedged vertebra at the apex of the curve. No appreciable correction was obtained by plaster corset or brace. Besides pain — disappearing on rest — the patient experienced decreased working ability and shortness of breath. The deformity is more conspicuous to the onlooker than to the patient himself. Since patients are young individuals with well developed back muscles they show good spinal mobility except for the fixed angulated kyphosis with the apex usually between D7-10. A compensatory lumbar lordosis develops with the trunk slightly thrust forward. Except for a kyphosis dorso-lumbalis, I never found changes in the cervical or lumbar segments. I found a dispropor-

portion between strong muscular development and marked deformity.

H. Virchow described anatomically "wear and tear changes" involving the epiphyseal bones of the vertebral bodies with depression of the epiphyseal segments ending in their disappearance first observed in Australian blacks. He attributed it to their postural habits. He noted that anthropoids have forward flexed positions. The main etiology seems a gravity deviation although I cannot rule out other factors.

Radiologically I did not find changes on the ventrodorsal position position but definitely in side views. X-ray findings of normal vertebral epiphyses show a broad annulus anteriorly, getting smaller posteriorly, after fusion of the epiphyses with the vertebra the annulus becoming biconvex. At the age of 15 the epiphyses can be demonstrated as a small triangular portion in the intervertebral space of the vertebra.

I could not demonstrate separately the epiphyseal shadow at the posterior vertebral segment. According to H. Virchow the ring shaped epiphyses was also found in monkeys and elephants, in other mammals the epiphyses forming a solid disc wider than in man.

A similar case was described by Koehler of an 11-year-old girl also finding small triangular shadows at the anterior vertebral borders (epiphyseal plates). He concluded that those areas fuse together forming a continuous plate between the ages of 12 to 24, first in the cervical and last in the lumbar area. According to my own findings those changes only appear around the age of 14-15 with calcification of the anterior vertebral border measuring $\frac{1}{2}$ mm. X-ray examination of a typical dorsal kyphosis demonstrates compression of the vertebral anterior borders on the convex side with increasing wedge deformity. A boy at ages 14 and 16 demonstrated irregular epiphyseal centers with unchanged disc structures and no evidence of any muscular insufficiency.

The term *kyphosis muscularis* (Schanz) is not valid. However, in my opinion, those changes I described are similar to those described by Calvé and Perthes as *Osteochondritis deformans juvenilis coxae* involving the *caput femoris* starting insidiously with mild pain and functional impairment and ending with some degree of local deformity but clinical recovery. Except for the different localization I conclude that there is pathological similarity of both conditions.

Unfortunately there is no definite proof for the etiology of the *Osteochondritis Deformans*. Perthes considered in a surgical specimen the formation of epiphyseal bone regeneration. In any case I feel justified to name the *kyphosis dorsalis juvenilis*, "*Osteochondritis deformans juvenilis dorsi*." For the effort to discover similar changes in animals, Prof. Foelger of the Academy for Veterinarian and Agricultural Research supplied spinal columns of 2 horses, showing differences from the rickety human spines with a dorsolumbar lordosis extending from D 1 to D 12 and an anterior spinal convexity with partial vertebral fusion indicative of a chronic process (14 years). H. Virchow 1916, described a similar specimen, consid-

ering the deformity by gravity, the primary and the later fusion as secondary arthritic spondylitis. A similar process in horses and the human juvenile kyphosis is evidently taking place, appearing in colts corresponding to a human age group between 14–16. With the difference of a lordotic deformity in horses and a kyphotic deformity in man, the deformity in the sagittal plane persists followed by fusion and periosteal reactions.

There is no specific therapy for the juvenile kyphosis and my efforts with prolonged bracing were unsuccessful. Bed rest is helpful to alleviate pain, but plaster corsets in overcorrection or suspension did not help in preventing persisting deformity.

SUMMARY

Kyphosis dorsalis juvenilis, the so-called apprentice or muscular kyphosis, is caused by disturbances in the vertebral epiphyses and not as originally suggested by muscular spinal insufficiency.

The pathology resembles Calvé-Perthes *osteochondritis deformans juvenilis coxae* and can therefore be labelled as *Osteochondritis deformans juvenilis dorsi*.