SCHEUERMANN'S DISEASE IN STUDENTS OF PHYSICAL EDUCATION.

by

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The vertebral column develops from a flexible rod of cells lying in a sheath which develops from the head process of the embryo. This arrangement of cells is the Notochord which subsequently becomes enclosed in mesenchyme. In the 7th week of intrauterine life chondrification occurs and towards the second intrauterine month centres of ossification appear in the cartilaginous vertebrae and the vertebral column enters its last stage of development. Ossification occurs from three primary centres - two for the arch and one (sometimes two) for the body until at birth the vertebrae consist of the Centrum and the two halves of the vertebral arch. The Centra unite with the arches between the third and sixth years of life. Until puberty the upper and lower surfaces of the body and the ends of the transverse processes and spine are cartilaginous. About the sixteenth year five secondary centres of ossification appear, the upper and lower parts of the body becoming two epiphyseal disks. These secondary centres do not fuse completely until about the 25th year of life. (Gray).

Radiology of the Spine.

The normal vertebral body is seen as an opacity bounded above and below by thin layers of compact bone. The epiphyseal plates ossify as ring-like structures and are usually seen as separate shadows anteriorly and posteriorly but generally only the anterior part is clearly seen. The epiphyseal plates can be seen about the 11th year and fusion to the body occurs by the 20th year (Appleton, Hamilton and Simon).

The intervertebral spaces are occupied by disks which cannot be seen directly (unless calcified) and abnormalities of the disk can only be inferred by the appearance of the surrounding bony structures, e.g., narrowing of the disk space when the nucleus has prolapsed. The injection of radio-opaque material into the disk space has been used diagnostically but many consider this a dangerous and unjustifiable procedure.

Scheuermann's Disease.

This is said to occur in boys between the ages of 12 and 17 years. Most authors share this view but Jewett has stated that the condition occurs mainly in adolescent girls. It is said to give rise to a marked kyphosis affecting

chiefly the lower and middle parts of the thoracic spine and aching is frequently present (Mercer). On the other hand Williams and Pugh in their study found that those with active disease had symptoms in only 52% of cases and of those with inactive disease only 12% had had symptoms in childhood.

The radiological appearances are of wedging of the vertebral body and mottling of the upper and lower ring epiphyses which may go on to fragmentation and disappearance of the upper and lower outer corners of the body. There may also be nuclear prolapses into the vertebral bodies - the so-called Schmorl's nodes. Repair occurs and density returns to the epiphyses but the vertebral bodies may remain wedged. It has been shown that pressure may produce changes in the rate of epiphyseal growth (Arkin) and it is likely that gravity plays a part in producing this deformity. The kyphosis is also increased by relative overgrowth of the neural elements of the spine when the growth of the body is defective, and anomalies of the epiphyseal plates have a greater influence in producing deformity than defects in the neural arch or spinal cord. (Roaf). Roaf goes on to say that this disease is a fairly common condition which usually requires little treatment and an important secondary factor in producing deformity is 'slouching'.

The Etiology of the condition is obscure but the disease is regarded as a sequel of the capacity of the spine and the load it is called upon to bear (Mercer). It is not clear whether the disturbance is a primary lesion of the disk or a secondary lesion due to multiple repeated trauma, but whatever the cause it appears clear that the turgidity of the disk is lost and abnormal movement may then occur between two adjacent vertebral bodies. It has been shown that the normal disk does not allow fluid to be injected into it but the degenerate disk will allow the injection of 3 - 5 ml or more of saline (Pridie).

The clinical recognition of the condition.

Scheuermann's Disease will rarely be seen early by a doctor since, as we have seen, symptoms may not be present and the deformity will have to be sufficiently severe as to be obvious to the layman before medical advice is sought. Considering the posture which is accepted as 'normal', deformity will have to be very severe indeed before the untrained eye will notice any abnormality. Even the trained eye may have difficulty in seeing the abnormal among the variations commonly regarded as normal but it is the purpose of this paper to suggest that we accept as normal too wide a spectrum of variation and the investigation of relatively slight deviations of spinal form and function would

bring to light many more cases of vertebral abnormality.

Scheuermann's Disease in Students of Physical Education.

When examining students for admission to the Scottish School of Physical Education at Jordanhill last year I recorded 28 cases of spinal abnormality which might have been due to Scheuermann's Disease. Since the candidates were not X - rayed the diagnosis of these abnormalities remains in doubt but all had deformities rather like those which I can now show you and who all had radiological evidence of epiphyseal abnormality. I am as sure as one can be on clinical grounds that a degree of Scheuermann's Disease was present in these cases and 28 cases out of the 215 who were examined gives a higher percentage than has been reported elsewhere (Williams and Pugh). These authors report a 5% and 6% incidence in two series, one in Denmark and one in the United States. The size of the figure quoted for the candidates for the Scottish School is only slightly less than the number of foot disabilities picked up but the latter, of course, attract much more attention.

As will be seen later the number of cases of Scheuermann's Disease among these students was probably a conservative estimate since I was accepting minor departures from excellence of spinal function as "within normal limits" and two students so graded subsequently proved to have radiological evidence of Scheuermann's Disease.

The abnormality most commonly seen was loss of mobility in the spine of a localised nature either in forward or lateral flexion, or in extension and a relatively fixed lordosis was not uncommon. None of the subjects you have seen have an "adolescent kyphosis".

The sequel to defects in the intervertebral disks is Degenerative Joint Disease due to malfunction of the posterior spinal joints with pain and discomfort presenting in a variety of ways often after the lapse of several years. It has been shown that heavy work contributes to this condition (Kellgren) and it is reasonable to suppose that heavy work on an already inadequate vertebral column should be avoided. The fact that the cases quoted produced symptoms only during a rigorous course of physical education makes one wonder whether there is not some danger of substituting for the back breaking drudgery of old fashioned manual labour the equally back breaking enjoyment of modern training methods.

The next slides show the feet of two students who were admitted to the course only after Orthopaedic opinion had been obtained. Both these students complained of back pain in the second term of their physical education course.

The pain could not be related to frank injury and their backs were regarded as being slightly faulty but not sufficiently so as to warrant outright rejection from the course. Here are their radiographs. Both are suffering from Scheuermann's Disease and it is interesting to find two apparently different skeletal abnormalities in the same subject. Multiple abnormalities are known to occur in the so-called 'dysostotic constitution' and a search for more cases of this type may prove revealing.

There may be a case for routine radiography of the spines of prospective students of physical education to say nothing of a search for this condition in those facing the prospect of heavy labouring jobs in industry. The recognition of abnormalities which predispose to the development of Spinal Osteoarthritis in later life might reduce the burden on Departments of Physical Medicine, crowded as they are with conditions many of which can be traced to long-standing joint inadequacy, and the early recognition of the possibility of the condition in the child or adolescent would allow the early application of prophylactic exercise and attention to posture which should minimise subsequent disability. Physical Educationists are in the best position to recognise early departures from perfection of form and function of the spine and any such departure should be viewed with suspicion, the idea of "within normal limits" is not good enough! We have never in this country been very happy with the idea of 'the body beautiful' and there has been a strong drift away from the application of exercises of a subjective nature but I think the position demands re-examination. The older physical educationist appeared to recognise the importance of perfection in form and function better than we do today - R. Tait Mackenzie was a sculptor and K. A. Knudsen in his Text Book of Gymnastics talked of the physical educationist as a 'sculptor in the human flesh'. Both of these gentlemen published before the classical paper of Scheuermann appeared in 1921.

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