

## SPONDYLOLISTHESIS\*

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IN 1853, Kilian applied the term spondylolisthesis (*σπόδυλος*, a vertebra, and *λίσθησις*, a sliding forward), to a condition in which the fifth lumbar vertebra had slipped downward and forward on the first sacral segment. His term was so truly descriptive of what actually happens that it has remained unchanged. My reason for presenting this subject is to review the literature and point out that, despite the warnings of Goldthwaite,<sup>1</sup> and Bowman,<sup>2</sup> we are still, I believe, overlooking spondylolisthesis as a cause of backache. Robert W. Johnson, Jr.,<sup>3</sup> writing in Kelly's recent edition of "Gynecology," apropos of this, remarks that "reflex pelvic disorders" and "kidney trouble" are not common causes of backache, as was formerly thought. He says, "the back itself should receive first consideration." The orthopædic surgeon, into whose hands these patients should fall, no doubt is alive to the possibility of this condition, but patients complaining of such symptoms are usually sent for x-ray examination first. Whether the patient goes to the orthopædist first or last, the court of final appeal is the radiologist's opinion on a good lateral plate of the sacro-lumbar region. With our ultra-speed films and modern x-ray equipment the production of such a film is not difficult. A Greek philosopher once said, "One picture is worth ten thousand words." This places a large responsibility squarely on the shoulders of the radiologist.

A review of the literature, which is, comparatively, not extensive, divides the study of spondylolisthesis into two periods. Before 1900, 125 cases were reported, all but six by obstetricians.<sup>4</sup> As a result, the opinion became prevalent that the condition was met with only in females and was preceded by the physiological softening of the pelvic joints incident to pregnancy. The name of Neugebauer is inseparably associated with this period.<sup>5</sup> Between 1900 and

1914 the work of Goldthwaite,<sup>1</sup> Darling,<sup>6</sup> and others established the fact that in America it is more common in males than in females and due, in the majority of cases, to severe injury, such as falling a considerable distance, or to heavy lifting. Goldthwaite thinks that many doubtful cases of backache, including sacro-iliac strains, are in reality cases of spondylolisthesis. Most authorities state that it is a rare condition; Bowman<sup>2</sup> thinks that it is common. There is no doubt, however, that spondylolisthesis occurs often enough to make it of practical importance and that it is frequently overlooked.

The etiology is most logically considered under two headings: (a) predisposing causes and (b) actual. The predisposing causes are congenital defects of the fifth lumbar vertebra; its anatomical relation to the sacrum, and, in females, the

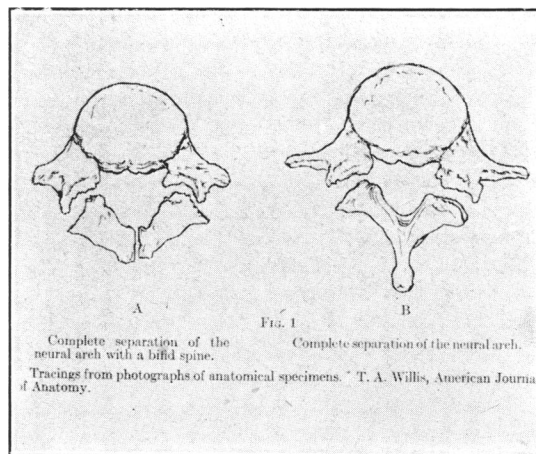


FIG. 1

softening and relaxation of the pelvic joints due to pregnancy. The actual cause is injury. Willis<sup>7</sup> examined 748 spines and found two principal congenital defects in the fifth lumbar vertebra: (1) non-fusion of the spinous process, the commonly seen spina bifida occulta, and (2) complete separation of the lamina on one or both sides. (Fig. 1). Actual separation of the lamina or fibro-cartilaginous union was present in 4.8 per cent of cases. This type of defect would result in a weak or unstable abutment

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for the powerful ligaments required in this location. Add a severe strain, and slipping forward of the fifth lumbar vertebra is the most likely result; add a series of strains and almost any degree of displacement forward and downward may be present, depending on the period in which the patient is examined. George and Leonard<sup>8</sup> report several cases in children in whom the congenital defects above mentioned constituted the only discoverable cause. Another factor predisposing to spondylolisthesis is the downward and forward angle of 30 degrees at which the fifth lumbar vertebra normally articulates with the sacrum.

The physical examination in a well developed case presents the following features: a striking prominence of the sacrum; a shortening of the trunk, as if it were telescoped into the pelvis; lumbar lordosis; wrinkling of the skin and superficial fat across the flanks; and a waddling gait. (Fig. 2). Very suggestive is a history

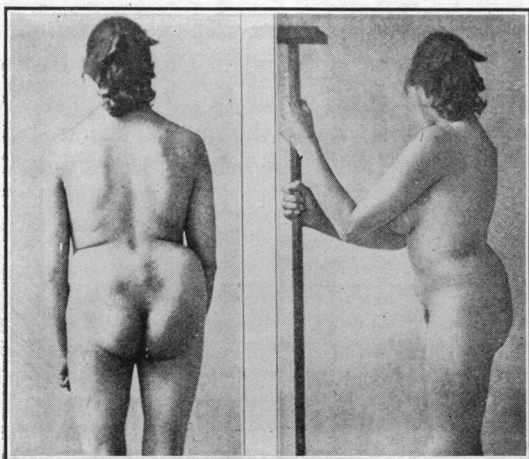


FIG. 2

of relief from pain after a period of rest and a return of this pain following exertion.

The radiological examination consists of antero-posterior and profile views of the lumbar spine and sacrum. If there is any doubt about the existence of spondylolisthesis repeat the examination, centring over the lumbo-sacral joint. The antero-posterior position frequently reveals three hints, *viz.*, the upward tilting of the spinous processes of the fourth and fifth lumbar vertebrae (Fig. 3), a dense shadow over the first sacral segment resulting from the superimposition of the body of the fifth lumbar, and only four lumbar vertebrae appearing above the pelvic brim. The lateral plate is the one on

which the diagnosis is decided. The characteristic downward and forward position of the body of the fifth lumbar vertebra in relation to the sacrum could hardly be mistaken for anything else. (Fig. 4). It should be mentioned

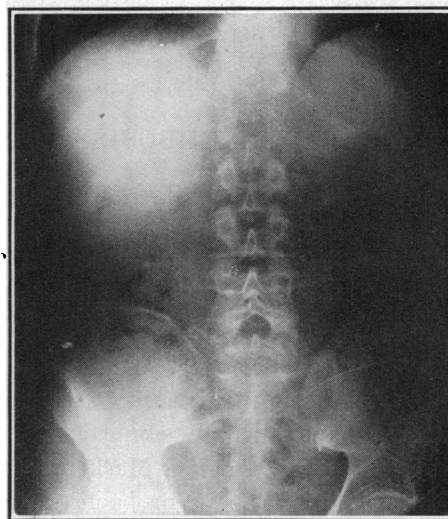


FIG. 3

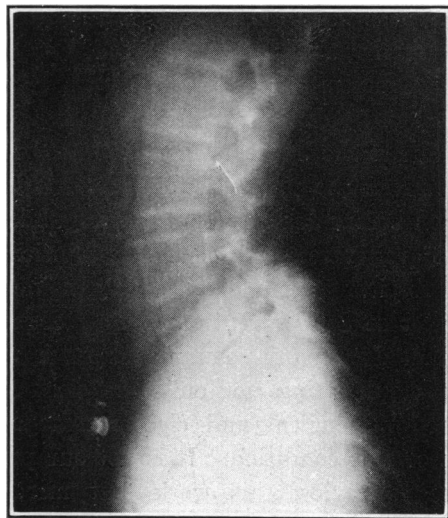


FIG. 4

that destruction of the intervertebral disc, as a result of tuberculous spondylitis or other rarer lesions in this region, would allow a slipping, but the radiological appearance, history and progress of the patient would indicate the true nature of the disease.

Border-line cases will arise in which, from the x-ray plate alone, there is a question of whether or not a little displacement forward has taken place. The procedure in such instances is exactly the same as with other doubtful medical or surgical problems, *i.e.*, consultation with

the attending physician and the orthopædic surgeon, and a careful consideration of the history, clinical and radiological evidence. The radiologist is a physician, not a fortune teller.

## REFERENCES

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## CORONARY THROMBOSIS: A CLINICAL AND PATHOLOGICAL STUDY\*

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THE recognition of coronary thrombosis as an anatomical condition has been accepted for many years. It was considered, however, more or less as a pathological curiosity and was not associated with any definite clinical syndrome. It is true that both Osler and Mackenzie recognized the condition as a probable cause of angina pectoris, but they did not attempt to make an ante-mortem diagnosis. It was also considered as being an important cause of rupture of the heart, but this, again, did not enter into ante-mortem diagnosis. Its classification as a clinical entity dates from the past fifteen years and is due to the work of Herrick<sup>1</sup> who, in 1912, demonstrated the possibility of recognizing the condition before death. His further publication in 1918<sup>2</sup> reiterated his former description and added to it. About this time Levine and Tranter<sup>3</sup> also drew attention to its recognition. Since that date many communications have appeared, emphasizing not only the clinical but also the pathological and electrocardiographic aspects of this condition. It is not our present purpose to review this work, but merely to mention how the large number of papers has brought about a condition of mind which has produced the phrase "the coronary problem", leading one to suppose that it is a greater problem to-day than it was a generation ago.

To undertake a comparative study of the incidence of coronary thrombosis as diagnosed ante mortem during the past thirty-five years is impossible, as it is only during the past ten years that this diagnosis has been made with

any frequency, and, as is so often the case with newly recognized clinical entities, the diagnosis has become rather popular and is made frequently on insufficient evidence.

The present communication is based upon a clinical and pathological study of 62 cases of coronary thrombosis with occlusion which occurred in the Royal Victoria Hospital during the past thirty-five years. The incidence of its occurrence is to be found in Chart I. Here is depicted the ratio of the number of cases of coronary thrombosis to the number of autopsies during this period, there being 62 cases in 6,548 autopsies—a ratio of 1 to 105.6. Although the incidence has increased some five-fold, the num-

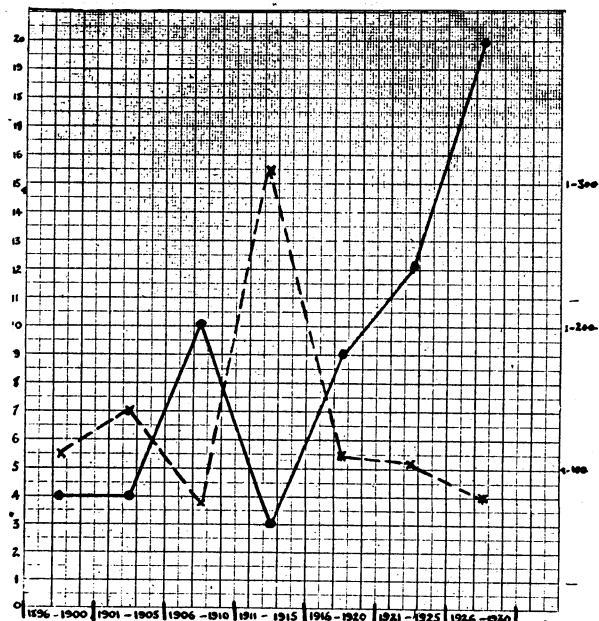


CHART I.—The incidence of coronary thrombosis during thirty-five years. The solid line gives the number of cases found at autopsy in five-year periods; the dotted line denotes the ratio of coronary thrombosis to total autopsies.

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