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TUBERCULOUS NECROSIS OF ENTIRE VERTEBRAL BODY WITH NEGATIVE X-RAY FINDINGS

BY

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It is a well-known fact that the X-ray findings are sometimes negative despite the presence of tuberculous spondylitis. This is all the more to be regretted as spondylitis can scarcely be established with certainty unless the X-ray findings are positive. In cases of tuberculous spondylitis, there is usually destruction of the osseous structures, sometimes with sequestration, and the lesion is thereby rendered visible in the roentgenogram. Small lesions, such as those found in a comparatively early stage of tuberculous spondylitis, do not show in the roentgenogram. However, even if no destruction of osseeous matter can be ascertained, it happens at times that other roentgenological changes will give rise to the suspicion that, after all, a tuberculous lesion in a vertebral body actually exists. A flattened disk, a periostial bulge on the vertebral body, a perifocal osteosclerosis, all these may indicate spondylitis, though no destruction within the actual vertebral body is so far to be detected. But not only small lesions may be invisible. Now and again it will happen that even quite large tuberculous destructions in the vertebral bodies do not show in the roentgenogram, by reason of the fact that they are shielded by normal bone tissue lying in front of, and behind, the lesion. Experimental research by *Chassin* has shown that uninjured bone cortex is here of outstanding

importance. Investigations made by *Böhmig* and *Prévôt* also point to this. They produced by curettage cavities of the size of a cherry in vertebral bodies without injuring the cortex, and the roentgenograms made subsequently did not show the slightest trace of these defects. Rather extensive tuberculous destructions within the vertebral bodies may thus be present without their showing in the roentgenogram, as the cortex is not destroyed. In the case of extensive tuberculosis of vertebral bodies with negative X-ray findings, which I shall now briefly report, the cause of the negative findings is, however, different.

The case was that of a woman aged 24. Early in March 1945, a tender swelling developed in the back, immediately to the right of the middle thoracic part of the spine, as well as another near the lower right eyelid. A couple of weeks later rise of temperature. The patient was admitted to a surgical department. Intracutaneous tuberculin test, positive. A tender abscess was found on the right side of the spine reaching from the third thoracic vertebra to the level of the scapular angle. There was an abscess above the right zygomatic arch. On the left side of the neck two swollen lymph glands of hazelnut to walnut size. The abscess beneath the right eye was incised, a fistula then forming in the incision scar. On April 12th, 1945, the patient was referred to the Department of Orthopaedics and Surgical Tuberculosis at St. Göran's Hospital. The slightly tender abscess in the back was punctured, the pus being forwarded for bacteriological examination. No acid-fast rods were found in the smear, but some few staphylococci, none however in connexion with leukocytes. A few surface colonies of staphyloccocci grew on plate culture, but no deeper colonies. In broth, there was no growth. No actinomyces. Guinea-pig test was carried out, also culture according to Löwenstein. X-ray examination of the thoracic spine on May 15th, 1945: No destruction within the vertebral bodies, no flattening of intervertebral disks. Along the whole thoracic spine an oblong, sharply-defined, non-osseous opaqueness. X-rays of the lungs showed pleural disease on the right side and enlargement of glands in the hilus region, with large infiltration of parenchyma in the right lung. On puncture of the pleural cavity clear exudate was obtained. The patient had a high temperature and chills. Blood culture, negative. As the possibility of sepsis could not be excluded, sulfathiazole and penicillin were administered, but without effect. In due course the reports on the Löwenstein culture and guinea-pig test were received. They were both positive as to tuberculosis. Thus, the diagnosis tuberculous abscess was securely established, but no oseous focus had been shown as causing the abscess

Thrombosis supervened in the left leg. Gradually increasing cachexia. The patient died on July 31st, 1945. The autopsy revealed caseous tuberculous glands in the neck, in the mediastinal space and in the abdomen, tuberculous lesions of the pleura and peritoneum, tuberculous ulcers in the ileum, miliary tubercles in lungs and spleen, tuberculous lesions in the spine and thrombosis of the left femoral and iliac veins.

Fig. 1.

In this connexion, the question of immediate interest is that of the spinal tuberculous disease. When, on autopsy, the vertebral bodies were opened, extensive lesions could be seen particularly in the fifth thoracic vertebra. The body of this, by its white colour, showed a marked difference from the rest of the vertebral bodies (Fig. 1). The entire vertebral body exhibited a uniform whitish hue, with the exception of certain small areas of its upper and lower portions. The vertebral body was not

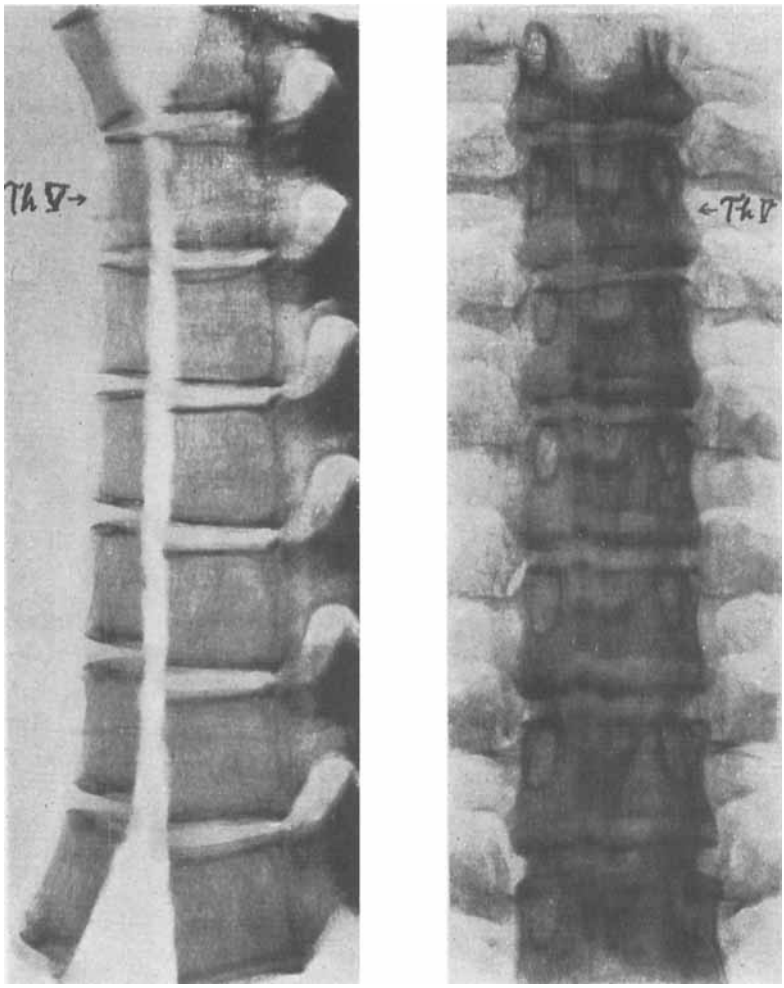

Fig. 2.

compressed, being of normal height; adjacent intervertebral disks, N.A.D. Small caseous abscesses were present bilaterally on the surface of the vertebral body In the middle of the left lateral portion of the vertebral body, a slight perforation of the bone cortex leading into the abscess was found. In other respects no destruction of the tissues of the vertebral body could be established.

Some few caseous foci, no larger than a pea, were to be found

located in the centres of the bodies of the first lumbar vertebra and of some of the lower thoracic vertebrae, for instance, of the second; no destruction to osseous tissue. A bean-sized caseous focus was present in the spinous process of the seventh thoracic vertebra from which the abscess in the back seemed to originate.

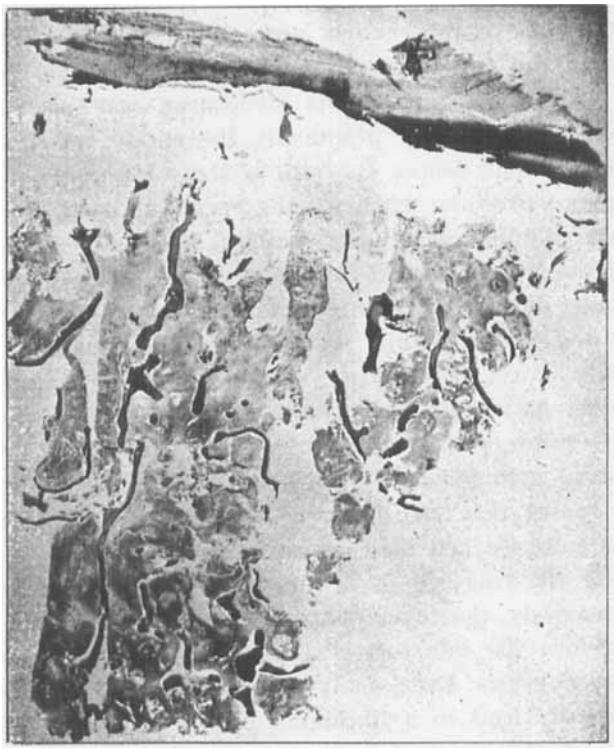

Fig. 3.
Intervertebral disk and adjacent part of the vertebral body.

The thoracic spine including the fifth thoracic and adjacent vertebrae was removed for X-ray photography. No conspicuous lesions, either in the vertebral body of the fifth thoracic vertebra or in the adjacent intervertebral disks, could be detected in the roentgenograms (Fig. 2).

Histo-pathological examination of body of fifth thoracic vertebra (Fig. 3): The medullary spaces in the vertebral body are completely choked with caseous debris, here and there alternating with small areas of fresh tuberculous granulation tissue with giant cells of Langhans.

The tuberculous lesion extends to the intervertebral disk. The surface of the disk touching the vertebral body is only slightly injured. The trabeculae of the spongy substance show satisfactory calcium content, the signs of decalcification being but slight. The bone lacunae in the trabeculae are mostly empty or else containing cells whose nuclei are stained badly or not at all. No acid-fast rods to be found.

In this case a tuberculous necrosis of an entire vertebral body, from the one intervertebral disk to the other, without marked impairment of osseous structures, was present. The medullary spaces within practically the entire vertebral body contained caseous debris. In spite of these tuberculous lesions being spread over the whole of the vertebral body, the roentgenograms did not show any changes at all, not even those made of the spine removed on autopsy. The fact that no more conspicuous damage to the trabeculae had taken place, explains why no destruction within the vertebral body could be ascertained by X-rays. The entire vertebral body was one large sequestrum. As a rule, sequestra are visible in the roentgenogram, by reason of their opaqueness being greater than that of the adjacent atrophic bone tissue, but in this case it was not possible to see that the opaqueness in the necrotic vertebral body was more marked than in nearby vertebrae.

Despite the tuberculous tissue touching the intervertebral disks extensively, the tuberculous disease did not involve these, and therefore the intervertebral spaces were not reduced in the roentgenograms. Even small paradiskal foci in the vertebral bodies usually lead to a flattening of the adjacent disk. The reduction of the intervertebral space is often the first roentgenological sign of tuberculous spondylitis, being not seldom visible in the roentgenogram at a much earlier stage than the focus in the vertebral body itself. According to *Randerath*, the site of the nucleus pulposus is an area of predilection for the spread of the tuberculous focus to the disk. He also points out that, if there is protrusion of the nucleus pulposus into the vertebral body, this is highly conducive to the disk being involved. But even in cases of small marginal foci, touching exclusively the annulus fibrosus, a flattening of the disk at the

site of the focus can usually be discerned at an early stage. Thus, a flattening of the intervertebral disks is the rule in cases of tuberculous lesions in the vicinity. If, in the roentgenogram, destruction within a vertebral body is seen, widely communicating with the intervertebral space, without the latter being reduced, there is reason to suspect another kind of disease than tuberculosis, e.g. neoplasia. In the case presented, where the disease was tuberculous, the intervertebral spaces were, as stated, not reduced, despite that the tuberculous lesion extended right through the vertebral body from the upper to the lower disk. I have seen a similar condition in two other cases. In both extensive injuries in the lower part of the fifth lumbar vertebra approaching the disk were shown by X-rays, but the disk was not flattened. An initial diagnosis of neoplasia was consequently agreed on, but the subsequent course revealed that tuberculosis was responsible.

In addition to the spondylitis in the fifth thoracic vertebra, smaller tuberculous bone foci in other vertebral bodies were present. In the second thoracic vertebra, in a couple of the lower thoracic vertebrae and in the first lumbar vertebra, single foci, at the most of the size of a pea, were found. All these were caseous, without suppuration, as was that in the fifth thoracic vertebra, and all were located in the centres of the vertebral bodies, and not, as is usual, near the disks. All these spondylitic lesions were thus of the same type, both as regards location and patho-anatomical picture. As to the lesion in the fifth thoracic vertebra, it is likely, by reason of the uniform spread of the tuberculous disease over the entire vertebral body, that even this had originated in the centre, subsequently extending over the whole vertebral body. On an investigation of tuberculous spondylitic lesions, carried out by me in 1937, I was able to ascertain, on the basis of the X-ray findings, that the comparatively infrequent central lesions, as well as the balloon-like and the primarily anterior and lateral lesions, are sometimes multiple within the spinal column, and that in these cases a certain tendency towards the development of the same type of lesions in different sites emerges. The case reported

above gives further support to this contention, as regards the central spondylitic lesions.

Finally, a few words also on the spondylitis of the arch present in the this case. In the spinous process extending to the senventh thoracic vertebra, a caseous necrotic focus, slightly larger than a bean, was found from which the abscess in the back originated. Nor did this lesion show in the roentgenograms of the spine made during the life of the patient. In the X-ray the spinous process was, however, rather poorly visible, and it is possible that detail roentgenograms, made with special regard to the spinous process, might have revealed that tuberculous focus. In cases of tuberculous abscesses in the back, it should not be assumed as a matter of course that they arise from a focus within a vertebral body, as an abscess derived from spondylitis of an arch may have the same location. It is important, in cases of these abscesses, to obtain a clear picture of the arch region showing the spinous processes, not the least in view of the fact that foci within the arches are often easily accessible to radical operation.

The case described above shows that a caseous tuberculosis may spread widely through the medullary spaces without conspicuous injury to the osseous tissue ensuing, and consequently also without any apparent changes of the vertebral body as shown by X-rays. In addition, the case proves that adjacent intervertebral disks are not necessarily involved, despite wide communication between the diseased tissue and the disk. This case thereby still further emphasizes the difficulties associated in certain cases with X-ray diagnosis of tuberculous spondylitis.

A corresponding case has been described by *Lindgren*, although the tuberculous lesions there were more advanced and extensive.

SUMMARY

A case of tuberculous necrosis of an entire vertebral body, from one disk to the other, without X-ray changes of vertebral body or disks is described. The medullary spaces in the vertebral

body were choked with caseous debris, whereas the osseous structures were uninjured.

ZUSAMMENFASSUNG

Beschreibung eines Falles tuberkuloser Nekrose eines ganzen Wirbelkörpers — von einer Intervertebralscheibe zur andern — ohne im Röntgenbilde sichtbare Veränderungen des betreffenden Wirbelkörpers oder der anstossenden Intervertebralscheiben. Die Markräume der Spongiosa waren mit käsigen Massen gefüllt, wohingegen die Knochenstruktur unversehrt war.

RÉSUMÉ

Communication d'un cas de nécrose tuberculeuse d'un corps vertébral entier, d'un disque vertébral à l'autre, sans altérations apparentes sur la radiographie du corps vertébral en question ou des disques intervertébraux contigus. Les lacunes médullaires du corps vertébral étaient encombrés de débris caséeux, tandis que la structure osseuse elle-même était intacte.

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