GIANT CELL TUMOR OF THE SPINE
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Giant-cell tumors of the lower ends of the long bones, though not commonplace, can no longer be considered as rarities. In the small bones, however, the disease is still sufficiently unusual to warrant report. Sporadic cases of involvement of the os calcis, the carpal scaphoid, or other of the bones of either extremity are almost pathological curiosities, and the number of reported cases involving the spine is notably small.

In 1924, Lewis (2) collected a total of 16 proved cases of giant-cell tumor of the spine and added one case of his own. In 1930, Santos (5) was able to collect 6 more cases, including one which he observed. Meyerding (4) reported a case in 1931; Farr (1) reported another in 1932, Lindsay and Crosby (3) a third in 1933. All portions of the spine appear to be liable to the disease, though the lumbar region was the site of the tumor in the greatest number of cases. Exclusive of the case here reported, only 6, those of Madelung (reviewed by Lewis), Camurati, Adson, and Cotton (reviewed by Santos), Farr, and Lindsay involved the cervical region.

CASE REPORT

J. M., a male, aged sixteen, was first seen in the Out-Patient Department, complaining of pain, which had developed gradually over a period of about six months. This was associated with stiffness of the neck, which at the outset had been noticed only in the morning, but which, with increasing pain, had become more constant and more severe. There was no antecedent history of trauma or of acute infection, nor was there a history of night sweats, loss of weight, or variation in the severity of the symptoms with change of weather. Some two months before his admission to the hospital the patient noticed pain between the spine and the right scapula, radiating down into the right shoulder, and apparently made worse by sneezing, coughing, or any motion of the head and shoulder. At the same time, a swelling in the cervical region was observed, and this had gradually increased in size and tenderness. The patient had been examined at another hospital and advised that he had a "cyst of the neck," but no treatment was undertaken.

The patient held his head in a typical left wry-neck position. There was slight contracture of the left sternomastoid muscle. Limited motion of the neck was possible in all directions, but with stiffness and pain at the limits of motion. At the level of the third cervical spine posteriorly was a smooth, firm, hemispherical, non-fluctuating, slightly tender mass about 3 cm. in its longest diameter, apparently attached to the underlying structures. Motion of the right upper extremity was unaffected, but there was a definite flattening in the supraspinous fossa, with a suggestion of weakness in the muscles of the right shoulder girdle. There were no sensory changes. The urine showed a faint trace of albumin, but no Bence-Jones protein. The blood showed 90 per cent hemoglobin; leukocytes 12,500, of which 60 per cent were neutrophilic polymorphonuclears, 1 per cent basophilic polymorphonuclears, 35 per cent large lymphocytes, 1 per cent monocytes, and 3 per cent metamyelocytes. There were 10.3 mg. of calcium and 4.7 mg. of phosphorus per 100 c.e. of blood. The blood Wassermann test was negative.
Roentgen examination of the cervical spine (Fig. 1) was reported by Dr. Pomerantz on July 27, 1932, as showing "an expansile tumor of the spinous process of the third cervical vertebra. The anterior extremity of the tumor reaches the facets. The cortex is thinned out and the tumor appears to be trabeculated. Conclusion: giant-cell tumor or osteochondroma."

Because of the radicular pains and the beginning weakness of the right shoulder girdle muscles, the tumor was believed to be causing pressure on the second to fourth
cervical roots on the right side, and radical removal in preference to radiotherapy was determined upon. A mid-line incision was made, extending from the tip of the second to the tip of the sixth cervical spine. After dissecting back the muscles, the tip of the third spinous process was found to be bulbous, thinned out, purplish in color, and very fragile to the touch. When this spine was completely isolated, the whole tumor was simply lifted out of the wound, exposing a slightly thickened dura, already the seat of tumor growth. The mass was then found to consist of the entire spinous process, with the posterior portions of the adjacent laminae. The wound was curetted as carefully as possible, without injury to the dura, and was closed in layers.

The gross specimen (Fig. 2) was a mass $4 \times 3 \times 2.5$ cm., reddish gray in color and having the granular appearance and consistency of a giant-cell tumor. On frozen section, a diagnosis of giant-cell tumor was made. The microscopic sections (Fig. 3) were described by Dr. Jaffe as showing "a very interesting and bizarre picture. At the periphery are a few remains of the original trabeculae of the spinous process. Within the substance of the spinous process are areas simulating giant-cell tumor, but throughout there is extensive hemorrhage, with calcification and connective-tissue ossification in the spinous process. The impression is that there has been extensive hemorrhage into a giant-cell tumor, with spontaneous healing phenomena manifested by extensive so-called local osteitis fibrosa. Diagnosis: healing giant-cell tumor of the spinous process, with associated local osteitis fibrosa."
For the first few days after operation, the reaction was normal, but later a local *Staphylococcus aureus* infection developed. Under appropriate treatment, this infection healed. To protect the spine, a leather collar was applied. Before discharge from the hospital, the patient was given radium pack treatments, totalling 22,250 mg. hours. At the time of his discharge he was in excellent general condition, though there was still deviation of the neck forward and to the left, with limitation of extension and absence of rotation. Flexion and lateral bending were fairly satisfactory, and the pain had completely disappeared. Since that time the postural defect has improved slightly and there has been a slight increase in the range of rotation. There is no pain in the shoulder region and the weakness of the shoulder girdle muscles has been entirely overcome. The

![Image of neck and spine showing regeneration](image)

**Fig. 4. Almost Complete Regeneration of Posterior Arch of Third Vertebra**

Note marked kyphosis at this level, with apparent spondylolisthesis.

The brace has been discarded. Roentgenograms taken in November 1933 show almost complete regeneration of the neural arch of the third cervical vertebra, with a marked kyphosis of the spine in this region, associated with a compensatory lordosis below and an apparent spondylolisthesis (Fig. 4). The patient is apparently well and engaging, with slight restrictions, in normal sport activities.

**Discussion**

While the observation of this case hardly justifies any extended discussion of the problem, a casual mention of some points of interest may be made. Giant-cell tumors are usually located in the spongy bone and give the impression of being a characteristic, almost a specific, disease of the spongiosa. Whether the giant-cell tumor is considered as a true neoplasm or is looked upon as of the nature of a tissue reaction to injury or inflammation, it would seem that it represents for the most part an affection of the spongiosa and that other parts of normal bone do not ordinarily react in this manner. It is interesting to observe that these
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tumors have been described as arising in the body, the spine, and the transverse processes; i.e., in those places where muscular attachments normally occur, but never in the pedicles or the laminae. Indeed, the very attachment of the muscles has been considered as mediating the trauma to which some attribute the origin of these tumors. Where the pedicles or laminae are involved, it is apparently only by extension of the disease process.

The symptoms are to be divided into two groups: those due to the tumor formation and those due to pressure upon the spinal cord or the peripheral nerves. Where the vertebra is superficial, as in the cervical region, the tumor may be readily palpated, but where, as in the lumbar region, the involved area is deep-lying, the tumor may first be betrayed by the appearance of neurological signs. These symptoms and signs, as in other tumors involving the cord, range from various types of sensory disturbance to more or less complete paralyses, and even to complete section of the cord.

Especially when the bodies of the vertebrae have been involved, these tumors have been mistaken by competent orthopedic surgeons for tuberculosis, tumors of other types, low grade osteomyelitis, and osteoarthritis. When the growth is situated in the spines or transverse processes, the x-ray photograph is usually characteristic, as in the long bones. Where the body of the vertebra is primarily involved, the influence of weight-bearing and the collapse of the internal structure of the bone may completely efface the typical picture and lead to difficulties in diagnosis. In such cases the diagnosis may be attempted by bone puncture, by biopsy, or by observing the reaction to x-ray therapy. Bone puncture may be dangerous, because of the collapse of the body and the proximity of important structures. Biopsy can readily be performed even on the body of the vertebra, by means of a relatively simple costo-transversectomy. The danger of this procedure lies in the possibility of opening into a closed tuberculosis or initiating a hemorrhage from an angioma or other vascular tumor.

The simplest and probably the safest method of diagnosing and treating these tumors is by x-rays or radium. Where the body of the vertebra is involved, even in the presence of nerve complications, conservative therapy is indicated. On the other hand, when the tumor is located in the spine or transverse processes, when paralysis is progressive, and when, in legal terminology, "time is of the essence," surgical intervention to relieve pressure, with subsequent radiotherapy, would seem to be the method of choice.

References