

## THE ACCIDENTAL OPERATIVE TRANSPLANTATION OF BENIGN GIANT CELL TUMOR

G. H. C. JOYNT, M.D. AND W. E. ORTVED, M.D.  
TORONTO, ONT.

FROM THE DEPARTMENTS OF ORTHOPEDIC SURGERY AND PATHOLOGY, TORONTO GENERAL HOSPITAL,  
UNIVERSITY OF TORONTO

THE NATURE OF GIANT CELL TUMOR of bone has been frequently discussed in the past few decades. In recent years it is more generally believed to be a type of benign bone tumor which may have local destructive powers with the ability to recur at the primary site and yet does not give rise to distant metastases. Meyerding<sup>5</sup> has suggested the use of the terms "benign giant cell tumor" and "malignant giant cell sarcoma" to differentiate the more common type from the malignant tumor.

The possibility of metastases arising from benign cell tumor, however, has been thoroughly reviewed in the literature. It has been indicated that pulmonary metastases might be expected from this benign tumor in view of its free vascular connections and the frequent treatment by curettage. Ewing made a careful search for such cases up to 1926 and pointed out that in spite of numerous efforts, no proven cases of metastases from benign giant cell tumor had been reported. Meyerding<sup>6</sup> in his large series of 40 cases treated by excision of the tumor and bone graft had no instance in which there had been a transplantation of a benign giant cell tumor.

This case report concerns the accidental operative transplantation of a benign giant cell tumor of the tibia to a distant soft tissue site over the crest of the ilium. No similar case was encountered in the literature.

J. M., a 56-year-old railroad worker was admitted to Toronto General Hospital on April 11th, 1946, with a history of intermittent swelling below the left knee for 5 months associated with slight pain and stiffness in the knee for 2 months. Five weeks before admission about 50 cc. of straw colored fluid had been aspirated from the knee joint with some relief of symptoms but one week previous to admission the patient developed an acute thrombophlebitis of the left leg. On admission the left knee presented a hard diffuse slightly tender swelling in the upper end of the tibia and roentgen-ray showed an expanding osteolytic lesion of the upper end of the tibia which had broken through the cortex at the level of the tibial tubercle, (Fig. 1). A biopsy of the tumor showed a typical histologic picture of benign giant cell tumor, with varying numbers of large irregular giant cells scattered throughout a fibrous tissue stroma. These giant cells had numerous hyperchromatic nuclei which were located usually in the central portion of the cell. (Fig 2).

On May 8th, 1946, the tumor mass was curetted leaving a large cavity in the upper end of the tibia about four inches in length. The defect was bridged with a sliding bone graft from the tibia and the remainder of the cavity was packed with cancellous bone chips obtained from both iliac crests. The can-

cellous bone graft was removed *after* the curetting of the tumor. Figure 3 shows an immediate postoperative roentgenogram with the limb in a circular plaster. The cast was removed and reapplied after two months with no evidence of recurrence of the tumor. On October 5th, 1946, five months postoperatively the patient was readmitted and on removal of the plaster cast a moderate sized swelling of the upper end of the tibia was noted. Roentgenogram showed

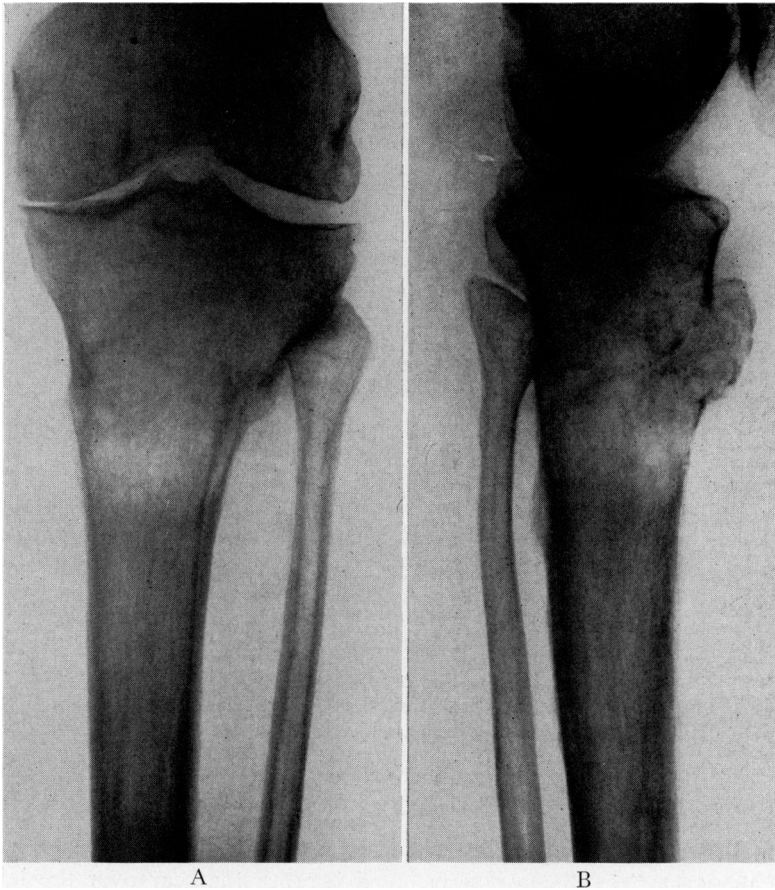


FIG. 1 (A).—A.P. X-rays to show the expanding osteolytic lesion of the upper end of the tibia—broken through at the level of the tibial tubercle. (B)—Same as on Fig. 1 (A).

a local recurrence of the tumor involving the whole upper end of the tibia. On October 16th, 1946, the upper end of the tibia and the tumor were excised and a massive tibial graft from the right leg was used to bridge the gap from the lower end of the femur to the middle of the left tibia. Cancellous bone chips from the upper end of the right tibia were packed about the graft. The microscopic sections of this tumor showed a recurrent giant cell tumor of bone with numerous variable sized multinucleated giant cells distributed through in-

terbranching bundles of fusiform fibroblastic cell elements. Additional sections of adjacent skeletal muscle tissue did not show any evidence of invasion of the tumor growth, (Fig. 4). The limb was immobilized with external skeletal fixation but slight infection developed about the upper two Rodger-Anderson pins. As a result the Rodger-Anderson apparatus was removed and a plaster spica applied (Fig. 5). Unfortunately the patient developed a mild infection in the wound at the left knee and a window was cut in the cast in the area of the sinus.

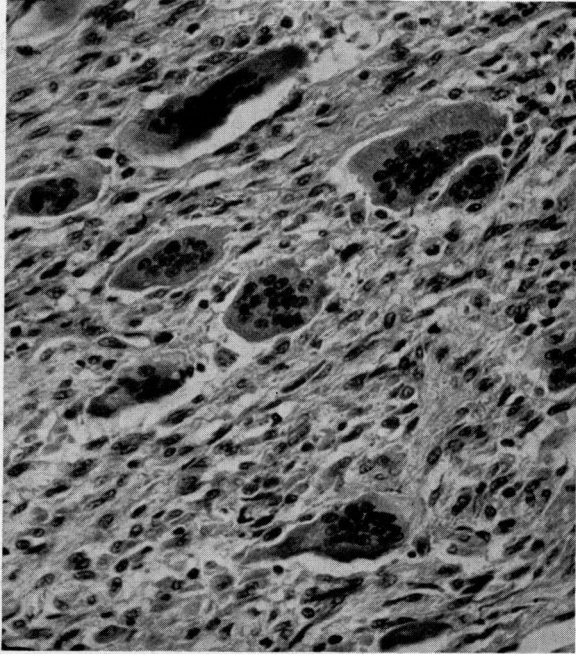


FIG. 2.—Biopsy from tumor of the upper end of the tibia showing varying numbers of irregular giant cells scattered throughout a fibrous tissue stroma. circular plaster.

On February 22nd, the plaster spica was removed and at this time a firm mass about  $1\frac{1}{2}$ " in diameter was noted beneath the scar over the left iliac crest at the site of previous cancellous bone graft (May 8th, 1946). A biopsy of this mass was taken and on March 5th, 1947, the tumor was widely excised. Figure 6 shows the gross specimen, bisected. It was situated superficially beneath the skin and was attached to scar tissue overlying the ilium. There was no attachment to bone. This implantation tumor revealed the characteristic picture of benign giant cell tumor of bone in the gross. The histologic appearance was similar to the sections previously described. In addition there were a few areas of patchy necrosis and haemorrhage (Fig. 7). Careful physical examination failed to reveal any further masses and roentgenograms of the pelvis and chest were negative.

DISCUSSION

Experimentally the inoculation and implantation of malignant tumor cells have been successfully carried out under certain conditions. This has been demonstrated well by transplanting sarcoma and carcinoma in rats and mice. Ewing, in discussing the essential conditions for neoplastic growth of misplaced cells, state that the cells must possess some special capacity for

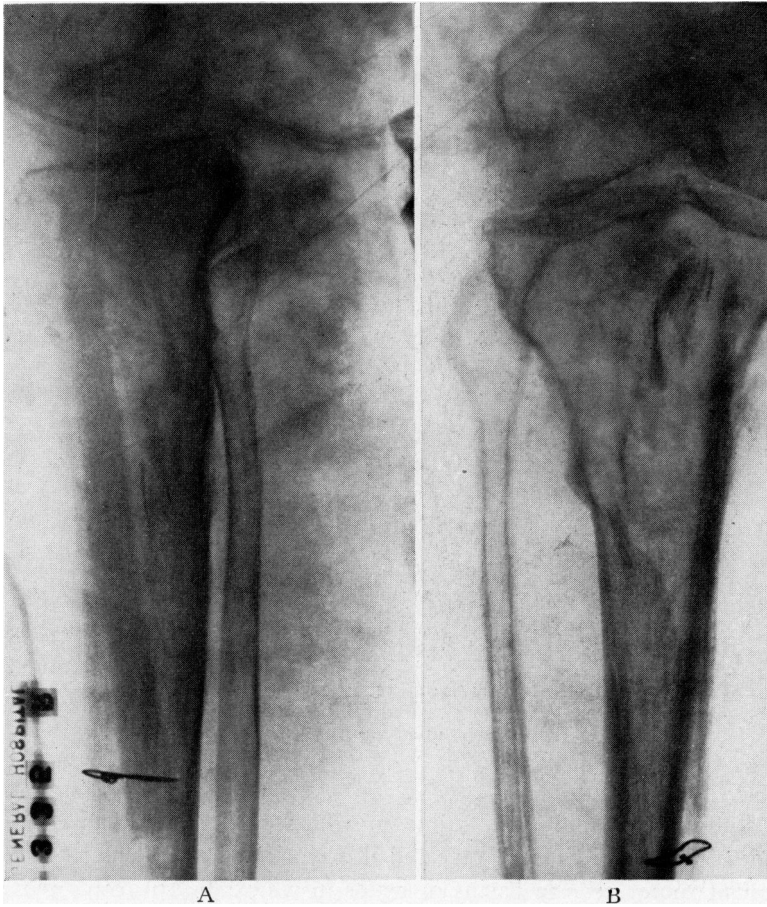


FIG. 3.—X-ray immediately postoperative (May, 1946) with limb in

growth, either by virtue of an embryonal character or from retention of proliferative tendencies in more than ordinary degree.

Clinically, operative transplantation of carcinoma has been frequently reported in the literature. Corniel in 1891<sup>3</sup> reported successful tumor transplantations from a malignant tumor of one breast to the other breast. Ryall, in 1907,<sup>9</sup> pointed out that recurrent carcinoma was frequently due to contamination of the instruments with cancer cells. Ryall was the first to advocate a complete change of gloves, drapes and instruments followed by re-

preparation of the operative site after a biopsy of a malignant tumor. Primrose in 1922<sup>3</sup> briefly recorded a case of an ovarian malignancy in which ascitic fluid was aspirated and subsequently injected in the submammary region as an experimental therapeutic procedure; a malignant tumor appeared in the breast and axillary glands.

The demonstration of viable tumor cells on instruments used for biopsy of a carcinoma of the breast was made by Saphir.<sup>10</sup> Smears were made directly

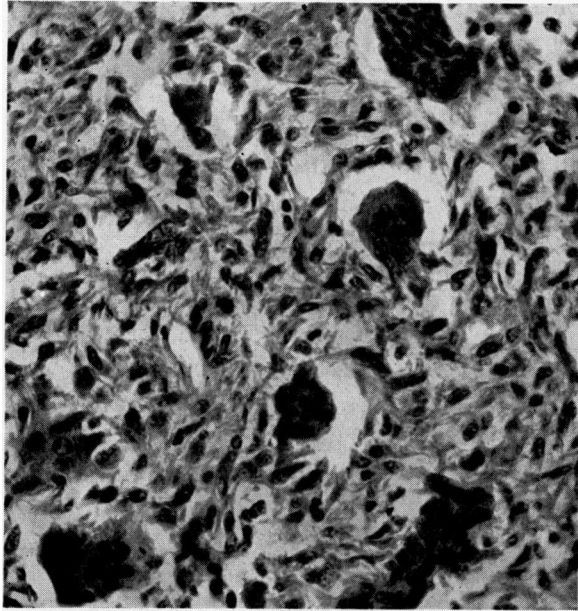


FIG. 4.—Biopsy from recurrence of tumor showing numerous variable sized multinucleated giant cells distributed through bundles of fusiform fibroblastic cell elements.

from knife blades and from saline in which such blades had been rinsed. Brandes White and Sutton<sup>1</sup> repeated this work and also demonstrated viable malignant tumor cells in basins of water in which the surgeon's gloves were washed. The cells appeared to remain viable for longer periods in saline than in distilled water. They reported a case in which it seemed evident that contamination of the gloves was responsible for transplantation of highly malignant carcinoma of the breast from the mastectomy site to a skin donor area on the left thigh.

The implantation of benign tumor cells, however, appears to be uncommon. Sampson studied the occurrence of endometriomata in extra genital positions and this led to his theory of endometrial transplantations. Previous to this time Iwanoff (1889) and others postulated a serosal origin for peritoneal endometriomata. MacLeod in his Hunterian lecture stated that invasion of

endometriomata has occurred along intertissue spaces and he favoured a theory of lymphatic permeation. Sampson's theory, however, still remains the most popular.

Burke<sup>2</sup> has recently reported a case of recurrent parathyroid adenoma occurring in a glandular graft. In 1943 a parathyroid adenoma was completely excised and at operation a small fragment of the adenoma was transplanted

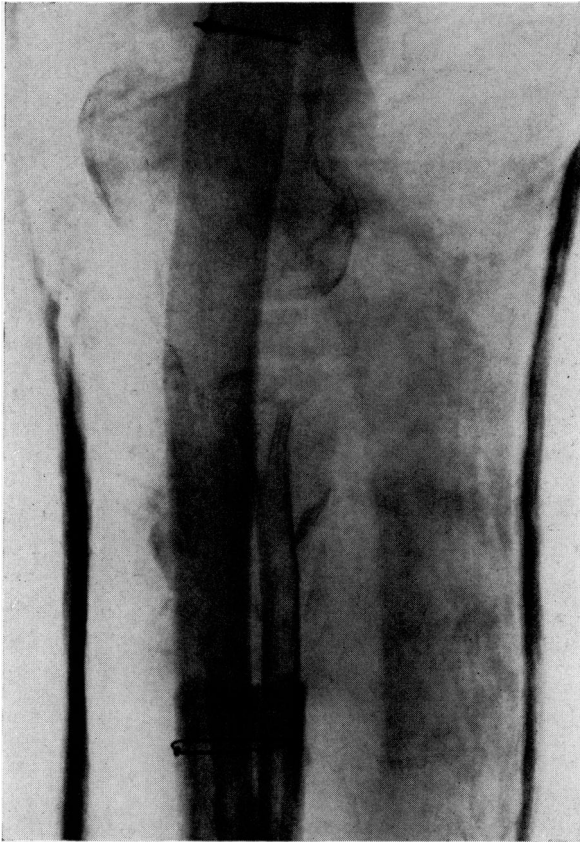


FIG. 5.—X-ray to show limb following treatment to recurrence after Rodger Anderson pins removed and limb encased in plaster.

between the sternothyroid and sternohyoid muscles in an endeavour to avoid a hypoparathyroid state postoperatively. Two years later the patient had a recurrence of hyperparathyroid symptoms and a benign parathyroid adenoma was removed from the sternothyroid muscle at the site of the graft. In this case a small glandular fragment was intentionally implanted, whereas in the above case report it is indicated that the benign tumor cells were transferred by the instruments or gloves of the operator.

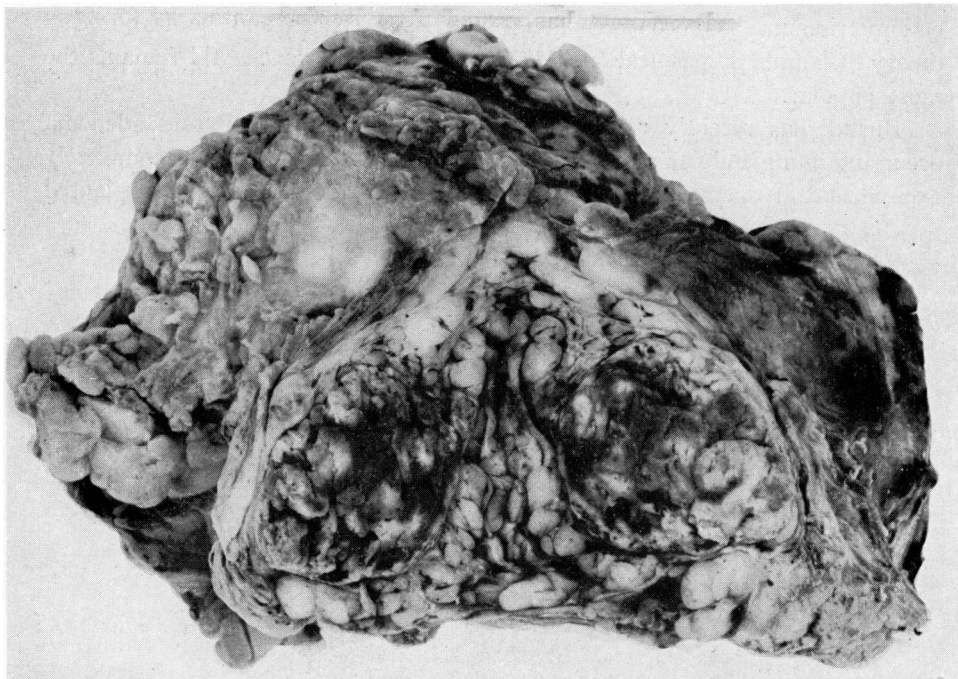


FIG. 6.—Gross specimen from left iliac crest showing implantation tumor. It has been bisected to show the two halves of the implant occupying the lower half of the picture.

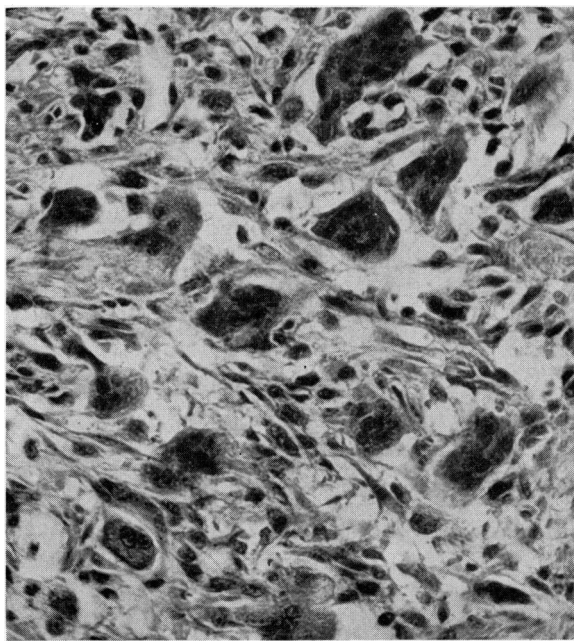


FIG. 7.—Microscopic appearance of the giant cell tumor implant which shows the same features as noted in the primary and the local recurrence.

SUMMARY

This case is reported to illustrate the operative transplantation of benign giant cell tumor of bone to a distant soft tissue site.

The primary tumor originating in the upper end of the tibia and the local recurrence 9 months later showed a typical benign histological picture.

The transplantation occurred in the soft tissue in the left iliac region at the site of previous operative interference and it revealed an identical histological picture.

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