FIBROSARCOMA OF PLANTAR TISSUES

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Although fibrosarcoma has been rarely encountered, it is the most frequent malignant tumor originating in the joint capsule. Because of its early slow growth and tendency to remain local over months or years, it is especially prone to be confused with the benign fibromata. The latter, however, have a greater tendency to involve the tendon and tendon sheath than the joint capsule. Clinically and histologically the two types may be most difficult to differentiate. Symptoms in each often seem to be attributable chiefly to trauma or mechanical interference by the tumor rather than to inflammatory swelling. While both fibroma and fibrosarcoma have shown resistance to roentgen therapy, the malignant tumor in the present instance responded rapidly during its relatively early course. Later it became very radio-resistant. This marked change in response to irradiation, conflicting histologic interpretations, and the long period prevailing before the appearance of metastases, during which amputation might have preserved life, are the interesting phases of the case.

The patient was a white male of nineteen years, whose first complaint, at the age of fourteen, was soreness over the mid-portion of the plantar surface of the right foot, while caddying. There was no swelling or local discoloration at that time. The condition seemed to improve during the following autumn and winter months, and a year later the patient even participated in athletic activities, attempting to excel in the high jump. Following this, slight swelling of the plantar tissues was noted. This increased slowly and by the following summer the condition was noticeably worse. Attributing the trouble to weak or fallen arches, a chiropodist treated the foot by repeated massage and bandaging. The soreness gradually became more severe and nearly two years after the first symptoms, an orthopedic surgeon, Dr. R. C. Lonergan, was consulted. Roentgenograms (Fig. 1) were made and a

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piece of tissue was removed for examination. Histologic sections were interpreted by the pathologist, as "soft fibroma of the plantar fascia area." Dr. Lonergan, apparently not satisfied, sent the sections to Dr. C. F. Geschickter, who made a diagnosis of malignant tumor and advised amputation of the foot.

The roentgenograms showed local loss of density of the navicular, the multangulars, and the cuboid. The trabeculae were not visible over areas 5 to 10 mm. in diameter. The surface of the bones was intact and the joint spaces were clearly defined. On the basis of the roentgen appearance an opinion favoring an inflammatory process in the soft tissue was given.

The patient, with the original slides, then consulted Dr. D. B. Phemister, who made a diagnosis of fibrosarcoma and recommended immediate amputation of the foot. This was refused, however, in view of the earlier diagnosis, and roentgen therapy was instituted. The swelling rapidly disappeared, but therapy was continued until 6,0000 r had been given.

**Figs. 3 and 4. Chest Roentgenograms, July 12, 1937 (Left) and Oct. 22, 1937 (Right)**

The arrows in the earlier picture indicate the outlines of the partially collapsed lung. The dense shadow along the left heart border is due to metastases. In the later picture there is no evidence of pneumothorax, but the left base is almost solid with metastases and small deposits are evident at the right base in the outer third.

Two months after completion of the first course of roentgen therapy the swelling in the foot returned, and the patient entered the Mayo Clinic, taking the original slides and roentgenograms. The roentgenograms were interpreted as showing "a destructive cystic process," which "looks like fibrocystic disease, but the appearance of a tumor mass with this is very unusual." The pathologist's report was "fibroma" and continuation of roentgen therapy was advised. The possibility of malignancy was discussed but it was "felt that there was no basis on which to make such a diagnosis at this time." Another biopsy was recommended if improvement failed to occur.

The patient returned home and received several series of roentgen therapy during the summer of 1935 and in 1936. The swelling on the plantar surface of the foot almost disappeared; the color became normal except for the bronze discoloration due to irradiation, there was little or no pain, and the patient could walk without cane or crutch. His general physical condition remained good. He grew normally and was well nourished.

In February, 1937 the pain, tenderness, and swelling returned. The symptoms were definitely worse than at any previous time. A new course of roentgen therapy (daily treatments of 175 r for a total of 2625 r) was given, but with practically no effect. Amputation, which had been recommended repeatedly, was still refused. Two months later a diffuse mass, 4 cm. in diameter, was discovered in the right groin. This was thought to be a metastasis and was removed Feb. 3, 1937. The slides were reported by the hospital pathologist, Dr. J. J. Moore, as showing "spindle-cell sarcoma." Deep therapy was continued
over the groin as well as the foot. The wound in the groin healed promptly but the swelling of the foot continued.

On July 10, 1937, the patient suddenly complained of pain in the chest. Dyspnea was present but the temperature was normal. A chest roentgenogram (Fig. 3), two days later, showed a pneumothorax with partial collapse of the left lung. Areas of dense tissue were seen at the left base and were thought to represent metastases. One week later a second roentgenogram showed that the lung had re-expanded. At this time there was no complaint referable to the chest. The patient did not improve but got about with a crutch and continued his studies until Nov. 18, 1937, when he was suddenly almost overcome by dyspnea and was again brought to the hospital. A roentgenogram now showed the presence of pneumothorax on both sides and many metastases in the lungs (Fig. 5). Death occurred six days later, four years and five months following the first symptoms in the foot, approximately three years after the first course of roentgen therapy.

At necropsy a reddish purple swelling was found on the plantar surface filling in the longitudinal arch of the right foot. An incision into this allowed a small quantity of blood and strings of friable, soft tissue to escape. The surface of the adjacent bones appeared normal but could be cut readily with the scalpel and were found to contain soft, friable tissue, though no tumor could be identified (Fig. 6). The abdominal viscera were carefully examined but no metastases were discovered. The site of the metastasis previously removed from the groin appeared to be filled in by normal tissue. Both lungs were firmly adherent at the bases. Many metastases, ranging from small, diffuse masses the size of a pea to areas 4 or 5 cm. in diameter, were present in the lower lobes. The larger metastases were in the left lung base. Sections of the gross specimens showed extensive involvement of the tissues surrounding the smaller tarsal bones. All slides, including the original one of the foot lesion, were interpreted by Dr. J. J. Moore as showing evidence of a spindle-cell fibrosarcoma (Fig. 7).
Fibrosarcoma has been described more frequently in the joint capsule than elsewhere. The more usual tumors in this region are not malignant and are derived from precartilaginous connective tissue, namely osteochondroma, ganglia, and giant-cell tumors. Tumors not related to precartilaginous or preosseous tissue, occurring at this site, are angioma, lymphangioma, lipoma, fibroma, and fibrosarcoma. The last two, although rare, seem to occur with about equal frequency in the neighborhood of the joint, tendon, and tendon sheath.

Not only may the gross appearance of fibroma and spindle-cell fibrosarcoma be similar, but it is evident that the tumors may be confused histologically. In a statistical study of 30 typical fibromas in which the origin could be assigned with reasonable accuracy to the tendon and tendon sheaths, Geschickter and Copeland (1) found that 10 were on the flexor or plantar surface of the hand or foot. This fact seemed to favor the presence of a fibroma in our case. Of 5 primary spindle-cell sarcomas of the fascial type of tendon and tendon sheath, 2 were found by these same authors to involve the quadriceps tendon; 1 was in the Achilles tendon, 1 above the phalanx of the toe, and 1 anterior to the ankle joint. All of these tumors were dense and firm, composed of closely packed spindle cells, as in our case. None, however, was in the palmar or plantar tissues of the hand or foot. All recurred after excision. Two were irradiated without result. One patient could not be traced two years after amputation for recurrence.

In both of these groups the age incidence was quite similar: the majority of fibromas occurred between the ages of ten and twenty-five years, and all of the fibrosarcomas were in children or young adults. In a group of 30 tumors originating in the joints, only one was spindle-cell fibrosarcoma.
Razemon and Bizard (3) collected 29 malignant tumors of joints from the literature up to 1931. Spindle-cell fibrosarcoma with a structure indicating an origin in the synovial membrane predominated. In their complete group of 74 tumors there was only one fibroma.

Other tumors to be thought of in the neighborhood of the joints, which, however, should not be so readily confused with fibroma and fibrosarcoma, are lipoma, angioma, and lymphangioma. Strauss found 18 cases of lipoma in the literature definitely connected with the tendon sheath.

Geschickter and Lewis (2) state that tumors recorded as sarcomas are often benign giant-cell tumors erroneously diagnosed.

The possibility of inaccuracy in determining the exact origin of a tumor which has become extensive by the time it is observed must be taken into consideration. It is not always easy to determine whether such a tumor originates in the tendon, the sheath, the joint, or, in some instances, in the bursa. Fibrosarcomata of different structures (mixed, spindle-cell, round-cell, and endothelial sarcoma) have been reported in the bursa. Bursal tumors, like those involving the joint, tendon, or tendon sheath, are often difficult to distinguish from inflammatory or traumatic lesions. It seems most probable that in our case the origin was in the joint capsule.

The outstanding features of fibrosarcoma are slow growth and late metastasis. Early cyst-like changes in several bones and rapid regrowth of the tumor after marked improvement in response to irradiation seem to us to be characteristic of this type of malignant tumor and should, we believe, outweigh a confusing histologic picture and support a diagnosis of malignancy. Because of the long period before metastases became evident in the case recorded, it would seem that life might have been preserved by early amputation.
A fibrosarcoma of the foot observed over a period of four years and five months is reported. The early histologic reports were divided between fibroma and fibrosarcoma. Amputation was refused. Roentgen therapy at first gave good results but later was without effect. After an exacerbation of symptoms, a metastasis was discovered in the groin. Ultimately metastases occurred in both lungs and the patient died. The histologic study of the primary tumor and the metastatic lesions showed similarity of structure, namely a spindle-cell fibrosarcoma.

Bibliography