Serious problem associated with femoral cannulation and is usually fatal. Thus, the change of cannulation sites from femoral to aortic was rapidly performed. However, the blood volume was not lost, but the inferior vena cava cannula was totally blocked and occluded by thromboembolic material. The increased circulation related to cardiopulmonary bypass may well have caused this large thromboembolus to break loose from its attachment, probably in an iliac vein.

Hopefully, report of this isolated clinical occurrence will ease the management problems of the next cardiac surgery team which experiences a similar problem. However, the use of moderate hypothermia (28-30°C) appears to be the main reason the patient subsequently achieved a very gratifying result. The routine use of moderate hypothermia lowers oxygen consumption by 25 to 40 percent and thus allows a margin of safety when circulation from the pump must be temporarily decreased or stopped. When a diagnosis of a blocked cannula becomes obvious, the only reasonable course is to clear it or change it, as was done here.

The decision to allow the major portion of the embolus to proceed to the distal pulmonary arterial tree was one of expediency in that it allowed us to re-establish cardiopulmonary bypass as soon as possible. The decision to leave the embolic material there was made on the basis of what appeared to be a normal PA pressure by palpation, satisfactory arterial blood gases after separation from bypass, and hemodynamic stability. The ability of the pulmonary arterial system to clear itself of emboli is once again demonstrated in this patient.

**Symptomatic Osseous Sarcoidosis with Findings on Bone Scan**

Harold M. Silver, M.D., F.C.C.P.;** Ali Shirkhoda, M.D.;† and David B. Simon, M.D., F.C.C.P.;†

Twenty-one years after the onset of sarcoidosis, a 51-year-old woman experienced pain in the lower portion of her back, which proved to be the result of sarcoidosis involving the pelvis. The pelvic abnormality consisted of osteosclerotic and osteoblastic lesions. A bone scan showed several other areas of increased uptake, and the diagnosis was confirmed by bone biopsy. The patient improved with treatment with steroids, but the findings on the x-ray film and the bone scan did not change. Sarcoidosis may cause obscure, but symptomatic, osseous lesions.

When a patient who had minimal sarcoidosis for more than 20 years developed pain in the back, the combination of radiographic studies, a bone scan, a needle biopsy, and ultimately open biopsy proved necessary to determine the cause as sarcoidosis. Bone scans and x-ray films, as well as the clinical sequence, were of interest; and this is believed to be the first abnormal bone scan to be reported in osseous sarcoidosis.

**Case Report**

In March 1956, a 32-year-old black woman complained of "bumps" around the nose, forehead, and eyes, which had been present for the past three years. There were no respiratory symptoms, and the chest x-ray film was said to have been normal in February 1955.

The skin revealed several firm nodules measuring 3 to 4 mm each in the borders of the nostrils. There were slightly elevated nodules infiltrating the medial canthus bilaterally. The findings from the remainder of the physical examination, in-
including ocular, lymphatic, pulmonary, and abdominal exam-
inations, were normal. A chest x-ray film taken in 1956 re-
vealed a prominent hilar shadow on the right, particularly at
the inferior portion. A biopsy of a nasal lesion was consistent
with sarcoidosis.

The patient was treated with 5 to 10 mg of prednisone
daily, with good control of the cutaneous lesions for the
next 19 years. In October 1975, she complained of pain in
the lower portion of the back. The findings from physical
examination were normal. Laboratory examinations re-
vealed slight anemia and normal levels of calcium and alkaline
phosphatase. A chest x-ray film showed no change since 1956.

X-ray films of the lumbar spine and pelvis demonstrated
areas of increased density in both iliac wings and
sclerotic changes in the regions of the sacroiliac joints (Fig
1). These changes were interpreted as possibly due to old
osteoitis or metastatic or hematologic disorder. A bone scan
employing radioactive "technetium pyrophosphate revealed
several areas of increased activity in the calvaria, left anterior
and posterior ribs, and both iliac wings and femurs (Fig 2).
A radiologic skeletal survey demonstrated the changes previ-
ously noted in the pelvis and, in addition, two small round
calciﬁc densities asymmetrically placed on either side of the
calvaria (Fig 3). X-ray films of the hands were normal.

A small nodule was detected in the left breast. A xeromam-
mogram showed diffuse changes compatible with ﬁbrocystic
disease and a suspicious area of calciﬁcation in the left breast,
roughly corresponding to the small nodule previously pal-
pated.

The findings from bone marrow aspiration and needle
biopsy of the right iliac crest were consistent with sarcoidosis.
Excisional biopsy of the nodule in the left breast revealed
ﬁbrocystic mastopathy with periductal mastitis. An open
biopsy of the right iliac crest showed multiple noncaseating
granulomas consistent with sarcoidosis. Special staining re-
actions for acid-fast bacilli and fungi were negative. There
was no malignant neoplasm, and there was no increase in the
numbers of osteoblasts or osteoclasts.

The dose of steroid was increased to 15 mg daily, and with-
in a month the pain in the lower portion of the back was
completely gone. A bone scan in June 1976 and a skeletal
survey in December 1976 revealed no change from the
earlier studies.

**DISCUSSION**

The prevalence of osseous lesions in sarcoidosis is
substantial, but symptomatic osseous lesions are rare.
Estimates of the incidence of osseous lesions range from
3.5 percent to 26 percent, but such data usually refer
to asymptomatic ﬁndings, characteristically involving
the small bones of the hands and feet with either lytic
areas, subcortical osseous sclerosis, or small nodular
opacities with circumscribed lytic areas in the medullary
cavities.1,2

The most common locus of symptomatic osseous sar-
coidosis is the vertebrae, for which ten cases have been
reported.3-11 An additional two cases without symptoms
have been described.12,13 Less common is symptomatic
involvement of long bones, ribs, calvaria, basal skull,
nasal bones, phalanges, and pelvis. Occasionally, exten-
tive osseous sarcoidosis may result in pathologic frac-
tures. Some patients with osseous symptoms have acute
fulminating multisystemic disease, while others have

**FIGURE 1.** X-ray film of pelvis, demonstrating osteoblastic
and osteosclerotic ﬁndings.

**FIGURE 2.** Bone scan showing uptake in pelvis and in cal-
varia, left ribs, and both shoulders and femurs.
low-grade chronic disease. There is a single report of extensive symptomatic phalangeal cystic lesions in which the biopsy was consistent with sarcoidosis, but the findings from the physical examination, the laboratory studies, and the chest x-ray films showed no other evidence of the disease.

It is noteworthy that in the current patient, the duration of illness prior to the development of symptomatic osseous disease was 21 years. The longest duration previously described was 13 years, while in more than half of the reported cases, the duration was a year or less.

The pelvis is a rare site of involvement. Clinical manifestations of sarcoidosis of the pelvis have been described in only three cases; and in an additional two cases, involvement without symptoms has been reported.7,12-15 Osteosclerotic and osteoblastic lesions are the least common manifestations of osseous sarcoidosis, so it is of interest that of the five cases in which pelvic lesions have been described, four were sclerotic, and the remaining case exhibited both lytic and sclerotic components.

The bone scan was abnormal in the pelvis, but more impressive was the extent to which the scan revealed osseous disease which did not yield abnormal x-ray films or symptoms. This suggests that abnormalities may be detected earlier by bone scan than by x-ray films and that the scan may point to areas accessible for tissue diagnosis. It is perplexing that the previous report of a bone scan in osseous sarcoidosis showed no uptake in the damaged vertebrae or anywhere else, despite the fact that there were both lytic and sclerotic components.10

The current patient had normal levels of calcium and alkaline phosphatase, as has been reported in the majority of cases with symptomatic osseous sarcoidosis. The normal level of alkaline phosphatase may aid in differentiating the condition from metastatic carcinoma with widespread osteoblastic lesions, in which this level might be expected to be increased.

The pain disappeared after the dose of steroid was increased, but the bone scan and x-ray film did not change. Most previously reported patients who were followed-up for a year or more had subjective improvement, although only half received steroids. Of the minority of patients who did not improve, half received steroids, and half did not. Thus, most patients experienced symptomatic improvement, but the role of therapy with steroids is inconclusive. Radiographic abnormalities showed improvement in half and no change in half, while only one patient was worse. Radiographic change had no discernible relation to therapy with steroids.

The lesions of the vertebrae, calvaria, pelvis, and long bones must be differentiated from metastatic disease, lymphoma, Hodgkin's disease, osseous infarcts, infection (tuberculous, brucellar, pyogenic, and fungal), multiple myeloma, and plasmacytoma. When osteosclerosis predominates, Paget's disease of the bone, osteopetrosis, melorheostosis, fluorosis, and mastocytosis must also be considered.

Since radiologic aspects of osseous sarcoidosis are not pathognomonic, the radiologist may suggest the more common diagnoses and omit sarcoidosis. The patient's physician must be alert to the possibility that sarcoidosis may be the cause of orthopedic complaints and peculiar skeletal radiographic findings, particularly in a patient who has the chronic form of that disease.

ACKNOWLEDGMENT: We are indebted to Ms. Suzanne C. Earley for bibliographic assistance and to Ms. Judy E. Shipe for production of the manuscript.

REFERENCES

Idiopathic Dilatation of Peripheral Pulmonary Arteries*

Jack E. Teitelbaum,** Michael Altman, M.D., F.C.C.P.†

We describe a patient with idiopathic dilatation of the peripheral pulmonary arteries radiologically mimicking pulmonary arteriovenous fistulae. Isolated involvement of the peripheral arteries in this patient supports a developmental defect in the arterial walls as the etiology.

Dilatation of the pulmonary artery occurs as a result of increased pulmonary arterial flow and/or pressure, as well as several intrinsic diseases, such as syphilis or Marfan’s syndrome, which may directly affect the pulmonary vessels. Idiopathic dilatation of the main pulmonary artery, not due to such physiologic or pathologic abnormalities, is an uncommon but by no means rare condition. This appears to be the first reported case of idiopathic, nonaneursymal dilatation of the segmental and subsegmental pulmonary arteries alone.

CASE REPORT

A 30-year-old student was referred to The Ohio State University Hospital in August, 1976, for evaluation of chest roentgenogram abnormalities. He had no cardiopulmonary symptoms except very mild shortness of breath on exertion and had had four episodes of nonorthostatic syncope over the previous ten years. Past and family history were unremarkable.

He was a well-developed, healthy-appearing man in no distress with a regular pulse rate of 60 and blood pressure of 106/78 mm Hg. He had no jugular venous distention or cardiomegaly. The first heart sound was normal; there was physiologic splitting of S2 with a normal P2. No click was present and there was no cardiac or extracardiac murmur. He had no ventricular thrusts or lifts and no stigmata of Marfan’s syndrome. The remainder of his physical examination was unremarkable. Blood count and thyroid function were normal. VDRL test was negative as were the tuberculin and histoplasmin skin tests. Electrocardiogram showed a terminal conduction delay. The chest roentgenogram is shown in Figure 1.

The arterial oxygen tension with the patient breathing 100 percent O2 was 564 mm Hg, indicating the absence of any significant right-to-left intrapulmonary shunt. This was confirmed by pulmonary angiography which showed normal main, right and left pulmonary arteries. The tertiary and smaller pulmonary arteries showed fusiform dilatation which extended to the periphery. No arteriovenous communications were present (Fig 2). Right atrial and ventricular and pulmonary artery pressures were normal with no pressure gradient across the pulmonic valve. There was no hiliar dance. Phonocardiogram showed no abnormalities and confirmed physiologic splitting of S2. Echocardiogram showed a normal aortic root with normal ventricular septal motion. Normal right ventricular size and septal motion excluded significant RV volume overload. Normal results of radionuclide angiocardiography also excluded any intracardiac shunt.1

**DISCUSSION**

This patient has idiopathic dilatation of the peripheral pulmonary arteries which roentgenographically mimics pulmonary arteriovenous fistulae. Pulmonary artery dilatation may also mimic mass lesions of the lung or pulmonary varices.2

Various criteria have been suggested for the diagnosis of idiopathic dilatation of the pulmonary arteries, but the descriptions have consistently included the involve-