

# ARTHROSCINTIGRAPHY IN ACUTE SYNOVIAL RUPTURE OF THE KNEE

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***A case of acute synovial rupture of the knee that simulated deep vein thrombophlebitis of the calf (sural thrombophlebitis) is presented. The relative value of arthroscintigraphy using intra-articular  $^{131}\text{I}$ -IHSA compared with intravenous  $^{99\text{m}}\text{Tc}$ -pertechnetate in establishing this diagnosis is demonstrated. Arthroscintigraphy using intra-articular  $^{131}\text{I}$ -IHSA is suggested as a substitute for gas or contrast arthrography in differentiating synovial rupture from sural thrombophlebitis.***

Dixon and Grant (1) in 1964 first described acute synovial rupture of the knee in patients with rheumatoid arthritis. Although acute synovial rupture is relatively uncommon, it is often difficult to differentiate from sural thrombophlebitis since the signs and symptoms of these two conditions are similar. This case demonstrates the value of arthroscintigraphy following the intra-articular instillation of  $^{131}\text{I}$ -IHSA in establishing the diagnosis of acute synovial rupture.

## CASE REPORT

A 56-year-old white man with a 13-year history of peptic ulcer disease and episodic rheumatoid arthritis involving multiple joints was admitted to the Ann Arbor V.A. Hospital complaining of pain and swelling in his left calf of 2 days duration. For 1 month before admission the patient had been having pain in his shoulders, wrists, right ankle, and left knee. On a regimen of antacids, 4.8 gm of aspirin per day, and physical therapy his pain improved although swelling of the knee persisted. Two days before admission the patient awoke with pain and swelling in his left calf and a concomitant decrease in swelling of his left knee. The calf pain and swelling were aggravated by walking and progressively worsened over the next 2 days.

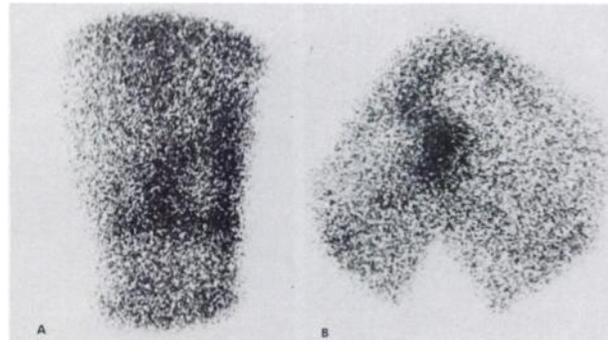
Admission physical examination revealed slight synovial swelling of the left knee but no palpable popliteal cyst. The left calf was erythematous, warm, and tender to palpation with 1+ pitting pretibial edema and a circumference of 40.5 cm compared with 37 cm for the right side. Homans' sign was positive in the left lower extremity, but no tender venous cords were palpable. The right ankle, shoulders, and several finger joints were warm and tender to palpation; the rest of the physical examination was otherwise unremarkable.

Synovial membrane scintigraphy (2) of the left knee  $\frac{1}{2}$  and 3 hr after the intravenous administration of 15 mCi  $^{99\text{m}}\text{Tc}$ -pertechnetate and ad lib ambulation was consistent with synovitis. No popliteal (Baker's) cyst or abnormal activity in the calf was detected (Fig. 1).

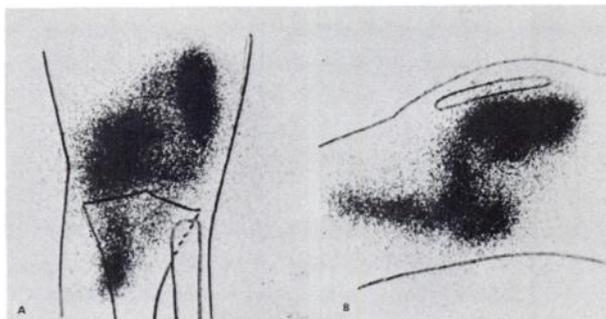
With the leg extended, anterior and lateral views of the left knee were obtained  $\frac{1}{2}$  and 3 hr after the

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**FIG. 1.** Anterior (A) and lateral (B) views of left knee after 15 mCi  $^{99\text{m}}\text{Tc}$ -pertechnetate administered intravenously do not show any abnormal collection of radionuclide distal to synovium of knee.



**FIG. 2.** Anterior (A) and lateral (B) views of left knee 3 hr after intra-articular instillation of 50  $\mu\text{Ci}$   $^{131}\text{I}$ -IHSA shows area of activity extending from knee joint into calf consistent with synovial rupture.

intra-articular instillation of 50  $\mu\text{Ci}$   $^{131}\text{I}$ -IHSA and ambulation. Seventy thousand counts per view were obtained using a scintillation camera with a 15% window and 360-keV parallel-hole collimator. These views (Fig. 2) showed an abnormal area of activity extending from the knee into the calf a distance of 8 cm.

An air arthrogram of the left knee was then performed. X-rays demonstrated gas in the fascial planes and soft tissues of the calf consistent with synovial rupture.

An intra-articular injection of 100 mg of hydrocortisone acetate was made into the left knee, and the patient was placed at bedrest. He was discharged 3 days later with no objective signs or symptoms referable to acute synovial rupture.

#### DISCUSSION

Although acute synovial rupture is most frequently associated with rheumatoid arthritis, it has also been described in patients with other forms of synovitis that are accompanied by effusion (3). The similarity in signs and symptoms of synovial rupture and sural thrombophlebitis has led some authors (4-6) to suggest performing gas or contrast arthrography in patients having knee involvement with rheumatoid arthritis in whom the diagnosis of sural thrombophlebitis is seriously entertained. If proper therapy is to be administered and needless anticoagulation avoided, then correct diagnosis is essential.

Roucaayrol, et al (7) performed joint scans using intra-articular  $^{198}\text{Au}$ - and  $^{90}\text{Y}$ -colloid to demonstrate popliteal cysts whereas Levin, et al (8) first used intra-articular  $^{131}\text{I}$ -IHSA for joint scanning to detect dissecting popliteal cysts in the calf. Alarcón-Segovia, et al (9) demonstrated popliteal cysts extending into the calf using intravenous  $^{99\text{m}}\text{Tc}$ -pertechnetate as a joint scanning agent and reported the differentiation of sural thrombophlebitis from painful popliteal cysts in two patients using this procedure (10).

In our patient synovial membrane scintigraphy using intravenous  $^{99\text{m}}\text{Tc}$ -pertechnetate did not demonstrate a popliteal cyst or an abnormal collection of radionuclide outside the joint. Arthroscintigraphy following the intra-articular instillation of  $^{131}\text{I}$ -IHSA revealed activity extending into the calf that was consistent with synovial rupture and confirmation was obtained by air arthrography.

The failure of synovial membrane scintigraphy using  $^{99\text{m}}\text{Tc}$ -pertechnetate to identify the synovial rupture is felt to be secondary to the relatively low concentration of the radionuclide in synovial fluid following intravenous administration (11). On the basis of this one patient, arthroscintigraphy using intravenous  $^{99\text{m}}\text{Tc}$ -pertechnetate may not identify synovial rupture. Arthroscintigraphy using an intra-articularly administered radiopharmaceutical such as  $^{131}\text{I}$ -IHSA may be necessary if this diagnosis is to be confirmed.

Arthroscintigraphy using  $^{131}\text{I}$ -IHSA has definite advantages over arthrography. Because of the small volume of radionuclide injected into the joint space, pain caused by overdistension of the joint as may occur with gas arthrography is avoided and the likelihood of iatrogenic synovial rupture is also reduced. Reaction to contrast material and pain on infiltration of the contrast material may be eliminated by using arthroscintigraphy with  $^{131}\text{I}$ -IHSA when acute synovial rupture is suspected.

In summary, this case demonstrates the value of arthroscintigraphy following the intra-articular instillation of  $^{131}\text{I}$ -IHSA in establishing the diagnosis of acute synovial rupture of the knee. This procedure is suggested as a substitute for arthrography in differentiating sural thrombophlebitis from synovial rupture.

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