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STRONTIUM-85 UPTAKE IN KNEE JOINTS WITH OSTEOCHONDRITIS DISSECANS

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The uptake of Strontium-85 in the distal end of the femur and in the immediate vicinity of the lesion was measured in 12 young men with osteochondritis dissecans. The uptake was significantly but only slightly increased. It was confined to the area of the lesion, was less than observed in early cases of gonarthrosis and an order of magnitude less than in cases of osteonecrosis. It is concluded that the repair process of osteochondritis dissecans is very slow and involves only a minor part of the bone tissue surrounding the lesion.

Key words: osteochondritis dissecans; Strontium-85; bone; knee joint

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In spite of the vast amount of research invested in the field of radio-nuclides and bone there are no data available on tracer studies on osteochondritis dissecans using bone-seeking radio-nuclides.

The object of the present study was to investigate the uptake of Strontium-85 in a series of cases with osteochondritis dissecans in the femoral condyle.

PATIENTS

Included in the study were 12 otherwise healthy men between 17 and 39 years old (average age 25) with osteochondritis dissecans in the medial femoral condyle. The contralateral knee joint was clinically and radiologically normal in all cases. The study was performed just after the radiological diagnosis of the osteochondritis was obtained. However, at the time of the diagnosis there was a history of knee symptoms in the patients ranging from 1 month to 17 years with an average of 5 years. The osteochondritis lesions were, in all instances, located in the medial femoral condyle and the size of the lesions varied between 0.5 and 2.5 centimeters measured as the maximal width on an antero-posterior film of the knee. There were no cases of the lesions sequestered to a loose body.

METHOD •

All the patients received an intravenous injection of 100 μCi Strontium-85. Two weeks later both knee joints were measured using the digital-step scanning technique described by Bauer & Smith (1969). With the patient on a stretcher in the supine position, a scintillation detector with a focusing collimator was moved over the knee joints. After measuring the activity of the Strontium-85 incorporated in bone, a radiogram was obtained with the knees in the same position. By means of a co-ordinate system, the data on uptake of tracer could be related to the anatomy of the knee joint as demonstrated in Figures 1 and 2. Both knees were measured, but

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• The scintimetry was performed in the Department of Roentgen Diagnostics II, Lund University Hospital.

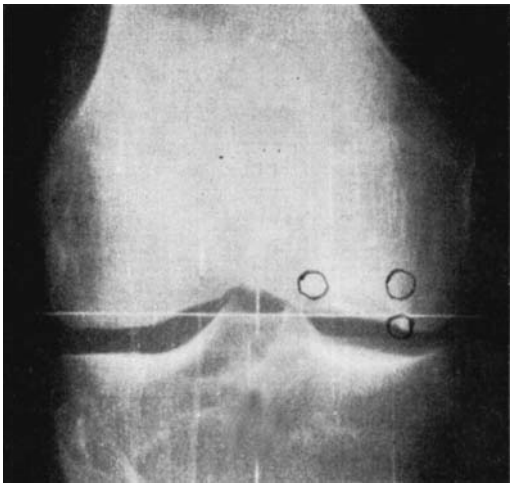

Figure 1. Knee joint with osteochondritis dissecans in the medial femoral condyle. Co-ordinates and values included in the count of the lesion indicated.

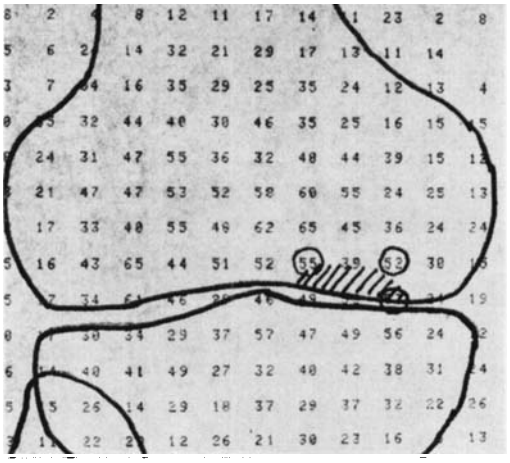

Figure 2. Display of count rates. Outline of the femur indicated.

only the antero-posterior projection was used for the radiography and the uptake measurement. The following measurements were calculated:

Femur:

The average count rates observed over the distal end of the femur including the condyles.

Lesion:

The average of the three highest count rates observed within the lesion or in the bone next to the lesion (Figure 2). The corresponding site of the contralateral joint was found by turning the outline of the osteochondritis dissecans joint over and superimposing the lesion on the corresponding site on the contralateral side.

Figure 3. Same joint, operative finding.

Lesion/Femur:

The ratio of the average count rate of the lesion and the average count rate of the femur as described above.

RESULTS

There was no significant difference in the uptake in the femur with the lesion as compared with the contralateral femur (Table 1). There was, however, a significant difference between the lesion and the corresponding site of the contralateral joint. The increase of the uptake in the area of the lesion was about 40 per cent. The uptake in the lesion corrected for the uptake in the distal end of the femur also differed significantly between osteochondritis and control knees.

DISCUSSION

Rosenberg & Zaas (1969), Rieschell (1973) and Smillie (1974) suggest that osteonecrosis is the osteochondritis dis-

Table 1. Uptake of Strontium-85 in osteochondritis dissecans.

	n	OD joint M ± SD	Contralateral joint M ± SD	t-test of paired observations
Femur	12	25.9 ± 12.7	22.5 ± 10.9	$p > 0.05$
Lesion	12	38.1 ± 14.1	26.7 ± 7.8	$0.01 > p > 0.001$
Lesion/Femur	12	1.57 ± 0.41	1.27 ± 0.25	$0.05 > p > 0.01$

Table 2. Highest values recorded in the femoral condyles compared with Ahlbäck et al. 1968. (Average ± SE).

	Ahlbäck et al.	Present study
Normal joints	48 ± 5	45 ± 6
Early gonarthrosis	76 ± 5	–
Osteonecrosis	181 ± 18	–
Osteochondritis	–	53 ± 7

secans of the elderly. However, Ahlbäck et al. (1968) found that osteonecrosis is a separate entity which differs from osteochondritis dissecans not only in the age of onset but also in the symptoms, the radiographic appearance and the location. In the present study, we have demonstrated that osteochondritis dissecans also differs from osteonecrosis with respect to the uptake of bone-seeking tracer. The increase is comparatively small whereas in osteonecrosis there is, almost always, an impressive increase in the uptake of tracer which can be observed early in the disease and which may provide the diagnosis prior to the radiological appearance of the lesion.

In order to compare with previous authors (Ahlbäck et al. 1968) the highest single uptake recorded over the femur condyles was also calculated for our series of osteochondritis patients (Table 2). The uptake of tracer measured in this way in normal knee joints is the same in our study as in the study of Ahlbäck et al. (1968). Calculated in this way, the uptake in the osteochondritis knee joint is only slightly elevated over that of normal joints. It is significantly less than in the cases of early osteoarthritis where the diagnosis was based on narrowing of the joint space in films obtained from patients who were standing and it is only a fraction of the uptake recorded in cases of osteonecrosis.

Chiroff & Cooke (1975) demonstrated that there was a thin layer of enchondral bone formation facing the osteochondritis lesion. From our data it seems that the rate of this formation is only slightly elevated over the rate normally observed in this region. Therefore, it may not be a sign of a true reaction of repair.

Later in the development of osteochondritis dissecans in adults, gonarthrosis is a frequent complication (Lindén 1976). These changes are, however, usually delayed for 20 years or more after the diagnosis of the lesion. Since these patients were all measured soon after the diagnosis, secondary gonarthrosis could not be expected and was not found. Therefore, there were no signs of a generally increased uptake in the joint as has been demonstrated in joints with gonarthrosis (Bauer & Smith 1969).

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