INTRA-OSSEOUS VENOGRAPHY IN PATELLOFEMORAL DISORDERS

A PRELIMINARY REPORT

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We have performed intra-osseous venography on 22 patients with chondromalacia patellae or patellofemoral osteoarthritis. Venous engorgement of the patella was demonstrated in both conditions regardless of the severity of the pathological changes.

Patients with severe degenerative osteoarthritis of the hip and knee have impaired venous drainage from the juxtacondral cancellous bone across the cortex (Mériel et al. 1955; Phillips 1966; Arlet, Ficat and Sebbag 1968; Arnoldi, Linderholm and Müssibichler 1972). Intra-osseous phlebography will demonstrate the absence of the normal drainage pattern, with delayed emptying of the contrast medium from the medullary cavity. Brookes and Helal (1968) found that in rats increased trabeculation of bone and calcification of the articular cartilage appeared as a consequence of chronic venous congestion, and suggested that this might be the precursor of osteoarthritis.

Primary or secondary venous engorgement and intra-osseous hypertension play a significant role in the aetiology of pain in osteoarthritis. Arnoldi, Lemperg and Linderholm (1971) demonstrated a reduction in intra-osseous pressure following osteotomy of the femur, and Morscher (1978) noted that pain was produced when intra-osseous phlebography was performed under local anaesthesia.

We have investigated the state of the venous drainage of the patella in patients with chondromalacia patellae and patellofemoral osteoarthritis. We agree with the view of Shoji, Sakai and Granda (1974) and of Mankin (1976) that chondromalacia patellae is an early stage in the development of patellofemoral arthritis.

MATERIAL AND METHODS

Twenty-two abnormal patellae in 22 patients were examined by intra-osseous phlebography. There were 14 men and eight women whose ages ranged between 20 and 55 years with a mean of 35 years. Eight patients had patellofemoral osteoarthritis and 14 chondromalacia patellae. The latter were assessed according to the criteria of Bandi (1976), and three were found to have Stage 1 disease, eight showed Stage 1 and Stage 2 while three exhibited all three stages of severity. In all patients the clinical findings were subsequently confirmed at arthroscopy.

Four patients with normal patellae who underwent meniscectomy volunteered to be subjected to intra-osseous phlebography of the patella, and were used as controls.

The procedure was carried out under general anaesthesia and monitored by an image intensifier. A small incision was made down to bone at the upper pole of the patella. A guide was then inserted and centred on the superior surface of the upper pole. A two-millimetre diameter drill was introduced into the guide and driven into the proximal two-thirds of the patella. Four millilitres of 60 per cent Urografin was then injected through a needle two millimetres in diameter over a period of five seconds in order to avoid any leak of contrast material through the channel produced by the drill. Lateral radiographs of the patella were taken at the end of the injection and after 30, 60, 90 and 120 seconds. A tourniquet was not used. Attempts were also made to measure the intra-osseous pressure but this proved technically difficult.

RESULTS

In the normal patella there was little pooling of contrast medium around the tip of the needle and a fine meshed network of intra-osseous channels was apparent on the radiograph taken at five seconds (Fig. 1). By 60 seconds most of the medium had disappeared from the patella and the extra-osseous circulation was almost clear (Fig. 2).

In both chondromalacia patellae and patellofemoral osteoarthritis the radiographs taken at five seconds showed a prominent zone of contrast medium around the needle with widened intra-osseous channels and peripheral pooling. There was virtually no extra-osseous drainage (Fig. 3). In the radiographs taken at 60 seconds most of the medium still lay within the patella but extra-osseous drainage was now apparent (Fig. 4).

The findings were similar in all 22 patients regardless of the stage of patellofemoral osteoarthritis or chondromalacia patellae. There was no correlation between the severity of the clinical or pathological state and the venographic picture, neither did it allow differentiation of patellofemoral osteoarthritis from...
chondromalacia, suggesting that chondromalacia is merely an early stage of osteoarthritis.

**DISCUSSION**

Our findings resemble the previous descriptions of the changes in venous drainage associated with degenerative joint disease of the hip and knee. The observation that venous engorgement is already present in Stage 1 chondromalacia patellae supports the view of Brookes and Helal (1968) concerning the pathophysiology of osteoarthritis.

Osteotomy of the bone adjacent to the joint has proved effective in the relief of pain in osteoarthritis of the hip and knee and such operations have been shown to reduce the degree of venous engorgement (Phillips 1966; Arnoldi et al. 1971).

Osteotomy of the patella has been found effective in the relief of patellofemoral pain by Deliss (1977), who

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**Fig. 1**

Figure 1—Normal patella five seconds after injection of contrast. There is a fine meshed network of intra-osseous channels with narrow extra-osseous veins.

**Fig. 2**

Figure 2—Normal patella 60 seconds after injection of contrast. Most of the medium has disappeared.

**Fig. 3**

Figure 3—Patella of 22-year-old patient with chondromalacia five seconds after injection of contrast. There is pooling of the dye with wide intra-osseous channels and extra-osseous veins.

**Fig. 4**

Figure 4—Same patient at 60 seconds. Pooling of the contrast is present with delayed clearance and few extra-osseous veins.
performed coronal section of the bone, and by Morscher (1978), who split the patella by a longitudinal wedge. Their success may well be due to relief of the venous pooling.

In one of our patients with Stage 1 and Stage 2 chondromalacia two drill holes were made in an unsuccessful attempt to perform venography. Four months after this procedure he is totally free of pain. We are now undertaking a trial of this simple drilling procedure performed in conjunction with arthroscopy in patients with early chondromalacia, in order to assess its effectiveness in the relief of pain.

This study served as partial requirement for the degree of MD for one of the authors (NT) at Hadassah Medical School, Hebrew University, Jerusalem.

REFERENCES


