

DELAYED INTRAOSSEOUS VENOUS BLOOD FLOW DOES NOT CORRELATE WITH PATELLAR CARTILAGE CHANGES IN ANTERIOR KNEE PAIN

G. N. HOMMINGA¹, H. A. MAZEE², E. S. VAN DER LINDEN³, A. VAN OOY⁴

In 67 patients with longstanding anterior knee pain intra-osseous phlebography of the patella and arthroscopy of the knee were performed. No statistical correlation could be demonstrated between the delayed drainage of the contrast medium from the patellar veins and the degree of damage to the patellar cartilage.

Keywords : patellofemoral pain syndrome ; patella phlebography ; arthroscopy ; chondromalacia.

Mots-clés : syndrome rotulien ; phlébographie trans-ossuse de la rotule ; arthroscopie ; chondromalacie.

INTRODUCTION

The patellofemoral pain syndrome (P.P.S.) is a distinct clinical entity, characterized by pain around the patella that is increased by static or dynamic loading of the extensor muscles. The etiology is most probably a disturbed gliding mechanism between patella and distal femur causing damage to the patellar cartilage i.e. chondromalacia. Pain evoked by loading of the knee is caused by the disturbed biomechanical properties of the patellar cartilage, through which part of the loading force is transmitted to the subchondral bone (10). These changes in the transmission of forces may cause increased intraosseous pressure and a delay in the venous bloodstream in the patella (6, 7, 9, 12). There may be a relation between patellar chondromalacia and a delay in venous circulation as assessed by phlebography of the patella (2). With this method contrast medium is injected in the cancellous bone of the patella. In a normal patella the contrast medium is drained into the extraosseous veins within one minute,

while a small delayed pooling around the tip of the needle is considered to be normal. These findings are in contrast with those found in patellar chondromalacia, in which case widening of the subchondral veins can be seen, as well as peripheral pooling and delayed extraosseous drainage. In the P.P.S. most of the contrast medium remains in the patella after one minute, and there is abnormal filling of large parts of the extraosseous veins (4, 11) (fig. 1).

At present it is not known whether there is any correlation between the symptoms in the patellofemoral pain syndrome, the arthroscopic findings, i.e. the degree of damage to the patellar cartilage, and pooling of contrast medium in the intraosseous vessels. This study examines this possible relation as it may increase our knowledge about this important clinical syndrome and open up therapeutic options for the future.

PATIENTS AND METHODS

Sixty seven patients, 45 men and 22 women, mean age 26.8 (16-43 years), with symptoms and signs of P.P.S.

¹ Department of Orthopedics, University Hospital Nijmegen, P.O.Box 9101, 6500 HB Nijmegen, The Netherlands.

² Orthopedic Department, University Hospital Maastricht, The Netherlands.

³ Dept. of Radiology, University Hospital Maastricht, The Netherlands.

⁴ Dept. of Orthopedics, University Hospital Maastricht, The Netherlands.

Correspondence and reprints : G. N. Homminga, Department of Orthopedics, University Hospital Nijmegen, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands.

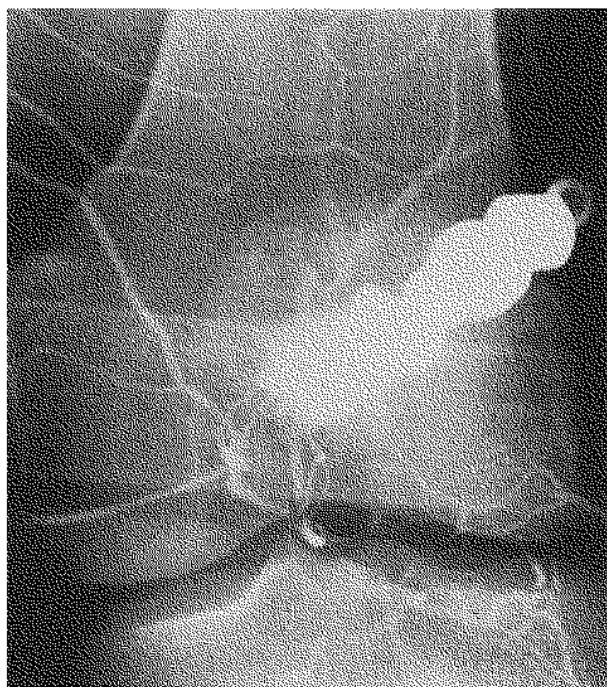


Fig. 1. — Abnormal filling of the extraosseous veins at one minute in chondromalacia patellae.

for at least 6 months, were recruited from the outpatient department of the orthopedic department of the University Hospital of Maastricht. The left knee was involved in 36 and the right knee in 35 patients. Patients with signs of instability, discopathy or inflammatory diseases were excluded. Before entering the study all patients were treated with muscle strengthening exercises and physiotherapeutic measures. They received instructions for diminishing the loading of the patellofemoral joint and their sports activities were restricted. Patients who had been operated on the same knee before, were excluded.

SURGICAL TECHNIQUE

The procedure is performed under general anesthesia. A tourniquet is not used. A sternal aspiration needle is introduced into the center of the patella from the front. The needle is filled with normal saline and subsequently 2cc Hexabrix® (joxitalic acid) is injected. After 60 seconds a radiograph is made in the anteroposterior direction. The needle is removed and arthroscopy is performed.

In evaluating the results of the phlebography attention is paid to the amount of contrast medium

in the extrapatellar vessels and to contrast medium deposits in the patella. Contrast material pooling in the patella after one minute is considered to be pathological (11).

RESULTS

In 8 cases intraosseous phlebography failed because of leakage of the contrast material outside the patella. In 35 of the remaining 59 patellar phlebograms, contrast medium was present in the extraosseous vessels after 60 seconds. In 35 cases contrast medium remained in the patella after 60 seconds; a large diffuse depot was seen in the patella in 3 cases.

Arthroscopic evaluation was done using the classification proposed by Outerbridge (8) (table I). Normal patellar cartilage was found in 10, softening and swelling in 33, fragmentation and fissuring of less than 0.5 inch in 7, fragmentation and fissuring of more than 0.5 inch in 4 and erosion of cartilage with exposure of the subchondral bone in 5 patients.

Table I. — Degree and extension of cartilage damage according to Outerbridge

Grade 0	no cartilage abnormalities
Grade I	softening and swelling
Grade II	fragmentation and fissuring < 1/2 — inch
Grade III	fragmentation and fissuring > 1/2 — inch
Grade IV	erosion of cartilage with exposure of subchondral bone

The numbers of patients with extraosseous contrast medium, contrast medium in the patella and diffuse large depots were correlated with the numbers of patients with different degrees of damage of the patellar cartilage (table II). Statistical evaluation of the correlation between venous engorgement and the degree of chondropathy showed no significant correlation between arthroscopic findings and the presence of contrast medium after one minute in the extraosseous vessels (Mann-Whitney rank sum test: $p = 0.886$). Neither was the presence of contrast medium in the patella after 60 seconds significantly correlated with the arthroscopic findings (Mann-Whitney rank sum test: $p = 0.845$).

Table II. — Extraosseous contrast material, contrast material in the patella and large diffuse contrast depots in relation to the degree of patellar cartilage damage

	0 n = 1 0	I n = 3 3	II n = 7	III n = 4	IV n = 5
Extra-osseous contrast material	4	24	2	2	3
Contrast material in the patella	5	21	6	2	1
Diffuse large depot	0	2	1	0	0

DISCUSSION AND CONCLUSION

In osteoarthritis of the hip a possible correlation is suggested between cartilage damage and delayed venous flow as visualized by intraosseous phlebography (2). A quantitative correlation between the grade of chondromalacia and phlebographic findings remains uncertain (5, 11). The relation between intraosseous venous engorgement, intraosseous hypertension and the presence of anterior knee pain at rest seems likely (1, 3). Possible causes for delayed venous flow are distension of the subchondral veins or blockage of extraosseous intracapsular veins (3, 4).

In our patients with a patellofemoral pain syndrome, no statistically significant correlation could be established between venous flow from the patella and the degree of chondromalacia patellae. These findings are in accordance with the findings of Brookes and Helal in 1968 (5). It seems likely that delayed venous flow and changes in the patellar cartilage are both part of the same clinical entity, but it remains unclear how they are related to each other. Nevertheless it is very likely that venous engorgement plays an important role in pain induction in the patellofemoral pain syndrome.

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SAMENVATTING

G. N. HOMMINGA, H. A. MAZEE, E. S. VAN DER LINDEN, A. VAN OOY. *Correlatie tussen vertraagde afvloed van het contrastmedium uit de patella en chondromalacie.*

Bij 67 patienten met langer bestaande retropatellaire pijn klachten werd een intra-ossaal phlebogram alsmede een arthroscopie van de knie verricht. Tussen de vertraagde afvloed van het contrastmedium uit de patella en de mate van chondromalacie kon geen statistische correlatie worden aangetoond.

RÉSUMÉ

G. N. HOMMINGA, H. A. MAZEE, E. S. VAN DER LINDEN, A. VAN OOY. Retard de drainage du produit de contraste par les veines de la rotule et lésions du cartilage articulaire rotulien.

Soixante-sept patients qui présentaient un syndrome rotulien douloureux de longue durée ont subi une phlé-

bographie transosseuse de la rotule et une arthroscopie du genou. Cette étude n'a pas permis de démontrer une corrélation statistique entre un retard dans le drainage du produit de contraste par les veines de la rotule et l'importance des lésions du cartilage rotulien.