

LATERAL DISLOCATION OF THE PATELLA FOLLOWING MARMOR AND GUEPAR ARTHROPLASTY OF THE KNEE

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The follow-up of 50 knees treated with the modular Marmor prosthesis and 50 with the Guepar hinge joint included tangential radiography of the femoro-patellar joint. After Marmor arthroplasty lateral patellar dislocation was found in seven knees, in six causing pain. After Guepar arthroplasty lateral patellar dislocation was found in 32 knees, but pain was present in only three. There was only a questionable correlation between pre-existing valgus deformity and postoperative lateral patellar dislocation, and an external rotation deformity of the lower leg was found in only five cases after Guepar arthroplasty. Thus, neither phenomenon could explain the high incidence of lateral patellar dislocation in the Guepar series. These dislocations must be assumed to be due to the unphysiological strain on the extensor apparatus inherent in this type of prosthesis.

Key words: knee; arthroplasty; patella; dislocation

Accepted 21.i.78

Dysfunction of the femoro-patellar joint is now assumed to be the most common cause of poor primary results following arthroplasty of the knee (Deburge & Guepar 1976, Engelbrecht et al. 1976, Insall et al. 1976, Marmor 1976). Some of these poor results appear to be due to dislocation of the patella, but the incidence of this complication is still largely unknown and apparently depends to some extent upon the type of knee prosthesis.

The object of the present study was to elucidate the incidence of femoro-patellar dislocation, and the associated pain, following knee arthroplasty using the Marmor modular prosthesis and the Guepar hinge joint.

MATERIALS AND METHODS

The material comprises 100 knee arthroplasties, 50 by the Marmor and 50 by the Guepar method, performed in the Department of Orthopaedic Surgery U, Rigshospitalet, University of Copenhagen, during the period 1974 to 1977.

During the study period the two types of arthroplasty were used as complementary methods. In cases of less severe articular destruction the Marmor knee was used; in cases of advanced destruction with severe contracture or deformity the Guepar knee was preferred.

In both methods the technique of opening and closing the knee was in principle the same. The approach was in all cases via a long, straight, medial parapatellar incision, extending proximally into the quadriceps aponeurosis close to its

Table 1. Grading of the lateral patellar dislocation

Grade	Patellar dislocation
0	None
1	$< \frac{1}{2}$ patellar width
2	$\frac{1}{2}$ –1 patellar width
3	> 1 patellar width

junction to the vastus medialis. In all cases of rheumatoid arthritis, synovectomy was carried out. In closing the wound, the quadriceps aponeurosis and joint capsule were carefully sutured using non-absorbable knotted sutures. Postoperative mobility training was started on the 1st day, and walking with full weight-bearing began on the 10th day.

Out of 50 consecutive Marmor arthroplasties 13 were performed on men and 37 on women. The age range was 18 to 82 years, mean 61. The underlying disease was rheumatoid arthritis in 29 cases, osteoarthritis in 17, posttraumatic arthrosis in two, and haemophilic arthropathy in two. The patients had been followed up for 3 to 37 months, mean 14 months.

Of the 50 consecutive Guepar arthroplasties 18 were performed on men and 32 on women. The age range was 28 to 86, mean 65 years. The underlying disease was rheumatoid arthritis in 37 cases, osteoarthritis in 10, and posttraumatic arthrosis in three. The patients had been followed up for 3 to 25 months, mean 10 months.

In all cases the follow-up included radiological examination with tangential exposure of the femoro-patellar joint. Displacement of the patella, if present, was graded on a scale from 0 to 3 (Table 1). A direct comparison with the preoperative X-ray appearances was not possible as far as the tangential view was concerned, as this was not a routine procedure at the beginning of the period under study.

RESULTS

Following Marmor arthroplasty patellar dislocation was found in seven knees, grade I in six and grade II in one. However, in the latter case the dislocation had been present also preoperatively, but no attempt had been made to correct it because of severe dysplasia of the femoro-patellar joint. Thus, following 50 Marmor replacements there were six patellar

Table 2. Grade of lateral patellar dislocation in relation to pain in 50 knees treated with the Marmor prosthesis

Grade of dislocation	Pain			Total
	None or negligible	Moderate	Severe	
0	33	9	1	43
1	1	5	0	6
2	0	1	0	1
3	0	0	0	0
Total	34	15	1	50

Table 3. Grade of lateral patellar dislocation in relation to pain in 50 knees treated with the Guepar prosthesis

Grade of dislocation	Pain			Total
	None or negligible	Moderate	Severe	
0	18	0	0	18
1	12	0	1	13
2	12	0	2	14
3	5	0	0	5
Total	47	0	3	50

dislocations (12 per cent) which could be related to the surgical treatment. Dislocation related to pain is shown in Table 2: Pain was present in six out of seven knees with patellar dislocation but in only 10 of the remaining 43 that did not have dislocation.

After Guepar replacement patellar dislocation was found in 32 (64 per cent) out of 50 knees. Among these dislocations 13 were grade I, 14 grade II, and five grade III. Within the Guepar series there was no recognized case of preoperative patellar dislocation. Dislocation related to pain is shown in Table 3: Pain was present in three of the 32 knees with patellar dislocation, but in none of the remaining 18 without dislocation.

The difference in the incidence of lateral patellar dislocation between knees having

Marmor (12 per cent) and Guepar (64 per cent) arthroplasty is statistically significant ($P < 0.025$).

DISCUSSION

The Marmor and the Guepar series do not differ essentially in sex ratio, age distribution, underlying disease, follow-up period, surgical approach, or postoperative management. On the other hand, they differ in two other respects: The Guepar series comprises cases having relatively severe destruction of the joint (cf. the indications), and the two types of prosthesis are entirely different in their relation to the biomechanics of the femoro-patellar joint.

The relatively severe articular destruction, in particular the presence of pronounced pre-operative valgus deformity, might be imagined to be responsible for the high incidence of patellar dislocation in the Guepar series. It has been reported that knees with severe valgus deformity of long standing may develop lateral patellar dislocation following surgical correction of the deformity owing to a taut lateral retinaculum (Weckström et al. 1976). In order to elucidate this aspect, the grade of dislocation is related to the presence of preoperative valgus deformity in Table 4.

Table 4. Preoperative valgus deformity of the knee in relation to type of arthroplasty and to the incidence of lateral dislocation of the patella at follow-up

	Degrees of valgus deformity			Total
	0-5	10-15	> 15	
Marmor				
Patella <i>in situ</i>	23	16	4	43
Patella dislocated	2	4	1	7
Guepar				
Patella <i>in situ</i>	13	4	1	18
Patella dislocated	18	6	8	32
Total	56	30	14	100

It will be seen that although the incidence of dislocation was indeed somewhat higher after correction of severe valgus deformities, lateral dislocation of the patella was almost as high among knees without valgus angulation as in the Guepar series as a whole. Thus, pre-existing valgus deformity did not essentially influence the postoperative incidence of dislocation.

If the Guepar prosthesis is inserted in cases with an external rotation deformity of the lower leg, there will be an increased tendency for lateral dislocation in relation to the lateral displacement of the insertion of the patellar ligament. The present series included five cases with such a deformity ranging from 20° to 30°. Only three of them developed lateral patellar dislocation. Therefore, external rotation deformity of the lower leg cannot have markedly influenced the incidence of dislocation in the Guepar series.

The weakening of the vastus medialis involved by the medial parapatellar approach has possibly been the cause of the relatively few and slight dislocations in the Marmor series. Since, however, this factor is the same in the Marmor and in the Guepar series, it cannot *per se* be an explanation of the increased incidence of dislocations among the Guepar operated patients.

Weckström et al. (1976) and Deburge & Guepar (1976) found the same high incidence of lateral patellar dislocation following Guepar arthroplasty. A probable explanation is an unphysiological design of the femoral shield of the prosthesis which does not sufficiently support the lateral articular surface of the patella (Figure 1). Moreover, the shield causes a slight forward displacement of the patella. Combined with the fact that the axis of flexion in the Guepar prosthesis is localized rather far posteriorly, this means great stress upon the extensor apparatus during flexion of the knee.

Patellar dislocation following Guepar arthroplasty does not seem to give rise to major pain in the short term (cf. Table 3). This must be due to the mechanical function of the femoral shield which secures a

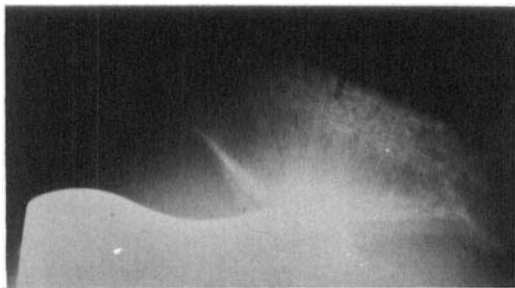


Figure 1. Tangential view of the femoro-patellar joint following Guepar arthroplasty. Note the unphysiological shape of the femoral shield and the lateral patellar dislocation typical of the Guepar prosthesis.

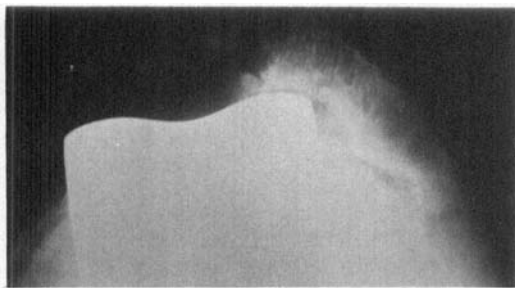


Figure 2. Tangential view of the femoro-patellar joint 8 months after Guepar arthroplasty. Note the lateral patellar dislocation and severe erosion of the patellar joint surface. The patient had satisfactory articular function and no pain.

reasonable sliding function regardless of appreciable incongruence against the articular surface of the patella and regardless of an occasionally severe secondary malformation of the patella (Figure 2). This is unlike the findings after Marmor arthroplasty in which even rather minor dislocation of the femoro-patellar joint, with which the arthroplasty does not otherwise interfere, apparently cause pain in most cases (cf. Table 2).

Patellar dislocation is not always recognized by conventional clinical and radiological examination, and often it is demonstrable only on a tangential view of the femoro-patellar joint. Therefore, patellar dislocation should be considered as a possible cause of persistent pain in the knee following arthroplasty.

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