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ORIGINAL STUDY

Hoffa's fat pad resection in total knee arthroplasty

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The authors have studied the consequences of resection of Hoffa's fat pad during total knee arthroplasty (TKA).
Sixty eight patients undergoing primary TKA were randomised to have Hoffa's fat pad either resected or preserved. Biopsy specimens of Hoffa's fat pad were taken for pathological study in all patients. Radiological, functional and clinical evaluation was made after surgery, before discharge from hospital, after one month and after six months. Thirty six percent of the patients were found to present inflammatory infiltration of Hoffa's fat pad, and severe fibrosis was found in 33 %. A progressive decrease in postoperative anterior knee pain was found in 95% of the patients in both groups. Hoffa's fat pad resection did not appear to result in a change in patellar tendon length during the first six months after TKA. Preoperative fibrosis of Hoffa's fat pad may play a role in postoperative pain and range of motion.

Key words : knee arthroplasty ; Hoffa's fat pad.

INTRODUCTION

Infra-patellar contracture syndrome is a well-defined clinical entity *(6, 8)* encountered following open surgery on the anterior cruciate ligament *(1, 11)* and other knee procedures, such as patellar and meniscal surgery, manipulations under anaesthesia *(3, 7)*, high tibial osteotomy, primary and revision TKA *(9)*.

Postoperative anterior knee pain after TKA has been related to resurfacing or non-resurfacing of the patella *(12)*, tension on the retinacular ligament, Hoffa's fat pad resection or intraoperative soft tissue injury *(10)*.

The authors studied the relationship between resection of Hoffa's fat pad and anterior knee pain, postoperative range of motion and patellar tendon length after TKA. The possible consequences for future TKA surgery are discussed.

MATERIAL AND METHOD

In a prospective randomised study of 68 patients who underwent total knee arthroplasty (TKA) for primary gonarthrosis between May 2003 and December 2003, two groups were compared : Hoffa's fat pad was resected in 50% of the patients, whereas it was preserved in the other 50%, with only one small fragment being removed for biopsy.

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One patient was randomised for no resection, but as Hoffa's fat pas was obstructing the view and had to be resected, she was excluded from the study.

Specimens were obtained and submitted to pathological study in all patients.

The average age of the patients was 71.6 years ; 58 were women and 10 men. The surgery was carried out by seven surgeons at the Knee Unit. A posterior cruciate ligament preserving prosthesis (Profix®, Smith & Nephew, Memphis, USA and Scorpio®, Stryker, Mahwah, USA) was implanted without patella resurfacing. Lateral release was necessary in 15 patients in the resection group and in 14 in the non-resection group.

Radiographs were obtained, range of motion and a VAS score (Visual Analog Scale) were noted on the day of discharge, after one month and after six months. Rehabilitation was supervised by the same team of physiotherapists, according to an established program, and mobility was evaluated on the fifth postoperative day, after one month and after six months.

Radiological measurements were made on a standard lateral view of the knee at 60° flexion : the size of the patella, the thickness of the joint line and the length of the patellar tendon were noted. The patellar length / tendon length ratio was compared *(4)* in the immediate postoperative period, after one month and six months. We took as reference points on the lateral radiograph the inferior border of the patella and the anterior edge of the metallic tibial platform.

Table I. — Pathology findings in biopsy specimens of Hoffa's fat pad

	Hoffa's pad resection	Control
Fibrosis		
light	49.4%	50.6%
moderate	17.6%	11.8%
severe	32.9%	37.6%
Vascular neoformations		
light	78.8%	74.1%
moderate	15.3%	20.0%
severe	5.9%	5.9%
Chronic inflammatory component		
Not present	64.7%	61.8%
Present	35.4%	38.2%

RESULTS

Hoffa's fat pad was found to present some vascular neoformations (moderate and severe in 20%) and fibrosis (severe in 33%) in all cases. Chronic inflammatory infiltration was noted in 35% of patients in the Hoffa resection group (table I).

In both study groups, postoperative pain improved progressively at subsequent follow-up visits (table II). Although the immediate postoperative pain was slightly worse in those patients that underwent fat pad resection, at six months the number of patients having no pain was clearly higher in the group that had Hoffa's fat pad excised than in the group that had an intact fat pad (76.5% versus 47.6%) ($p < 0.05$).

Knee flexion range increased progressively in the two study groups during the six months of observation (see minimal and maximal range of

Table II. — Pain intensity in the immediate postoperative period, after one month and after 6 months

			Hoffa's resection		Total
			Yes	No	
Postoperative	light	Nº	6	4	10
		%	17.6%	11.8%	14.7%
	moderate	Nº	20	22	42
		%	58.8%	64.7%	61.8%
	Severe	Nº	8	8	16
		%	23.5%	23.5%	23.5%
One month	No	Nº	6	8	14
		%	17.6%	23.5%	20.6%
	light	Nº	18	12	30
		%	52.9%	35.3%	44.1%
	moderate	Nº	10	14	24
		%	29.4%	41.2%	35.3%
Six months	No	Nº	26	16	42
		%	76.5%	47.1%	61.86%
	light	Nº	6	12	18
		%	17.6%	35.3%	26.5%
	moderate	Nº	2	6	8
		%	5.9%	17.6%	11.8%

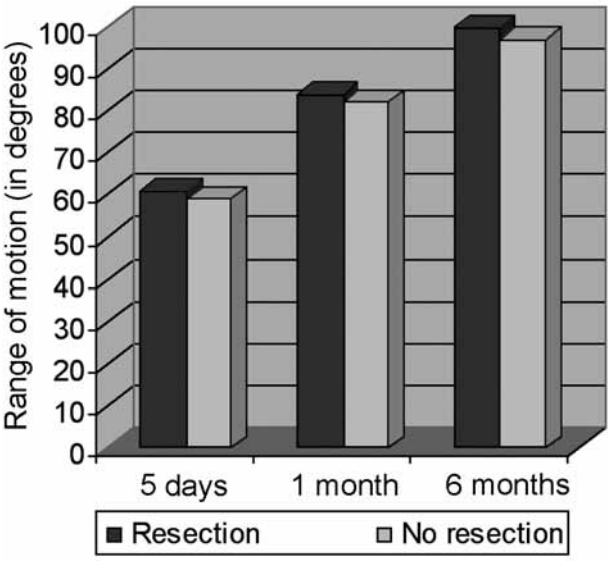

Fig. 1. — Evolution of the range of motion of the knees following TKA in patients with and without resection of Hoffa's fat pad.

motion in fig. 1), from a mean of 59.7° (95% CI : 53.7 - 65.7) at the fifth postoperative period, to 82.2° (95% CI : 77.0 - 87.4) after one month, and 96.9° (95% CI : 92.0-101.8) after sixmonths (fig. 1).

Two patients who showed marked fibrosis on biopsy of Hoffa's fat pad and had no resection ended up with a final range of motion of 70°. One of these also ended up with a flexion contracture of 30°. All other patients recovered complete knee extension at the end of the study, sometimes after a long delay.

Patellar tendon length changes were not statistically significant between both groups ($p < 0.05$), and tendon length did not appear to influence knee function (table III).

Table III. – Patellar tendon length

	Hoffa resection	average	S.D.
Postoperative	Yes	3.36	0.61
	No	3.31	0.65
One month p.o.	Yes	3.52	0.60
	No	3.54	0.61
Six months p.o.	Yes	3.52	0.64
	No	3.58	0.66

*S.D. Standard Deviation.

DISCUSSION

The usual surgical techniques for TKA use a wide exposure of the joint surfaces to facilitate placement of guiding and cutting instruments *(3, 11, 13)*. Exposure of the lateral tibial compartment is usually made difficult by Hoffa's fat pad, and this sometimes requires partial or complete fat pad resection.

Around 10% of the patients with a knee prosthesis have residual pain at various locations without any apparent cause. This pain is mostly anterior *(1, 2, 7, 10)*. Anterior knee pain may be caused by problems with patellar tracking, patella resurfacing and patella innervation *(1, 5, 7, 12)*. Hoffa's fat pad could be an important factor as well and its role has never been studied *(1, 6, 8)*. In our study lateral patellar release was performed when any patellar maltracking was detected, which explains the high rate of lateral release.

Joint degeneration is associated with structural alterations in the periarticular structures such as retraction of the collateral and retinacular ligaments and Hoffa's fad pad. Fibrosis and concomitant vascular neoformations may play a decisive role in postoperative pain. Persisting pain, the most important subjective factor to judge outcome, may be related to the existence of a fibrotic Hoffa's fat pad.

CONCLUSIONS

This study demonstrates a statistically significant relationship between Hoffa's fat pad fibrosis and anterior knee pain in TKA during the first six postoperative months. We believe that resection of a severely fibrotic Hoffa's fat pad has a favourable effect on pain at six months. We recommend systematic resection of Hoffa's fat pad during total knee arthroplasty.

The range of motion appears to be unfavourably affected by the conservation of a severely fibrotic Hoffa pad. Studies on a larger patient material should verify this hypothesis.

The length of the patellar tendon was not affected by Hoffa's resection at six months.

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