

PATELLECTOMY FOR FRACTURE

A STUDY OF THE RESULTS OF 40 CASES.

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Patellectomy was first performed about the turn of this century. Heineck (1909) stated that patellectomy was to be condemned in uncomplicated transverse fractures, and that it deserved consideration only as a last resort in comminuted fractures. Brooke (1937) advocated the treatment of fractures of the patella by excision, and since the publication of his paper and the support it received from no less a person than Hey Groves, the era of patellectomy was established. Though Brooke stated that the efficiency of the knee was increased after patellectomy, later workers such as Bruce and Walmsley (1942), Cohn (1944), and Smillie (1951) have maintained that patellectomy would lead to an extension lag, loss of protection to the femoral condyles, and arthritic changes in the knee.

There are in general, four conditions for which patellectomy may be performed. These are,

- i) symptomatic chondromalacia
- ii) patello-femoral arthritis
- iii) recurrent dislocation and
- iv) fracture

Though definite figures are not available, the incidence of the first three groups that may need patellectomy is very low indeed in Singapore. Hence this study concerns itself only with patellectomy for fracture.

MATERIAL

From the inception of the accident and orthopaedic service in 1952 to the end of 1964, the University Unit performed patellectomies in 101 cases for fracture. The operations were carried out by surgeons of all grades—medical officers, senior registrars and consultants.

Of the 101 cases, 8 case records were missing, and 50 cases could not be reviewed because they were either dead, had changed their addresses, the house had burned down, they had left the country, or for diverse reasons, they could not attend our follow-up clinics.

43 cases were therefore available for study. Of these, 3 had to be rejected as one had a stiff knee from an old fracture of the upper tibia before he fractured his patella; another was a schizophrenic and could not co-operate; and the third fractured both his patellae, leaving no normal knee for comparison.

TABLE I
MATERIAL

	Minimum	Maximum	AVERAGE
AGE at injury	20 yrs.	71 yrs.	43 yrs.
	Female	Male	RATIO
SEX	8	32	1 : 4
	Shortest	Longest	AVERAGE
FOLLOW-UP (Operation to Review)	4½ mths.	12 yrs. 4½ mths.	3 yrs.

Of 101 cases of patellectomy for fracture it was possible to study 40 cases.

Of the remaining 40 cases, 32 were male and 8 female, making a male/female ratio of 4:1. The youngest patient was 20 years of age, and the oldest 71 years, the average age being 43 years. The right patella was fractured in 23 cases and the left in 17 cases.

The time from Injury to Operation was usually 2-3 days, but 7 cases were operated on after nearly two weeks. Another 8 cases were operated on after one month or more. Of the 8, 2 cases were operated on between 1-3 months, 3 cases were operated on after 3 months (2 lower pole excisions and 1 total patellectomy); one was operated on after 5 months, another after 7 months, and yet another after 18 months. The last three were all lower pole excisions.

FOLLOW-UP

The cases were followed up for an average of 3 years, the shortest follow-up being 4½ months, and the longest 12 years 4½ months.

TABLE II

PERIOD OF FOLLOW-UP

Under 2 years:	17 cases
Over 2 years:	
2 - 4 yrs. —	5 cases
5 - 8 yrs. —	12 „
Over 8 yrs. —	6 „
	23 cases
	Total 40 cases

Seventeen cases were followed up for a period of less than two years. Twenty-three cases were followed up for more than two years. Of these, 5 cases were followed up for 2 to 4 years, 12 cases were followed up for 5 to 8 years and 6 cases were followed up for over 8 years.

The average time from operation to maximum recovery was hard to judge, but this was generally from 4 to 6 months.

METHOD OF ANALYSING THE RESULTS

The results have been analysed separately for excisions of the lower pole, of which there were 10 cases, and total patellectomies, of which there were 30.

They were graded in three categories, excellent, good and unsatisfactory:—

(a) Excellent result

- i) minimal subjective symptoms, if any.
- ii) a full range of knee movement as compared with the normal side.
- iii) full squatting and easy rising.
- iv) normal power in quadriceps (M.R.C. grading of 5).
- v) wasting of quadriceps (*i.e.*, girth of thigh) 1" or less.
- vi) no osteoarthritic change on X-ray.

(b) Good result

- i) mild subjective symptoms.
- ii) knee extension normal, but flexion limited by not more than 20°.
- iii) full squatting and easy rising.
- iv) power in quadriceps not less than 4.
- v) wasting of quadriceps more than 1", but less than 1½".
- vi) minimal osteoarthritic changes on X-ray.

(c) Unsatisfactory result

Cases which do not qualify for emplacement in the above categories.

RESULTS OF LOWER POLE EXCISION

There were 10 cases. Five were excellent, two were good, and three were unsatisfactory. In the 3 unsatisfactory cases, 2 were due to delay in operation, one being operated on 18 months after injury, and the other nearly three months after injury. Nevertheless, one case classified as excellent was operated on 3½ months after injury. This result may be exceptional. In the last unsatisfactory case, a 40 year old male was

TABLE III

RESULTS

	Excellent	Good	Unsatisfactory
Lower pole excision	5 (50%)	2 (20%)	3 (30%)
Complete patellectomy	14 (46.7%)	11 (36.7%)	5 (16.6%)

operated on the day of injury. Reviewed 4 years later, he had a 10° extension lag, and the patella was riding high and laterally. The repair had given way post-operatively. There were degenerative changes in the knee.

RESULTS OF TOTAL EXCISION

Out of 30 cases, 14 were excellent, 11 were good, and 5 were unsatisfactory. Of the unsatisfactory cases, one was a woman reviewed only $6\frac{1}{2}$ months after operation. Her range of knee movement was 10° - 80° . She may have improved subsequently, but she did not come again for follow up. Another was an excessively fat woman. She had full flexion and extension. She had difficulty in squatting and rising, but she did not have osteoarthritis in her knee, clinically or radiologically. Such a fat person would have difficulty in squatting and rising, even without patellectomy. The third unsatisfactory case was again in a female patient. She had osteoarthritis and limitation of knee flexion, but she had this even in the other knee.

The last two unsatisfactory cases were in male patients. One could flex his knee to only 90° , and it would appear that this repair had been too tight. The other had 10° extension lag and osteoarthritis, but his osteoarthritis was already present at the time of injury, and he was reviewed at $4\frac{1}{2}$ months after operation, the case with the shortest follow-up.

Ossification in the Quadriceps Tendon, and its Relationship to Functional Grading.

In 19 cases there was no ossification, in 12 there was minimal ossification, and in 9 cases there was moderate ossification. However, it would appear that there was no correlation between the presence of ossification and functional recovery. There were many knees with excellent function that had ossification. Three of the eight unsatisfactory cases had no ossification.

EXTENSION LAG

This was present in 5 out of the 40 cases. Three of the five were in lower pole excisions. Two of these were operated on late, 18 months and 3 months after injury. In the third case, the repair gave way post-operatively.

The last two cases with extension lag were after total patellectomy. The patients had short follow-up, at $4\frac{1}{2}$ and $6\frac{1}{2}$ months after operation. They could easily have improved subsequently.

DISCUSSION

Duthie and Hutchinson (1958) in a review of 24 cases of patellectomy for fracture had a satisfactory result (excellent + good) in 50%, and an unsatisfactory result (fair + bad) in the other 50% of his cases.

West (1962) in a review of 29 patellectomies for fracture had a satisfactory result (excellent + good) in 69%, and an unsatisfactory result (fair + poor) in 31% of his cases.

In our series, the satisfactory result (excellent + good) was 70% in lower pole excisions and 83.3% in total patellectomies.

Our study also showed that a normal range of knee motion is the usual outcome after patellectomy (Fig. 1). The slight deformity arising from the absence of the patella did not disturb our patients.



Fig. 1. A normal range of knee motion is the usual outcome after patellectomy.

The statement that there is a relationship between ossification in the quadriceps tendon and functional recovery (Duthie and Hutchinson 1958) has not been borne out in our series.

Duthie and Hutchinson (1958) and West (1962), showed that there was no evidence that arthritic changes develop after patellectomy. This statement appears to be true, in the light of our findings. Moreover, in congenital absence of



Fig. 2a.



Fig. 2b.

Figs. 2a & 2b. Onycho-osteodysplasia—No degenerative changes in the knee.



[Fig. 3. Total patellectomy 12 years before. No osteoarthritis.



Fig. 4a.



Fig. 4b.

Figs. 4a & 4b. Comminuted fracture left patella. Total excision 9 years before. No osteoarthritis. Two small areas of ossification in quadriceps tendon.



Fig. 5a.



Fig. 5b.

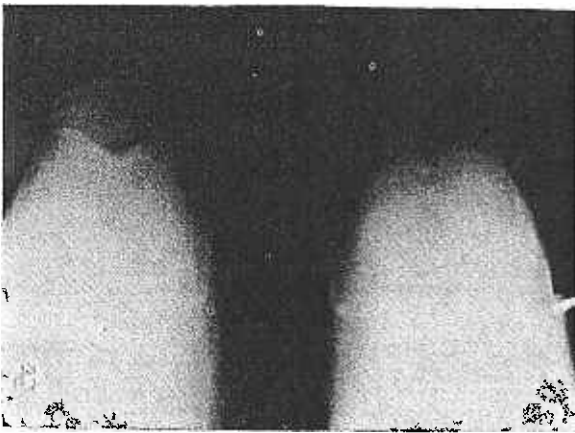


Fig 5c.

Figs. 5a, 5b & 5c. Transverse fracture left patella.
Total excision 7½ years ago. No osteoarthritis
Minimal ossification in quadriceps tendon.

the patella as seen in onycho-osteo-dysplasia (Fig. 2), the nail-patella syndrome, early degenerative changes in the knee have not been noted.

In the following three patients with long follow-up after patellectomy, no evidence of osteoarthritis was seen. Fig. 3 shows the knee of a patient who had total excision of the patella twelve years ago. Fig. 4 shows the operated and normal knees of a patient who had total patellectomy 9 years previously. Fig. 5 shows the operated and normal knees of a patient 7½ years after patellectomy.

CONCLUSION

It would appear that the results of either lower pole excision or total patellectomy are most satisfactory provided that the operation is performed soon after injury.

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