CHONDROMALACIA OF THE PATELLA

A Study of the Later Results of Excision of the Articular Cartilage

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The etiology, diagnosis and treatment of chondromalacia of the patella were discussed in a paper in this Journal by Wiles, Andrews and Devas in 1956. Many of the patients had been treated by excision of a part or the whole of the affected articular cartilage, the patella itself being left *in situ*. The results, on the whole, compared favourably with those of excision of the patella, but the review was carried out rather too soon after most of the operations to be sure that they would stand the test of time. We have therefore re-examined the same patients in an attempt to determine the later results.

It has been possible to trace twenty-seven of the thirty patients reported upon (twenty-eight knees). The shortest time since operation is now nearly five years, the longest is more than seven years, and the mean is five and a half years. Nineteen patients were personally examined by one of us (R. A. B.), and the remainder supplied information by letter (Table I).

TABLE I
RESULTS

Cartilage removed from	Good	Fair	Bad	Subsequent patellectomy
One-third of patella	4	—	0	2
Two-thirds of patella	10	2	0	2
All patella	6	—	0	2
	20	2	0	6

The results are detailed in Table II. The same case numbers have been used as in the previous paper, and the same criteria for assessing the grading. Nine of the twenty patients with results classified as good regarded their knees as completely normal. The other eleven did admit in answer to leading questions that there was an ache or a feeling of stiffness after sitting for a long time—for example, at the cinema—and after strenuous exercise. This is also a common experience of patients with good results from excision of the patella.

Since the last report the condition of two knees has improved from fair to good, two have deteriorated from good to fair, and the patella has been removed from three. The two patients who have been downgraded (Cases 12 and 14) still lead active lives, one as a physical training instructress and the other playing football. Their knees do not appear to have deteriorated, and they do not interfere with their activities, but are still a nuisance.

In six patients the patella was excised because of continuing symptoms. Three of the operations were before the first report (Cases 5, 7 and 25) and three after it (Cases 2, 17 and 31). The patient in Case 17 had other serious injuries to the knee and the original cartilage shave was perhaps ill-advised; the excision of the patella is still too recent for an

TABLE II
CLINICAL DETAILS AND RESULTS IN THIRTY-ONE CASES

Case number	Sex	Age at operation (years)	Date of operation	Condition in 1955	Condition in 1959	Comment
One-third of articular cartilage removed						
1	M	22	1952	Good	Good	Same patient as Case 26
2	M	16	1953	Good	—	Patella excised 1958 because of continuing symptoms
3	F	16	1953	Good	Good	Now a trained nurse
4	M	37	1954	Good	Good	—
5	M	41	1954	*	—	Patella excised 4 months later because of continuing symptoms
6	M	21	1954	Good	Good	—
Two-thirds of articular cartilage removed						
7	M	15	1952	*	—	Patella excised 8 months later because of continuing symptoms; the other patella was excised soon afterwards
8	F	19	1953	Good	Good	—
9	F	16	1953	Good	Good	—
10	M	27	1953	Good	Good	Also had over 100 loose bodies removed. A doctor who has recently moved to New Zealand. His former partner says his knee was then causing no trouble
11	M	24	1953	?	?	Cannot be traced
12	F	21	1954	Good	Fair	Aches both spontaneously and after use but the patient is still a physical training instructress
13	M	45	1954	Good	Good	—
14	M	23	1954	Good	Fair	Knee feels weak and twice has "given way," but the patient plays rugby football regularly
15	M	18	1954	Good	Good	—
16	M	28	1955	Good	Good	Plays squash

assessment. Removal of the patella has not greatly helped in Case 31 and the patient's personality is such that it is doubtful if this operation would have been successful even as a primary procedure. The result of excision of the patella in the others has been satisfactory.

DISCUSSION

Two interesting observations can be made. Firstly, the failures do not appear to be related to the area of articular cartilage removed because they are distributed evenly amongst the three groups of patients. Secondly, the twenty-two knees that were immediately improved by shaving off the affected cartilage continued to improve and, with one exception, they have remained good ever since. On the other hand, five of the six patients whose patellae were removed later because of continuing symptoms failed to improve, even for a short while, after the first operation; these knees, bad to start with, continued bad until after the patella was excised.

There has been no opportunity to examine a patella that has been shaved with a successful

TABLE II—*continued*

Case number	Sex	Age at operation (years)	Date of operation	Condition in 1955	Condition in 1959	Comment
Two-thirds of articular cartilage removed						
17	M	43	1955	Bad	—	Also had torn cruciate and medial ligaments. Patella excised October 1958
18	M	20	1955	Toorecent	Good	—
19	M	37	1955	Toorecent	?	Cannot be traced
20	M	28	1955	Toorecent	Good	Also had osteochondritis dissecans of femur
21	M	22	1954	Good	Good	—
22	M	33	1955	Toorecent	Good	—
All articular cartilage removed						
23	F	?	1951	Good	Good	Can dance indefinitely
24	F	27	1952	Fair	Good	Also had gross villous synovitis which was slow to recover. Now plays squash and walks up to 15 miles
25	F	15	1953	*	—	Patella removed by another surgeon in 1954
26	M	25	1954	Good	Good	See Case 1. Aches after long-distance running
27	F	22	1954	Good	Good	—
28	F	36	1954	Good	Good	Has recently been climbing mountains
29	F	43	1954	Bad	Good	On feet all day and dances. Occasional ache
30	M	28	1955	Good	?	Cannot be traced
31	F	24	1955	Toorecent	—	Patella excised 1956 because of continuing symptoms

* These three knees failed to improve after operation and the patellae were removed before the date of the first review. The condition of all three is now satisfactory.

result; so nothing is known about the condition of the remaining cartilage or of the areas from which cartilage was removed. It seems, however, that in the unsuccessful cases the chondromalacia has been rapidly progressive. This is illustrated in Figures 1 and 2, which show also the area of cartilage removed at the first operation. Figure 3 demonstrates the deterioration in another patella in only four months. No photograph was taken at the time of operation, but the records show that most of the patella was normal macroscopically. Only a small area was shaved and some regeneration of cartilage is apparent. Figure 4 shows a patella from which the major part of the cartilage had been removed eighteen months before; the remainder is greatly hypertrophied by chondromalacic changes.

The unsuccessful results have been reviewed to see if there is any way of telling in advance when the chondromalacia is likely to be progressive and therefore excision of the articular cartilage is contra-indicated.

Age—Three of the failures were in patients aged fifteen, fifteen and sixteen at the time of operation. The patient in Case 31, although aged twenty-four at the time of operation, had

FIG. 1

Case 2—Appearance after the articular cartilage had been shaved from the medial half of the patella. The lateral half shows no macroscopic evidence of chondromalacia.

FIG. 2

Case 2—The patella after removal five years later. There is widespread fissuring of the lateral half. (The incision was for the removal of cartilage for microscopy.)

FIG. 3

Case 5—A small area of cartilage was cut away from the lower and medial facet (*on the left of the photograph*) four months before the patella was excised; there is some evidence of regeneration. Macroscopic chondromalacia of the rest of the patella developed during this time.

FIG. 4

Case 3—The greater part of the articular cartilage was removed a year before patellectomy. The remaining cartilage is greatly swollen by chondromalacic changes.

had symptoms for many years. In this series the only successful result in an adolescent was in Case 3; the patient had had a previous injury to the knee that may have damaged the small area of cartilage that was excised. It may well be that a very early onset of severe chondromalacia indicates that it is likely to be progressive and then it would be better to excise the patella. This view is supported by Case 7, in which the second knee was affected soon after the first.

Condition of femur—It happens that the patient in Case 2 had also an osteochondritis dissecans of the femur. Femoral chondromalacia was not more noticeable when the results were unsuccessful than when they were successful.

Associated injuries—The cartilage shave carried out in Case 17 at the same time as repair of the medial and anterior cruciate ligaments was probably inadvisable.

Histological findings (P. S. A.)—The histology of the articular cartilage removed at the primary operations has been reviewed in the light of subsequent knowledge. The cases in which the patellae were later removed showed mild degrees of chondromalacia with superficial fissures, partial loss of metachromasia of the ground substance and cyst formation. The chondrocyte nuclei in the deeper layers in the excised cartilage were hypertrophic and showed some mitotic activity indicative of attempted regeneration. When compared with the shavings of the successful group, the failures had less advanced degenerative changes associated with some repair activity. There was no single feature which distinguished a successful case from a failure, and it was not found possible to forecast which would do well and which badly.

The excised patellae showed the marks of previous shaving which took place between one and four years earlier; naked-eye examination revealed oval or circular shave-marks reaching various depths of the cartilage. Sections showed that the usual fissured surface of chondromalacia was replaced by a wavy or saw-like edge which remained irregular in spite of constant friction with the apposing femoral condyle. The failure to smooth off the roughness is not due to generalised death of the cartilage because the deeper layers remain viable even though the matrix often stains poorly and may contain cysts. The chondro-osseous line is doubled or trebled in thickness; the bone is alive and condensed in places beneath thinned cartilage.

Marginal osteophytes and eburnation of the bone do not appear to be significantly increased in the failures. Therefore the changes in their patellae are not typical of advanced osteoarthritis of the joint; nor has a pannus developed as a result of either the disease or the surgical assault on the joint.

CONCLUSIONS

Removal of a small, moderate or major part of the articular cartilage of the patella for chondromalacia has been successful in twenty-two knees out of twenty-eight. These knees are functionally at least as good as after a successful patellectomy, and their appearance is better.

Only one knee that was initially improved by operation deteriorated during a follow-up period of five to seven years.

Of the six unsuccessful results, four were in patients whose symptoms began during adolescence. Excision of articular cartilage therefore seems to be contra-indicated during adolescence and when there is reason to believe that the chondromalacia will be rapidly progressive.

Failure of excision of articular cartilage to relieve the symptoms within a few months is an indication for patellectomy.

REFERENCE

- WILES, P., ANDREWS, P. S., and DEVAS, M. B. (1956): Chondromalacia of the Patella. *Journal of Bone and Joint Surgery*, **38-B**, 95.