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THE RESULTS OF CHONDRECTOMY IN CHONDROMALACIA OF THE PATELLA

By

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In 1906, *Büdinger*[2] reported a case of traumatic rupture of the patellar cartilage for which excision of the cartilage was performed. It was then many years before attention once more became focused on this condition. In 1925, *Läven*[10] published a survey of 13 surgically treated cases of what he called fissural degeneration of the cartilage. He described the operation as "Frühoperation der Arthritis deformans". *Aleman*[1] introduced the term chondromalacia patellae. In 1928 he published his observations on these changes in the cartilage which he had found in one-third of a large series of patients whose knees had been operated on. In 20 cases it was the only lesion. *Aleman's* precise description of the condition served to make it increasingly widely known in Scandinavia. He considered, on the basis of clinical observations, that it is caused by a traumatic lesion of the cartilage. He divided the pathological process into the following three stages: 1. Rupture of the cartilage caused by contusion, usually in childhood. 2. Latent chondromalacia, rupture of the cartilage with no degenerative changes. 3. Manifest chondromalacia with degenerative changes in the cartilage, synovitis and possibly exudate.

The traumatic origin of the condition appears to have been generally accepted even before Aleman's publication. However, in 1936 *Övre*[14] demonstrated convincingly on a large autopsy series that chondromalacia is a "normally" occurring degeneration of the joint cartilage. He stated that it increases with age and that it forms the preliminary stage of diffuse osteo-arthritis of the knee-joint; all transitions between the two conditions are found. *Hirsch's*[5] study of the elasticity and chondroitin sulphuric acid content of the joint cartilage also indicates a pathological change, the fissures appearing as secondary phenomena.

Surgical intervention consists of chondrectomy alone or combined with a patellaplasty, or of extirpation of the patella, according to the degree of severity of the process. In the following, only chondrectomy will be discussed. This operation consists of the excision of pathological cartilage and smoothing of the margins in order to obtain smooth gliding surfaces. The question arises whether, in addition to this mechanical effect, any change is brought about in the function of the joint. This problem was not discussed until 1941, when *Hultén* and *Gellerstedt*[6] demonstrated experimentally a condition which they named synovitis chondrodetritica, caused by absorption of débris in the knee-joint. They concluded that the effect of chondrectomy is due to the fact that it diminishes the amount of débris and thereby brings about regression of the synovitis.

A number of follow-up studies have been made on patients who have undergone chondrectomy. They comprise both cases of chondromalacia alone and cases combined with other disorders, such as injuries to the meniscus. This makes it more difficult to evaluate chondromalacia as an independent disease.

Erb[4] made a follow-up study of *Läven*'s cases after an observation period of 5-10 years. His series consisted of 18 cases, only 8 of which comprised fissural degeneration of the cartilage alone. The operation had a beneficial effect on the subjective symptoms.

Stig Karlsson's[8] follow-up study of *Aleman*'s operated cases consisted of 36 patients with uncomplicated chondromalacia. The observation period ranged from 1 to 20 years. The material derived from a military hospital is not, however, representative since it consists of men only, mainly around 20 years of age. *Karlsson* had a control series of 71 patients who had not been operated on. He found that such patients had evident discomfort more frequently than those operated on. The incidence of subsequent osteo-arthritis was approximately the same in both series.

Silfverskiöld[11] reported a follow-up study of 43 patients operated on and *Kallio*[7], a follow-up study of 23 patients with uncomplicated chondromalacia.

It is seen from the foregoing that reports from Scandinavia predominate in the literature on the subject. It is only recently that reports have been issued from the English-speaking countries. These have consisted mainly of small series with a short obervation period (*e.g., Bronitsky*[2], *Sutro*[12]). All the authors have found that chondrectomy gives satisfactory results with improvement in the majority of cases. In none of the forementioned series was a personal follow-up examination made of all the patients.

The symptoms of chondromalacia are somewhat diffuse and there is often a lack of agreement betwen the subjective and objective symptoms. In my opinion, personal contact with the patient is therefore necessary for an evaluation of the therapeutic results. Moreover, this affords a possibility of making a systematic study of the radiological changes. No such study appears to have been made hitherto. There is thus no convincing proof of the value of chondrectomy for this disorder. This is all the more desirable since the afore-mentioned investigations indicate that chondromalacia is a "normally" occurring degenerative change in cartilage which increases with age.

In pronounced cases of chondromalacia with widespread spongy excrescences, radical excision appears to be justified. Experience shows that the operation has a particularly favourable effect on just such cases. Clinically, however, they can scarcely be distinguished from cases with small, unimportant areas of softening. Pain, crepitations and synovial reactions are not in proportion to the degree of severity of the cartilaginous changes. The question arises whether the excision of these small foci is justified or whether we should adopt other procedures, such as intervention on the synovial membrane which presumably plays a greater rôle as far as pain is concerned. Is it perhaps possible to obtain satisfactory results without surgical intervention?

THE PRESENT SERIES

Operated Group.

I made a follow-up study of a large and representative series from the Orthopaedic Clinic of Karolinska Institutet. This was in order to obtain a better idea of the results of chondrectomy and of the indications for it. All the patients had suffered from uncomplicated chondromalacia of the patella. In every case I made a personal examination; this consisted of a clinical and radiological examination of both knee-joints. Reference is made to *Aleman*'s[1] and *Karlsson*'s[8] publications for the diagnosis of the disorder.

Not all the patients had been operated on by the same surgeon; the indications for operation had therefore varied somewhat. As a rule, it had been performed when there was pain and recurrent hydrops and lengthy physiotherapy and restriction of activities had proved ineffective.

Fifteen of the patients operated on between 1936 and 1946 could not be traced. The remaining 61, 25 men and 36 women, presented themselves for examination. In 8 cases the operation was bilateral; the series thus consisted of 69 knee-joints. The observation period

varied from 3-13 years (Fig. 1). The age and sex distribution of the 61 patients is shown in Fig. 2 and the distribution of the knee-joints in Fig. 3.

Prior to the operation, 9 patients had heavy manual work, 16 had other work requiring them to be on their feet and 36 had mainly se-

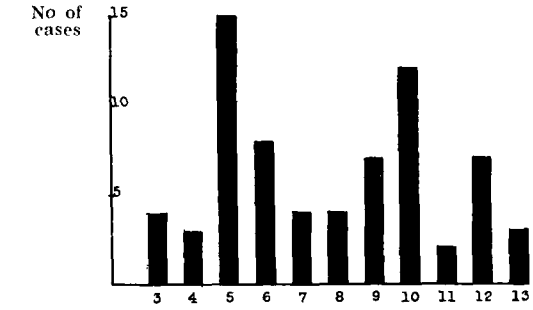


Fig. 1.

Operated group.

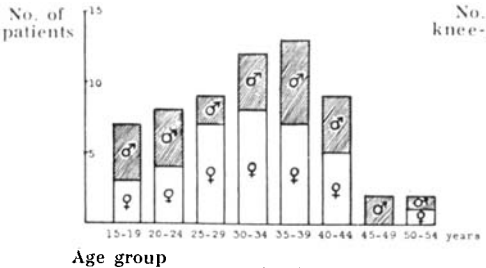


Fig. 2.

Age and sex distribution: operated group.

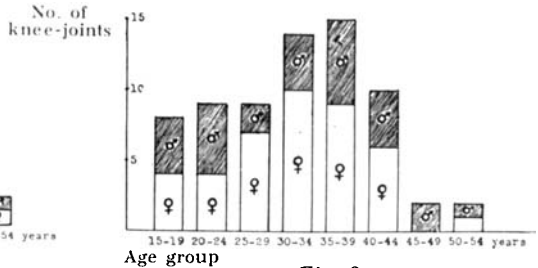


Fig. 3.

Age and sex distribution: operated knee-joints.

dentary occupations. The histories of the injuries were difficult to evaluate. In many cases it was impossible to judge whether there had been definite contusion of the patella or distortion of the knee-joint. Definite injuries were stated to have precipitated the symptoms in 28 of the cases.

At the follow-up examination, a systematic record was made both of the subjective symptoms and of the objective findings. This was in order to assess the results of operation as accurately as possible. It proved difficult to evaluate these results objectively. As a rule, it was a question of mere details dependent on the sensitivity of the individual patient to pain, his working conditions, etc. I nevertheless

endeavoured to classify the results as objectively as possible in four groups (Table 1).

Of the 69 knee-joints operated on, 26 caused no discomfort and 27 gave rise to slight inconvenience which had no effect on the way of living. Altogether, the results were good in 77 per cent of the cases.

TABLE 1

Results of Chondrectomy.

	No. of knee-joints	Percentage
Entirely free from symptoms	26	77
Slight discomfort with no effect on way of living	27	
Marked discomfort with effect on way of living, possibly change of occupation	9	13
No improvement or exacerbation	7	10
Total	69	100

Nine showed improvement but had residual discomforts which affected their way of living. Seven were unimproved or showed exacerbation. A closer study of the cases in which there was no improvement revealed that, in every case, there were evident signs of a synovial reaction prior to operation. This applied to 38 patients, *i.e.*, somewhat more than half the total number. The extent and depth of the chondromalacia appeared to have had no influence on the residual symptoms, but the figures were too small to permit a statistical analysis.

Two of the unimproved patients had sustained direct violent injury to the knee-joint. This is in agreement with *Kallio*'s[7] observation that the prognosis is poorest for the post-traumatic cases. The other post-traumatic cases were, however, fairly evenly distributed among the different groups.

Chondromalacia developed in a third patient after skeletal traction for a femoral fracture. He had great trouble with his knee-joint and decalcification of the skeleton. He was thus a special case.

A fourth patient had earlier been operated on for a degenerated, ruptured meniscus. On chondrectomy there was synovitis and exudate containing débris of cartilage, *i.e.*, signs of generalized cartilaginous degeneration.

Exacerbation occurred in a fifth patient after a fresh injury, which may have been slight dislocation of the patella, since the X-rays showed lateral subluxation.

Widespread malacia of the entire patella was found at operation in a sixth patient.

The only remarkable feature in a seventh case was postoperative stiffness of the knee-joint of long duration.

At the follow-up examination, all these 7 patients showed muscular atrophy with decreased tonicity of the quadriceps. It may be mentioned by way of com-

parison that this finding was made only in one-fourth of the patients in the group of improved cases and was then less pronounced.

One case of particular interest, and the only one that required re-operation, was not included in the present series.

The patient was a woman, operated on for the first time at the age of 20. A very early malacia without any fissure or shagginess was then excised. After chondrectomy she still experienced severe discomfort and patellectomy was therefore performed five years later. The patella was found to show only inappreciable changes, the articular surface being dull and somewhat uneven. Microscopical examination revealed no signs of chondromalacia and the articular surface was entirely covered with hyaline cartilage. Eight years after patellectomy she was entirely free from discomfort.

This case is a good illustration of the lack of agreement between the subjective trouble and the anatomical changes.

Thus, in the present series, the results of chondrectomy were found to be very satisfactory. No post-operative complications occurred. In the cases in which no improvement was noted, there were usually special circumstances such as severe post-traumatic or other disorders of the knee-joint.

We are now aware that chondromalacia is often a degenerative sign of ageing which may, however, appear at an early age. There is thus reason to wonder why the degenerated joints give rise to discomfort in some cases only and whether chondromalacia is, in fact, the primary cause. It is impossible to avoid the speculation that improvement may not have been due to the operation itself but to the accompanying rest and after-treatment.

In order to ascertain whether there were any grounds for this supposition, I made a closer study of the nine patients with bilateral chondromalacic lesions of the patella, operating having been performed on one knee only. In a few of these patients the symptoms were stated to have been equally severe in both knees; in the others they were said to have been somewhat milder in the non-operated knee. Four of these patients were entirely free from discomfort in either knee. The remainder had slighter or equally pronounced symptoms in the non-operated knee, but in no case were they more marked than in the knee that had been operated on. In those cases in which osteoarthritis was demonstrable radiologically, it was equally marked in both knees. It is obvious that the conditions were not directly comparable in the two knees. Notwithstanding, no convincing proof was forthcoming that the excision of the cartilage had had a favourable effect on the discomfort.

Non-Operated Group.

In order to make a further comparison between the results of operation and conservative treatment, I made a personal follow-up examination of non-operated patients who had attended the Clinic during the same period as those operated on. Both operated and non-

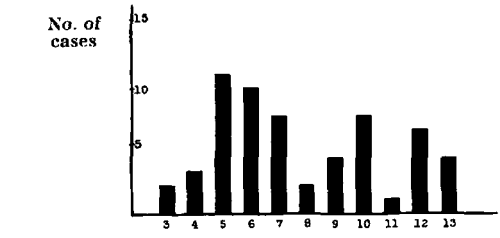


Fig. 4.

Non-operated group.

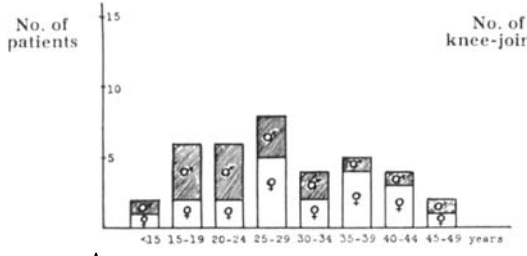


Fig. 5.

Age and sex distribution: non-operated group.

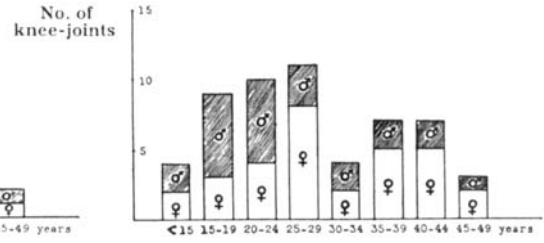


Fig. 6.

Age and sex distribution: non-operated knee-joints.

operated patients were thus all examined by the same physicians. There is therefore reason to assume that the diagnosis and the attitude towards the indications for and against operation were uniform.

The patients selected were those in whom the symptoms had been so pronounced that operation had either been suggested at once or had at any rate been discussed. The two series were thus as similar as possible and therefore suitable for comparison. I did not, however, include in this comparison the afore-mentioned patients with bilateral chondromalacia who had undergone operation on one knee. This was because their attitudes might have been influenced by the results of the operation.

The group consisted of 37 patients, 18 of whom had signs of bilateral chondromalacia; there were thus 55 knee-joints. There were

17 men and 20 women, *i.e.*, a slight preponderance of the latter as in the operated group. The observation period ranged from 3 to 13 years (Fig. 4). The age and sex distribution of the 37 patients are shown in Fig. 5 and the distribution of the 55 knee-joints in Fig. 6. The two youngest patients were 14 years old at the first examination, one of

TABLE 2
Results of Conservative Treatment.

	No. of knee-joints	Percentage
Entirely free from symptoms	18	71
Slight discomfort with no effect on way of living	21	
Marked discomfort with effect on way of living, possibly change of occupation	10	18
No improvement or exacerbation	6	11
Total	55	100

them having had symptoms as early as at 8 years of age. Three of the patients had heavy manual work, 21, other work requiring them to be on their feet, and 13, sedentary occupations. An injury was stated to have precipitated the symptoms in 10 cases.

The following statistical comparison was made between the two series:

	Operation: 69 knee-joints	No operation: 55 knee-joints	Difference
Mean age (yrs.)	32.4 ± 1.1	28.5 ± 0.4	3.9 ± 1.2 %
Men and women, respectively	40.6 and 59.4 ± 5.9 %	43.6 and 56.4 ± 6.7 %	3.0 ± 8.9 %
Mean observation period (yrs.)	7.8 ± 0.4	7.8 ± 0.4	0

There was thus a statistically significant difference only in the mean age. The difference, *i.e.*, 3.9 ± 1.2 years, was extremely small. It therefore appears justified to consider the two groups as homogeneous as far as the clinical and radiological evaluation of such a disease as chondromalacia of the patella is concerned.

Of the 55 knee-joints examined, 18 gave rise to no discomfort and 21 to slight discomfort. The results were thus good in 71 per cent of the cases in which expectant treatment was applied. Improvement was noted in 10 cases although the knee affected the way of living.

Exacerbation had occurred in 6 cases. It may be deduced from Table 2 that the results of conservative treatment were not much poorer than those of operative treatment. It must, however, be pointed out that in no case were the symptoms so severe at the follow-up examination that operation was considered.

I must however stress the fact that the two groups cannot be considered as completely homogeneous. It is thus necessary to assume that the discomfort had, as a rule, been more severe in those patients who had undergone surgical intervention. The findings nevertheless indicate that some caution is necessary with respect to the indications for operation.

RADIOLOGICAL STUDIES

In addition to the customary frontal and lateral radiograms, the radiological examination included an axial projection according to the technique described by *Knutsson*[9]. The last-mentioned projection is necessary to assess the state of the femoropatellar joint. Otherwise, as may be seen from the radiograms (Figs. 7 and 8) taken at the follow-up examination, even pronounced lesions may escape detection. Both subluxation and severe osteo-arthritic changes are revealed on the axial projection. It thus allows us to observe the shape of the patellar joint, the height of the cartilage and extent of the osteo-arthritic changes.

A subluxation position with lateral displacement—as shown in Figs. 7 and 8—was found in 8 cases; in 6 of them it was bilateral. Unfortunately, axial projections were taken in none of these cases at the first examination. It was therefore impossible to determine whether subluxation was primary or whether it was secondary to reduction of the cartilage. In recurrent dislocation of the knee-joint there is often abnormal development of the femoro-patellar joint—so-called dysplasia. In the knee-joints studied here, such dysplasia of mild degree was found only in one case with bilateral lesions. It may therefore be presumed to have no importance for the onset of chondromalacia.

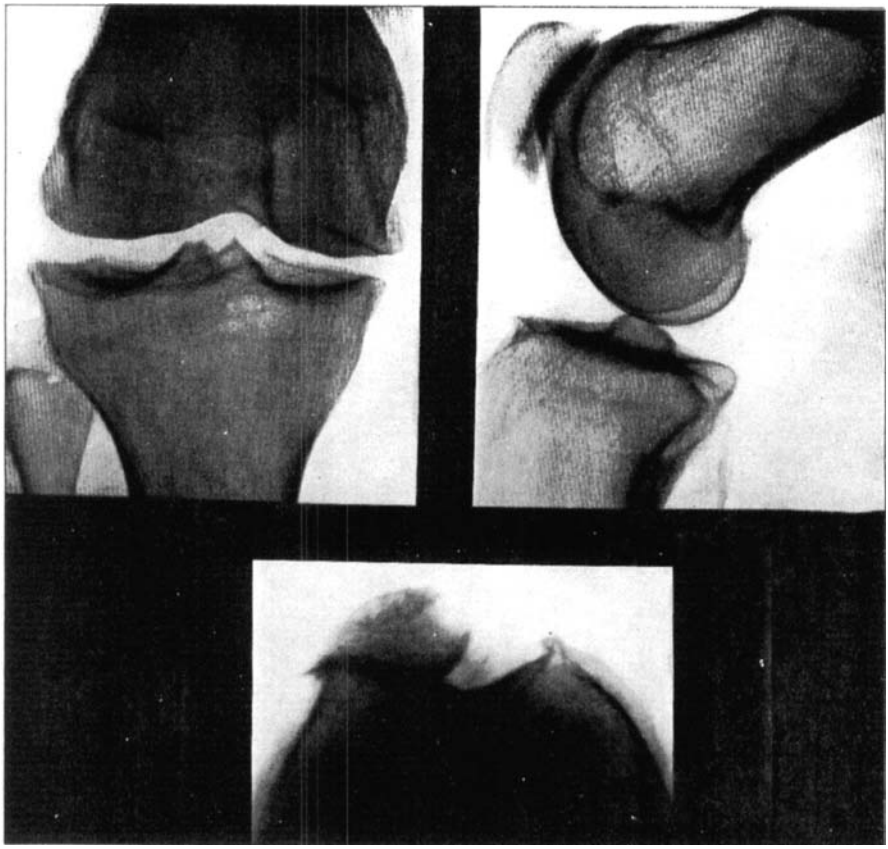
In the large majority of cases, the shape of both patellas, as seen in the axial projection, was the same. Slight asymmetry was present in 7 out of the 124 patients examined; 4 of them had bilateral chondromalacia of the patella.

In his study of the femoro-patellar joint, *Wiberg*[13] made a classification into three normally occurring groups according to the size of the lateral and medial articular surfaces. In group I the articular

Figs. 7 and 8.

Radiograms taken at the follow-up examination, demonstrating the importance of an axial projection of the femoro-patellar joint. Severe osteo-arthritic changes and subluxation of the patella can only be detected by means of this projection.

surfaces were of the same size; in group II the lateral surface was somewhat larger than the medial. Group III was characterized by the fact that the ridge between the articular surfaces was situated considerably more medially, so that the medial surface was very small and sharply sloping and incongruous in proportion to the corresponding femoral condyle. He was able to demonstrate on autopsy material that chondromalacia occurs most frequently at a site of sharp apposition between convex articular surfaces. This occurs with considerable flexion and particularly at the medial articular surface adjacent to the ridge. *Wiberg* suggested—in view of the previous forementioned observation—that persons belonging to his group III might have a predisposition to chondromalacia. His series was, however, too small to permit any definite conclusions.



I made a study of my series with reference to this problem but could find no predisposition in the patients I assigned to group III. Approximately one-half of the cases belonged to group II and one-fourth to each of the others. There was thus an inappreciable deviation from the normal distribution. The incidence of advanced cases with deep and widespread lesions was approximately the same in all the groups. This also applied to the traumatic cases; a predisposition would imply that the changes would occur to a greater extent when there had been no injury. There is thus no indication that the shape of the patella is of any causative significance for chondromalacia

Osteo-Arthritis.

It has earlier been assumed that chondrectomy inhibits the development of osteo-arthritis. As I mentioned in my survey of the literature, *Läwen* named the operation "Frühoperation der Arthritis deformans". In the present series, osteo-arthritic changes were visible

TABLE 3

Relationship of the Age to the Development of Osteo-Arthritis: Operated Group.

	No. of cases	Average age at operation	Average age at follow-up examination
No osteo-arthritis	28	27.1 ± 1.7	33.2 ± 1.5
Slight osteo-arthritis	28	33.8 ± 1.2	41.6 ± 1.1
Advanced osteo-arthritis	13	39.8 ± 1.9	49.4 ± 2.2

TABLE 4

Relationship of the Age to the Development of Osteo-Arthritis: Non-Operated Group.

	No. of cases	Average age at first examination	Average age at follow-up examination
No osteo-arthritis	33	25.1 ± 1.4	32.5 ± 1.5
Slight osteo-arthritis	14	33.2 ± 2.5	41.1 ± 2.5
Advanced osteo-arthritis	8	36.9 ± 2.6	46.2 ± 3.3

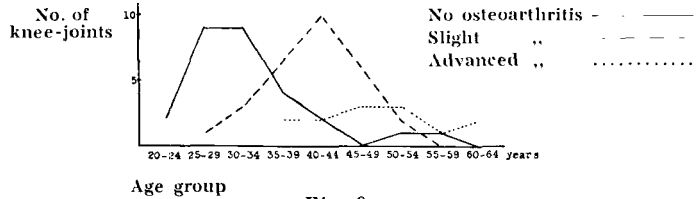


Fig. 9.

Incidence of osteo-arthritis at the follow-up examination: operated knee-joints.

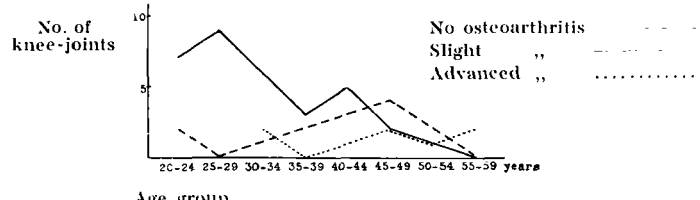


Fig. 10.

Incidence of osteo-arthritis at the follow-up examination: non-operated knee-joints.

TABLE 5

Relationship of the Observation Period and the Duration of the Symptoms to the Development of Osteo-Arthritis: Operated Group.

	No. of cases	Average observation Period (Yrs.)	Average duration of Symptoms (Yrs.)
No osteo-arthritis	28	5.8 ± 0.5	11.1 ± 0.9
Slight osteo-arthritis	28	7.0 ± 0.5	11.8 ± 0.8
Advanced osteo-arthritis	13	7.4 ± 0.6	13.2 ± 1.3

TABLE 6

Relationship of the Observation Period and the Duration of the Symptoms to the Development of Osteo-Arthritis: Non-Operated Group.

	No. of cases	Average observation period (Yrs.)	Average duration of symptoms (Yrs.)
No osteo-arthritis	33	7.3 ± 0.5	10.7 ± 0.7
Slight osteo-arthritis	14	8.3 ± 0.9	11.8 ± 1.1
Advanced osteo-arthritis	8	8.6 ± 1.0	11.3 ± 0.8

radiologically at the follow-up examination in 59.4 ± 5.9 per cent of the patients operated on and in 40.0 ± 6.6 per cent of those not operated on. The incidence was thus higher in the operated group. The difference, *i.e.*, 19.4 ± 8.8 per cent, is not significant. It nevertheless permits the conclusion that chondrectomy does not prevent the development of osteo-arthritis.

In order to ascertain the factors which affect the development of osteoarthritis, I made a statistical analysis with regard to age, length of observation, and duration of chondromalacia of the patella. The changes were classified as slight and advanced respectively. The former category comprised the cases with sharpening of the margins of the articular surfaces and small osteophytes, the latter, those with larger osteophytes and reduction of cartilage.

I did not wish to take into consideration the age at the follow-up examination only. I therefore made use of the age at the first examination as well. This was in order to ascertain whether the length of the observation period was reflected in the figures for the mean age. It may be deduced from Tables 3 and 4 and Figs. 9 and 10 that there is a marked increase in the mean age if a comparison is made between the groups a) without osteo-arthritis, b) with slight, and c) with advanced osteo-arthritis. In the case of the operated group, the difference is statistically significant. In the non-operated group, the

difference between the cases without osteo-arthritis and with slight osteo-arthritis is more than 2.5 times the standard error, *i.e.*, probable. This difference is of the same order of magnitude both with regard to the age at the first examination and that at the follow-up examination.

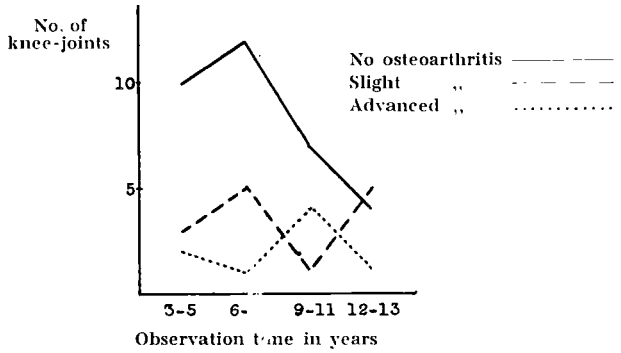


Fig. 11.

Relationship of the observation period to the development of osteo-arthritis: operated knee-joints.

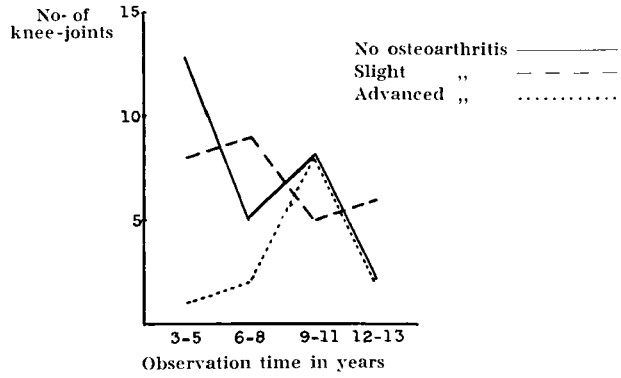


Fig. 12.

Relationship of the observation period to the development of osteo-arthritis: non-operated knee-joints.

There is thus no positive correlation with the length of the observation period. If a comparison is made between the corresponding figures for the operated and the non-operated groups, no difference is found in the mean age in the respective groups.

The length of the observation period and the duration of the dis-

ease in relation to the development of osteo-arthritis is shown in Tables 5 and 6 and Figs. 11, 12, 13 and 14. No difference is found within the operated group or the non-operated group or on a comparison between the two groups.

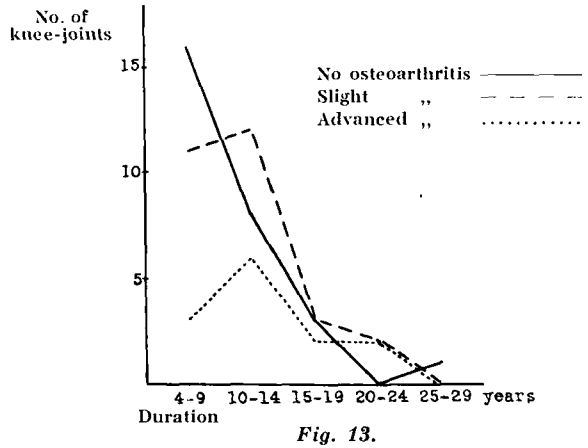


Fig. 13.

Relationship of the duration of the symptoms to the development of osteo-arthritis: operated knee-joints.

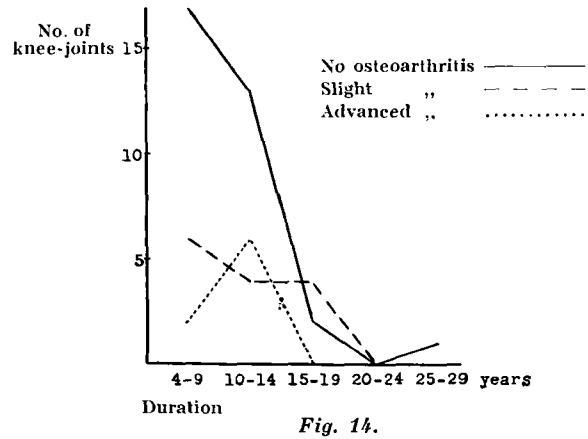


Fig. 14.

Relationship of the duration of the symptoms to the development of osteo-arthritis: non-operated knee-joints.

The following conclusions may therefore be drawn from the results of the calculations. The onset of osteo-arthritis runs parallel with ageing; it is independent of the duration of chondromalacia of the

patella and its incidence is the same whether chondrectomy or conservative therapy has been employed.

I found no relationship between the subjective symptoms and the occurrence of osteo-arthritis. This is in agreement with the observations of other workers. There were even patients who had subluxation of the patella and severe reduction of cartilage without experiencing the least discomfort (Figs. 7 and 8). A study of the cases with unilateral discomfort showed that 13 of the 45 patients operated on had osteo-arthritis in the operated knee only and the same number in the knee free of symptoms. Five out of the 19 patients with unilateral symptoms in the nonoperated group had osteo-arthritis in both knee-joints and 2 in the affected knee only.

CONCLUSIONS

It may be concluded from the present study that, in uncomplicated chondromalacia of the patella, chondrectomy gives satisfactory results and is free from risks. It may, however, be asked whether equally good results may not be obtained with conservative treatment in the majority of cases. The indications for operation in this disorder must remain strict.

Crepitations are frequently found in knee-joints entirely free from symptoms. The question also arises whether a diagnosis of chondromalacia of the patella is justified in patients with indefinite subjective troubles and crepitations. Our knowledge of the pathogenesis of joint pains is as yet incomplete; the symptoms may therefore be caused by other factors.

Conservative treatment in the form of rest and exercise of the quadriceps is often effective. The symptoms of insufficiency frequently subside with such therapy, irrespective of whether they are due to chondromalacia, more advanced osteo-arthritis or disorders of the knee-joint of uncertain origin.

Moreover, it does not suffice to rely on a history of earlier ineffective physiotherapy. Further questioning may elicit the information that this had consisted of short-wave or other irradiation but no active movements, which appear to be of great value. When the quadriceps insufficiency is inhibited, the symptoms usually subside. It is nevertheless difficult to determine which of these factors is, respectively, the cause and the effect.

Only when thorough conservative therapy has proved ineffective should an operation be considered. Presumably, the indications should

then be confined to such cases in which there are signs of a definite, localized, painful process in the patellar cartilage. Chondrectomy cannot be assumed to inhibit the future development of osteo-arthritis.

SUMMARY

A personal follow-up examination was made of 69 knee-joints (61 patients) on which chondrectomy had been performed for chondromalacia of the patella. The observation period ranged from 3-13 years.

There were no post-operative complications and the results were found to be satisfactory in 77 per cent of the cases. The results were almost equally favourable in a group of patients treated conservatively.

A statistical analysis of the radiological findings shows that the incidence of osteo-arthritis increases with ageing, is independent of the duration of the symptoms, and is the same following either chondrectomy or conservative treatment.

The writer therefore concludes that the indications for operation in chondromalacia of the patella should remain strict. In his opinion, operation should be confined to cases in which there are signs of a definite painful process on the articular surfaces of the patella. Moreover, thorough conservative treatment and restriction of activities should be tried first.

RESUME

Un réexamen de 69 articulations du genou (61 malades) chez lesquels avait été pratiquée une chondrectomie pour chondromalacie de la rotule a été effectué par l'auteur. La période d'observation s'est étendue sur 3 à 13 ans.

Il n'y a pas eu de complication post-opératoire et les résultats constatés ont été satisfaisants dans 77 % des cas. Les résultats ont été à peu près favorables dans le groupes des malades soumis à un traitement conservateur.

Une analyse statistique des trouvailles radiographiques montre que l'incidence de l'ostéo-arthrite augmente avec l'âge, mais qu'elle est indépendante de la durée des symptômes et qu'elle est identique pour les cas chez lesquels on a pratiqué la chondrectomie et ceux soumis au traitement conservateur. C'est pourquoi l'auteur en conclut qu'il convient de maintenir strictement l'indication de l'opération dans les chondromalacies de la rotule. D'après lui, l'opération doit être réservée aux cas montrant des signes de processus douloureux définis

des surfaces articulaires de la rotule. Néanmoins, il convient tout d'abord essayer un traitement conservateur et une restriction de l'activité du malade. .....

ZUSAMMENFASSUNG

Eine persönliche Nachuntersuchung von 69 Kniegelenken (61 Patienten) an denen eine Chondrektomie wegen Chondromalacia patella ausgeführt worden war, wurde vorgenommen. Die Beobachtungszeit war 3-13 Jahre.

Es gab keine postoperativen Komplikationen und die Ergebnisse wurden in 77 % der Fälle als zufriedenstellend angesehen. Die Resultate waren beinahe ebenso günstig in einer Gruppe von Patienten, die konservativ behandelt wurden.

Eine statistische Analyse der röntgenologischen Befunde zeigt, dass das Auftreten von Osteoarthritis mit zunehmenden Alter wächst, dass es jedoch unabhängig von der Dauer der Symptome ist, und ebenso oft nach Chondrektomie wie nach konservativer Behandlung auftritt.

Der Autor ist deshalb der Auffassung, dass die Indikation zur Operation bei der Chondromalazie der Patella eine strenge sein sollte. Nach seiner Meinung sollte die Operation nur in Fällen ausgeführt werden, in denen sichere Zeichen eines schmerzvollen Prozesses an den Gelenksflächen der Patella vorhanden sind. Vor allem sollte zuerst eine gründliche konservative Behandlung und Einschränkung des Gebrauches der Extremität versucht werden.

REFERENCES

1. *Aleman, O.:* Chondromalacia posttraumatica patellae. Acta Chir. Scand. 1928: 63:149.
2. *Bronitsky, J.:* Chondromalacia patellae. J .Bone and Joint Surg. 1947:29:931.
3. *Büdinger, K.:* Über Ablösung von Gelenkteilen und verwandte Prozesse. D. Zschr. f. Chir. 1906:84:311.
4. *Erb, K. H.:* Spätresultate der Knorpelresektion bei fissuraler Degeneration des Kniescheibenknorpels. D. Zschr. f. Chir. 1933:239:332.
5. *Hirsch, C.:* A contribution to the pathogenesis of chondromalacia of the patella. Acta Chir. Scand. 1944:90: suppl. 83.
6. *Hultén, O. & Gellerstedt, N.:* Über Abnutzungsprodukte in Gelenken und ihre Resorption unter dem Bilde einer Synovitis detritica. Acta Chir. Scand. 1941:84:1.
7. *Kallio, K. E.:* Chondromalacia patellae. Annales Chir. et Gyn. Fenninae. 1947: 36:173.

8. *Karlson, S.:* Chondromalacia patellae. Acta Chir. Scand. 1940:83:347.
9. *Knutsson, F.:* Über die Röntgenologie des Femoropatellar-gelenks sowie eine gute Projektion für das Kniegelenk. Acta Radiologica 1941:22:371.
10. *Läwen, A.:* Knorpelresektion bei fissuraler Knorpeldegeneration der Patella — eine Frühoperation der Arthritis deformans. Brun's Beitr. z. klin. Chir. 1925:134:265.
11. *Silfverskiöld, N.:* Chondromalacia of the patella. Acta Chir. Scand. 1938:9:214.
12. *Sutro, C. J.:* Fissures of the articular cartilage of the patella. Surgery 1946: 19:251.
13. *Wiberg, G.:* Roentgenographic and anatomic studies on the femoropatellar joint. Acta Orth. Scand. 1941:12:319.
14. *Övre, A.:* Chondromalacia patellae. Oslo 1936.