

THE TREATMENT
OF CHRONIC EXUDATIVE GONITIS
BY TOTAL SYNOVECTOMY

By

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Chronic or recurrent effusion in the knee joint is a comparatively rare disease. Various etiologic factors in these disabling affections are recognized. Subsequent to trauma we sometimes find that a hydropic condition develops. After bed rest or a period of immobilization in plaster the effusion disappears rapidly but appears when the patient begins to walk again. An extremely troublesome and protracted affection may develop in this manner. Atrophy of the quadriceps muscle will very soon occur and gradually decalcification and arthritic changes of the knee joint appear.

In the absence of trauma too a clinically similar condition may arise. In these cases also the exudate sometimes disappears after aspiration and immobilization, but soon recurs when the patient starts to walk. In many cases of this type, in which it is possible to inspect the joint at operation, pronounced chondromalacic destruction may be found in addition to changes in the synovial membrane.

Inflammatory processes in the joint and surrounding areas can also give rise to chronic synovial effusions. In the material presented in this paper, one case of tuberculous synovitis and two cases of polyarthritis are included.

Finally, there are also allergic processes that may give rise to recurrent synovial exudates of the knee joints. I have had the opportunity of observing two such cases.

The synovial exudate which is to be interpreted as a reaction to the lesions or the disease affecting the joint is the major symptom. The patient also complains of pain and tension when walking. Large exudates cause defects in the power of extension.

The conservative therapy in these conditions consists of punctures and rest, possibly also fixation in plaster. As the results in certain

cases have not been so satisfactory attempts have been made to remove surgically the synovial membrane, which in these cases always shows changes that must be considered the source of the effusions in the joint.

Our knowledge of the physiology and the pathology of the synovial membrane is extremely limited in spite of extensive investigations (J. A. Key, Eifskind, Magnus, Kuhns, Mayeda et al.).

On studying these investigations, it is striking that the absorption conditions of the joints are carefully noted, while the factors regulating the production of synovial fluid are not given much attention.

The exudate may be due to a primary disease in the synovialis, as in tuberculosis. The membrane can also show a secondary reaction with exudate or with histological changes due to some other intra-articular lesion present at the same time. It has been shown by Hultén and Gellerstedt that when disintegration of intra-articular cartilage takes place the synovial membrane responds with hyperemia and histological changes. Similar investigations were later carried out by Horwitz in neuropathic diseases of the joints. In lesions of the meniscus too according to the investigations of Soeur, clear reactions of the synovial membrane may be observed. *An excision of this membrane would thus under certain circumstances be a logical operation even though it would not be directed immediately towards the primary cause of disease.*

The first synovectomy seems to have been performed by Volkmann in 1877 in a case of tuberculous synovitis of the knee joint. The operation, however, seems to have been abandoned, owing to poor results in tuberculosis cases. Not until 1923 is it again reported in medical literature. Swett then published 15 cases. From this time on, there is a fairly extensive literature. The operation has been used in etiologically very different situations. Jones, Speed and Swett have performed the operation in cases of "Chronic infectional arthritis", Låwen, Mandl and Payr have used it in chronic "hypertrophic conditions" and in benign tumors. R. Magnussen, Pardee, Heyman and others, have inter alia treated cases of chronic exudative gonitis. Hirsch in 1947 published 2 cases of chondromalacia patellae treated with synovectomy. In my personal experience synovectomy but rarely brings good results, at least not lasting good results, in chronic hypertrophic affections of the joints, for instance, in those cases where hypertrophies of the capsule and the synovial membrane, osteophytes, and degenerative processes of the cartilage are the dominating factors. On the other hand, where a chronic or recurrent joint effusion has been the major symptom I have obtained good results in most of the cases.

One should obviously endeavour to exclude the presence of a monarticular polyarthritic affection. Inge, Boon-Itt, and others, report approximately 50% cures in this disease. But, in view of the tendency towards spontaneous healing, the figures can not be considered satisfactory.

M A T E R I A L

My personal series comprises 22 operated joints in 21 patients in ages 11 to 61 years, 9 men and 12 women: 19 of these were re-examined 6 months to 8 years after the operation. In one of these cases, tubercles were discovered upon histological examination of the operative specimen, although a previous biopsy had given negative findings. In another case subsequent development revealed the presence of chronic polyarthritis. In 5 cases there was a history of trauma but only in Case 1 did this seem to be of significance for the disease. In the remaining cases the exudative process developed without extrinsic causes. Conservative treatment with plaster bandages, punctures, heat or roentgen treatment was first tried in all of the cases. Operative treatment was not advised until it was shown that the above-mentioned measures were inefficacious. All of the operations were carried out by the writer.

Operative technique.

The synovial membrane may without difficulty be removed in one piece from a parapatellar incision. In my earlier cases the incision was made on the medial side. In the recent cases I have placed the incision on the lateral side on the suggestion of Ragnar Magnusson. Contact with the vastus muscle is avoided by this. In the early cases I made a smaller incision on the opposite side, in addition to a long parapatellar incision. This however, is unnecessary. In cases with superficial cartilage erosions on the back of the patella, the changed cartilage has been peeled off. In cases with deep circumscribed crateriform ulcerations of the cartilage, these have not been treated locally.

Post-operative treatment.

An extremely important stage of the treatment is muscle-strengthening exercise after the operation. The musculature of the anterior aspect of the thigh is always rather atrophic prior to the intervention and the atrophy increases post-operatively. In order to counteract this atrophy, so deleterious to the function of the joint, physical exercises

should be instituted a few days after operation. At first the Patient is to perform active movements with the aid of the physiotherapist. As soon as possible the patient is placed in a specially designed chair where he is instructed to exercise the extensor musculature of the leg against resistance. The chair is elevated so that the patient can be seated with freely hanging lower legs. From the heel a cord runs backward over a pulley. A weight can be attached to the free end of the cord; when the lower leg is extended, the weight is raised. The exercises are to be pursued each time until the patient feels marked fatigue of the musculature of the leg, after which he is to rest for quite a while, the exercise then being repeated. The weight should at first be 500 grams and be gradually increased to 3 or 4 kg. In a relatively short time an efficient physiotherapist may obtain excellent results as regards the recovery of the extensor musculature of the thigh by this method. If defects of extension, which sometimes may appear post-operatively, are present the physiotherapist, after the patient himself has extended his knee joints to his utmost ability, must stretch the flexor musculature passively. The exercise in the chair affords appreciably better and speedier results than do extensor exercises exclusively with the weighted foot. Massage and passive movements are not effective.

RESULTS AND DISCUSSION

The period of observation is in many cases rather short, but one can, however, obtain a fairly significant impression of the results afforded by the operation. In general these must be considered extremely good, inasmuch as 16 out of the 21 cases operated upon have given favorable results. (The results of the 3 latest cases cannot be assessed as yet). It is noteworthy that the joint function and ability to walk proved good in most cases, although on subsequent examination crepitations were noted in nearly all of the cases upon passive movement of the joints. A certain degree of atrophy of the quadriceps has consistently been found on re-examination. The operation can hardly be considered especially extensive, nor is a prolonged period in hospital necessary. Since it is of fundamental importance, as mentioned before, that the muscles be exercised post-operatively, the period of after-treatment will sometimes be rather protracted. The longest period of after-treatment in this series was 3½ months. It is of great importance that the physician personally supervises the physical therapy through frequent examination.

A number of observations are of interest. Case 4 had had knee-

symptoms pre-operatively for 3 years with frequently recurring effusions. Biopsy from the synovial membrane did not show specific changes, nor did guinea-pig tests from the exudate give significant findings. Histological examination of the operative specimen revealed typical tubercles, however. During the four years following the operation the patient has had no further trouble from his knee joint. There was probably a mild tuberculosis present. R. Magnusson reports a similar case in his casuistics. Case 3 had also been operated upon but the diagnosis was erroneous. For 3 years he had repeated effusions in his right knee joint. Later on he felt discomfort in his left knee joint and in the shoulder and elbow joints. A typical chronic polyarthritis developed, causing total disablement of the patient. At the follow-up examination, 4 years later, the surgically treated knee joint showed a rather better function than did the other. No harm was thus inflicted upon the patient by the operation carried out upon erroneous indications. There is in the above-mentioned work of Magnusson an analogous case.

Both knee joints were affected in a 45-year-old woman (Case 6). The left knee joint was free from symptoms after operation but recurrence took place in the right knee after a few months. Re-operation did not give an entirely satisfactory result. On subsequent examination, 1 year after the last operation, the joint was swollen and not completely free from pain. A 43-year-old woman (Case 5) had no exudate after operation but she had severe pain and pronounced crepitations on walking. After extirpation of the patella she had complete freedom from symptoms.

The youngest patient operated on was an 11-year-old girl (Case 2) whose attendance at school was disturbed by recurrent effusions. Conservative treatment for 2 years gave no results. She became completely free from discomfort following the operation.

In all instances the extirpated synovial membrane was histologically examined. With the exception of the cases mentioned above, subacute or chronic changes were established in all of the cases. In 2 of the cases small bits of hyaline cartilage were found in the synovial membrane, an interesting feature, having regard to the investigations of Hultén-Gellerstedt mentioned above.

At the follow-up examination the roentgenograms all showed signs of chronic arthritis. There is thus reason to assume that patients who at present are free from symptoms, will gradually develop a certain amount of knee trouble at advanced ages. It seems to be clearly evident, however, that the patients have benefited by the operation, which has generally relieved them of their most troublesome symptoms.

CASE REPORTS

1. Record No. 1565/47. T. S. 46 years. Turner.

Six months previous to admission he had severe trauma while driving,—had swelling since that time. Has been treated with knee plaster and punctures. Hydrops in left knee. Considerable atrophy of quadriceps muscle.

Op. Total synovectomy from 2 incisions. Synovial membrane markedly thickened. No bone or cartilage changes. Re-examined 2 years after operation. Full power of movement, subjectively free from symptoms. Slight crepitations. Rather pronounced quadriceps atrophy.

2. Record No. 1304/48. M. L. 11 years.

Has for 2 years had recurrent effusions in right knee joint. She has during this period been treated with repeated plaster bandages and punctures without lasting improvement. After long deliberation, operation was decided upon, as the patient was markedly disabled, and her attendance at school disturbed.

Op. Synovectomy. An extremely thick synovial membrane was found. P.A.D. showed extremely pronounced round cell infiltrations.

Follow-up examination 2 years post-operatively: the patient is free from discomfort.

3. Record No. 487/46. K. F. 47 years. Factory workman.

Three years prior to admission, trauma of right knee joint. From that time on periodic effusions and a feeling of stiffness in right knee joint.

Op. Synovectomy. Synovial membrane markedly thickened. P.A.D. showed profuse round cell infiltrations in synovial membrane. Follow-up examination, 4 years post-operatively. Markedly disabled by chronic polyarthritis. The operated knee joint can be totally extended and flexed about 35°. The left knee joint has full extension and flexion about 20°.

4. Record No. 826/45. B. B. 33 years. Housewife.

Trauma of left knee 3 years previously. Since then, discomfort from knee joint with swelling and pain. Biopsy from capsule. Histological examination shows chronic inflammation. Guinea pig tests of exudate were negative. Negative findings on culture also. As the patient did not show improvement after protracted conservative treatment with plaster bandages operation was carried out.

Op. Synovectomy. Synovial membrane is reddened and thickened. No changes of the meniscus or the posterior surface of the patella. The histological diagnosis of the synovial membrane shows pronounced inflammatory changes with thickening of the endothelium and marked round cell infiltrations. A couple of tubercles were also observed. (Fåhræus).

Follow-up examination 4 years post-operatively. Completely well. Full extension. Full flexion. Walks without discomfort.

5. Record No. 1747/48. S. L. 43 years. Housewife.

Has for 3 years had discomfort in right knee joint in the form of swelling, at times locking symptoms. Treatment with rest and plaster bandages without effect.

Op. Synovectomy. Fairly large exudate in joint. Synovial membrane thickened and swollen. Medial to the patella there is found a corpus liberum, half the size of a Lima bean, capsulated in the synovial membrane.

Post-operatively, no exudate in the joint but still pain on walking. Marked crepitations and tenderness over patellar borders.

Re-operation 6 months later. Exstirpation of the patella. Very extensive destruction of cartilage on posterior aspect of the patella.

18 months after operation the patient is free from symptoms. Full extension and full flexion in joint.

6. Record No. 2197/48. A. G. 51 years. Housewife.

Knee symptoms of many years standing. Has for about 8 months had recurrent effusions in right knee joint. Treated with plaster bandages and quadriceps exercise without effect.

Op. Synovectomy. Light cartilage erosions on posterior aspect of the patella. Marked thickening of the synovial membrane.

Follow-up examination 1 year later. Complete freedom of movement in joint. Slight crepitations. Subjectively free from discomfort.

S U M M A R Y

In the opinion of the writer synovectomy is not an adequate procedure in changes of the knee joints distinguished by hypertrophy of the capsules, osteophytes and destruction of the cartilage without fluid exudates. One may, however, expect good results in exudative gonitis where the chronic or recurrent effusion predominates. It is emphasised that exercise of the quadriceps muscle post-operatively is of fundamental importance to the final result.

R E S U M E

L'auteur est d'avis que la synovectomie n'est pas l'intervention appropriée dans les modifications de l'articulation du genou qui se caractérisent par une hypertrophie de la capsule, des ostéophytes et une destruction des tissus cartilagineux sans épanchement d'exsudat. On peut sans doute s'attendre à obtenir de bons résultats à la suite de cette intervention dans les cas où c'est l'épanchement chronique ou récidivant d'exsudat qui domine le tableau de la maladie. Il est souligné qu'il est de la plus haute importance de procéder à l'entraînement gymnastique régulier du quadriceps après l'opération.

Z U S A M M E N F A S S U N G

Es ist die Auffassung des Verfassers, dass die Synovektomie bei Veränderungen im Kniegelenk, die durch Kapselhypertrophie, Osteophyten und Beschädigung des Gelenksknorpels ohne flüssiges Exsudat

karakterisiert sind, kein adäquater Eingriff ist. Hingegen kann man gute Resultate in jenen Fällen erwarten, in denen chronische oder recidivierende flüssige Exsudate das Krankheitsbild beherrschen. Es wird auf das stärkste hervorgehoben, dass eine konsequent durchgeführte Quadricepsgymnastik nach der Operation die grösste Bedeutung hat.

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