FROM THE INSTITUTE OF PATHOLOGY, UPPSALA.
CHIEF: PROF. NILS GELLERSTEDT

CAN DEGENERATION OF THE PATELLAR CARTILAGE, WHICH IS SUFFICIENT TO BE DIAGNOSED CLINICALLY, OCCUR AS A TEMPORARY DISTURBANCE OF FUNCTION?

BY

H. HINRICSSON

3 different stages in degeneration of the patellar cartillage, representing 3 different phases of its development, are recognised. Thus Aleman, who has recently completed a number of years' work on the subject, describes a first stage, the latent stage, in which the patellar cartilage shows varying degrees of softening with some abnormal staining; a second stage, the manifest stage, with more advanced softening and the appearance of fissures in the cartilage; and, finally, a third stage, in which the fissure formation is so advanced that free flakes of cartilage have formed and the degenerative process reaches or crosses the epiosseal layer and the bone is eroded. In this third stage there occur reparative processes in the form of pannus formation growing in towards the foci of degeneration. There is no specific pathological picture in degeneration of the patellar cartilage, apart from intracellular degeneration of the fibrils, which is, as Reuterwall expresses it, "that which usually occurs with cartilage degeneration", and it is obvious that this degeneration may have various causes.

From the mechanical point of view softening of the cartilage implies a reduction of its elacticity and resistance and an increase of friction on movement; and from the biochemical

Read at the meeting of the *Nordisk Ortopedisk Forening*, June 1947, Stockholm.

point of view, there is an increase in the water content, which normally forms 50 % of the cartilage, and a change in other biochemical conditions (Hirsch, Sylven, etc.).

It is known that the water content of the cartilage, which swells in these cases, also increases with hyperactivity (Ingelmark) and the author has been able to produce crepitations in these cases by first injecting physiological saline into the cartilage from post mortem material and later moving the layers of cartilage against one another. This suggests that in some cases, especially in young subjects, who already have excessive use of the joint, one should be able to demonstrate these otherwise pathognomic signs of, especially, the manifest stage of degeneration of the patellar cartilage, and at the same time, confirm them by positive functional tests, such as the wellknown weight-bearing tests, on the joint.

Thus, theoretically, there may be a clinical condition which appears as a degeneration of the patella, but in which the changes have not passed the limit within which they can be reversed by immobilisation, so that the symptoms and signs completely disappear. In other words the temporary compensatory functional hypertrophy of the cartilage which occurs with temporarily increased fluid content and consequent reduction of resistance to wear and tear should be held responsible for the subpatellar crepitations, which will disappear with a change in the cartilage's function.

It has been stated (*Øwre*, etc.) that subpatellar crepitations may sometimes be detected in a case in which a later arthrotomy failed to show any definite evidence of cartilage degeneration; this may possibly be evxplained now. Aleman was able to demonstrate cartilage degeneration in about 33 % of 220 anterior knee arthrotomies performed over a period of 20 years, which suggests that the condition is very common.

However, degeneration of the patellar cartilage is usually rather easy to diagnose without performing an arthrotomy, and 6 cases will be described here, in whom the condition was regarded as clinically certain, but both symptoms and signs completely disappeared with rest.

The first case was a 10-year-old schoolgirl, who as a result of excessive ski-ing developed dyspnoea and a systolic murmur as well as symptoms from both knees which had originally been sound. There were fine, soft crepitations under both patellae and positive signs with tests of function; there was no definite effusion. After a month's relative rest the crepitations disappeared, and during the 3 years she remained under the author's supervision, neither they nor any other signs of the original condition re-appeared.

The second case was a 12-year-old schoolgirl with a history exactly like that of the first case.

The third case was a 27-year-old officer in the infantry with degeneration of the patellar cartilage and a recurrent effusion, diagnosed by the Kongeliga Akademiska Sjukhus in Uppsala and by Dr. Palmer, as well as by the author. The symptoms increased steadily for 9 months, and finally the patient could not carry out his duties. Repeated radiographic examination at the K.A.S. was negative and a clear greenish-yellow fluid obtained from the joint by puncture was negative for tubercle. After the patient had been off duty for 6 months, during which time he walked as little as possible and had, as he had had earlier, short-wave therapy, the symptoms gradually diminished and even the crepitations also disappeared. For 18 months he performed full service, with a certain amount of care, in the infantry, and now for 6 months has been in civilian employment.

The fourth case was a 21-year-old conscript with typical symptoms of cartilage degeneration in both knees. Radiography in the K.A.S. in Uppsala was negative. With rest the crepitations disappeared in 15 days. He was able to continue his military service but was later discharged on psychiatric grounds.

The fifth case was also a 21-year-old conscript who had the same symptoms as the previous case, in the L. knee after marching 12 kilometres. After 5 weeks relative rest all signs of degeneration of the patellar cartilage disappeared.

The sixth case was also a 21-year-old conscript who had signs of an ordinary chronic synovitis in the L. knee with crepitations which were not subpatellar.

The condition was exacerbated after a 12-kilometre march and now there were additional crepitations under the patella on acute flexion of the knee. After 5 days relative rest and heat treatment the crepitations disappeared; radiography at the K.A.S. in Uppsala was negative, and a few days later the patient returned to full military duties. Three days later, however, the crepitations recurred under the patellar apex and he was given light duties for a few days. After a week the crepitations had again disappeared but again they recurred after a further few lays of full duties, and were now present below even the R. patella. After

8 days relative rest and heat treatment the crepitations disappeared again: his duties were changed and he has had no further trouble.

SUMMARY

Observations which have been made on the normal and pathological physiology of cartilage are referred to as well as reports of the discrepancy between the clinical diagnosis of degeneration of the patellar cartilage and the negative arthrotomy findings. Experimental investigations into the part played by increased fluid content as a factor in the production of crepitations as the cartilage surfaces slide over one another are discussed, and finally the results of 6 cases of degeneration of the patellar cartilage, in which the condition disappeared after relative immobilisation are described. All these observations suggest that clinical degeneration of the patellar cartilage represents a temporary disturbance of function. This should be of considerable importance from the point of view of medical insurance.

It is pointed out from actual cases that in young persons subpatellar crepitations cannot be considered sufficient justification for the diagnosis of a manifest degeneration of the patellar cartilage.

RESUME

Il est rendu compte aussi bien des observations qui ont été faites sur la physiologie normale et pathologique du cartilage que sur la divergence existant entre le diagnostic clinique de la dégénération du cartilage patellaire et les trouvailles arthrotomiques négatives. Des recherches expérimentales faites sur le rôle joué par une augmentation de la teneur en liquide comme le facteur causateur de crépitations, les surfaces du cartilage frottant l'une sur l'autre, sont discutées. Enfin, il est donné la description de 6 cas de dégénération du cartilage patellaire dans lesquels ce phénomène disparaît après immobilisation relative. Toutes ces observations font supposer

que la dégénération clinique du cartilage patellaire est un trouble fonctionnel temporaire. Ce fait présenterait une importance considérable au point de vue des assurances médicales.

Sur la base des cas examinés, il a été constaté que les crépitations sub-patellaires ne peuvent pas justifier chez les personnes jeunes le diagnostic d'une dégénération manifeste du cartilage patellaire.

ZUSAMMENFASSUNG

Es werden Beobachtungen mitgeteilt über die normale und pathologische Physiologie des Knorpels, sowie über die Diskrepanz zwischen der klinischen Diagnose einer Degeneration des Patellarknorpels und dem negativen Arthrotomiebefunde. Es folgt eine Erörterung experimenteller Untersuchungen über den Anteil, den ein erhöhter Flüssigkeitsgehalt bei der Verursachung von Krepitationen spielt, wenn die Oberflächen des Knorpels sich aneinander reiben, und schliesslich werden die Ergebnisse von 6 Fällen von Degeneration des Patellarknorpels beschrieben, bei denen der Zustand nach relativer Immobilisierung verschwand. Alle diese Beobachtungen machen es wahrscheinlich, dass die klinische Degeneration des Patellarknorpels eine vorübergehende Funktionsstörung darstellt. Dies dürfte vom Gesichtspunkte der Krankenversicherung aus von wesentlicher Bedeutung sein.

Auf Grund von Fällen aus der Praxis wird nachgewiesen, dass subpatellare Krepitationen bei Jugendlichen nicht als hinreichende Grundlage für die Diagnose einer manifesten Degeneration des Patellarknorpels angesehen werden können.

REFERENCES

Aleman, O.: Chondromalacia posttraumatica patellae. Nord. Kir. Förenings förh. 1927. p. 1-37.

Hinricsson, H.: Studies on Patellar Chondromalacia. Acta orthop. scand. 1939. Vol. X. Fasc. 3-4. p. 312—322.

Hirsch, C.: The Pathogenesis of Chondromalacia of the Patella. Acta chir. scand., suppl. 83, 1944.

Silfverskiöld, N.: Om frekvensen av chondromalacia patellae. Nord. kir. förenings förh. 1933. p. 1-8.

Wiberg, G.: Significance of the Contact of the Articular Surface to the Development of Chondromalacia Patellae. Acta orthop. scand. 1943. Vol. IVX.