SVEN JOHANSSON, GOTHENBURG:

AFTER-EXAMINATION OF COLLUM FRACTURES OF THE FEMUR OPERATED ON BY EXTRA-ARTICULAR OSTEOSYNTHESIS

The author has after-examined, after periods varying from seven to sixteen months, nine cases of medial collum fracture operated on by extra-articular osteosynthesis. In seven of them he found indubitable osseous healing; in one, partial osseous healing; while in one case there was still no osseous healing after seven months, probably owing to a technical error. The author believes himself justified in recommending extra-articular osteosynthesis, by the method described by him, as the normal procedure in cases of medial collum fracture.

The author has treated 3 cases of intertrochanteric collum fracture by extra-articular osteosynthesis according to the same method as previously devised by him for the treatment of medial fractures of the neck of the femur. The patients were able to leave the hospital after an average of fifty-four days, with their walking capacity restored practically to normal condition.

The author describes a case of pseudarthrosis of the neck of the femur, and its treatment, with good result, by extra-articular osteosynthesis fourteen months after the trauma had been sustained. He suggests that the method should be tried, at least in the cases where the patient is still relatively young, and the pseudarthrosis of fairly recent origin.

DISCUSSION:

Gunnar Nyström, Upsala:

After the demonstration which *Sven Johansson* has given us of the fine results he has obtained with spiking in so many cases

of collum fracture, it may seem presumptuous of me to come forward to speak about some of my own experiences with that method, which are based on only eight cases. But there is evidently a great deal to be learned yet about the subject, specially as regards its technical side; and contributions from several sides may help in the effort to bring the method to such perfection as will make it increasingly sure and effective.

It must be admitted that when one first tries the method, one finds it technically more difficult than expected, and specially that it taxes one's patience not a little, on account of the time required for the roentgen controls, with the development of the pictures. One will be wise to reckon with from two to three hours for the operation. It then becomes a question of sufficiently lasting anesthesia. According to our experience this is best obtained by lumbar puncture with pantocaïne, which produces perfect anesthesia for three hours. The difficulty lies both in getting the fragments to lie in the exact position and in the correct placing of the rod that is to guide the spike when the latter is driven in. According to our experience, the first of these difficulties is the greatest one. It may happen, for instance, that the caput gets caught on some point of the collum and rotates with the latter when it is displaced, so that the two parts of the bone come to lie at an angle to one another; or the fracture may have resulted in the ends of the fragments becoming compressed in various ways which require departures from the usual setting in a position of abduction *cum* flexion *cum* inward rotation, in order to secure the best adaptation. This makes it impossible to make any fixed rules for the position of the leg; in some cases, for instance, a certain degree of inward rotation, or the normal position, or even outward rotation, may give the best setting. For the same reasons it is not always best, either, that the spike is inserted along the horisontal plane.

A rather difficult thing is the proper adjustment of the guiding rod. In order to be independent of the position of the collum when the optimum reduction has been attained, we have constructed an apparatus of which an adjustable, awl-shaped point is placed against the caput immediately below the margin of the

acetabulum, exactly over the place where the femoral artery and the inguinal ligament cross each other, at which point the awl is pressed down through the soft tissues; while a tubular mouthpiece is placed, through an incision made, against the point below the trochanter where it has been decided to insert the spike. Through this mouthpiece, the guiding rod is then introduced and directed. The awl and the mouthpiece are adjusted, in relation to one another, in such a manner that the rod will aim at a point about 2 centimeters back of the one where the awl rests against the caput. The rod will then be aiming more or less exactly at the centre of the latter. We feel, however, that this device has not yet been tried out sufficiently; and in our last cases we have therefore used a simpler method. After the lumbar anesthesia has been administered, with the patient still in bed, lying on her well side, she is transferred to a Waldenstrom's extension table fitted with a knee rest, and on which a stool with a cassette opening has been substituted for the lower part of the table top on which she lies. The fracture is then reduced in the best possible manner »by feel«, with control by means of a measuring tape. Next, an incision is made above the base of the trochanter, and a nail, about 12 centimeters long, of the same caliber as Johansson's guiding rod for Smith-Petersen's spike, is driven in through the cortex (in which a small hole may have been pierced beforehand), by means of an ordinary hammer, in what we have calculated to be the correct direction. As guiding point we use here a Michel's agraffe fastened in the skin above the point where the femoral artery and the inguinal ligament cross each other; which point we know corresponds more or less exactly to the line between the inner and the two outer thirds of the head of the femur. When this is done, we roentgenograph, for control, in sagittal and frontal projection, and, if necessary, correct the reduction; using the pictures for a guide and measuring, in both planes, the error of the angle at which the nail may have been inserted. If it is found necessary, as will oftenest be the case, to alter the position of the nail, a second one is driven in close to the first, with observation, by eye measure, of the required correction. In this way one will

often succeed at once in getting the nail to lie in the central axis of the collum. As long as one wishes to preserve the possibility of making still further reduction at the point of fracture, this »preliminary nail« must not be driven in farther than to the beginning of the latter. In one case, in which it had been driven in too far, it broke under a following manœvre of this kind, and the long fragment which had penetrated into the anterior part of the caput had to be removed during a following séance. (By inserting the preliminary nail already before the first roentgen control is made, one will be able to correct both the reduction of the fracture and the position of the nail itself already after the first pictures, and may thus perhaps save the taking of one set of roentgenograms). When now, at last, the best possible reduction, and a good position of the nail, have been obtained, the latter is driven for a distance into the caput, and will then serve as guiding rod for the introduction of Smith-Petersen's spike.

The length which Smith-Petersen's spike must have is calculated on the nail already inserted. As we know the total length of this nail, all that is necessary is to measure the length of that part of it which protrudes outside the bone. This gives us the exact measure of the part of it which is embedded in the latter (s^1). In the roentgenogram, the length of this part is s^2. We now measure on the roentgenogram the distance (r) from the point where the nail enters the bone to the point of the cortex toward which it is directed, and we then get the length of Smith-Petersen's spike (x) by the simple equation $x:r = s^1:s^2$.

The spike must not be too short. It must be chosen and inserted in such a manner that on the one side its head will rest against the compact tissue of the diaphysis, while, on the other side, its point engages the inner side of the compacta of the caput. It must be remembered that the spongious interior of the latter is very fragile, and does not offer sufficient hold for the spike, but will break if any weight is brought to bear on it.

With regard to the time that should elapse before any weight is allowed to bear on the bone, it is undoubtedly best not to be too schematic, but to be guided by the circumstances in each

individual case. If the fracture is fairly horisontal, the attempt may be made very soon, perhaps already after a few days; if it is more vertical, one must use greater care. If the spike does not rest firmly against the compact layer of the caput it may, as I said before, be pressed down through the spongiosa, if a weight is brought to bear on it too early, and the result will be a displacement at the point of fracture. This has happened for us in some instances; in two cases with the result that the spike became bent a little. In general, it is probably best not to let the patient get up too soon, but to be content, for some weeks, with what is in itself an immense gain,—that she can lie freely and without any sort of restraint in her bed, can change into various positions, and can make active movements. In certain cases, early attempts to let the weight bear on the repaired joint may be included in the after-treatment, as part of the endeavor to reduce the fracture; for instance in cases of a more or less transverse fracture where there still, after the spiking, is some diastasis between the fragments. The time for letting the patient get up and begin to use her leg had thus probably best be made to depend on the direction of the fracture, the exactness of the reposition, the position of the spike, the greater or lesser fragility of the bone (the substance of which is always more atrophic and brittle in people either very old or who have been in bed a long time before the operation is performed), etc.

None of our eight cases ended fatally, and in none of them did any serious complications set in. On the whole, the patients have expressed themselves as greatly pleased with the change in their condition which immediately resulted from the operation.

There can be no doubt but that this manner of repair with Smith-Petersen's spike, by Johansson's method, represents a great advance in the treatment of fractures of the collum femoris. Already the exact control of the reposition which it demands is an excellent thing, which probably in itself increases the change of healing. But to this is added, further, the immense advantages of a relatively permanent fixation, and the fact that it is possible to dispense with restraints while the patients lies

in bed, and to let her get up already after a short time. The oldest of my patients is eighty-nine years. She stood the long operation splendidly, and it has been a positive relief to be able to let her lie in her bed, afterwards, in any position she chose, without any sort of fixation appliance that would have been a hindrance in tending and looking after her.

Hj. Schilling, Oslo:

The speaker complimented *Johansson* on his fine results. After *Smith-Petersen* had demonstrated his intra-capsular synthesis at Ulleval, in 1929, he had himself done a number of operations by that procedure, but after two of them had turned out to be failures he had abandoned the method, and had, since 1931, used the extra-articular one, with *Smith-Petersen*'s spike. The American model of the latter, which *Smith-Petersen* had given him, he had tried in vain to get copied by Stille's. On the spikes made in Oslo, the rustfree blades had been soldered together with an alloy, and in some cases this spike had caused a sterile, seropurulent secretion, and had become loose, so that it had to be removed prematurely. This trouble had ceased since he had obtained his spikes from Odelga in Vienna and *Johansson* in Göteborg. He had not used *Johansson*'s guiding rod, because it did not fit his extension table; but had used other devices for guiding. He cited an example of how it was possible that, even after an absolutely ideal reposition, a retroversional bending might occur while the patient was confined to bed; probably because the caput had not furnished sufficient hold for the spike; and yet osseous healing might be obtained. He agreed with *Nyström* that the operation might be a rather lengthy one when it happened to be necessary to photograph from four to six times. In such cases, the important thing was to make sure that the spinal anesthesia would last sufficiently long.

V. Bülow-Hansen, Oslo:

Bülow-Hansen merely wishes to point out that Prof. *Nicolaysen,* from Norway, already at the Congress here, in 1895, made a communication concerning his method with spiking of the neck of the femur.

H. SUNDT, OSLO:

3 CASES OF OSTEOCHONDRITIS PHALANGUM AND 1 CASE OF OSTEOCHONDRITIS ACETABULI

DISCUSSION:

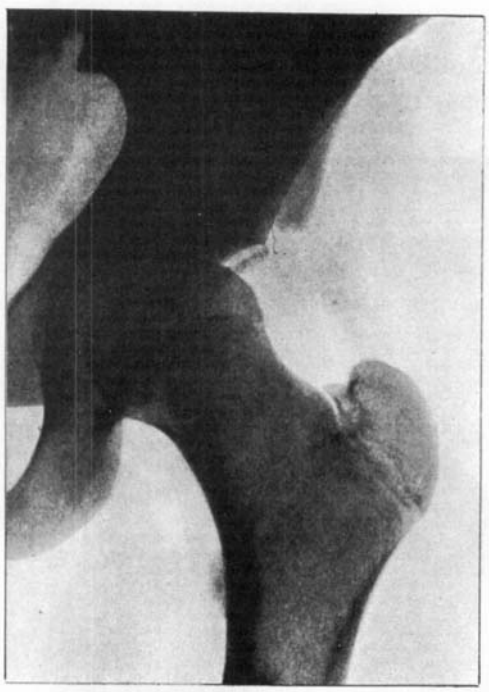
H. Nilsonne, Stockholm:

By reason of Dr. *Sundt*'s paper I would like to relate a case with symptoms from the hip and roentgenological changes at

Left hip 1 XII 1930.

the upper acetabular corner, to the like of which I have found no correspondence in the literature.

A girl, aged 13, consulted me for pains on certain movements in the left hip. During the gymnastic lesson she had felt while in knee-bend-sitting position stinging pains in the hip; she had for a few days afterwards had difficulty in walking after which



Left' hip 23 XII 1930.

the symptoms had abated except for some difficulty in going up and down stairs. After a fortnight symptoms returned on doing some violent abduction movement and this brought the patient to see me.

On examination mobility in the hip was normal and painless except terminal abduction and inward rotation which brought about a stinging pain in the hip. S.R. was normal. The radiogram showed an os acetabuli of ordinary appearance. Above this was

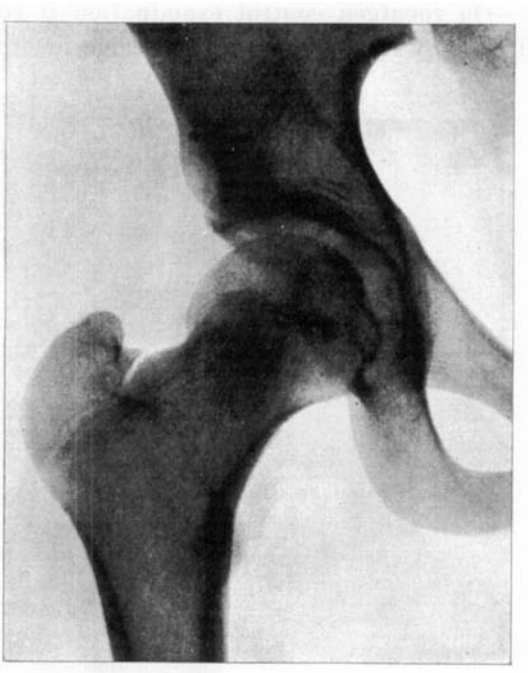
seen outside the ilium an ill-defined streaky bone shadow a few centimetres in length. Within this area the os ilium also showed an ill-defined outline. The patient was only advised to avoid athletics and excessive movements.—The symptoms recurred now and then for a couple of days but then gradually again disappeared.—On roentgen control examination it could be seen how the free bony shadow gradually became incorporated with

Left hip 6 V 1931.

the structure of the ilium so that finally a broad ridge with indication of a double structure was seen above the hip-joint.

Six months after the first consultation the patient returned to me with similar symptoms in the right hip. The same findings were in evidence here as in the left hip. The radiogram showed an ill-defined somewhat prominent contour at the same place as on the left hip. This time the patient's symptoms disappeared more rapidly than those of the other hip.

It is difficult to say what is the anomalous condition we are dealing with here. In the case of the left hip I first believed the case had to be interpreted as a periosteal separation with subperiosteal haematoma after some sudden abduction movement. When afterwards the right hip became the seat of similar



Right hip 6 V 1931.

changes one naturally thought of some *developmental disturbance* of the ossification in the os ilium.