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ON THE OPERATIVE TREATMENT OF MEDIAL FRACTURES OF THE NECK OF THE FEMUR

BY
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Translated from the Swedish.

Scarcely any form of fracture has attracted so much interest or been the subject of so much discussion as fractures of the neck of the femur, particularly those in the medial region. In the following I shall deal exclusively with these.

With regard to distinction and nomenclature, I need not go into detail here, but will refer to *Faltin*'s explanatory paper in »Nord. kir. förenings förhandlingar« 1923.

In its results the treatment of fractures of the medial collum has long been most unsatisfactory, despite the many methods — bloodless and otherwise — that have been tried. It is only within the past decade or two that there has been any change for the better, through the wide adoption of the Whitman method, or, as it is often called in the Scandinavian countries and Germany: the Löfberg-Whitman method, in which the principle is reposition and protracted immobilization in plaster of Paris in abduction and internal rotation. It will be agreed, I think, that even this method does not give completely satisfactory results in a sufficiently high percentage of cases, and most surgeons and orthopaedists will endorse my statement when I say that the last word has by no means been said in the treatment of collum fractures.

If we examine the literature and from it endeavour to form an idea of the results of the Whitman method, we are confronted with great difficulties. It is astonishing to see how

few are the useful statistics available. As far as I have been able to find, Whitman himself has never published any collective statistics of his cases, while the summaries that do exist are often very unsatisfactory, as regards both specified diagnoses and final results. This has also been pointed out i. a. by *Johan Waldenstrøm, Reggio* and *Camitz.*

Nevertheless, I will very briefly recapitulate some of the best known and most reliable statistics.

In his paper read at the Nord. kir. förening's meeting in 1923 *Uno Lindgren* accounted for 49 medial collum fractures, of which, however, only 31 were treated according to Whitman. The results are described as good in 52 per cent., bad in 32 per cent. of the cases; the primary mortality was 16 per cent. (cit. from Anschütz and Portwick). In at least 12 cases (out of 26) pseudoarthrosis was considered present at a subsequent examination.

Anschütz and *Portwick,* using the Whitman method, have obtained »good« results in two-thirds of their cases »satisfactory« in four-fifths. Their material, however, comprises no more than 10 patients and, in addition, is made up of selected cases; very old people have not been treated.

In 1924 *Johan Waldenström,* in a particularly thorough and critical paper, accounted for 59 medial collum fractures treated by him. Only 22 were treated with reposition and plaster of Paris according to Whitman. The mortality was 2. Of 15 cases examined after treatment, 6 are shown with osseous union and good function, 2 osseous union and unsatisfactory funtion; 6 had pseudarthrosis — 3 with good function and 3 bad. In one case resection of the caput was performed.

In 1928 the American Orthopaedic Society appointed a commission, consisting of *Osgood, Cambell* and *Orr,* to study and report upon the final results of the treatment of medial, unimpacted collum fractures at various clinics in U. S. A., limiting the investigation to patients over sixty years of age. The report was submitted in 1929. The cases numbered 331, with a known final result in 201 cases. The primary mortality was high, no less than 28 per cent. Of these 201 cases, union had taken place

in only 30 per cent. twelve months after the injury. If cases of pseudarthrosis with good function are included, the percentage of good functions rose to 50. Unfortunately, we have no details of what is considered to be »good function«. On the whole, the report is much too summary to enable one to form a really clear idea. The method used in the majority of cases was Whitman's.

The following year — 1930 — the same commission submitted a supplementary report, partly on cases of medial collum fractures *under* 60 years, treated *manipulatively,* partly cases *both over and under* 60 years treated *operatively.* This supplementary report included 365 cases that had been examined after treatment. I will revert later to those treated by operation.

Regarding the cases under 60 years treated according to the Whitman method, the result was better than among the older patients, as might have been expected. The primary mortality was 9 per cent., and bony union had taken place in about 52 per cent. twelve months afterwards. Whether we take regard to cases over or under 60 years, however, we may fully concord with the statement of the commission regarding the former group, that the results are not so good as would have been desirable, and that serious attempts ought to be made to improve the method of treating medial collum fractures.

Probably the largest statistics from *one* hospital dealing with rationally applied Whitman treatment are those published by *Löfberg* in 1927. The results of the treatment of no less than 168 medial collum fractures were as follows: 6 per cent. primary mortality; of the survivors: 54 per cent. good result, 18 per cent. fairly good, 25 per cent. bad, 3 per cent. unknown. By *good result* Löfberg understands osseous union, ability to walk without walking stick or other support and without limping, no subjective symptoms (nothing is said of mobility in the hip and knee in this respect) ; *fairly good:* osseous union, eventually secondary arthritis or varus position, insignificant subjective symptoms and relatively good ability to walk and work. *All pseudarthrosis* is considered a bad result.

When a man like *Löfberg,* who devoted great personal efforts

and interest to the treatment of collum fracture, nevertheless arrives at the figure of 25 per cent. bad results, there is every reason for our taking a note of it.

Indirect evidence of the limitations of even the Whitman method is provided by the lively interest that is generally taken in the treatment of pseudarthorosis; this, however, should of course not lead us to overlook the fact that, on a close examination of their anamneses being made, many of these cases do not come up to standard in the question of treatment carried out lege artis.

Nevertheless, the fact remains that despite the most conscientious treatment, too many collum fractures are not healed in a manner satisfactory to the patient.

But apart from this, the method is combined with tangible drawbacks. It is by no means an insignificant step to take to provide people who often — or rather, oftenest — are well advanced in years, with a plaster of Paris bandage that will immobilize them for months. Even if all deaths from pneumonia and lung embolism may not be charged to immobilization, surely no one doubts that it is a highly contributory cause of death in many cases. Nor is the method entirely innocent of exercising a deleterious influence upon the mobility of the joints, especially the knee.

In this connection I would recall *Giertz'* suggestion of the combined use of plaster and wire extension with the knee free.

The question therefore arise: is it not possible to devise a better method of treatment, giving a better final result functionally and also less primary risk and less discomfort for the patient?

As to »good functional result« I for my part would say that I mean normal or almost normal hip movement and also knee and ankle movement; no shortening, or at any rate only very little; good ability to walk without limping and without support of any kind, and no pain; and furthermore, a good roentgenological position.

In my opinion, the only method that can be discussed as a competitor to the Whitman method is operative treatment.

This is not the place to give a description of the various methods of operative treatment that have been tried in the course of time; and, in fact, *Faltin* (1923) has already done so very thoroughly.

The largest statistics of operated fresh medial collum fractures are, I believe, those published from Delbet's clinic by *Leveufet* and *Girade,* based upon no fewer than sixty cases (as well as about a hundred cases, partly of cervico-trochanteric fractures, partly of pseudarthrosis). The operation performed was extra-articular osteosynthesis, in some cases with metal screws (»vissage metallique«) — principally in the period 1907—1924 — and in others with free bone-transplantation from the fibula after removal of the periosteum in the period 1924—1926. The former group comprises 50 cases, the latter 15 cases. Apart from the question of the nature of the osteosynthesis material, the treatment of the latter group differs from that of the former in that there was more precise roentgen control, and an alignment apparatus was used during the operation. After reviewing their material the authors named come to the conclusion that osteosynthesis with metal screws gives osseous union and satisfactory results with patients under 50 years. After 60 years pseudarthrosis has developed in more than half of the cases. Of the 15 with free bone transplantation the result is described as good in 11 (six of them were over 60 years old).

A close examination of Delbet's cases shows, it is true, that the screws used have loosened or broken in several instances; still, the cause of the poor results in these earlier cases is not this alone, but also the less satisfactory primary reposition and alignment when putting in the screws. As a final verdict, however, one must agree with *J. Waldenstrøm* that the Delbet method's superiority over Whitman's has not been confirmed by the material published.

Quite recently, operative treatment has once again come to the fore, principally through the method used by the North-American orthopaedist *Smith-Petersen.* He exposes the fracture and fixes the fragment with metal nails. The novelty in his method is not the exposure, for this has been done by many

before him, but the *shape* of the nail, which is of stainless steel, and has three metal lamellæ on a common shaft. With this form the bone substance is not damaged so much when introducing it; the nail has difficulty in twisting; the frection is increased and, according to *Smith-Petersen,* there is less pressure necrosis round the nail. In 1931 *Smith-Petersen* published 24 operated cases, the oldest five years previously. Of these 24 cases only 15 were fresh fractures. In 15 cases (75 per cent.) the bone united. *Smith-Petersen,* like *Böhler,* considers that the exposure of the fracture is absolutely necessary.

The American Orthopaedic Society's commission, referred to in the foregoing, in its second report (dated 1930) had collected no fewer than 103 operatively treated cases, though it should be noted that most of them were cases of pseudarthrosis. Regarding the *fresh* cases operated — usually with the *Smith-Petersen* method — the Commission considered that the number was as yet too small to permit of any definite conclusions in the question of operative or non-operative treatment.

A year ago I chanced to see a preparation originating from post mortem examination of a case operated in Oslo according to *Smith-Petersen* by *Lindboe,* and I observed then the firm fixation of the fragment still two months after the nail was put in and before the bone had united. I determined then to endeavour to turn the advantages of the method to account without exposing the fracture: in other words, to work out a method of extra-articular osteosynthesis with the *Smith-Petersen* nail. Only by this means would the operation be relatively slight — so slight that, even having regard to the advanced age at which most of these fractures occur, it seemed to me to be justified. The advantages one derives from osteosynthesis are: firm fixation, shortened period of union and simplified after-treatment. My experience as yet is too small to enable me to decide in what manner the period of union can be reduced, but I believe I can already state that it is possible to satisfy the other two requirements.

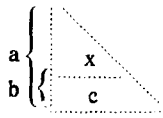
The method I have evolved is based upon the introduction of a strong metal wire, such as is so much used nowadays in

so-called wire extension, in the axis of the collum from a point below the trochanter — naturally after reposition of the fracture (according to Whitman) and thereafter, with this wire as a guide and, after controlling the alignment in the ventrodorsal and the lateral direction, to introduce the *Smith-Petersen* nail, which for this purpose has been furnished with a central canal. The real — or rather the only — difficulty consits in determining the direction when introducing the wire so that it will lie as near axially as possible in the collum.

The central point of the caput femoris is *usually* found, measured from the *anterior superior iliac spine,* according to the following formula:

The distance between the anterior superior iliac spine and the symphysis — 1.5 cm. divided by 2. The point found is marked with a leadmarket and may, before inserting the wire, be further adjusted if found necessary. The lower point of the axis of the collum, or, in others words, the point on the shaft of the femur below the trochanter where the nail is to be introduced, is best determined on a skiagram of the sound hip, taken in abduced and internal-rotated position. On exposure of the trochanteric region this point is determined by measuring from the lower part of the trochanter itself, which is usually well marked. (As a rule the distance is about 2 cm.)

The length of the axis of the collum from the middle of the caput to the aforementioned lower point of the collum is also determined on the skiagram, but with the correction, necessary on account of the projection, according to the following formula:



$$\frac{a}{c} = \frac{a - b}{x},$$

where $\times$ is = the actual collum length; a = the distance between the lamp focus and the table; b is the distance between the frontal plane of the hip joint and the table; c is the length of the collum on the skiagram (abduction and internal rotation). The nail itself should be chosen rather shorter than the axis of the collum, to obviate the risk of its projecting into the joint.

With regard to the position of the entrance-opening on the shaft of the femur, I have found that the middle point between front and back, approximately calculated, is the right one. In this respect it is important to take care not to get too far forward (i. e. upwards in the horizontal position), as happened with me once or twice.

The desired point having been found in this manner, a de-

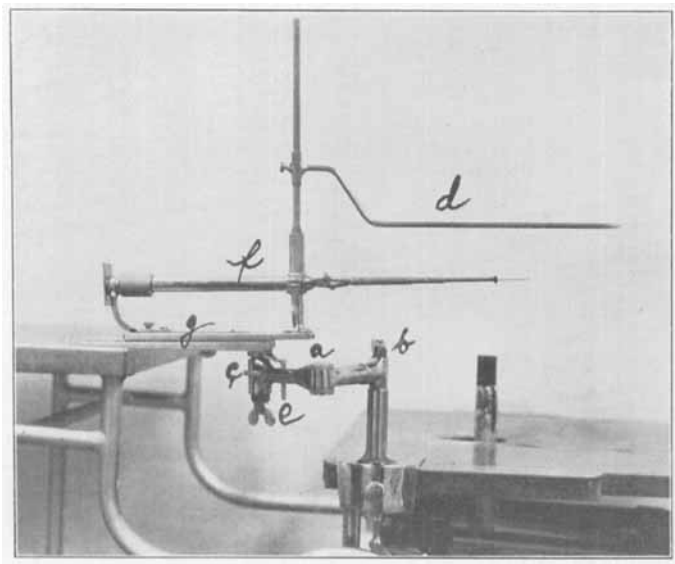


Fig. 1.

pression should be made in the corticalis by means of a couple of blows of the chisel, so that the drill obtains a better hold.

The most difficult of all is to determine the direction of the frontal plane. Investigations, i. a. by *Ostrowski,* have shown that at about 25° to 30° interanl rotation of the femur (the position of the patella, not the foot, should determine this), the collum is practically parallel with the horizontal plane — i. e. with the extension table. The object then is to introduce the wire at 25° to 30° internal rotation of the femur parallel with the table. This can scarcely be done, at least not with any great precision, without an alignment apparatus. I have constructed such an

apparatus for the purpose. (Fig. 1). In principle it resembles one described by *Ostrowski*. The apparatus is fixed with a strong stand close to the extension table slightly above the hip. Adjustment is partly horizontal by means of a movable arm (a) which is locked with the screw (b), and partly vertical by lowering the top of the extension table, afterwards making the fine adjustment with the screw (c) until one reaches the desired

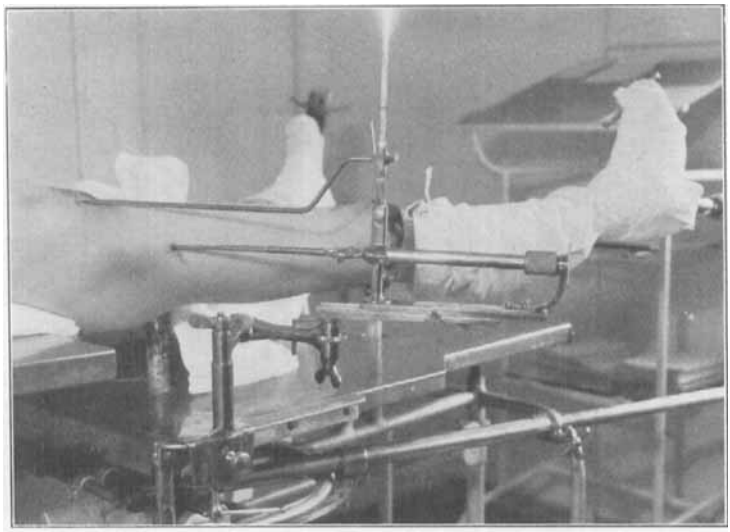


Fig. 2.

point on the shaft of femur. Adjustment towards the middle of the caput, marked with the pencil, is facilitated by means of the pointer (d); the screw (e) fixes this adjustment. The wire is introduced by means of the hand-drill (f) described by me in Zentralblatt für Chirurgie 1923, fitted to the alighment apparatus. One should remember to use the drill »with a light hand«. On the scale (g) with moveable zero point on the stand one can accurately read the length of the drilled-in wire. Should the position of the wire not be satisfactory, it should of course be replaced with another, in the right position. I have had to do this on two occasions. When the wire (2 mm gauge) has been

introduced and its position controlled by roentgen, the nail is threaded on the wire and knocked in, the blows being applied indirectly through a punch canalized for the wire. Fig. 2 shows the position of the alignment apparatus in relation to the patient on the extension table. With the aid of a piece of metal (fig. 3) specially designed by *Smith-Petersen* for the purpose, a few powerful hammer strokes are finally directed towards the region just outside the nail for the purpose of pressing the fracture together. While doing so the traction of the extremity should be eased a little.

Reposition, and the position of the wire, must absolutely be

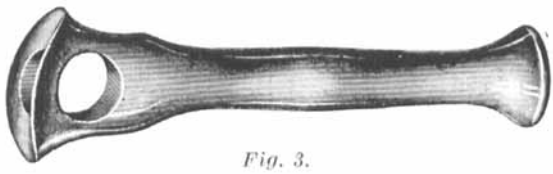


Fig. 3.

controlled with roentgen. To be quite certain one may also control the position of the nail while the patient is on the table. In my cases so far this has proved to be unnecessary; the position of the nail and the wire has always been the same. I have used photography exclusively. I have not tried transillumination, but at any rate with the present arrangements this would not be practicable.

The skiagrams are taken ventrodorsally and laterally. For the latter the under-part of the table should be lowered so that the vertical X-ray tube may be applied between the patient's legs up to the sound knee. The X-ray film should be held *vertically* against the trochanteric region. (Fig. 4). I have used Philips transportable X-ray apparatus, which does not give shocks of high tension.

The various stages in the treatment are as follows:

1. After diagnosing medial collum fracture, take skiagrams of the sound hip abduced and internally rotated, and also of the injured hip, marking the calculated middle of the caput.

2. From the skiagram of the sound hip determine the actual length of the axis of the collum.
3. On the extension table repose the fracture by means of abduction and internal rotation (I have found 25° to be the best). The foot on the injured side should be *plastered* to the footboard. On the uninjured side fixation with bandages should be sufficient. I anaesthetize spinally or locally (usually spinally).

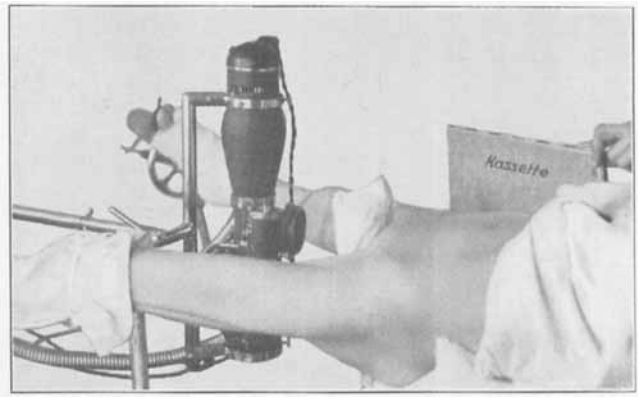


Fig. 4.

4. Roentgen control of the reposition.
5. Exposure of the trochanteric region to about 10 cm below the point and determining of the point for the introduction of the wire in the manner already described. A small depression is made by means of a chisel in the corticalis.
6. Drop the lower board of the extension table and direct the drill towards the entrance opening in the manner described.
7. Drill in the wire correspondingly to the length of the axis of the collum.
8. Control by roentgen the position of the wire, both ventrodorsally and laterally.
9. Insert the nail and remove the wire.
10. Press the fracture together by means of blows round about

the head of the nail, easing the extension a little the while.

11. Suture.

It may be thought that I have explained the technique too minutely and in too much detail; but even if the technique is quite simple, it is precision work that is required, and, if it has no other significance, there is no doubt that it will save time in following what may seem to be less important details of a method that has proved to be practical. In order to illustrate

Fig. 5. Case 6. *Fig. 6.*
Before reposition. After reposition.

the technical procedure by means of skiagram I refer to pictures No. 5—9 (case No. 6).

Regarding *after-treatment* I have so far used neither traction-bandage nor plaster of Paris. The patients have been placed either on a Braun splint with slight flexion and abduction of the hip joint or simply with two sandbags as supports. After a couple of weeks they have cautiously begun active movement and about the same time diathermic treatment (in bed) has been instituted. After about two months they have been allowed to sit up, but not to make any attempt at walking until after about three months, and then only with the aid of walking-sticks. It is possible that a more rigorous aftertreatment may prove to be

necessary. May be the contrary may turn out to be possible. Long experience is necessary to decide this point.

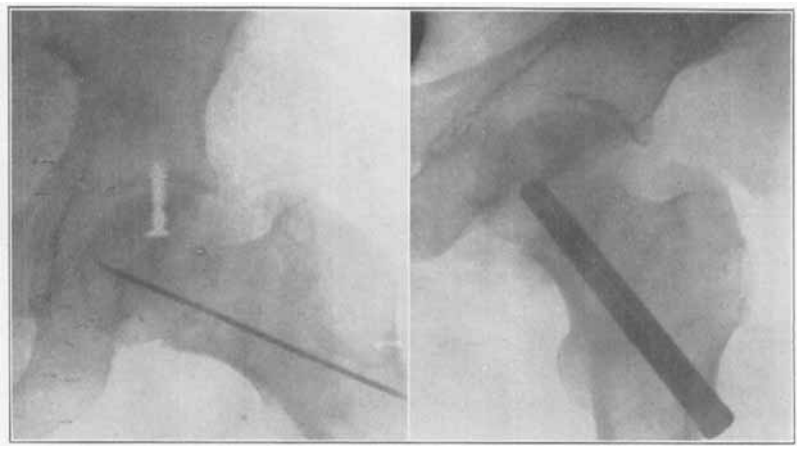


Fig. 7. Case 6. *Fig. 8.*
After introduction of the wire. After introduction of the nail.

At first *Smith-Petersen* used plaster of Paris immediately after the operation, but he has now turned to the traction-bandage for the first period, then a short plaster or leather bandage, which the patient has to wear for three to six months.

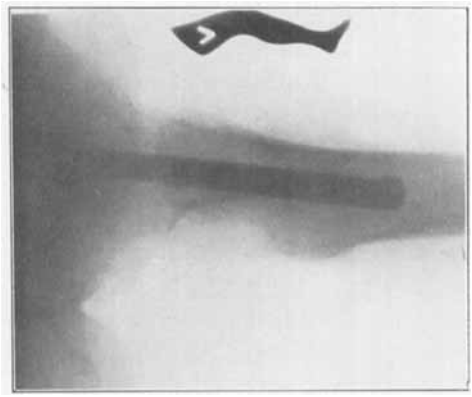


Fig. 9.
Case 6. Lateral view.

Another question that requires answering is *whether* and *when* the nail should be removed. *Smith-Petersen* states that he has removed the nail after varying periods — 6 months up to 4 years. He does not say whether they were then loose or still fast.

In my first cases I used nickel-plated steel nails, and since then nails of stainless steel. The question of the best metals for use in osteosynthesis has not yet been conclusively settled; but so much may be taken to have been established, that nails of a single metal are better than for instance plated or chromed, and also that the metal used ought to be rustless. Of the many works treating the question of the best, or perhaps rather the least troublesome metal for osteosynthesis I would refer to *Max Lange*'s. He has shown, i. a. that stainless steel, as differing from iron, into the musculature without any reaction whatever, but that the formation of callus is somewhat slower; iron impedes the callus formation.

Casuistics.

Since 18th January 1932 I have treated operatively nine cases of medial collum fracture. In one case (not among these nine) on which I operated, when by accident the apparatus was deranged, the nail was given a bad position and had to be taken out. This patient, who was old and feeble, has since been treated with traction. Otherwise all medial fractures since the above date have been treated operatively. The cases in question are:

Case 1. No. 57/1932, ♀, 69 years. Admitted 5—1—32, discharged 10—6—32. Had fallen and struck the right hip on the floor, after which unable to walk.

Present Condition: Frail old woman. Cannot raise right leg; slight outward rotation of foot. Roentgen shows a medial (so-called transcervical) collum fracture with coxavara position. Traction bandage applied 9—1—32. Owing to increase of temperature the intended operation had to be postponed. Roentgen 13—1—32: Fig. 10. On 18—1—32 operation (author) spinal anaesth. Reposition + extra-articular osteosynthesis, author's

method. By an oversight there was no hammerung after insertion of the nail.

After inserting the nail the position was satisfactory, both ventrodorsally and laterally. The former is shown on Fig. 11. After only a few days the patient was able to raise her leg from the bed. A photograph taken January 25 shows obvious displacement (see fig. 12). Repeated examinations showed no further change after that. April 4 the patient was allowed to sit in a chair. Began to walk after three months. Disharged after about five months. Mobility in the hip was then almost normal except for rotation, which was limited. Aug. 22 — after not quite eight months — the record says: walks about in the house without a stick. Outside she uses a stick. Has no pain. Limps obviously, but not much.

Roentgen Aug. 24 (fig. 13) shows coxa vara position and a noncalcareous zone between the fragments. Bone union commencing at lower region?

Epicrisis. In this case there has undoubtedly been a displacement after the introduction of the nail, for which I have been unable to find any definite cause; the position immediately after the operation was quite satisfactory in both directions. May be the omission to press the fracture together has had something to say, especially as the fracture was fourteen days old before it was reposited and pinned.

Case 2. No. 443/32. ♀, 50 years. Admitted 10—2—32. Discharged 11—6—32. The patient has previously been admitted to hospital for nephritis and gastric ulcer.

On Feb. 10 she fell and struck her hip on the ground. Could not get up. Admitted immediately.

Present condition: Patient very anaemic and has clinical symptoms of chronic nephritis. Cannot raise left leg; foot pronouncedly external-rotated. Shortened 3 cm. Roentgen shows a medial collum fracture with coxa vara position and marked outward rotation (Fig. 14).

Feb. 11. *operation* (author). Spinal anaesth. Reposition + extra-articular osteosynthesis, author's method. The position

was thereafter satisfactory (Fig. 15). At once able to rotate the foot inwards and outwards. March 8 she raised her leg with ease from the support. May 22 (after 2½ months) she was allowed to walk cautiously with sticks.

June 11 she walked without sticks. Mobility almost normal. August 15 recorded: the patient has no pain. Walks freely, and in such a manner that *it is impossible to say which leg has been injured.*

Roentgen July 1.: Fig. 16.

Case 3. No. 633/32, ♀, 56 years. Admitted 25—2—32, discharged 14—5—32. Fell and struck her hip on the ground. Was able to walk a few steps, then fell and could not rise. Admitted immediately.

Present condition: Left leg rotated outwards. No perceptible shortening. The patient cannot raise her leg. Roentgen: A medial collum fracture with marked external rotation, but without coxa vara position or shortening (Fig. 17).

Feb. 27. Operation (author). Spinal anaesth. Reposition + extra-articular osteosynthesis, author's method. The position was afterwards satisfactory (Fig. 18). The patient was immediately able to rotate internally and externally and even completely raise her leg. April 25. patient was allowed to cautiously put her weight on the leg in a go-cart. May 14 (after 2½ months) the patient is walking without sticks. Almost normal mobility.

Roentgen July 2 (Fig. 19) shows position unchanged. Diastasis disappeared. Osseous union?

July 11 recorded: the patient walks without difficulty without sticks. *It cannot be seen which leg has been injured.* Normal mobility.

Case 4. No. 1398/32, ♀, 71 years. Admitted 9—5—32, discharged 28—6—32. On May 9 fell and struck her hip against the floor, after which could not stand. Admitted immediately.

Present condition: Little, frail old woman. Cannot raise her leg, which is very much rotated externally; 2 cm short. Roent-

gen: medial collum fracture with coxa vara position and outward rotation (Fig. 20).

May 11th. Operation (author). Local anaesth. Reposition + extra-articular osteosynthesis, author's method. After the operation slight coxa valga position, otherwise good position (Fig. 21). Able to rotate outwards and inwards immediately. May 18 she could lift her leg herself. June 8 was allowed to sit up. Discharged June28, when mobility in the hip was almost normal. Not yet allowed to put her weight on the leg. Roentgen July 13: Fig. 22.

Aug. 18: Fully normal mobility, allowed to start walking with sticks.

Case 5. No. 1963/32, ♀, 58 years. Admitted 29—6—32, discharged 26—8—32.

Fell while walking 28—6—32. Admitted next day.

Present condition: Right leg lying externally rotated, the patient cannot raise it. Roentgen shows coxa vara position and marked external rotation (Fig. 23).

June 29: operation (author). Spinal anaesth. Reposition + extra-articular osteosynthesis, author's method. After reposition good position in both directions. July 2. control-Roentgen ventrodorsally (Fig. 24). The patient can move leg actively, even raise it.

July 11. Can raise leg 60°.

July 13. Diathermy commenced.

August 8 (after 6 weeks). Allowed to sit up, but not to put her weight on the leg. Roentgen Aug. 24—32 shows unaltered good position (Fig. 25). Is discharged on Aug. 26—32 and is instructed *not* to put her weight on the leg at home.

Case 6. No. 2157/32. ♂, 68 years. Admitted 17—7—32. Had fallen in the street. Admitted at once.

Present condition: Very senile old man, asthmatic, with signs of myocarditis. Intoxicated. Left leg lying externally rotated, about 1 cm shortened. Cannot be raised. Roentgen: medial fracture with coxa vara position and pronounced outward rotation (Fig. 5).

July 16: operation (author). Spinal anaesth. Reposition + extra-articular osteosynthesis, author's method. Position after reposition satisfactory (Fig. 9). He could rotate his leg immediately after the operation.

A week after the operation the patient got up during the night and was found standing.

August 15 the patient raises his leg with great ease and turns it in all directions.

July 27: diathermy begun. The patient has all the time been very unruly, could not be persuaded to lie still, and even demanded to be allowed to get up. The control-Roentgen on August 24 showed that the nail had worked out a little; the position still satisfactory. August 25 the operation area exposed. The nail found to have slid out about 1 cm. It was fastened in and a short plaster hip bandage put on. Control-Roentgen shows position still good.

Case 7. No. 2473/32, ♀, 52 years. Admitted 17—8—32. Had been knocked down by a bicycle and struck her hip on the ground, Admitted at once.

Present condition: Left leg outwardly rotated, about 2 cm short. Roentgen shows a medial fracture with coxa vara position and outward rotation (Fig. 26).

August 19: operation (author). Spinal anaesth. Reposition — extra-articular osteosynthesis, author's method. After operation: position satisfactory (Fig. 27). The nail is rather short, however. The patient immediately able to rotate the leg.

Control-Roentgen some days later shows unchanged, good position.

Epicrisis: In this case the nail was somewhat short, owing to miscalculation, as the skiagram shows. The patient would probably do well to move cautiously and be careful about putting her weight on the leg. Should it turn out to be necessary, the nail may still be inserted further in or perhaps may be prolonged by inserting a wire in the central canal.

Case 8. No. 2595/32, ♀, 74 years. Admitted 27—8—32. August 23 patient had fallen on the stairs, since when she had not been

able to use her left leg. At first lay some days with sandbags and pronounced external rotation. Admitted here August 27. Roentgen showed medial fracture with coxa vara position (Fig. 28).

Present condition: Very corpulent. Good general health for her age.

August 29 operation (author). Spinal anaesth. Reposition + extra-articular osteosynthesis, author's method. After the operation: satisfactory position (Fig. 29). Was able to rotate outwards and inwards at once.

Case 9. No. 2574/32, ♀, 85 years. Admitted August 25. Fallen backwards downstairs. Could not rise. Admitted at once.

Present condition: Very corpulent. In good health for her age. Left leg outwardly rotated; shortened about 1.5 cm.; cannot be raised.

Roentgen: medial fracture with coxa vara position and marked outward rotation (Fig. 30).

August 25: traction bandage applied temporarily and the patient received digalen.

August 30: operation (author). Spinal anaesth. Reposition + extra-articular osteosynthesis, author's method. Despite her advanced age and considerable corpulence, the operation presented no especial difficulty. Position afterwards satisfactory (Fig. 31).

A numerical summary of these cases cannot be worth much, for they are neither sufficiently numerous nor sufficiently long under observation. Still, one or two matters may already be referred to.

All cases except one were operated within six days after the injury, most of them on the first or second day. In one case (the first) the operation had to be put off for fourteen days. This case is the only one in which there has been a secondary displacement. I imagine the reason lies in the circumstance that reposition had to be postponed. Longer experience may enable us to judge of this. Five of the nine patients were over sixty years of age, three over seventy, and one even eighty-five.

In two of the cases, No. 8 and No. 9, I would have entertained considerable doubt about the advisability of applying a plaster bandage on account of the corpulence of the patients and their immobility. The difficulty of getting sufficient immobilization in plaster of Paris in such cases is in fact known and recognized.

The average time during which the five cases discharged lay in bed has not been more than three months, which must be regarded as a short period compared with the plaster treatment.

I would not at all assert that from these nine cases the conclusion may be drawn that extra-articular osteosynthesis with the Smith-Petersen nail and with the technique I have described should be the normal method of treatment for medial collum fractures. The period of observation is as yet too short for that. Among other things, we do not know whether a possible loosening round the nail may take place with secondary weakening of the collum as a consequence. To what extent interposition of fragments of the capsular ligament and periosteum between the fragments may imperil union is also a question which must be taken up for consideration. The same risk, however, is also present with the Whitman method, so that in making comparisons with this latter method this point is of no significance.

One may safely assert, too, that *no method* is or can be capable of leading to 100 per cent. of completely satisfactory results in a material like this, in which a priori a high percentage of the patients are very old and delicate.

Even in collum fractures that anatomically and roentgenologically have resulted in perfect union, in fact in pertrochanteric cases, on has found (as I have shown in a report of similar cases) long afterwards very considerable secondary articular changes. Whether these sequels are governed by constitutional factors or by primary injury to vessels (or nerves), it is not likely that we shall be able to prevent them.

These cases have, however, been so encouraging to me, not least because of the advantage to the patients in the simplified aftertreatment, that I have not hesitated to already describe the method now for other surgeons and orthopaedists to try it.

SUMMARY

The author points out that treatment of fractures of the neck of the femur by means of the Löfberg-Whitman method has progressed very considerably. Even with this method, however, the results are not so good as may justifiably be demanded. In addition, the long fixation in plaster of Paris is a great strain upon the patience of the patient, difficult to bear and by no means free of risk. Operative treatment has recently been taken up again for discussion, particularly in America. By means of the metal nail introduced by Smith-Petersen, better fixation is possible than with the spikes and screws previously used. This method, however, necessitates exposure of the fracture.

The author has now worked out a method intended to make use of the advantages of the Smith-Petersen osteosynthesis without exposing the fracture. The principle consists in using a thin metal wire as a guide for the Smith-Petersen nail, which is furnished with a longitudinal canal. Roentgen control in two directions is necessary, as also a special apparatus for ensuring the introduction of the wire at the proper angle. The author describes nine cases of medial collum fractures treated since 18. January 1932. So far the results have been very encouraging. After-treatment has been simplified, the period of inactivity has been shortened, and, as far as it has been possible to keep track of the patients, the functional results have been very good.

The author considere that he can recommend the method for trial.

RÉSUMÉ

L'auteur prétend que le traitement de la fracture médiale du collum par la méthode Löfberg-Whitman a fait de grands progrès. Cependant, même par ce mode de traitement, les résultats obtenus n'ont pas été aussi bons que ceux auxquels on aurait cru pouvoir s'attendre. Il y a toujours au moins 25 % de résultats peu satisfaisants. Ajouter à cela que, pour les malades, la longue fixation dans le gypse est une épreuve de patience, difficile et non sans risques. Au cours de ces derniers temps, et notamment

en Amérique, le traitement opératif a été remis en discussion. Avec les agrafes métalliques Smith-Petersen, il est obtenu une meilleure fixation qu'avec les agrafes et les vis employées antérieurement, mais cette méthode exige la mise à nu de la fracture.

L'auteur a élaboré maintenant une méthode permettant de tirer profit de l'ostésynthèse Smith-Petersen, sans mettre la fracture à nu. Elle consiste dans l'emploi d'un mince fil métallique, conducteur de l'agrafe Smith-Petersen, perforée au milieu. Le contrôle radiologique doit être fait dans deux directions et il est indispensable d'avoir un appareil spécial pour procéder à l'introduction régulière du fil. L'auteur rend compte de 9 cas de fractures médiales du collum, traités depuis le 18 Janvier 1932. Jusqu'à présent, les résultats ont été très encourageants. L'après-cure est simplifiée, la durée de l'alitement diminuée et, pour autant que l'on ait pu suivre les cas jusqu'à présent, les résultats fonctionnels constatés ont été excellents.

L'auteur se voit en mesure de recommander la mise à l'essai de la méthode en question.

ZUSAMMENFASSUNG

Der Verfasser hebt hervor, dass die Behandlung der medialen Kollumfraktur durch die Löfberg-Whitmansche Methode einen grossen Fortschritt gemacht hat. Die Resultate sind einstweilen selbst bei dieser Behandlung nicht so gut als man es verlangen sollte. Man muss zumindest mit 25 % unzufriedenstellenden Resultaten rechnen. Hierzu kommt, dass die langdauernde Fixierung in Gips für die Patienten eine Geduldsprobe, schwierig und gar nicht so ungefährlich ist. Die operative Behandlung ist in der letzten Zeit, besonders in Amerika wieder zur Diskussion aufgenommen worden. Durch den von Smith-Petersen eingeführten Metallstift wird bessere Fixierung als mit den früher angewendeten Schrauben und Nägeln erzielt. Diese Methode setzt einstweilen die offene Freilegung der Fraktur voraus.

Der Verfasser hat nun eine Methode ausgearbeitet um die Vorteile der Smith-Petersen Methode auszunutzen, ohne die

Fraktur freilegen zu müssen. Das Princip besteht in der Anwendung eines dünnen Metalldrahtes als Leiter für den in der Mitte mit einem Loch versehenen Stift von Smith-Petersen. Die Röntgen-Kontrolle ist in zwei Richtungen notwendig, gleichfalls ein besonderer Apparat zur regelrechten Einführung des Drahtes. Der Verfasser berichtet über 9 seit dem 18. Januar 1932 behandelte Fälle von medialen Kollumfrakturen. Die Resultate waren bis jetzt sehr ermunternd. Die Nachbehandlung wurde vereinfacht, die Liegezeit abgekürzt, und so weit man bis jetzt den Fällen folgen konnte, waren die funktionellen Resultate sehr gut.

Der Verfasser meint die Methode zur Nachprüfung empfehlen zu können.

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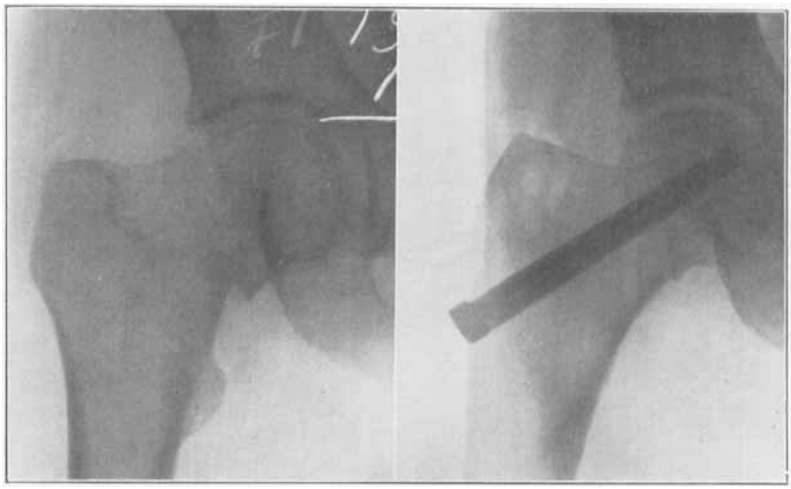

Fig. 10. Case 1. *Fig. 11.*
Before reposition. After reposition.

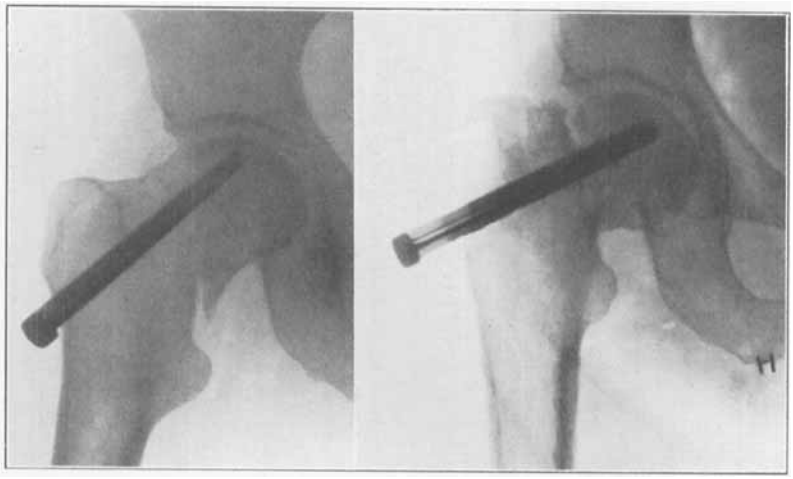

Fig. 12. Case 1. *Fig. 13.*
After oneweek. After 7 months.

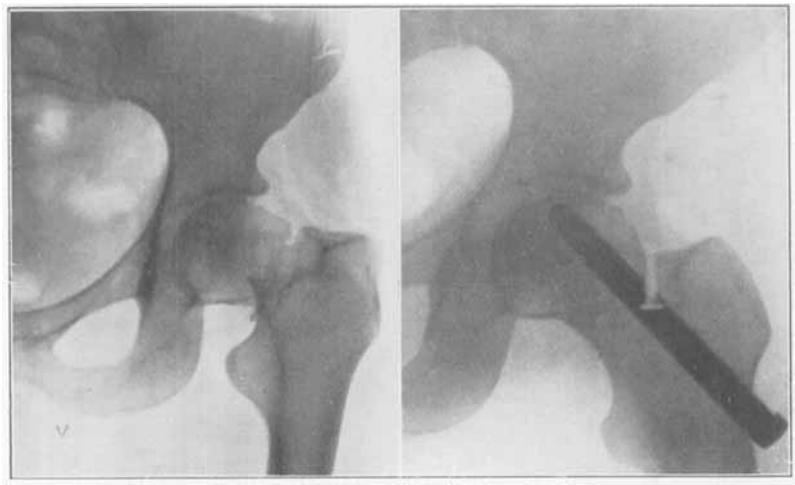

Fig. 14. Case 2. *Fig. 15.*
Before reposition. After reposition.

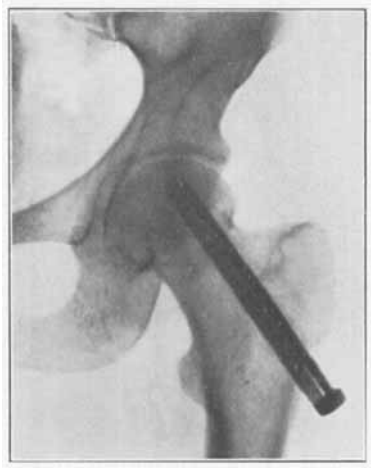

Fig. 16.
Case 2. After 4½ months.

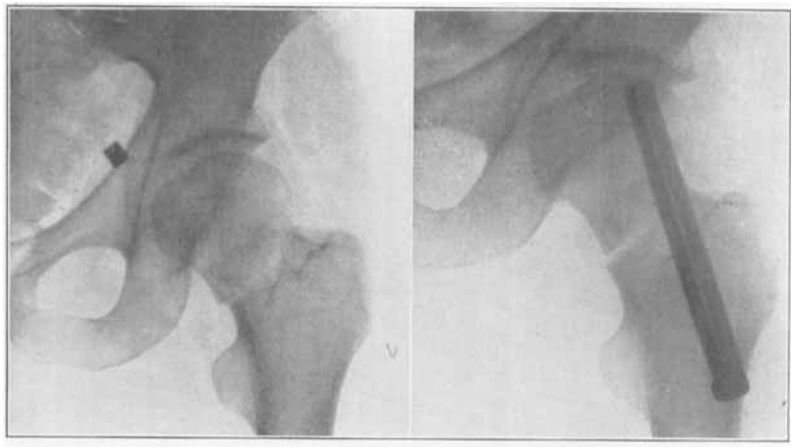

Fig. 17. Case 3. *Fig. 18.*
Before reposition. After reposition.

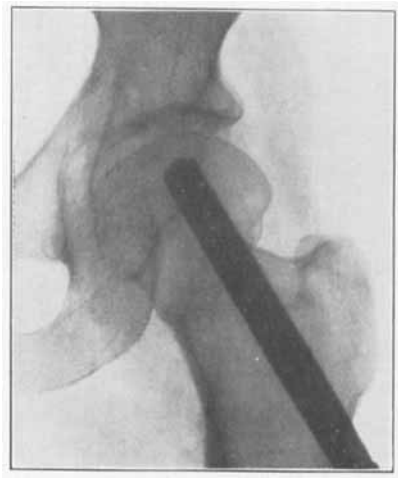

Fig. 19.
Case 3.
After 4 months.

Fig. 20.
Case 4.
Before reposition.

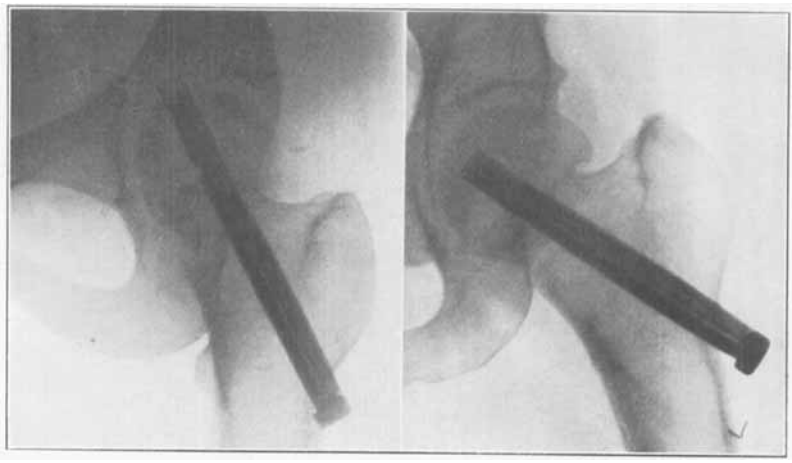

Fig. 21.
After reposition.

Fig. 22. Case 4.
After 2 months.

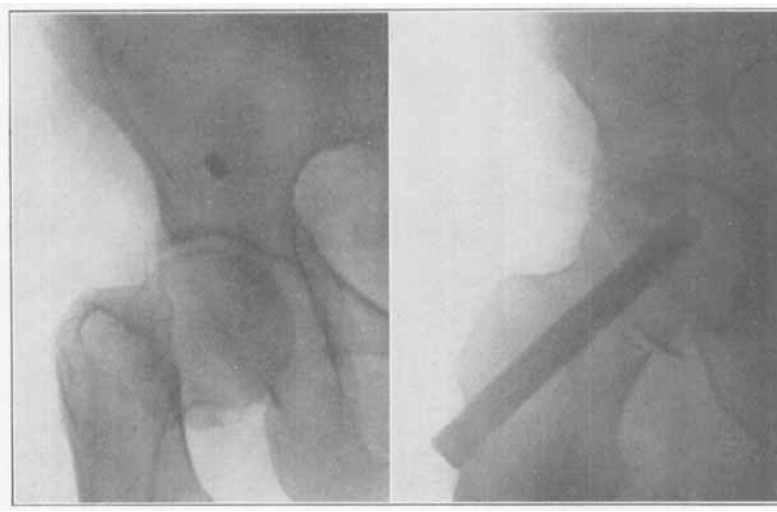

Fig. 23. Case 5. *Fig. 24.*
Before reposition. After reposition.

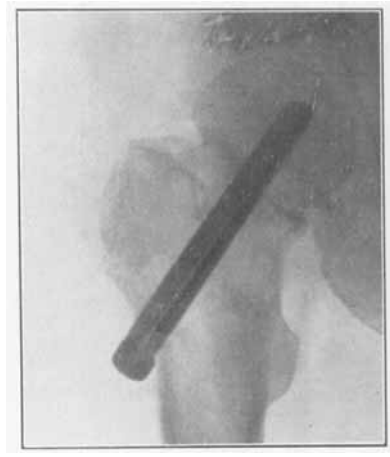

Fig. 25.
Case 5.
After 2 months.

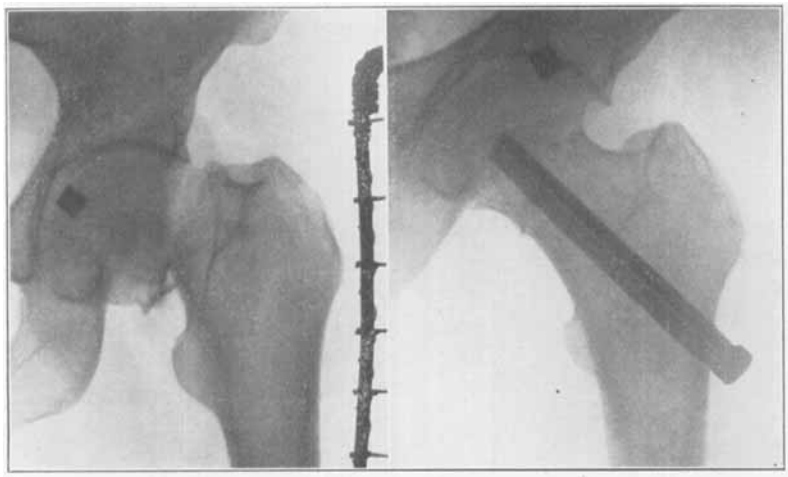

Fig. 26. Case 7. *Fig. 27.*
Before reposition. After reposition.

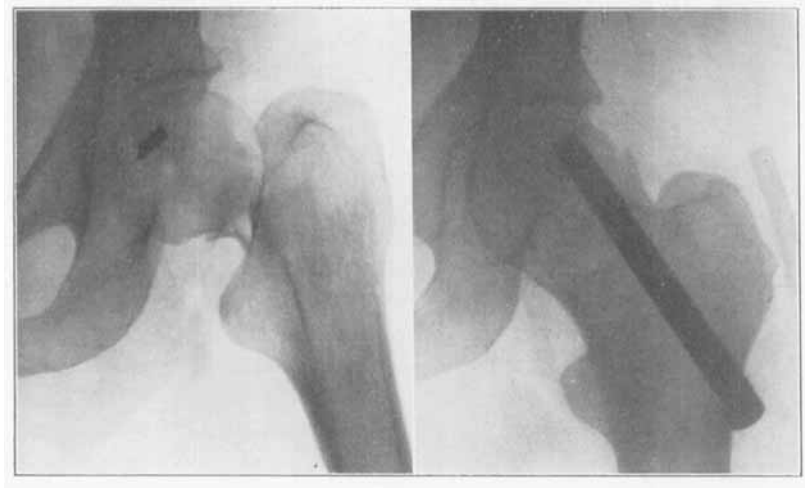

Fig. 28. Case 8. *Fig. 29.*
Before reposition. After reposition.

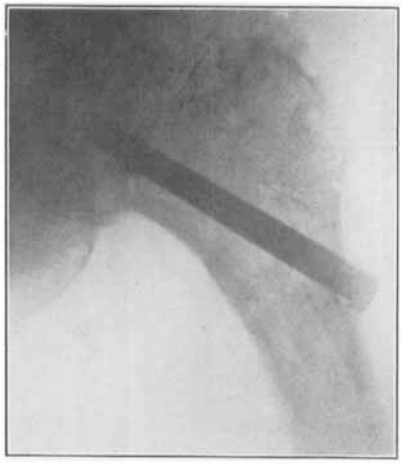

Fig. 30. Before reposition.

Case 9.

Fig. 31. After reposition.