

PROCEEDINGS OF THE NORTHERN ORTHOPEDIC
ASSOCIATION AT ITS XVIII MEETING IN GOTHENBURG,
SWEDEN 28th—29th JUNE 1937

EDITED BY

H. NILSSONNE, M. D.,
Stockholm

The meeting was opened by the chairman, surgeon in chief
H. Camitz, M.D., Gothenburg.

EIVIND PLATOU, OSLO:

SUBTROCHANTERIC OSTEOTOMY
IN RELATIVELY OLD CONGENITAL LUXATION OF
THE HIP, ARTHRITIS DEFORMANS AND
COXA VARA

A considerable literature has been published on this subject. The operation was performed as early as 1826 by *Barton*. In 1856 *Langenbeck* recommended the operation, and it was further developed by *Volkman*. In the nineties it was dealt with by *Kirmission*, *Hoffa*, and *Kondring*, but then nothing was mentioned about it till 1918—19, when *Baeyer*, *Lorentz* and, a little later, *Schanz* published a new method for the treatment of old cases of luxation of the hip. Usually the operation is still called the *Lorentz bifurcation* even though it is carried out no longer as first described, and its main principle—the direct support of the shaft of the femur against the acetabulum—may be said generally to have been discarded. In *Acta Orthopaedica Scandinavica*, vol. V, 1934, *Camitz* has given a historical review of the development of this operation, together with a detailed account of his results in 30 patients.

In 1936 *Lance* has given a thorough critique of the typical *Lorentz bifurcation*, and as this operation as a rule leads to a considerable reduction in the mobility of the hip-joint—amount-

ing in some cases even to ankylosis—he discards the method in its original form, and I quite agree with him.

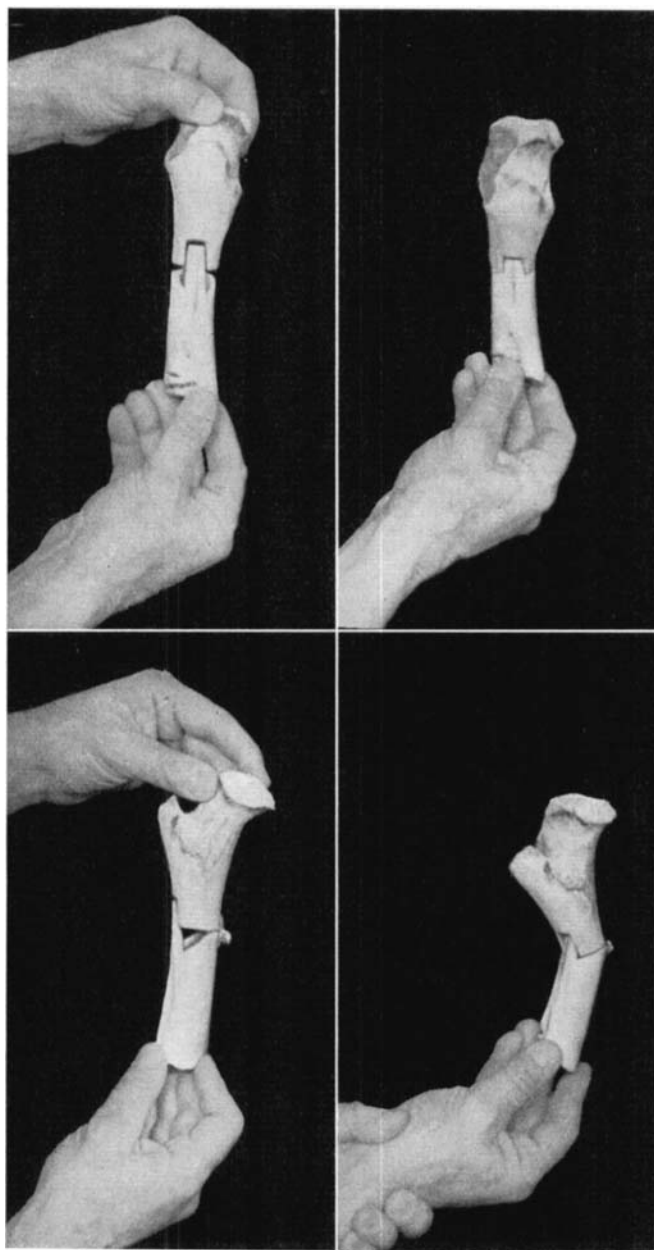
When here I take up this question again, it is chiefly for technical reasons.

When we look upon drawings or direct reproductions of a number of cases in which subtrochanteric osteotomy has been performed, we find a striking diversity of anatomical results. In quite analogous cases the angle varies from 10° to 60° , the site of the osteotomy is most variable, even though all the pictures are taken merely in the frontal plane. If pictures were taken from the side, no doubt, their features would be even more variegated. This cannot be right even though the results to a great extent may be said to be good. There certainly is room for improvement.

The point to be aimed at in the treatment is to produce a suitable angle of the axis of the femur without displacement of the fragments and to lower the trochanteric region and thus obtain a better muscular function.

Essentially the operation is carried out in two ways, by the “closed” method or by the “open”. After the closed method, a broad chisel is introduced through an incision (5—6 cm. in length), and the femur is divided obliquely or transversely at the level of the lower edge of the acetabulum or even lower, and then the leg is abducted 30° — 45° , whereafter a plaster cast is applied. After the other method the femur is laid open through a 10—15 cm. long incision from the trochanter and a suitable wedge of the bone is removed (with its base outwards and downwards); then an attempt is made to adjust the leg in the desirable angle, without getting any medial displacement of the lower fragment.

The first method—with the smallest incision possible—dates from the pre-aseptic days, and it ought to be discarded as altogether unsurgical. One operates in the dark and has no control whatever over the angle obtained, as one has no control of the position of the upper fragment, which may be shifted easily. In cases where a destructive process has resulted in ankylosis of the hip with faulty position, I think, a simple chiseling through a button-hole incision may be the proper measure. The

*Fig. 1.*

other method is better, but it too may give disagreeable surprises.

During the first 6 months of 1934 we performed 4 osteotomies, quite open, removed a suitable wedge of bone and abducted the leg carefully so that at that time there was no displacement of the fragments. In none of these cases was the result anatomically ideal. The greatest difficulty lies in the fact, as mentioned, that we have no control over the upper fragment, and it has a tendency to place itself in flexion in relation to the lower, and after the plastering the adduction may increase so that the angle of osteotomy becomes too great. Besides, the ends of the fragments may slip past each other in the plaster cast. This would not do; the technique had to be modified.

We had tried previously the measure suggested by *Schanz*: fixation of the ends of the fragments with two long screws, going out through the plaster cast. But we were not satisfied with it. Since December 1934 we have employed the following technique, as illustrated in Fig. 1.

Through a longitudinal incision, from 10 to 15 cm. long, depending upon the amount of panniculus present, the femur is laid open from the greater trochanter. The lesser trochanter is palpated, and the site of osteotomy is decided in keeping with the X-ray picture. We use always a slender chisel, 6 mm. in width, and chisel out first a plug of bone, 2—2½ cm. long and 1 cm. wide, from the lateral surface of the femur; then we chisel right through the femur, removing a wedge, with its base outwards and obliquely downwards (5—11 mm.), depending on the angle desired. From experience we reckon that 10—11 mm. corresponds to an angle of 40—50° at the site of the osteotomy. We do not loosen the periosteum and musculature from the inside of the femur. We keep on chiseling with the narrow chisel until the sound tells us that we have got through the bone. If the osteotomy is performed more than 2 cm. below the lesser trochanter, the abduction of the leg will make the peg enter into the marrow cavity and the angle is formed with a shifting of the medial side of the femur amounting to a few millimetres. If the peg is too long it is simply snapped off. If the osteotomy is performed right at the lesser trochanter, the peg will be rest-

ing against spongy tissue; and then we adduct the femur enough to be able with a small sharp spoon to dig out a suitable bed for the peg. Abduction of the leg will then make the peg sink into the bed, allowing us to obtain an angle of from 10° to 60° , just as desired. One of the reasons why the usual osteotomy fails so often is, as mentioned before, that the upper fragment has a tendency to place itself in flexion in relation

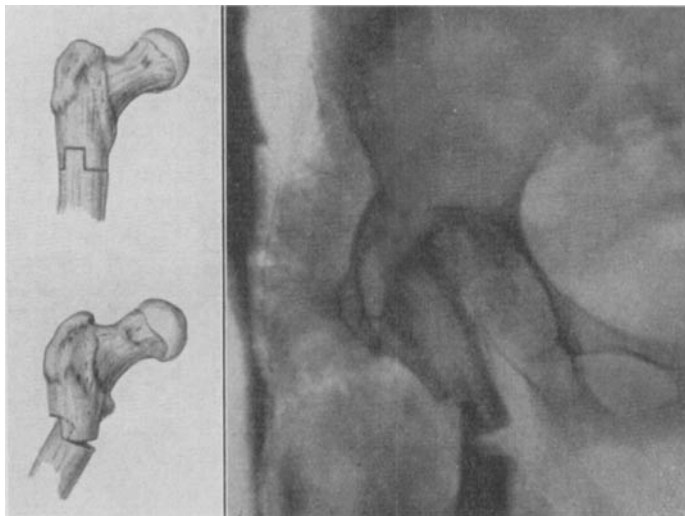


Fig. 2.

to the lower. And this is prevented by the peg. The osteotomy is fixed completely.—(Cinematogram.)

If there is present beforehand a flexion contracture, it may be counterbalanced by chiselling out a little of the posterior surface of the bed of the peg. During the performance of this operation the patient has been lying on his side. Now he is turned over in a slightly oblique position, and the wound is closed with catgut throughout; a hip plaster bandage is applied, covering also the other extremity to the knee. For control, the field of operation is roentgenographed before plastering and as soon as the cast is finished. The cast is cut open after 8 weeks; then the patient stays in bed one week more, in the loose cast, training in active motion of the leg; and he is allowed to get up 9 weeks after the operation.

In his aforementioned work, *Lance* employed a similar technique with a bone peg (Fig. 2), but he did not remove any wedge of bone.

Judging merely from the illustrations the method may perhaps appear rather difficult technically, but it really is quite simple. As the fracture is impacted, the patient has practically

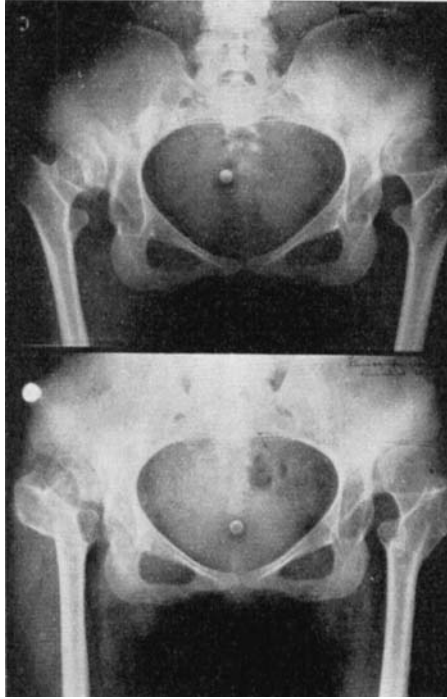


Fig. 3.

no pain after the operation, and he can be turned over on the side already on the day after the operation, for cleansing of the anal region, without any inconvenience.

Like any other method, of course, this one does not give good results in every case, but it is our impression that with this method we will have fewer disappointments than before—and the anatomical result, as shown in Fig. 3, is captivating. But two other, equally important, questions arise—namely, those

concerning the *site of the osteotomy* and the *size of the angle* to be formed. The answers to these questions have to be individual, depending in each case on the character of the lesion and the present anatomical conditions. Our materiel is as yet



Fig. 4.

too small to allow of any definite conclusions in this respect. I will have to limit myself to mention the lines we have followed and the general impression I have received from working up our materiel.

In the first place: *Where is the osteotomy to be laid?* Gradually we have arrived at the view that the osteotomy is to

be laid just opposite the lower edge of the acetabulum, which shows distinctly in all roentgenograms as a crossing of two lines. The lower picture in Fig. 4 shows that, according to this statement, the osteotomy has here been placed at a rather low level, but nevertheless the result is ideal. So in this respect, presumably, a certain margin is allowed. In the upper picture the osteotomy is laid precisely at the given level; and here the result is good too.

In the next place: *How wide is the angle to be?*

Generally it may be said, that the nearer the osteotomy to the lesser trochanter, the greater has the angle to be. But, as far as I can see we have also here a wide margin.

With low osteotomy an angle of 30—45° appears to be suitable; with higher osteotomy the angle ought to be 45—60°. In Fig. 4 the angle is respectively 40° and 50°.

We read the angle directly under the operation by means of a lead band. If the osteotomy is laid immediately below the lesser trochanter, we have to include in the calculation the angle of the part of the greater trochanter in relation to the long axis of the femur. If this is not taken into consideration, the angle obtained will be 20—30° too small. We have not laid any stress on getting the upper fragment flexed—it always places itself in some degree of flexion—but if the head is displaced uncommonly far backwards, it is easy, besides the angle of abduction, to obtain also a flexion of 30—40° simply by chiseling off a part of the posterior margin of the bed of the peg and deepen the resting point of the peg anteriorly in the upper fragment.

Considering the roentgenograms taken in the frontal plane, in the most successful cases it looks as if we have obtained that the femur is supported directly against the pelvis when the extremities are parallel; and one would be inclined to think that this is the reason why the Trendelenburg has become negative. Clinically as well as roentgenographically, however, there will often be an adduction in the hip amounting to 20—30°, and that naturally rules out this explanation and the hypothetical view of the bony support as the essential point. In these cases

it is the lowering of the greater trochanter plus the shifting of the loading weight-carrying axis medially and somewhat forwards that decides the outcome.

But then it occasionally happens that we obtain no adduction of the leg, in spite of a correct angle of osteotomy. The leg remains in an abduction of 10—20°. When this happens in unilateral luxation it is of minor or no importance. The patient (in one of our cases, a girl) places her legs parallel by lowering the pelvis—something she has been doing already all her life because of the shortening present. If the abduction contracture results in a case of bilateral luxation, however, the extremity becomes too long. If, on the other hand, the capacity for adduction is lowered or perhaps abolished, the gait will be straddling; and in one case of this kind we have had to make a new osteotomy one year later. Stereoscopic roentgenograms explained at once this surprising condition.

As a rule, the luxated head of the femur stands above and back of the acetabulum. Through the osteotomy the upper fragment of the femur is pushed in against the iliac bone, back of the acetabulum, and this explains the often marked capacity for adduction in spite of an osteotomy angle of 40—50°.

In one of our cases where abduction contracture resulted, it was found that the head of the femur stood right over the acetabulum, and on adduction of the osteotomized extremity the lesser trochanter hit against the posterior edge of the acetabulum, which naturally absolutely prevented any further adduction.

Reexamination of these patients has shown, in keeping with the decisions reported by other authors, that several cases show a gradual *decrease of the osteotomy angle*, which may be straightened out so much that the later result is not so good as the immediate. The present material is not old enough to illustrate this, we may perhaps say, unfortunate aspect of the method. We have two cases in which the angle has decreased 15° after removal of the plaster.

It appears as if this straightening takes place especially in very young individuals, and it has been asserted that osteotomy

for this reason should not be performed before the age of 15 years. This applies not to coxa vara, for which the operation should be performed preferably at the age of 3—4 years. We have performed osteotomy at the age of 12 years, and we intend to lower the age limit to 9—10 years in case of unilateral upwards displacement with scoliosis resulting herefrom. If at the age of 18—20 years the angle should be straightened out so much that the Trendelenburg again is positive, the required operative measure is simply a new osteotomy, shortening the operated side by from 1 to 2 cm.

We then turn to another lesion in which subtrochanteric osteotomy is useful, namely: *arthritis deformans of the hip*. Here we have to distinguish between two groups of cases. In one group the hip is practically stiff and as a rule in marked flexion and adduction contracture. In these cases the operation is quite simple. Osteotomy is performed right under the lesser trochanter, and the leg is adjusted in moderate abduction and about 15° flexion. This is one of the most gratifying operations the orthopedist may have occasion to perform. The hip is stiff and will remain so, but that cannot be helped. The point is: the patient becomes free from pain and able to walk without a limp.

In the other group the patient is often quite young, coming to the doctor on account of increasing pain, but with fairly good capacity for flexion. These cases are difficult to handle. In many cases, it is true, we are able to mitigate or relieve the pain, but run the risk of lowering the faculty of flexion even to ankylosis, so that what is gained in one way is lost in the other. We have had disappointing experiences with such cases, but fortunately good ones too.

It is obvious that when we turn the deformed head of the femur partially out of the equally deformed acetabulum, we disestablish the existing congruence, and the result will be a reduction or discontinuance of the faculty of flexion, but for-

tunately the pain will cease as a rule. In our materiel we have as yet only 9 cases of this kind, 7 favourable and 2 unchanged, so that we know nothing definite about this group. I should be inclined to think, however, that the angle in these patients ought to be less than 30° . But, as shown in Fig. 5, when in two identical cases we are able to cure one patient and unable to

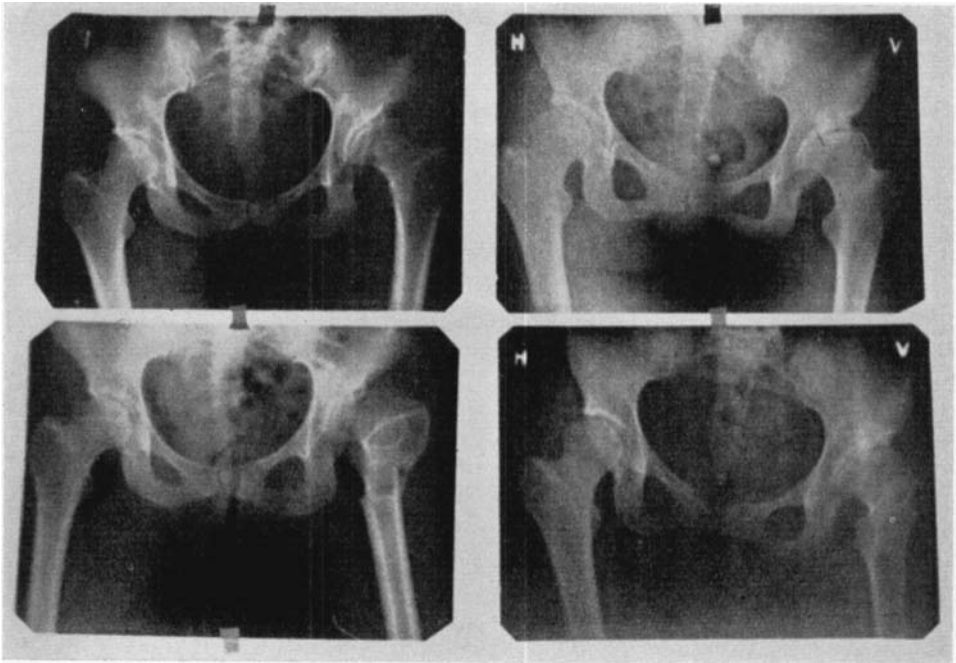


Fig. 5.

obtain any improvement whatever in the other, it is not so easy to know what to do. In both cases the osteotomy angle of 20° is in an ideal position. The pictures to the left are from a woman (Mrs. F.), 35 years old, with maximal flexion before and after the operation; but 9 months after the operation she has about the same pain as before. The pictures to the right are from another woman (M. P.), 35 years old, with a flexion capacity of 90° before the operation, and only 45° after the

operation; but the pain that was very severe before, is now all gone. She is able to walk 10 km. without any inconvenience, and the reduction in her capacity for flexion does not inconvenience her.

Adult patients with congenital luxation of the hip show not infrequently a well-developed new-formed acetabulum and at the same time, as a rule, a considerable degree of arthritis deformans. In such cases one has to be more reserved as to the performance of osteotomy than in patients with a free head of the femur. The latter may be improved in nearly 100 % of cases. In cases with a new-formed acetabulum the pain may be so severe as to constitute a compelling indication for operative treatment.

As everybody knows, arthritis deformans of the hip is a very troublesome affection, and often the physician is unable to be of any real help in such cases. Besides osteotomy, drilling of the head and neck of the femur is employed with varying result, also resection of the obturator nerve. In the autumn 1936 *Smith-Petersen* (The Journal of Bone and Joint Surgery, p. 869) suggested to remove the anterior part of the acetabular roof together with the appertaining part of the joint capsule. *Smith-Petersen* reported some very good results with this method. Personally I have performed the operation altogether 6 times, all with a very good result. So I am absolutely confident the method ought to be tried.

Arthroplasty is another treatment that may be tried, but it is a rather extensive operation, and it is my impression from the literature that the results obtained in this way are merely tolerable. I take it for granted, of course, that in such cases the patient has been treated beforehand with X-rays, diathermy, massage, and hot baths.

The third group to be mentioned is *coxa vara*, rachitic and congenital.

Here the osteotomy is laid a little below the lesser trochanter,

and the angle is made so great—from 30° to 80° —that we obtain approximately the normal column-shaft angle of 130° .

Fig. 6 shows the result in a boy, 6 years old, about 4 months after the performance of osteotomy.

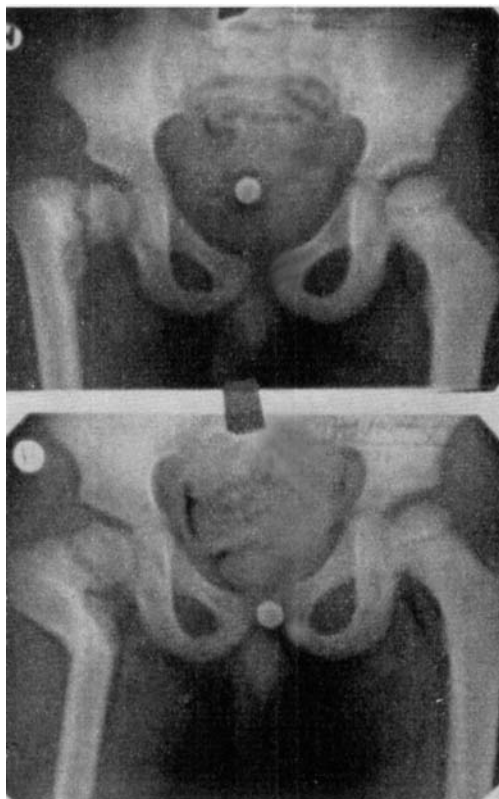


Fig. 6.

Fig. 7 is the picture of a girl, 14 years old, on whom osteotomy (without peg) was performed on the left side in 1933. The lower fragment was about to slide inwards past the upper, but this was prevented by wire stretching, and the clinical result was good. The right side was operated on in 1935 with a hole for the bone peg as suggested by *Lange*. Here

the osteotomy angle was nearly 90° —an ideal result, anatomically as well as functionally.

This presentation is based on 37 osteotomies performed on 29 patients. Since the material was collected, we have performed 15 osteotomies, with equally favourable results. The present material comprises:

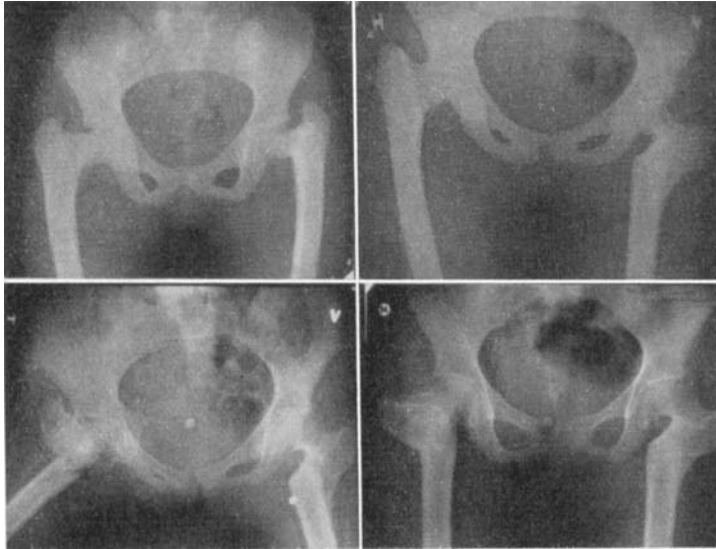


Fig. 7.

Unilateral luxation	10 cases
Bilateral „	7 „
Arthritis deformans	9 „
Coxa vara	2 „
Gluteal insufficiency after poliomyelitis	1 case

The most important movement in the hip-joint is that of flexion. If this is reduced to less than 45° , the patient is inconvenienced by it. This applies especially to older patients in whom the lacking flexion cannot be remedied so easily by a compensatory increase in the angle of pelvic inclination through adjustment of the vertebral column.

The following tables show that the subtrochanteric osteotomy here described with accurate dosage of the angle has given very good results, undoubtedly better than those obtained with the "simple" forms of osteotomy usually employed.

Unilateral Luxation.

Name	Age	Osteotomy angle	Flexion	
			Before operation	After
Liv H.	10	55°	> 90°	90°
Jenny F.	13	60° ¹⁾	> 90°	> 90°
Astri J.	13	50°	> 90°	> 90°
Ragnhild J.	13	40°	> 90°	> 90°
Gunvor V.	17	45° ²⁾	90°	90°
Martha S.	21	50°	90°	> 90°
Ragna H.	23	55°	> 90°	80°
Ingrid I.	25	55°	> 90°	90°
Klara N.	28	45°	> 90°	> 90°
Anny O.	35	40°	> 90°	90°

¹⁾ Lacking 15° in full adduction.

²⁾ " 20° " " "

Bilateral Luxation.

Name	Age	Osteotomy angle		Flexion			
				Before oper.		After oper.	
		Right	Left	R.	L.	R.	L.
Thordis H.	15	45°	45°	> 90°	> 90°	90°	90°
Hildur J.	16	30°	¹⁾	> 90°	—	> 90°	—
Henny Th.	16	35°	35°	> 90°	> 90°	90°	70°
Hilma E.	23	35°	30°	> 90°	> 90°	60°	90°
Lilla A.	23	²⁾	30°	90°	90°	90°	70°
Ragnhild H. ...	25	50°	40°	> 90°	> 90°	> 90°	> 90°
Konstanse T. ...	40	40°	50°	> 90° ³⁾	50° ⁴⁾	45°	50°

¹⁾ Operated elsewhere.

²⁾ Fracture at the site of the osteotomy in the 3rd month, angle straightened out.

³⁾ 50° flexion contracture before operation, 20° after.

⁴⁾ 35° " " " " 15° "

Arthritis deformans.

Name	Age	Osteotomy angle	Flexion		Pain	
			Before	oper. After	Relief	No Change
Paul H.	16	40°	90°	80° ¹⁾	1	
Kirsten M.	33	40°	90°	35°	1	
Olga K.	33	40°	90°	80°		1
Betty O.	33	50°	80°	80°	1	
Maren P.	35	20°	90°	45°	1	
Fru F.	35	20°	> 90°	> 90°		1
Fru T.	40	40°	0° ²⁾	0°	1	
Karl S.	44	15°+25° extension	40° ³⁾	40°	1	
Fru R.	45	35°	60°	80°	1	

¹⁾ Not satisfactory, owing to 30° flexion contracture.

²⁾ Before op. 30° flex. and 30° add. contracture.

³⁾ " " 20° " "

Coxa vara.

Name	Age	Osteotomy angle		Flexion				Abduction			
				Before		After		Before		After	
		Right	Left	R.	L.	R.	L.	R.	L.	R.	L.
Birgit H.	14	90°	60°	90°	90°	80°	90°	0°	0°	45°	40°
Roar J. ..	6		45°			> 90°		20°		60°	

DISCUSSION

N. Silfverskiöld, Stockholm:

Fracture of a diaphysis heals more slowly than fracture of spongy bone. Apart from *Schanz'* low osteotomy, therefore, I prefer to perform intertrochanteric osteotomy; in this way the dislocation is avoided, and the consolidation takes place more rapidly. In most cases I combine this method with downward moving of the trochanter. Patients who have been operated on in this way are allowed to get up 3½—5 weeks after the operation.

P. G. K. Bentzen, Aarhus:

It is now 13 years since I read a paper on subtrochanteric osteotomy, at the meeting of the Scandinav. Orthoped. Assoc.,

here at Gothenburg. The technique for the performance of the Drehmann osteotomy which I described at that time has been employed by me ever since without any technical misfortune. The purpose of such an osteotomy is partly to obtain the formation of a bend at the site of the osteotomy. When the operation is performed as treatment for a non-reposed congenital luxation of the hip, the bend should always be partly a valgus bend, partly a forwards convex bend, so that the lesser trochanter is moved forwards and inwards towards the acetabular region.

I would be inclined to think that the osteoplastic elaboration of the osteotomy suggested by *Platou* is aimed too categorically at a bend entirely in valgus position. The operation is intended to give, partly an adjustability of the leg in all directions at the site of the osteotomy, partly such a sure apposition of the two fragments that they do not slide past each other, increasing the shortening of the leg and delaying the healing of the bone. I obtain a secure contact of the fragments, for one thing, by dividing the bone obliquely (from the medial aspect and below—upwards and laterally) by means of a *wire saw*. By using a special conductor (constructed after the principle of the conductor for the Parham band) the wire saw may be laid around the bone without detaching more than a minimal amount of the strong fibrous elements at the *linea aspera*, which after the osteotomy keep the fragments firmly united. In the next place, I shape the proximal lateral tongue of the lower fragment with a Luer rongeur in such a manner as to leave a not too short point that can be introduced into the marrow cavity of the upper fragment. This form of osteotomy gives a sort of simple ball joint that allows adjustment in all directions without any risk of the fragments sliding out of the wanted position.

A. *Sundblom*, Stockholm:

It is doubtful whether it is practicable with this method to obtain a suitable angle of flexion; and this angle is at least just as important as the angle of abduction, namely for the elimination of the lordosis.

The preparation demonstrated by Dr. Platou is an ideal model, not something accomplished under an operation, and yet this preparation does not allow of flexion mobility beyond a few degrees.

P. Guildal, Copenhagen:

The technique of the subtrochanteric osteotomy included many details that might give rise to discussion. Here G. would merely mention the questions about rotation of the lower fragment in relation to the upper, the age at which the operation is apt to give the best result, and the site of the osteotomy in relation to the upward displacement.

G. would like, however, to enter into two questions that were connected most directly with the report presented by the lecturer. One was the importance of having an angle formed with the vertex pointing forwards—something G. took to be just as important as the angle with the vertex pointing medially. The latter brought the support medially, and this shifting was at least just as important as the formation of the angle of the femur. The former brought the support forwards, so that the lordosis was straightened; and this lordosis with the secondary arthritic changes would in the course of time be most disabling in these patients.

In several of the demonstrated X-ray pictures the lordosis had not been eliminated.

The other point was the question as to how one might best ensure the maintenance of the desired position, as the upper fragment through the pull of the *glutæus medius* had a tendency to be placed in abduction—and G. had observed this feature even 2 months after the osteotomy. G. had attempted fixation with *Schanz* nails, but even though these were left in for 3–4 weeks, he had seen a faulty position arise. Lately, therefore, he had employed the technique given by *Lance* and *Mommsen* which afforded an extraordinarily stable locking of the fragments. G. thought that this stability was superior to that reported by *Platou*. This operation might perhaps look somewhat

complicated but it involved no particular technical difficulties when it was carried out with drill and saw (Difra or Bayer).

H. Camitz, Gothenburg:

The technique of the bifurcation operation has been facilitated considerably through the X-ray apparatus.

By means of small drills it is practicable to establish precisely the proper place for the osteotomy. At this site, then, I carry through the osteotomy either as a straight cross-section or somewhat oblique. Immediately after this, I place the fragments in the position I think they ought to have, and with the control of roentgenography I adjust them till their position is good. In my cases the fragments have never become displaced.

There is only one contraindication for the bifurcation operation, and that is when the head of the femur rests in or, rather up against a false acetabulum, as this condition implies a risk of ankylosis, for we can obtain no mobility in two firmly united joints with different axes of articulation. It may be difficult to judge whether the contact between the head of the femur and the wall of the pelvis is pronounced enough to jeopardize the result.

If such an ankylosis is the result I recommend to extirpate the head of the femur. I am able here to demonstrate on the screen a couple of cases of this kind in which the final result is fairly good.—

I think, therefore, I am able to recommend this method in such cases which often seem rather hopeless.

P. Haglund, Stockholm:

I have been very interested in the discussion here carried on about many different details in the technique for improvement of the functional condition of a defective hip-joint. Perhaps I may be allowed to say that I think that when it comes to operative treatment of defective hip-joints there is a general tendency to lay too much stress upon the details of the technique. If we understand the functional situation of the defective

hip-joint and the principle for its improvement, we may reach the goal in many different ways. Every orthopedist elaborates the technique that to him appears to be the most rational and the most easy to carry out. In this connection I may repeat what I often have said to the students in speaking of the unlimited variability of orthopedic cases: "In orthopedy it is essential in each case to invent the operation that is most suitable in the given case."¹)

¹) The last words of *Haglund* in the Northern Orthopedic Association.