

PROCEEDINGS OF  
THE NORDISK ORTOPEDISK FORENING'S  
24TH MEETING IN HELSINGFORS  
JUNE 1949

The annual meeting of the Scandinavian orthopaedic association was held at Helsingfors, Finland June 49 under the presidency of G. Wallgren, Helsingfors.

EXPERIENCE WITH BUNNELL'S PULL-OUT WIRE SUTURES

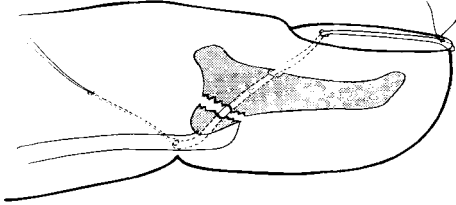
by *Erik Moberg* (Göteborg)

Bunnell's method of suture with stainless steel wire and a pull-out wire has been used in the reconstruction of the hand, as shown in the picture and in the Table.

The pull-out wire technique has been used for	
attachment of tendons in tenodeses .....	8 cases
attachment of digital ligaments .....	5 „
attachment of ruptured dorsal aponeurosis	
to the base of the middle phalanx.....	7 „
ditto to the base of the distal phalanx.....	16 „
attachment of flexor profundus to its fractured	
insertion .....	3 „
attachment of tendons to the skeleton .....	37 „
in free tendon transplantations	
in reattachment of tendons	
in tendon transfers	
suture of flexor tendons .....	3 „
	79 cases

In 2 cases the pull-out wire broke when pulled; this is a complication which can, no doubt, be avoided by using a rubber band for traction on the suture in cases which may give difficulty. No gliding function was obtained in the 3 cases of group 7. In the rest of the cases the results

were uniformly good, and the method can be regarded as a considerable advance in a field where other techniques are difficult to carry out and have given unsatisfactory results.



Suture and pull-out wire for fixing the fractured attachment of the flexor profundus to the finger.

#### DISCUSSION:

*Bentzon* (Århus) has for a number of years consistently used the pull-out wire principle in various operations, e.g. in the interposition treatment of painful pseudarthrosis fractures of the carpal navicular bone. In these cases the fatty connective tissue flap is fixed to the bottom of the fracture gap with a suture which is passed double through the skin on the volar surface of the wrist. For these operations he always uses fish gut (silkworm gut), which never give trouble in pulling out as they is so smooth and flexible.

*Severin, Moberg.*

#### MEDULLARY NAILS AS AN AID TO CERTAIN PLASTIC BONE OPERATIONS

by *Anders Westerborn* (Göteborg)

Medullary nailing has now won a secure place in the surgery of fractures. Experience of its use in plastic bone operation is, however, still small, and it is desirable that cases in which it has been used in this way should be reported.

In Surgical Department II of the Sahlgrenska Sjukhus, medullary nailing has been used in 20 cases of bone-shortening, bone-lengthening, correction of faulty positions and joint resections, and the experience gained has been very encouraging. The main advantages are the absolute fixation, which facilitates union, and the avoidance of a big plaster cast in the after treatment. Further, stiffness in the joints is avoided, since physiotherapy can be started early and the patient can be allowed up early. In some cases medullary nailing makes it possible to carry out a more radical treatment than would otherwise be possible. The nail has no harmful effect on the tissues, in particular none on the bone-

marrow. The risk of infection is very small, and can be still further reduced by the use of sulfa and penicillin preparations.

Some typical cases of medullary nailing for resection of the knee, bone-shortening and subtrochanteric osteotomy were reported.

#### DISCUSSION:

*Bentzon:* Dr. Westerborn's proposal to widen the indications for the use of medullary nailing must be regarded critically. The medullary nail principle can undoubtedly be said to have some mechanical advantages, but from both the biological and the general surgical points of view the method is less attractive, and one can never disregard the risk involved in inserting such a large foreign body into the marrow cavity. In October, 1948, I attended the Annual Meeting of the B.O.A. in Belfast, where a paper was given on the medullary nailing of fractures. The British orthopaedic surgeons present were completely silent; they clearly avoided the method. I, however, felt bound to report a case of pseudarthrosis of the femoral shaft which had been treated by medullary nailing, and which, in spite of all *lege artis* treatment (preparatory penicillin treatment, etc.), became infected. In such cases the infection spreads rapidly along the nail through the whole marrow cavity. Finally it was necessary to amputate.

I regard the use of a medullary nail for a simple knee resection, involving as it does the opening of the medullary cavities of both the tibia and the femur, as inexcusable, for there are a number of other, less extensive, and very satisfactory methods of primary fixation after a knee resection.

*Agerholm-Christensen* (Copenhagen): We have become very reserved in our use of medullary nailing. In our experience callus formation is delayed and the risk of delayed healing and possible pseudarthrosis is increased. We have also seen that the medullary nail may bend after a long period of non-weight-bearing, and we have been faced with the difficult problem of removing the bent nail, for which it is often necessary to chisel away a considerable amount of bone, and of then performing some other kind of osteosynthesis.

*Sten Friberg* (Stockholm): I should like to join myself with what Dr. Bentzon has said. It cannot be denied that the Küntscher nail is sometimes a great help, but it has hardly had the general success which was at first expected, and surgeons in various places are becoming a little more cautious about its use. Whether it is used for fresh fractures, pseudarthroses, bone shortenings, or joint resections, it has been generally found that the consolidation is slow. This could also be seen in three of Dr. Westerborn's cases. One must also question both the advisability

of performing an arthrodesis in a still active arthritis and the wisdom of using in the knee joint a Küntscher nail, which makes its own track into the medullary cavities and reduces the chances of a good contact of the osteotomy surfaces.

*Westerborn, Støren.*

### THE INDICATIONS FOR OPEN REDUCTION OF CONGENITAL DISLOCATION OF THE HIP

*E. Platou* (Oslo): The results of open reduction of 50 hips in 44 children with congenital dislocation of the hip.

The indications for open reduction were:

- 1) All hips which a skilled orthopaedic surgeon could not reduce in 30 minutes.
- 2) All hips where the head was too far out and re-dislocated easily without marked slipping.
- 3) All hips which redislocated while in plaster or later, and in which there had been no fault in technique.

The hip-joint was exposed by a Smith-Petersen's incision. In about half of the cases it was not necessary to divide the rectus muscle.

The joint capsule was opened widely with a cross-shaped incision, and the tissues preventing reduction were removed. The bony parts of the acetabulum were never touched.

Plaster was applied with the hip in full extension, 50' abduction, and 30-40' pronation, and left on for 8 weeks. After this a plaster shell was applied with 30' abduction and still 30-40' pronation. Massage and stretching was given daily. After 4-8 weeks the child was allowed up on a tricycle; after a further 4 weeks he began to walk, i.e. 4-5 months after the operation.

The obstructions preventing reduction were:

Isthmus .....	21 hips
Isthmus + ligamentum teres .....	4 hips
Ligamentum teres .....	5 hips
capsular fold above .....	3 hips
" " below .....	10 hips
" " " + ligamentum teres .....	3 hips
Connective tissue in the acetabulum .....	4 hips

In some cases the reduction was unsatisfactory. The head was too big for the acetabulum, and could not be brought properly under the upper rim. In these cases a shelf operation was considered. A shelf was made at

the end of the operation in 5 hips, and a later date in 5 hips; in 2 it was made before the open reduction.

When the head is in position, the question is: what is the position of the limb and how much pronation is required to keep it in the best position. This depends on the original antetorsion. The physiological antetorsion is about 20°, so that a corresponding pronation of the limb is normal. If 60-90° pronation was necessary a rotation osteotomy was performed 4 weeks after the reduction.

The clinical results are summarised under the following headings:

*Excellent*: no symptoms from the hip-joint.

*Good*: slight symptoms, viz: a slight limp and slight pain after extra exertion, but no inconvenience from the hip in daily life.

*Bad*: a marked limp, with constant pain and considerable inconvenience from the hip in daily life.

The radiographic results are also summarised under 3 headings:

*Cured*: a normal hip-joint (In most cases there will be some small deviations from the normal, but in this group they were thought to be insignificant).

*Good result*: a moderate deformity of the femoral head and neck or of the acetabulum, a slightly high position of the head, but no subluxation.

*Bad result*: luxation or subluxation, and marked deformity of the head and neck.

For the sake of simplicity the material is divided into 2 groups, good and excellent results being taken together.

1-5 years after operation:

	On discharge	1-5 years after operation
Clinical result .....	18 good 6 bad	18 good 6 bad
Anatomical result .....	17 good 7 bad	17 good 7 bad

The primary results have remained unchanged. But the picture is quite different 5-13 years after operation.

	On discharge	5-13 years after operation
Clinical result .....	20 good 3 bad	13 good 10 bad
Anatomical result .....	19 good 4 bad	6 good 17 bad

Out of 20 good primary clinical results, 7, or one third, and of 19 good primary anatomical results 13, or two thirds, have changed to bad results.

Of 13 clinically good results only 6 are anatomically satisfactory. This demonstrates the old experience that one cannot say anything definite about the function from the radiographic picture. But I am afraid that in 10 years time many of the 13 now classed as good clinical results will no longer be in that group.

*Rotation osteotomy* was performed 4 times, twice with a good result and twice with a bad result.

To summarise our experiences:

One should not be over reluctant to use open reduction.

Smith-Petersen's incision is the simplest approach to the hip-joint. It does not cause much bleeding, and children stand the operation well.

We are most glad that we have been able to *see* the importance of antetorsion for the position and have been convinced that rotation osteotomy is both useful and necessary. It should undoubtedly be used much more widely than it is.

*E. Severin* (Göteborg): Open reduction of congenital dislocation of the hip has been reserved by most surgeons for cases in which closed treatment is unsuccessful. In recent years the indications for open reduction have been widened by some surgeons. The most extreme representative of the active group was the late *Leveuf*. He considered that closed treatment of a complete dislocation was bound to fail, since the limbus, the capsule, the ligamentum teres and other soft tissues must lie as a hindrance to the head on its way into the acetabulum. *Leveuf* wrote: "When good results were obtained in congenital dislocation of the hip by closed reduction without arthrography, according to the former methods, the condition was a primary subluxation and never a true luxation." (*Jour. of Bone Jt. Surg.*, Oct. 1948). Consequently, he recommends open reduction for all cases with complete dislocation.

*Leveuf's* method of operation is drastic. After chiselling away the trochanter, the soft parts are cleared out of the acetabulum, the capsule is freed from off the ilium, a shelf is made, and in some cases an osteotomy of the neck of the femur is performed. The neck is pinned with the head and neck in the corrected position.

The most important argument in favour of this big operation should be that there is a primary interposition of soft tissues between the head and the pelvis, and that these could not be removed by closed treatment.

In order to show the progress of a congenitally dislocated hip after reduction I have studied the arthrograms of 115 dislocated hips in 77 cases treated during the years 1937-40 at the Orthopaedic Clinic, Van-förestalten, Stockholm. In one third of the cases arthrography was repeated one or more times during treatment.

The main lessons which can be learnt from the investigation are: When a complete dislocation is reduced in a child over 1 year one can never expect that the cartilaginous roof of the acetabulum will immedi-

ately take on a normal form. In half of the cases the limbus is pushed up above the Y-line, and in the other half it is interposed between the head and the pelvis. A primary interposition does not, however, mean that closed treatment is bound to fail. On the contrary, it is a usual finding that the interposition is overcome in the course of a few weeks or a few months, if the head can be maintained against the acetabulum. The later course of these cases with primary interposition is no more unsatisfactory than that of other cases. In other words: a primary interposition does not in itself justify open reduction.

72 hips, all with complete dislocation confirmed on the arthrograms, which have been treated by closed reduction, have been followed up for at least 5 years. In no case did dislocation recur after the treatment was completed. In one third of the cases subluxation had occurred, and in the remaining two thirds the head was in a normal position in the acetabulum.

The arthrograms as well as the follow-up studies show that even complete dislocations could be successfully treated by closed reduction. Published pictures and case-histories show that deformations changes occur in a very high percentage of hips treated by open reduction. Closed treatment carried out by modern methods, with early gentle reduction and free rotation at the hip after reduction, gives late anatomical results which, as far as we can judge now, are far superior to those of open treatment. It would therefore be incorrect to use open reduction as a standard method in the treatment of congenital dislocation of the hip. Open reduction should only be considered for cases in which closed reduction does not give the desired result.

(Paper to be published with illustrations, in the *Acta Orthopaedica Scandinavica*.)

*S. Barner-Rasmussen* (Helsingfors): At the Orthopedic Hospital of the Rehabilitation Centre of the Invalidisäätiö-Invalidistiftelsen, about 50 children with congenital dislocation of the hip have been treated by open reduction during the last 3 years. The reason for adopting this procedure was the dissatisfaction felt here—as elsewhere—with the large proportion of poor results obtained with closed reduction. The follow-up of the immediate results of the operation is still in progress, so it is not possible to give exact information.

The indications for operation have always been considered in relation to the arthrograms after closed reduction has been tried. At first these were regarded with considerable pessimism, so the indications were relatively wide. But increasing experience has narrowed the indications to:

cases in which the femoral head cannot be brought down to the level of the acetabulum,

cases which have been unsuccessfully treated in other hospitals, or have re-dislocated while in plaster, cases in which the head will not pass the isthmus, and finally cases in which the arthrogram shows a significant and massive inter-position of the soft parts (not contrast positive) between the head and the bottom of the acetabulum.

In border line cases unilateral involvement favours operation, and bilateral involvement is a relative contra-indication.

TECHNICAL ASPECTS OF THE OPERATIVE REDUCTION OF  
CONGENITAL DISLOCATION OF THE HIP  
by *F. Langenskiöld* (Helsingfors)

The technique used at the Orthopaedic Hospital of the Rehabilitation Centre of the Invalidisäätiö-Invalidstiftelsen has been influenced by the following observations:

- 1) Most of the redislocations seen after manipulation are anterior, obviously due to the marked anteversion of the head and neck, combined with external rotation.
- 2) After reduction, the gluteus minimus muscle is flaccid.
- 3) The longer the period of immobilisation after operative reduction, the poorer is the mobility.

From these observations we have drawn the following conclusions:

- 1) An anteversion of more than 60° must be corrected by osteotomy.
- 2) The internal rotation must not be wakened by any such measure as detaching the gluteus minimus muscle from the iliac crest. Instead, it should be strengthened by attaching the capsule to the neck, under tension, and by transplanting the greater trochanter, with the insertion of the gluteus muscles, downwards and backwards.
- 3) Immobilisation in plaster is reduced to 2-3 weeks, followed by 3 weeks of skin traction.

A detailed report of the technique will be published in this journal.

REDUCTION AND SHELF OPERATIONS IN OVER-AGE CASES OF  
CONGENITAL DISLOCATION OF THE HIP  
by *Gunnar Wiberg* (Lund)

Over-age cases of congenital dislocation of the hip, by which is meant cases which do not come for treatment in the first 2 years of life, may be treated by slow reduction by traction applied for several weeks. When, in this way, the head has been reduced to a central position in the acetabulum, a final open reduction, supplemented with a shelf opera-

tion, can be performed if necessary, The shelf is made, as originally recommended by Gill, by completely breaking down the whole roof of the acetabulum. 2 cases, aged 4 and 5 years respectively, were reported.

#### THE SHELF OPERATION AS A SUPPLEMENTARY OPERATION FOR CONGENITAL DISLOCATION OF THE HIP

by *H. S. Nissen-Lie* (Oslo)

57 patients, aged between 2 and 10 years, with congenital dislocation of the hip treated by a shelf operation after closed reduction, are reported. The indication was relaxation after repeated attempts at reduction. The operations were performed 3 months to 3 years after the first reduction.

47 patients were re-examined more than 2 years after the operation. At the follow-up examination 20 were symptom-free, 23 had no pain but a slight limp, 14 had pain and considerable limp.

The radiographic result was far worse. In only 1/4 (13) was the result satisfactory; in 29 cases there was a shallow acetabulum with a subluxated head, in 15 there was a total luxation. In 20 cases the shelf had either been totally resorbed, or was so high that it was no use.

The reasons for the bad results are discussed. The main factor appears to be the reduction. If a satisfactory reduction had not been obtained, the result was usually bad. If the reduction had been satisfactory, the result was good, but it is doubtful whether the shelf played any part in the good result.

The investigation seems to show that shelf operations do not materially improve the prognosis, and that one must always aim to obtain an anatomical reduction, if necessary by open reduction.

On the other hand, shelf operations appear to have a good result in subluxation cases aged over 5 years.

#### DISCUSSION:

*Støren* (Stavern): In connection with *Nissen-Lie's* paper I should like to report one case which I believe is included in his material. I report it because the operation which I performed should be tried in cases where a shelf operation fails. The shelf operation had been performed twice, presumably both times satisfactorily from the technical point of view. When the patient came to me she had a marked limp from a strongly positive Trendelenberg. She was said to have limped more since the last operation. The radiographs shows that the acetabulum is quite indefinite, only traces of a shelf remain, and the head lies outside its outer border.

I performed an operation which was described by *Colonna*: After thorough preparation by traction in internal rotation an open reduction

is performed. The capsule is incised near its acetabular attachment. A deep, wide acetabulum is chiselled out at the original site, so that one can see the Y cartilage centrally at the bottom. The capsule is sewn up over the head. No attempt at all is made to mould the head, which is reduced. Plaster is applied for 3-4 weeks in extension and abduction.

The operation is drastic, and cannot be called physiological, but *Colonna* has followed up cases for 10 years and found such good results that I thought it justifiable to try the method in a bad case like this. I operated on her 4 months ago, and the preliminary result at any rate is good. There is no danger of re-dislocation, but the mobility will probably be reduced.

*E. Severin:* In assessing the indications for open reduction, it is not possible so to simplify the problem that open reduction should be done in all cases where closed reduction has been unsuccessful. If the patient is over age, or the dislocation is very high and there is rigidity of the soft tissues, either reduction cannot be performed by any means, or it can be carried out only with such trauma to the joint that secondary deformity and stiffness must be the inevitable result. One must be clear about what will be gained and what lost by the operation. A stiff hip on one side does not necessarily mean a big disability for the patient. Two stiff hips, particularly if they are painful, are severely disabling. The indications for treatment cannot therefore be the same for cases with dislocation on one and on both sides.

In cases with unilateral dislocation one must, even when there is evident risk of later deformans changes in the joint, try to secure the femoral head in the region of the acetabulum. When, by reduction, the considerable difference in the length of the two legs is reduced, a good foundation has been laid for future orthopaedic procedures, whether these be arthroplasty or arthrodesis, if they should be necessary. Even though the joint either becomes or is made quite stiff, the price is worth paying.

This is not so in cases with bilateral dislocation. If, in these cases, bilateral painful stiff hip develops, the treatment has worsened the patient's condition instead of improving it. A persistent dislocation can sometimes give astonishingly little trouble. I have seen a patient with persistent bilateral congenital dislocation of the hip who was still, at 35 years of age, doing heavy agricultural work without any complaint except of his limp. However, subluxation with arthritis deformans usually gives considerable trouble in adults. When the reduction is very difficult the risk of future deformity and subluxation is always considerable. If the dislocation is bilateral it may be best to avoid completing the reduction. If, in a case of bilateral dislocation, one succeeds in reducing only one hip, the future functional result will

be very poor. Usually subluxation and deformans changes in the reduced hip occur early. It is true that the patient limps worse on the unreduced side, but as it is the reduced side which is painful, it is the reduced side which causes the most disability. So soon as it is seen that in a case of bilateral congenital dislocation of the hip it is only possible to reduce one hip, this hip should be redislocated and both hips left unreduced.

This negative indication will be altered the day we have a fully reliable arthroplastic treatment.

The following principles for the treatment of congenital dislocation of the hip might be laid down:

- A. Closed reduction should always be attempted first. It should be carried out as early as possible and without much manual force. "Slow" reduction with extension and abduction may be tried. If reduction cannot be obtained without trauma, closed reduction is considered to have failed.
- B. Open reduction is used:
  - I: In unilateral cases
    - a) with unsuccessful primary reduction,
    - b) with persistent subluxation after closed reduction, in spite of 2 months retention of the head against the acetabulum,
    - c) with redislocation or a tendency to redislocation after complete closed reduction.
  - II: In bilateral cases
    - a) Closed reduction has been successful on one side. Open reduction is performed on the other side
      - 1) with unsuccessful primary closed reduction
      - 2) with persisting interposition after bloodless reduction in spite of at least 2 months retention of the head in the acetabular fossa,
      - 3) with redislocation, or a tendency to redislocation, after complete closed reduction.
    - b) Closed reduction has failed on both sides.  
If the head can be pulled down on both sides, open reduction should be considered.
    - c) If there is a high dislocation with rigidity of the soft tissue on both sides both joints should be left unreduced.

In these proposals I have intentionally avoided stating any definite age limits. The radiographic appearance and the findings on palpation, perhaps under anaesthesia, are more important than the patient's age.

*Bentzon, F. Langenskiöld, Berntsen, Friberg, Platou.*

## METATARSUS PRIMUS FLEXUS

by *K. Vainio* (Helsinki)

By the term metatarsus primus flexus we mean the plantarflexion of the 1st metatarsal, which occurs when the peroneus longus is stronger than its antagonist, the tibialis anterior. In this condition the ground is touched first, when walking, by the fallen capitulum, and secondary changes develop on it. Metatarsus primus flexus may be seen in a wide variety of static and functional disorders of the foot. It was seen in 45 out of 1500 patients at the Orthopedic Hospital of the Rehabilitation Center of Invaliidisäätiö-Invalidistiftelsen.

*Treatment:* For mild cases, conservative treatment with exercises and foot support. For moderately severe static deformities, *Bentzon's* operation, i.e. division of the peroneus longus tendon and attachment of the proximal stump to the peroneus brevis. For paralytic cases, the peroneus longus should be transferred to the insertion of the tibialis anterior. *Gocht's* transplantation of the extensor hallucis longus to the first metatarsal does not give a satisfactory result. For severe cases with fixed deformity, the tendon transplantation is supplemented by subtalar arthrodesis or wedge resection in the cuneometatarsal joint. In spastic cases the peroneus longus is weakened by *Stoffel's* technique.

## A CASE OF ACQUIRED LUMBAR SPONDYLOLISTHESIS

by *Lars Unander-Scharin* (Stockholm)

A case of spondylolysis and spondylolisthesis of the neural arch of a 3rd. lumbar vertebra, which had shown no abnormality at 3 previous radiographic examinations, is reported. The spondylolysis was observed 5 years after an osteosynthesis between the 3rd. lumbar vertebra and the sacrum. The osteosynthesis had been performed because of pain in the back, associated with definite radiographic evidence of degeneration of the 4th. intervertebral disc. A theoretical distinction has been made between congenital, acquired and traumatic spondylolyses. Previously, only congenital spondylolyses had been demonstrated. This case can be regarded as confirmation of the occurrence of acquired spondylolysis. It is also interesting as being the only one reported as occurring after a lumbar osteosynthesis.

## DISCUSSION:

*Bentzon* reported that the Orthopaedic Hospital in Århus had had about 100 cases of spondylolisthesis. In only 1 of them was it possible to show on radiographs taken at definite intervals any increase in the displacement. He described and showed on a film the method he used for fixing the spondylolisthesis with a long cross graft, inserted into a notch in the lower surface of the spinous process of the vertebra above the spondylolisthetic vertebra—i.e. usually L IV—so that it rests, on both

sides, on the gutters chiselled out on the iliac crest (see Acta Orthopaedica Scandinavica Vol. IX P. 175).

*Støren:* Regarding the operative treatment of these cases I should like to mention the operation which is rational for cases with considerable slipping at the spondylolisthesis, i.e. fixation of the bodies with an anterior bone graft.

We know *Pawel's* law for fracture of the femoral neck: that compression encourages and tension discourages union at a pseudarthrosis. Examination of a spondylolisthesis with a considerable degree of slipping will show that the slipping will tend to compress an anterior graft and to pull on a posterior graft. The operation in advanced cases of spondylolisthesis is not so simple as *Mercer's* description in his Orthopaedic Surgery suggest, and *Mercer's* technique cannot be used in these cases. I have chiselled out a groove a finger's breadth wide and 2-3 cm deep in the spongiosa of LV and S1, cut out as much as possible of the intervertebral cartilage, and replaced it with spongiosa from the vertebral bodies: finally, a spongy graft of iliac crest is fixed sagittally into the groove. I have done this operation 5 times, first in 1944. The complication has been a tendency to ileus after the operation; this I believe to be due to oedema of the mesentery.

*Friberg, Unander-Sharin, Nissen-Lie.*

#### TRACTION LESIONS OF THE PERIPHERAL NERVES

by *Agerholm-Christensen* (Copenhagen)

Apart from birth lesions the number of cases of traction lesions of the peripheral nerves is rather few, and these lesions undoubtedly occur more often than they are recognised. (Short histories of 5 typical cases seen in the last few months were given here).

When I was working with Professor Seddon at the Peripheral Nerve Injury Unit at the Wingfield Hospital, Oxford in 1944-5, I collected together 94 cases of traction lesions of the peripheral nerves and we were to have published a paper on them.

The subject is a big one and rather complicated, and only a few points will be made here.

The 94 cases formed about 7 % of the first 1300 nerve lesions seen at the Centre.

*Causes:* The material was collected during the war, but the accidents which caused the lesions can all occur in peace time. 47 were caused by road accidents (31 motor cycle, 20 car, 6 bicycle), 16 by flying accidents, 7 by falls, 4 by machinery accidents and 3 by surgery.

*Age-groups:* 49 patients were aged between 20 and 30 years, and 21 between 30 and 40.

*Nerves Involved:* The brachial plexus and its nerves were affected

in 67 cases, most due to characteristic falls on the shoulder. The sciatic nerve was affected by 13, either by dislocation of the hip or by hyperflexion of the extended leg at the hip. The peroneal nerve was affected in 14 by adduction of the knee, usually with evulsion of the biceps tendon.

*Morbid anatomy:* In the mildest cases, with clinical transient block,—"neurapraxia"—no changes were seen. In the severest cases there was complete rupture of the nerve with wide separation of the ends and very large neuromata. In the intermediate cases the picture showed a wide range of variation, but typical was the scattered patchiness of the changes along the nerve over considerable distances. This patchiness affected not only the nerve as a whole, but also the individual fibre, which might be injured in several places; further in some places the injury might involve the whole fibre—"neurotmesis"—while in others only the axon might be damaged, the sheaths being intact—"axonotmesis". Macroscopically it is easy to recognise a traction lesion: the nerve has often a pinkish-yellow colour its consistency is harder than normal and uneven over long distances, and its surface is irregular.

The *clinical picture* varies, of course, with the anatomical lesion. The mildest cases, with "apraxia" or "transient block" are hardly ever seen in special departments, as they recover before they arrive. The severest cases have complete motor and sensory loss. Intermediate cases show very different pictures, in accordance with the many variations of damage to the nerve fibres. On admission to a special department the clinical picture is often clearer than immediately after the injury, as there has usually been a lapse of 2-3 months and the transient block part of the picture has disappeared.

Many cases show a characteristic dissociated lesion, the motor loss being usually more severe than the sensory: e.g. there may be a complete motor paralysis of the muscles supplied by the sciatic nerve, without any sensory impairment, or a complete motor paralysis of the muscles supplied by the brachial plexus and a partial sensory loss confined to the area supplied by the 5th and 6th cervical roots.

*Progress.* Re-innervation is best followed by observing the return of voluntary muscle power. In traction lesions it does not follow the course observed for nerves damaged by more direct, localised injuries, neither as regards the rate of recovery nor its progress proximally-distally. Similarly, the onset and completion of recovery, both motor and sensory, is less predictable, and one must realise that re-innervation may occur very late, e.g. more than 3 years after injury, even for the proximal muscles of the arm.

*Treatment.* The mildest cases, which show no reaction of degeneration in the muscles, recover spontaneously after a few weeks, and require no treatment beyond splinting and physiotherapy to maintain

full mobility. In the severest cases, early exploration, to discover whether there is a complete tear, is justified. If there is a complete tear the prognosis is bad, as the damage is usually so extensive that resection and suture are impossible. A cable nerve graft may, however, be considered. If there is no tear, or the lesion does not warrant exploration because of its diffuse clinical picture, treatment must be conservative and persistent. Electrical treatment of the muscles, passive movements of the joints, and splinting to avoid over-stretching of the muscles and contractures, must be persisted with for a considerably longer time than with other types of nerve lesions, before hope of recovery is abandoned.

#### DISCUSSION:

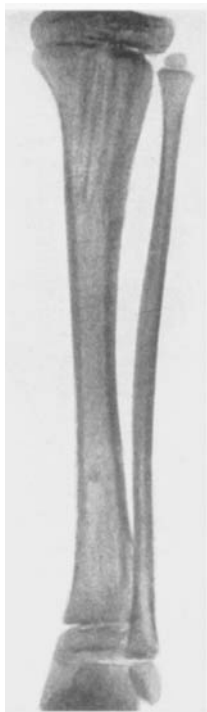
*Bentzon:* Many years ago, when working on obstetric paralyses of the brachial plexus, I was able to examine serial sections of these damaged plexuses, and found, like *Agerholm-Christensen*, that the lesions were widely scattered in the plexus. We have had similar experiences in the Orthopaedic Hospital in Århus, where explorative operations have been made on severely damaged brachial plexuses. Usually, the conditions are such that there is no possibility of operative repair of the lesion. I will take this opportunity to call attention to the quite typical, but less well-known, traction lesion, which only damages the suprascapular nerve. Usually it is quite painless, passive movements of the shoulder are completely free, but abduction and elevation of the arm is impaired by the paralysis of the supraspinatus muscle. A case which had been branded by the insurance doctor as a malingerer, because the doctor himself was ignorant of this isolated traction paralysis, is reported.

#### OLLIERS'S DISEASE

by *Bentzon* (Århus)

That form of endochondromatosis which has been called *Ollier's* disease is a rare condition. Most publications about it appear because the author has come across a single case; this he reports, together with a bibliographical survey and his own ideas on the nature of the condition—its etiology and pathogenesis. These ideas will almost inevitably be influenced in some degree by the peculiarities of the author's "own" case. At any rate, this was so when in 1924 I published my case, which was (to my mind at least) a very satisfactory one, because the condition was both sufficiently marked for the characteristic signs to be well developed, and yet not so severe that the changes on the radiographs had anywhere become so extreme that the original, very characteristic morphology was obscured. The extent and the position of the chondromatous formations in the bones involved could be clearly seen. As it is

almost exactly 25 years since I published the case (in *Acta Radiologica* vol. 3), I must assume that at least my younger colleagues here, who have not "specialized" in Ollier's disease, will not have read the article in question. I propose therefore to give a short summary of the case and to show some of the radiographs. The patient was sent to Stomann's

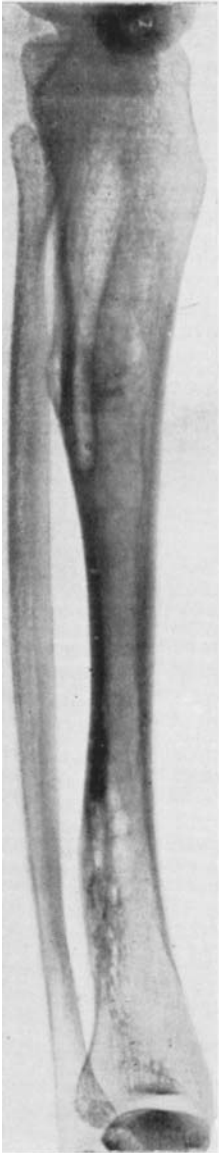


*Fig. 1a.*



*Fig. 1b.*

and my private clinic in January 1922. She was then 15 years old. Her family was a healthy one, and no other congenital deformities were known. The pregnancy and birth had been normal. When she was 5 years old, her parents (a wealthy miller family from a Danish provincial town) noticed that her right leg was somewhat shorter than the left one, but not until she was 7 was the first radiograph taken. She later, at some years' interval, twice fractured the medial epicondyle of the humerus—both times after sufficient trauma; but at 13 she fractured the lower half of the femur of the short right leg. This fracture, occasioned by a simple fall with her bicycle, hit an area affected by



*Fig. 2.*



*Fig. 3.*



*Fig. 4.*

the chondromatosis, and it is reasonable to regard it as a spontaneous fracture of that area. The fracture healed without any dislocation. When I first saw her she was a normally developed girl of 15, with normal build apart from a shortening of 7 or 8 cm. of the right lower limb. Even at the age of 7 radiography of the pelvis and lower limbs had shown rarefactions, which were streaky in the os ilium femur and tibia. If you look particularly at the changes in the tibia (at the age of 7), you will notice partly the shortening of the bone compared with the sound side, partly the presence of translucences in the tibial diaphyses and metaphyses; in the lower metaphyses these appear as somewhat irregular patches; but in the upper metaphysis they form beautiful stripes arranged in a fan, opening rather laterally and upwards (Fig. 1 a).

I have here contrasted my case with the one published by the Norwegian pediatrician *Johannessen* (Fig. 1b), and you will notice that his case was rather more severe than mine in degree, but otherwise there is a remarkable similarity between the two cases in regard to the position, and even the number of chondromatous spots and stripes in the tibia. At that time, radiography was more casual than nowadays, and people were perhaps more stingy with photographic material. At any rate, I was the first to think of taking a picture *in profile* of such an Ollier-tibia. I took it because I thought it significant that the stripes of cartilage had always just that arrangement. The profile exposure gave the interesting result you see on fig. 2 it is quite clear that the stripes follow the same course as the arteria nutritia and its larger branches in the tibia. I wrote to Mr. *Johannessen* asking him to take a profile view of his case, and it showed exactly the same thing. If you compare these photos with injection-preparations of the tibia (I have here contrasted my patient's tibia with an injection-photo of a tibia from the same age class (fig. 3), and also from a foetus (fig. 4) it can be seen quite clearly that the changes—the streaky, enchondromatous formation—in *Ollier's* disease are primarily an affection of the *diaphysis*. The part you see on the foetal preparation in fig. 4, and which shows exactly the same characteristic course of the arteria nutritia as on the preparations from the 7-year old, has nothing to do with the part of the diaphysis originating from the epiphysis, it is a piece of the ossified, primordial cartilage of the diaphysis which is shown here. The arteria nutritia enters the tibia rather high up, and runs with a markedly downward direction through the posterior cortical wall to reach the marrow cavity, where it splits up into branches running up and down the shaft. This course is reflected very clearly in the position of the chondromatous stripes in *Ollier's* disease. You will notice a distinct thickening corresponding to the entrance of the artery, and a marked upward translucency beginning near the posterior cortical wall rather

more distally, and obviously corresponding to the ascending branch of the nutrient artery.

We need not explain in detail that these changes, both with regard to their position in the bone and their special course, cannot have anything whatever to do with bone originating in epiphyseal deposits during the growth in length.

Other attempts which I have made to clear up the problematic etiology and pathogenesis of *Ollier's* disease (experiments with animals etc.) will be found in my original account in *Acta Radiologica* vol. 3.

My reason for stressing the above on this occasion, and in this place, is, of course, that I must disagree with most of what Anders Langenskiöld has written about *Ollier's* disease, which he regards as a disturbance of the epiphyseal growth (as *Ollier* himself and several other earlier authors also did).

A few further features are still to be added: Marked disturbances in the epiphysis e.g. Calve-Perthes' disease and *Köhler II*, do not impair, or at any rate only to very slight degree, the growth in length of the diaphysis. What makes *Ollier's* disease particularly interesting to my mind is that it is a condition in which the ossification process of the diaphysis is disturbed, and in this connection it must be pointed out that the deposition of bone, which is responsible for the greater part of the growth in length of our long bones, and which takes place juxtaepiphyseally, is in reality a diaphyseal process. By that I mean particularly that it is the diaphyseal arteries which nourish this longitudinal growth. Therefore it is comprehensible that a disturbance in the diaphysis, such as that found in *Ollier's* disease, is particularly likely to cause a considerable shortening of the diaphysis concerned.

#### DISCUSSION:

*A. Langenskiöld, Bentzon.*

#### EXPERIENCES WITH A BONE BANK

by *L. Hult* (Stockholm)

The theoretical and practical requirements of a bone bank were discussed. Bone can be kept sterile at  $\pm 15^{\circ}\text{C}$  for practically as long as one likes. At the Orthopaedic Clinic of the Karolinska Institute bone from the bone bank, taken from 75 different donors, has been used for 48 operations, with good results in all cases. The use of stored bone means that in many cases there is a considerable reduction in the severity of the operation, and it is recommended for this reason.

(To be published later in *Acta Orthopaedica*.)

#### DISCUSSION:

*Severin, Agerholm-Christensen, Friberg, F. Langenskiöld, Hult.*

*Støren*: I have had an experience which supports Prof. Langenskiöld's opinion that homo transplants tend to be resorbed.

In 1944 I showed to the Oslo Surgical Society a girl, then aged 4 years, who had a congenital pseudarthrosis of the tibia, with a considerable gap between the bone ends; this gap was further increased when I had had to resect the ends in order to reach an open medullary cavity. As not enough bone could be obtained from the child herself the mother was laid on one operating table and the child on another. Two full-thickness grafts, were taken from the mother and inserted in the child, so that they were in wide contact with the open medullary cavities of the two tibial ends and formed a gutter. The space was filled with tightly packed bone chips taken from the child's own healthy tibial metaphysis.

It looked fine—but gradually the mother's tibial grafts were "eaten away". We could follow the process on the radiographs. Finally, there were only two thin irregular shadows, and these did not form useful bone. I have repeated the operation now that the child is 7 years old, but I do not believe that the result will be any better this time.

#### DEMONSTRATION OF A BILATERAL KRUKENBERG AMPUTEE EARNING HIS LIVING AS A DRIVER

by *K. E. Kallio* (Helsinki)

As will perhaps be remembered, I showed at our meeting in Stockholm in 1947 a film of the results in cases in which I had done *Krukenberg* operations (*Acta Chir. Scand.* 1948:97:165). I will not therefore discuss the subject further, but will only demonstrate a particular case.

The patient is a man aged 29 year. He was wounded on 29.6.45 by a German land mine in North Finland, and both forearms had to be amputated immediately: in addition, there was an injury of the left leg. On admission to our orthopaedic hospital he was already in a state of deep psychical depression, which persisted for as long as he was helpless, without hands. The following spring, both the leg and his general condition had improved enough for me to be able to perform a *Krukenberg* operation on the R. side on 19 Feb., and on the L. side on 22 April. As the stumps were short it was possible to cover the two branches with their own skin, and this considerably shortened the duration of treatment. Training of the hands was rapid, and his depression disappeared as soon as he could wash himself, shave, dress and undress, etc. He was discharged on 1.7.46.

During his convalescence he occupied himself with interior decorating, weaving, cycling and rowing. As he was an iron founder by trade he had to learn a new occupation. He decided to trade. For a beginning, he transported his goods himself, on a sledge in the winter, and on a barrow in the summer. When his business improved, he bought a



*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

horse, and taught himself to harness it and look after it without help. In the autumn of 1948 he came to me because he had bought a car for his work. First, he thought of employing a driver, but as he could take the engine apart and put it together again, he had boldly decided to fit the car with modifications so that he could drive it himself. His plans for these modifications were already prepared, and he wanted our orthopaedic workshop to carry them out. He was, however, afraid that the police authorities would not give a driving licence to a man without hands, unless his surgeon could convince them that the Krukenberg hands were fit for driving a car. He was given the certificate and, never having driven a car before, he went to a driving school and obtained his driving licence. Since then he has already driven 15,000 km. all over the country alone, earning his living by trading in cloth.

I will now ask my colleagues to come outside to see this man driving his car. You will see that the stumps are indeed short; the left one is 15 cm. the right 16 cm. long, and that the branches are therefore not longer than 6 and 7 cm. respectively. The branches move directly against each other and, as you can feel, his grip is strong. The sensation is good; the rate of movement is about 100 a minute. He has never used his prostheses, as they would make it impossible for him to carry on his trade. The car is a Chevrolet, and the special modifications can be seen: the choke, the hand gas, the gear, the lights, and the wheel with extra spokes (See pictures 1, 2 and 3). Now we can see how he starts the engine, uses the gear, releases the hand brake, starts the car and shows his driving abilities.

The result emphasises the Anglo-Saxon conception of *rehabilitation* or, in this special case, the importance of an arrangement whereby the same surgeon from the very beginning of the treatment has an intimate personal contact with his patient, performs all the reconstructive operations, supervises his training, and does not regard his work as finished when the patient leaves the hospital, but only when he is completely established in the employment most suitable for him.

#### DISCUSSION:

*Bentzon:* *Kallio's* achievements in this patient are impressive, and it is particularly interesting to hear an account of the "psychological-social" side of the problem, which has been as important for the unique result as the brilliant plastic surgery which he used for the Krukenberg operation. I should like to take the opportunity to thank *Kallio* officially for his help with a similar case of bilateral forearm amputation, in which he did a Krukenberg operation for us at Århus. The patient, a young mechanic, was at that time, before the operation, well on the way to becoming "demoralised" by his absolute idleness. Now he has an excellent position as telephone operator and messenger-foreman for

the Århus telephone company, writes excellently with his Krukenberg stump, and fulfills all his duties.

In my opinion the Krukenberg operation is indicated in patients who have lost both hands. We have, however, fortunately, so few of this kind of patient in Denmark that we can with difficulty get sufficient experience of its use. I personally would prefer to send all these patients to *Kallio* for their operation.

#### ARTHROSIS ACROMIO-HUMERALIS

by *Agerholm-Christensen* (Copenhagen)

This term is suggested as the name of a group of painful shoulders, which appear to show a common clinical and anatomical picture.

The patient complains of pain and clicking when the arm is brought into maximal abduction and flexion. The top of the head of the humerus is tender anteriorly. Radiography shows a defect of the head of the humerus at the edge of the cartilage at this point. At arthrotomy is found a defect in the compacta and cartilage anterior to the supraspinatus tendon where the head of the humerus abuts against the acromion when the arm is in maximum abduction with flexion. Partial resection of the acromion is suggested as treatment.

#### DISCUSSION:

*Wiberg, Bentzon, Agerholm-Christensen.*

#### AGREEMENT BETWEEN CLINICAL SIGNS, ABRODIL MYELOGRAPHY AND THE OPERATION FINDINGS IN 350 CASES OF PROLAPSED LUMBAR DISC

by *L. Hult* (Stockholm)

In 95 % of cases with positive abrodil myelography findings, there were also positive operation findings at the level indicated, even when there were no clinical signs from that level. A negative abrodil myelogram does not exclude a disc prolapse, especially if there are marked clinical signs. In 11 cases which were operated on in spite of negative myelography, and in which there were no clinical signs of the level of the lesion, no prolapse could be found in any case. The investigation showed that abrodil myelography is a valuable aid in the diagnosis of ruptured disc.

#### DISCUSSION:

*Gunnar Wiberg* (Lund): The value of myelography in the diagnosis of ruptured disc has been discussed, and I have myself maintained that in the majority of cases one can diagnose a root compression by a careful clinical examination. At the time when I began to operate

without preliminary myelography, complications became more frequent than they are nowadays; but in spite of this I still believe that it is unnecessary to use the method routinely. Undoubtedly, myelography has its use in doubtful cases, but by itself it is by no means 100 % certain, particularly in cases with lumbosacral prolapses, in which the anatomy of the dural canal is known to allow a prolapse to be present without its being necessarily shown on the myelogram.

*A. Langenskiöld, Friberg, Hult.*

#### ON SUBTROCHANTERIC OSTEOTOMY FOR WEAKNESS OF ABDUCTION OF THE HIP AFTER INFANTILE PARALYSIS

by *E. Lehtovaara* (Helsinki)

Paresis of abduction of the hip after infantile paralysis causes much the same impairment of function as congenital dislocation of the hip. The main disability consist in the marked tilting toward the affected side, when weight is put on the paralyzed leg, and a strongly positive Duchenne-Trendelenburg sign. For the correction of this deformity we have at the Orthopedic Hospital of the Rehabilitation Center of the Invaliidisäätiö—Invalidestiftelsen used the subtrochanteric osteotomy of *Schanz*, particularly because this operation has in our hands given good results in correcting congenital dislocation of the hip.

The technique has been mainly the same as that of *Schanz*, except that the osteotomy is made in a particular way, with angleshaped fracture surfaces. Immobilization in plaster is maintained for 8 weeks. The average duration of treatment has been 3 months. 21 cases have been treated in this way, of which 18 have been followed up. The results of the treatment were good or satisfactory in 18 cases on discharge, and in 13 cases at the follow-up examination. 3 of the cases with bad final results had already been acknowledged as failures before discharge. The failures were due to straightening of the osteotomy angle because of unsatisfactory immobilization. For this reason, fixation of the osteotomy fragment with a metal plate and screws being tried.

In all cases with a satisfactory result it was found that the stability of the hip had improved, and with it the ability to walk. The tilting of the upper part of the trunk was reduced, and in some cases nearly eliminated. In most cases Duchenne-Trendelenburg's sign had become negative. There was no disabling reduction of mobility nor any pain in the hip.

#### DISCUSSION:

*Berntsen, Wallgren, Wiberg, F. Langenskiöld, Lehtovaara.*

## MORTON'S DISEASE

by *N. Ringertz* and *L. Unander-Scharin* (Stockholm) see p. 327.

## DISCUSSION:

*Bentzon* suggested that the condition is clinically characteristic, but in its pure form is not very common. It is the occurrence of attacks of severe pain localised to a single metatarso-phalangeal joint which are the main symptom. In refractory cases he has done a simple but quite extensive resection of the metatarsal head. It is a minor operation, which can be done through a small dorsal incision, and has always been effective. In no case has there been any trouble from the loss of one of the three middle (II, III, IV) metatarsal heads.

*K. E. Kallio*: A few weeks ago a patient came to me with Morton's disease. He had already been ordered foot supports, but the pain had got steadily worse and persisted day and night. I removed the interdigital nerve between the 3rd and 4th metatarsals and found the neuroma, which I now have in a bottle. The patient lost his pain immediately and the lateral side of the foot, which had become insensitive, recovered its sensation.

*Lindström, F. Langenskiöld, Severin, Agerholm-Christensen, Friberg, Ellonen.*

## THE TREATMENT OF CONGENITAL CLUB-FOOT IN CHILDREN, AND ITS LATE RESULTS

by *Støren* (Stavern)

The various reports of late results of the treatment of club-foot all suffer from different weaknesses. The most common failing is that the follow-up period is too short. In club-foot particularly it is right to say "do not judge the day until the sun has gone down".

I have personally treated and followed up 104 children with, in all, 177 club-feet. These are classified according to the original degree of deformity and the degree of fixation into mild, moderate and severe.

A curve shows that the majority, 64, had a severe degree, 30 a moderate degree and 10 a mild degree of club-foot. The relapse rate is seen to be, as would be expected, greatest among the primarily worst cases: i.e. 97 %, with 66.7 % among the moderate cases, and 30 % among the mild. The greatest number of relapses occurred at 7-8 years of age.

The high figure for the relapse rate is due to the high standard required for a good result. All cases with a tendency to relapse are counted as relapses—but if in these cases the right treatment is applied in good time, the results are very good. (Resistant relapse cases which later developed normal feet were shown on a film).

2 cases, which, after 6 months treatment from 2 weeks old developed normal feet without any tendency to relapse—without any after treatment—are excluded. These cases are assumed to have had another aetiology than the normal club-foot. They may be examples of the old theory of abnormal position and pressure in utero. The tendency to relapse is quite different in common club-foot, and has certainly a quite different fundamental cause.

Club-foot in arthrygryphosis multiplex is usually of a different type from the usual club-foot—it represents congenital defects of the muscles and joints of the feet as found in the other joints.

Another weakness of the different follow-up investigations is the different evaluation of the results. What one calls a good result, another calls a bad result.

(A picture from J. Bone Joint Surgery, October, 1947, was shown). This is described as “an excellent result 3 years after treatment”.

I call it a less good result, showing incipient relapse. As comparison I should like to show one of my own cases, which, 5 years after treatment, looks considerably better, but which, I consider, shows incipient relapse of one foot.

I will also show how photographs by themselves can lie. The foot's position in walking must be shown—either on a film or in real life. The result can be assessed only from a film or from the patient.

Radiographs are also necessary; they must be taken not only from above, to show the talo-calcaneo angle and the foot axis, but also from the side, with the foot in maximum dorsiflexion. In this way rocker-foot will be found where least expected, since in feet with apparently good dorsiflexion a good part of the dorsiflexion actually occurs in *Chopart's* joint. (Photographs and radiographs).

Radiographs taken from the side in this way, ought especially to be claimed of those who think that elongation of the tendo Achilles can be avoided by their treatment, for instance treatment with Dennis Browne's splint and its varied modifications.

It is the general experience that it is difficult to obtain satisfactory dorsiflexion of the foot, although one lengthens the Achilles tendon at an early stage in the treatment. Posterior capsulotomy, lengthening of the other plantar flexors, and traction on the heel with different apparatuses, helps a little. From this I conclude that the anterior part of the trochlea of the talus becomes too wide for the mortise at an very early age. Therefore, I lengthen the Achilles tendon at an early stage, as early as 6 months in cases where the radiographs show rocker-foot. This is not necessary, however, in cases where the arch of the foot shows such marked excavation that there is no risk of failure in *Chopart's* joint when the foot is forced into dorsiflexion. I always over-correct. I have never seen over-correction persist in the valgus plane, but I have

seen some relapses of over-correction in the equinovarus. I distinguish from pes plano valgus, a "pes planovalgus spuria", which clinically resembles pes plano valgus, but has a small talo-calcaneus angle. Pes plano valgus spuria is often associated with rocker-foot (Photos and radiographs).

I disagree with the old orthopaedic principle that weight-bearing in the correct or over-corrected position *prevents* relapse, and think that I have demonstrated this satisfactorily in these follow-up investigations. I do not deny that weight-bearing in the correct position is of some importance in preventing relapse but I believe that this is over-estimated. In contrast to what has been said by *C. G. Thomassen*, a big angle between the talus and the calcaneus is no guarantee against relapse. I will demonstrate this with radiographs and photos. The author's method of treatment has been to obtain the greatest abduction possible and put the foot in plaster, as early as possible, preferably the day after birth. The plaster is changed with further correction a few days later. Over-correction is seldom obtained later than after 2 weeks. I follow the well-founded reduction principles described by *Thomassen* in 1940, but I use other holds for the manipulation. I find his holds are more difficult, and that with them I cannot correct the more severe degrees of adduction and inflexion contracture, which is many times greater than the normal maximum supination, even though this position is the anatomical starting-point. Demonstration of holds with photos, and after that moving pictures of cases of severe club-foot treated from 2-30 days after birth, now 9 years old. The feet and gait appear normal and have a normal range of movement. When there was a tendency to relapse several years ago, treatment was begun in time.

A bilateral case with a tendency to relapse on one side, only visible when walking: here I shall interfere, and the result will be, as in the others, a normal well-developed foot.