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THE RESULTS AFTER RESECTIO ARTHROPLASTICA
COXAE AND ARTHRODESIS COXAE INTERNA IN
ARTHROSIS COXAE

BY

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I.

In arthrosis coxae the *pain* will first and foremost be invalidating to the patient, the *impairment of mobility* being considered next. If *contracture positions* develop in flexion or adduction the patient's troubles will, of course, be increased.

When the non-surgical methods of treatment, such as massage, physical treatment, and X-raying, are without lasting effect, and the minor orthopedic interferences: inforatio coxae and resectio nervi obturatorii are of no effect either it must be considered if the large operations, resection or arthrodesis are indicated. The indication of a greater interference and the choice of the latter must, of course, be decided on after a close estimation of the patient's chances, depending on age, general health, obesity, occupation, and mental prædisposition.

It will readily be understood that resection with formation of a new articulation is more attractive to patient and surgeon than arthrodesis, which aims at a stiff joint in a "utility position", thus first and foremost aiming at obviating the pain.

In order to elucidate these questions we have made a survey of the operation results of the years from 1925 to 1942 inclusive. There are 26 patients on whom resectio coxae arthroplastica was made and 15 on whom arthrodesis coxae interna was made.

II.

By *resectio coxae arthroplastica* is understood a resection in which a new articulation is formed by resection of the deformed caput and shaping of the stump. If there is complete ankylosis, a new acetabulum is also formed. We do not aim at removing the capsule or articular edges. The joint is opened by *Smith-Petersen's* or *Matthieu's* section; it is a matter of taste which is chosen. As a rule the whole of the caput is removed and the collum is shaped to a suitable stump, not too pointed.

In some cases soft parts were used for interposition, in other cases a rubber sheat (cofferdam), and in others again no interposition was used. In a number of cases the greater trochanter was split from above and a piece of bone was wedged in to increase the tension of the glutæus medius, the so-called "activation of the glutæus medius".

The effect of these procedures will be explained below in the survey of the material.

After the operation wire extension was applied through the condyles or the tuberosity of tibia and as a rule the hip was bandaged in plaster of Paris down to the knee on the affected side. After a fortnight or so a plaster lid is removed on the anterior aspect of the affected thigh and *Riemke's* mobilizer is set going. After 6 or 8 weeks in bed the patient is allowed to get up and walk with crutches. In some cases a supporting appliance was made, the use of which was discontinued after 6 or 12 months. We shall also revert to its effect in the following.

III.

The material comprises 26 patients, 29 hips operated on, 12 male and 14 female patients, 1 of whom died of shock. On judging the remaining 25 patients, 28 hips, a subjective result is first and foremost considered. The grading: + = positive result of the operation, ranges from "excellent" to "very good" and down to "good". No effect of the operation is indicated by ÷.

Unfortunately complications have occurred. 1 woman died of shock. (She got hypodermic infusion of saline.) 1 woman was

saved from shock by blood transfusion. 2 patients got infarcts without further complications. 1 patient developed a postoperative phlebitis.

A positive result of the operation was achieved in 19 patients, 21 hips, thus with + results, whereas there was no effect, ÷ result, in 6 patients. In 10 patients the result was "excellent", in 5 "very good", and 4 "good".

On a more detailed examination of the material with a view to the following points, the results are:—

Mobility before and after operation:

Of the 21 hips of the 10 + patients the mobility improved in 14 hips, remained unchanged in 5, and decreased in 2. Of the 7 hips of 6 ÷ patients the mobility improved in 3 hips, remained unchanged in 4, and none had a decreased mobility.

Increased mobility and + effect of the operation thus need not coincide.

Sex:

Of 13 woman there were 11 + and 2 ÷. Of 12 men there were 8 + and 4 ÷.

The distribution of + and ÷ is thus almost identical in the two groups.

Age when operated:

In the case of + the distribution is as follows: 14 patients were operated in their 2nd and 3rd decades, 4 in the 4th and 5th, and 1 in the 6th decade: 19 in all.

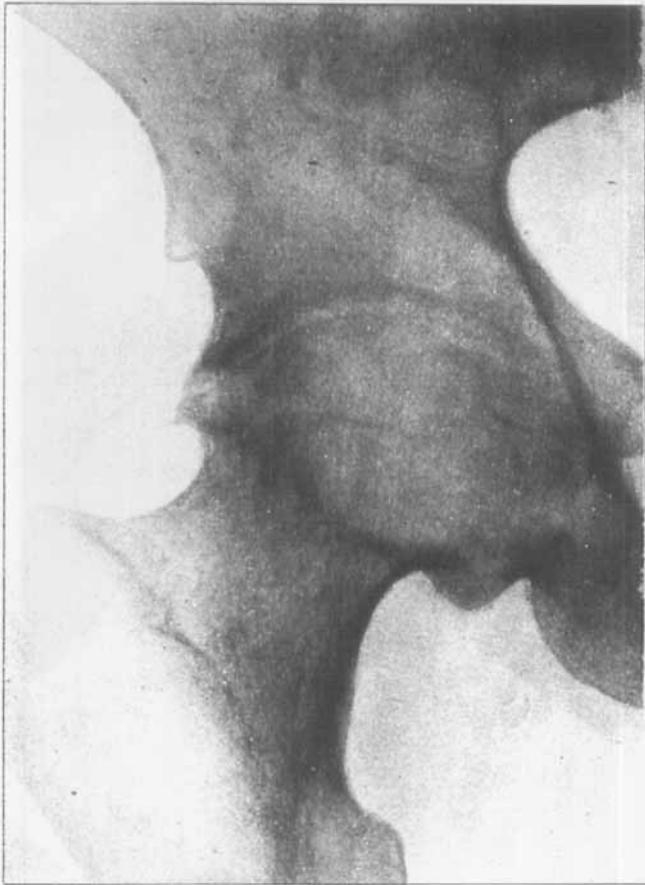
In the case of ÷ effect the distribution is as follows: 3 patients were operated in the 2nd and 3rd decades, 2 in the 4th and 5th, and 1 in the 6th decade: 6 in all, the total being 25 patients. The youngest + is 15 years, the oldest 65 years. The youngest ÷ is 18 years, the oldest 50 years.

No special conclusions can be drawn from these figures.

Period of observation:

The shortest period of observation is about 1 year, the longest 18 years. A period shorter than 10 years showed 15 + and 5 ÷; more than 10 years 4 + and 1 ÷, total 25 patients. These figures show that the good results arrived at may even in the case of a long period of observation.

A man, aged 30 years, a commercial agent. Arthrosis coxae dxt. Arthrodesis on May 6th, 1938. Fibrous ankylosis is found. After chiselling off cartilage, fragments of bone are put in. Plaster of Paris in flexion 160° , abduction 160° , otherwise medium position. Complication: Shock, saved by blood transfusion. Plaster of Paris bandage and confinement to bed for 2 months, plaster of Paris trouser legs for 1 month. No supporting appliance. Revision on June 15, 1939. Is able to walk well without a stick. The hip is in osseous ankylosis in flexion 160° , abduction 160° , otherwise medium position. Right knee can be moved 180/60. Both subjectively and objectively an excellent result.



X-ray before the operation.

Ultra posse, nemo obligatur—we must be content if some of the patients operated upon are relieved for a number of years.

Interposition:

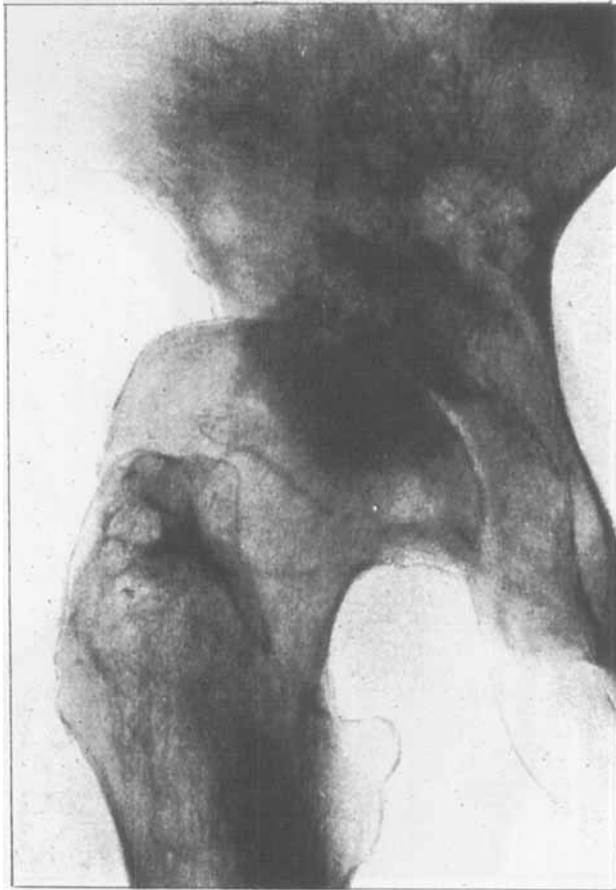
In 6 cases soft parts were interposed (from the adjoining parts, or free fascia lata), 5 of them + and 1 ÷. Rubber sheat (cofferdam) was interposed in 14 cases, 9 of them + and 5 ÷. In 8 hips no interposition was made. 6 of them + and 2 ÷. Total 28 hips in 25 patients. The figures are low, but it looks



X-ray after the operation.

A woman, aged 20 years, a clerk. Arthrosis coxae dxt. in subluxatione. Resectio coxae on Aug. 28th, 1937. No interposition. Activation of the glutæi (the trochanter major is moved distad). Wire extension and plaster of Paris for 3 weeks. No supporting appliance. Movements before operation: Flexion 180/110. Adduction to 140, abduction to 140. Rotation inwards about 30, outwards about 20. Period of observation 3 years. Movements then: Flexion 180/80, adduction to 150, abduction to 150, rotation inwards about 30, outwards about 30.

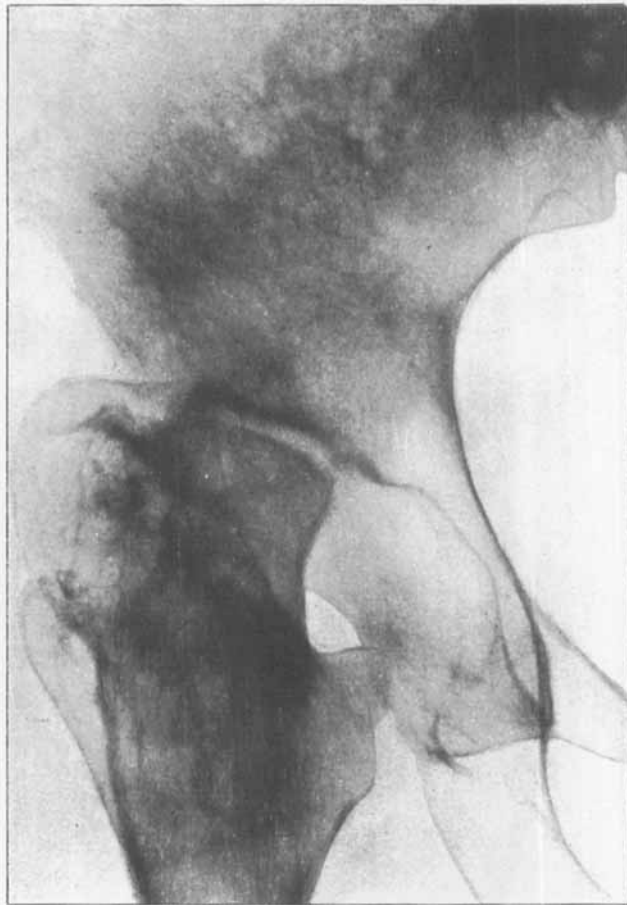
Both subjectively and objectively an excellent result.



X-ray before the operation.

as if a better result cannot be obtained by means of interposition. In 4 cases in which cofferdam was used, it had to be removed later on account of fistula formation. In 3 of these patient the result was, however, + and 1 ÷

In 10 hips, in 8 patients, both the neck of the femur *and* the *acetabulum* were trimmed. Soft tissues were interposed in 3 hips, cofferdam (sheet India rubber) in 6, nothing in 1. The



X-ray after the operation.

result was: "excellent" in 2, "very good" in 3, "good" in 2, and negative in 3.

"*Activation of the glutæus medius*" was made in 8 hips, 6 of them + and 2 ÷. No activation in 20 hips, 14 of them + and 6 ÷. These figures seem to show that this development of the operation is of no importance; it might be more rational to combine the resection with *Lances operation* ("eaves"). This was made in one case with + result.

Supporting appliance after the operation was prescribed in the case of 8 hips, 7 of them +, 1 ÷. In 20 cases the hip was started without supporting appliance, 13 of them + and 7 ÷.

Thus the supporting appliance does not seem to be strictly necessary in order to be set going again. In the cases where it was prescribed it was generally discontinued after 6 or 12 months.

Systematic removal of articular edges and capsulo was not made in our material. This may be a problem.

Occupation:

Most of the patients continued their usual occupation. The figures are too low to allow further considerations.

IV.

We have thus reviewed the results of resectio arthroplastica coxae and we'll now look at arthrodesis coxae interna. In conclusion we shall summarize what may be obtained by means of these two methods of operation.

By *arthrodesis coxae interna* is understood arthrodesis of the hip joint where the greatest importance is attached to a solid healing of the articular surfaces possibly supported by extracapsular ferrule.

In this operation, too, the joint is opened by means of *Smith-Petersen's* or *Matthieu's* section; they are equally good. The ultimate result aimed at is a painless ankylosis in the so-called utility position, i. e. in flexion of about 160° (so that it is not too difficult for the patient to sit), abduction of about 160° (to get good static conditions in walking), and lastly, slight

outwards rotation (for proper movement of the foot when walking). It is a great advantage to operate with the patient on the extension table, where the leg can be given the position desired. The best thing is to chisel off broad supporting surfaces from the caput and the acetabulum, whilst the leg is kept in the position desired, especially as regards abduction. If possible the caput is dislocated at last and all cartilage is chiselled off whereupon bone dust is embedded medially. But in some cases the caput is so mushroom-like deformed that it cannot be pulled out of position, for which reason morcellation must be made. In this case bone dust must be rammed in between the supporting surfaces to obtain osseous ankylosis. The internal arthrodesis may be supported by notching or embedding a bony ferrule from the os ileum along the external aspect of the joint.

After the operation the hips are bandaged with plaster of Paris covering the whole of the diseased leg including the foot and the healthy leg as far as the knee. This plaster of Paris is left for 2 months, when roentgen control is made, and generally plaster of Paris trouser legs are applied to the knee of the diseased leg and round the pelvis, but now the whole of the healthy leg is left unbandaged, and the patient is allowed to get up. After the course of 1 month the whole of the bandage is removed and the patient walks by means of a stick.

V.

The material comprises 15 patients all of them, of course, only operated in one joint, 1 males and 4 females. On judging the cases a subjective result has first and foremost been considered. The grading ranges from "excellent" as the best possible result, via "very good" down to "good", positive result is thus indicated by +. Unchanged condition is indicated by ÷.

Complications: 1 man died a few days after the operation of embolism. 1 had a shock but was saved by means of blood transfusion, 1 developed pneumonia and 1 phlebitis.

A positive *result*, +, of the operation was seen in 12 out of the 14 patients, no effect, ÷, in 2. In 9 patients the result was "excellent", in 2 "very good", in 1 "good".

Ankylosis was obtained in 9 patients, 8 of them with "excellent" result, 1 with "very good" result. Rocking movements were found in 5 patients, 3 of them "good", 2 without effect. The best result thus seems to follow a successful ankylosis.

On a more detailed examination of the material with a view to the following points the results are:

Sex: 4 women, all of them +, 10 men, 8 + and 2 ÷, total 14 patients.

Age when operated: 2 patients were operated in their 3rd decade. 11 in the 4th and 5th decades, and 1 in the 6th decade. The youngest patient was 22 years, the oldest 52 years (the latter obtained the result "very good"). The result ÷ was seen in 2 men, 1 aged 45 and 1 aged 47 years.

Bandage after the operation: Supporting hip leather bandage was used in 2 cases, 1 with "excellent" result, in which the bandage was worn for 18 months, period of observation 2 years. 1 ÷, period of observation about 1 year (subsequent atypical stabilizing operations, however, gave a good result).

Occupation: Most of the patients were able to continue their occupation. The figures are too small for statistics.

VI.

Summarizing the results of resectic arthroplastica and arthrodesis in arthrosis coxae we see, first of all, that it is a question of great interference which had a fatal result of 2 case—1 in resectio and 1 in arthrodesis. 1 died of shock, 1 of embolism. 2 other patients got a shock but were saved by means of blood transfusion. 2 patients developed infarct, 1 pneumonia, and 2 phlebitis. The indications must thus be imperative.

In tabular form the results look as follows:

In resectio arthroplastica:	In arthrodesis:
(25 pts., 28 hips)	(14 pts., 14 hips)
Result:	Result:
Excellent: 10 pts.	Excellent: 9 pts.
Very good: 5 pts.	Very good: 2 pts.
Good: 4 pts.	Good: 1 pt.
No effect: 6 pts.	No effect: 2 pts.
Total 25 pts.	Total 14 pts.

In both methods of operation so good results have thus been obtained that operation should be performed in suitable cases. Arthrodesis is preferred in the case of patients who have to be able to stand and walk without pain and in elderly people. And the lasting analgetic effect is, of course, safer in arthrodesis.

Resectio arthroplastica is indicated in younger persons, especially women, but these operations will tax the patient's energy and entire mental condition to a far greater extent and, of course, it cannot be precluded that a new painful condition may develop in the course of time.

VII.

If we compare our results with the literature that has been accessible we find the following in

Halford Hallock (Surg. Gynæc. and Obstetric., 1939, vol. reconstruction operations on the hip joint.

As far as can be made out from the results given there, 75 hips were operated on 71 patients. Period of observation 5 < 1 year, 70: 1 year or more, 12 years at the utmost, 3 to 5 years on an average. Ages from 18 to 66 years, average 29.

Technically different, as a dozen surgeons had operated. As a rule the caput is shaped or completely removed, in 51 cases the trochanter was moved distally. Interposition was generally not used. Plaster of Paris for 3 to 6 weeks, for the longest time in the cases where the trochanter had been moved.

Complications: 11 wound infection, comprising 4 abscesses, 2 massive skin-flap necroses. 1 case of embolism. No deaths.

In the grading of the results of operation the cases are classified in "no pain", "some pain", "more pain", "still more pain", and "much pain".

26 patients had no pain after the operation, 21 had some pain, 19 more pain, there is no information about pain in 4 cases, thus 70 in all. As far as can be made out 8 patients had rather much pain.

In 47 cases it may doubtless be said that the condition is decidedly better corresponding to our results: excellent and very good.

In conclusion Hallock gives some good advice:

- 1) Shape a collum stump. (As a rule we have endeavoured to do the same.)
- 2) Interpose double fascia lata.
- 3) Do not move the trochanter. The mobility can then be trained at once from the 2nd or 3rd day.
- 4) Do not operate on dull or whimpering people or old ankyloses with flaccid muscles.
- 5) Arthrodesis should be performed in unilateral cases of arthrosis.

Anders Karlén (acta chir. Scandinav., 1944, vol. XC, fasc. V): Arthroplasty in arthritis deformans of the hip joint.

A grave interference that ought to be closely deliberated. 16 cases were operated at the Cripples' Institute in Stockholm. In 7 cases fascia lata is interposed, in 9 vitallium capsule. Period of observation at least 12 months. Fascia lata is used in young, vitallium in older individuals. The result was good in 2 cases, fairly good in 5, and poor in 8; 8 patients were able to take up their work again. Thus 7 +, 8÷.

Lastly, we have been able to find information about arthroplasty in a publication by *F. Langenskiöld* (acta chir. Scandinav. 1944, vol. XCI).

15 hips were operated in 14 patients.

The convex articular surface is shaped with a smaller radius than the concave surface. The caput and part of the collum must frequently be removed in order to correct the malposition. Interposition of fascia lata. Extension and possibly plaster of Paris for 10 days, then exercises.

The result is promising for the first few years, but a longer period of observation (how long?) shows less satisfactory results, the ankylosis-forming still threatening.

In 6 out of the 15 cases good results are, however, obtained (3 "sehr zufrieden", 3 guter Erfolg") in 8 cases ÷ ("Miserfolg"), 1 case ? ("zweifelhalter Erfolg").

The Danish results of resectio arthroplastica seem to be slightly better, but the estimation of the cases will doubtless depend much on the attitude of the examiner.

As to results of arthrosis operations we have been able to find the following:

Anders Karlén: A Clinical Study on Arthrodesis for Arthritis Deformans of the Hip Joint (Acta Chir. Scand., 1944, vol. XCI. suppl. 96).

74 cases of the "Ortopediska Kliniken", Stockholm. 71 cases came for after-examination. Indication: All severe unilateral cases, however, not such in which the patient's occupation requires a movable joint (e. g. in the case of a motor-car mechanic). Also in bilateral cases with symptoms chiefly from one hip. Patients more than 60 years of age should also be operated on, it is especially indicated for patients with heavy work. A good result was obtained in 97 per cent., i. e. a hip free from pain. In 84.7 per cent osseous ankylosis was achieved. Mortality 2½ per cent.

The intra-articular arthrodesis should be combined with juxta-articular arthrodesis. Subtrochanteric osteotomy may be performed if contracture position cannot be corrected surgically.

Arthrodesis with nail should be employed especially in elderly people to avoid long confinement to bed. (At the Orthopedic Hospital of Copenhagen such operations have also been performed during recent years but are not included in the present publication).

In 97.2 per cent. it was possible for the patients to take up their previous occupation.

The cases quoted above from foreign statistics in themselves confirm our results showing that arthrodesis will doubtless give the best possibilities of a permanent improvement of the condition.

SUMMARY

An account is given of the results of operation for arthrosis coxae in 41 patients operated in the Orthopedic Hospital of Copenhagen in the course of the years 1925-1942 incl.

In 26 patients resectio arthroplastica was performed, in 15 arthrodesis coxae interna. Complications: 2 deaths, 1 owing to

shock, 1 of embolism. 2 other patients got a shock, but were saved by means of blood transfusion. 2 developed infarct, 1 pneumonia, 2 phlebitis. Complications in , in all out of the 41 patients. We thus have to do with grave and large operations.

Arranged in tabular form the results are as follows:

In resectio arthroplastica:	In arthrodesis:
(25 pts., 28 hips)	(14 pts., 14 hips)
10 pts.: Excellent result	9 pts.: Excellent
5 „ : Very good	2 „ : Very good
4 „ : Good	1 pt.: Good
6 „ : Without effect	2 pts.: Without effect

Period of observation about 12 months at least.

Resectio arthroplastica is especially indicated in younger energetic individuals, especially in women. There is, of course, a possibility of developing a new painful condition as time goes on.

Arthrodesis coxae interna is especially indicated in elderly people, on the whole in persons in whom a lasting analgesic effect is desirable.

ZUSAMMENFASSUNG

der Ergebnisse von Operationen wegen Arthrosis coxae bei 41 Patienten, die in den Jahren 1925—1942 inkl. am Orthopädischen Krankenhaus in Kopenhagen ausgeführt wurden. Bei 26 wurde eine Resectio arthroplastica vorgenommen, bei 15 eine Arthrodesis coxae interna. Komplikationen: In 2 Fällen Mors — 1 durch Schock, 1 durch Embolie. 2 andere Patienten gerieten in Schockzustand, wurden aber durch eine Bluttransfusion gerettet. 2 bekamen Infarkt, 1 Pneumonie, 2 Phlebitis. Insgesamt bei 9 von 41 Patienten Komplikationen. Es handelt sich also um ernste und grosse Operationen. Schematisch aufgestellt waren die Ergebnisse folgende:

Bei Resectio arthroplastica

(25 Pat., 28 Hüften)

10 Pat.	ausgezeichnetes Resultat
5 „	sehr gutes „
4 „	gutes „
6 „	ohne Erfolg

Bei Arthrodesis

(14 Pat., 14 Hüften)

9 Pat.
2 „
1 „
2 „

Observationszeit mindestens 1 Jahr.

Die Resectio arthroplastica ist besonders indiziert bei jüngeren energischen Personen, insbesondere Frauen. Natürlich besteht die Möglichkeit, dass sich mit den Jahren ein neuer schmerzhafter Zustand entwickelt.

Die Arthrodesis coxae interna ist besonders indiziert bei älteren Personen, im übrigen allgemein bei Personen, bei denen man eine dauerhafte schmerzstillende Wirkung erzielen will.

RÉSUMÉ

Il est donné un compte rendu des résultats de l'opération de l'articulation de la hanche chez 41 malades, opérés à l'Hôpital Orthopédique de Copenhague dans les années 1925 à 1942 inclus.

On pratiqua chez 26 malades une résection arthroplastique, chez 15 l'arthrose interne de la hanche. Complications: 2 malades décédés, 1 par suite du choc, 1 d'une embolie. On constata également le choc chez 2 autres malades, mais ceux-ci furent sauvés par transfusion de sang. Il y eut infarctus chez 2 malades, 1 souffrit de pneumonie, 2 de phlébite. Au total il y eut donc des complications chez 9 malades sur 41. Il s'agit donc des opérations graves.

Sous forme de tableau, les résultats se présentent comme suit:

<i>Résection arthroplastique</i>	<i>Arthrodèse</i>
(25 malades, 28 hanches)	(14 malades, 14 hanches)
10 malades: excellent résultat	9 malades: excellent résultat
5 „ : très bon	2 „ : très bon
4 „ : bon	1 „ : bon
6 „ : sans effet	2 „ : sans effet

La période d'observation a porté sur 12 mois au moins.

La résection arthroplastique est particulièrement indiquée chez les sujets jeunes et actifs, spécialement chez les femmes. Il se peut cependant qu'un nouvel état douloureux se développe au cours des temps.

L'arthrodèse interne de la hanche est particulièrement indiquée chez les personnes âgées, d'une manière générale lorsqu'il est souhaitable d'obtenir un soulagement durable.