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COMPRESSION ARTHRODESIS OF THE HIP JOINT BY THE METHOD OF AXER

A preliminary Report

By

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For unilateral severe affections of the hip joint, arthrodesis is still the only treatment which guarantees a stable hip free of pain for the rest of the patient's life. In osteoarthritis, intertrochanteric osteotomy with internal fixation and combined with discission of the iliopsoas tendon, has given excellent results. This has considerably reduced the number of cases in which arthrodesis of the hip is found indicated. There are, however, cases in which extreme deformity and limitation of motion make osteotomy ineffective. Our experience from cup arthroplasty and the use of acrylic endoprostheses in such cases have not been encouraging as only about fifty per cent of the patients benefited from the operation (*Laurent*). The results obtained by total replacement of the hip joint by a double endoprosthesis (*Charnley, McKee & Watson-Farrar)* cannot yet be judged.

Immobilization in a plaster spica for several weeks, with the risk of complications from prolonged bed rest and a comparatively high incidence of fibrous union, are disadvantages of many methods used for arthrodesis of the hip. As a good mobility of the knee joint is of paramount importance for a person with a stiff hip, arthrodesis of the hip should not imply a risk of stiffening of the knee.

For arthrodesis of the hip joint we have been looking for a method allowing early mobilization and weight-bearing of the limb without too great a risk of pseudarthrosis.

Watson-Jones & Robinson obtained fusion in ninety-four per cent of 120 cases in which Smith-Petersen's nail was used for intraarticular arthrodesis of the hip. However, the patients were immobilized in

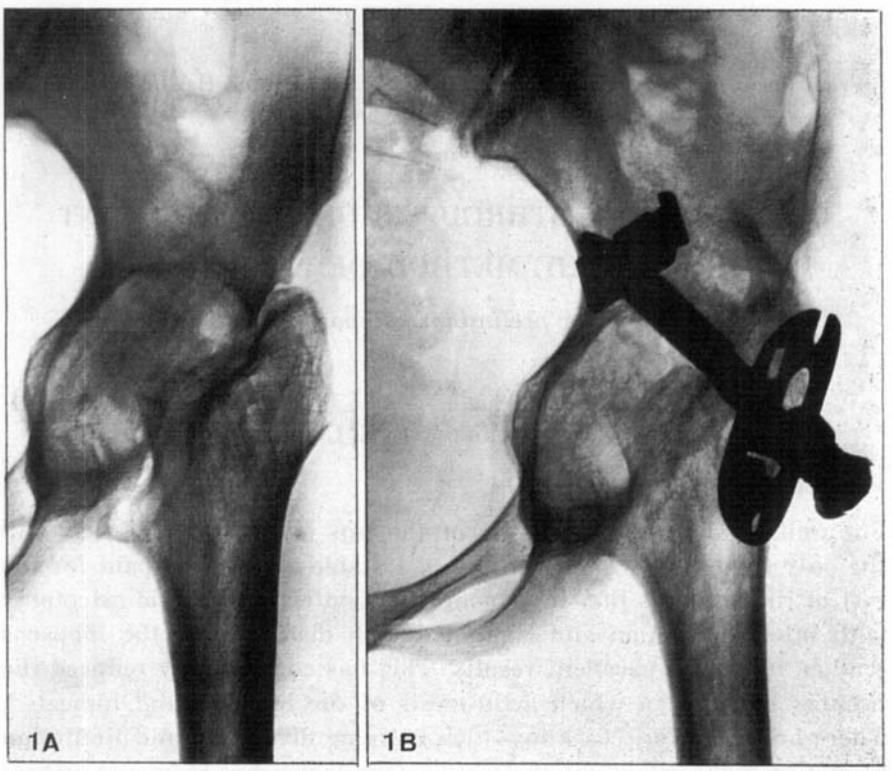

Figure 1 A. Tuberculosis of the left hip. Female, age 32 years. The femoral head and neck were missing. There was an active focus in the lesser trochanter which was evacuated at the operation.
B. Iliotrochanteric fusion nine months after operation.

plaster for four months. With a similar method, *Lindström* obtained consolidation in thirty-eight cases out of forty without external fixation in plaster. Our own results with this method have been less encouraging. *Alvik* obtained good results in forty-one cases in which internal fixation was performed by means of a Smith-Petersen nail and a metal plate fixed with screws.

Other methods for internal fixation in arthrodesis of the hip have been described by *Niebauer, Dickson & Willien, DePalma et al., Witt, May & Mauck, Altcheck,* and *Onji et al. Graziati & Kalén* showed in experiments that three Nyström nails gave a more stable fixation of the hip than one Smith-Petersen nail. *Merle d'Aubigné & Deburge* and *Smith & Baab* have used fixation by three Vitallium nails.

In 1955, *Charnley* described his method of central dislocation of the

hip. The method was later developed by him to include the use of a compression screw (*Morris*, 1966). *McKee* (1957) got good results in forty-seven cases out of fifty using a lag-screw in combination with a bone graft from the greater trochanter. The method of *Chryssantakis*, who used a Smith-Petersen nail in combination with a screw, was used by us in a few cases with a good result.

In 1961, *Axer* described a new method for compression arthrodesis of the hip joint and reported his experience obtained in nineteen cases. Wishing to try a method allowing early mobilization, we have used *Axer*'s method in thirteen cases since the spring of 1965.

MATERIAL

Five of the patients were males and eight were females. The age of the patients appears in Table 1.

Table 1.

Age of the patients at operation					
Age	20–29	30–39	40–49	50–59	60–69
Number of patients	1	5	2	3	2
Cause of the deformity of the hip					
Tuberculosis	3 cases	(active process in one)			
Acute coxitis	2 cases				
Trauma	4 cases	(in two, fracture of the femoral neck; in one traumatic dislocation; in one, a war injury)			
Primary osteoarthritis	3 cases				
Infantile coxa vara	1 case				

In twelve cases the contralateral hip was normal, in one case there was slight osteoarthritis in the other hip. All patients had pain from weight-bearing, eight of them had pain when resting. Eleven patients were limping considerably but did not need a cane. One was using a cane and one patient walked with crutches. There was malposition of the hip in five cases and shortening of the limb in twelve.

The range of flexion movement of the hip joint was less than ten degrees in six cases, ten to thirty degrees in five, and thirty to sixty in two cases. The range of movement of the knee joint was normal in ten cases and in three it was from a position of ninety degrees to one of 180 degrees.

In the radiographs, severe deformity of the joint with the head of the femur remaining was seen in six cases. In five cases the head of the femur had partly collapsed and in two cases the head was missing altogether. Denervation of the hip had been carried out in two cases; in two, osteotomy for correction of position

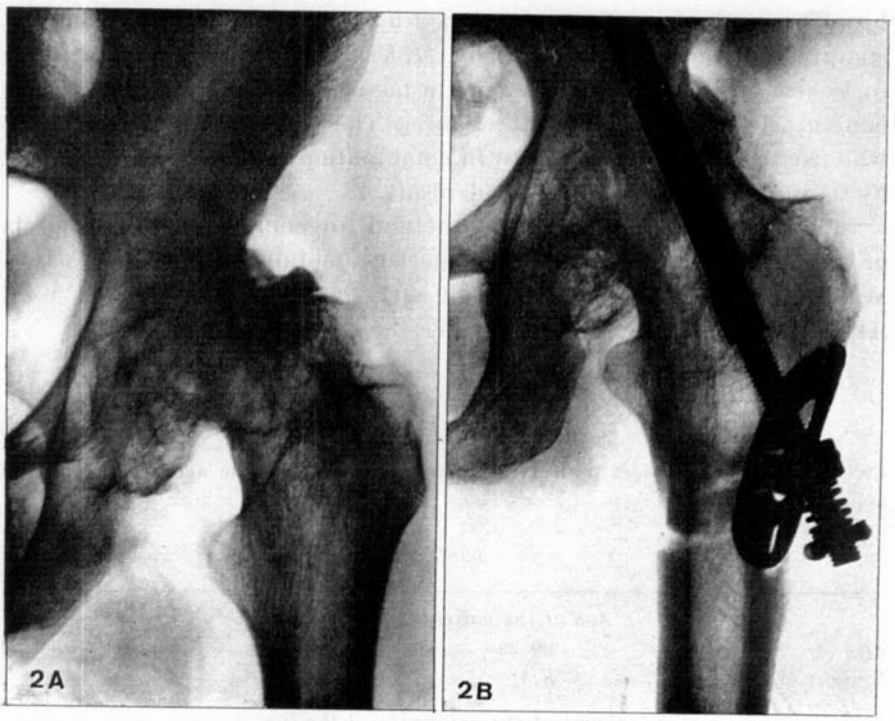

Figure 2 A. Osteoarthritis of the left hip. Female, age 55 years.
B. Bony fusion of the hip eleven months after arthrodesis. Subtrochanteric fracture after trauma.

had been performed. In three cases, arthrodesis operations resulting in fibrous union had been carried out; in two of these, twice.

TECHNIQUE OF OPERATION AND AFTER-CARE

In the main, the technique described by *Axer* (1961) was followed. In eleven cases, the head of the femur was completely dislocated at operation and all cartilage was removed from the joint surfaces. In two cases the cartilage was partially resected without dislocation of the joint. Good compression was achieved with the nail and its accessories in twelve patients. Bone chips obtained at the operation, and in some cases transplants from the iliac crest, were placed around the compressed surfaces. In one case, the nail was wedged firmly in the ilium and compression could not be applied because it was considered to involve too great a risk of fracture of the osteoporotic greater trochanter.

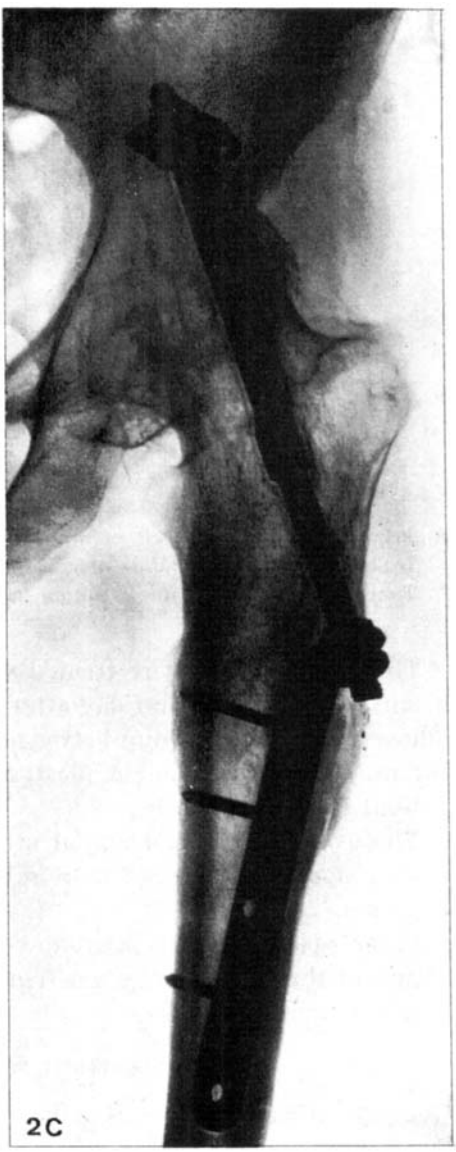

Figure 2 C. The compression plate was replaced by a Thornton plate without a spring.

The hip was, as a rule, fixed in a position of twenty-five to thirty degrees of flexion, slight outward rotation and in the frontal plane in the neutral position. In four elderly patients who had a severe adduction contracture before operation, the contracture was not completely corrected in order to avoid too great a change in pelvic tilt.

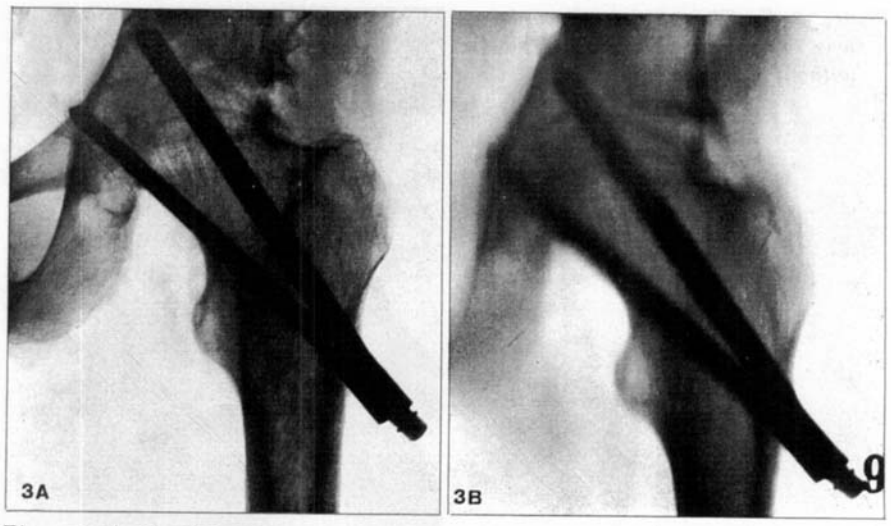

Figure 3 A. Condition seven months after arthrodesis a. m. Witt for sequels of traumatic dislocation. Male, age 34 years.
B. Tomography showed fibrous union as an explanation of pain.

The patients who were treated without plaster were encouraged to be out of bed on the first day after operation. Full weight-bearing was allowed at a time varying between two to four months after the operation. One patient had a plaster spica for six weeks and another patient for three months.

The average stay in hospital after operation was thirty-nine days. The preoperative range of motion of the knee could be maintained in all cases.

In ten cases, in which the follow-up time was more than six months, fusion of the hip could be verified. In three cases the follow-up time was 3–4 months.

COMPLICATIONS

One patient had postoperative thrombosis in the sound leg and another one a pulmonary embolus after change of the compression plate at a later stage. Both patients were cured by anticoagulant treatment.

Infection of the wounds did not occur in this series. In one case a subtrochanteric stress fracture occurred four months after the arthrodesis, which had resulted in bony union. The fracture healed in two months, the patient using crutches during this time. Five months later the patient fell and sustained a fracture in the same site. The

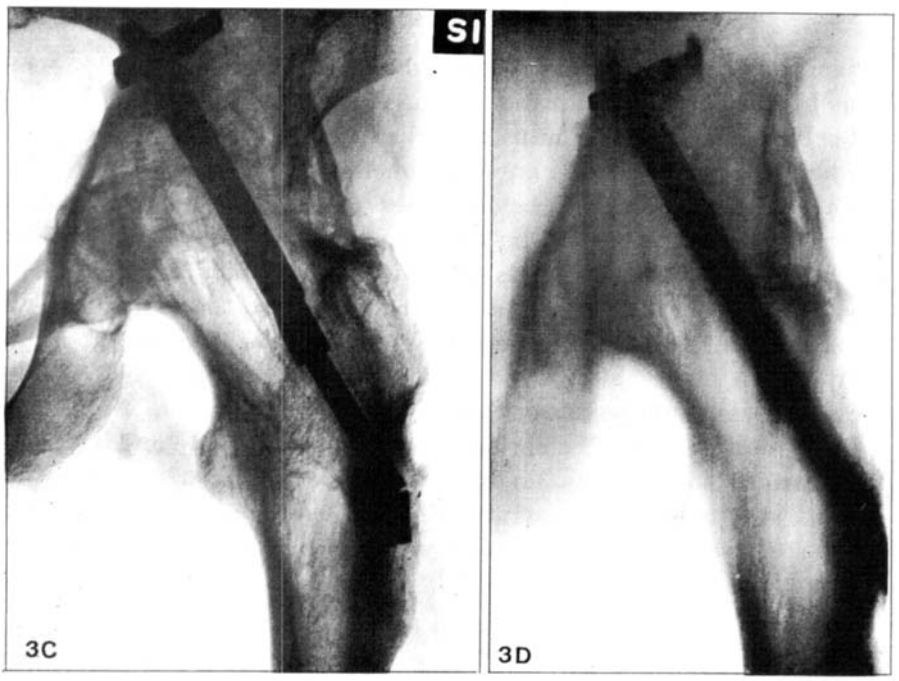

Figure 3 C. Thirteen months after rearthrodesis by the method of Axer. The nut, the spring, the compression plate and a part of the threaded bolt removed six months earlier.
D. Tomography confirmed bony union.

Axer plate was replaced by a Thornton plate, and at this operation is was found that the Axer plate had been pressed half a centimeter into the femur, causing resorption of the lateral cortex. The fracture healed in two months (Figure 2).

In one case the stop-plate on the inner side of the ilium was found to have been loosened one month after the operation and the compression was lost. A new stop-plate was inserted and compression was restored. In the same case the stop-plate was later found to be buried in the osteoporotic ilium, but the spring had maintained compression until fusion of the hip.

In one case the position of the hip changed slightly towards more adduction during the first few days after operation. However, consolidation was obtained in a few months.

DISCUSSION

When properly applied, *Axer*'s method for arthrodesis of the hip seems to us to allow early mobilization of the patient and full weight-bearing of the limb two to three months after the operation. The stay in hospital has been shorter than with any other method we have used.

The femoral head should be dislocated at operation in order to allow the creation of compression between large raw surfaces of bone. Good contact in the peripheral parts of these surfaces should be especially ensured. The nut should not be drawn too tight on the spring because resorption of bone under the plates may follow. The width of the compression plate makes it somewhat difficult to apply. The lock of the stop-plate could be more secure.

Removal of the nut, the spring, the compression plate and a part of the threaded bolt (Figure 3c) is recommended in order to reduce the risk of subtrochanteric fracture. Figure 1 gives an example of the successful use of the method in a case in which the femoral head was missing.

SUMMARY

The compression method of *Axer* for arthrodesis of the hip joint was used in thirteen cases. Eleven patients were allowed out of bed without a plaster spica on the first day after operation. Full weight-bearing was allowed two to four months later. In ten cases follow-up time was sufficiently long to allow the confirmation of bony fusion.

RESUME

La méthode de compression d'*Axer* pour l'arthrodèse de l'articulation de la hanche a été utilisée dans 13 cas. Il fut permis à 11 malades de sortir du lit sans bandage plâtré le lendemain de l'opération. La charge entière du corps a été permise entre deux et quatre mois plus tard. Dans 10 cas, la période d'observation a été suffisamment longue pour que l'on obtienne la confirmation de la soudure osseuse.

ZUSAMMENFASSUNG

Die Methode von *Axer* für Arthrodese des Hüftgelenks wurde in dreizehn Fällen angewandt. Elf von den Patienten waren aus dem Bett am ersten Tag nach der Operation. Volle Belastung wurde von zwei bis vier Monate später erlaubt. In zehn Fällen war die Nachuntersuchungszeit lang genug um knöcherne Heilung zu bestätigen.

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