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THE FIRST HUNDRED AND FIVE INTERTROCHANTERIC DISPLACEMENT OSTEOTOMIES PERFORMED WITH A NEW COMPRESSION PLATE

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Despite recent developments in the treatment of painful osteoarthritis of the hip joint, particularly by means of artificial joints, intertrochanteric displacement osteotomy still has its place, especially in the treatment of young patients. Stable internal fixation is an absolute necessity for complete and rapid post-operative recovery after intertrochanteric displacement osteotomy (Green 1967, Osborne 1964, Rosborough & Stiles 1967, Scott 1967).

In 1969, at the meeting of the Finnish Surgical Association, I introduced a new compression plate for internal fixation of intertrochanteric displacement osteotomy (Salenius 1970). The plate is made of stainless steel and is available in one size only; it is manufactured at present in England by Zimmer.

OPERATIVE TECHNIQUE

Intertrochanteric displacement osteotomy is performed through a lateral incision. It has been our custom to divide the ileopsoas tendon. When the osteotomy has been performed the plate is applied to the proximal fragment so that its upper end goes over the greater trochanter (Figure 1). If the osteotomy has been made too low so that the proximal fragment is longer than the upper part of the nail, the nail can be hammered lower down through the greater trochanter. The plate is then fixed with compressing bone clamps against the greater trochanter and the upper screw in the proximal fragment is screwed in. In the beginning, ordinary A–O compression screws were used, but later, compression screws manufactured by Zimmer, England, have been used because they have a lower screw head which does not irritate the surrounding tissues when the patient walks. After the proximal screw is secured in its place the compressing clamp can be removed and the lower screw is fixed similarly after boring and applying threads for the screw with the AO instrumentation. When the two upper screws are screwed in, the plate rests firmly on the upper

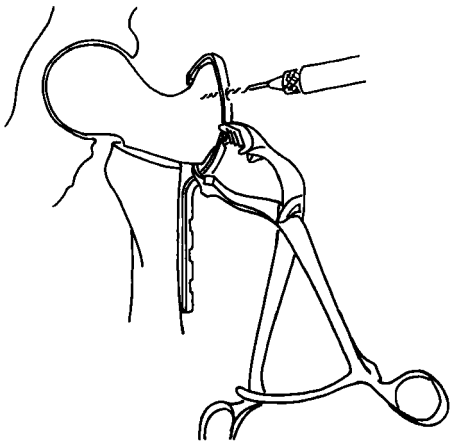

Figure 1. The compression is applied on the proximal trochanteric fragment and fixed to it with two screws. The plate must sit tightly on the bone in order to prevent unwanted change of the position of the fragments.

fragment. The lower fragment is then fixed with a clamp against the plate and a compression device is applied (Figure 2). A full compression is applied and this is at its maximum when the plate begins to straighten. This results in an elastic compression according to the elasticity of the stainless steel plate. Even if the fragments should go into each other the compression continues because the plate tends to pull them closer together even after the screws in the lower fragment are screwed in. After the compression is applied the screws in the lower fragment are applied according to Figure 2. The compression device is then removed and the

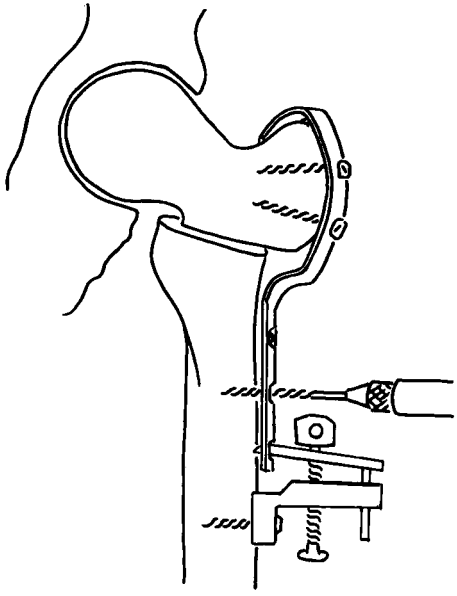

Figure 2. When the plate has been fixed to the upper fragment it is attached to the distal fragment and compression applied.

Table 1. Distribution according to age.

Age	No. of patients	Male	Female
Under 30 years	4	–	4
30–39 years	5	1	4
40–49 years	19	8	11
50–59 years	32	18	14
60–69 years	34	14	20
70–79 years	10	2	8
Total	104	43	61

osteotomy completed. If a varus or valgus position is required a corresponding wedge of bone is removed from either of the fragments. The plate has then to be bent according to the desired position of the fragments. Because of the mechanical factor resulting from the pull on the outer sides of both fragments this compression device has a slight tendency towards the valgus position, but this can be prevented by a proper technique. In all cases a suction drainage is applied postoperatively. The patient stands up with two crutches the day following the operation. The operated leg can be safely put on the floor and slight weightbearing allowed. During the last few years I have allowed full weightbearing without crutches within four to six weeks after the operation. However, some patients have walked, without permission, a few days after the operation without any harm to the internal fixation, so obviously the period for non-weightbearing can be shortened in the future.

We have now performed about 350 osteotomies with the new compression plate and this report deals with the first 105 osteotomies performed until the beginning of 1972. The osteotomies have been performed by several surgeons though 60 of the cases have been performed by the author.

RESULTS

The material comprises 104 operated patients one of whom had a bilateral osteotomy so that in fact the total number of osteotomies was 105. Five of these were performed in a private hospital, the remainder in the Orthopaedic Hospital of the Invalid Foundation, Helsinki. The age distribution of the patients is shown in Table 1. The mean age of the patients was 55 years, the oldest being 74 years and the youngest 20 years of age. The majority of the cases were primary displacement osteotomies. In four cases, however, osteosynthesis was performed after failure of a previous osteosynthesis performed with another fixation method. One patient died of pulmonary embolism 3 weeks after operation. Mortality in this series was then 0.95 per cent. In one

Table 2. Hospitalization after operation.

	No. of patients	Male	Female
Less than 2 weeks	33	10	23
2–4 weeks	62	28	34
4–6 weeks	8	4	4
More than 6 weeks	1	1	–
Total	104	43	61

case a deep thrombosis developed in one leg. In another a fracture of the femoral neck occurred during the operation. Osteotomy led to consolidation but the femoral neck did not consolidate so that a total hip replacement was performed later. It has been necessary to remove the lower screw of the proximal fragment in three cases because of the loosening of the screw, obviously during the application of the plate. In two cases the entire plate has been removed. In one case the plate had broken during the post-operative period. In this case the plate was bent several times during the operation to find a proper angle for the

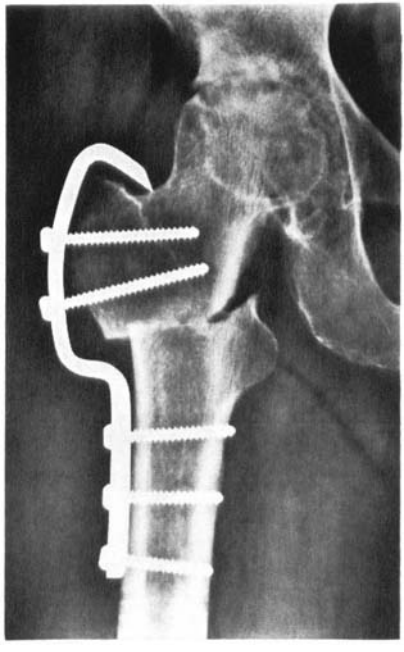

Figure 3. Intertrochanteric displacement osteotomy immediately after operation.

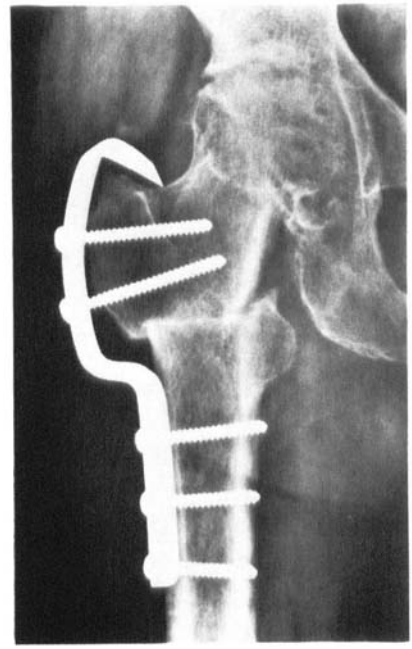

Figure 4. The osteotomy 6 weeks after operation. The osteotomy site is disappearing. The consolidation has obviously taken place. This stage of consolidation has been taken as the time of union in Table 3.

osteotomy. Osteotomy led to consolidation however, and the plate was removed later.

Post-operative time spent in the hospital per patient is shown in Table 2. It will be noted that about one third of the patients went home less than 2 weeks after operation. Patients received physiotherapy for mobilization of the hip and knee after operation.

In the case of a stable osteosynthesis it is extremely difficult to judge the state of consolidation radiologically. Figure 3 illustrates an osteotomy immediately after operation, where the osteotomy surfaces can be sharply and clearly seen on an X-ray and the site of the osteotomy is

Table 3. Period of consolidation in weeks.

	Total hips	Male	Female
4–6 weeks	16	7	9
6–8 weeks	46	14	32
8–12 weeks	32	18	14
Over 12 weeks	10	3	7
Non union	1(0.95%)	–	1

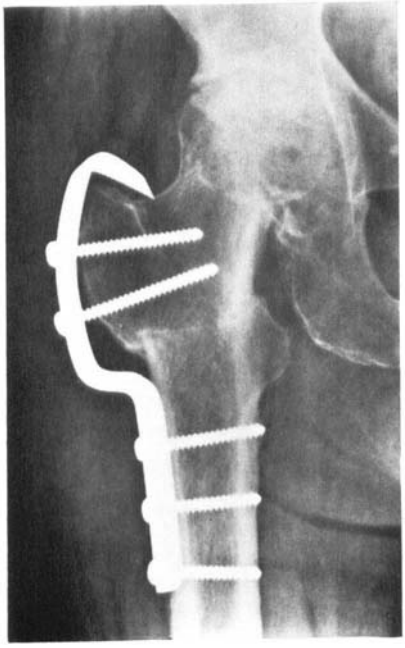

Figure 5. The osteotomy 16 weeks after operation. The site of the osteotomy is hardly visible. The remodelling has also been weightbearing for $2^1/_2$ months already.

clearly apparent (Figure 3). An X-ray of the same case 6 weeks post-operatively reveals that the osteotomy site has become less and less clear and is now poorly visible on X-ray (Figure 4). Periosteal callus is not visible but there is no doubt that at the point of the osteotomy consolidation is continuing. In a later table I have chosen this point of development as the time of consolidation. In the following X-ray 4 months after operation (Figure 5) the osteotomy site has gradually disappeared. The patient has been moving without crutches 2 months before the last figure and full weightbearing has been allowed during the same period. The times for consolidation in the entire series are shown in Table 3. We observe in the table that 62 cases consolidated in less than 2 months and the majority in less than 3. Only in one case did non-union occur. The rate of non-union was thus 0.95 per cent. This patient did not begin weightbearing on the operated limb and osteoporosis developed causing instability at the point of osteotomy a few months later. This patient had taken small doses of cortisone because of her rheumatoid arthritis in the other joints. The patient was re-operated with a similar plate and consolidation took place within 2 months. The observation period in the material was on the average 1 year.

DISCUSSION

Intertrochanteric displacement osteotomy has given good results according to many reports (Nissen 1963, 1964, 1966, Hirsch 1961, Salenius et al. 1971). Therefore it is still advisable to perform intertrochanteric displacement osteotomies especially in younger age groups, as we still do not know the long-term results of total hip replacements. For a successful recovery from the operation it is of the utmost importance that the osteosynthesis is stable and results in firm consolidation. In many previous reports the non-union rate in intertrochanteric displacement osteotomy has varied between 6 and 10 per cent (Hirsch 1961, Green 1967, Rosborough & Stiles 1967, Scott 1967). The non-union clearly prolongs the rehabilitation of the patient and delays his return to work. In this series of operations, which were performed with the new compression plate, the non-union rate was very low indeed as there was only one case of non-union in the series of 105 operations. As the weightbearing could be started at an early stage, 4–8 weeks after the operation, the patients' rehabilitation was easy and the short non-weightbearing period did not result in osteoporosis in the operated limb. Moreover, it has been seen clinically when the osteosynthesis is firm and stable that the initial recovery from the operation is rapid; the patients are almost pain-free after operation and their discharge from the hospital can take place within 2–3 weeks after the operation in many cases. This compression plate does not require a very large amount of displacement and therefore a possible application of total hip replacement afterwards is easier than with many other internal fixation systems. The osteosynthesis has been in some cases very firm as indicated by the fact that some patients have walked without support immediately after operation with no harm to the osteosynthesis. According to the results reported in this series it is therefore quite obvious that the new compression plate has fulfilled the hopes placed upon it and the new compression plate may therefore be recommended for internal fixation of the intertrochanteric displacement osteotomy of the femur.

SUMMARY

In this series the results of 105 intertrochanteric displacement osteotomies have been reported. The internal fixation has been performed with a new compression plate. The hospitalization after the operation has been very short, being less than 2 weeks in 33 patients and less than

4 weeks in 95 patients. One patient died 3 weeks after operation with pulmonary embolism and therefore the death rate was 0.9 per cent. In many cases the consolidation occurred very rapidly and was confirmed by radiology in less than 8 weeks in 62 patients. Altogether 94 osteotomies consolidated in less than 12 weeks. Only one case of non-union occurred in this series. This patient was a fat female who had used cortisone for rheumatoid arthritis in other joints. The non-union rate in this series was 0.95 per cent. The recovery of the patients was rapid and hospitalization was short, and the new plate may therefore be recommended for internal fixation of intertrochanteric displacement osteotomies.

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