THE ROLE OF TROCHANTERIC WIRE REVISION
AFTER TOTAL HIP REPLACEMENT

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Fifty-nine cases of trochantericwire revision following hip arthroplasty with trochanteric osteotomy and reattachment were identified and their outcome was studied. Two were infected and were excluded. Five were revised for instability: four became stable while one continued to have persistent dislocation.

Fifty-two were revised for pain, 36 by removal of the trochanteric wire and 16 by reattachment of the greater trochanter. Successful relief of pain was obtained in less than half the cases. There was no difference in the incidence of back pain, wiring technique, trochanteric advancement, previous surgery to the same hip, trochanteric size or the pattern of wire breakage in the successfully treated group and the unsuccessful group. Neither was the removal of intact wire from a united trochanter any more certain of relieving pain than removal of broken wire from an un-united trochanter. Six patients later required revision for loosening or infection.

These results indicate the need for full radiological and haematological investigation before exploration of the greater trochanter. At exploration for pain the wires should simply be removed as we could show no successful union after late reattachment of the trochanter in the absence of instability.

The lateral approach to the hip with osteotomy and reattachment of the greater trochanter with wires is a fundamental part of the technique of Charnley total hip replacement and is widely practised. Trochanteric osteotomy allows the accurate placement and fixation of the femoral and acetabular components (Charnley 1970; Lazansky 1970; Mallory 1974; Hamblen 1984) which is of primary importance in hip replacement. Methods which avoid trochanteric osteotomy may provide inadequate exposure, particularly in revision surgery or in the presence of anatomical variation. The original Charnley technique of trochanteric advancement allows rearrangement of the forces acting on the hip by reattaching the greater trochanter distal and lateral to its original site. Problems with reattachment of the trochanter are well recognised and complications attributed to trochanteric osteotomy include trochanteric bursitis, delayed and non-union of the greater trochanter, fracture of the wires and separation of the trochanter producing pain, a Trendelenburg gait and hip instability. Often patients present in the postoperative period with pain over the greater trochanter and radiographs showing trochanteric non-union and broken or prominent wires. Surgery is then undertaken to remove the wires and attempt to reattach the trochanter. This paper reviews the outcome of such procedures.

MATERIALS AND METHODS

We identified 59 cases of further surgery to the greater trochanter in 58 patients who had undergone total hip replacement with trochanteric osteotomy. The indication for hip replacement had been osteoarthritis in 45 patients, rheumatoid arthritis in four, avascular necrosis in four, and one each of infantile coxa vara, polymyalgia rheumatica, old tuberculous infection, Perthes' disease and associated ulcerative colitis. These patients had removal of the wires or reattachment of the greater trochanter over the 10-year period 1975 to 1985. The patients' records were examined, noting the indication for surgery, the relief obtained from the procedure and of any other possible source of pain either locally in the hip or referred from the back. Signs of loosening or infection of the prosthesis were noted. Radiographs were examined for wiring technique (Fig. 1), trochanteric advancement, bone quality, size of the trochanteric fragment and the site of wire breakage if it occurred (Fig. 2; Clark, Shea and Bierbaum 1979).
Any hips revised at the same time for defective fixation of the acetabular or femoral components were excluded. The assessment of osteoporosis on plain radiographs is difficult, and the diagnosis is often made retrospectively; we therefore did not record this.

The remaining 36 patients had the trochanteric wires removed; 13 were relieved of pain, five had partial relief while 18 had no relief. In this group 21 trochanters had united, while 15 had not united before revision and have not united subsequently. A united trochanter did not increase the likelihood of relief from pain following removal of the wire: 11 patients were relieved of pain while 10 were not. The removal of intact wires in the presence of a united trochanter gave relief of pain in six cases but no relief in four.

Overall symptoms were improved in 25 of the 52 hips treated for pain, but in seven the improvement was only partial; in the other 27 cases there was no improvement. There were 10 patients with a history of low back pain among those who had had no improvement but there were also seven among those whose symptoms had improved.

The greater trochanter had been advanced at the primary arthroplasty in nine of the group that had improved and in eight of those that did not improve. There was no statistical difference in the distribution of the wiring techniques (Fig. 1) used in the two groups nor in the distribution of wire failure (Fig. 2). There were three patients in each group who had had previous surgery to the same hip. Small or fragmented trochanters at primary arthroplasty were present in 11 cases. Five were relieved of pain while six were not.

**Later operations.** Six patients required revision of the femoral, acetabular or both components on average 31 months after wire revision: four because they were loose and two for infection.
**DISCUSSION**

The above figures show a low success rate for revision of trochanteric wiring after hip replacement with trochanteric osteotomy. Relief of pain after reattachment of the greater trochanter or the removal of trochanteric wire was successful in less than half of the cases. Removal of wire was no more successful in relieving pain when performed in those in whom the trochanter had already united than when it had not united, supporting the clinical impression that an asymptomatic un-united trochanter is often seen with an otherwise good result (Lazansky 1970; Charnley 1972; Cupic 1979). Neither was the removal of intact wires from a united trochanter any more likely to relieve pain than the removal of broken wires from an un-united trochanter. Variations in the technique of wiring and in trochanteric advancement were not useful as prognostic indicators as to the likely success of trochanteric wire revision.

Problems in trochanteric fixation occur in a significant minority of cases after osteotomy and reattachment of the greater trochanter (Boardman, Bocco and Charnley 1978; Clarke et al. 1979; Markolf, Hirschowitz and Amstutz 1979). We agree that all efforts must be made at the time of primary surgery to optimise conditions for trochanteric union, as it is then that conditions are most favourable for union. We found no case of late reattachment of the greater trochanter leading to union. The avoidance of soft-tissue interposition between bone and wire, excessively long wire loops and the needless half hitch was stressed by Charnley (Boardman et al. 1978). Kinking or scoring of the wire should also be avoided. The use of synthetic materials for trochanteric reattachment is being evaluated.

More accurate methods of trochanteric replacement and the use of chevron osteotomy to increase the surface area and stability of reattachment have been advocated, as well as different wiring techniques (Boardman et al. 1978; Markolf et al. 1979; Weber and Stühmer 1979; Dall and Miles 1983; Wroblewski and Shelley 1985). We have restricted this study to the more commonly used wiring techniques (Fig. 1) but could show no difference in their susceptibility to failure.

Fracture of the trochanteric wires and loss of position of the greater trochanter is not infrequently seen in asymptomatic patients. Our study suggests that pain in the region of the hip may well arise from sources other than the radiologically obvious co-existing abnormality of trochanteric fixation which is frequently revised, often with poor results: for example, six of our patients went on to major revision for loosening and infection which may not have been recognised at the time of wire revision. In the light of these results we would recommend that full clinical, haematological and radiological investigations should be carried out to exclude other causes of pain before exploring the greater trochanter. At exploration the wires should simply be removed. In the absence of instability, we can show no evidence that reattachment achieves trochanteric union.

**REFERENCES**


