Fractures of the greater trochanter following total hip replacement

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ABSTRACT: We studied the incidence of greater trochanteric fractures at our department following THR. In all we examined 911 patients retrospectively and found the occurrence of a greater trochanteric fracture to be 3%. Patients with fractures had significantly poorer outcome on Oxford Hip score, Pain VAS, Satisfaction VAS and EQ-5D compared to THR without fractures. Greater trochanteric fracture following THR is one of the most common complications following THR. It has previously been thought to have little impact on the overall outcome following THR, but our study suggests otherwise.

KEY WORDS: Greater trochanter fracture, Total hip replacement, Total hip arthroplasty, Iatrogenic, Patient reported outcome measures

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INTRODUCTION

Fracture of the greater trochanter is common following total hip replacement (THR), the incidence possibly as high as 5% (1, 2). It is not thought to have a major effect on overall outcome (3).

We believe that iatrogenic trochanteric fractures have a bigger impact on overall outcome than previously described and therefore studied the relevance and incidence of these in our department.

The existing literature suggests that such injuries have little effect on patient outcome following THR (1-3). However, none of the published work reported patient related scores and all seemed to base conclusions on a number of assumptions.

There is no classification system following this type of iatrogenic fracture and there are no guidelines regarding how to treat and follow-up this complication. Our study aimed to address these issues.

MATERIALS AND METHOD

We studied the incidence of isolated greater trochanteric fracture in our department following total hip replacement from 2005-2010. Approximately half of the patients (486) underwent surgery using a transgluteal approach and half (425) had a muscle sparing approach (MSA) direct anterior approach.

The age of our patients ranged between 41 and 86. We reviewed the x-rays of all patients who underwent THR in this period.

We included all patients with a greater trochanteric fracture observed on radiographs postoperatively. All patients received hybrid prostheses, consisting of a cemented acetabulum and uncemented femoral component.

All patients followed the department’s common rehabilitation programme.

We sent questionnaires to all patients with a trochanteric fracture. The questionnaires included Oxford hip score, Pain VAS, Satisfaction VAS and EQ-5D.
This data were compared to the expected outcome of Oxford hip score, Pain VAS, Satisfaction VAS and EQ-5D from the hip register in Sweden and New Zealand.

RESULTS

We found 26 fractures of the greater trochanter. Twenty-five out of 26 patients answered the questionnaires, and one patient had died. Four of the questionnaires were answered by telephone interview since these patients did not send their questionnaires back.

We found iatrogenic fractures in 26 of 911 THR (3%), five of which occurred in males and 21 in females. Seven of the patients were treated with fixation of the fracture, using either Kirschner wires with cerclage or a claw plate. Overall, 65% of the patients with a fracture, reported limping post operatively, and 46% reported pain. The incidence of either complication being reported was 70%.

There was no difference in the occurrence of iatrogenic trochanteric fractures when comparing MSA to the transgluteal approach (13/425 vs 13/486).

The patients with fractures of the greater trochanter report clinically and statistically significant poorer results on all outcome values; (EQ-5D index 0.60 (0.24-1.0) vs 0.76, Oxford hip score 32 (8-48) vs 41, satisfaction VAS 47 (0-100) vs 18 og pain VAS 32 (0-73) vs 15).

We saw no difference in the outcome irrespective of whether the fracture was fixed primarily, secondarily or not fixed at all.

We decided to compare outcomes of the individual types of fractures from a classification we created, since there was a clear pattern, based on fracture location (Brun-Maanssons classification).

We compared the outcomes of different types of fractures to the expected values from THR found in the hip register in Sweden (2008) (4) and New Zealand (1999-2008) (5).

The grey line in the graphs indicates level of significance p<0.05 (Figs. 1E-H).

The poor results occur mainly after type 3 fractures, which are significant on all outcome values whereas type 1 and type 2 fractures show non-significant changes on all measured values. Figure 1F shows the clearest pattern of all the values with OHS being significantly lower in type 3 fractures whilst type 1 and 2 fractures are non-significant.

Figure 1G also show the same pattern with significantly higher values in pain for type 3 fractures and non-significant values for type 1 and 2 fractures.

Finally, the satisfaction values are significantly higher for type 3 fractures whilst type 1 and 2 fractures show non-significant values.

DISCUSSION

Our study is a retrospective study with inherent limitations regarding cause and effect. However, our study is, to our knowledge, the only study including patient related scores. Hendel and Yasin reported that all trochanteric fractures fixed primarily healed without complications (1), but we did not observe this. Such fractures are more common in females, possibly due to osteoporosis. Like us, Pritchett found no difference in the number of isolated trochanter fractures when comparing surgical approaches (the direct lateral and the posterior approach) (2).

Our results suggest that a fracture during THR can greatly affect the outcome. This applies particularly if it is a type 3 fracture. Further research should focus on finding optimal treatment options for this fracture.

However, the best treatment option for type 3 fractures remains unknown. We had only eight type 3 fractures. The outcome was poor on all values and this was irrespective of whether they were treated with fixation or not, either primarily or at a later time.

Further investigation should focus on finding the best treatment option for type 3 fractures and to further investigate type 2 fractures. It seems clear that a fracture caused by cutting off the top part of the trochanter during the femoral neck osteotomy (type 1) has less or no impact on the outcome of THR, possibly because this fracture (and type 2 fractures) do not violate the gluteus medius muscle significantly.

A stem with a lateral insertion point into the femur might produce more trochanteric fractures. All patients in our study had a stem with a low lateral profile (Corail, Depuy). When dealing with isolated fractures of the greater trochanter in adults due to trauma the recommandations are bed rest/crutches with protected weight bearing for 3-4 weeks. Often the fracture is incomplete and intact fibres of the gluteus medius prevent wide separation (6). They heal well and have a good expected outcome.

Pritchett states the indications for operative treatment of greater trochanter fractures following THR to be:
Fig. 1 - A) Type 1: Fracture as a result of the osteotomy. B) Type 2: Partial fracture of the greater trochanter. Frontal view. C) Type 2: Partial fracture of the greater trochanter. Side view. D) Type 3: Complete fracture of the greater trochanter. E) The figure shows the relationship between Eq-5d index and the different types of fractures. F) The figure shows the relationship between the Oxford Hip Score and the different types of fractures. G) The figure shows the relationship between the Pain VAS and the different types of fractures. H) The figure shows the relationship between the Satisfaction VAS and the different types of fractures.

1. Dislocation or instability of the prosthesis;
2. Severe limp or pain;
3. Widely displaced trochanter fracture >2 cm.

The specific treatment options for type 3 fractures remain unknown. Further studies must attempt to clarify what osteosynthesis yields the best results following a type 3 fracture.

In cases of non-union with dislocation tension band fixation or a trochanteric claw plate can be effective, so these options should be considered for further evaluation in type 3 injuries (7-9).

Overall, we observed that fractures of the greater trochanter can influence the outcome adversely following THR, and further evaluation of this complication is warranted.
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