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Routine follow-up is unnecessary after intramedullary fixation of trochanteric femoral fractures – analysis of 995 cases

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Highlights

- Routine follow-up after trochanteric fracture is a burden to the patients and health care system, with less than 1 % leading to changes in treatment.
- Large scale efforts should be conducted to optimize the hip fracture postoperative treatment.
- The role of routine follow-up visits has been questioned in many different fracture types.
- 9 of 995 patients required a change in treatment plan due to the findings on planned visits.
- We discourage the use of routine follow-up visits for patients with an intramedullary fixation of a trochanteric fracture.

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Routine follow-up is unnecessary after intramedullary fixation of trochanteric femoral fractures – analysis of 995 cases

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Abstract

Background and purpose - Approximately 2000 trochanteric fractures are operated in Finland annually. These fractures make a major burden to health care system and affected individuals. The role of routine follow-up has been questioned in multiple fracture types.

Patients and methods - We analyzed routine follow-up visits after intramedullary fixation of trochanteric fractures (n=995). Patients were followed up from patient registries until 2 years or death. Planned and unplanned follow-up visits were analyzed.

Results – Altogether 9 patients (0.9 %) had a change in treatment at planned outpatient visit. 6 of these were due to mechanical complication, 1 due to refracture and 2 due to delayed unions. 64 (6.4 %) patients had a change in treatment plan because of an unplanned visit: 28 infections, 6 pressure sores, 15 mechanic complications and 14 refractures and 1 AVN, respectively.

Interpretation - Routine follow-up visits are a burden both to the patients and health care system, with less than 1 % leading to changes in treatment. Our suggestion is to give good instructions to patients and rehabilitation facilities instead of routine follow-up.

Keywords – hip fracture, trochanteric fracture, follow-up

Introduction

Hip fractures are typical geriatric fractures which burden the health care system[1] and estimates have been done that the number of hip fractures will increase significantly in the future[2,3]. The mean annual health care cost of a single hip fracture is approximately € 30 000 leading to an annual total cost of approximately 200 million euros in Finland. (PERFECT). Therefore, large scale efforts should be conducted to optimize the hip fracture postoperative treatment.

Clinical and radiographic follow-ups have been traditionally scheduled to monitor appropriate fracture alignment, the position and integrity of hardware and fracture healing. AO Foundation recommends routine x-rays six weeks after the internal fixation of proximal femoral fractures and subsequently every-six weeks until the fracture has healed.[4] However, the role of routine follow-up visits has been questioned in many different fracture types.[5–8] Thus, the clinical significance of these follow-ups is somewhat unclear.

Aim of our study was to assess the clinical significance of planned visits at outpatient clinic with routine radiographs after intramedullary fixation of trochanteric fractures. Our hypothesis was that routine follow-up visits rarely lead to changes in the primary treatment protocol.

Patients and methods

We did a chart review of all patients with a trochanteric fracture treated with an intramedullary nail in Helsinki University Central hospital trauma unit, a level 1 trauma center, from 1.1.2011 to 31.12.2016. All patients were identified from the hospital surgery database, by querying our operating theatre database for ICD-10 diagnoses coded as trochanteric fracture (S72.1) and with a procedure code for intramedullary fixation of proximal femoral fracture (NFJ54) by Nordic Classification of Surgical Procedures (NCSP). In total, 995 consecutive fractures on 973 patients were analyzed. None of the patients had simultaneous bilateral fractures.

A standardized operative and postoperative protocol was used during the study period. Intramedullary nailing was performed based on AO-principles (AO Trauma 2016). PFNA trochanteric nail (DePuy Synthes) was used to treat all the fractures operated at the time period. Operations were performed by orthopedic surgeon on call, either consultant or senior resident (4-6 years of orthopedic training). Postoperatively full weight bearing was allowed, and radiographs were obtained before hospital discharge. Our follow-up protocol consisted of visits at 6 and 12 weeks after surgery and additional planned follow-up visits according to treating surgeons' preference. Skin staples were removed two weeks after the operation.

Patients were followed from the patient registries for minimum of two years or until death. All visits related to the fracture were recorded and divided to either planned or unplanned follow-up visits. These visits were further divided based on whether they led to a change in treatment protocol (Table 1).

Permission for the study was obtained from the research committee of the University of Helsinki and all acquired data was processed as required by European Union regulations. An ethics

committee opinion was not sought, since study was a retrospective analysis of data without interaction with the patients.

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Conflict of interest statement

Authors declare no conflicts of interest. There was no financial support for the research. No writing aid obtained.

Results

The mean age of patients was 81 years (range 21-104 years) and 68% of patients were females. The basic patient characteristics are presented in Table 1. The early mortality (< 3months) rate was 14 % and 2-year mortality was 35 %.

607 follow-up visits were scheduled at 6 weeks, of which 526, (53% of study group) were present at this visit. 230 patients (23%) attended follow-up visit at 12 weeks and 73 (7 %) patients attended a third follow-up visit. Additionally, 342 had follow up x-ray taken at six weeks at a rehabilitation facility. None of these patient's had a change in the original treatment plan or unplanned visit at the emergency department.

Altogether, 9 of 995 (0.9%) patients required a change in treatment plan due to the findings on planned visits of which 5 were on the first follow-up visit and 4 after additional follow-up. (Table 1) The causes for a change in treatment plan at routine follow-ups were due to clinical and radiographic findings. 6/9 changes were due to mechanical complications. All these lead to a re-operation as well as the other changes in treatment plan. There were no predicative patient or surgery related characteristics that lead to change in treatment plan. Additionally, 112 patients solicited an unplanned visit due to emerging problems related to fractures, of which 63 (56 %) led to a deviation in treatment plan (Table 2). Reason for change in treatment plan at emergency department were most likely due to acute emergencies; wound infection (43%) or re-fracture due to new fall (22%).

Discussion

Our results showed that in only 9 of 995 (0.9%) operatively treated patients, did a planned follow-up visits lead to a change in treatment. Previously, Kuorikoski et. al[5] suggested that routine early follow-ups after proximal femoral fractures are unnecessary. Based on these findings, routine follow-up seems to be futile. As the hip fracture incidence is increasing, surgeons should focus on optimizing the resources and cost-effectiveness of given treatment.

Similar results have been reported for several other fractures. Ovaska[6] and Stenroos[9] have questioned the role of early radiographs among adult and pediatric patients with ankle fractures. Ghattas[8] noted that after fixation of an acute fracture, early radiographic controls rarely lead to a change in treatment plan. These unnecessary visits lead to extra costs for the patient and the health care system. AO Foundation recommends routine x-rays six weeks after the internal fixation of proximal femoral fractures and subsequently every-six weeks until the fracture has healed, but there is little or no evidence supporting the benefit of this recommendation. Previous studies have shown that early radiographic follow-ups seem unnecessary and the present study displays that even the subsequent planned follow-up visits at 12 and 18 weeks don't affect the treatment.

Fixation failures are associated with two-fold increase in hospital stay together with doubling of healthcare costs.[10] The complications of trochanteric fractures can be divided to technical and patient related complications. Blade cut off, blade migration, nail breakage and locking bolt loosening can be surgeon related technical complications which may be avoided with meticulous planning and execution. The cutout rate has varied in the literature between 2 and 7 % [11–14] We noted a 1,2 % cutout rate, this suggests that the quality of surgery is acceptable at our institution.

Based on the present study, patients should be instructed to contact operating unit if experiencing any postoperative problems. As our results present, 11 % of patients contacted the hospital because

of having postoperative problems. We believe that patient education is the key to find these adverse events occurring after hospital discharge. Proper instructions would also save the resources of health care system. Overall there were 73 complications (7.3 %) and vast majority of the patients contacted the outpatient clinic or the emergency department before the scheduled outpatient visit. None of the infections or pressure sores and only one refracture were caught in routine outpatient clinic visits. We believe that properly instructed patients and rehabilitation facilities will contact hospital if problems occur. We noted that only three patients with symptoms and mechanical complication didn't seek care before the first scheduled visit. The other three patient with mechanical complication that were noted at planned visit didn't express notable symptoms. These complications were minor, and we believe that these patients would have sought to the outpatient clinic if their symptoms progressed.

This study has several limitations due its retrospective nature. Some patients with superficial infections might have sought treatment at health centers or on private clinics. However, all the major infections requiring revision surgery are included. Also, part of the follow-up radiographs was taken in rehabilitation facilities. However, these radiographs did not change the treatment plan of given patients. The strengths of this study include the large number of patients within a single institute. To our knowledge, this is the first analysis of the value of the outpatient visits following trochanteric fracture surgery.

Conclusion

We discourage the use of routine follow-up visits for patients with an intramedullary fixation of a trochanteric fracture. We suggest to rather give patients and their rehabilitation facilities comprehensive information regarding when to contact the treating center if they are having problems with rehabilitation. In the light of results from the present study, we are going to implement a new written protocol: After intramedullary fixation of trochanteric fractures, patients are not going to be routinely followed up, if they are allowed full weight bearing post-operatively.

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Table 1. Patient characteristics.

	No change	Change at planned visit	Change at unplanned visit	All
Patients	922 (92.7%)	9 (0.9%)	64 (6.4%)	995
Age	81 (29-104)	83 (67-95)	81 (53-104)	81 (29-104)
ASA*	3.2 (1-5)	2.9 (2-4)	3.2 (2-4)	3.2 (1-5)
CCI**	4.8 (0-11)	3.7 (0-6)	5.0 (2-10)	4.8 (0-11)
LOS (days)***	7.2	8.2	7.3	7.2
Female/Male	632/290	6/3	42/22	680/315

*ASA: American Society of Anesthesiologists, physical status classification system

**CCI: Charlson comorbidity index

***LOS: Length of stay

Table 2. Complications (n=73, 7 % of patients) leading to a change in treatment protocol in the study group

	Change at planned visit	Change at unplanned visit	Total
Infection	-	28	28
Pressure sore	-	6	6
Mechanical complications	6	15	21
Blade cut off	4	8	12
Blade migration	1	4	5
IMN breakage		3	3
Locking bolt loosening	1		1
Re-fracture	1	14	15
AVN	0	1	1
Delayed union	2	0	2
Total	9	64	73