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Evaluation of a routine follow-up visit after an internal fixation of proximal femoral fracture

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ABSTRACT

Background and purpose: Post-operative follow-up after internal fixation of fractures is a common practice. The goal of this study was to evaluate the necessity of a routine follow-up visit after internal fixation of a proximal femoral fracture. Our hypothesis is that these follow-up visits do not result in a change in the treatment plan, but add an extra cost to the health care system and lead to the purposeless utilisation of limited resources.

Patients and methods: A retrospective study of 428 consecutive patients (431 fractures) with a scheduled outpatient clinic visit after internal fixation of proximal femoral fractures in a single hospital during years 2012–2013. We noted any changes in the patients' treatment plans based on the first follow-up visits, including scheduled visits up to ten weeks after internal fixation.

Results: None of the patients showed signs of infection, implant failure or loss of reduction requiring re-operation at the scheduled follow-up visit. In only one (0.23%) visit a change in treatment plan was made as a result of the scheduled follow-up visit (decision to remove the distal screws from the long intramedullary nail to obtain dynamic compression). Scheduled visits did not occur for the following reasons, death (11.8%), visit to emergency department prior scheduled visit (3.2%), and not known (3.9%).

Conclusions: The first scheduled visit within ten weeks after internal fixation of a proximal femoral fracture leads to no changes in treatment. We recommend considering the need of these follow-up visits.

Introduction

The health care expenses were 2013 in Finland were 9.5% of the nations gross domestic product which was slightly higher than the average of OECD countries (8.9%), but significantly lower than in US (17.4% in 2009) [1] Also, the health care expenses have increased from 2000 to 2014 [1]. The Choosing Wisely Initiative aims for the reducing of unnecessary costs in health care by naming tests, interventions or services which are overused or unnecessary [2]. A routine post-operative visits after third molar removal under intravenous sedation was not necessary as shown in a randomized clinical trial [3]. In a primary total hip arthroplasty with prostheses with excellent long-term results, a routine follow-up of asymptomatic patients is not necessary [4]. In the light of the above it is necessary to evaluate our common practices in orthopaedic trauma as well.

The estimated global incidence of proximal femoral fracture (PFF) in 1990 was 1.31 million, with a prevalence 4.48 million and 0.7 million deaths [5]. Also, the number of hip fractures globally is estimated to increase to 2.6 million by 2025 and to 4.5 million by 2050 [6]. As a consequence the socio-economic impact of these fractures can be expected to increase significantly [6]. According to the National Institute for Health and Welfare (THL) in Finland, every year about 7000 PFFs occur in Finland. The average health care expenses in 2005 in Finland for the first year after proximal femoral fracture were around 19000 € [7].

Routine radiographs in the first post-operative visit are common in orthopaedic practice. For example, the AO Foundation recommends routine x-rays six weeks after the internal fixation of PFF and subsequently every-six weeks until the fracture has healed [8]. However, the efficacy of these routine follow-ups is unclear and the effect of these radiographs on treatment has been challenged. In a recent study of 200 acute fractures, only one routine radiograph during the first post-operative visit led to a change in the therapy [9]. This change in the radiograph led to no changes in treatment. Some evidence indicates that early radiographs after ankle fracture fixation do not lower the complication

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rate and could be omitted [10]. In only three of 878 ankle fracture patients (0.3%), the treatment plan was changed in the first follow-up visit due to radiological findings [11]. Stone et al. [12] demonstrated that post-operative radiographs taken two weeks following plate fixation of distal radial fractures rarely resulted in changes in patient management, but added an extra cost to the health care system [12]. Thus, although the benefit of early post-operative radiographs remains questionable, they do increase costs for the patient and health care system. Thus the need of routine post-operative follow-ups with radiographs should be evaluated.

In this study, we assessed whether the first scheduled follow-up visit after internal fixation of a PFF alters treatment. Our hypothesis is that first post-operative follow-up visits, scheduled up to ten weeks post-operatively, result in no changes in the treatment plan, but only adds an extra cost to the health care system and lead to waste of limited resources.

Patients and methods

This is a retrospective study of consecutive operatively treated proximal femur fracture patients scheduled for post-operative follow-up in Töölö Hospital (part of the Helsinki University Central Hospital in Helsinki, Finland). Töölö Hospital is the only public orthopaedic trauma hospital in Helsinki (population 630000 inhabitants) and it serves as a tertiary referral hospital for approximately 1.8 million inhabitants. The inclusion criteria for the study were: 1) Proximal femoral fracture treated with internal fixation in our hospital between 1 January 2012 and 31 December 2013 and, 2) scheduled post-operative follow-up according to our hospital protocol. The exclusion criteria were: 1) PFF treated with hemi- or total arthroplasty, 2) patients outside our hospital district (follow-up at other institutes), 3) patients with femoral shaft fracture (with no ipsilateral proximal femoral fracture), 4) patients who underwent prophylactic surgeries due to primary bone malignancies or metastatic changes in the bone, 5) pathological fractures (metastatic changes or primary tumors).

If a patient had bilateral proximal femoral fractures, the fractures were counted as two individual fractures. We used Nordic Classification of Surgical Procedures (NCSP) codes NFJ50, NFJ52, NFJ54, and NFJ60 to identify patients possibly eligible for the study.

The operative and post-operative treatment protocols were standardized and remained the same throughout the study period. Open reduction and internal fixation was done according to AO-principles. Weight-bearing was restricted only in younger patients with high-energy neck of femur fracture (NOF). At discharge all the patients were instructed to contact our hospital in case of any problems with the operated hip. Our hospital protocol included scheduled visit to outpatient clinic at 6 and 12 weeks after the index surgery. Due to the limited resources the 6 weeks follow-up visit was usually within 4–9 weeks. We decided to include first visits up to ten weeks because the last routine follow-up was never this early in our practice. The scheduled visit included a physical examination and routine radiographs of the hip (anteroposterior and lateral projections).

We collected data from electronic medical records, radiographs and radiograph reports. For each patient we collected age, fracture type, method of internal fixation, time from surgery to the follow-up visit, and any possible change in the patient's treatment plan at the scheduled visit. Methods of internal fixation included cannulated screws, dynamic hip screw, short intramedullary nail, long intramedullary nail and other (plating or a combination of several methods). Changes in treatment plan included any alteration of the treatment plan that deviated from normal post-operative management. The changes were: antibiotics due to a wound infection, and re-operation for any reason (infection, hardware failure, loss of fracture reduction). The number of visits is calculated on by the number of scheduled visits (e.g. by the number fractures), and not by the number of patients. We used IBM SPSS Statistics for Windows, Version 21.0 (Armonk, NY, USA: IBM Corp) to analyse the data and the Wilcoxon Rank-Sum Test with an α-value of less than 5% (0.05) for statistical significance. This was a retrospective study of medical records, so Finnish law does not require approval by an ethics board. The research council of the Helsinki University Central Hospital approved the study protocol.

Results

During the study period (2 years) a total of 428 consecutive PFF patients with 431 fractures were treated with internal fixation and scheduled to follow-up at our outpatient clinic. The female-to-male ratio for fractures was approximately 2:1 (66.2% vs. 33.6%, 286 vs. 145 fractures) with a mean age of 74.2 ± 17.4 years. The average age of the men was 65.0 ± 18.0 years (range 20–101 years), which was significantly lower than the average age of the women, which was 78.9 ± 15.0 years (range 18–101 years) ($p < 0.001$).

The majority of the fractures ($n = 312$, 72.4%) were trochanteric, followed by femoral neck ($n = 76$, 17.6%) and subtrochanteric fractures ($n = 43$, 10.0%). The mean age of the patients with femoral neck fractures treated with cannulated screws or DHS was 60.8 ± 17.6 years compared to 77.9 ± 15.4 years for the patients with trochanteric or subtrochanteric fractures ($p < 0.001$). DHS was the most common internal fixation method on neck of femur fractures, used in 56.6% (43 of 76) of cases. Short intramedullary nail (48.4%, 151 of 312) was the most common method for fixation of pertrochanteric fractures. Subtrochanteric fractures were mainly fixed by long intramedullary nail (86%, 37 of 43).

For the study population 431 post-operative follow-ups were scheduled to outpatient clinic. Majority of the patients ($n = 349$, 81.0%) showed up to the scheduled visit. At the first post-operative visit, radiographs were taken of all patients. None of the patients showed implant failure or loss of reduction requiring re-operation. None of the patients showed signs of infection. In only one patient treatment plan was changed in the follow-up visit. This patient (age 39 years) had the distal screws removed from the long intramedullary nail in order to obtain dynamic compression for the subtrochanteric fracture. Thus the scheduled visit led to a change in 0.23% of patients coming to the scheduled visit. The type of fracture and method of internal fixation of the patients attending to scheduled follow-up appear in Table 1.

Fourteen patients (3.2% of all scheduled visits) had a sixteen unplanned visit to ER before the scheduled routine outpatient clinic visit. The reasons for unplanned visits were (percentages calculated from all scheduled visits): deep wound infection requiring intravenous antibiotics and revision surgery ($n = 3$, 0.7%), new fracture on the contralateral femur ($n = 3$, 0.7%), periprothetic fracture or implant failure ($n = 3$, 0.7%), suspicion of superficial wound infection ($n = 2$, 0.5%), pain in the operated leg ($n = 2$, 0.5%), wound haematoma ($n = 1$, 0.3%), urinary tract infection ($n = 1$, 0.3%), and fall without new fractures ($n = 1$, 0.3%). The unplanned visit led to deviation from normal post-operative management in eleven of these sixteen visits (69%).

Fifty-one patients (11.9% of scheduled visits) died before the scheduled post-operative visit. The average age of these patients was 84.9 ± 11.3 years and 60.8% were females. Seventeen patients (4.0%) did not show up to their scheduled visits for unknown reasons. Revision surgery for post-operative infections and re-operations for these fractures is done in our hospital for patients in our hospital district. Therefore it is unlikely that infection or revision surgery would have been the reason for missing the scheduled visit. The electronic medical records showed that these patients were not operated in other public hospitals either. The

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