

Proximal femoral fractures in elderly people: time to surgery. The experience of Milan's "ASST Pini/CTO"

Paola Navone^a, Marta Nobile^a, Thea Scognamiglio Pasini^a, Antonio Piscitelli^a, Alessandra Colombo^b, Simone Mazzola^b, Emilio Luigi Mazza^b, Massimiliano Colombo^{b,*}, Giorgio Maria Calori^b

^aManagement department – ASST Pini-CTO, University of Milan, Milan, Italy

^bC.O.R., Reparative Orthopaedic Surgery Department – ASST Pini-CTO, University of Milan, Italy

KEYWORDS

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ABSTRACT

Proximal femoral fractures in elderly patients represent a rapidly increasing socio-economic problem. The functional recovery and the mortality rate are influenced by a substantial quantity of variables, including the waiting time for surgical treatment ("time to surgery"). This study aims at investigating the average waiting time, and ascertaining the causes and effects, together with other non-modifiable variables, on the outcome for patients admitted to Milan's Istituto Ortopedico Gaetano Pini (Gaetano Pini Orthopaedic Institute) with a proximal femoral fracture. Data have been collected from 234 patients, between May and November 2015. Parameters recorded and analysed included fracture type, presence of comorbidities (*Charlson Index (CCI)*), the ASA (American Society of Anesthesiology) score, day of the week presenting to hospital, the type of treatment received, the functional recovery, and the patient's condition on discharge. In 46.4% of cases, the duration of preoperative stay prior to surgery was found to be in line with what is recommended in the literature (<48 h). In 20% of cases, the time to surgery was found to exceed 96 hours.

The data collected that pertain to the distribution of the sample and the comorbidities were shown to be in line with the literature. A statistical significant difference was found between day of the week that the patient was admitted to hospital and the waiting time for surgery.

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Introduction

Proximal femoral fractures in elderly patients represent a very significant problem in industrialized countries, due to the aging of the population. The incidence rates, in fact, increase exponentially from 65 onwards, doubling every five years approximately and reaching rates in excess of 400/10,000 in women above 85 years of age. The consequences of this injury are heavy, in terms of both morbidity and socio-economic impact, with mortality rates after 1 year ranging between 14% and 36% [1–3]. According to the IOF (International Osteoporosis Foundation) data, the expectation is that, by 2050, the incidence of femoral fractures will increase by 240% among women and by 310% among men, with the number of cases set to reach 6.3 million in 2050.

In Italy, it is estimated that the incidence of proximal femoral fractures is approximately 90,000 per year, and that they are

responsible for an annual expenditure in excess of 800 million euros in hospital costs alone. From the patient's perspective, in around 20% of cases, motor autonomy is completely lost and only 30–40% recover full autonomy in daily activities [4].

Surgery is still considered as the gold standard of treatment in this elderly, frail patient cohort, [5,6] with the time to surgery parameter to be a determinant in terms of mortality rate and functional recovery [7].

A number of studies have reported improved outcomes when surgery is conducted within 48 hours from the point of admission [8–11].

Karres J et al. [12] found that every day "lost" from admission to operation to be linked to an increased mortality rate and to a rise in postoperative complications ($P=0.04$), as well as to a decrease in survival time ($P=0.03$). In particular, the mortality rate is higher in operations conducted more than two days after admission (*two day surgery*, OR: 1.14; 95% CI: 1.06–1.23; $P<0.001$) and three or more days after admission (*three or more day surgery*, OR: 1.34; 95% CI: 1.23–1.46; $P<0.001$) compared to those conducted on the same day (*same day surgery*). The rate of complications, too, increases in operations conducted after the third day (OR: 2.08; 95% CI 2.00–2.16; $P<0.001$) compared to those conducted on the same day and on the next day. [13].

* Corresponding author at: ASST Pini-CTO, University of Milan, Italy, P.zza Cardinal Ferrari 1, 20122-Milan, Italy, Tel: +39-02-58296903, Fax: +39-02-58296905.
E-mail address: maz.colombo@hotmail.it (M. Colombo)

The access time to surgery is influenced by several variables, especially by the concomitant pathologies (comorbidity), in particular those of a cardiovascular nature, that give rise to a increased perioperative risk, quantified in accordance with the ASA (*American Society of Anesthesiology*) score [14–17].

The aim of the study is to investigate the time to surgery from presentation of elderly patients with a proximal femoral fracture admitted at Milan's Istituto Ortopedico Gaetano Pini.

Specific objectives are:

- Identify patient and procedural factors associated with preoperative stay
- Identify factors can guide changes to decrease preoperative stay
- Identify pre-operative risk factors for surgical delay

We also collected data about the time intervened between access to the Emergency Trauma Service (Servizio di Traumatologia d'urgenza - STU) and the operation, the mortality rate after 30 days and one year after the fracture, the duration of hospital stay, the incidence of surgical site infections, the functional recovery after 30 days and one year after the fracture, and, lastly, to ascertain the factors impacting on mobility and mortality in proximal femoral fractures.

Materials and methods

Patients admitted with the diagnosis of proximal femoral fracture between 4 May 2015 and 4 November 2015 were eligible to participate. The follow up of this patient cohort completed on 6 November 2016.

Exclusion criteria were subjects affected by rheumatoid arthritis, metabolic bone diseases (osteoporosis excluded), pathological (oncological) fractures and high-energy trauma and pediatric patient

For collection of data, two computerised data forms were developed. One included capture of such details as patient age, sex, weight, height, ethnic group, marital status, education, any institutionalization, degree of dependence expressed by the Barthel scale*, MMSE* (Mini-Mental State Examination) within 48 hours from operation, type of proximal femoral fracture sustained according to the Müller AO* classification (reference), ASA* and CCI* scores (references) and presence of concomitant chronic diseases. Moreover, other details recorded were date of entry in ward, date of operation, ICD-9-CM operation code, type of osteosynthesis or prosthetic implant used, use of cement and type of cement used, duration of the operation, intraoperative blood loss, data on the antibiotic prophylaxis (peri-operative; antibiotic therapy administered before/during/after the operation, by specifying the type of antibiotic, the dose, the administration route), blood transfusion, date of discharge from hospital and patient's condition upon discharge.

The second card captured date relating to mortality after 30 days and 1 year after the operation, functional recovery measured through the Barthel scale (Barthel ADL) (reference) after 30 days/60 days/1 year from date of operation, occurrence of surgical site infection by specifying the day of onset, the type, the localization, the microorganism involved, and the antibiotic resistance. Collection of data related to the follow-up took place through outpatient clinic medical consultation 30 to 60 days, and telephonic interview 12 months, after the operation.

An analysis was conducted on the associations between duration of the preoperative stay and variables connected to the time to surgery, namely, age, sex, type of fracture, BMI (Body Mass Index), ASA score, MMSE, day of the week admitted to hospital, and *Charlson Index* (CCI). The preoperative stay has been divided into 5 subgroups as shown below:

- Within 24 hours from the trauma
- Between 24 and 48 hours
- Between 48 and 72 hours
- Between 72 and 96 hours
- Beyond 96 hours

Patient sample was also subdivided into six categories on the basis of the *Charlson Comorbidity Index*:

- Class 1: CCI 0
- Class 2: CCI 1
- Class 3: CCI 2
- Class 4: CCI 3
- Class 5: CCI 4
- Class 6: CCI >4

Results

During the above pre-specified period 234 patients were enrolled. The mean age was 81.9 years.

The prevalence of fractures was higher among females (79.4%) compared to males (20.6%). 92% of patients had not been institutionalized at the time of admission to hospital.

The most represented ASA anaesthetic risk scores proved to be ASA 3 (64% of the sample) and ASA 2 (31.6%). The pre-selection of patients might explain the scarcity of high scores within the sample (ASA 4, 3.1%); patients with a high anaesthetic risk are usually admitted to other institutions and not ours due to the lack of support services such as an intensive or high dependency unit. (Figure 1).

Overall, 53.7% of patients were found to have hypertension, 31.5% osteoporosis whereas 29.6% suffered from a documented senile dementia (Figure 2).

Most commonly used drugs amongst this cohort were antihypertensives, pump inhibitors, antiplatelets and benzodiazepines (Figure 3)

Fracture distribution according to the AO classification is shown in Figure 4.

56% of subjects included in the sample have underwent an osteosynthesis. 44% of patients have been treated with prosthetic replacement, 36% of them with endoprosthesis (37% of which cemented) and 6.4% with arthroplasty (Table 1).

Table 2 shows the *Charlson Comorbidity Index*. 78.3% of the subjects had a score between 0 and 2. The score 0 is the one most represented (35.5% of the sample), only 6.9% of patients display a higher score than 4.

The average duration of stay was 11.9 days (5–29 range), whereas the preoperative stay, on average, was found to be 3.2 days (76.8 hours), Table 3. In 46.4% of cases, the duration of preoperative stay proved to be in line with the recommendations made in the literature (<48 h).

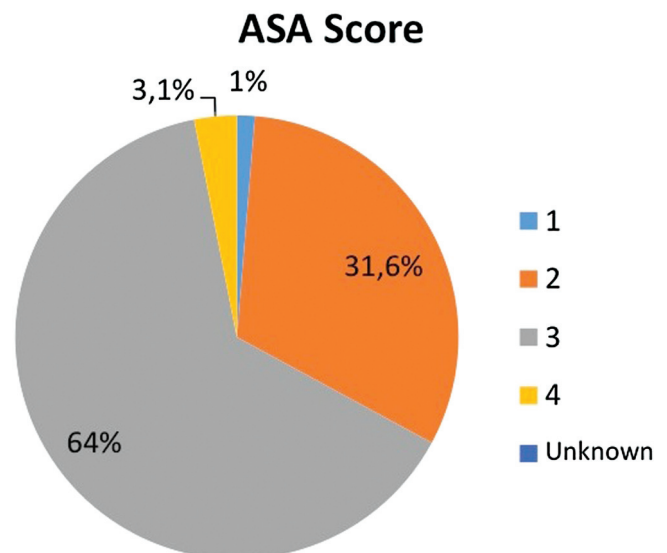


Fig. 1. ASA score of population.

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