Journal of Clinical Anesthesia 53 (2019) 11–19

Contents lists available at ScienceDirect

Journal of Clinical Anesthesia

journal homepage: www.elsevier.com/locate/jclinane

Original Contribution

Efficacy of a multidisciplinary approach on postoperative morbidity and mortality of elderly patients with hip fracture

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ARTICLE INFO

Keywords:
Clinical pathway
Hip fracture
Mortality
Postoperative complications
Surgical delay

ABSTRACT

Study objective: We evaluated the efficacy of a multidisciplinary approach to reduce postoperative complications and 1-year mortality in patients, undergoing hip fracture surgery and the impact of surgical delay on mortality.
Design: A non-randomized intervention study with a historical control group (CG).
Setting: During the hospital stay of patients undergoing hip fracture surgery and subsequent follow-up during 12 months post-discharge.
Patients: 240 patients undergoing hip fracture surgery were included in the CG. 272 patients were included in the intervention group (IG).
Interventions: CG patients received the standard care given at our hospital. Patients in the IG received a new model of multidisciplinary approach to care.
Measurements: The following variables were collected: study group, age, gender, ASA physical status, co-morbidity, type of fracture, type of anaesthesia, surgical delay, postoperative complications, hospital stay, destination after discharge and postoperative mortality.
Main results: 512 patients (CG = 240; IG = 272). Mean age was 83.8 years in CG and 84.9 years in IG. Patients in the IG had a worse health status according to ASA (III-IV: 68.8% vs 51.7%; $p < 0.001$) and took more drugs ($p < 0.001$). Surgery was performed within 48 h of admission in 55.1% of patients of the IG (38.3% CG; $p < 0.001$). Incidence of postoperative complications (67.3% IG vs 76.2% CG $p = 0.025$) and hospital stay was shorter in the IG ($p < 0.001$). A surgical delay of > 48 h (HR = 0.61; CI95%: 0.42–0.88) and allocation to the IG (HR = 0.64; CI95%: 0.44–0.93) were the protective factors for mortality.
Conclusions: The multidisciplinary approach could be associated with a decrease in postoperative complications, hospital stay and mortality. Surgical delay may not increase the risk of mortality. The main objective in the management of these patients should be the optimization of their general health status before surgery rather than surgical delay.

1. Introduction

Hip fractures are very common among elderly people. The incidence is increasing and it is estimated to reach one million people in Europe and over six million people around the world by 2050 [1].

Surgical repair is the treatment of choice but is associated with high one-year morbidity and mortality [2–6]. Postoperative complications are the major cause of death and mortality can reach 30% one year after surgery [7–9]. Despite improvements in treatment in recent years, mortality has not substantially improved.

Clinical guidelines and a multidisciplinary approach are presently recommended to improve final outcomes [10–14]. Although most guidelines recommend surgery to be performed within 48 h of admission, the impact of surgical delay on mortality remains controversial [14–17].

The main objective of the present study was to assess the efficacy of a multidisciplinary approach to reduce mortality within 12 months after surgery in patients with hip fracture. The secondary objectives were to evaluate the impact of a multidisciplinary approach in post-operative complications, hospital stay, destination after discharge,

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https://doi.org/10.1016/j.jclinane.2018.09.029
Received 6 June 2018; Received in revised form 16 August 2018; Accepted 26 September 2018

readmission within 30-days after surgery and to assess whether performing surgery within 48 h upon admission reduced mortality after one year.

2. Material and methods

Ethical approval for this study (Ethical Committee N° CEIC 10/92) was provided by an independent Ethical Committee of Clinical Research (Comitè d'Ètica d'Investigació Clínica de la Fundació Unió Catalana d'Hospitals), Barcelona, Spain (Chairperson Dr. Imma Guasch Jordan) on 10 of January 2011. Patients in the intervention group provided written, informed consent to participate and when that was not possible, the consent was obtained from the next of kin or carer or legal guardian. The study complies with all local legal and regulatory requirements and with the Declaration of Helsinki.

2.1. Study design

A non-randomized hospital-based intervention study with a historical control group (CG) and 12-month follow-up after hospital discharge of patients who underwent surgery for hip fracture.

2.2. Study subjects and recruitment

All patients over 64 years of age undergoing surgery for hip fracture were included. Patients with pathological or traffic accident-related fractures and those unwilling to give informed consent were excluded (Fig. 1).

2.3. Study arms

2.3.1. Control

Patients who underwent surgery for hip fracture between January and December 2008 with follow-up until December 2009. Patients in the CG received the standard care given at our hospital. The management of patients with hip fracture was done by the orthopaedic surgeon who also set the date for surgery. Preoperative assessment was performed by the anaesthetist on duty. The internal medicine specialist only intervened when required by the orthopaedic surgeon or when the patient presented any medical complication.

2.3.2. Intervention

Patients who underwent surgery for hip fracture between October 2010 and November 2011 with a follow-up until December 2012. The patients in the intervention group (IG) were treated at the Hip Fracture Unit (HFU). The HFU is a healthcare unit based on a multidisciplinary approach of patients with hip fracture that was initiated in 2010 after the development of clinical guidelines for this pathology. The design of the multidisciplinary approach covers the whole period from patients' admission in the emergency department to their discharge, choosing the most suitable action for each patient, in order to diminish the variability of the clinical performance and the possibility of errors, while improving the final outcome. The main objectives were to optimize patients' health status before surgery, to minimise preoperative stress, to prevent and/or treat electrolyte imbalance, to prevent and/or treat cardiovascular, respiratory, infectious and cognitive disorders, to improve the nutritional status and to reduce surgical delay.

The main points of our clinical guidelines were:

- To monitor O_2 saturation/8 h. Oxygen therapy when < 92% and maintenance until 48 h after surgery.
- To start the treatment protocol for anaemia when Hb < 13 g/dl on admission and to assess transfusion when Hb < 10 g/dl.
- To start the treatment protocol in those patients who received antiplatelet agents (APA) or oral anticoagulants (OAC) on admission.
- Prioritize surgery within 48 h upon admission in patients presenting a stable medical condition.
- High protein diet and oral liquids enriched with 12.5% of carbohydrates until 2 h before surgery.
- Appropriate i.v. pain treatment.
- Thromboprophylaxis i.v./24 h.
- Gastric prophylaxis i.v./24 h.
- Protocol for wound prevention.
- Urinary sediment and treatment when clinics suggest urinary infection.
- Bladder catheterization only when incontinency or when needing to monitoring of renal and/or cardiac function.
- Fluid therapy i.v. 24 h before surgery and maintenance until beginning of oral diet post-surgery.
- Revision of patients' medication on admission and modification of the treatment regimen when necessary.
- Delirium prevention measures during hospital stay (Normothermia maintenance. Use of periphery blocking by postoperative analgesia. Avoid using morphine derivatives and benzodiazepines. Avoid hypotension. Avoid anaemia. Avoid hypoxemia).
- Respiratory physiotherapy in patients with respiratory pathology.
- Rehabilitation of the patient 24 h after surgery.

The multidisciplinary team was composed of orthopaedic surgeons, anaesthetists, an internist specialized in geriatrics, a nurse case manager, a social worker, a physiotherapist and a nutritionist. Preoperative assessment was performed by the anaesthetist. The internal medicine specialist was responsible for patients' follow-up until hospital discharge. The date of surgery was set by the orthopaedic surgeon, except when the internal medicine specialist and/or anaesthetist decided to delay surgery following the protocol of action (antiplatelet agents or anticoagulants) or patients' physical condition-until the patients were stabilized.

For patients of both groups who received antiplatelet agents (APA) or oral anticoagulants (OAC), the guidelines of the Spanish Society of Anaesthesiology and Reanimation (SEDAR) [18] and the American Society of Regional Anaesthesia (ASRA) [19] were followed, in agreement with our hospital's Haematology Service. Surgery was not contraindicated in patients who took acetylsalicylic acid 100 mg/day or triflusal 300 mg/day. When patients took doses of acetylsalicylic acid > 100 mg/day, trifusal > 300 mg/day or clopidogrel on admission, the treatment was replaced for acetylsalicylic acid 100 mg/day and surgery was postponed 4 days. In cases of patients taking OAC when admitted, surgery was delayed 2–3 days until INR < 1.5. All patients received prophylactic enoxaparin 40 mg/day from admission. Perioperative anaemia was managed following the transfusion criteria established by the Haemotherapy Committee of our centre. Transfusion was administered to patients whose haemoglobin level was < 8 g/dl and those with cardiorespiratory disease and/or haemodynamic instability with haemoglobin level < 10 g/dl.

2.4. Data collection and measures

2.4.1. Procedure

The control group was identified from the Minimum Basic Hospital Discharge Data Set (MBHDDS). Records regarding treatment and clinical and demographic information were obtained from patients' medical history.

The data collection process for the IG was carried out with patients' follow-up and the clinical information available in our hospital's computerized clinical records. All data were collected by the main investigator with the collaboration of a nurse from the department of anaesthesiology.

For both study groups, post-discharge follow-up was done with a structured telephone interview at 3, 6 and 12 months after hospital discharge. When the information could not directly be obtained from the patients (including deceased patients), the interview was done with