

# Multidisciplinary Approach to Hip Fracture in the Elderly: Florence Experience

Carlo Rostagno<sup>1\*</sup>, Alessandro Cartei<sup>1</sup>, Roberto Buzzi<sup>2</sup>, Ferdinando Landi<sup>2</sup> and Gian Franco Gensini<sup>3</sup>

<sup>1</sup>Department of Medical and Surgical Critical Area, University of Florence, Italy

<sup>2</sup>Departments of Orthopedics and Traumatology, Traumatology and Orthopedics AOU Careggi Florence, Italy

<sup>3</sup>Department of Internal Medicine, Health Management AOU Careggi Florence, Italy

## Abstract

Since September 2011 in Orthopaedic and Trauma Centre of AOU Careggi, Florence, exists a trauma area with 75 beds managed by a team with the key figure of the internal medicine specialist as coordinator of a Multidisciplinary Working Group that will include several specialists such as Anaesthesiologists, Geriatricians, Orthopaedics. Due to the high number of elderly patients, most frequently admitted for hip fracture and often suffering from multiple co-morbidities, the clinical approach is significantly more complex than in patients undergoing elective surgery. To evaluate the effectiveness of this organization model we prospectively followed the hospital course of 297 patients with hip fracture admitted to our hospital course from September 15 2012 to November 15 2012, Results were compared with an historical sample, e.g. 235 consecutive patients admitted between January 1 and March 31 2011. In the period under investigation patients treated within 48 hours raised from 36 to 80%, while early intervention was performed in historical group in only 26%. Hospital mortality was 2.3% (7/297 patients) in comparison to 3.1%. Overall incidence of severe complications has been low, less than 8% (mainly pneumonia and respiratory failure) while, despite LMWH prophylaxis, Doppler examination showed an 18% incidence of distal DVT. No proximal symptomatic DVT however was diagnosed. Mean length of hospital stay,  $18.1 \pm 7$  days in historical sample, significantly decreased to  $6.6 \pm 8.9$  days in September 15 2011  $\pm$  October 15 2011 and to  $13.6 \pm 4.7$  days ( $p=0.0022$ ) in November 15-December 15 2011.

We suggest that an integrated evaluation at hospital arrival with careful clinical investigation, identification and stabilization of concomitant clinical problems, would allow decreasing the time to surgery, in particular in frail subjects. Moreover, clinical management by internal medicine specialists and geriatricians, other than orthopedics, should improve the ultimate outcome in patients with hip fracture.

**Keywords:** Hip fracture; Ageing; Surgical timing; Multidisciplinary approach; Mortality; Rehabilitation

## Introduction

Hip fracture is one the most frequent causes of hospitalization in developed countries. In the European Community about 500,000 people suffer from hip fracture every year and not less than 70,000 cases /year are reported in Italy [1,2]. More than 90% of hip fracture is observed in people aged > 65 years and the risk doubles for every decade after 50 years Due to progressive ageing it has been estimated that the incidence will increase by nearly 60% over the next 20 years. One year mortality is near 40 % in comparison to 6.3% expected 1-year mortality in a healthy age matched population at time of fracture. In addition more than 60% of patients does not fully recover autonomy in basic daily life activities.

Early surgery (within 24–36 hours from trauma) has been demonstrated to decrease 30-days and 1-year all-cause mortality in comparison to an intervention delayed >48 hours (mortality decrease by 41% and 32%, respectively) [3-5]. However a major bias in the evaluation of these results is that delay to surgery may be a confounding factor affecting survival, rather than an independent prognostic factor. Patients with delay to surgery could have been more compromised, with a major number of co-morbidities on admission, thus requiring more time before clinical stabilization and surgery [6,7]. Heart failure, dementia, atrial fibrillation, diabetes, renal failures have been related to a higher in hospital mortality after surgery [8-11]. Both hospital mortality and morbidity rates and long term results may be advantageously influenced by a careful evaluation and early treatment of co-morbidities, allowing most of patients to benefit of early surgery and to limit postoperative complications.

Organization models in which an internal medicine specialist coordinates an integrated team (geriatrics orthopedics,

anesthesiologists) may contribute, through careful evaluation of clinical conditions and detection of co-morbidities at hospital admission, to safely decrease time to surgery, decrease post operative complications, decrease the length of hospitalization, and allow understanding the cause of falling and individuating a proper rehabilitation pathway.

In the present paper will presented the characteristics and preliminary results of the model adopted in Orthopaedic and Trauma Centre of AOU Careggi, Florence.

## Methods

### Patients included in the study

In this study were included 297 consecutive patients with hip fracture referred to the Emergency Department of Orthopaedic and Trauma Centre of AOU Careggi, Florence from September 15 2012, when the new organization model was activated, to November 15 2012, Data from an historical sample, e.g. 235 consecutive patients admitted between January 1 and March 31 2011 were recalled from ICD-9 discharge forms and considered for comparison. Percentage of patients undergoing early surgery, in hospital mortality and length of hospital stay were compared between the two groups.

**\*Corresponding author:** Carlo Rostagno, Department of Medical and Surgical Critical Area, University of Florence, Largo Brambilla, 3, 50134- Florence, Italy, E-mail: [carlo.rostagno@unifi.it](mailto:carlo.rostagno@unifi.it)

**Received** July 01, 2013; **Accepted** August 07, 2013; **Published** August 10, 2013

**Citation:** Rostagno C, Cartei A, Buzzi R, Landi F, Gensini GF (2013) Multidisciplinary Approach to Hip Fracture in the Elderly: Florence Experience. Emergency Med 3: 148. doi:10.4172/2165-7548.1000148

**Copyright:** © 2013 Rostagno C, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Multidisciplinary team organization : hospital admission

Every patient referred for suspected hip fracture undergoes orthopedic and radiological investigation, venous line positioning, ECG, laboratory examination and chest X-ray if aged > 59 years. Deep venous thrombosis prophylaxis with low molecular heparin is started as soon as possible. In patients treated with warfarin drug withdrawal and oral vitamin K administration were considered to recover normal clotting parameters. Withdrawal of thienopyridines platelet antagonists was considered individually. After transferral to the general ward, careful clinical evaluation by the internal medicine specialist (history, physical examination, ECG and chest X ray evaluation, bedside ECHOCARDIOGRAPHY when needed) allowed orthopaedics and anaesthesiologists to schedule surgery and choice anaesthesiology strategy within 48 hours from trauma. Postoperative 24-48 hours observation in Intensity care unit will be planned for high risk patients.

## Multidisciplinary team organization post surgical treatment

A dedicated medical service, with multidisciplinary competences, followed patients after surgery. Antibiotic prophylaxis, mainly cefazolin, was started in surgery room and prosecuted for at least 24 hours. Careful evaluation of comorbidities and their treatment aimed to decrease the risk of postoperative complications. Particular care has been paid to proper hydration and nutrition, careful nursing management. Pain control may be obtained with paracetamol or opioids. The Australian Hip Fracture Evidence Based Clinical Practice Guidelines [12] suggest that patients with hip fracture should be offered a coordinated multidisciplinary rehabilitation program. Strict collaboration with physiotherapists is essential and should lead to early mobilization with individualized programs according to patient characteristics to obtain the most favourable results. Patients were sit in bed on 1<sup>st</sup> post-operative day and therefore gradually mobilized according to the load allowed on treated limb. Early assisted ambulation (i.e. within 48 h of surgery) accelerates functional recovery [13]. The careful search for the cause of fall was carried out during hospitalization in order to prevent further trauma. Treatment to limit progression of osteoporosis was encouraged [14]. A better recognition and understanding of delirium had the objective to decrease the duration of hospital stay and favour early mobilization [15-16]. A program of accelerated discharge admission to a rehabilitation program should be considered in patients who were previously well. Home-base rehabilitation may lead to functional improvement in patients who are not candidate to intensive rehabilitation program, in particular for those with previous cognitive impairment. Nursing care facilities are reserved to patients who do not fulfil criteria for the previous two solutions, or with severe social problems. Hospital and health care district for care continuity is contacted through a continuous collaboration with Social Service Staff Health and Social Agency staff.

## Results

From September 15<sup>th</sup> 2011 to December 15<sup>th</sup> 2011, 297 patients with hip fracture were admitted to our hospital. There was a large prevalence of female sex (202 vs. 95). Mean age was 82.6 years (range 48-97 years). Neck fractures and per throcanteric fractures accounted for 47% and 45% respectively, while in the other 8% of patients femur fracture was sub throcanteric. A comprehensive preoperative multidisciplinary team evaluation, including echo cardographic examination when needed, was obtained in all patients (71 % evaluated within 24 hours from hospital admission). Dementia, heart failure and coronary heart disease were the more frequently detected co morbidities (Table 1).

	Period under study	Historical period
Number	297	235
Sex : female /male	202/95	155/80
Mean age (years)	82.6+9	83.2+10
Preserved BADL > 3	57%	n.a.
Dementia	38%	33%
Heart failure	14%	19%
Coronary artery disease	14%	16%
COPD	25%	21%
Cerebrovascular disease	20%	18%
Diabetes	10%	9%
Average time to surgery (days)	3.1+1.9	3.7+2.2
Early surgery (<48 hours)	54%	26%
Average time to clinical evaluation (days)	1.1+0.7	n.a.
Early clinical evaluation (< 24 hours)	69%	n.a.
Average lenght of hospital stay (days)	15.1+6.3	18.1+7.2

**Table 1:** Characteristics of patients. Main clinical end-points.

More than 3 BADL were preserved in 57% of patients, while a motility index > 2 was preserved in 51%. Echocardiographic examination allowed to detect not previously diagnosed severe aortic valve disease in 9 % of patients thus allowing change of anesthesiologist strategy before surgery. Four patients with severe life threatening co morbidities were not treated, Data were compared with an historical sample before development of multidisciplinary team (235 patients admitted between January 1 and March 31 2011, table 1). In this group only 26% underwent surgery within 48 hours from admission early surgery in the period under examination was performed in 57% of patients (p<0.001). Moreover the percentage of early interventions increased progressively from 37% in the period September 15 2011-October 15 2011 to 65 % in the period November 15-December 15 2011.

Since most of surgical interventions at that time were performed under spinal anesthesia, one of the main causes of delay has been ongoing oral anticoagulant or clopidogrel -prasugrel treatment that accounted for more than 10% of the population under study. The widespread adoption of a protocol to early antagonize the effects of warfarin with oral vitamin K administration and the decision to not withdraw antiplatelet drugs in patients with medicated stents and to perform the intervention in general anesthesia had recently significantly increased the number of patients undergoing early intervention (at present near 80%). Unstable clinical condition at hospital arrival, mainly heart or respiratory failure that needed clinical stabilization, accounted for another 5-10% of surgery delayed > 48 hours from trauma. Finally organizational problems accounted for most of the remaining cases of delayed surgery.

Hospital mortality has been 2.3% (7/297 patients) in comparison to 3, 1% in historic period. Three patients died for respiratory failure, 2 for renal failure, and respectively 1 for rupture of an abdominal aortic aneurysm and 1 for complicated stroke. Overall incidence of severe complications has been low, less than 8% (mainly pneumonia and respiratory failure) while, despite LMWH prophylaxis, scheduled Doppler examination at fifth postoperative day showed 18% incidence of distal DVT. No proximal symptomatic DVT however was diagnosed. Mean length of hospital stay, 18.1 ± 7 days in historical sample, significantly decreased to 16.6 ± 8.9 days in September 15 2011 ± October 15 2011 and to 13.6 ± 4.7 days (p=0.0022) in November 15-December 15 2011.

## Discussion

The analysis of main international health-care models has been conducted in a recent systematic review [17]: when the patient is followed in an orthopedic ward with a geriatrician integrated into the orthopedic team associated with multiprofessional group, the lowest in-hospital mortality rate, length of and mean time to surgery (1.43 days) are reported [17].

Our model is based on the hypothesis that a multidisciplinary team (cardiologists, orthopedists, geriatricians, anesthesiologists, nurses and physiotherapists) coordinated by an internal medicine specialist may further improve 1) clinical results, 2) organizational and clinical governance results 3) economic and climate results:

Preliminary data from this model of organization showed a significant increase of patients treated surgically < 48 hours, a low perioperative mortality and postoperative complication rate and a significant, although further improvable, decrease of length of hospital stay. Hospital mortality in our series has been 2.3 %. In recent papers in hospital mortality in patients with hip fracture has been reported between 3.7 and 7.3 % [18,19]. Medical co morbidities (atrial fibrillation, heart failure, diabetes, renal failure, dementia) were independently related to an higher risk of death at 30 days [8-11]. In the study by Husko et al. [20] intensive geriatric rehabilitation within hospital was compared to standard care in local community hospitals. No differences in mortality at discharge (4% in both groups) were found, although in patients treated intensively functional recovery was more frequent. Similar results were reported by Bielza-Galindo et al. [21]. Thus although the effects on functional recovery may be significantly influenced by intensive rehabilitation programs, only a careful preoperative evaluation and postoperative treatment of comorbidities and complications may allow to limit in hospital mortality.

## Conclusion

In conclusion we believe that in elderly patients with hip fracture an integrated multidisciplinary approach may improve clinical results. An early accurate preoperative risk assessment, allowing the choice of better anesthesiology strategy and if needed post operative observation in a higher intensity care unit, may limit perioperative mortality while a careful evaluation in the post operative period allowing a better treatment of co morbidities and to prevent/ treat early complications could significantly improve life expectancy and quality of life.

## References

- Sanders KM, Nicholson GC, Ugoni AM, Pasco JA, Seeman E, et al. (1999) Health burden of hip and other fractures in Australia beyond 2000. Projections based on the Geelong Osteoporosis Study. *Med J Aust* 170: 467-470.
- Piscitelli P, Brandi ML, Chitani G, Argentiero A, Neglia C, et al. (2011) Epidemiology of fragility fractures in Italy. *Clin Cases Miner Bone Metab* 8: 29-34.
- Grimes JP, Gregory PM, Noveck H, Butler MS, Carson JL (2002) The effects of time-to-surgery on mortality and morbidity in patients following hip fracture. *Am J Med* 112: 702-709.
- Mak JC, Cameron ID, March LM; National Health and Medical Research Council (2010) Evidence-based guidelines for the management of hip fractures in older persons: an update. *Med J Aust* 192: 37-41.
- Shiga T, Wajima Z, Ohe Y (2008) Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression. *Can J Anaesth* 55: 146-154.
- Stoddart J, Horne G, Devane P (2002) Influence of preoperative medical status and delay to surgery on death following a hip fracture. *ANZ J Surg* 72: 405-407.
- Orosz GM, Hannan EL, Magaziner J, Koval K, Gilbert M, et al. (2002) Hip fracture in the older patient: reasons for delay in hospitalization and timing of surgical repair. *J Am Geriatr Soc* 50: 1336-1340.
- Cullen MW, Gullerud RE, Larson DR, Melton LJ 3rd, Huddleston JM (2011) Impact of heart failure on hip fracture outcomes: a population-based study. *J Hosp Med* 6: 507-512.
- Adunsky A, Arad M, Koren-Morag N, Fleissig Y, Mizrahi EH (2012) Increased 1-year mortality rates among elderly hip fracture patients with atrial fibrillation. *Aging Clin Exp Res* 24: 233-238.
- Huang YF, Shyu YI, Liang J, Chen MC, Cheng HS, et al. (2012) Diabetes and health outcomes among older Taiwanese with hip fracture. *Rejuvenation Res* 15: 476-482.
- Hebert-Davies J, Laflamme GY, Rouleau D; HEALTH and FAITH investigators (2012) Bias towards dementia: are hip fracture trials excluding too many patients? A systematic review. *Injury* 43: 1978-1984.
- Mak JC, Cameron ID, March LM; National Health and Medical Research Council (2010) Evidence-based guidelines for the management of hip fractures in older persons: an update. *Med J Aust* 192: 37-41.
- Bachmann S, Finger C, Huss A, Egger M, Stuck AE, et al. (2010) Inpatient rehabilitation specifically designed for geriatric patients: systematic review and meta-analysis of randomised controlled trials. *BMJ* 340: c1718.
- NICE technology appraisal guidance 161 (2008) Alendronate, etidronate, risedronate, raloxifene, strontium ranelate and teriparatide for the secondary prevention of osteoporotic fragility fractures in postmenopausal women.
- Hommel A, Ulander K, Bjorkelund KB, Norrman PO, Wingstrand H, et al. (2008) Influence of optimised treatment of people with hip fracture on time to operation, length of hospital stay, reoperations and mortality within 1 year. *Injury* 39: 1164-1174.
- Kalisvaart KJ, de Jonghe JF, Bogaards MJ, Vreeswijk R, Egberts TC, et al. (2005) Haloperidol prophylaxis for elderly hip-surgery patients at risk for delirium: a randomized placebo-controlled study. *J Am Geriatr Soc* 53: 1658-1666.
- Kammerlander C, Roth T, Friedman SM, Suhm N, Luger TJ, et al. (2010) Orthogeriatric service—a literature review comparing different models. *Osteoporos Int* 21: S637-646.
- Harris I, Madan A, Naylor J, Chong S (2012) Mortality rates after surgery in New South Wales. *ANZ J Surg* 82: 871-877.
- Kristoffersen DT, Helgeland J, Clench-Aas J, Laake P, Veierød MB (2012) Comparing hospital mortality—how to count does matter for patients hospitalized for acute myocardial infarction (AMI), stroke and hip fracture. *BMC Health Serv Res* 12: 364.
- Huusko TM, Karppi P, Avikainen V, Kautiainen H, Sulkava R (2000) Randomised, clinically controlled trial of intensive geriatric rehabilitation in patients with hip fracture: subgroup analysis of patients with dementia. *BMJ* 321: 1107-1111.
- Bielza Galindo R, Ortiz Espada A, Arias Muñana E, Velasco Guzmán de Lázaro R, Mora Casado A, et al. (2013) Opening of an Acute Orthogeriatric Unit in a general hospital. *Rev Esp Geriatr Gerontol* 48: 26-29.