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Multidisciplinary Approach to Hip Fracture in Elderly Patients: A New Clinical Organizative Model

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ABSTRACT: 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. Establishing 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 Anesthesiologists Geriatricians, Orthopaedics, Radiologist, nursing Service Managers, Nurses, Physiotherapists , Social Service Staff , Health Care and Social Agency staff may allow an integrated evaluation at hospital arrival with careful clinical investigation , identification and stabilization of concomitant clinical problems, to decrease the time to surgery, in particular for frail subjects. Moreover, clinical management by internal medicine specialists and geriatricians, other than orthopedics, should improve the ultimate outcome in patients with hip fractures.
Key words: hip fracture, ageing, surgical timing, multidisciplinary approach, mortality, rehabilitation

INTRODUCTION

Hip fracture is a major clinical and social problem, being 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 (Sanders et al , 1999; Piscittelli et al , 2011) . More than 90% of hip fracture are observed in people aged > 65 years and the risk of disease doubles for every decade after 50 years . Due to the progressive ageing of population it has been estimated that the incidence will increase by nearly 60% over the next 20 years.

One year mortality ha been reported close to 40 % in patients with hip fracture in comparison to expected 1-year mortality in an age matched population at time of fracture of 6.3 % (Stoddard et al , 2002). In addition more than 60% of elderly patients does not fully recover previous autonomy in basic daily life activities with relevant increase in social and sanitary costs due to rehabilitation, assistance, and the need for admission to health care facilities.

Early surgery (within 24–36 hours from trauma) is associated with a decreased 30-day all-cause mortality and 1-year all-cause mortality in comparison to a delayed intervention beyond 48 hours (mortality decrease by 41% and 32%, respectively) (Grimes et al. 2002; Orosz et al 2002; Mak et al , 2010) In the largest systematic review to date (257 367 patients), increased odds for 30-day all-cause mortality and 1-year all-cause mortality were observed for delay to surgery beyond 48 hours (41% and 32%, respectively).(Shiga et al , 2008) . An integrated team (internal medicine , geriatric and orthopedic specialists) may contribute, through careful evaluation at hospital admission of clinical conditions and detection of co-morbidities which may deeply affect clinical outcome, to decrease time from hospital admission to surgery, allowing to schedule surgical intervention within the first 48 hours of trauma, decrease perioperative complications, decrease the length of hospitalization, allow to understand the cause of falling and individuate a proper rehabilitation pathway.

Moreover, clinical management by internal medicine specialists and geriatricians, with the elaboration of specific programs for postoperative care including treatment of comorbidities , maintenance of adequate nutrition ad hydration , early mobilization , prevention of DVT and prevention of fracture recurrence other than orthopedics, should improve the ultimate outcome in patients with hip fractures. . In the present paper will

presented the preliminary results of three months of activity of the model adopted in Orthopaedic and Trauma Center of AOU Careggi, Florence ,

METHODS

Multidiciscplinary team organization

A) acute phase

Every patient referred for suspected hip fracture will be evaluated in the Emergency Department of Centro Traumatologico Ortopedico – AOU – Careggi , Firenze. Orthopedic evaluation and radiological diagnostic investigation will eventually confirm clinical diagnosis . The patient will undergo 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 should allow to recover normal clotting parameters . Withdrawal of tienopyridine platelet antagonists should be considered individually .

The patient will therefore be transferred to the general ward where careful clinical evaluation by the internal medicine specialist (history , physical examination , ECG and chest x ray evaluation , ECHOCARDIOGRAPHY when needed) will allow orthopaedics and anaesthesiologists to establish the need and timing of surgery and type of anaesthesia within 48 hours from trauma (figure1). Postoperative 24-48 hours observation in Intensity care unit will be planned for high risk patients . Data from literature suggest that no more that 5% of patients will not receive surgery and are treated conservatively .

B)

POST SURGICAL TREATMENT - a dedicated perioperative medical service , with multidisciplinary competences will follow patients after surgery . Antibiotic prophylaxis should be started in surgery room and prosecuted for at least 48 hours . Careful evaluation of comorbidities and their treatment will decrease the risk of postoperative complications . Particular care should be paid to proper hydration and nutrition , careful nursing management . Pain control may be obtained with paracetamol or opiods Strict collaboration with physiotherapists should lead to early mobilization and recovery of limb load and deambulation . Elderly patients (> 64 years) with at least loss of 2 IADL or comorbidities ($\geq$ 2) are candidate to geriatric evaluation and follow-up . The Australian Hip Fracture Evidence Based Clinical Practice Guidelines (2010) suggest that patients with hip fracture should be offered a coordinated multidisciplinary rehabilitation program. Individualization according to patient characteristics is essential to obtain the most favourable results. Early assisted ambulation (i.e. within 48 h of surgery) accelerates functional recovery (Bachman et al. 2010). No particular mobilisation strategies can be recommended over others. The careful search for the cause of fall will be carried out during hospitalization in order to prevent further trauma . History reconstruction of the dynamic of traumatic event is the main step to direct diagnostic evaluation . Treatment with calcium , D vitamin and diphosphonate should be encouraged to limit progression of osteoporosis . Assessment of socio-sanitary needs of elderly hip fracture patients is essential for preparation of the patient discharge planning.

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 . Although the expected benefit is not likely to be large in single patient (about 10% to 15%), because the number of people with hip fracture is large, even a modest effect may be very important from a clinical , social and economic point of view.

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 are contacted trough a continuous collaboration with Social Service Staff Health and Social Agency staff.

RESULTS

From September 15 2011 to November 15 2012 297 patients with hip fracture were admitted to Traumatologia e Ortopedia Generale AOU- Careggi Firenze . There was a large prevalence of female sex (202 vs 95) . Mean age was 82.6 years (range 48 – 97 years) . Neck fractures and perthrocanteric fractures accounted for 47% and 45% respectively , while in the other 8% of patients femur fracture was distal , A comprehensive preoperative multidisciplinary team evaluation, including echocardographic examination when needed , was obtained in 71 % of patients within 24 hours from hospital admission. Dementia , heart failure and coronary heart disease were the more frequently detected co morbidities . More than 3 BADL were preserved in 57% of patients , while a motility index > 2 was preserved in 51% . Echocardiographic

examination allowed to detect in 9 % of patients not previously diagnosed severe aortic valve disease thus allowing change of anesthesiologist strategy before surgery .

Overall early surgery (within 48 hours from hospital admission) in the period under examination was performed in 57% of patients . The percentage of early interventions however increased progressively from 37% in the period September 15 2011 – October 15 2011 to 65 % in the period December 15 2011 – January 15 2012. 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 , more than 10 % of the population under study . Unstable clinical condition at hospital arrival , mainly heart or respiratory failure that needed clinical stabilization , accounted for another 5-10% of surgery > 48 hours from trauma . Finally organizational problems accounted for most of the remaining cases of delayed surgery . Four patients with severe life threatening co morbidities were not treated,

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%) . Hospital mortality has been 2.3% (7/297 patients) . 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 a 18% incidence of distal DVT . No proximal symptomatic DVT however was diagnosed . Mean length of hospital stay has been 15.1 days , however it significantly decreased from 16.6 + 8.9 days in the period September 15 2011 $\pm$ October 15 2011 to 13.6$\pm$ 4.7 days (p = 0.0022) in the period December 15 2011– January 15 2012.

CONCLUSION

A major confounding 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. In fact patients with delay to surgery could have been more compromised, with a major number of comorbidities on admission, thus requiring more preoperative time to stabilize their medical conditions. Furthermore, delay to surgery beyond 48 hours has been shown to be associated with more than twice the number of major postoperative complications, including bedsores, pneumonia, urinary tract infections, deep vein thrombosis and pulmonary embolism, when compared with surgery within 48 hours.

THE MULTISCIPLINARY TEAM MODEL

Increasing age and co morbidities frequently affect the outcome in patients undergoing orthopedic surgery after trauma. An integrated team (internal medicine , geriatric and orthopedic specialists) may contribute to decrease time from hospital admission to surgery, decrease perioperative complications, decrease the length of hospitalization, allow to understand the cause of falling and individuate a proper rehabilitation pathway. The elaboration of specific programs for the preoperative evaluation and admission to surgery room , postoperative care including treatment of comorbidities , maintenance of adequate nutrition ad hydration , early mobilization , prevention of DVT and prevention of fracture recurrence will be an integrant part of the project (figure 1)

Multidisciplinary team assessment of patients with hip fracture would allow careful evaluation of clinical conditions and early detection of co-morbidities which may influence clinical outcome. Most of these conditions may be stabilized by the medical team , allowing to schedule surgical intervention within the first 48 hours of trauma .

Continuous post-operative clinical monitoring by internal medicine specialists and geriatricians would have the purpose of early detection and treatment of in-hospital complications , thus allowing decrease early mortality .

Preoperative evaluation of clinical conditions and previous assessment of motor capacity would suggest the proper rehabilitative program , considering early mobilization , within the first 24 hours after surgery whenever possible. Functional recovery with the possibility to recover home independent life style should be one the main objectives in patients with preserved BADL before hip fracture . By converse the intervention should decrease the number of patients referred to definite nursing care facilities. Expected results will be a significant decrease in hospital mortality , an earlier admission to rehabilitative programs with decreased hospitalization times in order to obtain a more favourable functional recovery . Early treatment and decrease of immobilization related complications should result in a decrease in early (3 months) and late mortality (Hommel, et al 2008) .

In comparison to recently reported experience of ortho geriatric programs, the original aspect of the present model is the key figure of the internal medicine specialist as coordinator of a Multidisciplinary Working Group that will include several specialists such as Anesthesiologists Geriatricians, Orthopaedics, Radiologist, nursing Service Managers, Nurses, Physiotherapists , Social Service Staff , Health Care and Social Agency staff. Previous experiences preferentially followed two principal models related to the management of post operative period : patients followed in orthopaedic wards with consultant orthogeriatcs or alternatively direct referring to an orthogeriatric service . In our model, after initial admission through Emergency Department , each patient will be evaluated by a senior internal medicine specialist to assess general clinical conditions , presence of significant co-morbidities and actual medical treatment . This careful evaluation , in presence of indication to surgery , would allow after an early anaesthesiologist examination to schedule most interventions within 24-48 hours after trauma . In the postoperative period, clinical conduction will be left to internal medicine specialist cooperating with geriatricians , leaving to orthopaedics the management of surgical problems . This methodological approach would allow a more appropriate management of co-morbidities , earlier treatment of medical complications , earlier mobilization of patients , a better recognition and understanding of delirium (Kalisvaart KJ et al 2005; Delirium: diagnosis, prevention and management of delirium. 2010). Finally the assessment of functional impairment before surgery would enable to obtain a better coordinated community support programs .

The analysis of main international health-care models for the approach to elderly patients with hip fractures has been reported in a recent systematic review (Kammerlander C et al ,2010) which identified four main models:

1. Orthopedic ward and geriatric consultant service. This is the simplest model. The patient is treated in the orthopedic ward until he is transferred to a rehabilitation center. The geriatric consultative service is on request.

2. Orthopedic ward and daily consultative service. This is a variation of the traditional team where the geriatrician consults from admission to discharge.

3. Geriatric and rehabilitation ward and orthopedic consultant service. In this setting, the patient is from admission to discharge at the geriatric ward, and the orthopedic surgeon is consultative.

4. Orthopedic ward and integrated care. This is the most sophisticated model where the orthopedic surgeon and the geriatrician manage the patient together from admission until discharge. The patient is in an orthopedic ward, and the geriatrician is integrated into the orthopedic team. A multi professional group with nurses, social workers, physiotherapists, and others is formed, and standardized treatment paths are implemented.

Regarding the main outcome parameters, the studies in group 4 with integrated care could show the lowest mean values regarding in-hospital mortality rate , the lowest length of stay , and the lowest mean time to surgery (Kammerlander C et al ,2010).

Early accurate clinical preoperative evaluation, careful evaluation and treatment of co morbidities (diabetes, heart failure, COPD, etc.), early recognition and treatment of complications , early mobilization program are the mainstay of the choice to implement for the first time an integrand clinical-organizational model based on the creation of a multidisciplinary team coordinated by an internal medicine specialist and including cardiologists, orthopedists, geriatricians, anesthesiologists, nurses and physiotherapists supported by ward's, operating room's, first aid's nursing coordinators and dedicated health managers, management engineers and economists. Preliminary results of this model of organization showed a significant improvement in the number of patients surgically treated within 48 hours , a low incidence of perioperative mortality and postoperative complications, and a significant , although further improvable , decrease of length of hospital stay . Hospital mortality in our series has been 2.3 % . In orthopedic wards in patients aged 60 years or older suffering from hip fracture overall hospital mortality was reported close to 14% , and over 20% in patients with co morbidities (Bergeron et al , 2006) . In the study by Husko et al (2000) intensive geriatric rehabilitation within hospital was compared to standard care in local community hospitals. No differences in mortality at discharge (4% in both groups) was found , although a more frequent regaining in their independency in ADL was reported in patients treated intensively .

Thus while careful preoperative evaluation could allow a decrease in hospital mortality and complications , early mobilization with dedicated physiotherapists is currently believed the key issue to obtain a better functional recovery . Early intervention not followed by early mobilization may decrease or nullify the objectives of the program and limit the expected results on late end-points The in hospital presence of care continuity agency can also ensure continuity between hospital and territory , however the full development of these networks are at present the weakest points of the pathway , largely contributing to longer hospitalization in comparison to other countries and probably contributing to limit the achievement of satisfactory late functional results .

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.

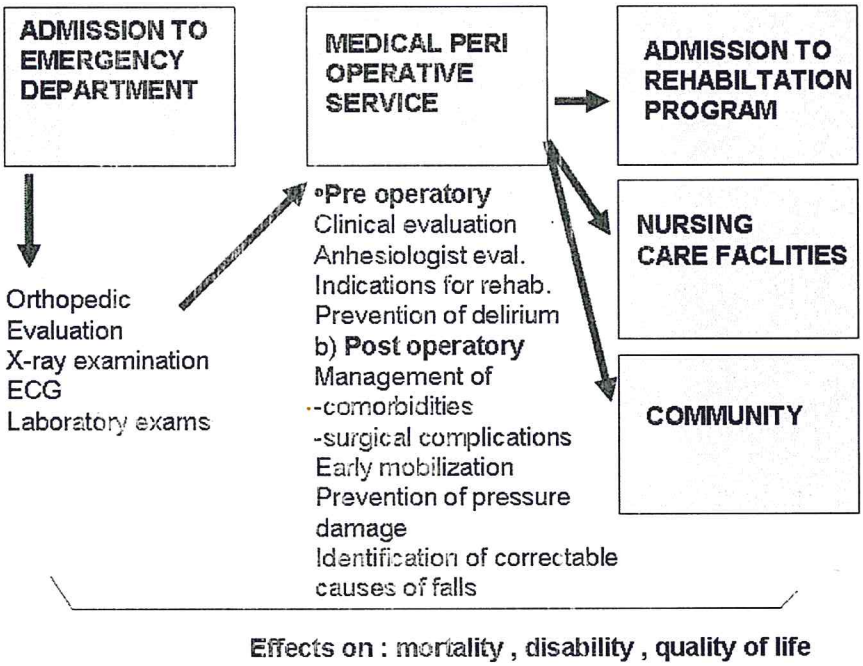

Figure 1. Schematic representation of organization model

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