HIP FRACTURES IN THE ELDERLY: SURGICAL TREATMENT TIMING AND ITS CORRELATION WITH DELIRIUM AND INFECTION

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SUMMARY

Hip fracture is an important problem for the Public Health System. It is estimated that 100,000 fractures happen each year in Brazil. The mean mortality rate after one year of the fracture is 30%. Surgical management is crucial in these cases. This study was aimed at investigating if elderly patients with hip fractures treated after 48 hours of admission showed a higher incidence of delirium and infections than those operated within 48 hours. A prospective observational study was carried out in 21 elderly patients over a six-month period in Hospital do Servidor Público Municipal of Sao Paulo. Only 4 patients (19%) were operated within 48 hours of admission. Postoperative delirium was seen in 52% of the patients. Complications such as pneumonia, urinary tract infection, and wound infection were found in 28.5% of the patients. Eighty three percent of the infected patients were treated after 48 hours of admission and seventeen percent were treated within 48 hours. The main cause of surgery delay was bureaucracy. The correlation between surgical treatment timing and its impact on survival rate is still controversial. In this study, surgical treatment after 48 hours of admission was associated with a higher frequency of complications such as infections and delirium.

Keywords: *Hip fractures; Aged; Intraoperative complications.*

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INTRODUCTION

With the increased life expectancy of the Brazilian population, geriatric traumatology has become increasingly important. The sixth cause of death among the elderly population is external causes, just behind cardiovascular diseases, cancer, and neurologic, respiratory and metabolic diseases.

Hip fractures are traumatic injuries that are characteristic of old ages, accounting for 50%, in average, of hospitalizations for trauma in emergency hospitals. It is estimated that 80% of such cases occur in aged people able to walk by themselves and living in communities[1].

The World Health Organization regards proximal femoral fractures as a major public health issue, both in developed and developing countries. In Brazil, no statistical data are available on the costs of these fractures, but, in the United States, 10 billion dollars are spent each year, with 30 billion dollars/ year estimated for the next few years[3].

Of all fractures associated to osteoporosis, those presenting the most significant consequences to quality of life of an individual are the ones occurring at the proximal femoral end, with a mean mortality rate of 30% in the first 6 months after trauma, and lost independence in 50% of the cases[3-6].

Surgical approach is the key element when addressing hip fractures. In theory, postponed surgery and mobilization may impact function and increase the complications associated to long-lasting rest, such as thromboembolism, urinary tract infection, atelectasis, and pressure sores. On the other hand, early surgery without clinical stabilization of the patient may increase the risk of intraoperative complications[1].

In general, the timing of a surgical approach should be as soon as possible, preferably around 24-48 hours after admission, a time interval allowing the patient to become clinically stable[7-12].

The surgical approach timing may impact a patient's evolution; a delayed surgical treatment leads to delayed mobilization, thus negatively impacting functional recovery[12-14]. On the other hand, the failure to achieve clinical stability prior to the surgery may increase the risk of intraoperative complications[1].

The major postoperative systemic complications found in literature include: urinary tract infection, pneumonia and delirium,

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followed by pressure sores, heart failure, stroke, thromboembolism, hypertensive peak, heart arrhythmia and acute myocardial infarction[4,11,15]. Delirium in aged people secondary to hip fracture surgery is a frequent complication (35%), especially when associated to dementia. Urinary tract infection is a common complication in patients submitted to hip fracture surgeries (23%), leading to a higher incidence of delirium and a longer time of hospitalization[16]. The use of prophylactic intraoperative antibiotic therapy has been shown to substantially reduce the incidence of urinary tract infection[16].

Thus, literature reports show that the early surgical treatment in the elderly population with hip fractures provides lower complication rates[6]. In our environment, few data are available addressing this topic.

OBJECTIVE

To check if aged people with hip fractures and surgically treated after 48 hours of admission present a higher incidence of delirium and infection when compared to those receiving early surgical treatment (within the first 48 hours after trauma).

CASE SERIES AND METHODS

This was a prospective observational study assessing 21 patients above the age of 65, for a 6-month period, from January 1st to June 30th, 2006, admitted at the emergency room of Hospital do Servidor Público Municipal de São Paulo, due to hip fracture. All patients were admitted at the Orthopaedic Emergency Room, there remaining hospitalized.

The exclusion criteria were the following: age below 65 years, pathological fracture, bilateral hip fracture, fracture on hip with prosthesis, hip fracture during hospitalization, multiple trauma patients (long bones, spine and acetabulum), as well as patients referred to other hospitals.

The patients were followed up by the hospital's geriatric interconsultive group prior to the surgical procedure, making suggestions to prevent complications and to help on clinical stabilization in order to provide surgical care the earliest possible. During hospitalization, a questionnaire was applied by qualified personnel.

Free and informed consent terms were signed by patients or family members at the first hospitalization day. The following data were recorded: name, address, telephone number, age, vital signs, Glasgow scale, kind of fracture, associated chronic diseases, sensorial deficits, presence of infection at admission, preoperative test results (hemogram, biochemical, urine I, uroculture, X-ray images, ECG) and list of drugs currently used. Uroculture was requested at admission in order to differentiate UTI as a postoperative complication from UTI present prior to hospitalization.

Before the surgical procedure, all patients included in the study were categorized according to risk criteria for serious intraoperative cardiovascular complication or death by Detsky's scale and by the anesthesia risk scale by the American Society of Anesthesiology - ASA[8]. All patients were followed up throughout the time of hospitalization, being assessed for vital signs and laboratory tests to investigate clinical intercurrences. They were also assessed for cognitive deficit by means of the Clock Drawing Test[3].

During hospitalization, the following items were monitored: surgical approach timing, causes for postponement, time of hospitalization, presence of pre- or postoperative delirium by testing them with the Confusion Assessment Method[19], presence of postoperative infections, dependence level previously to the fracture (Katz and Lawton scale)[11] and hospital discharge status.

The patients were contacted via telephone 2 months after hospital discharge for checking their clinical evolution and impact on the dependence level after fracture.

The subjects were grouped according to surgical approach timing as group A, which was addressed within up to 48 hours of admission, and group B, addressed after 48 hours of admission. For group B patients, the causes of surgery postponement were recorded. Both groups were assessed for incidence of postoperative delirium and infection.

The patients were referred from the orthopaedic outpatient facility to the hospital, where the kind of surgical approach was determined. All patients received clinical support, prophylaxis against deep venous thrombosis and against intraoperative infection.

Statistical Method

Data were entered on the Excel application included on the Microsoft® Office package and subsequently assessed through SigmaStat program.

For groups A and B, the following variables have been correlated: gender, number of medications, presence of diabetes *melittus*, systemic arterial hypertension, dementia, delirium, infection, previous fracture, osteoporosis, Parkinson's disease, urinary tract infection, and activities of daily life (ADL), using the Fisher exact test.

Groups A and B were compared for the following variables: age, Glasgow scale, time of hospitalization, week days rate and fracture type rate, using the Mann-Whitney test.

A level of 0.05 or 5% was adopted as α risk for ruling out a null hypothesis ($p \leq 0.05$). Significant results are marked with an asterisk(*).

RESULTS

Delirium						
Surgery	Yes	%	No	%	Total	%
< 48h	2	18.2	2	20.0	4	19.0
> 48h	9	81.8	8	80.0	17	81.0
Total	11	100.0	10	100.0	21	100.0

Fisher exact test p = 0.669

Table 1 *– Rate of patients experiencing or not postoperative delirium, correlated to surgical approach timing.*

Infection						
Surgery	Yes	%	No	%	Total	%
< 48h	1	16.7	3	20.0	4	19.0
> 48h	5	83.3	12	80.0	17	81.0
Total	6	100.0	15	100.0	21	100.0

Fisher exact test p = 0.684

Table 2 *– Rate of patients experiencing or not postoperative infection, correlated to surgical approach timing.*

	Surgery					
Kind of Fracture	< 48h	%	> 48h	%	Total	%
RFN	0	0.0	3	17.6	3	14.3
LFN	1	25.0	3	17.6	4	19.0
RST	0	0.0	1	5.9	1	4.8
RTT	1	25.0	4	23.5	5	23.8
LTT	2	50.0	6	35.3	8	38.1
Total	4	100.0	17	100.0	21	100.0

Mann-Whitney z = 2.234* p = 0.025

Table 3 *– Rate of patients with right femoral neck fracture (RFN), left femoral neck fracture (LFN), right subtrochanteric fracture (RST), right transtrochanteric fracture (RTT) and left transtrochanteric fracture (LTT) compared to surgical approach timing.*

	Surgery					
Week	< 48h	%	> 48h	%	Total	%
Sunday	0	0.0	3	17.6	3	14.3
Monday	1	25.0	3	17.6	4	19.0
Tuesday	1	25.0	1	5.9	2	9.5
Wednesday	2	50.0	2	11.8	4	19.0
Thursday	0	0.0	2	11.8	2	9.5
Friday	0	0.0	2	11.8	2	9.5
Saturday	0	0.0	4	23.5	4	19.0
Total	4	100.0	17	100.0	21	100.0

Mann- Whitney z= 2. 760* p= 0.006

Table 4 – *Rate of patients according to the week day on which they were admitted to hospital compared to surgical approach timing.*

	Time of Hospitalization		
	< 48h	> 48h	Total
Mean	11,5	11,7	11,7
Median	5,5	9,0	9,0
Maximum	31	34	34
Minimum	4	5	4

Mann- Whitney z = 1.320 p = 0.187

Table 5 *– Comparison of hospitalization time according to surgical approach timing for the patients included in the sample.*

Cause of surgery postponement	Amount	%
Administrative	11	65.0
Administrative and clinical stabilization	1	6.0
Delirium	1	6.0
Clinical stabilization	1	6.0
Infection	2	12.0
Infection/ Administrative	1	6.0
Total	17	100.0

Table 6 *– Rate of causes for surgery postponement among the sample.*

DISCUSSION

The study team was prone to provide surgical treatment as early as possible. However, only 4 patients (19%) were surgically treated within 48 hours. Nevertheless, several studies report a rate of over 50%[7-9,15].

We found a higher incidence of hip fracture in women (81%), which is consistent to literature, in which some studies report an incidence among the overall elderly population twice to three times higher in women compared to men[1,15].

The mean age found in this study was 79.23 years, which was also consistent to literature reports, ranging from 78.2 to 82 years old[6,15].

In the present study, 38% of the assessed population presented with no comorbidities. Patients with a higher number of comorbidities at admission showed a higher risk of postoperative complications and of death, which is consistent to results of retrospective studies on small samples[15,18,20].

Groups A and B did showed no differences concerning the following variables: gender, age, presence of diabetes *melittus*, systemic arterial hypertension, dementia, osteoporosis, Parkinson's disease, presence of previous fracture, urinary infection at admission, level of independence to perform basic activities of daily living, number of medications, and Glasgow scale scores at admission.

In literature, the most common kinds of hip fractures in the elderly are the transtrochanteric and femoral neck ones, accounting for 90% of the total amount of fractures. Subtrochanteric fractures account for about 5-10% of the total amount[4,14]. A significant difference was found between groups A and B for: femoral neck fracture and transtrochanteric fracture, the latter showing a higher incidence among the individuals of group B (Table 3).

In the current study, we found 33% of the individuals with osteoporosis, 86% of these were women and 14% among men. Bibliographic data report that, 17% of the Caucasian osteoporotic women will experience hip fracture sometime in life[21].

Fifty-two percent of the patients developed postoperative delirium, while literature estimates an incidence of 61%[12]. Delirium after hip fracture surgery is a common complication (35%), strongly correlated with advanced age and dementia[21]. In this research, groups A and B did not differ for postoperative delirium (Table 1), due to the small amount of assessed patients.

We found infection (pneumonia, urinary tract infection, and surgical site infection) in 28.5% of the patients, which is consistent to literature reports[5,11,14-16]. Among the patients presenting infection, five (83%) were submitted to surgery after 48 hours of admission, and one (17%) was operated within the first 48 hours of hospitalization, but no significant difference was found between groups A and B (Table 2).

We analyzed the week day on which the patients were admitted in the hospital, correlating it to the surgical approach timing, and a statistical significance was found for patients admitted during the weekend (Saturday and Sunday), composing group B (Table 4). In this study, all patients hospitalized on the weekend were treated after 48 hours of admission as a result of bureaucracy. Literature also reports delays in providing surgical treatment for patients hospitalized during the weekends[10].

The main cause for postponement was bureaucracy (Table 6), i.e., due to the unavailability of operating rooms, and also of surgeons experienced with hip prosthesis, which are usually available on week days. This kind of problem was also reported by other studies[5].

The correlation between surgical approach timing for hip fractures and the subsequent impact on mortality rates has been extensively studied, but remains a controversial subject. Several studies in literature report on that. In the current investigation, surgery after 48 hours was associated to a higher number of infection complications (pneumonia, urinary tract infections, and surgical wound infection) and delirium.

Literature data report that early surgery provides higher survival rates, lower postoperative complications risk (infection, pressure sores, delirium)[8,10,13,14,16].

Despite of the recommendations found in literature to early surgical procedures, there is a concern among surgeons that this should be made in the presence of better clinical conditions, even if in detriment of the surgical approach timing.

Injuries resulting from trauma may be accompanied by a long treatment period and by a reasonably increased number of complications. Those complications usually constitute the triggering causes of death, and they are also accountable for chronic cases, disability, handicap, and its biopsychosocial consequences. An orthopaedic & geriatric interdisciplinary team significantly reduces the incidence of sepsis, pneumonia, thromboembolism, urinary tract infection, pressure sores, gastrointestinal bleeding, heart failure, and vascular brain events[1].

RECOMMENDATIONS

Due to the increased number of elderly patients and age-related diseases, healthcare services must be attentive to the increased demand of hip fractures in the elderly and create a channel to provide healthcare to that population, because delayed surgical treatment for these patients can result in an increased number of complications, increased hospitalization time, which can ultimately lead to increased costs to hospitals in providing care to these patients[3].

CONCLUSION

In this study, we didn't find differences in the surgical treatment timing among patients operated within the first 48 hours or after this period of time both for delirium and infection.

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REFERENCES

1. Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. J Bone Joint Surg Am. 1995; 77:1551-6.
2. Papaléo Netto, M. Tratado de Gerontologia, 2ª ed, São Paulo: Atheneu, 2007
3. Freitas EV, et al, Tratado de Geriatria e gerontologia. 2a. ed. Rio de Janeiro: Guanabara Koogan; 2006
4. Franzo A, Francescutti C, Simon G. Risk factors correlated with pos-operative mortality for hip fracture surgery in the elderly: a population-based approach. Eur J Epidemiol. 2005; 20: 985-91.
5. Moran CG, Wenn RT, Sikand M, Taylor AM. Early mortality after hip fracture: is delay before surgery important? J Bone Joint Surg Am. 2006; 87:483-9.
6. Vidal EIO, Cueli CM, Pinheiro RS, Camargo KR. Mortality within 1 year after hip fracture surgical repair in the elderly according to postoperative period a probabilistic record linkage study in Brazil Nationa osteoporosis foudation. Osteoporos Int. 2006; 17:1569-76.
7. Castillo RE, Cardoso OP. Osteotomías de apoyo en el tratamiento de las fracturas intertrocantéricas inestables de cadera. Rev Cubana Ortop Traumatol. 2000; 14:17-20.
8. Gdalevich M, Cohen D, Yosef D. Morbidity and mortality after hip fracture: the impact of operative delay. Arch Orthop Trauma Surg. 2004; 124: 334-40.
9. Joseph D, Zuckerman MD. Hip Fracture. New England. 2006; 334:1519-25.
10. Orosz GM, Magaziner J, Hannan EL, Morrison RS, Gilbert M, McLaughlin M, Halm EA, Wang JJ, Litke A, Silberzweig SB, Siu AL. Association of Timing of Surgery for Hip Fracture and Patient Outcomes. JAMA. 2004; 291:1738-43.
11. Catalán J, Lui A, López R, Gross K, Erskine P. Factores asociados a morbimortalidad em fractura de cadera. Experiência Clínica. Rev Hosp Clin Univ Chile. 1998; 11-6.
12. Gillespie WJ, Walenkamp G. Antibiotc prophylaxis for surgery for proximal femoral and other closed long bone fractures. Cochrane Database Syst Rev. 2001;(1):CD000244.
13. Hoening H, Rubenstein LV, Sloane R, Horner R, Kahn K. What is the role of timing in the surgical and rehabilitative care of community – dwelling older persons with acute hip fractures? Arch Int Med. 1997; 157: 513-20.
14. Beaupre LA, Jones CA, Saunders LD, Jahnston DWC, Buckingham J, Majumadar SR. Best practices for elderly hip fracture patients. A systematic overview of the evidence.J Gen Intern Med. 2005; 20:1019-25.
15. Roche JJW, Wenn RT, Sahota O, Moran CG. Effect of comorbities and postoperative complications on mortality after hip fracture in eldery people: prospective observational cohort study. BMJ. 2005; 331:1374-79.
16. Kamel KH. The frequency and factors linked to a urinarytract infection coding in patients undergoing hip fracture surgery. J Am Med Direct Assoc. 2005; 6:316-20.
17. Morrison RS, Chassin MR, Siu AL. The Medical Consultant's Role in Caring for Patients with Hip Fracture. Ann Intern Med.1998; 128:1010-20.
18. Nettleman MD,Alsip J, Schrader M, Schulte M. Predictors of mortality after acute hip fracture. J Gen Intern Med. 1996; 11:765-7.
19. Inouye SK, van Dyck CH, Alessi CA, Balkin S, Siegal AP, Horwitz RI. Clarifying confusion: the confusion assesment method. A new method for detection of dellirium. Ann Intern Med. 1990; 113:941-8.
20. Dirksen A, Kjoller E. Cardiac predictors of death after non cardiac surgery evaluated by intention to treat. BMJ. 1988; 297:1011-3.
21. Bitsch MS, Foss NB, Kristensen BB, Kehlet H. Pathogeneis of and management strategies for postoperative dellirium after hip fracture: a review. Acta Orthop Scand. 2004; 75:378-89.