



Original Article

Influence of proximal femur fractures in the autonomy and mortality of elderly patients submitted to osteosynthesis with cephalomedullary nail[☆]



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ARTICLE INFO

Article history:

Received 30 November 2016

Accepted 26 January 2017

Available online 26 August 2017

Keywords:

Hip fractures

Femoral fractures

Independent living

Ambulation

Elderly

ABSTRACT

Objective: To determine the autonomy and mortality of elderly patients submitted to proximal femoral osteosynthesis with cephalomedullary nail after hip fracture.

Methods: Retrospective study with 61 patients with proximal femoral fractures submitted to cephalomedullary nail osteosynthesis. The authors analyzed the medical records and collected information from the preoperative period. Patients were questioned regarding pain, postoperative autonomy, and degree of satisfaction. The total number of deaths was verified. The results were then correlated.

Results: The mean age was 84 years, predominantly female (82%). In the postoperative evaluation, 45% of the patients presented worsened levels of autonomy. The majority of patients presented mild pain (61%) on the VAS scale. The mortality rate was 24.6%, and the mean time of preoperative hospitalization was three days. The factors that presented statistical significance regarding postoperative autonomy were the time elapsed from the trauma until the moment of surgery, ASA score, fracture stability, and previous functional status of the patients. The mortality rate was associated with three main factors: advanced age, ASA score, and preoperative hospitalization time.

Conclusion: The patient's previous autonomy positively influenced the functional outcome and postoperative recovery. Unstable fractures presented worse results for pain and ambulation in a follow-up of 27 months. Hip fracture is a risk factor associated with mortality and decreased independence in patients over 65 years of age.

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<http://dx.doi.org/10.1016/j.rboe.2017.08.014>

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Influência das fraturas do fêmur proximal na autonomia e mortalidade dos pacientes idosos submetidos a osteossíntese com haste cefalomedular

R E S U M O

Palavras-chave:

Fraturas do quadril
Fraturas do fêmur
Vida independente
Deambulação
Idoso

Objetivo: Determinar a autonomia e a mortalidade de pacientes idosos após fratura do quadril submetidos a osteossíntese do fêmur proximal com haste cefalomedular.

Métodos: Estudo retrospectivo com 61 pacientes com fratura do fêmur proximal submetidos a osteossíntese com haste cefalomedular. Os prontuários foram analisados e os registros clínicos do pré-operatório foram coletados. Os pacientes foram reavaliados e perguntados em relação a dor, autonomia pós-operatória e grau de satisfação. Foi verificado o número total de óbitos. Os resultados foram então correlacionados.

Resultados: A média de idade foi de 84 anos, com predominância do sexo feminino (82%). Na avaliação pós-operatória, 45% dos pacientes apresentaram pioria em seu nível de autonomia. A maioria dos pacientes apresentou dor leve (61%) pela escala EVA. A taxa de mortalidade encontrada foi de 24,6% e o tempo médio de internação pré-operatória foi de três dias. Os fatores que apresentaram significância estatística quanto à autonomia pós-operatória foram o tempo decorrido do trauma até o momento da cirurgia, escore ASA, estabilidade da fratura e estado funcional prévio do paciente. A taxa de mortalidade foi associada a três fatores principais: idade avançada, escore ASA e tempo de internação pré-operatória.

Conclusão: A autonomia prévia do paciente influenciou positivamente o resultado funcional e a recuperação pós-operatória. Fraturas instáveis apresentaram piores resultados para dor e deambulação em um seguimento de 27 meses. A fratura do quadril é um fator de risco associado à mortalidade e diminuição da independência em pacientes acima de 65 anos.

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Introduction

The incidence of proximal femoral fractures has increased significantly in the last decades and is expected to double within the next 25 years, due to increasing life expectancy. Older age and associated comorbidities are responsible for high morbidity and mortality, as well as higher costs of treatment and hospitalization.¹ Among proximal femoral fractures, the transtrochanteric fracture is an important group, since they are common and usually affect debilitated and elderly patients.^{2,3} These fractures are defined as those occurring in the area extending from the extracapsular region of the base of the femoral neck to a proximal region along the minor trochanter.⁴

This type of fracture is common in the elderly population due to osteoporosis, and is mainly associated with low-energy trauma, such as fall from their own height. It is estimated that nine out of ten trochanteric fractures occur in individuals older than 65 years.^{5,6}

Hip fracture is a devastating injury in elderly patients, affecting their physical, mental, functional, and social function. It reflects the aging process of the population, and has permanent consequences on patient survival and independence.

Surgical stabilization is the option of choice to manage trochanteric fractures, regardless of deviation type or pattern. The goal of surgical treatment is to achieve stable reduction

and fixation, allowing early active and passive mobilization. Since elderly individuals are not always able to walk without placing some load on the fractured limb, due to the pre-existing conditions, fracture stabilization must be sufficient to allow a certain load tolerated by the patient.⁷

Studies demonstrate that up to 50% of patients with proximal femoral fractures die within the first six months after trauma, and that many patients submitted to surgical treatment do not regain their baseline function and independence.⁸

This study aimed to determine the autonomy and mortality of elderly patients who underwent proximal femoral osteosynthesis with cephalomedullary nail after hip fracture.

Methods

A longitudinal, retrospective, and descriptive study was performed with 61 patients with proximal femoral fracture who underwent osteosynthesis with cephalomedullary nail from March 2012 to March 2014, at the Hospital de Ortopedia e Traumatologia, Rio de Janeiro, TijuTrauma.

Patients' medical records were analyzed and information from the pre-operative clinical records (clinical evolution and surgical risk) was collected.

The following data were collected: age; sex; preoperative time; fracture severity (according to the Tronzo I to V classification); preoperative American Society of Anesthesiologists

(ASA) score; and pre-trauma autonomy, divided into five walking patterns: (1) Walks outside home community distances without help; (2) Walks outside home community distances with help; (3) Walks household distances without help; (4) Walks household distances with help; (5) Non-ambulatory or wheelchair user. Patients with incomplete medical charts were excluded from the sample.

After collection of complete preoperative data, patients were interviewed and underwent clinical evaluation to assess pain through a visual analog scale (VAS), postoperative walking status, and degree of satisfaction. At follow-up, the total number of deaths after surgical treatment was used to determine the mortality rate. Patients who did not attend the interview or who were lost follow-up were excluded.

Data collected in the pre- and postoperative periods were then correlated with mortality and with influence on the patients' autonomy.

For statistical analysis of the results, tables with absolute and relative frequency distribution were used. The associations were tested by Pearson's chi-squared test or Fisher's exact test. Normality was assessed by the Shapiro-Wilk test, and continuous variables were assessed by Student's t-test or ANOVA.

Results

The mean age of the patients was 84 years (± 7.2), ranging from 67 to 97. The male group presented a slightly higher mean age than the female group (86 [± 8.0] years vs. 83 [± 7.0], respectively, without statistical significance [$p = 0.260$]). Laterality of the affected hip was similar (50.8% and 49.2%, respectively).

A significant difference was observed in the prevalence between sex ($p < 0.001$); as most cases (82.0%) were female, that is, on average, surgical procedures for proximal femoral fracture were performed 4.5 times more often in women than in men (Fig. 1).

Regarding fracture classification, 24 patients (39.3%) presented Tronzo type III, while type II was observed in 24.6% (Table 1).

Mean hospitalization time was 9 days, ranging from 2 to 27. Mean hospitalization time before surgery was 3 days, ran-

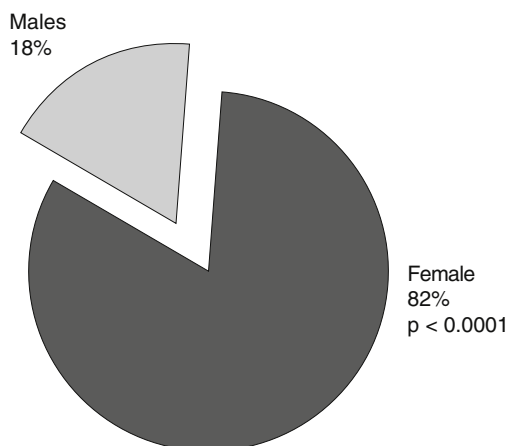


Fig. 1 – Frequency by sex of the elderly submitted to surgical treatment with transtrochanteric fracture.

Table 1 – Correlation between operated patients and the Tronzo classification.

Tronzo	n	%
I	5	8.2
II	15	24.6
III	24	39.3
IV	12	19.7
V	5	8.2
Total	61	100

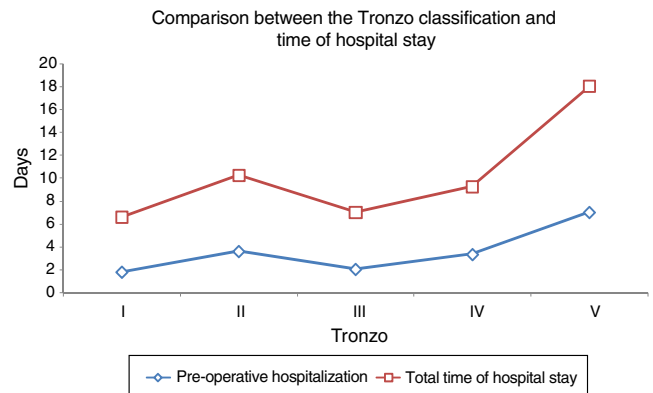


Fig. 2 – Comparison between the Tronzo classification and hospitalization time.

ging from 1 to 14. Patients classified as Tronzo type V had the highest mean pre-operative hospitalization: 7 days ($p = 0.0047$) (Table 2 and Fig. 2).

In the preoperative assessment, 21 patients were able to walk outside home for community distances without help. After surgery, 15 patients (71.4%) maintained this condition and 33.3% worsened their walking status. Of the patients who were able to walk outside their home for community distances with help, six (50%) maintained their condition and 50% worsened. Of the 10 patients who were able to walk for household distances without help, 44.4% maintained their condition and 55.6% worsened. Of the patients who were able to walk for household distances with help, 60.0% maintained their condition and 40.0% worsened. Therefore, when comparing the pre- and post-operative general ambulation status, 45% of the patients presented a decrease in their level of functional independence (Table 3). The VAS scale was applied after surgery and most patients (60.9%) presented mild pain while 37.0% presented moderate pain. Only one patient (2.2%) reported severe pain. When asked about the degree of satisfaction, 90% of the patients were satisfied with the result of the surgery; the remaining 10% were dissatisfied with not being able to walk or with living in nursing homes, as they did not regain their previous independence.

Patients with a more severe Tronzo score had a higher mean VAS, but the difference was not statistically significant ($p = 0.057$).

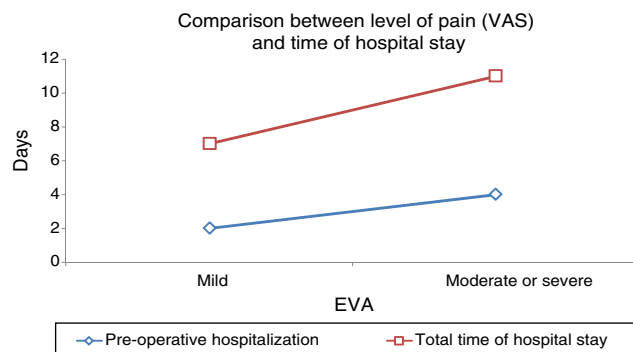
Comparing pain (VAS) with preoperative hospitalization time and total hospitalization time, a significant correlation was observed in both situations: longer preoperative hospital stay was associated with greater pain reported on the VAS

Table 2 – Comparison between the Tronzo classification and mean time of hospital stay.

Tronzo	Mean pre-operative hospitalization	p	Mean total time of hospital stay	p
I	1.8	0.0047	6.6	0.0020
II	3.6		10.3	
III	2.0		7.0	
IV	3.3		9.3	
V	7.0		18.0	
Total	3.1		9.1	

Table 3 – Comparison between pre- and post-operative walking status.

Walking status	Evaluation			
	Pre-operative		Post-operative	
	n	%	n	%
Walks outside home for community distances without help	21	45.7	15	32.6
Walks outside home for community distances with help	6	13	8	17.4
Walks for household distances without help	9	19.6	3	6.5
Walks for household distances with help	10	21.7	13	28.3
Non-ambulatory, wheelchair user	0	0	7	15.2
Total	46	100	46	100

**Fig. 3 – Comparison between level of pain (VAS) and hospitalization time.**

scale ($p=0.016$), as was total hospitalization time ($p=0.026$; Fig. 3).

Fifty-eight patients (95.1%) had at least one preoperative comorbidity. Only three patients (4.9%) had no pre-existing disease.

The five most common co-morbidities were: SAH (39 patients; 63.9%), dyslipidemia (14 patients, 22.9%), diabetes (10 patients, 16.4%), cardiopathy (seven patients, 11.5%), and hypothyroidism (seven patients, 11.5%).

The mortality rate found in the study was 24.6% (15 deaths). Three factors were significantly associated with higher mortality in these patients: advanced age, ASA score, and preoperative hospitalization time (Table 4). Mean age of the patients who died was 87.6 years, versus 82.5 of those patients who were alive ($p=0.016$). Patients classified as ASA III

Table 4 – Factors associated with higher mortality rate.

Variable	Alive n=46	Death n=15	p
Age-mean (\pm SD)	82.5 (\pm 6.7)	87.6 (\pm 7.5)	0.16
Gender – n (%)			0.810
Male	7 (63.3%)	4 (36.4%)	
Female	39 (78.0%)	11 (22.0%)	
Tronzo – n (%)			0.561
Stable	16 (80.0%)	4 (20.0%)	
Unstable	30 (73.2%)	11 (26.8%)	
ASA – n (%)			0.45
I and II	26 (86.7%)	4 (13.3%)	
III and IV	20 (64.5%)	11 (35.5%)	
Preoperative hospitalization – n (%)			0.30
Up to 48 h	30 (85.7%)	5 (14.3%)	
Over 48 h	16 (61.5%)	10 (38.5%)	
Associated lesion, n (%)			0.093
Zero to 3	35 (81.4%)	8 (18.6%)	
Over 3 h	11 (61.1%)	7 (38.8%)	
Total time of hospital stay – n (%)			0.605
Up to 7 days	25 (78.1%)	7 (21.9%)	
Over 7 days	21 (72.4%)	8 (27.6%)	

or IV presented a higher mortality rate than those classified as ASA I or II: 35.5% versus 13.3%, respectively. Regarding the preoperative hospitalization time, the mortality rate of patients who were operated on within 48 h of the fracture was 14.3%. In patients who were operated on after over 48 h of the fracture, the mortality rate increased to 38.5%.

Factors such as Tronzo classification, gender, number of associated diseases, and total hospitalization time were not associated with mortality.

Discussion

Transtrochanteric femoral fractures are the most frequently operated fracture type, and present the highest postoperative mortality rate; they have become a public healthcare issue, due to the high cost of treatment and the difficulty of recovering postoperative functional independence.⁴

The epidemiological profile of the individuals in the present sample was not much different from those observed in Brazilian and international studies. In the present study, a predominance of females was observed, at a 4.5:1 ratio; their mean age was 84 years. Comparing with Brazilian studies, Hungria Neto et al.² found a predominance of women in the proportion of 2:1 and a mean age of 78.2 years; Ramalho et al.⁹ observed a ratio of 3.3:1 and a mean age of 78.5 years.

In the present study, we observed that the degree of autonomy decreased after surgical treatment.⁸ Nonetheless, 55% of the patients recovered their functional level. A similar finding was observed by Herrera et al.¹⁰ in their work with 250 patients treated with cephalomedullary nail, in which approximately 50% recovered their previous walking status after one year.

Patients' previous autonomy positively influenced the functional outcome and the postoperative recovery. We observed that 71.4% of patients who were able to walk outside home for community distances without help maintained their level after surgery. This demonstrates that more physically independent patients present better results. Zuckerman et al.^{11,12} observed that the group of patients with the best pre-fracture score recovered almost 100% of their functional capacity.

Regarding pain intensity after surgical treatment of transtrochanteric fractures, most operated patients (60%) had mild pain; similar data were retrieved in the Brazilian literature.¹³

The mortality rate in the present study was 24.6%, at a mean follow-up of 27 months. In a study with 1448 patients, Rosso et al.¹⁴ found a mortality rate of 18.8% in one year of follow-up, while Dousa et al.,¹⁵ in a study with 4280 patients, observed a 30% death rate.

Cooper et al.¹⁶ stated that the consequences of a hip fracture include premature death (around 20% in one year), loss of function (in 30%), inability to walk independently (40%), and loss of at least one independent daily activity (in 80% of the patients treated).

Some factors were statistically significant for mortality, such as time elapsed from trauma to surgery, ASA score, fracture stability, and age at the time of trauma.

In the present study, patients with preoperative hospitalization time greater than 48 h had a 38.5% mortality rate, while patients who underwent surgical treatment in up to 48 h had a lower rate, 14.3%. Regarding the time of surgical delay, Hamlet et al.¹⁷ demonstrated that patients operated within the first 24 h of admission had lower mortality than those operated after 24 h, regardless of the preoperative ASA score. The higher mortality rate associated with surgical delay demonstrates the importance of the early treatment of these fractures, which are now treated as orthopedic emergencies. Some factors undermine the improvement of this treatment, such as overcrowding of public hospitals, bureaucracy for surgical authorization, availability of the necessary materials, and availability of medical staff.

Another factor that was statistically significant for mortality was the ASA score. Only four deaths (6.5%) were observed in patients classified as ASA I and II, versus 11 (18%) in patients classified as ASA III and IV. Michel et al.¹⁸ demonstrated that patients classified as ASA III or IV had a nearly nine-fold greater risk of death in the first postoperative year than those classified as ASA I or II ($p < 0.001$).

Conclusion

Patient's previous autonomy positively influenced functional outcome and postoperative recovery.

In a follow-up of 27 months, unstable fractures presented worse results for pain and walking status.

Hip fracture is a risk factor associated with mortality and decreased autonomy in patients aged over 65 years. These fractures are devastating injuries that should be treated as orthopedic emergencies.

Conflicts of interest

The authors declare no conflicts of interest.

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