







Evaluation of the Surgical Treatment of Patients over 90 Years Old with Hip Fractures and Their Morbidity and Mortality

Avaliação do tratamento cirúrgico de pacientes acima de 90 anos com fraturas de quadril e sua morbimortalidade

Daniela Burguêz¹  Rangel Menegatti¹  Felipe Odeh Susin¹  Lauro Manoel Etchepare Dornelles² 
Oswaldo André Serafini³ 

¹ Orthopedics and Traumatology Service, Hospital São Lucas, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

² Orthopedics and Traumatology Service, Hospital São Lucas, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

Address for correspondence Daniela Burguêz, MD, Orthopedist and Traumatologist, Hospital São Lucas of PUCRS, Porto Alegre, Brasil (e-mail: dburguez94@gmail.com).

³ Medical School, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

Rev Bras Ortop 2024;59(1):e88–e92.

Abstract

Objective: Hip fractures in older adults have the highest impact on the patient's health. These injuries result in many complications, reducing functional capability, quality of life, and life expectancy. This study aimed to provide more epidemiological data on the outcomes of these fractures in nonagenarians from a large city treated at a tertiary hospital.

Methods: This study consisted of medical record reviews and interviews.

Results: In this study, 76 patients underwent 82 surgeries. The mean age of the patients was 92.5 years. Ninety percent of the subjects were female. The patients spent 10.4 days in hospital. Surgery occurred on average 2.3 days after hospitalization. Regarding fractures, 46 were trochanteric (56%), and 34 affected the femoral neck (41.5%). Forty-one surgeries used the short proximal femoral nail (50%), and 18 were partial hip replacements (22%). During hospitalization, 46 patients (55%) had no complications, excluding episodes of delirium, and seven patients (9%) died. Forty-two subjects completed the one-year postoperative follow-up period, with 56% alive and 44% dead.

Conclusions: Treating hip fractures in older patients is challenging. Our goal must focus on helping these subjects receive the quickest and least aggressive treatment possible and start mobilization early. We hope the data presented in this study can lead to a better understanding of the characteristics of our nonagenarian population with hip fractures and seek the best possible treatment for them.

Keywords

- ▶ hip fractures
- ▶ indicators of morbidity and mortality
- ▶ nonagenarians

Work developed at the Orthopedics and Traumatology Department, Hospital São Lucas, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil.

received
May 15, 2023
accepted after revision
November 6, 2023

DOI <https://doi.org/10.1055/s-0044-1779684>.
ISSN 0102-3616.

© 2024. The Author(s).
This is an open access article published by Thieme under the terms of the Creative Commons Attribution 4.0 International License, permitting copying and reproduction so long as the original work is given appropriate credit (<https://creativecommons.org/licenses/by/4.0/>).
Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

Resumo

Objetivo: As fraturas de quadril em idosos são as que mais impactam na saúde do paciente e estão associadas a muitas complicações, levando a redução da capacidade funcional, da qualidade de vida e da expectativa de vida. O nosso trabalho visa trazer mais dados epidemiológicos sobre os desfechos dessas fraturas em nonagenários em uma grande cidade atendidos em um hospital terciário.

Métodos: O trabalho foi realizado através de revisão de prontuários e entrevistas.

Resultados: Foram realizadas 82 cirurgias em 76 pacientes nesse período. A média de idade foi de 92,5 anos, 90% eram mulheres e ficaram 10,4 dias internados. A cirurgia foi realizada em média 2,3 dias após a internação. Do total, 46 fraturas foram trocantéricas (56%) e 34 do colo do fêmur (41,5%). Foram realizadas 41 cirurgias com a técnica da haste cefalomedular curta (50%) e 18 artroplastias parcial de quadril (22%). Durante a internação, 46 pacientes (55%) não apresentaram complicações, excluindo episódios de delirium, e 7 pacientes (9% dos casos) evoluíram para óbito. 42 pacientes já fecharam 1 ano após cirurgia: 56% estão vivos e 44% evoluíram para óbito.

Conclusões: O tratamento de fraturas de quadril em pacientes idosos é desafiador. O nosso objetivo deve estar focado em ajudar esses idosos a receber um tratamento rápido e menos agressivo possível e a mobilizar precocemente. Esperamos que, com os dados apresentados nesse trabalho, possamos entender melhor acerca das características da nossa população nonagenária vítimas de fratura de quadril e buscar o melhor tratamento possível para esses pacientes.

Palavras-chave

- ▶ fraturas de quadril
- ▶ indicadores de morbimortalidade
- ▶ nonagenários

Introduction

Global population aging increased the number of older patients seeking several medical specialties, including orthopedics. Hip fractures are common in nonagenarian patients.¹ This group of patients reportedly presents higher morbidity and mortality, elevating the costs to the public and private healthcare system.²

The treatment of choice is virtually always surgical. From the beginning of the 20th century onward, several orthopedists in North America and Europe started to indicate surgical treatment instead of conservative treatment, reducing mortality rates. Since then, several devices have been developed for surgical treatment, reducing complications but not changing the mortality rates.³

Hip fractures in older adults have the highest impact on the patient's health. These injuries result in many complications, reducing functional capability, quality of life, and life expectancy.⁴ Some studies show that only around 30% of patients recover their pre-fracture functional status.^{5,6}

Early mobility is one of the chief measures in preventing post-fracture health problems.⁷ Bedridden patients present more infections, especially lung infections. The time from fracture to surgery also seems to improve functional outcomes.⁸ Older adults with multiple preoperative comorbidities, regardless of the time until surgery, the type of fracture, and the type of surgery, have worse outcomes.⁹

Mortality associated with these types of fractures is high, reaching approximately 20 to 30% within the first year after the event.^{10,11} Risk factors associated with worse outcomes include advanced age, male gender, low functional level

before fracture, low bone mineral density, previous cognitive dysfunction, low socioeconomic status, and poorly controlled systemic disease.^{12,13}

To our knowledge, there are no Brazilian studies about clinical outcomes in the specific population of patients over 90 years old. Our study aimed to provide more epidemiological data on the outcomes of these fractures in nonagenarians based on the type of fracture, type of surgery, previous comorbidities, and functional outcomes in the population of a large city treated in a tertiary hospital and followed up for one year after surgery. More reliable data on our population may provide insights to plan more effective treatment measures to reduce complications and morbidity.

Materials and Methods

This study is cross-sectional, retrospective, descriptive, analytical, and reviewed medical records from patients admitted to the Orthopedics and Traumatology Service of a tertiary hospital in a large city from 2018 to August 2022, aged 90 years or over with a hip fracture undergoing surgical treatment.

The study included all patients operated on after a hip fracture. Subjects under 90 years old, opting for conservative treatment, or who did not want to participate in the study were excluded from the study.

We reviewed the medical records of patients included in the research and interviewed them by telephone to complete the missing data, obtain their informed consent, and gather information at one year of follow-up.

The criteria evaluated included age, gender, previous comorbidities, fracture type, surgical technique, length of stay, time from admission to surgery, postoperative complications, and evolution within one year (mainly morbidity).

The primary outcome was patient mortality during hospitalization and within one year after the procedure. Secondary outcomes included complications, length of stay, time to surgery, and previous comorbidities.

Statistical analysis was univariate. Descriptive statistics characterized the sample as mean, standard deviation, median, interquartile ranges, and absolute and relative frequencies. Bivariate analysis employed the chi-square test to associate independent and dependent variables, adopting a 95% confidence interval and a p-value < 0.05 for statistical significance.

The Scientific Committee of the Medical School approved the research project. The Certificate of Presentation for Ethical Appreciation (CAAE) of this study is 61470022.4.0000.5336.

Results

Seventy-six subjects underwent 82 surgeries during this period. The mean age of the patients was 92.5 years (range, 90 to 103), and 90% were females (►Table 1).

The five most prevalent pre-fracture comorbidities were dementia (23 subjects), cardiovascular diseases (57 patients), diabetes mellitus (11 patients), chronic kidney disease (seven patients), and cancer (five patients) (►Fig. 1).

The mean length of stay was 10.4 days (range, 5 to 40 days), and surgery occurred on average 2.3 days (range, 0 to 9 days) after hospitalization (►Table 1).

Regarding the fracture type, 46 were trochanteric, 34 occurred at the femoral neck, three were periprosthetic, three were subtrochanteric, and one was an acetabular fracture (►Fig. 2).

As for surgical techniques, 41 procedures used a short proximal femoral nail (PFN), 18 were partial hip replacements (PHR), 14 employed femoral dynamic hip screws (DHS), three were osteosyntheses with cannulated screws, three used long PFNs, and three were total hip replacement (THR) (►Fig. 3).

During hospitalization, 46 patients (55%) had no complications, excluding episodes of delirium due to its high prevalence in this population, and seven patients (9%) died. Around 30% of all patients experienced an episode of delirium during hospitalization. The most common complication was infection (urinary tract or lung), affecting 22 patients (26.20%). In addition, ten subjects had acute renal failure (ARF), five presented upper or lower digestive bleed-

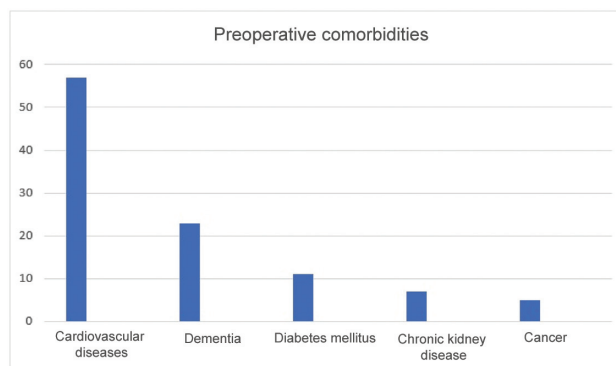


Fig. 1 Preoperative comorbidities.

ing (UDB/LDB), three had bronchopulmonary aspiration, and seven presented cardiovascular complications such as acute myocardial infarction, stroke, and pulmonary embolism (►Fig. 4).

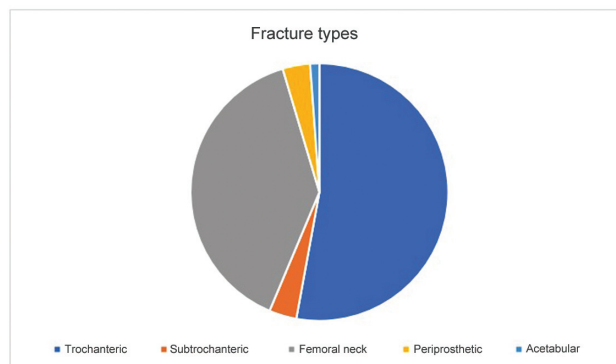


Fig. 2 Fracture types.

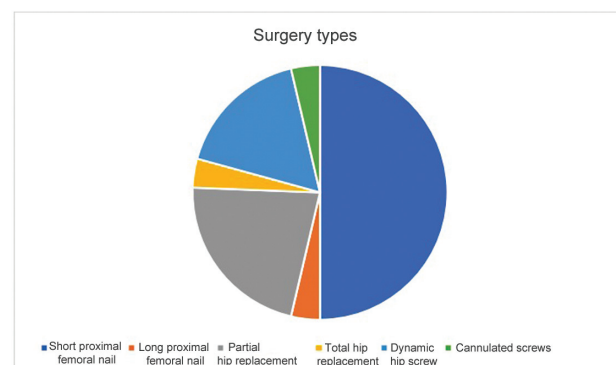


Fig. 3 Surgery types.

Table 1 General features of the population under study

	All patients	Female patients	Male patients
Mean age	92.5 ± 2.3	94.8 ± 3.1	90.5 ± 1.9
Hospitalization days	10.4 ± 3.5	9.8 ± 2.9	10.8 ± 4.8
Days until surgery	2.3 ± 1.2	2.2 ± 1.4	2.5 ± 1.3

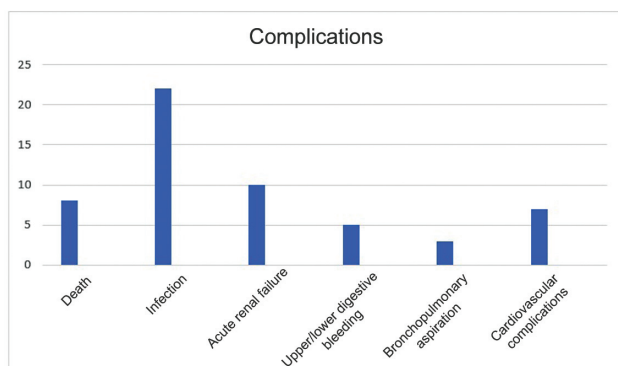


Fig. 4 Complications during hospitalization.

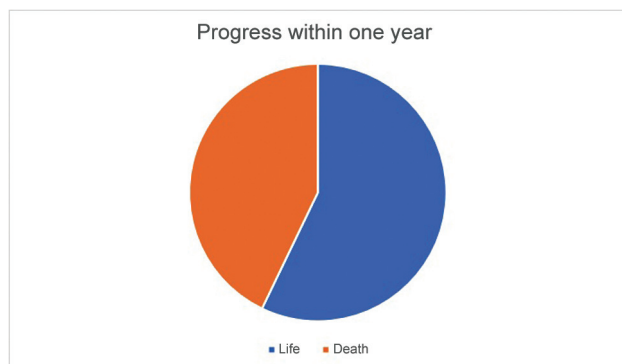


Fig. 5 Progress within one year.

Forty-two patients completed one year of postoperative follow-up, with 56% alive and 44% dead (seven patients died during the same hospitalization, and eleven passed away after hospital discharge) (→ **Fig. 5**). Another 18 patients also completed one year after surgery, but they were unable to contact or lost at follow-up.

Discussion

We believe that patients over 90 in the studied region have unique characteristics that differentiate them from other older adults regarding mortality and complications.^{14,15} Understanding the demands of this age group is the only way to seek individualized and personalized treatments and improve outcomes.

In our study, the mortality was higher compared with the literature on femoral fractures in people over age 60 (around 25%).

The small sample of male patients hinders gender correlation with worse or better outcomes. Patients with a longer length of stay had worse outcomes and higher mortality ($p = 0.027$).

The time between hospitalization and surgery does not seem to change the mortality outcome. There was no association between the type of fracture and the type of surgery with patient mortality ($p = 0.032$). Although the number of trochanteric fractures in older adults is reportedly higher than femoral neck fractures, these figures were similar in our study.¹⁶

Patients with no comorbidities before the fracture had fewer complications during hospitalization, shorter lengths of stay, and lower mortality ($p = 0.041$). Studies demonstrated that proper disease control before fracture or the lack of comorbidities results in better prognoses regardless of the time from injury to surgery.¹⁷ Consistent with the literature,¹⁸ at least one episode of delirium occurred during hospitalization in 30% of our patients.

Subjects diagnosed with dementia before the fracture did not have worse outcomes or higher mortality than those without dementia. Studies showed that dementia is a risk factor for worse outcomes in patients with hip fractures due to problems during postoperative rehabilitation and early deambulation. However, these studies focused on patients aged over 60. On subjects aged 90 or older, this risk factor seems null.^{19–21}

Patients evaluated one year after the fracture (56% of the 42 subjects completing this follow-up period) reported no major complaints regarding the hip (88% had no complaints while 12% reported mild complaints), and most (92%) resumed the previous walking ability. Among the patients who died within one year after the fracture, seven passed away during the same hospitalization, all due to infection (respiratory or urinary infection progressing to sepsis and death). The remaining 11 patients died after hospital discharge from clinical comorbidities unrelated to the fracture.

Data collection occurred during the coronavirus pandemic, which began in Brazil in March 2019. We observed no decrease in the number of hospitalizations of patients aged 90 or over with hip fractures. There was also no increase in the number of infections affecting this group of patients.

The limitations of our study include the small sample size and the loss at follow-up in one year. We could not contact 10% of patients who completed 12 months of surgery. Another factor that we would have liked to evaluate was deambulation before and after surgery, but this was not feasible. There was missing data in the medical records, and, in some cases, we could not address them in interviews with family members and patients. This outcome is significant since rehabilitation after hip fracture surgery aims at early mobilization and recovery of the independence level before the event.

Treating hip fractures in elderly patients is challenging, even more so in the population over 90 years old. It is a fact that hip fractures reduce the quality of life of these subjects. Our goal must focus on helping these older adults receive the quickest and least aggressive treatment possible and start mobilization early. We hope the data presented in this study can lead to a better understanding of the characteristics of our nonagenarian population with hip fractures and seek the best possible treatment for them.

Financial Support

The authors did not receive financial support from any public, commercial, or not-for-profit sources.

Conflict of Interests

The authors declare no conflict of interests.

Acknowledgments

We thank the patients and their family members for agreeing in participating in this study.

References

- 1 Fernandes RA, Araújo DV, Takemoto MLS, Sauberman MV. Fraturas do fêmur proximal no idoso: estudo de custo da doença sob a perspectiva de um hospital público no Rio de Janeiro, Brasil. *Acta Ortopédica Brasileira* 2011;21(02):395–416
- 2 Lustosa LP, Bastos EO. Fraturas proximais do fêmur em idosos: qual o melhor tratamento? *Acta Ortop Bras* 2009;17(05):309–312
- 3 Petros RSB, Ferreira PEV, Petros RSB. Influence of proximal femur fractures in the autonomy and mortality of elderly patients submitted to osteosynthesis with cephalomedullary nail. *Rev Bras Ortop* 2017;52(1, Suppl 1):57–62
- 4 Cunha U, Veado MAC. Fratura da extremidade proximal do fêmur em idosos: independência funcional e mortalidade em um ano. *Rev Bras Ortop* 2006;41(06):195–199
- 5 Kenzora JE, McCarthy RE, Lowell JD, Sledge CB. Hip fracture mortality. Relation to age, treatment, preoperative illness, time of surgery, and complications. *Clin Orthop Relat Res* 1984;(186):45–56
- 6 Ions GK, Stevens J. Prediction of survival in patients with femoral neck fractures. *J Bone Joint Surg Br* 1987;69(03):384–387
- 7 Hershkovitz A, Polatov I, Beloosesky Y, Brill S. Factors affecting mortality of frail hip-fractured elderly patients. *Arch Gerontol Geriatr* 2010;51(02):113–116
- 8 Sexson SB, Lehner JT. Factors affecting hip fracture mortality. *J Orthop Trauma* 1987;1(04):298–305
- 9 Magaziner J, Simonsick EM, Kashner TM, Hebel JR, Kenzora JE. Survival experience of aged hip fracture patients. *Am J Public Health* 1989;79(03):274–278
- 10 Parker MJ, Palmer CR. Prediction of rehabilitation after hip fracture. *Age Ageing* 1995;24(02):96–98
- 11 Keene GS, Parker MJ, Pryor GA. Mortality and morbidity after hip fractures. *BMJ* 1993;307(6914):1248–1250
- 12 Schnell S, Friedman SM, Mendelson DA, Bingham KW, Kates SL. The 1-year mortality of patients treated in a hip fracture program for elders. *Geriatr Orthop Surg Rehabil* 2010;1(01):6–14
- 13 Morghen S, Gentile S, Ricci E, Guerini F, Bellelli G, Trabucchi M. Rehabilitation of older adults with hip fracture: cognitive function and walking abilities. *J Am Geriatr Soc* 2011;59(08):1497–1502
- 14 Bolton D, Bush C, Wallace MT. Nonagenarian hip fractures: Morbidity and mortality at a single institution. *J Clin Orthop Trauma* 2020;14:69–73
- 15 Ooi LH, Wong TH, Toh CL, Wong HP. Hip fractures in nonagenarians—a study on operative and non-operative management. *Injury* 2005;36(01):142–147
- 16 Lu Y, Uppal HS. Hip Fractures: Relevant Anatomy, Classification, and Biomechanics of Fracture and Fixation. *Geriatr Orthop Surg Rehabil* 2019;10:2151459319859139
- 17 Alegre-López J, Cordero-Guevara J, Alonso-Valdivielso JL, Fernández-Melón J. Factors associated with mortality and functional disability after hip fracture: an inception cohort study. *Osteoporos Int* 2005;16(07):729–736
- 18 Rosso LH, Gomes GA, Maronezi LFC, Lindemann IL, Riffel RT, Stobbe JC. Delirium em idosos internados via unidades de emergência: um estudo prospectivo. *J Bras Psiquiatr* 2020;69(01):38–43
- 19 Rozell JC, Hasenauer M, Donegan DJ, Neuman M. Recent advances in the treatment of hip fractures in the elderly. *F1000Res* 2016;5:F1000. Faculty Rev 1953
- 20 Características epidemiológicas e causas da fratura do terço proximal do fêmur em idosos. *Rev Bras Ortop* 2011;46(06):660–667
- 21 Friedman SM, Menzies IB, Bukata SV, Mendelson DA, Kates SL. Dementia and hip fractures: development of a pathogenic framework for understanding and studying risk. *Geriatr Orthop Surg Rehabil* 2010 Nov;1(02):52–62. Doi: 10.1177/2151458510389463. PMID: 23569663; PMCID: PMC3597300