

DOES PERICAPSULAR ANESTHETIC BLOCK IMPROVE THE POSTOPERATIVE PERIOD IN TRANSTROCHANTERIC FRACTURES?

BLOQUEIO ANESTÉSICO PERICAPSULAR MELHORA O PÓS OPERATÓRIO EM FRATURAS TRANSTROCANTÉRICAS?

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ABSTRACT

Objective: To evaluate pain and mobility in patients with transtrochanteric fractures subjected to osteosynthesis with pericapsular nerve group (PENG) block and compare with patients who did not receive the block. **Methods:** The medical records of 49 patients were analyzed and data were collected regarding: age, gender, anesthetic evaluation, cause of trauma, locomotion, fracture classification, type of anesthesia used, anesthetic technique, pain, opioid administration and mobility with partial load. **Results:** Out of 49 patients, 17 (34.7 %) received PENG block. After surgery, most patients complained of pain and opioids were administered (67.3 %), with greatest frequency in the group without PENG block (93.3 %). Most patients who received PENG block walked within 6 h after surgery (52.9 %) and all recovered the ability to walk until hospital discharge (48 h), different from the group that did not receive PENG block ($p = 0.012$). The groups showed a significant difference between them regarding the frequency of reports of moderate to severe pain ($p = 0.003$). **Conclusion:** The use of PENG block in patients with transtrochanteric fractures subjected to osteosynthesis can help to reduce postoperative pain, early mobility with partial load and less use of opioids. **Level of Evidence III, Retrospective Comparative Study.**

Keywords: Hip Fractures. Femoral Fractures. Early Mobility. Analgesia.

RESUMO

Objetivo: Avaliar a dor e a mobilidade em pacientes com fraturas transtrocantéricas submetidos à osteossíntese com bloqueio do grupo de nervos pericapsulares (PENG) e comparar a pacientes que não receberam o bloqueio. **Métodos:** Foram analisados os prontuários de 49 pacientes e coletados dados referentes a: idade, sexo, avaliação anestésica, causa do trauma, locomoção, classificação da fratura, tipo de anestesia utilizada, técnica anestésica, dor, administração de opioide e deambulação com carga parcial. **Resultados:** Dos 49 pacientes, 17 (34,7%) receberam o bloqueio PENG. Após a cirurgia, a maioria dos pacientes queixou-se de dor e foi administrado opioide (67,3%), sendo a maior frequência no grupo sem o bloqueio PENG (93,3%). A maioria dos pacientes que receberam bloqueio PENG deambularam em até 6h após a cirurgia (52,9%) e todos recuperaram a capacidade de deambular até a alta hospitalar (48h), diferindo do grupo que não recebeu o bloqueio PENG ($p = 0,012$). Houve diferença significativa entre os grupos em relação à frequência de relatos de dor moderada a forte ($p = 0,003$). **Conclusão:** O uso de bloqueio PENG em pacientes com fraturas transtrocantéricas submetidos à osteossíntese pode auxiliar na diminuição da dor pós-operatória, deambulação precoce com carga parcial e menor necessidade de uso de opioides. **Nível de Evidência III, Estudo Retrospectivo Comparativo.**

Descritores: Fraturas do Quadril. Fraturas do Fêmur. Deambulação Precoce. Analgesia.

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INTRODUCTION

Proximal femoral fractures are increasing proportionally to the population's life expectancy, since this trauma is more common in older adults. Advanced ages associated with the presence of comorbidities increase morbidity and mortality and hospital costs due to this type of fracture.¹ The fractures that occur in the area from the extracapsular region of the base of the femoral neck to a proximal

region in the lesser trochanter are called transtrochanteric, the most common ones due to the association between osteoporosis and the low-energy trauma.²

Unstable femoral fractures are surgically treated using osteosynthesis methods, with internal fixation³ being the most common technique for transtrochanteric fractures, showing advantages such as: pain relief, fast recovery of mobility, fast rehabilitation and

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the patient's motor independence, who walked freely before the trauma.⁴ The use of new intramedullary synthesis materials such as the gamma-type pin and the cephalomedullary nail offer a more rigid and safe fixation, which guarantees the patient a lower level of mechanical complications in the postoperative period and earlier mobility recovery.⁴

Despite advances in surgical procedures and anesthesia, patients subjected to femoral osteosynthesis have higher risks of functional disability and mortality than patients subjected to other surgeries of lower limbs and hip.⁵ The type of anesthesia has been related to postoperative mortality in patients with femoral and hip fractures. Regional anesthesia (spinal or epidural anesthesia) and general anesthesia are the most used techniques, but application is limited in cases of severe comorbidities and anticoagulant administration, common in older patients with femoral and hip fractures.⁶

The literature lacks studies comparing the effect of different types of anesthetic blocks on femoral fractures. However, when comparing the effects of peripheral nerve block (PNB) and spinal anesthesia on mortality and mobility of older patients with hip fracture after hip arthroplasty, Fu et al.⁷ observed a reduction in mortality between 30 and 90 days after surgery and a higher cost with hospitalization of older adults after hip arthroplasty with the use of PNB. However, the type of anesthesia was not associated with mortality, walking capacity, major complications within one year and length of hospital stay.

Thus, we aimed to evaluate pain and mobility in patients with transtrochanteric fractures subjected to osteosynthesis of the cephalomedullary nail type with pericapsular nerve group (PENG) block and compare with patients who did not receive PENG block.

METHODS

This study was approved by Plataforma Brasil (CAEE: 48664121.5.0000.5082). A retrospective and descriptive study was conducted with 49 patients with transtrochanteric fracture subjected to osteosynthesis of the cephalomedullary nail type in a public hospital between June and August 2021. The patients' medical records were analyzed and data on age, gender, and preoperative anesthetic evaluation were collected according to the American Society of Anesthesiologists (ASA), cause of trauma, autonomy prior to trauma and classification of walking patterns in five levels: 1) community walker without assistance, 2) community walker with assistance, 3) home walker without assistance, 4) home walker with assistance, 5) non-walker or wheelchair user.¹ Information on surgical procedure was collected: classification of the fracture according to the Orthopaedic Trauma Association and the *Arbeitsgemeinschaft für Osteosynthesefragen* (AO)⁸ – defining transtrochanteric fractures of simple fracture trait as AO 31 A1 and multifragmented fracture trait as AO 31 A2 – , type of anesthesia used and the anesthesiologist's technical ability to perform PENG block. The time until hospital discharge and the number of times the patient complained of pain was also collected from the patients' medical records and opioids were administered. After signing the informed consent form (TCLE), the patients who consented were interviewed for pain assessment by the Visual Analog Scale (VAS) within 2, 4, 6, 12, 24 and 48 h after surgery and questioned about the partial load support capacity at the same moments. The VAS criterion⁹ classifies pain as a 10 cm line, in which zero is absence of pain and 10 is severe pain, and the patient is asked to mark the pain level and measure it. Absent (0 cm), Mild (1-3 cm), Moderate (4-6 cm), Severe intensity (7-9 cm) and Unbearable (10 cm). The collected data were evaluated in the software Statistical Package for the Social Sciences (SPSS[®]), version 17.0. Statistical analyses were performed at 5 % significance level.

Inclusion criteria

Patients who showed AO 31 A1 and AO 31 A2 transtrochanteric fractures surgically treated with cephalomedullary nail in the first 72 hours since hospitalization.

Exclusion criteria

- Other fractures associated with transtrochanteric fracture;
- Chronic neuropathic pain;
- Previous diagnosis of dementia;
- AO 31 A3 fractures (due to the severity and complexity of the fracture trait and increased surgical time that could compromise the evaluation of postoperative pain);
- Postoperative clinical and/or hemodynamic instability;
- Postoperative death;
- Implants other than the cephalomedullary nail;
- Cephalomedullary nails from different manufacturers;
- Non-walking patients prior to the fractures;
- Patients with hospital stay > 48 hours, from the postoperative.

RESULTS

Within three months, 49 patients with transtrochanteric fracture were subjected to osteosynthesis of the cephalomedullary nail type in a public hospital. A total of 17 (34.7 %) received spinal anesthesia and sedation associated with pericapsular nerve group block (PENG group) and 32 (65.3 %) received only spinal anesthesia and sedation (SEM group).

The mean age of the patients (Table 1) was 70 years old (± 17.9 , 95 % CI: 65.82-75.90), ranging from 34 to 93 years old, higher for women (79.2 ± 14.9) compared to men (65.1 ± 17.9) and significantly different from each other ($p = 0.004$). The PENG group and the SEM group showed no significant difference regarding age ($p = 0.233$).

Table 1. Characteristics of patients with transtrochanteric fractures subjected to osteosynthesis with (PENG) and without (SEM) pericapsular nerve group block.

Variable	Total	Groups*		p
		PENG (n = 17)	SEM (n = 32)	
Age (mean SD)	70.4 17.9	74.8 14.7	68.8 19.4	0.272
Gender (n, %)				
Men	29 (59.2 %)	11 (64.7 %)	18 (56.25 %)	0.566
Women	20 (40.8 %)	6 (35.3 %)	14 (43.75 %)	
Classification				
31-A1	11 (22.4 %)	6 (35.3 %)	5 (15.6 %)	0.117
31-A2	38 (77.6 %)	11 (64.7 %)	27 (84.4 %)	
ASA (n, %)				
I and II	19 (38.8 %)	6 (35.3 %)	13 (40.6 %)	0.714
III and IV	30 (61.2 %)	11 (64.7 %)	19 (59.4 %)	
Postoperative analgesia				
Yes	33 (67.3 %)	3 (17.6 %)	30 (93.3 %)	<0.001
No	16 (32.7 %)	14 (82.4 %)	2 (6.7 %)	

*PENG: group with use of pericapsular nerve group block; SEM: group without use of pericapsular nerve group block.

Although most patients were men (59.2 %, n = 29), the proportion of surgical procedures to treat proximal femoral fracture did not differ between men and women in the sample evaluated ($p = 0.199$). Regarding the classification (Table 1), 38 patients (77.6 %) showed multifragmented transtrochanteric fracture (31-A2). Regarding the preoperative anesthetic evaluation, most patients obtained a score III (61.2 %), without significant difference between the PENG and

SEM groups. Most patients complained of pain after surgery and opioids were administered (67.3 %), with greatest frequency in the SEM group (93.3 %), in which the anesthesiologist was unable to use pericapsular anesthetic block, significantly differing from the PENG group ($p < 0.001$).

Most fractures occurred on the right side (69.4 %, $n = 34$). Regarding the preoperative evaluation of mobility, 47 patients (95.9 %) were community walkers without assistance and only two (4.1 %) were home walkers with assistance. The main cause of trauma was the fall from one's own height in 29 patients (Figure 1).

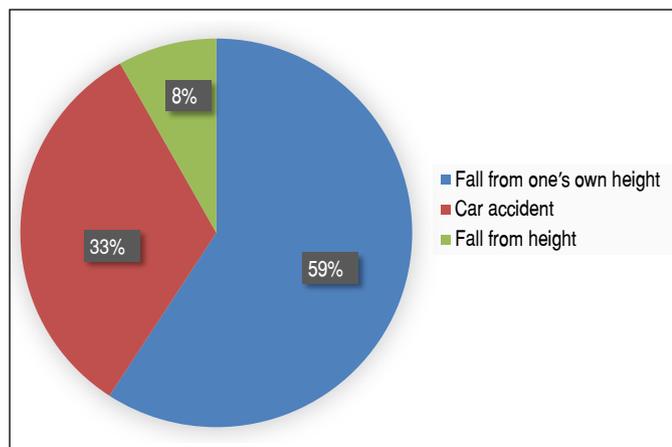


Figure 1. Frequency of the cause of trauma in patients with trans-trochanteric fractures subjected to osteosynthesis with and without pericapsular anesthetic block.

Most patients in the PENG group (52.9 %, $n = 09$) recovered the ability to walk by the bed with partial load within 6 hours after surgery (Figure 2), while those in the SEM group walked within > 8 h (75 %, $n = 24$) and 15.6 % ($n = 5$) of patients in this group did not recover the ability to walk until hospital discharge (48 h). All patients who received PENG block recovered the ability to walk until hospital discharge (48 h), significantly different ($p = 0.012$) from the SEM group.

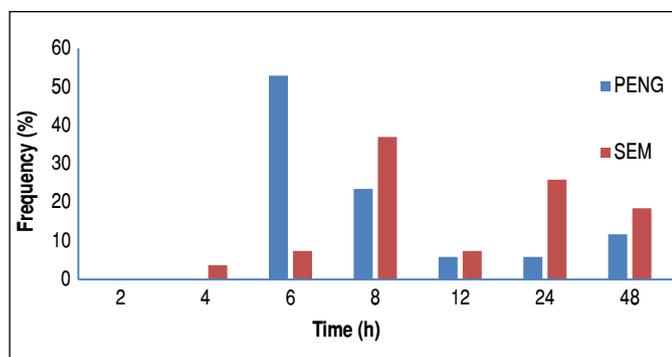


Figure 2. Frequency of patients able to walk by the bed with partial load according to the length of hospital stay after osteosynthesis with (PENG) and without (SEM) pericapsular nerve group block.

Regarding pain intensity, we observed a significant difference between the groups regarding the frequency of reports of moderate to severe pain ($p = 0.003$). The group that received PENG block showed greater frequency of reports of mild pain between 4 and 48 h after surgery (Figure 3). The SEM group showed greater frequency of reports of moderate to severe pain between 4 and 48 h after surgery (Figure 4).

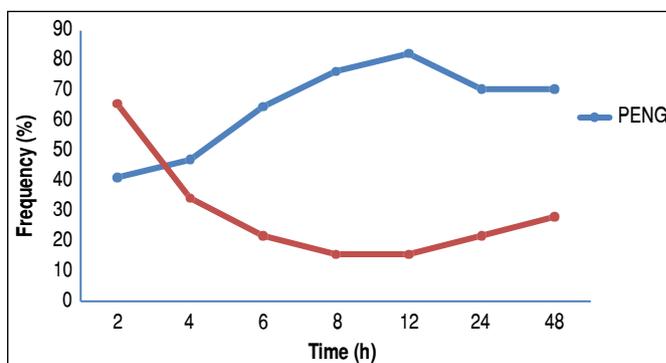


Figure 3. Frequency of reports of mild pain in patients with trans-trochanteric fractures subjected to osteosynthesis with (PENG) and without (SEM) pericapsular nerve group block.

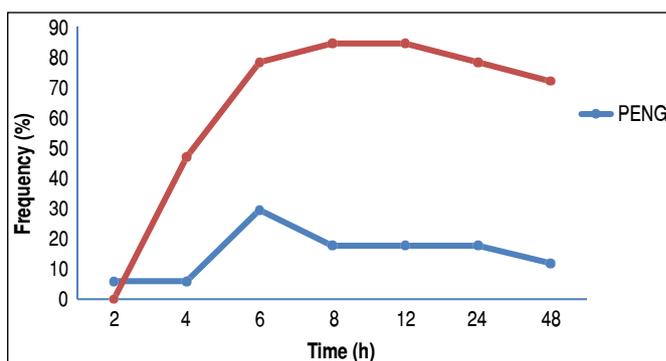


Figure 4. Frequency of reports of moderate to severe pain in patients with trans-trochanteric fractures subjected to osteosynthesis with (PENG) and without (SEM) pericapsular nerve group block.

DISCUSSION

Trans-trochanteric fractures of the femur are more frequent in older adults, which are associated with low-energy trauma, which is the main cause of the fall of their own height. Car accidents represent the main cause of this type of fracture in young adults. Treatment has a high cost and difficult recovery, besides a high mortality rate and postoperative functional dependence.¹ Most patients subjected to surgery do not fully recover and most do not recover their previous ability to walk.¹⁰

Our study shows that the main cause of trans-trochanteric fractures of the femur was the fall from one's own height, which can be explained by the high mean age of the studied population (Table 1), a fact commonly reported in the literature.¹¹⁻¹⁴ Rocha et al.¹⁵ observed a greater incidence of trans-trochanteric fractures of the femur at older age (mean of 72 years), a data similar to our study (Table 1), but the authors reported a greater prevalence in women (56.3 %). Garcia, Leme and Garcez-Leme¹⁶ observed a greater incidence in men (84 %) when evaluating the epidemiological profile, mortality and functional evolution of older adults with hip fracture, aged ≥ 60 years. Our study shows that the use of PENG block significantly reduced pain intensity and the request for stronger analgesia in the immediate postoperative period of the patients studied (Table 1 and Figures 3 and 4).

Peripheral nerve block can reduce morbidity and mortality in patients with femoral and hip fractures. Allard et al.¹⁷ evaluated morphine consumption within 48 hours of postoperative using PENG block in patients with femoral neck fracture and observed a significant improvement in the mobility of the operated limb, although they did not observe a significant change in postoperative morphine consumption.

Our study shows that the use of PENG block seems to significantly improve the ability to walk after surgery, and all patients who received PENG block recovered the ability to walk until hospital discharge (48 h). The recovery was faster in this group and occurred earlier (within 6 h) for most patients (Figure 2). Regarding Tramadol consumption (postoperative analgesia), only 17.6 % (n = 03) of patients in the PENG group requested it, differing significantly from the SEM group, in which 93.3 % (n = 30) requested stronger analgesia. Lin et al.¹⁸ compared the use of femoral nerve block (FNB) and PENG block in patients with hip fracture. The authors concluded that patients receiving PENG block felt less postoperative pain, but without difference regarding opioid use.

The literature lacks data on the request for stronger analgesia, ability to walk and postoperative pain from 2 h to 48 h after osteosynthesis, in patients with transtrochanteric fractures with and without the use of pericapsular nerve group block. However, studies in which regional nerve block techniques are used in hip fractures show essential results in reducing perioperative pain and better postoperative recovery.¹⁹⁻²⁰ The benefits of using PENG block

include patient positioning for the procedure, no significant motor weakness (potential motor sparing effect) and analgesic efficacy.¹⁸ We were able to establish a significant relationship between the use of PENG block and a better postoperative evolution. The ability to walk in the immediate postoperative period is essential for postoperative recovery and to reduce morbidity and mortality after surgical discharge, since the lack of walking may lead to a new hospitalization due to complications such as arterial occlusion and venous thrombosis.¹⁹ Despite the relevance of our findings, we emphasize that it has limitations because it is a unicentric retrospective study with a relatively small sample size. Besides, the use of PENG block in femoral fractures is a challenging procedure with many stages, and the anesthesiologist's bias is inevitable.

CONCLUSION

The use of pericapsular anesthetic block in patients with transtrochanteric fractures subjected to osteosynthesis of the cephalomedullary nail type may help to reduce postoperative pain, early mobility with partial load and less use of opioids, thus, a lower probability of immediate postoperative comorbidities in the medium term.

AUTHORS' CONTRIBUTIONS: Each author contributed individually and significantly to the development of this article. BST: preparation of the entire research project and review; RAM: data analysis and statistical analysis; UTA: writing of the article and performing the surgeries; LAO: performing the surgeries and review.

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