mgr Karolina Gawrońska

Ocena jakości życia, sprawności funkcjonalnej i motorycznej u osób w wieku późno starczym i sędziwym po leczeniu operacyjnym złamań przezkrętarzowych

Rozprawa na stopień doktora w dziedzinie nauk medycznych i nauk o zdrowiu w dyscyplinie nauki o zdrowiu

Promotor: dr hab. n. med. Jacek Lorkowski

Promotor pomocniczy: dr n.med. Renata Wilk

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10. Abstract

Evaluation of the quality of life, functional and motor skills in middle-old and oldest-old after surgical treatment of pertrochanteric fractures.

Introduction

Pertrochanteric fractures of the femoral bone, are frequent lesions of the femur, which mainly affect elderly patients with osteoporosis. PFs are typically caused by a low-energy trauma such as ground-level falls. The standard and optimal treatment of PFs is quick surgery to allow the patient a rapid upright position, thus reducing the likelihood of systemic complications. The choice of a proper stabilization system remains under discussion and may vary among different medical centres. Despite the use of modern methods of osteosynthesis and comprehensive rehabilitation treatment, the consequences of pertrochanteric fractures are among the leading causes of disability resulting from dysfunction of the musculoskeletal system. PFs significantly reduce the quality of life and lead to loss of independence and impaired social functioning. Therefore, PFs need multidisciplinary prevention and treatment.

Aim

The aim of this study was to determine the results of surgical and rehabilitation treatment of pertrochanteric fractures in the elderly, in particular:

1. assessment of treatment results in patients after stabilization of the PFs with a dynamic hip screw - DHS and a intramedullary Gamma nail fixation, including quality of life, functional assessment, pain level, degree of reconstruction of the anatomy of the proximal end of femoral bone based on the analysis of the radiological image and functional capacity in the pedobarographic examination,
2. comparison of treatment results in particular study groups, depending on the method of fixation (stabilization of the fracture with DHS or intramedullary Gamma nail) during the three month, six month and nine month postoperative follow-up.

Due to the scale of the problem, which are the medical, social and economic effects of pertrochanteric fractures in the modern population, the presented research project had practical objectives. The main practical goals set in the project are:

1. Indicating the possibility of interdisciplinary cooperation in the prevention, treatment and reduction of the social consequences of pertrochanteric fractures.
2. The use of theoretical knowledge and the results of sociological empirical research in building health awareness and creating pro-health habits during the diagnostic and

therapeutic process in the analyzed study and control group, and among patients' families (the most important practical goal from the point of view of health education).

3. Analysis of the results on smart home solutions and designing apartments adapted to individual needs used by elderly people to reduce the likelihood of falls and subsequent fractures.
4. Checking the possibility of using new technologies during the rehabilitation process, in particular the diagnostic method, which is the pedobarographic examination.

Material and Methods

A total of 618 patients, admitted to Central Clinical Hospital of the Ministry of Interior and Administration in Warsaw (official English name, according to the website on 17.04.2023) for pertrochanteric fractures between 2015 and 2019, at a mean age of 82.40 (range 29–104) were screened. For a more detailed analysis, patients who had been operated by the same operator were included in the study. Finally, 78 patients were enrolled, including 70 patient middle-old (75 to 84 year) and oldest-old ≥85 years (during 3 and 6 – months follow up). During the 9 month observation, the study group consisted of 40 people. The inclusion criteria included the type of fixation used: the DHS dynamic screw plate or intramedullary Gamma nail fixation and was the basis for separating the study groups. A control group included 20 subjects free from significant disorders of the musculoskeletal system and any other disorders that might induce a compensatory abnormal gait pattern. There were no statistical differences in the distribution of sex and age between the studied groups.

All patients after fixation of a PFs underwent the same rehabilitation protocol. Parameters related to hospital stay and surgery (length of hospital stay, surgery duration) were compared in both groups. The patient's history was supplemented with a author's own questionnaire on the strategy of maintaining a long and healthy life. Quality of life was evaluated using the EQ-5D-5L questionnaire. The obtained results were evaluated at 3 and 6 month follow-up. Functional outcomes were assessed by the Harris Hip Score and subjective pain was measured with a visual analogue scale (VAS) in three, six and nine month follow up. Radiographic parameters were measured based on the preoperative and postoperative standing anterior–posterior pelvic radiographs and axial projection of the hip at 6 and 9 month follow-up. Plantar pressure distribution and arch index were measured with a pedobarographic examination during nine month follow-up.

Statistical analyses were performed with Statistical software - Statistica 10.0 working on Windows 10 (StatSoft, Cracow, Poland). Independent sample t-tests and the Mann-Whitney U Test were used. The level of statistical significance was set at $p < 0.05$ for all analyses.

Results

7. The study conducted using the author's own questionnaire showed no significant differences between the two study groups in terms of the direct cause of the fall and the strategies used to maintain a long and healthy life. A ground-level fall, due to trip/slipping, was the main cause of the injury.
8. The comparison of the results of the health-related quality of life examined with the EQ-5D-5L questionnaire and the functional state of the musculoskeletal system and motor efficiency, assessed using the Harris Hip Score questionnaire showed no statistically significant differences between the two study groups.
9. No statistical difference in subjective pain assessed with the visual analogue scale (VAS) was reported at three, six and nine months post-operatively.
10. On the basis of X-ray images, bone union was found in all cases. The symmetry of the proximal end of the femurs of the operated and non-operated lower limbs was reconstructed, which is confirmed by the obtained values of the neck-shaft angle.
11. Comparison of the plantar pressure distribution, in the static mode, between the study groups also showed no significant difference in both operated and non-operated lower limbs. These results concerned both entire foot loading and analysis conducted in the masked regions of the foot. However, pedobarographic analysis between the study group and the control group shows significant differences in plantar pressure distribution. This applies to both study groups.
12. In the conducted project, no significant difference in foot arch index values was found between patients operated with both methods of surgical treatment.

Conclusions

The most important conclusions resulting from the conducted research project:

1. In the study group, quite good results of surgical and rehabilitation treatment of pertrochanteric fractures were obtained, both in patients operated with the dynamic screw plate - DHS and in patients treated with a short Gamma locking nail. This applies to the assessment of the quality of life, functional status and the level of perceived pain, despite the correct reconstruction of the anatomy of the proximal end of the femur found in the radiological image.

2. The choice of the method of surgical fixation, DHS or intramedullary Gamma nail fixation, used by the same surgeon, does not significantly affect the short-term results of treatment of a pertrochanteric fracture. This is confirmed by the treatment results obtained during the three month, six month and nine month postoperative observation conducted by a doctor and a physiotherapist.
3. The assessment of functional capacity in the pedobarographic examination showed no full return to the symmetrical plantar pressure distribution of the feet in patients after pertrochanteric fracture, despite the restoration of correct anatomical relationships as a result of comprehensive surgical and rehabilitation treatment.

The most important practical conclusions for physiotherapists resulting from the conducted research project:

1. The priority task is to perceive pertrochanteric fractures not only as a medical problem, but also as a growing social problem requiring interdisciplinary work aimed at reducing the susceptibility of the elderly to falls and, consequently, to the discussed PFs.
2. It is necessary to include educational activities among the treatment and rehabilitation priorities, in particular raising health awareness, creating health-promoting habits in order to extend and increase the quality of life in patients with PFs.
3. It seems necessary to increase and systematize knowledge in the field of fall risk assessment, including familiarization with the subject of new technologies.
4. It is advisable for physiotherapists to become more familiar with the possibility of using pedobarography assessment in the diagnosis and monitoring of treatment of PFs.
5. It is useful to have basic radiographic image analysis skills to assess the restoration of the correct anatomy of the proximal femur and the presence or absence of bone union.

Practical conclusions to convey to patients and their families:

1. It is necessary to familiarize with the basic principles of adapting houses/flats in accordance with the changing needs of the elderly.
2. With the current state of knowledge, it is advisable to show the practical application of smart home solutions in the homes of the elderly, using intelligent home automation systems to increase the safety and comfort of life.