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Original Research Article

Predictive factors of return to activity in elderly patients operated on for a fracture of the lower limb: a study of 113 patients

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ABSTRACT

Background: The aim of this study was to determine the factors predictive of resumption of activity in elderly subjects operated on for a fracture of the lower limb.
Methods: This was a cross-sectional study with retrospective data collection in subjects aged 56 and over who had undergone lower-limb surgery with a minimum follow-up period of six months. Patients' walking autonomy was assessed using the Parker score. The modular integrated household survey on living conditions was used to assess patients' socio-economic status. Bivariate analysis was performed using the chi-square test and the calculation of measures of association.
Results: The series included 113 patients with a mean age of 70±9.54 years and a sex ratio of 1.09. Fractures of the upper end of the femur predominated in 67.6% of cases. The most common surgical procedure was intermediate hip replacement in 30 patients (26.5%). Rehabilitation sessions were performed in 95 patients (84.1%). The postoperative Parker score at the last follow-up was 9/9 in 41 patients (36.3%). Resumption of educational and productive activities and interpersonal responsibilities was achieved in 90 patients (79%). Significant associations ($p<0.05$) were found between resumption of activities and age, sex, marital status, history of arterial hypertension, psychiatric history, preoperative Parker score, postoperative Parker score and return to a private residence.
Conclusions: Older age, female gender, absence of a partner, high blood pressure, non-personal residence and poor Parker score are factors with a poor prognosis for return to activity.

Keywords: Elderly subject, Return to activity, Lower limb

INTRODUCTION

Falls in the home are a major health problem among the elderly because of their frequency and consequences: injuries, fractures, loss of independence and quality of life, and institutionalisation.[1] In France, falls account for 84% of the causes of accidents in everyday life in people aged 65 and over. Fractures account for 41% of injuries, and the lower limbs are most often affected (34% of cases).[2] In the elderly, this situation leads to more or less prolonged bed rest, which will be responsible for deleterious effects such as amyotrophy due to non-use, decompensation of pre-existing defects, complications of decubitus, etc.[3] Fractures of the upper end of the femur are a clinical entity that includes fractures of the neck of the femur and fractures of the trochanteric mass.[4] They are the second most common cause of fracture in the elderly, after distal radius fractures. They are a major source of morbidity and mortality in the elderly population, and represent a significant health and economic burden for society.[5] The

mortality rate for fractures of the upper end of the femur is 9% postoperatively in the first few months, rising to 33% in the first year.[2] In view of all the above, it is important that bedridden elderly patients are rapidly restored to health, so that all their functions can be effectively controlled. Hence the need for operative tactics with a functional aim, and support in re-education and functional rehabilitation, with the aim of enabling a more or less rapid return to activity. The general aim of this study was to determine the factors predicting the resumption of activities (personal, environmental and lifestyle factors) in elderly subjects undergoing surgery for a fracture of the lower limb.

METHODS

This was a descriptive and analytical cross-sectional study with retrospective data collection in two departments of the Centre National Hospitalier et Universitaire Hubert Koutoukou Maga (CNHU-HKM) in Cotonou: the Clinique Universitaire de Traumatologie Orthopédie et Chirurgie Réparatrice (CUTO-CR) and the Clinique Universitaire de Médecine Physique et de Réadaptation (CUMPR). The population was made up of subjects aged 56 and over who underwent surgery following a fracture of the lower limb over a six-year period from 1 January 2016 to 1 January 2022. A minimum follow-up period of six (6) months was used. Patients with lower-limb amputations, tumours or motor disorders sequelae of a pathology pre-existing the lower-limb fracture or an acquired or congenital lower-limb deformity were excluded. The modular integrated household survey of living conditions (EMICoV) was used to assess patients' socio-economic status.[6] The Parker score was used to assess the degree of autonomy of elderly subjects before the fall.[7]The dependent variable in our study was resumption of activities. In order to determine the independent variables useful for our study, the human development disability production process model (MDH-PPH) was used. This is an ecosystemic or interactionist conceptual model that facilitates the identification, description and explanation of the causes and consequences of illness, trauma and other attacks on a person's integrity and development. According to this model, apart from the level of functional autonomy, several other factors can explain a person's return to activity. In the context of our study, we took into account: personal factors including identity factors (age, sex, family status, ethnicity, religion, socio-economic status according to EMICoV), organic systems (antecedents and comorbidities) and abilities (Parker score, presence of psychiatric antecedents, presence of cognitive disorders, presence of memory disorders); environmental factors: micro-environment (patient's home after surgery, perception of home help in assuming its role, patient's family environment after trauma), meso-environment (patient's mode of transport, public places frequented after surgery) and macro-environment (health coverage at the time of surgical treatment); lifestyle habits: patient hygiene after surgery, nutrition, clothing habits, means of communication, educational activities, productivity and interpersonal responsibilities.

Data analysis

Data was entered using Épi Data 3.1 software. Épi info version 7.2.5 software. A bivariate analysis was performed using the chi-square test (significant threshold $p<0.05$) to compare frequencies and means. Secondly, the relative risk (RR) was calculated with confidence intervals (CI) in order to identify protective or deleterious factors.

RESULTS

Of the 185 medical records listed, 113 patients were selected. The average age of the patients in our study was 70±9.54 years, with extremes ranging from 56 to 96 years. The majority of patients were male (N=59 or 52.2%) with a sex ratio of 1.09. The (Table 1) summarises the socio-demographic characteristics of the selected patients. Resumption of educational or productive activities or interpersonal responsibilities was effective in 90 patients (79%). These included educational activities for the benefit of grandchildren, or basic activities, home-based business activities or participation in community life.

Personal factors

Identity factors: There was a statistically significant association between age (p value=0.0000), gender (p value=0.0066) and resumption of educational, productive or interpersonal responsibilities. Female sex was a deleterious factor for resumption of activities (RR=2.87 with a CI; 1.32-6.20). In addition, the absence of a spouse was a deleterious factor in the resumption of educational or productive activities or interpersonal responsibilities (RR=3.88 with a CI; 1.75-8.60). There was no statistically significant association (p value=0.2015) between socio-economic status and resumption of activities.

Organ systems: The presence of history and/or comorbidities was observed in 87 patients (77%). Of these, 41 patients (47.1%) had a single history and/or comorbidity, 37 patients (42.5%) had two to three histories and/or comorbidities and nine patients (10.3%) had more than three histories and/or comorbidities. Table II shows the distribution of comorbidities in elderly patients undergoing lower limb surgery. There was no statistically significant association between history and/or comorbidities and return to activity (p value=0.053). On the other hand, there was a statistically significant association between arterial hypertension and return to activity (p value=0.034).

Abilities: According to the preoperative Parker score, 96 patients (85%) were walking easily without human or technical assistance before the accident. There was a statistically significant association (p value=0.0000) between the preoperative Parker score and the resumption of activities. Four (4) patients had a psychiatric history:

depression (N=2), anxiety disorders (N=1), dementia (N=1).

Table 1: Socio demographic charactéristics of patients.

Parameters	Effectifs	%
Age (years)		
<60	14	12.4
60-70	46	40.7
70-80	32	28.3
80-90	19	16.8
≥90	2	1.8
Total	113	100.0
Sex		
Male	59	52.2
Female	54	47.8
Total	113	100.0
Family status		
Single	2	1.8
Married	53	46.9
Widowed	41	36.2
Divorced	8	7.1
Polygamist	9	8.0
Total	111	100.0
Religion		
Christian	88	77.8
Muslim	15	13.3
Animist	7	6.2
Atheist	1	0.9
Eckist	2	1.8
Total	113	100.0
Ethnie		
Fon	83	73.4
Adja	10	8.9
Yorouba	14	12.3
Bariba	2	1.8
Yoa-Lokpa	2	1.8
Dendi	1	0.9
Wolof (senegalese)	1	0.9
Total	113	100.0
Socio economic status		
Low level	19	16.9
Medium level	71	62.8
High level	23	20.3
Total	113	100.0

A single cognitive disorder such as Alzheimer's disease and two cases of retrograde amnesia were known in the series prior to surgery. They were all well monitored in a specialised setting. There was a statistically significant association (p value=0.0164) between the presence of a psychiatric history and the resumption of activities.

Clinical, therapeutic and developmental data

The most frequent types of injury were femoral neck fractures (N=37 or 32.5%) followed by pertrochanteric fractures (N=35 or 30.7%). Fractures of the upper end of the femur accounted for 67.6% of all injuries.

Table 2: Antecedents/comorbidities recorded in patients operated on for a fracture of the lower limb.

Parameters	N	%
Hypertension	67	59.2
Diabetes	24	21.2
History of surgery	29	25. 6
Cerebrovascular accident without sequel	5	4. 5
Cataract not operated	3	2.7
Arthritis	3	2.7
Glaucoma not operated	3	2.7
Peace maker	2	1.8
Prostatic disease not operated	1	0.9
Bilateral blindness	1	0.9
Chronic hepatitis	1	0.9
Deep vein thrombosis	1	0.9
Heart disease	1	0.9
Eyes disease	1	0.9

Patients underwent surgery within an average of 17.47±12.43 days, with extremes ranging from 1 to 75 days. There was no statistically significant association between operating time and return to activity, p value=0.05711. The (Table 3) shows the distribution of patients in the series according to the type of surgery performed. The average hospital stay was 30.03±21.67 days, with extremes ranging from 2 days to 155 days. There was no statistically significant association between length of hospitalisation and return to activity (p value=0.7964). Post-operatively, 95 patients (84.1%) underwent functional rehabilitation. The sessions were started within seven days or more in 54 patients (56.8%). Patients operated on by PIH and PTH had started rehabilitation before seven days (N=36, i.e. 31.8%). The average number of rehabilitation sessions was 22.50±11.79 sessions, with extremes ranging from three to 60 sessions. All patients were reviewed at an average follow-up of 829.26±626.47 days, with extremes ranging from 180 days to 2374 days. At the last follow-up, 41 patients (36.3%) were walking without technical aids or assistance from a third party. There was a statistically significant association (p value=0.0000) between the postoperative Parker score and return to activity.

Environmental factors

Micro-environment: After surgery, 104 patients (92%) had returned to their personal residence. There was a statistically significant association (p value=0.0196) between the patient's home and return to activity. Patients who returned to their personal residence were five (5) times more likely to resume their activities. Most of the patients perceived the ability of the carer to take on the role of integrating them into working life as excellent and good in 24 cases (21.6%) and 49 cases (44.1%) respectively. 82 patients (72.6%) lived with their family after returning home.

Table 3: Patients operated on for fractures of the lower limb according to type of surgery.

Limb segments	Area affected	Type of surgery	N	%
Hip	Femoral neck	PIH	30	26.5
		PTH	6	5.3
	Trochanteric massif	Gamma nail	20	17.7
		Dynamic hip screw	17	15.1
		Screwing	2	1.8
Thigh	Femoral shaft	Dynamic locked nailing	1	0.9
		Static locked nailing	1	0.9
Knee	Distal end of the femur	Blade plate	4	3.5
		Dynamic condylar screw	2	1.8
		Condylar plate	8	7.1
	Kneecap	Pinning strapping	4	3.5
		L plate	2	1.8
	Proximal end of the tibia	T plate	1	0.9
		L and T plates	4	3.5
		Screwing	2	1.8
Leg	Tibial shaft	Static locked nailing	1	0.9
		Dynamic locked nailing	1	0.9
		External fixator	2	1.8
		Ender nailing	1	0.9
	Tibia distal	Plate	1	0.9
	Diaphyse fibula	Pinning	4	3.5
Ankle	Internal and external malleolus	Screwing	1	0.9

There was no statistically significant association between the perception of the carer's role and the resumption of activities, p value=0.2137. Meso-environment: After returning home, 64 patients (57.1% of cases) used their own means of transport (motorbike, car). Use of public places was distributed as follows: all places without restriction (N=60 or 62.5%), no place (N=24), place of worship (N=10) and leisure centre (N=2). Macro-environment: Health coverage, commonly referred to as "state care", was provided to 76 patients (67.3%). There was no statistically significant association between health coverage and return to activity (p value=0.42888). Health coverage did not predict the resumption of activities.

Lifestyle habits

After returning home, patients' lifestyles varied. In terms of the type of sanitary facilities used after their return home, 70 patients (62.5%) had adopted modern sanitary facilities. In terms of hygiene, running water at home came from the Société Nationale des Eaux du Bénin (SONEB) for 69 patients (61.6%). In terms of nutrition, the fuel used by the household was charcoal for 68 patients (60.7%), followed by domestic gas (N=34, 30.4%). Dietary restrictions related to religion, ethnicity or co-morbidities were recorded in 55 patients (50.9%). In terms of clothing, patients adopted a traditional style (N=55 or 49.1%) and a traditional + modern style (N=58 or 50.9%). Mobile phones were the only means of communication used by patients. A number of telephone contacts greater than or equal to two was recorded in 105 patients (93.8%). Home television was available to 92 patients (81.4%).

DISCUSSION

The general aim of this study was to determine the factors predicting return to activity in elderly patients undergoing lower-limb surgery. In the study population, 79% of cases had returned to educational, productive activities or interpersonal responsibilities. These results are similar to those of Ganczak et al who reported that two-thirds of elderly patients operated on for hip fracture recovered their pre-fracture rate of activities of daily living.[8]

In our study, the majority of elderly patients operated on had an average age of 70±9.54 years. This could be explained by the fact that, in this age group, bone fragility develops due to osteoporosis.[2] These results are superimposed on those of Kardali et al who found an average age of 76.3 years in elderly subjects operated on for a true cervical fracture.[9] Analysis of our data showed a statistically significant association between age and return to activity, p value=0.0000. Thus, advanced age is a poor prognostic factor for return to activity. Our results are similar to those of Wantonoro et al who found in their study that advanced age was a poor predictor of the resumption of physical and instrumental activities of daily living after hip fracture surgery.[10] The same observation was made by Wallace et al in the United States in 2014 with a review of hip fractures which showed that age over 60 years was significantly associated with slower recovery of functional activities.[11] Similarly, the results on male predominance in our series are superposable with those of Kardali et al who reported a male predominance with a sex ratio of 1.2.[9] Our work found that female gender was a poor

prognostic factor for return to work. This result cannot be compared with that of Ganczak et al who reported that women were five times more likely than men to return to their pre-fracture level of activity of daily living three months after hip fracture surgery.[8] The importance of marital status may be related to the socio-cultural context in which marriage is considered important. A favourable social environment and good interpersonal relationships have positive effects on health. They are a source of emotional and material support. Belonging to a network of relationships and mutual support gives you a feeling of being recognised, loved, esteemed and valued. This has a protective effect on health.[12] The predominance of medical history and/or co-morbidities could be related to the advanced age of the study population. Chronic pathologies are more likely to recur at an advanced age. Arterial hypertension (AH) was the most frequent comorbidity in our series, and is thought to be linked to the resumption of activity. These results are similar to those of Evano et al. Indeed, hypertension is the most frequent intercurrent pathology affecting patients referred for surgery; patients aged 60 and over are a population with a high prevalence of hypertension.[4]

The preoperative scores recorded in our series are similar to those of Wantonoro et al who found independence in 75.8% of patients.[10] Our results are superior to those of Gomez et al who found a mean Parker score of 5.78± 2.56 in patients with a pertrochanteric fracture admitted for Fast Track.[13] A better preoperative Parker score would be predictive of patients returning to activity. Our results are similar to those of Mallick et al who demonstrated that dependence on pre-fracture walking ability negatively affects recovery after hip fracture.[14]

Cognitive disorders found in elderly subjects vary in frequency and are associated with changes in the brain. Some subjects maintain their cognitive vitality even at very advanced ages.[15] The low prevalence of memory disorders in the elderly in our series may be related to the size of the series. According to Ndiaye et al benign memory complaints are, in the majority of cases, linked to psycho-affective factors (bereavement, distance from relatives, loneliness).[16] There was a statistically significant association between the presence of a psychiatric history and the resumption of activities, p value=0.0164. The presence of a psychiatric history would appear to be a poor prognostic factor for return to work. Wantonoro et al reported that depression is a poor prognostic factor for the resumption of instrumental activities of daily living.[10]

Our patients had long operating times, but there was no significant link with return to activity. The same applies to the length of hospital stay. In Benin, although patients are covered by "administrative care", this does not include pharmaceutical products and implants. Hence the need for patients to take the time they need to raise the necessary funds. In a study carried out by Wantonoro et al all the participants in the study had public or private health insurance.[10] Dubuc et al stated that medical and surgical management of cervical fractures in elderly patients would be best within the first 24 hours and at the latest 48 hours unless there was a formal medical contraindication.[17] We found no statistically significant association between length of hospitalisation and return to activity, p value=0.7964. The length of hospitalisation therefore had no impact on the return to activity. Our results are similar to those of Ganczak et al who found that length of hospital stay was not predictive of long-term functional outcome in elderly patients undergoing hip fracture surgery.[8] After surgery, early functional rehabilitation plays an important role in the restoration of natural organic function and the resumption of easy daily activity.[18] In our study, 34.5% of patients regained their preoperative functional autonomy. Our results are similar to those of Lestavel et al who estimate that approximately one third of patients regain their previous autonomy after surgical management of a hip fracture.[19] But this is not the only predictor of return to activity. Under our skies, there are no retirement homes or rehabilitation centres. This would explain why most people return home. The use of public places was also noted by Kardali et al in a study carried out in Morocco on HSPs, according to them, 97.61% of patients were still able to leave their homes after surgery.[9]

Limitations

This was a cross-sectional study. It made it possible to calculate frequency measurements and to determine a number of factors predictive of resumption of activity in elderly subjects undergoing lower-limb surgery. But the level of evidence would have been higher if it had been an observational study.

CONCLUSION

The aim of this study was to determine the factors predictive of resumption of activity in elderly subjects operated on for a fracture of the lower limb. Resumption of activity was recorded in 79% of cases. Older age, female gender, absence of a partner, high blood pressure, non-personal residence and a poor Parker score were found to be poor predictors of return to activity.

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