



Prognostic factors in patients surgically treated after hip fracture

Czynniki rokownicze po złamaniu bliższego końca kości udowej u pacjentów leczonych operacyjnie

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Abstract

Introduction: By the impact of demographic changes and as the result of the 'incorrect' lifestyles pursued in developed societies, osteoporosis has become a serious social problem. Hip fracture is the most serious complication of osteoporosis and is associated with high mortality rates or permanent health impairment.

The goal of this study was an evaluation of the impact of selected socio-economic factors and of the time period from fracture to surgical intervention on the patient's prognosis.

Material and methods: A group of 148 patients (114 women and 34 men) participated in the study, their age varying between 48 and 93 years, all of them after surgical treatment of hip fracture. A questionnaire study was carried out, encompassing all the participants.

Results: During a year-long follow up, thirty-four (34) patients, i.e. 23% of the whole group, passed away. Further comparisons were performed between two groups: Group A — 114 patients, who survived the follow up period, and Group B — those who died. The mean age of patients was 76.3 and 82.6 years in Groups A and B, respectively ($p < 0.05$).

In Group A, 79.8% of the patients declared full self-dependence prior to fracture episode vs. 44.1% of the patients in Group B ($p < 0.05$). Regular physical activity – in various forms – was undertaken by 39.5% of the patients in Group A and 11.8% of those in Group B ($p < 0.05$). Active ways of spending outdoor time were reported by 32.5% of the patients in Group A vs. 14.7% in Group B ($p < 0.05$). Fracture unfavourably influenced the material situation of affected patients.

No relationship was found between the time period from fracture to surgery and the patient's prognosis.

Conclusions:

1. Despite the currently available surgical treatment methods, hip fracture is still laden with a high risk of fatality.
2. High physical activity, especially outdoors, self-dependence and having a partner positively influence patient's prognosis after hip fracture.
3. Hip fracture negatively changes the material situation of patients.
4. The length of time from hip fracture to operation has no effect on the survival rate. (*Endokrynol Pol* 2013; 64 (2): 108–113)

Key words: osteoporosis, hip fracture, prognostic factors, mortality

Streszczenie

Wstęp: Osteoporoza z racji zmian demograficznych oraz nieprawidłowego stylu życia społeczeństw rozwiniętych stała się poważnym problemem społecznym.

Złamanie bliższego końca kości udowej stanowi jej najpoważniejsze powikłanie, związane z dużą śmiertelnością lub trwałymi następstwami. Celem pracy była ocena wpływu wybranych czynników socjoekonomicznych i czasu interwencji chirurgicznej na rokowanie.

Materiał i metody: W badaniu uczestniczyło 148 pacjentów (114 kobiet i 34 mężczyzn) w wieku od 48 do 93 lat, po operacyjnym leczeniu złamania bliższego końca kości udowej, wśród których przeprowadzono badanie ankietowe.

Wyniki. W trakcie rocznej obserwacji zmarło 34 pacjentów, co stanowiło 23% badanej grupy. Kolejnych porównań dokonano w dwóch grupach. Wśród 114 pacjentów, którzy przeżyli roczną obserwację (grupa A) oraz w grupie pacjentów, którzy zmarli (grupa B). Średnia wieku pacjentów z grupy A wynosiła 76,3 lata, a dla pacjentów grupy B — 82,6 lat ($p < 0,05$).

W grupie A przed złamaniem 79,8% pacjentów deklarowało pełną samodzielność, w porównaniu do 44,1% w grupie B ($p < 0,05$). Regularnie uprawiało różne formy aktywności fizycznej 39,5% z grupy A i 11,8% w grupie B ($p < 0,05$). Aktywne spędzaniu czasu poza domem zgłaszało 32,5% chorych w grupie A vs 14,7% w grupie B. Złamanie wpłynęło niekorzystnie na sytuację materialną pacjentów. Nie stwierdzono zależności między szybkością operacji a rokowaniem pacjentów.

Wnioski:

1. Złamanie bliższego końca kości udowej mimo zastosowania leczenia zabiegowego nadal obarczone jest dużym ryzykiem zgonu.
2. Duża aktywność fizyczna, szczególnie poza domem, samodzielność oraz posiadanie partnera wpływają korzystnie na rokowanie pacjentów po złamaniu bliższego końca kości udowej.
3. Złamanie bliższego końca kości udowej ma negatywny wpływ na sytuację materialną pacjentów.
4. Szybkość interwencji chirurgicznej po złamaniu bliższego końca kości udowej nie ma wpływu na przeżywalność. (*Endokrynol Pol* 2013; 64 (2): 108–113)

Słowa kluczowe: osteoporoza, złamanie bliższego końca kości udowej, czynniki rokownicze, śmiertelność



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Introduction

The incidence of osteoporotic fractures, including hip fractures, increases with the age of patients [1, 2]. An osteoporotic fracture increases the risk of further low-energy fractures: 2.5 x higher risk of vertebral fractures and 2.3 x higher risk of the other hip fracture [3]. The incidence of hip fracture in women rapidly grows between the 60th and the 85th year of life [4]. This particular fracture is often a turning point in life of osteoporotic patients, being the most dangerous complication, most often causing permanent consequences. This fact may reduce the length of a patient's life, but it will inevitably compromise the patient's life quality. During the first year from hip fracture, 20-45% of patients pass away from resulting complications, while more often, this fracture ends up with permanent impairment of physical efficacy, chronic pains and an utmost need for additional care [5, 6].

Data from 2005 gives information about 17,625 hip fracture episodes (on average, it is 224 cases per 100,000 people) in Poland (data from the Health Care Fund) [7]. Depending on geographic region, the prevalence of fractures varied from 165 to 283/population of 100,000 [7]. For comparison, the prevalence of hip fractures in the UK amounts to 372/population of 100,000. The highest numbers of bone fractures in this particular localisation are recorded in Scandinavia [8]. Poland is classified as a country with a relatively low prevalence of this medical condition, although the available data seems to be underestimated. However, hip fracture still ranks fourth in the causes of hospitalisation of women after 65; higher than, among others, pneumonia, pulmonary obstructive lung disease or renal failure (data from the Health Care Fund from 2009).

Regardless of the applied treatment method, hip fracture is associated with a serious prognosis. Being aware of the factors which promote a patient's return to a normal health condition may determine therapeutic success, despite the application of the same surgical treatment methods [9, 10]. Their identification may help implement a proper management and improve prognosis.

The goal of this study was an evaluation of the effects of selected socio-economic factors and of the time period from fracture to operation on one-year survival after hip fracture.

Material and methods

The study group included 148 patients, surgically treated for low-energy fracture of the proximal femur. The study was carried out by a questionnaire method. The study group consisted of 114 women and 34 men,

their age varying from 48 to 93 years (mean age: 78.6). The mean age for the women was (79 years SD \pm 9.285) and 71 years (SD \pm 12.540) for the men. The observations were carried out between 2006 and 2012.

A questionnaire evaluating the above-mentioned parameters was obtained during hospitalisation of the patients at the Department of Surgery. All the patients declared and provided their conscious, written consent to participate in the study. The data regarding health condition and lifestyle before and after the fracture episode was provided by the questionnaire filled out by the patients, while the information about the applied surgical treatment and time from fracture until operation was obtained from medical documentation.

The questionnaire enquired about issues associated with the patient's subjective evaluation of health condition, physical activity, self-dependence in everyday tasks, intellectual activity, material situation, and ways of spending free time. Regarding the subjective evaluation of their general health condition, a 1–5 scale was employed, where 1 corresponded to very poor, and 5 corresponded to very good, health condition.

Those patients who were not able to understand and answer the questions themselves were immediately excluded from the study. Also excluded were subjects with very serious medical conditions, general or psychiatric in character, as well as patients who reported considerable limitations of physical activity before fracture. No effects of performed operations were evaluated, limiting the treatment information to the fact of interventional therapy application. All the studied patients were discharged home in good general condition. Neither long-term medical therapy nor any age-related chronic diseases, including degenerative joint disease, were the cause of exclusion from the study.

Statistical analysis

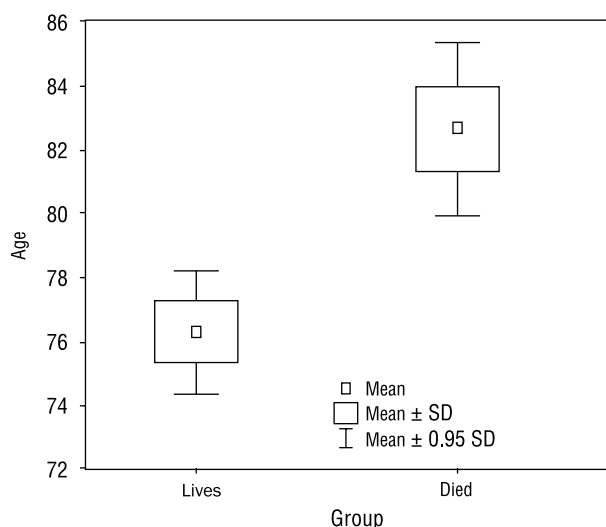
A comparison of the groups of patients who survived vs. those who passed away was carried out by the Mann-Whitney non-parametric test in the analysis of ordinal data and by the chi-square independence test in the analysis of data in nominal scale. On the other hand, a comparison of related variables – data before and a year after the operation — were analysed by the Wilcoxon test and the McNemar's test, respectively. The calculations were done using a Statistica v10 (StatSoft) software package. All the tests were analysed at the significance level of $\alpha = 0.05$.

Results

After twelve (12) months, 114 patients were still alive, regaining physical functionality to varying degrees

Table I. Age characteristics of patients in Groups A and B**Tabela I. Charakterystyka pacjentów pod względem wieku w grupie A i B**

	Number of patients	Mean age	Median value	Minimum	Maximum	Standard deviation	p
Group A	114	76.3 yrs	80	48	93	10.3	0.000004
Group B	34	82.6 yrs	82.5	65	92	7.8	0.015245

**Figure 1. Age characteristics of patients****Rycina 1. Charakterystyka pacjentów pod względem wieku**

(Group A). Thirty-four (34) patients had died (Group B). The mean age of the patients was 76.3 years and 82.6 years in Group A and Group B, respectively.

See Table I and Figure 1 for age characteristics of Group A and Group B.

A group of 114 women and 34 men participated in the study. In the course of observations, thirty-one (31) female patients passed away, i.e. 27.2% of all the studied women, and three (3) male patients, i.e. 9.1% of all the studied men (Table II).

Table III shows how many patients were married or remained in life partnership or informal relationship during the study.

We analysed whether living with other persons had exerted any influence on the patient's situation. See Table IV for results.

Full independence before fracture was declared by 79.8% patients from Group A vs. 44.12% among the patients in Group B ($p = 0.00005$). Independence restrictions before the fracture trauma were reported by 19.3% of the patients in Group A and 35.3% of those in Group B. Before the fracture, there were 0.8% of dependent subjects in Group A vs. 20.6% in Group B ($p = 0.0013$). All of those patients provided their own, subjective evaluation. See Table V for results.

Table II. Gender-based division of patients**Tabela II. Podział pacjentów ze względu na płeć**

	Group A		Group B	
	n	%	n	%
Women	84	73.03	31	90.91
Men	31	26.96	3	9.09
$p = 0.034$				

Table III. Division of the study group with regards to the marital status of patients**Tabela III. Podział badanej grupy ze względu na pozostawanie w chwili urazu w związku**

	Group A	Group B
Persons married or in relationship	42.9%	20.6%
Persons unmarried nor in any relationship	57.1%	79.4%
$p = 0.018$		

Table IV. Housing conditions of patients in Group A and Group B**Tabela IV. Sytuacja mieszkaniowa pacjentów z grupy A i B**

Living alone	Yes		No	
	n	%	n	%
Group A	32	28.07	82	71.93
Group B	15	44.12	19	55.88
$p = 0.07$				

Table V. Evaluation of independence degree in Group A and Group B**Tabela V. Ocena stopnia samodzielności w grupie A i B**

Independence	Group A		Group B
	Before fracture	12 months after fracture	Before fracture
Full	79.8 %	9.42%	44.1%
Limited	19.3%	51.9 %	35.3%
Not independent	0.8%	38.68%	20.6%
$p < 0.05$			

Table VI. Evaluation of material status

Tabela VI. Ocena sytuacji materialnej

Material status	Group A		Group B
	Before fracture	12 months after fracture	Before fracture
Very good	8.8%	0	6.1%
Good	4.3%	21.7%	18.2%
Satisfactory	35.1%	51.9%	48.5%
Bad	13.1%	24.4%	27.2%
$p < 0.05$			

Table VII. Evaluation of physical activity before fracture

Tabela VII. Ocena aktywności fizycznej przed złamaniem

Regular physical activity before fracture	Yes		No	
	n	%	n	%
Group A	45	39.47	69	60.53
Group B	4	11.76	30	88.24
$p = 0.00316$				

Table VIII. Outdoor activity before fracture

Tabela VIII. Aktywność poza domem przed złamaniem

Regular going out before fracture	Yes		No	
	n	%	n	%
Group A	37	32.46	77	67.54
Group B	5	14.71	29	85.29
$p = 0.04$				

Table IX. Subjective health condition assessment in patients of Groups A and B before fracture

Tabela IX. Subiektywna ocena stanu zdrowia pacjentów przed złamaniem w grupie A i B

	Very good		Good		Satisfactory		Bad		Very bad	
	n	%	n	%	n	%	n	%	n	%
Group A	7	6.19	39	34.51	42	37.17	23	20.36	2	1.77
Group B	1	3.13	12	37.5	14	43.75	3	9.37	2	6.25

Table X. Time from fracture to surgical intervention in Group A and Group B

Tabela X. Czas od złamania do interwencji chirurgicznej w grupie A i B

Time period from fracture to operation	Group A n = 114		Group B n = 34		p
	n	%	n	%	
On the day of fracture	32	28.1	11	32.4	0.6280
1–3 days after fracture	51	44.7	11	32.4	0.2020
4–7 days after fracture	21	18.4	6	17.6	0.9155
More than one week	10	8.8	6	17.6	0.1472

The patients evaluated their material status on a four-point scale (3 — very good, 2 — good, 1 — satisfactory, 0 — bad). Immediately after fracture and still during hospitalisation, the patients were asked about their financial status before fracture, both in Groups A and B. That question was repeated in Group A after 12 months from fracture. See Table VI for the answers.

See Table VII for the results of physical activity assessment, declared by studied patients.

Table VIII presents the results of patient activity and Table IX presents subjective evaluation of their health condition before fracture.

We also analysed if the time from fracture to operation influenced in any way the survival of affected patients. See Table X for results.

Discussion

Despite the progress in medicine, the mortality rate after proximal femur fracture has for years been — and still is — as high as 30%. The results, recorded by British doctors during 1989–2004 on 3,628 patients (including 80% of women) with proximal femur fracture, revealed post-operative mortality rate at merely 7% for the patients, operated within 48 hours from the fracture episode, and may thus be regarded as exceptional. Among the patients in whom the surgery had been delayed, the mortality rate was 13.8% [10].

In a German study, carried out on a group of 2,916 patients, the mortality rate was 19.7%, which approximates to the results obtained in the reported study [11]. On the other hand, other studies have revealed higher

mortality rates, namely 26.4% in women and 37.1% in men [12–17].

Regarding the reported study, the observed general mortality rate was close to that in the above-mentioned analyses, namely 23% (27.2% for women and 9.1% for men). Most of the available sources report higher mortality rates in men. This difference is particularly distinct during the first six months from the fracture event and also increases with the age of men after fracture. It may be associated with the fact that men are at a higher risk of postoperative complications vs. women. On the other hand, taking into account the differences in bone quality, fractures in men usually result from severe traumas or occur in advanced medical condition, when the general health is badly compromised and much worse than the corresponding health condition in women. The observations of the risk of fatality, carried out in the reported study, are different, with a prevalence of mortality cases in women. The younger age of the male participants (the mean age of 71 years vs. 79 years for women) may explain this difference. In turn, the ratio of men with fractures to women with fractures was 1:4, which corresponds to the incidence of osteoporosis in both sexes.

In the entire group of women and men, the mean age of the patients with therapy failure (82.6 years) was significantly higher than the age of the patients (76 years) who returned to health (however, not all in the same way). These results are not in any way surprising, as it is known that old age is one of the major unfavourable factors for a patient's prognosis. The older the patient, the higher the number of concomitant diseases, the weaker his or her general physical ability, and the higher the risk of complications.

During the survey, immediately after fracture, questions were asked about the degree of the patient's independence before the accident. An analysis of obtained data indicated that most patients who declared a high degree of independence before proximal femur fracture were in the group with favourable outcomes of surgical intervention.

This means that subjects with earlier physical dysfunction are more susceptible to fractures. We found that the patients who had survived the observation period reported considerable deterioration of their independence, while it should be emphasised that most of them (approximately 80%) declared full physical ability and independence before fracture. In turn, following the fracture episode, that index demonstrated a dramatic drop, down to < 10%. Thus the number of persons demanding regular support and care from others demonstrated a drastic increase.

It was proven in the study that living alone was a prognostically unfavourable factor. In the group of pa-

tients who died despite administered treatment, almost half had not been living with their families, while the patients with favourable post-operative outcomes had been living with their relatives (70%) and running the household together. The support of family or friends increased the motivation to physical exercise and rehabilitation and, although the obtained results did not attain statistical significance, a certain trend became fairly apparent ($p = 0.07$).

It was also demonstrated that staying in life partnership was prognostically favourable. In Group A, 43% of the patients remained in various relationships, while only 20.6% of the patients in Group B had a relationship status. Having a partner was also positive for regaining physical fitness and personal independence. The study also confirmed our earlier observations that proximal femur fracture is a turning point for affected patients, most often imposing a chain of negative changes onto their previous life. In the reported study, patients who survived for 12 months after fracture lost much of their previous independence.

It was also confirmed that proximal femur fracture compromised the material status of affected patients. In fact, there was not even one patient who would have perceived his/her material situation after fracture as very good. The number of patients who evaluated their financial situation as good fell by 50%, while those who perceived their material status as bad increased by 13%. Proximal femur fracture is associated with costs of additional physiotherapy, orthopaedic provision and prescribed medications.

About 40% of the patients in Group A were regularly exercising, while in Group B it was merely 12% ($p = 0.003$). Also the outdoor activity of the patients differed between the groups. In Group A, about 32% of the patients used to systematically go out for social or religious meetings. In Group B, the number of socially active subjects was significantly lower, amounting to only 15% ($p = 0.04$). The presented results indicate that the patients who — before fracture — had been more active and/or regularly exercised, got used more quickly to their new situation, while declaring higher strength and motivation to return to the previous fitness level.

In the group of patients with unfavourable or fatal outcomes, those patients had more often indulged themselves with long hours of radio or TV. This can be interpreted in two ways. First, those who more often watched TV or listened to the wireless, used those media more frequently simply because of their difficulties with normal physical activity and problems with an independent, active spending of free time and, most often, because of limited physical abilities and personal independence.

Another analysis indicated that more patients from Group A evaluated their health condition as very good; it was seven (7) patients altogether, which constituted 6% of that group. In turn, only one (1) person in Group B assessed her health condition as very good i.e. 3% of the group. Because of the small numbers of patients, these results did not attain statistical significance.

On the other hand, no relationship was demonstrated between the survival rate and the time period from fracture to operation. This is confirmed by results from other reports, which did not prove any relationship between the time period from fracture to surgery and the survival rate, either. German and Dutch reports, although confirming the beneficial effect of early surgical intervention on the decreased number of post-operative complications, still did not prove any relationship with the survival rate [18, 19]. In an Australian study, the authors did not prove any significant relationship between the fracture-operation time period and the mortality rate of affected patients, either, although it should be noted that they studied early mortality i.e. within 30 days of surgery [20].

Conclusions

Summing up, the following conclusions can be drawn:

1. Despite the application of surgical treatment, proximal femur fracture is still associated with a high risk of fatality.
2. Extensive physical activity, especially outdoors and away from home, independence, and having a partner, positively influence a patient's prognosis after proximal femur fracture.
3. Worse material status of patients after proximal femur fracture is one of the factors compromising quality of life.
4. The time period from proximal femur fracture to surgical intervention has no effect on the survival rate of affected patients.

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