The second hip fracture in osteoporotic patients: not only an orthopaedic matter

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Summary

The second hip fracture indicates the fracture of the osteoporotic femoral neck which occurs in patients already operated on the opposite side. It is a growing problem, especially in Italy where the ageing rate of the population is one of the highest in the world. Only in recent years this issue has been discussed in the international literature about timing and the treatment methods as a consequence linked to the social costs, mortality, disability of this pathology. The aim of our study is the evaluation of the incidence of hip fractures in a sample of patients that already sustained a surgical procedure for a proximal femur fracture. The evaluation was based on the time elapsed between the two fractures, the quality of life after the second fractural episode through a telephone questionnaire (EQ-5D), the incidence of mortality, the adhesion to the antifractural therapy and the comparison of the obtained data to the international standards.

KEY WORDS: osteoporosis; hip fracture; refracture; elderly.

Introduction

The fracture caused by bone’s fragility is a common pathology among old subjects and the frequency raises within the increase of the average age of the population. The vertebral soma, the proximal humerus, the femur and the distal radius are more frequent to fractures in elderly patients causing morbidity and hospitalization (1). Hip fractures, both neck fracture and intertrochanteric (or subtrochanteric), are the main causes of hospitalization for elderly patients in industrialized countries. These types of fractures are causing an increase of mortality, of morbidity (2) and loss of independence (3). Italy is one of the country where the ageing rate of the population is significantly increasing, also confirmed from the WHO (World Health Organization). The last demographic data confirm the constant increase of the average life of the Italian population (76.7 years old for men and 82.9 years for women, source Istat 2001). In Italy every year 80,000 people risk hip fractures and most of the cases are older than 70 years old, 5% of the fractured patients die in the acute phase and 15-20% die within a year from the fracture. This traumatic event decreases the quality of life of the patients determining disability and loss of self-sufficiency. From the etiopathogenetic point of view it can be considered direct and indirect causes. Direct causes are represented by falls of subjects in advanced age where traumas are caused by a loss of energy. Indirect causes are represented by falls caused by health conditions for example senile dementia (11, 14), but also other neurological diseases, like the Parkinson’s disease (15), COPD and in smaller percentage sight problems and vertigos (5). Age, the feminine sex, alcoholism, living by themselves and previous fractures are useful factors in order to deduce hip fractures. A previous fragility fracture can represent a further risk which mostly verifies within a year after the first fracture. During this time the risk of vertebral fracture increases of 5 times after the first episode, instead contralateral femoral fracture verifies in 38% of the cases (1). After the first fracture the trabecular architecture of the proximal femur changes with a decrease of the Singh index caused by the immobility. Over 80 years old and a serious state of immobility increase the risk of second fracture, load lack on the skeleton increases the mobilization of calcium on bones and negatively influences on the muscular tone increasing the risk of fall and the probability of fracture risks according to Anghthong et al. publication in 2009 (8).

Osteoporosis is the most evident cause which determines fractures in elderly people, a pathology characterized by a reduced bone mass including avoidance of trabeculae of the spongy bone and thinning of the cortical. Trabecular bone reduces more than cortical bone, a phenomenon which decreases the mechanical property of the skeleton increasing the risk of fractures. The bone mass catches up its peak between the age of 30-35 years old and its values are more elevated of 25% in males. After the age of 40 years old the value decreases with an annual average loss of approximately 1% in women and 0.3% in men. In women there is a remarkable decrease during the postmenopausal period caused by the estrogen deficiency where the risk of osteoporosis becomes elevated and it increases getting older. In some patients there has been a lack of an adequate bone mass accumulation during the stage of growth. The tendency of young people to follow unhealthy diets and no- active lifestyle can cause obesity risks and skeleton weakness. In time it can cause the lack of bone mass with a high risk of osteoporosis and fractures (12, 16). The aim of our study is the evaluation of the incidence of hip fractures in a sample of patients that already sustained a
surgical procedure for a proximal femur fracture. The evaluation was based on the time elapsed between the two fractures, the quality of life after the second fractural episode through a telephone questionnaire (EQ-5D), the incidence of mortality, the adherence to the antifractural therapy and the comparison of the obtained data to the international standards.

Our patients are treated with emiarthroplasty, arthroplasty or osteosynthesis. When the clinical conditions allowed, the patients are treated within 48 hours.

Material and method

In our study we have analyzed 1184 patients with hip fractures (514 femoral neck fractures and 670 inter-subtrochanteric fractures) between January 2007 and June 2010 treated in our department. We found that 52 of these subjects (4.4%) had contralateral fractures at the time of analysis. This percentage gives an underestimation of our real sample due to the lack of information in the archives consequently creating great difficulty in obtaining information regarding the patients. Out of these 52 patients 28 (53.8%) had one per-subtrochanteric fracture and 24 (46.2%) a neck fracture one, 43 patients (83%) were women and 9 (17%) men. The average age of the refractured patients was 83.4 years old, precisely 83 years old for women and 85.4 for men (Table 1).

In particular the youngest patient was 55 years old, the oldest one was 104 years old (treated with osteosynthesis with 2 plates).

The elapsing time between the first and the second fracture were:

- < 1 year: 29 patients (55.7%)
- between 1 and 2 years: 14 patients (27%)
- between 2 and 5 years: 4 patients (7.7%)
- > 5 years: 5 patients (9.6%).

Moreover we have found that in 69.2% of the cases (36 patients) the fracture of the contralateral femur was the same as the first fracture: 20 patients in fact had introduced 2 per-subtrochanteric fractures and 16 patients 2 neck fractures. While in 30.8% of the cases (16 patients) fractures varied (Table 2).

It has only been possible to interview 19 of the 52 patients who substanied a second fracture. Of the not contactable group 14 were certainly deceased and 19 were not traceable: 9 did not answer the telephone, in 2 cases we had their nursing home telephone number but the patients had left leaving no contact address, 1 was in another hospital ward and 1 did not collaborate and in 6 cases we had a wrong number. We gave them a form to fill-in called EuroQol (EQ-5D) regarding the quality of life, health conditions of people operated for hip fractures being based on 5 parameters: mobility, care of themselves, everyday activity, pain, anxiety/ depression after their return at home. The questionnaire uses a scale from 0 to 100 which the patients express their health level condition also giving a valid aid to the patients in being able to express their objective assessment on their pain and their quality of life. The EQ-5D form widely used in European community countries because it is simple, direct and explicit. It has also been an ideal instrument in our studies questioning a group of elderly patients, over 80 years old. The questions must be very clear and simple, this has permitted us to eliminate questionnaires which are more complex like SF-36 health survey. Our telephone survey has asked the patients if the mobility problems returned to be the same as before surgery or if they needed aid such as crutches and walking sticks or if they were bedridden. The same surveying has been carried out regarding independence in their personal care (washing themselves and getting dressed) and in daily activities (housework, freetime and family duties). As far as the psychological state we asked if things have changed since undergoing surgery such as being anxious or depressed. Last of all we asked if the patients were taking medication against osteoporosis and for how long they have been taking it. We can study the antifractural therapy in several subjects that have comorbidity and how much this drug could be effective in subjects with compromised bones.

Results

The answers to the questions of questionnaire EQ-5D result in (Table 3): 4 patients (21.1%) had recovered completely the ability to walk, 13 (68.4%) needed crutches or walking sticks, 2 (10.5%) were bedridden; 6 patients (31.6%) were able to wash and dress themselves, 6 (31.6%) needed aid, 7 (36.8%) depended completely on relatives;

Table 1 - Features of patients.

<table>
<thead>
<tr>
<th>Features</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age</td>
<td>83.4</td>
</tr>
<tr>
<td>Men</td>
<td>85.4</td>
</tr>
<tr>
<td>Women</td>
<td>83</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>9 (17%)</td>
</tr>
<tr>
<td>Women</td>
<td>43 (83%)</td>
</tr>
<tr>
<td>Type of Fracture</td>
<td></td>
</tr>
<tr>
<td>Medial</td>
<td>24 (46.2%)</td>
</tr>
<tr>
<td>Lateral</td>
<td>28 (53.8%)</td>
</tr>
</tbody>
</table>

Table 2 - Variation of fracture's type.

<table>
<thead>
<tr>
<th>Pz</th>
<th>First Fracture: Medial</th>
<th>First Fracture: Lateral</th>
<th>Second Fracture: Medial</th>
<th>Second Fracture: Lateral</th>
<th>First Fracture # Second Fracture</th>
<th>First Fracture # Second Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>22 (42.3%)</td>
<td>30 (57.7%)</td>
<td>24 (46.2%)</td>
<td>28 (53.8%)</td>
<td>36 (69.2%)</td>
<td>16 (30.8%)</td>
</tr>
</tbody>
</table>

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Table 3 - Questionnaire EQ-5D Results.

<table>
<thead>
<tr>
<th>No problem</th>
<th>Moderate problem</th>
<th>Significant problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Personal care independence</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Daily activity independence</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Pain</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Psychological state</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

7 patients (36.8%) were independent in carrying out daily activities, 4 (21.1%) were not completely self-sufficient, 8 (42.1%) were not independent; 7 patients (36.8%) did not complain pain in the inferior limbs, 11 (57.9%) reported moderate pain, 1 (5.3%) strong pain; 8 patients (42.1%) did not have problems of anxiety or depression after surgery, 8 (42.1%) had anxiety and depression, 3 (15.8%) presented significant anxiety and depression. Of the 19 interviewed patients, 10 (52.6%) were following a therapy for osteoporosis (prescribed by an orthopaedic specialist or family doctor given after the first or second fracture) while 9 (47.4%) were not. Out of these 9 patients, 3 did not remember if they had been prescribed medication, 3 had not been proposed and 3 had decided not to follow any kind of therapy independently because they were already taking other drugs. About medical therapy 5 patients were taking bisphosphonates since the first fracture and 4 from the second fracture; 1 starts teriparadate treatment daily after the second fracture changing the prescription given after the first fracture. In the group of subjects taking osteoporosis therapy 80% starts at least 1 year before.

The 4 patients who had completely recovered the ability to walk followed an antosteoporotic therapy, 2 from the moment of fracture and 2 from the re-fracture. The average age was 82.7 years old. The type of re-fracture was 50% medial and lateral 50%.

Of the 13 patients who needed some form of aid for example crutches, walking sticks, or help from their relatives, 6 were following the therapy for osteoporosis rigorously (3 from the first fracture and 3 from the second) 4 patients reported that they had not been prescribed with medication and 3 did not remember. The average age was 83.5 years old and 4 subjects had senile dementia and the relatives reported that their difficulty in movement was not only a problematic organic one, but a general degeneration of their physical condition. In this group the type of re-fracture, 9 were lateral and 4 medial. The 2 bedridden patients, 1 had Alzheimer’s while already presented a clinical and psychological decay after the first fracture. The average age was 90.5 years and the re-fracture was 1 medial and 1 lateral one.

Of the 52 re-fractured patients 14 deceased, 8 women and 6 men, with a mortality rate 26.9%. Of the deceased patients 78% deceased within 6 months (11 patients), 85% within a year (12 patients), in line with the most recent literature in spite of the lack of documentation of our research.

Discussion

Femoral fractures occur more frequently in elderly people and have a high degree of mortality. The problem of a second fracture of the femur has not been emphasized enough in documents. The percentage of patients with fractures of contralateral femur has resulted in 4.4%, of which 83% were women and 17% men. The re-fracturing within a year, on 1183 fractured patients resulted in 2.4%. The average time between the two fractures is of 22 months and 55.7% (29 patients) re-fractured within 1 year while 90.3% within 5 years.

Berry et al. study in 2007 total amount of re-fractures is of 14.8% and 1-2.5% of the cases occur after a year from the first fracture while 8-8.2% after 5 years, (7); Lönnroos et al. (2007) study 5.1% after a year and 8.1% after 2 years (9). Ryg (2009) study instead was 16.5% of the patients suffer a second femoral fracture, of which 9% after a year and 20% after 5 years (11); Nymark study (2006) second fracture occurs in 8.7%, of which 50% within 12-19 months (6). According to Dretakis et al. to (1998) 50% of the subjects already re-fracture within 2 years and 75% within 4 years (10). Anghthong et al. (2009) reported a total amount of the second fracture is 5-10%, of which 78.6% occurs in the 12 months after the first fracture (8). In general terms the other research carried out demonstrates that the frequency of re-fractures varies from 2 to 11% after the first fracture.

Our sample of new fractured patient had a mean age 83.4 years old (83 years old in women and 85.4 years in the man). Our data do not deviate from other literature available, in fact according to Shabat et al. (2003) average age is 82 years old (4) and according to Nymark et al. (2006) it is over 85 years old (6). From the answers to the questions of questionnaire EQ-5D carried out by patients it turns out that 4 patients (21.1%) have completely recovered the ability to walk and this group resulted in a better ability to recover probably due to the absence of significant comorbidities and their very good psychological state. 13 (68.4%) need aid such as crutches and walking sticks and 2 (10.5%) are bedridden. There was a minor recovery in the movement in the patients with lateral fractures in comparison those with medial fractures, the possible explanation could be due to the fact that, after the surgery, they are verticalized after 25-30 and this increases the risk of other complications, like thrombosis and wounds from decubitus, but above all the negative psychological state of the patient, after the traumatic event and hospital stay influences his total recovery.

Shabat et al. (2003) estimated that 60-70% of the subjects with re-fractures walk again (4). The difficulty they are faced with in walking again and the daily activities is partially tied to general clinical problems. Must be kept in mind that many patients have senile dementia and find more difficulty taking Alzheimer’s, therefore the questionnaire has to be completed by relatives. Moreover we have noticed that recovery is better in younger patients, with medial hip fractures and significant absence of comorbidity.

Patients affected by femoral neck fracture are usually treated with arthroplasty, therefore they are able to walk after 2-3 days, while patients affected by perthrocanteric unstable fractures are usually treated with osteosynthesis. Moreover we have found that in 69.2% of the cases (36 patients) the fracture of the contralateral femur was the same as the first fracture while in 30.8% of the cases (16 patients) fractures varied agreeing therefore with Shabat et al. (2003) and Yamanashi et al. (2005) (15). In our sample mortality is 26.9%, especially the first year has
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been of 23%. Of the deceased patients 78% died within 6 months (11 people), 85% within 12 months (12 people). Mortality rate is higher in men (66.7%) than in women (18.6%), in line with Berry study (2007) which indicates 24.1% mortality after a year from the re-fracture and 66.5% after 5 years (7), and Ryg (2009) estimated 27% mortality in men after a year and 64% after 5 years, while in women 21% after a year and 58% after 5 years (11). In both cases mortality is higher in men (7, 11). As far as the medical therapy against osteoporosis, 19 patients contacted again, 9 were taking medication, prescribed by our specialist or their family doctor while 10 patients did not. According to Edwards (2007) a reduction in re-fracture risk is estimated from 5 to 50% if medication for osteoporosis is taken and failing to take medication from the first fracture contributes to an increase of the incidence of a second fracture of the femur (17). Chapurlat (2003) (18) and Yamanashi (2005) (15) also emphasize the importance of preventive therapy for osteoporosis, following the first fracture is important in order to prevent a second one (Table 1). Among disposable medical therapies, according the 2010 North American Menopause Society (NAMS) position statement (19), bisphosphonates are considered the first line therapy in the treatment of osteoporosis and reduce vertebral fractures by 40 to 70% and non-vertebral fractures by 20 to 35%. Teriparatide is recommended for patients with severe osteoporosis and has been shown to reduce vertebral fractures 65% and non-vertebral fractures 53%. Calcitonin showed promise during early trials in 2000 with a 33% reduction in fractures but these results have not been replicated and this therapy is now relegated to a second line treatment. The newly approved monoclonal antibody for osteoporosis treatment in postmenopausal women, denosumab, leads to a 68 and 19% reduction of vertebral and non-vertebral fractures, respectively.

Conclusion

Our study it is agreed that the incidence of a second fracture of the femur is higher in the following year from the first fracture, agreeing in other research data. There is no significant age difference between men and women at the time of the re-fracture. As far as mortality there is an increase within the first year from the second fracture and this percentage is higher in men. This data agrees with the most documented research already carried out. Documented literature states the importance of the medical therapy in order to reduce the risk of fragility fractures and to prevent new ones in who already has them. In our opinion in this, extremely old patients a medical therapy with 1 year subministration of zoledronic acid should be considered, in order to reduce risk of new fracture and avoid discontinuance of therapy (20).

In that regard Rossini et al. (2004) and Trivedi et al. (2004) cases showed that the oral Vit D administration (300,000 UI /year) decreases the incidence of femoral fractures about 20%, even because it betters balance, muscular strength and functional motility, besides improving calcium uptake. Osteoporosis is the most important factor causing fractures in the elderly and considering the increase of mortality, above all after second fractures, more importance must be given to the preventive therapy. In 2010 the region of Tuscany has approved the plan called TARGET (Appropriate Treatment for Geriatric Refractures in Tuscany) for the preventive fracture therapy strategy which could reduce fracturing risk. This project involves the Orthopaedic Department, the Internal Medicine Department, the Rheumatology Department, the Endocrinology Department and the General Medicine Department. In our opinion the role of orthopedic is to lead this patients to first level of osteoporosis investigation exams and set up the most correct combination of medical therapy, antiresorptive and Vit D, for the best second hip fracture prevention strategy.

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