The impact of rehabilitation on the health-related quality of life in patients with vertebral fragility fractures

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Summary

Vertebral fractures are one of the most frequent and serious osteoporotic fractures. Rehabilitation plays an important role in these patients through its potential impact on pain and physical function, not only in the short-term, but also in the long term. The aim of this study is to assess the impact of a 10 days-rehabilitation program on quality of life in the long term. This study was an observational study conducted on patients with fragility vertebral fractures. At baseline and after 6 months the following parameters were evaluated: height and occiput wall distance, Visual Analogue Scale for dorsal and lumbar pain, 20 meters walk test for gait’s performance. For quality of life assessment we used the Italian version of EuroQuol-5-dimensions-3-level. Patients were divided in two groups: 39 patients underwent a 10 days-rehabilitation program specific for fragility vertebral fractures, 15 patients did not receive any rehabilitation treatment. Patients who underwent a specific physiotherapy program had better quality of life-related outcomes after 6 months than patients did not perform any rehabilitation, in particular in EQ-Global Health and in the mobility and selfcare dimension of EQ-index. In conclusions this study shows that in the management of fragility vertebral fractures the exercises have an important role.

KEY WORDS: quality of life; vertebral fractures; exercises; rehabilitation program; osteoporosis.

Methods

This study was an observational study conducted on female patients who were referred to the multidisciplinary outpatient clinic for “Diagnosis, therapy, rehabilitation of patients with fragility vertebral fracture” of “Azienda Ospedaliera Universitaria di Pisa”, Italy.

Age, Body Mass Index (BMI), Barthel index (17), number, level and severity of vertebral fractures (Genant’s score), bone densitometric values at lumbar and femur sites (measured by DXA) were obtained at the baseline assessment. At baseline and after 6 months the following parameters were evaluated: height and occiput wall distance, Visual Analogue Scale (VAS) for dorsal and lumbar pain; 20 meters walk test for gait’s performance. For quality of life assessment we used the Italian version of EuroQuol-5-dimensions-3-level (EQ-5D-3L) (18). The EQ-5D-3L consists of 2 parts: the EQ-5D descriptive system and the EQ visual analogue scale. The EQ-5D descriptive system comprises the following 5 dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimen-
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The EQ-5D descriptive system may be converted into a single summary index by applying a formula that essentially attaches values to each of the levels in each dimension (EQ-index). The EQ visual analogue scale records the respondent’s self-rated health on a vertical, visual analogue scale where the endpoints are labelled ‘Best imaginable health state’ and ‘Worst imaginable health state’. This information can be used as a quantitative measure of global health as judged by the individual respondents (EQ-GH). Exclusion criteria were: uncooperative patients, patients with recent fracture (< 3 months) or with corset and the patients unable to walk independently.

Patients selected were 54, divided in two groups. Patients of group A (39) underwent a 10 days-rehabilitation program specific for fragility vertebral fractures. Patients of group B (15) did not receive any rehabilitation treatment (they were patients who could not perform rehabilitation for logistical reasons). All patients underwent treatment for osteoporosis and appropriate analgesic therapy. Primary endpoint was to evaluate the differences in EQ-GH and EQ-index after 6 months in the two groups.

**Physiotherapy program**

The physiotherapy protocol includes 10 treatment sessions lasting 40 minutes each. The sessions were performed in the morning (from Monday to Friday for two weeks). The exercises were applied by the same physical therapist. The protocol provided exercises supine with lower limbs flexed to 90° and supported on a cube, exercises in seated position with hip and knee flexed to 90°, exercises in upright position in support to the wall.

- Respiratory exercises
- Retropulsion and antepulsion shoulder exercises
- Abduction of upper limb on frontal plan with elbows flexed at 90°
- Strengthening of the abdominal muscles
- Retroversion, anteversion and lateralization of the pelvis on the proprioceptive pillow

Exercises in seated position with hip and knee flexed to 90°:
- Alignment of spine
- Elevation of the shoulders with upper limbs adducts
- Retropulsion shoulder exercises
- Retroversion, anteversion and lateralization of the pelvis on the proprioceptive pillow

Exercises in upright position in support to the wall with feet apart:
- Extension upper limb against resistance
- Retropulsion shoulder exercises
- Antepulsion shoulder exercises up to 90°

**Data analysis**

For anthropometric and functional outcomes measured using continuous scale, differences in mean changes were compared between groups using the Student’s T-test. The p value was set at p < 0.05.

**Results**

Table 1 shows the characteristics and clinical parameters of group A and B at baseline. No difference was found between two groups. All patients of group A and B were female.

Table 2 shows changes in clinical parameters after 6 months between group A and B. After 6 months, although there were an improvement in the parameters, only the per-

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th></th>
<th>Group B</th>
<th></th>
<th>P</th>
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<td>N° vertebral fractures</td>
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<td>1,8</td>
<td>2,87</td>
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<td>4,2</td>
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<td>Barthel</td>
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<td>10,9</td>
<td>89</td>
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<td>0,73</td>
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<td>48,7</td>
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<td>20 meters walk test (sec)</td>
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<td>30,77</td>
<td>16,4</td>
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<td>8,12</td>
<td>4,0</td>
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Lumbar spine bone mineral density (DXA t-score L); femoral neck bone mineral density (DXA t-score FN); total hip bone mineral density (DXA t-score FT); standard deviation (std.dev.); * P<0.005
did not perform any rehabilitation, in particular in EQ-Global Health and in the mobility and self-care dimension of EQ-index. After 6 months the anthropometric and functional outcomes are sensible better both group A and B, but there were no difference between groups. In fact all patients underwent treatment for osteoporosis and appropriate analgesic therapy and also practical advice for daily life. EQ-Global Health and EQ-index (mobility and self-care) although also improved in group B, showed a significant difference in the group that performed physiotherapy. A number of RCTs of exercise interventions in people with vertebral osteoporosis reported reduced pain and improved quality of life (13-16, 19-21). There are only few studies that examined exercise in osteoporotic populations with vertebral fracture. Papaioannou et al. in a RCT of 2003 found that a home exercise program improved quality of life in symptoms, emotion, leisure and social activity over 6 months (16). In this study patients were instructed to complete 60 min of exercise over the course of the day on 3 days each week for 6 months. Bergland et al. in 2010 found that exercise improves mobility as well as the health-related quality of life in elderly women with a history of vertebral fractures measured at 3 months after baseline as well as at 12 months (13).

**Discussion**

The results of this observational study show that patients who underwent a specific physiotherapy program (group A) had better quality of life-related outcomes than patients who did not perform any rehabilitation, in particular in EQ-Global Health and in the mobility and self-care dimension of EQ-index. After 6 months the anthropometric and functional outcomes are sensible better both group A and B, but there were no difference between groups. In fact all patients underwent treatment for osteoporosis and appropriate analgesic therapy and also practical advice for daily life. EQ-Global Health and EQ-index (mobility and self-care) although also improved in group B, showed a significant difference in the group that performed physiotherapy. A number of RCTs of exercise interventions in people with vertebral osteoporosis reported reduced pain and improved quality of life (13-16, 19-21). There are only few studies that examined exercise in osteoporotic populations with vertebral fracture. Papaioannou et al. in a RCT of 2003 found that a home exercise program improved quality of life in symptoms, emotion, leisure and social activity over 6 months (16). In this study patients were instructed to complete 60 min of exercise over the course of the day on 3 days each week for 6 months. Bergland et al. in 2010 found that exercise improves mobility as well as the health-related quality of life in elderly women with a history of vertebral fractures measured at 3 months after baseline as well as at 12 months (13).

**Table 2 - Clinical parameters group A and B after 6 months.**

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<th></th>
<th>Group A</th>
<th>Group B</th>
<th>P</th>
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<tbody>
<tr>
<td></td>
<td>Baseline</td>
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<td>Baseline</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td>std.dev.</td>
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<td>0.14</td>
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<tr>
<td>EQ-GH</td>
<td>56.7</td>
<td>63.5</td>
<td>17.8</td>
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<td>Dorsal VAS</td>
<td>3.6</td>
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<td>2.53</td>
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<tr>
<td>Lumbar VAS</td>
<td>5.1</td>
<td>4.7</td>
<td>2.9</td>
</tr>
<tr>
<td>20 meters walk test (sec)</td>
<td>28.65</td>
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<td>3.8</td>
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<tr>
<td>Height (m)</td>
<td>1.56</td>
<td>1.6</td>
<td>0.1</td>
</tr>
</tbody>
</table>

* P<0.005
ros et al. found that a 10-week exercise program improved balance, quality of life, level of daily function and decreased pain (15). Gold et al. found that group exercises and coping classes for 6 months delivered by a physiotherapist and social worker led to improvements in back extensor strength and psychological impairment but not in pain levels (14). In our study patients performed a physiotherapy protocol which included 10 daily sessions lasting 40 minutes each, so the treatment lasted a shorter period. Nonetheless improvement of the perceived quality of life is maintained over 6 months, in particular the improvement in global health and in mobility and self-care dimension. These results support the benefits of exercises in the clinical management of patients with osteoporotic vertebral fractures. The limits of this study are: the sample has a limited number, the two group are heterogeneous in the number of participants, it was not possible exclude physiological musculoskeletal differences between two groups that could affect the results. This is only an observational study on female who were referred to the multidisciplinary outpatient clinic for “Diagnosis, therapy, rehabilitation of patients with fragility vertebral fracture” of “Azienda Ospedaliera Universitaria di Pisa”, Italy, without the possibility to create groups blinded randomized certainly would strengthen further results.

Conclusions

This study shows that in the management of fragility vertebral fractures the exercises have an important role. In fact a physiotherapy protocol of 10 daily sessions lasting 40 minutes each associated to analgesic therapy and anti-resorptive treatment can improve quality of life in the long term. So, a global care of patients with fragility vertebral fractures, including correct drug treatment and physiotherapy, helps to improve their perceived quality of life. Written informed consent was obtained from patients. With this consent the patients authorize the collection and publication of clinical data about their case for scientific and educational purposes even outside the institution.

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