Osteoporosis Follow-up After Wrist Fractures Following Minor Trauma

Sophia A. Khan, MD; Carolyn de Geus, MD; Brian Holroyd, MD; Anthony S. Russell, FRCP

Background: Patients presenting with low-trauma wrist fractures are an ideal target population for early case finding of osteoporosis. We decided to investigate whether this early detection occurred in practice.

Methods: This study was conducted at a single center in Edmonton, Alberta. A structured interview format was used to contact 112 (72%) of 156 patients older than 40 years who were diagnosed as having an atraumatic fracture of the distal radius/ulna from April 1997 to March 1998 and from January 1999 to February 1999. Information on osteoporosis follow-up and drug therapy was obtained from the patient.

Results: The time between fracture and telephone interview ranged from 6 months to 3 years, with the majority of the sample being interviewed at least 1 year after fracture. Of the 112 patients in this study, 44 had sustained previous fractures, 17 of which had occurred at the wrist, vertebrae, or hip. Sixteen patients in the sample had already sustained a subsequent clinical fracture before our telephone contact. Thirty-two patients had received treatment for osteoporosis before fracture. A further 24 patients (21%) had undergone osteoporosis follow-up after fracture. After fracture, 42 (38%) of all patients were receiving either hormone replacement therapy or using a bisphosphonate.

Conclusions: Only 50% of the study population had received osteoporosis follow-up after fracture. Few patients had any change in their medication use after fracture. The findings in this study population suggest that recognition of the potential for osteoporosis in such patients is inadequate. Given the magnitude of this public health care problem, it is clear that attention to case finding and treatment of osteoporosis should be increased.

Arch Intern Med. 2001;161:1309-1312

---

The major consequences of osteoporosis are fractures, especially of the wrists, vertebrae, and hips. These fragility fractures confer a significant morbidity, mortality, and cost to the Canadian public. Strategies to prevent such fractures are important both to the individual and from a public health care perspective.

Adults who sustain wrist fractures as a result of minor trauma are an ideal target group for early case finding of osteoporosis. This group has a high probability for having osteoporosis and are at an increased risk for sustaining hip fractures. Also, wrist fractures generally precede hip fractures by about 15 years. By identifying patients with wrist fractures who have low bone mass, there is a window of opportunity to prevent subsequent and potentially more serious fractures.

An unrestricted MEDLINE search from 1966 to the present was conducted using the key words: wrist fractures, osteoporosis, and follow-up studies. No published studies were found that determined the rate of follow-up or treatment of osteoporosis for patients who sustain a wrist fracture. The primary objective of the study was to determine the percentage of patients who receive any formal osteoporosis follow-up after sustaining a low-trauma wrist fracture. The second objective was to compare the percentage of patients who receive protective drug therapy before and after fracture.

RESULTS

One hundred fifty-six patients were eligible after the exclusion criteria were applied. Of the 25 patients excluded, 17 had fallen from a height of 1.2 cm or more or from a ladder, and 8 had been in a motorized vehicle crash or struck by an object. Follow-up was complete for 112 (72%) of the 156 patients. Of the 44 patients whose survey information was not collected, 4...
SUBJECTS AND METHODS

SUBJECTS

This study was conducted at a single tertiary care center in Edmonton, Alberta, and had received approval from the Faculty of Medicine Ethics Review Board. Two groups of patients were studied. The first group consisted of 34 patients with wrist fractures who had been seen at the orthopedic platter clinic. This group of patients was used to pilot the development of a survey instrument on osteoporosis follow-up.

The second group consisted of 181 patients treated in the emergency department for wrist injuries from April 1997 to March 1998 and from January 1999 to February 1999 (14 months). Patients had to be older than 40 years and had to have sustained a closed fracture of the distal radius/ulna (International Classification of Diseases, Ninth Revision, Clinical Modification codes 813.4 and 813.5) to be included in the study. Patients were identified via a medical records review of discharge diagnoses.

Patients were excluded if there was a history of significant trauma as determined through diagnostic codes or through telephone interview. Significant trauma was defined as a fall from 1.2 cm or more, a fall from a ladder, being in a motorized vehicle crash, or being struck by an object. Compound fractures were excluded.

METHODS

After consent for the interview was obtained from each subject, we collected information on demographics, follow-up, and drug therapy using a structured telephone interview format and a single interviewer. Follow-up was defined as a discussion with a physician on osteoporosis or as a referral for bone mineral density testing. Protective drug therapy was defined as in- or being referred for bone mineral density testing. Protective drug therapy was defined as in-

follow-up after fracture (Table 1). Forty-four patients had a history of fracture, and 17 (almost 40%) of those fractures had occurred at a typical osteoporotic site (wrist, vertebra, or hip). Sixteen patients (14% of the sample) had sustained another fracture before our telephone contact. Seven (44%) of those fractures had occurred at a typical osteoporotic site (Table 1).

Twenty-nine percent (n=39) of the sample underwent treatment for osteoporosis before fracture. Fifty percent (n=56) of the sample received osteoporosis follow-up after fracture (Table 2). Fifty percent (n=56) of the patients also were taking calcium or vitamin D supplements before fracture. After fracture, 69 patients were taking one of these medications. Thirty percent (n=34) of the patients were receiving either hormone replacement therapy or using a bisphosphonate. After fracture, 38% (n=42) of the patients were taking one of these medications (Table 2).

COMMENT

This study allows several observations. The first is that the majority of fractures in this study occurred in women. This observation confirms the results of large epidemiological studies and supports the idea that wrist fractures are associated with osteoporosis. The vulnerability of women to wrist fractures is likely due to a declining bone mass during the postmenopausal years. It must be emphasized not only that fractures relate to a propensity for falls, but also that aspects of bone structure not reflected in bone mineral density are of importance as well. Thus, 1 fracture significantly increases the risk from 6 months to 3 years, with the majority of the sample being interviewed at least 1 year after fracture.

The mean age of the subjects was 64 years (age range, 42-91 years). Eighty-three percent of the patients were female. Ninety-two percent of women had a SCORE index of 6 or more, with a mean value of 14 (Table 1). Forty-four patients had a history of fracture, and 17 (almost 40%) of those fractures had occurred at a typical osteoporotic site (wrist, vertebra, or hip). Sixteen patients (14% of the sample) had sustained another fracture before our telephone contact. Seven (44%) of those fractures had occurred at a typical osteoporotic site (Table 1).

Twenty-nine percent (n=39) of the sample underwent treatment for osteoporosis before fracture. Fifty percent (n=56) of the sample received osteoporosis follow-up after fracture (Table 2). Fifty percent (n=56) of the patients also were taking calcium or vitamin D supplements before fracture. After fracture, 69 patients were taking one of these medications. Thirty percent (n=34) of the patients were receiving hormone replacement therapy or using a bisphosphonate. After fracture, 38% (n=42) of the patients were taking one of these medications (Table 2).

<table>
<thead>
<tr>
<th>Characteristic Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean ± SD, y 64 ± 13</td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>White 103 (92.0)</td>
</tr>
<tr>
<td>Asian 4 (3.6)</td>
</tr>
<tr>
<td>Other 5 (4.4)</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Female 93 (83.0)</td>
</tr>
<tr>
<td>Male 19 (17.0)</td>
</tr>
<tr>
<td>Fracture treatment Medical 91 (81.3)</td>
</tr>
<tr>
<td>Surgical 21 (18.8)</td>
</tr>
<tr>
<td>SCORE, mean ± SD 14 ± 6.2</td>
</tr>
<tr>
<td>History of fracture before wrist 44 (39.3)</td>
</tr>
<tr>
<td>Fracture at typical osteoporotic site‡ 17/44 (38.6)</td>
</tr>
<tr>
<td>History of fracture after wrist 16 (14.3)</td>
</tr>
<tr>
<td>Fracture at typical osteoporotic site 7/16 (43.8)</td>
</tr>
</tbody>
</table>

*All values are given as number (percentage) unless indicated otherwise.
†See “Methods” subsection of “Subjects and Methods” section for expansion of SCORE.
‡Typical osteoporotic site is defined as wrist, vertebrae, or hip.

from 6 months to 3 years, with the majority of the sample being interviewed at least 1 year after fracture.

The mean age of the subjects was 64 years (age range, 42-91 years). Eighty-three percent of the patients were female. Ninety-two percent of women had a SCORE index of 6 or more, with a mean value of 14 (Table 1). Forty-four patients had a history of fracture, and 17 (almost 40%) of those fractures had occurred at a typical osteoporotic site (wrist, vertebra, or hip). Sixteen patients (14% of the sample) had sustained another fracture before our telephone contact. Seven (44%) of those fractures had occurred at a typical osteoporotic site (Table 1).

Twenty-nine percent (n=39) of the sample underwent treatment for osteoporosis before fracture. Fifty percent (n=56) of the sample received osteoporosis follow-up after fracture (Table 2). Fifty percent (n=56) of the patients also were taking calcium or vitamin D supplements before fracture. After fracture, 69 patients were taking one of these medications. Thirty percent (n=34) of the patients were receiving hormone replacement therapy or using a bisphosphonate. After fracture, 38% (n=42) of the patients were taking one of these medications (Table 2).
for subsequent fractures, even in patients with similar bone densities.

In men, bone mass does not decline at the same rate, and there is no comparable rise in fracture incidence in men during what would be the postmenopausal years in women. Nevertheless, men with wrist fractures as a result of minor trauma may still be an appropriate target group for case finding of osteoporosis. Fractures due to minor trauma may indicate a secondary cause of osteoporosis. Also, wrist fractures in men are a powerful predictor of subsequent hip fracture risk. A study conducted by Owen et al15 demonstrated a relative risk for hip fracture of 6.4, and one performed by Mallmin et al14 revealed a hazard ratio of 2.27 for hip fracture in men with a history of Colles fracture. These studies indicate that men with Colles fractures are susceptible to further fractures. For these reasons, men were not excluded.

The second finding is that almost 40% of the sample had sustained a fracture before the one in their wrist, and 39% of those fractures had occurred at a typical osteoporotic site. Surprisingly, 14% of the sample at follow-up had already sustained an additional fracture after the one in their wrist by the time of our contact call. The large number of fractures in the study group underscores the importance of case finding, as appropriate treatment can clearly reduce the incidence of fractures.16-20,31

The rationale for case finding in patients with fracture is further supported by the findings of a large cohort study of more than 800 women that was conducted by Sanders et al22 in 1998. The authors reported that patients with fracture were 3 times more likely to have osteoporosis than were population-based controls, irrespective of the degree of trauma.28,29,32 Studies that have focused on Colles fractures also report a high prevalence of osteoporosis.4,9 In a prospective study of 106 women with Colles fracture, 50% of the patients had osteoporosis and only 9% had normal bone mineral density.3 These results highlight the importance of fracture as a clinical indicator for the possibility of osteoporosis.

More than 90% of the women in our study had a SCORE index of 6 or more. The mean value was 14, with an SD of 6. In the study by Lydick et al,27 nearly all women with an index of 14 were in the osteoporotic range (specificity, 93% for T score; 2.5 SD). The fact that the SCORE index was so high in this study further validates the idea that this index both emphasizes risk factors and provides a quantitative measure of a need for osteoporosis screening that family physicians could use.

A liberal definition was used to define follow-up that included a physician discussion on osteoporosis. This flexible definition allows a clinical diagnosis of osteoporosis and limits bias against those patients who cannot access densitometry testing or those who implement a preventive approach to osteoporosis, irrespective of bone density testing.

Despite such a liberal definition, only 50% of the study population received osteoporosis follow-up after fracture. If therapy is examined, few patients had any change in their medication use, as evidenced by a small increase in the rate of calcium or vitamin D supplement use and an even smaller increase in the rate of bisphosphonate or hormone replacement therapy after fracture. The findings in the study population suggest that recognition of the potential for osteoporosis and further complications in such patients is inadequate.

These findings are comparable to those of other studies that have examined the utilization rates of proven therapies. For example, a recent study on the use of β-blockers in the post–myocardial infarction period reported that only 50% of infarct survivors actually receive this therapy.13 The authors concluded that β-blockers are significantly underused despite abundant scientific literature supporting their use.23 Whether osteoporosis or other diseases are examined, it is clear that more than scientific evidence is required to instruct a change in practice.

Interventions to improve osteoporosis follow-up of patients with wrist fracture can include identifying these individuals in the emergency department, providing them with literature on osteoporosis, and faxing an information sheet to their family physician. Referral of these patients to a dedicated clinic for prevention of osteoporosis is another option. Current studies to assess some of these approaches are under way.

The most significant result of the present study is that 50% of the sample population did not receive any osteoporosis follow-up after minor trauma or fragility fracture. In Canada, the incidence of wrist fractures was 5 per 1000 women older than 50 years.1 Given the magnitude of this public health care problem, quite apart from the costs relating to subsequent hip fracture, more attention should be given to case finding and treatment of osteoporosis.

Accepted for publication December 6, 2000.

We would like to thank Proctor and Gamble Pharmaceuticals Canada for partial funding for this study, as well as David Felson, MD, Samia Khan, MEd, Nadia Khan, MD, and Waleed Khan, MBA, for their review of the manuscript.

Table 2. Osteoporosis Management and Drug Therapy for 112 Study Patients*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoporosis management before fracture</td>
<td>32 (28.6)</td>
</tr>
<tr>
<td>No</td>
<td>80 (71.4)</td>
</tr>
<tr>
<td>Osteoporosis management after fracture</td>
<td>56 (50.0)</td>
</tr>
<tr>
<td>No</td>
<td>56 (50.0)</td>
</tr>
<tr>
<td>Calcium/Vit D use before fracture</td>
<td>56 (50.0)</td>
</tr>
<tr>
<td>No</td>
<td>56 (50.0)</td>
</tr>
<tr>
<td>Calcium/Vit D use after fracture</td>
<td>69 (61.6)</td>
</tr>
<tr>
<td>No</td>
<td>43 (38.4)</td>
</tr>
<tr>
<td>HRT/bisphosphonate use before fracture</td>
<td>34 (30.4)</td>
</tr>
<tr>
<td>No</td>
<td>78 (69.6)</td>
</tr>
<tr>
<td>HRT/bisphosphonate use after fracture</td>
<td>42 (37.5)</td>
</tr>
<tr>
<td>No</td>
<td>70 (62.5)</td>
</tr>
</tbody>
</table>

*Osteoporosis management is defined as physician discussion regarding osteoporosis or referral to bone mineral density testing. Vit D indicates vitamin D; HRT, hormone replacement therapy.
REFERENCES


