PRACTICE

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DECISIONS

A 66-year-old woman with spontaneous rib fracture

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The clinical scenario is fictitious.

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A 66-year-old woman presents to her family physician with an emergency department radiograph report showing a transverse fracture of the posterior right 11th rib. She states that the rib pain started a few days ago and, when rolling over in bed from her back to her side the previous night, she heard a crack and felt a sharp pain in her right rib cage, precipitating the visit to the emergency department. The patient has a history of longstanding osteopenia (for which she is undergoing treatment with alendronate) and asynchronous bilateral breast cancer, which last occurred in the right breast 16 years ago. On physical examination, this patient has point tenderness over the posterior-lateral portion of the lower ribs on the right side.

Is this patient likely to have metastatic breast cancer?

A review of this patient's history for the last diagnosis of breast cancer showed that she had a grade 2 tumour (2.4 cm) with four axillary lymph nodes positive for metastases (stage IIB). Because local or distant recurrences will develop in up to 70% of patients with node-positive breast cancer1 and bone is the most common site for metastases,² it is reasonable to suspect that the rib pain may be due to metastatic disease. A population-based retrospective cohort study of fracture

risk involving 608 women with a history of breast cancer showed that about 30% of the reported rib fractures were due to metastatic lesions.3

What other possible causes for the rib fracture should be ruled in or out?

In addition to a history of breast cancer, this patient also has long-standing osteopenia (diagnosed at age 46 yr). A long-term (median followup time = 13.9 yr), population-based study involving 699 randomly selected adults reported that almost 40% of the 67 episodes of rib fracture in older adults were "spontaneous" or nontraumatic.⁴ Long-term use of bisphosphonates, e.g., alendronate in this case, has been associated with lowenergy cortical fractures, including rib fractures.⁵

Other factors that likely contributed to the rib fracture in this patient include previous radiotherapy of the right chest wall and axilla following surgery and chemotherapy⁶ and five years of treatment with an aromatase inhibitor after she completed the other treatments (Box 1).⁷ A systematic review of bone health in women who underwent treatment with aromatase inhibitors for early-stage breast cancer showed that these patients were at a 1.5 times greater risk of fracture than patients undergoing treatment with tamoxifen or placebo.⁷

Case reports have suggested that the use of tissue expansion for the placement of breast implants in irradiated tissue may be a risk factor for rib fractures; this patient underwent this procedure following mastectomy.8,9

What additional tests should be ordered?

Because of the point tenderness on examination, her family physician ordered a bone scan and blood tests (complete and differential blood cell counts and assays of cancer antigens 125 and 15-3, and carcinoembryonic antigen) after consultation with this patient's medical oncologist. The investigations are recommended by the National Comprehensive Cancer Network in their 2014 breast cancer clinical practice guidelines.¹⁰

A computed tomography (CT) scan of the chest (without contrast), which is recommended by the European Society for Medical Oncology

Box 1: Risk factors for rib fractures	
Risk factor	Approximate risk
Metastatic breast cancer	30%³
Aromatase inhibitor therapy	1.4%–11.0% (any fracture) ⁷
Radiotherapy of breast or chest wall	3.6%-4.5%6
Prolonged use of bisphosphonates	7.4%5
Women aged 83 years or older	40%4
Early menopause or ovarian ablation secondary to adjuvant chemotherapy	Unknown
Tissue expansion in breast reconstruction using implants	Unknown

clinical practice guidelines for locally recurrent or metastatic breast cancer,¹ was ordered next to detect if any osteolytic lesions suggestive of metastatic disease were present.¹¹

Case revisited

The results of the bone scan showed increased activity within the posterior 11th rib on the right side as well as foci of increased activity within the proximal 5th and 6th ribs on the right side, the latter thought to be associated with previous trauma. The radiologist could not exclude bone metastases at this point. However, all results from the blood tests were within normal limits. Because no osseous abnormalities other than the incident fracture were noted on the CT scan, the radiologist concluded that the rib fracture was due to causes other than metastasis.

Although the initial suspicion was that this patient's spontaneous rib fracture might be due to metastatic breast cancer, results of the bone and CT scans combined with normal tumour markers ruled that out. Her history of osteopenia and long-term alendronate use, as well as the likelihood of radiation damage to the ribs and additional bone loss owing to alendronate use, could have contributed to the pathologic fracture.

Six weeks after the fracture occurred, most of this patient's symptoms had resolved (other than some tenderness at the fracture site when lying on the right side), and the rib fracture had healed. She returned to her usual activities of playing tennis and jogging without further incident. Because the patient had been taking alendronate for 12 years, her family physician recommended that she take a drug holiday for one to two years and then have a repeat dual energy x-ray absorptiometry scan.

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Physician resources can be found in Appendix 1 available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.141435/-/DC1

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Decisions is a series that focuses on practical evidence-based approaches to common presentations in primary care. The articles address key decisions that a clinician may encounter during initial assessment. The information presented can usually be covered in a typical primary care appointment. Articles should be no longer than 650 words, may include one box, figure or table and should begin with a very brief description (75 words or less) of the clinical situation. The decisions addressed should be presented in the form of questions. A box providing helpful resources for the patient or physician is encouraged.