

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## **Case Study: Skeletal System**

**Chief Complaint:** 72-year-old woman who fell on her right hip.

**History:** Margaret Donovan, a 72-year-old white female, was brought to the emergency room by her son-in-law after falling in her bathtub. She was previously in good health, despite leading a relatively sedentary lifestyle and having a 30-year history of cigarette smoking. The only medication she currently takes is Inderal (propranolol) for mild hypertension (high blood pressure). She fell upon entering the bathtub when her right leg slipped out from under her; she landed on her right hip. There was no trauma to her head, nor does she complain of right or left wrist pain. However, she reports severe pain in the right hip and upper thigh, and was unable to get up after her fall. An injection of oxymorphone hydrochloride (Numorphan) helped relieve her pain and she was taken to the radiology department for an X-ray of her right leg and hip.

**Physical examination:** The patient was alert, oriented to time, place and date, and was responding appropriately to questions despite being in considerable pain. There were no signs of trauma to the head, neck, torso, arms or left leg. The right thigh and hip were extremely tender and were immobilized by a leg splint. Heart and lung sounds were normal and abdominal sounds were reduced.

**Radiology report:** The X-ray of the right hip revealed a complete, comminuted, intertrochanteric (*top part of the femur*) fracture of the right hip. No other fractures were noted in the right leg. There were also long-term osteoporotic changes in the femur, tibia and fibula.

### Questions

1. What is meant by a “complete, comminuted, intertrochanteric fracture of the right hip?”
2. Draw a picture of what you think Margaret’s fractured femur looks like.
3. The radiologist reports signs of osteoporosis. How is osteoporotic bone different from regular bone?
4. Why do bones become osteoporotic in some people? (What, specifically, is happening in the bones themselves?)

Surgeons performed an open reduction of Margaret’s fracture, immobilizing the bones with internal pins. “Open reduction surgery” is a procedure in which the broken bones are re-aligned and long, thick pins are inserted lengthwise into the bone tissue. The pins are held in place by screws drilled in from the outside of the bone.

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5. Describe the changes that a broken bone undergoes as it is healing.

During her long recovery, Margaret is advised by her physician to begin weight-bearing as soon as she can. To aid her in this regard, Margaret begins light physical therapy three times per week.

6. How does weight-bearing influence the bone healing process? (Be detailed!)
7. In addition to the physical therapy benefits, why else might Margaret's physician want her to avoid prolonged bed-ridden activity? (Think of Wolfe's Law)
8. What risk factors does Margaret have for osteoporosis?
9. What bones are most vulnerable to osteoporosis and why?

Following her recovery, Margaret was placed on three medications: oral calcium supplements, oral estrogen and oral alendronate sodium (Fosamax). (*Fosamax is a drug which inhibits the activity of osteoclasts.*)

10. Specifically describe how each of these medications works to treat Margaret's condition.

### Mini Case-Studies

1. A 12 year-old boy fell while playing basketball. The physician explained that the head (epiphysis) of the femur was separated from the shaft (diaphysis). Although the bone was properly set, by the time the boy was 16 it was apparent that the injured lower limb was shorter than the normal one. Explain why this difference occurred.
2. One day while shopping, Ms. Wantta Bargain picked up her 3-year-old son, Somm, by his right wrist and lifted him into a shopping cart. She heard a clicking sound and Somm immediately began to cry and hold his elbow. Given that lifting the child caused a separation at the elbow and not a fracture, which is more likely: separation of the radius and humerus or separation of the ulna and humerus? Why?