# BONE FRACTURES

**31.** Using the key choices, identify the fracture (fx) types shown in Figure 5–14 and the fracture types and treatments described below. Enter the appropriate key letter or term in each answer blank.

*Key Choices*

A. Closed reduction
B. Compression fracture
C. Compound fracture
D. Depressed fracture
E. Greenstick fracture
F. Open reduction
G. Simple fracture
H. Spiral fracture

_____ 1. Bone is broken cleanly; the ends do not penetrate the skin

_____ 2. Nonsurgical realignment of broken bone ends and splinting of bone

_____ 3. A break common in children; bone splinters, but break is incomplete

_____ 4. A fracture in which the bone is crushed; common in the vertebral column

_____ 5. A fracture in which the bone ends penetrate through the skin surface

_____ 6. Surgical realignment of broken bone ends

_____ 7. A result of twisting forces

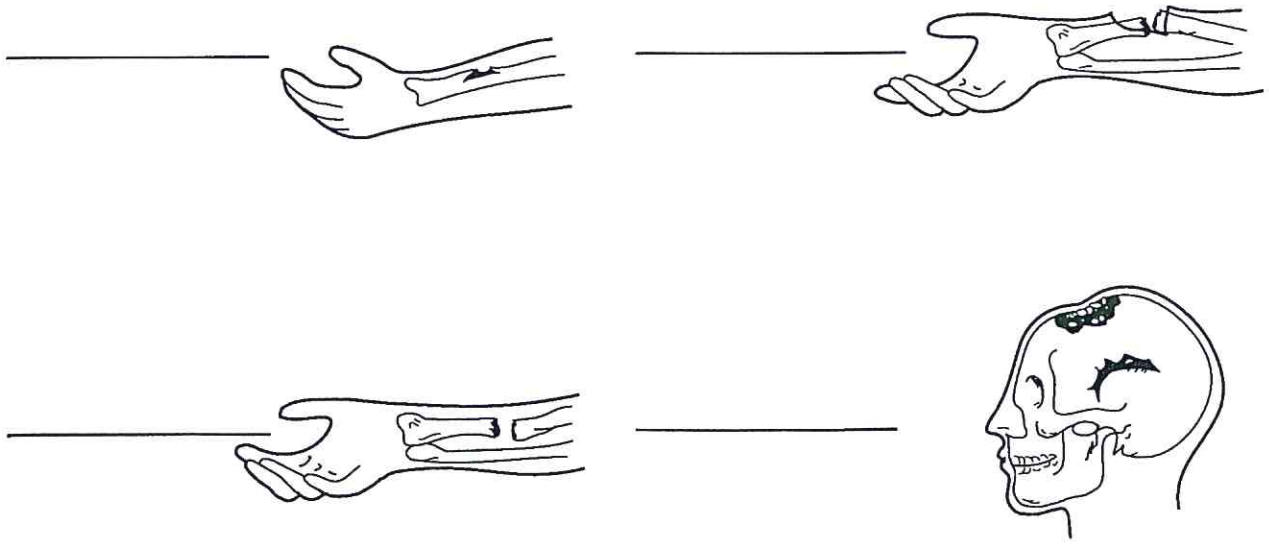

**Figure 5–14**

**32.** For each of the following statements that is true about bone breakage and the repair process, insert *T* in the answer blank. For false statements, correct the underlined terms by inserting the correct term in the answer blank.

_____ 1. A hematoma usually forms at a fracture site.

_____ 2. Deprived of nutrition, osteocytes at the fracture site die.

_____ 3. Nonbony debris at the fracture site is removed by osteoclasts.

_____ 4. Growth of a new capillary supply into the region produces granulation tissue.

_____ 5. Osteoblasts from the medullary cavity migrate to the fracture site.

_____ 6. The fibrocartilage callus is the first repair mass to splint the broken bone.

_____ 7. The bony callus is initially composed of compact bone.

## JOINTS

**33.** Figure 5–15 shows the structure of a typical diarthrotic joint. Select different colors to identify each of the following areas and use them to color the coding circles and the corresponding structures on the figure. Then, complete the statements below the figure.

◯ Articular cartilage of bone ends

◯ Fibrous capsule

◯ Synovial membrane

◯ Joint cavity

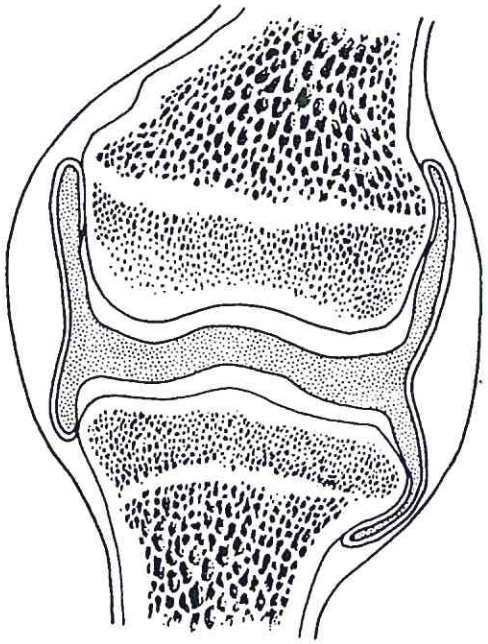

**Figure 5–15**

1. _____ The lubricant that minimizes friction and abrasion of joint surfaces is __(1)__.

2. _____ The resilient substance that keeps bone ends from crushing when compressed is __(2)__.

3. _____ __(3)__, which reinforce the fibrous capsule, help to prevent dislocation of the joint.

**34.** For each joint described below, select an answer from Key A. Then, if the Key A selection *is other than C* (a synovial joint), see if you can classify the joint further by making a choice from Key B.

*Key Choices*

| Key A: | A. Cartilaginous | Key B: | 1. Epiphyseal disk |
|---|---|---|---|
| | B. Fibrous | | 2. Suture |
| | C. Synovial | | 3. Symphysis |

_____ 1. Has amphiarthrotic and synarthrotic examples

_____ 2. All have a fibrous capsule lined with synovial membrane surrounding a joint cavity

_____ 3. Bone regions united by fibrous connective tissue

_____ 4. Joints between skull bones

_____ 5. Joint between the atlas and axis

_____ 6. Hip, elbow, and knee

_____ 7. All examples are diarthroses

_____ 8. Pubic symphysis

_____ 9. All are reinforced by ligaments

_____ 10. Joint providing the most protection to underlying structures

_____ 11. Often contains a fluid-filled cushion

_____ 12. Child's long-bone growth plate made of hyaline cartilage

_____ 13. Most joints of the limbs

_____ 14. Often associated with bursae

_____ 15. Have the greatest mobility

**35.** Which structural joint type is *not* commonly found in the axial skeleton and why not?

_____

_____

_____

## Homeostatic Imbalances of Bones and Joints

**36.** For each of the following statements that is true, enter *T* in the answer blank. For each false statement, correct the underlined words by writing the correct words in the answer blank.

_____ 1. In a sprain, the ligaments reinforcing a joint are excessively stretched or torn.

_____ 2. Age-related erosion of articular cartilages and formation of painful bony spurs are characteristic of gouty arthritis.

_____ 3. Chronic arthritis usually results from bacterial invasion.

_____ 4. Healing of a partially torn ligament is slow because its hundreds of fibrous strands are poorly aligned.

_____ 5. Rheumatoid arthritis is an autoimmune disease.

_____ 6. High levels of uric acid in the blood may lead to rheumatoid arthritis.

_____ 7. A "soft" bone condition in children, usually caused by a lack of calcium or vitamin D in the diet, is called osteomyelitis.

_____ 8. Atrophy and thinning of bone owing to hormonal changes or inactivity (generally in the elderly) is called osteoporosis.

# DEVELOPMENTAL ASPECTS OF THE SKELETON

**37.** Using the key choices, identify the body systems that relate to bone tissue viability. Enter the appropriate key terms or letters in the answer blanks.

*Key Choices*

A. Endocrine
B. Integumentary
C. Muscular
D. Nervous
E. Reproductive
F. Urinary

_____ 1. Conveys the sense of pain in bone and joints

_____ 2. Activates vitamin D for proper calcium usage

_____ 3. Regulates uptake and release of calcium by bones

_____ 4. Increases bone strength and viability by pulling action

_____ 5. Influences skeleton proportions and adolescent growth of long bones

_____ 6. Provides vitamin D for proper calcium absorption

**38.** Complete the following statements concerning fetal and infant skeletal development. Insert the missing words in the answer blanks.

_____ 1.
_____ 2.
_____ 3.
_____ 4.
_____ 5.
_____ 6.
_____ 7.
_____ 8.
_____ 9.

"Soft spots," or membranous joints called __(1)__ in the fetal skull, allow the skull to be __(2)__ slightly during birth passage. They also allow for continued brain __(3)__ during the later months of fetal development and early infancy. Eventually these soft spots are replaced by immovable joints called __(4)__.

The two spinal curvatures well developed at birth are the __(5)__ and __(6)__ curvatures. Because they are present at birth, they are called __(7)__ curvatures. The secondary curvatures develop as the baby matures. The __(8)__ curvature develops as the baby begins to lift his or her head. The __(9)__ curvature matures when the baby begins to walk or assume the upright posture.

# INCREDIBLE JOURNEY

## *A Visualization Exercise for the Skeletal System*

***. . . stalagmite- and stalactite-like structures that surround you . . .***
***Since the texture is so full of holes . . .***

**39.** Where necessary, complete statements by inserting the missing words in the answer blanks.

_____ 1.
_____ 2.
_____ 3.
_____ 4.
_____ 5.
_____ 6.

For this journey you are miniaturized and injected into the interior of the largest bone of your host's body, the __(1)__. Once inside this bone, you look around and find yourself examining the stalagmite- and stalactite-like structures that surround you. Although you feel as if you are in an underground cavern, you know that it has to be bone. Since the texture is so full of holes, it obviously is __(2)__ bone. Although the arrangement of these bony spars seems to be haphazard, as if someone randomly dropped straws, they are precisely arranged to resist points of __(3)__. All about you is frantic, hurried activity. Cells are dividing rapidly, nuclei are being ejected, and disklike cells are appearing. You decide that these disklike cells are __(4)__ and that this is the __(5)__ cavity. As you explore further, strolling along the edge of the cavity, you spot many tunnels leading into the solid bony area on which you are walking. Walking into one of these drainpipe-like openings, you notice that it contains a glistening white ropelike structure (a __(6)__, no doubt) and blood vessels running the length of the tube. You eventually come to a point in the channel where the

_____ 7.
_____ 8.
_____ 9.
_____ 10.
_____ 11.
_____ 12.

horizontal passageway joins with a vertical passage that runs with the longitudinal axis of the bone. This is obviously a __(7)__ canal. Because you would like to see how nutrients are brought into __(8)__ bone, you decide to follow this channel. Reasoning that there is no way you can possibly scale the slick walls of the channel, you leap and grab onto a white cord hanging down its length. Because it is easier to slide down than to try to climb up the cord, you begin to lower yourself, hand over hand. During your descent, you notice small openings in the wall, which are barely large enough for you to wriggle through. You conclude that these are the __(9)__ that connect all the __(10)__ to the nutrient supply in the central canal. You decide to investigate one of these tiny openings and begin to swing on your cord, trying to get a foothold on one of the openings. After managing to anchor yourself and squeezing into an opening, you use a flashlight to illuminate the passageway in front of you. You are startled by a giant cell with many dark nuclei. It appears to be plastered around the entire lumen directly ahead of you. As you watch this cell, the bony material beneath it, the __(11)__, begins to liquefy. The cell apparently is a bone-digesting cell, or __(12)__, and because you are unsure whether or not its enzymes can also liquefy you, you slither backwards hurriedly and begin your trek back to your retrieval site.

## AT THE CLINIC

**40.** Antonio is hit in the face with a football during practice. An X ray reveals multiple fractures of the bones around an orbit. Name the bones that form margins of the orbit.

**41.** Mrs. Bruso, a woman in her 80s, is brought to the clinic with a fractured hip. X rays reveal compression fractures in her lower vertebral column and extremely low bone density in her vertebrae, hip bones, and femurs. What are the condition, cause, and treatment?

**42.** Jack, a young man, is treated at the clinic for an accident in which he hit his forehead. When he returns for a checkup, he complains that he can't smell anything. A hurried X ray of his head reveals a fracture. What part of which bone was fractured to cause his loss of smell?

**43.** A middle-aged woman comes to the clinic complaining of stiff, painful joints and increasing immobility of her finger joints. A glance at her hands reveals knobby, deformed knuckles. For what condition will she be tested?

**44.** At his 94th birthday party, James was complimented on how good he looked and was asked about his health. He replied, "I feel good most of the time, but some of my joints ache and are stiff, especially my knees, hips, and lower back, and especially in the morning when I wake up." A series of X rays and an MRI scan taken a few weeks earlier had revealed that the articular cartilages of these joints were rough and flaking off, and bone spurs (overgrowths) were present at the ends of some of James's bones. What is James's probable condition?

**45.** Janet, a 10-year-old girl, is brought to the clinic after falling out of a tree. An X ray shows she has small fractures of the transverse processes of $T_3$ to $T_5$ on the right side. Janet will be watched for what abnormal spinal curvature over the next several years?

**46.** The serving arm of many tennis players is often significantly larger (thicker) than the other arm. Explain this phenomenon.

**47.** Jerry is giving cardiopulmonary resuscitation to Ms. Jackson, an elderly woman who has just been rescued from the waters of Cape Cod Bay. What bone is he compressing?

**48.** Rita's bone density scan revealed she has osteoporosis. Her physician prescribed a drug that inhibits osteoclast activity. Explain this treatment.

## THE FINALE: MULTIPLE CHOICE

**49.** Select the best answer or answers from the choices given.

1. Important bone functions include:
   A. support of the pelvic organs
   B. protection of the brain
   C. providing levers for movement of the limbs
   D. protection of the skin and limb musculature
   E. storage of water

2. A passageway connecting neighboring osteocytes in an osteon is a:
   A. central canal
   B. lamella
   C. lacuna
   D. canaliculus
   E. perforating canal

3. What is the earliest event (of those listed) in endochondral ossification?
   A. Ossification of proximal epiphysis
   B. Appearance of the epiphyseal plate
   C. Invasion of the shaft by the periosteal bud
   D. Cavitation of the cartilage shaft
   E. Formation of secondary ossification centers

4. The growth spurt of puberty is triggered by:
   A. high levels of sex hormones
   B. the initial, low levels of sex hormones
   C. growth hormone
   D. parathyroid hormone
   E. calcitonin

5. Deficiency of which of the following hormones will cause dwarfism?
   A. Growth hormone
   B. Sex hormones
   C. Thyroid hormones
   D. Calcitonin
   E. Parathyroid hormone

6. Women suffering from osteoporosis are frequent victims of _____ fractures of the vertebrae.
   A. compound
   B. spiral
   C. comminuted
   D. compression
   E. depression

7. Which of the following bones are part of the axial skeleton?
   A. Vomer
   B. Clavicle
   C. Sternum
   D. Parietal
   E. Coxal bone

8. A blow to the cheek is most likely to break what superficial bone or bone part?
   A. Superciliary arches
   B. Zygomatic process
   C. Mandibular ramus
   D. Styloid process

9. Which of the following are part of the sphenoid?
   A. Crista galli
   B. Sella turcica
   C. Petrous portion
   D. Pterygoid process
   E. Lesser wings

10. Structural characteristics of *all* cervical vertebrae are:
    A. small body
    B. bifid spinous process
    C. transverse foramina
    D. small vertebral foramen
    E. costal facets

11. Which of the following bones exhibit a styloid process?
    A. Hyoid
    B. Temporal
    C. Humerus
    D. Radius
    E. Ulna

12. Hip bone markings include:
    A. ala
    B. sacral hiatus
    C. gluteal surface
    D. pubic ramus
    E. fovea capitis

13. Cartilaginous joints include:
    A. syndesmoses
    B. symphyses
    C. synostoses
    D. synchondroses

14. Considered to be part of a synovial joint are:
    A. bursae
    B. articular cartilage
    C. tendon sheath
    D. capsular ligaments

15. Abduction is:
    A. moving the right arm out to the right
    B. spreading out the fingers
    C. wiggling the toes
    D. moving the sole of the foot laterally

16. In comparing two joints of the same type, what characteristic(s) would you use to determine strength and flexibility?
    A. Depth of the depression of the concave bone of the joint
    B. Snugness of fit of the bones
    C. Size of bone projections for muscle attachments
    D. Presence of menisci

17. Which of the following joints has the greatest freedom of movement?
    A. Interphalangeal
    B. Saddle joint of thumb
    C. Distal tibiofibular
    D. Coxal

18. Which specific joint does the following description identify? "Articular surfaces are deep and secure, multiaxial; capsule heavily reinforced by ligaments; labrum helps prevent dislocation; the first joint to be built artificially; very stable."
    A. Elbow
    B. Hip
    C. Knee
    D. Shoulder

19. An autoimmune disease resulting in inflammation and eventual fusion of diarthrotic joints is:
    A. gout
    B. rheumatoid arthritis
    C. degenerative joint disease
    D. pannus

20. Plane joints allow:
    A. pronation
    B. flexion
    C. rotation
    D. gliding

21. Movements made in chewing food are:
    A. Flexion
    B. Extension
    C. Elevation
    D. Depression
    E. Opposition