Radiologic History Exhibit

Musculoskeletal Eponyms: Who Are Those Guys?[1]

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Introduction

Accuracy and conciseness are essential elements in medical communication. Accuracy is achieved through careful and painstaking use of medical nomenclature, which at times can be cumbersome. This difficulty has been overcome to some extent by the use of labels, tags, acronyms, and eponyms, which, when precisely defined and accurately used, convey a great deal of information very concisely. Eponyms are labels that provide two kinds of information: the pattern of a complex injury or pathologic problem and the name of an individual who has been closely identified with that problem, reminding us that the medicine of today is not entirely the work of our contemporaries. "The word eponym is derived from the Greek word *eponymos*, which means named after. An eponym may be defined as the name(s) of one or more individuals who presumably have devised or described an anatomic structure, a classification system, a disease, an injury, a principle, a physical sign, or an operative technique" (Salter RB, written communication, 1999). Mark Ravitch, in discussing Guillaume Dupuytren's invention of the Mikulicz enterotome, had this to say about eponyms: "Given an eponym one may be sure (1) that the man so honored was not the first to describe the disease, the operation, or the instrument, or (2) that he misunderstood the situation, or (3) that he is generally misquoted, or (4) that (1), (2), and (3) are all simultaneously true.... My own feeling is that whatever their fallibility, eponyms illustrate the lineage of surgery and bring to it the color of old times, distinguished figures, ancient sieges and pestilences, and continually remind us of the international nature of science..." (1).

Index terms: Extremities, injuries • Fractures • Radiology and radiologists, history

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All labels, whether they are tags, acronyms, or eponyms, depend for their value on an accurate understanding of their meaning. Without this understanding, their use can be confusing, even dangerous. When there is an accurate understanding of their meaning, eponyms are valuable shorthand since they convey a good deal of specific information in an abbreviated way. Unfortunately, eponyms are often not used consistently or accurately by all, and, in some instances, there are reasonable differences of opinion concerning the proper descriptive terminology applied to a particular type of injury. This is particularly true in the case of classifications of ankle fractures.

The classification of ankle fractures has a long and varied history, going back to Paris, France, at the beginning of the 19th century. With an unlimited supply of fresh cadaver material, Dupuytren and his students applied controlled mechanical forces to the ankle and dissected and visualized the bone and soft-tissue injuries they had produced. The results of their experiments were surprisingly consistent, and they identified categories of fractures to which their names were applied (2–5). Over the years, various ankle fracture classification systems have been developed, including the Bosworth, Cotton, Dupuytren, Lauge-Hansen, Le Fort, Pott, and Weber systems. Today, there are two commonly used classifications, the Lauge-Hansen (6–10) and the Weber (11–13) systems. The Lauge-Hansen classification, which uses the mechanism of injury to classify ankle fractures, is confusing. It uses terminology such as supination and pronation that, when applied to the foot, is poorly understood, even by experienced orthopedic surgeons. The Weber classification is the most practical system for orthopedic surgeons. Because of the multiplicity of eponyms and other designations for ankle fractures, there is great confusion in their usage. For this reason, the terms that are archaic, poorly defined, and poorly understood should not be used, including the Bosworth, Cotton, Dupuytren, Le Fort, and Pott classifications. The Lauge-Hansen classification should be used only if one is very familiar with its principles.

In this article, we define and illustrate many common and several not so common musculoskeletal injury eponyms used in daily practice (see the Appendix for a bibliography). The Table classifies the eponyms by body site, and Figure 1 displays the relative locations for these eponymic injuries. We have depicted the injuries in a manner most consistent with the original description of the injury. In addition, to acknowledge and honor the significant contributions of those individuals whose eponyms we are illustrating, we have included, wherever possible, a short description of the individual's career and reference to

Musculoskeletal Injury Eponyms Classified by Site

Head and neck
Le Fort (facial)
Jefferson (C1 ring)
Thoracic and lumbosacral spine
Holdsworth (thoracolumbar junction)
Chance (thoracolumbar junction)
Pelvis
Duverney (wing of ilium)
Malgaigne (hemipelvis)
Upper extremity
Hill-Sachs (glenohumeral joint)
Bankart (glenohumeral joint)
Essex-Lopresti (elbow)
Monteggia, Bado (elbow, proximal radioulnar joint, proximal ulna)
Galeazzi (wrist, distal radioulnar joint, distal radius)
Barton (distal radius)
Hutchinson (distal radius)
Colles (distal radius)
Pouteau (distal radius)
Smith (Reverse Colles) (distal radius)
Goyrand (distal radius)
Kienböck (carpal lunate)
Bennett (base of thumb metacarpal)
Rolando (base of thumb metacarpal)
Lower extremity
Pellegrini-Stieda (distal femur)
Segond (proximal tibia)
Osgood-Schlatter (tibial apophysis)
Maisonneuve (tibia, fibula)
Gosselin (distal tibia)
Ankle and foot
Bosworth, Cotton, Dupuytren, Lauge-Hansen, Le Fort, Pott, Weber (ankle)
Shepherd (ankle, talus)
Tillaux (distal tibia, ankle)
Chopart (midtarsal joint)
Lisfranc (tarsometatarsal joint)
Freiberg (metatarsal head)
Jones (proximal shaft little toe metatarsal)
Miscellaneous
Salter-Harris classification

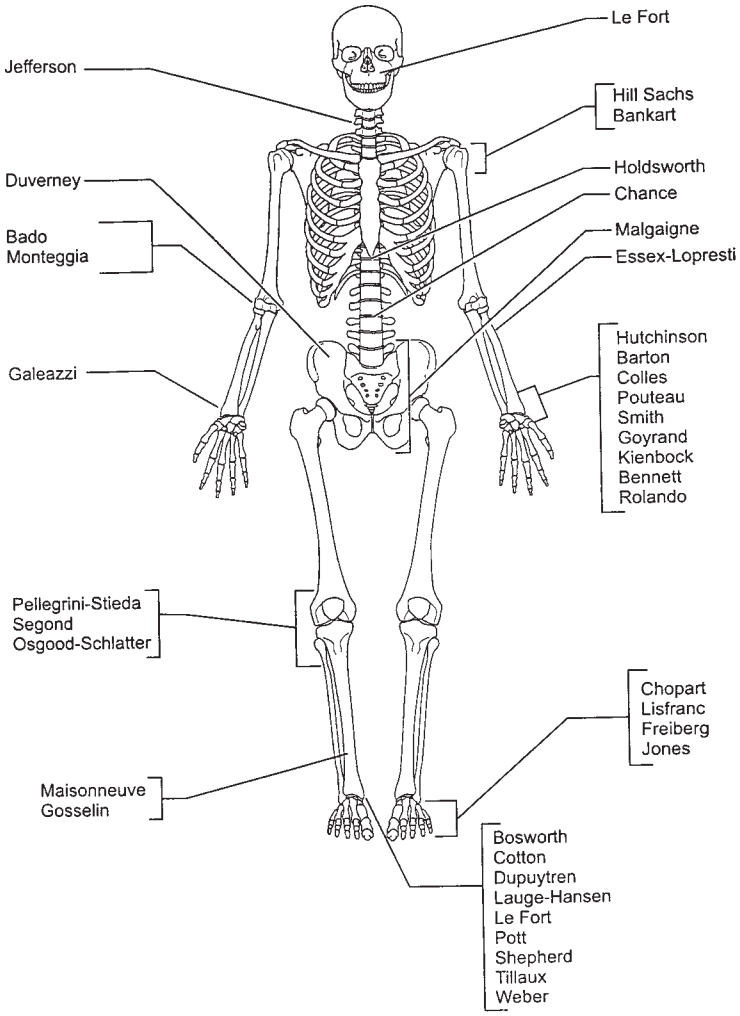


Figure 1. Drawing of a skeleton standing in standard anatomic position illustrates the relative location of eponymic musculoskeletal injuries.

their original description of the injury now bearing their name. We have designated those fracture eponyms that are no longer in current use or that are poorly understood as archaic, and we recommend that they not be used.

We advise radiologists to describe soft-tissue and bone injuries by using standard anatomic and radiographic terminology. Always avoid the use of an eponym or colloquial descriptive term, unless you are certain of its precise definition. Never use a colloquial term, whether it be an abbreviation, tag, acronym, or eponym, as a standalone description for an injury or pathologic process. On the other hand, radiologists should become familiar with the eponyms illustrated herein. They are terms in everyday use by orthopedic surgeons. Accurate knowledge of them will enhance radiologists' interactions with their orthopedic colleagues.

Musculoskeletal Injury Eponyms

Bado Classification.—The Bado classification system is used for the Monteggia type of fracture-dislocation injuries in which there is fracture of the ulnar shaft and dislocation of the radial head (14–16). In a type I Bado fracture, the radial head is displaced anteriorly; in type II, the radial head is displaced posteriorly or posterolaterally; in type III, the anterior or anterolateral dislocation of the radial head is associated with an ulnar metaphyseal fracture; and in type IV, fractures of the proximal one-third of the radius and ulna at the same level are associated with anterior displacement of the radial head (Fig 2).

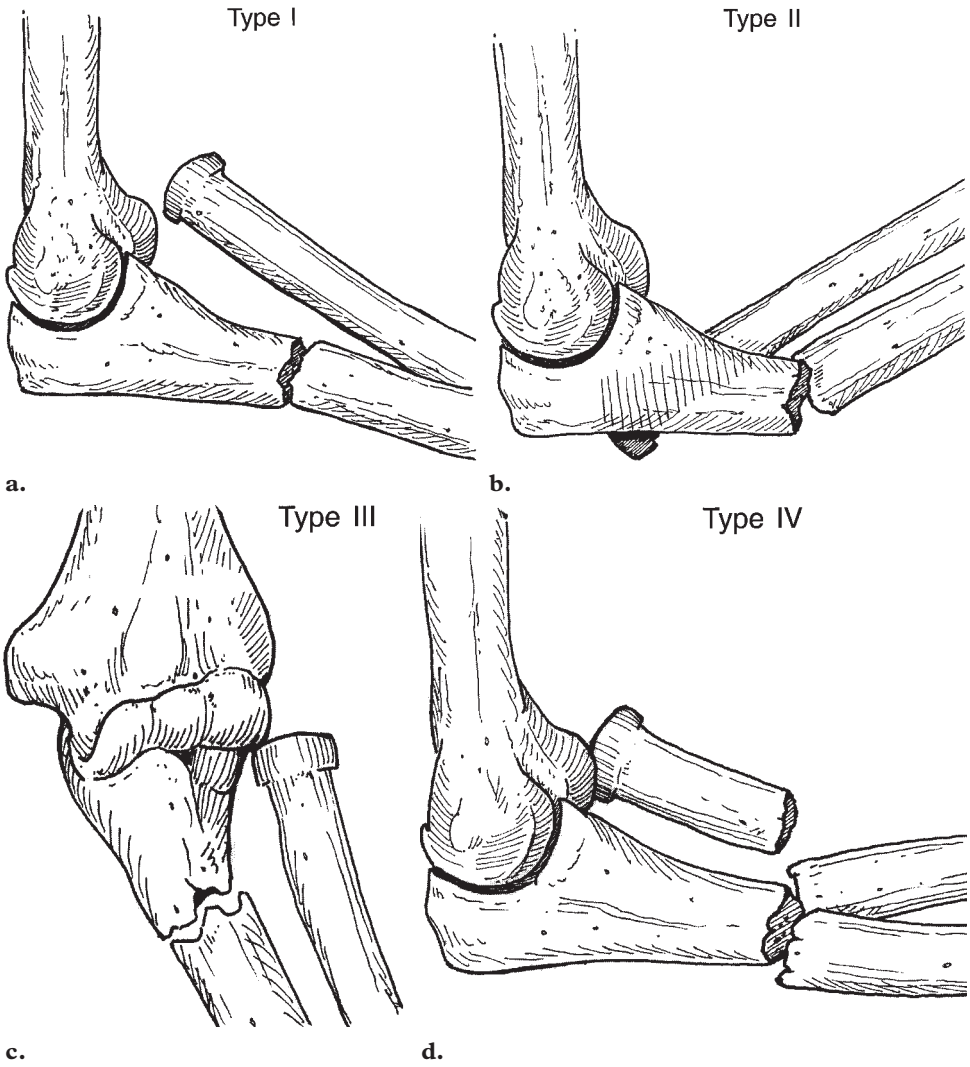


Figure 2. Drawings illustrate Bado's classification of Monteggia fractures: type I **(a)**, type II **(b)**, type III **(c)**, and type IV **(d)**. A type I Bado fracture represents the fracture-dislocation originally described by Monteggia, a fracture of the proximal one-third of the ulna with anterior dislocation of the radial head.

Jose Luis Bado (1903–1977) was a distinguished orthopedic surgeon from Montevideo, Uruguay. His works have been widely published in Latin America, North America, and Europe. He founded and headed for many years the Instituto de Ortopedia y Traumatologia in Montevideo.

Bankart Fracture.—A Bankart fracture refers to an anterior tear of the glenoid labrum that is associated with anterior dislocation of the shoulder (Fig 3) (17,18).

Arthur Sydney Blundell Bankart (1879–1951) was a distinguished British orthopedic surgeon. He was a founding member of the British Orthopaedic Association and served as its secretary and as its president.

Barton Fracture.—In a Barton fracture-dislocation, either the dorsal or ventral (anterior or posterior) aspect of the radiocarpal joint is fractured (19,20). The fracture involves the articular surface of the radius (Fig 4). (See also Colles Fracture and Smith Fracture.)

John Rhea Barton (1794–1871) carried out the first hip arthroplasty in 1826 at the Pennsyl-

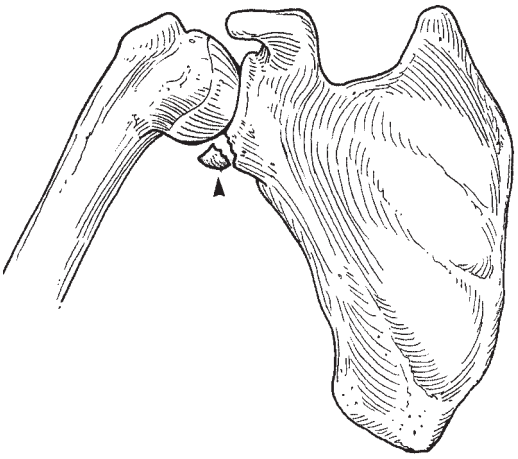


Figure 3. Drawing depicts a Bankart fracture (arrowhead), which consists of an anterior tear of the glenoid labrum in association with anterior dislocation of the shoulder. The labral tear may be chondral or osteochondral.

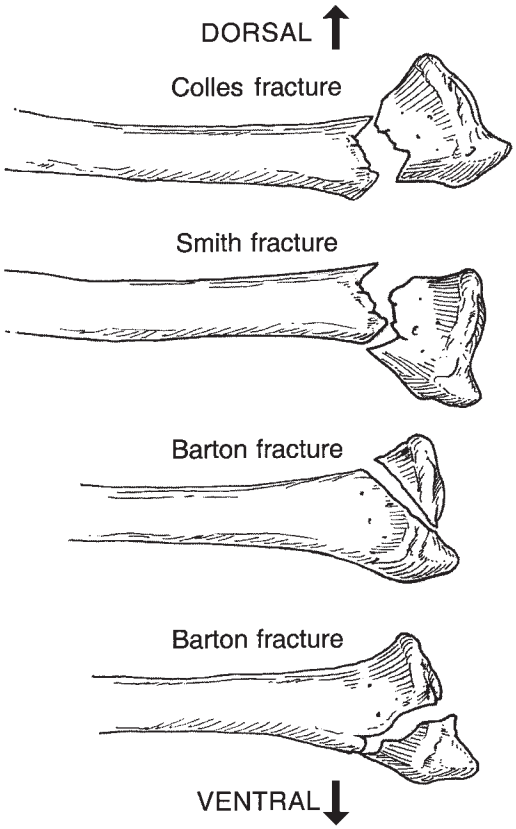


Figure 4. Drawings of lateral views of the radius illustrate Colles, Smith, and Barton fractures. The Smith and Colles fracture-dislocations are nonarticular. The Barton fracture is articular involving the radiocarpal joint. The Barton distal fracture fragment may be displaced in either a dorsal or ventral (volar) direction.

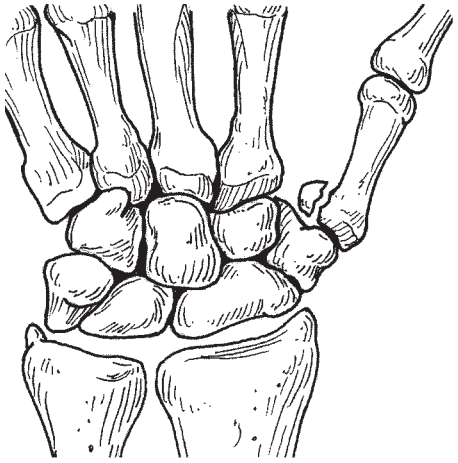


Figure 5. Drawing of a Bennett fracture demonstrates subluxation or dislocation of the main metacarpal shaft fragment and a smaller avulsion fragment that remains attached to the trapezium and index metacarpal.

vania Hospital in Philadelphia. His widow endowed the first surgical chair in the United States, the John Rhea Barton Professor of Surgery of the University of Pennsylvania.

Bennett Fracture.—A Bennett fracture consists of an intraarticular fracture-dislocation at the base of the thumb metacarpal (Fig 5). There is associated subluxation or dislocation of the main metacarpal shaft fragment and a smaller avulsion fragment that remains attached to the trapezium and index metacarpal (21–23).

Edward Hallaran Bennett (1837–1907) was a surgeon in Dublin, Ireland. He introduced Lister's antiseptic surgical technique into Ireland.

Bosworth Fracture.—Now an archaic term for a type of ankle fracture-dislocation, Bosworth fracture refers to a fracture of the fibula and a

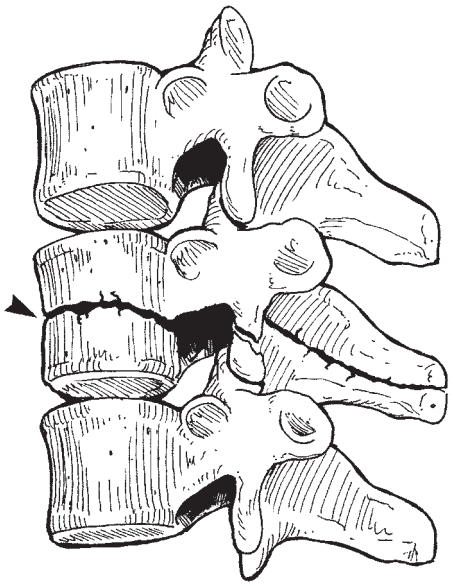


Figure 6. Drawing shows a Chance fracture (arrowhead), which is an unstable injury that involves all three columns of the spine. The fracture may also occur through the disk as well as the vertebral body.

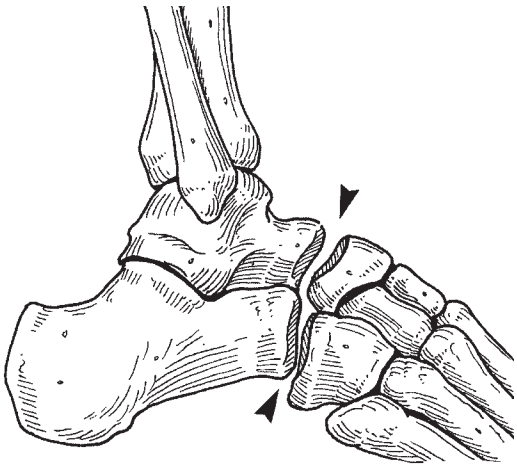


Figure 7. Drawing shows a rare Chopart fracture-dislocation (arrowheads). This injury involves the midtarsal joints (talonavicular and calcaneocuboid).

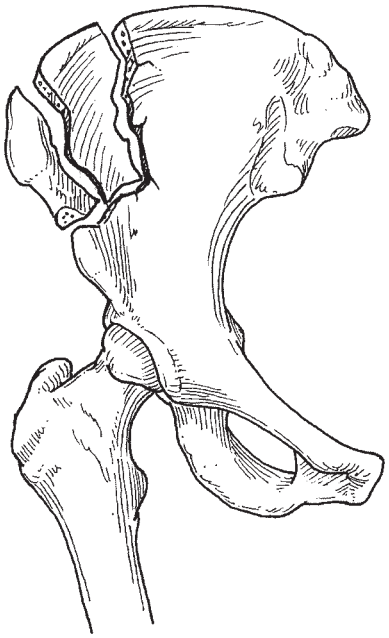


Figure 8. Drawing of the pelvis depicts Duverney fractures.

posterior dislocation of the talus. This type of fracture is frequently irreducible by closed methods (24).

David M. Bosworth (1897–1979) was an important and innovative orthopedic surgeon in New York. His most important contribution was the introduction of streptomycin for the treatment of bone and joint tuberculosis (25).

Chance Fracture.—The Chance fracture is a transverse fracture through a vertebral body and neural arch (Fig 6). Also known as the seat belt fracture, it occurs at the thoracolumbar junction and is usually associated with motor vehicle accidents in which the injured passenger is wearing a seat belt (26).

George Quentin Chance was a British radiologist in Manchester, England, and an honorary fellow faculty radiologist of the Royal College of Surgeons in Ireland.

Chopart Fracture.—A Chopart fracture-dislocation involves the midtarsal joints (talonavicular and calcaneocuboid) (Fig 7). The midtarsal joint is named Chopart's joint because he disarticulated this joint while performing amputations (27–30).

Francois Chopart (1743–1795) was a surgeon in Paris. His amputation through the midtarsal joint was an effective procedure for patients because it allowed weight bearing and it resisted infection better than many other lower extremity amputations.

Colles Fracture.—The Colles fracture is a nonarticular fracture of the distal radius, with dorsal displacement of the distal fracture fragment and volar angulation of the fracture apex (Fig 4). It may be associated with an ulnar styloid fracture as well (31–33). (See also Pouteau Fracture and Smith Fracture.)

Abraham Colles (1773–1843) was the greatest teacher of surgery of the 19th century in the Dublin school and a distinguished professor of surgery at

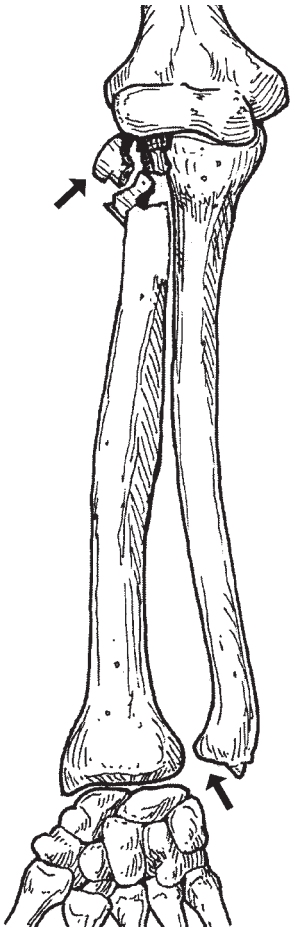


Figure 9. Drawing of a Essex-Lopresti injury demonstrates the fracture of the radial head (top arrow), which is usually comminuted and displaced, in association with dislocation of the distal radioulnar joint (bottom arrow).

the Royal College of Surgeons in Ireland, which has named a lectureship and medal after him. He was known for his work on the nature of congenital syphilis (ie, Colles's law) (33).

Cotton Fracture.—The Cotton fracture-dislocation, now an archaic term, refers to fractures of both the lateral and medial malleolus and a fracture of the posterior process of the tibia (ie, a trimalleolar fracture) (34).

Frederich J. Cotton (1869–1938), a Boston surgeon, was an accomplished artist who illustrated his own 1910 book, *Dislocations and Fractures*, with line drawings.

Danis-Weber Classification.—A common system for classifying ankle fractures, the Danis-Weber classification is known more commonly as the Weber classification. (See Weber Classification.) This system was first introduced by Danis in 1949 and later modified by Weber (11–13).

Robert Danis (1880–1962), a Belgian surgeon, was a seminal figure in the development of internal fixation of fractures. "In the early 1950's, the pioneering work of Robert Danis on operative treatment of fractures was in danger of falling into oblivion..." (12). In 1958, Maurice E. Muller assembled a group of colleagues to form a study group for clinical trials of internal fixation. "This group was set up in the same year under the name Arbeitsgemeinschaft fur Osteosynthesefragen (AO), later on to be known in English-speaking countries as the Association for the Study of Internal Fixation (ASIF)" (12).

Dupuytren Fracture.—Dupuytren fracture is an archaic term used for many types of bimalleolar ankle fractures. The term is commonly used to refer to a fracture of the distal portion of the fibula above the lateral malleolus, with an associated tear of the tibiofibular ligaments and the deltoid ligament. There is lateral displacement of the talus and a possible medial malleolus fracture as well (2–5).

Guillaume Dupuytren (1777–1835) was the greatest French surgeon of the 19th century, with his name being associated with 12 different conditions or operations. He studied fracture healing and carried out extensive experiments on cadavers to elucidate the mechanism of fractures about the ankle. Dupuytren was a master of polemics and was known as "the greatest of surgeons and the meanest of men" (2).

Duverney Fracture.—A Duverney fracture refers to a fracture of the iliac wing that is not associated with other pelvic fractures (Fig 8).

Joseph Guichard Duverney (1648–1730), a French surgeon, was the first truly academic physician in the modern sense: He was a teacher, an investigator, and a surgeon. He published the first accurate description of the anatomy of the ear as well as an early description of osteoporosis (35,36).

Essex-Lopresti Fracture.—An Essex-Lopresti fracture involves the head of the radius, with an associated dislocation of the distal radioulnar joint (Fig 9) (37). In addition, the radial head fracture is usually comminuted and displaced. A radiographic finding of a displaced radial head fracture (as opposed to the usual nondisplaced, more routine radial head fracture) suggests the wrist should be examined closely.

Peter Gordon Essex-Lopresti (1918–1951) was a surgeon at Britain's Birmingham Accident Center. As a surgeon for the British Air Borne Division during World War II, he was an expert in parachuting injuries. He also described a useful classification of fractures of the os calcis.

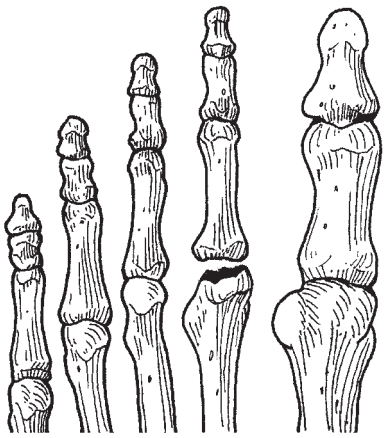


Figure 10. Drawing of the metatarsals shows a Freiberg infraction.

Freiberg Infraction.—A Freiberg infraction refers to a deformity of the head of the second or third metatarsal from avascular necrosis, presumably secondary to trauma usually unrecognized by the patient (Fig 10). It is typically seen in adolescents, especially in girls (38,39).

Albert Henry Freiberg (1868–1940) was professor of orthopedic surgery at the University of Cincinnati, Ohio. Both his son (Joseph Albert, 1898–1973) and grandson (Richard A., 1932–) also became well-known orthopedic surgeons.

Galeazzi Fracture.—The Galeazzi fracture occurs in the radial shaft, most commonly at the junction of the middle and distal thirds, with an associated dislocation of the distal radioulnar joint (Fig 11) (16,40). (See also Piedmont Fracture.)

Riccardo Galeazzi (1866–1952) was an important figure in the development of orthopedic rehabilitation services in Italy, especially in the care of crippled children and soldiers wounded in World War I.

Gosselin Fracture.—The Gosselin fracture refers to a V-shaped fracture of the distal tibia that extends into the tibial plafond and divides the plafond into anterior and posterior fragments (Fig 12) (41).

Leon Athanese Gosselin (1815–1887) was chief of surgery at the Hôpital La Charite in Paris.

Goyrand Fracture.—Goyrand fracture is the term used in France for a Smith fracture (Fig 4) (31). (See also Smith Fracture.)

Jean-Gaspar-Blaise Goyrand (1803–1866) was chief of surgery at the city hospital in Marseilles, France. A prominent provincial surgeon, he carefully clarified the anatomy of the many varieties of fractures of the distal radius, including epiphyseal separations.

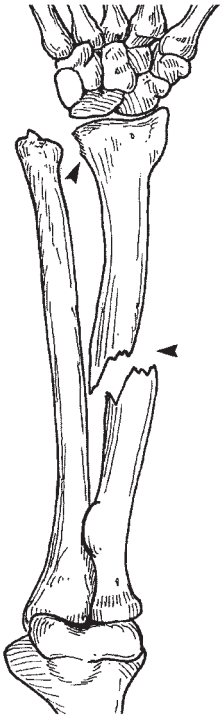


Figure 11. Drawing of a Galeazzi injury depicts the fracture of the distal radial shaft (bottom arrowhead) with an associated dislocation of the distal radioulnar joint (top arrowhead).

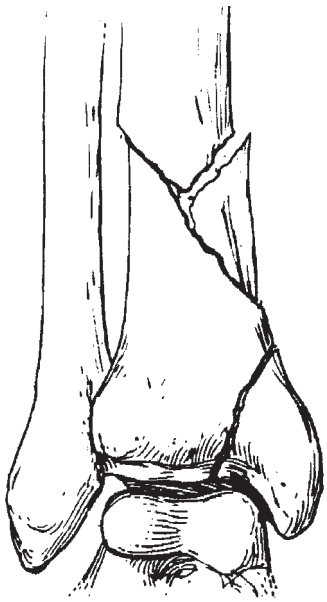


Figure 12. Drawing of a Gosselin fracture shows the V-shaped fracture of the distal tibia that extends into the tibial plafond, dividing the plafond into anterior and posterior fragments.

Harris Fracture.—See Salter-Harris Fracture.

Hill-Sachs Fracture.—The Hill-Sachs fracture is an impacted fracture of the posterolateral aspect of the humeral head caused by impingement of the head on the anterior edge of the scapular glenoid during anterior dislocation of the shoulder (Fig 13). The resultant lesion predisposes the shoulder joint to recurrent dislocations (42).

Harold Arthur Hill (1901–1973) and Maurice David Sachs (1909–1987) were prominent radiologists in San Francisco, California.

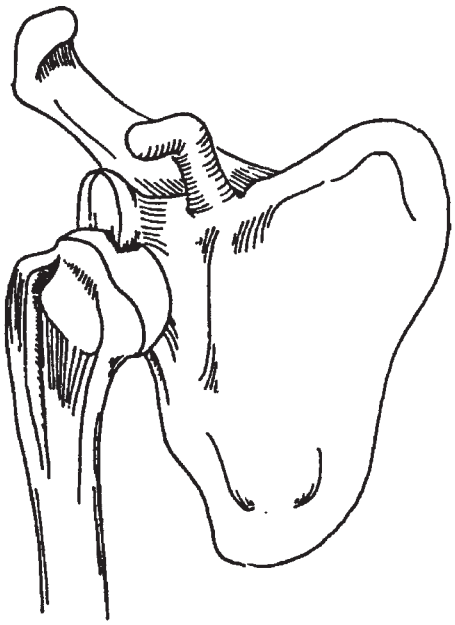


Figure 13. Drawing of a Hill-Sachs fracture shows how the posterolateral aspect of the humeral head is fractured by impingement of the head on the anterior edge of the scapular glenoid during anterior dislocation of the shoulder.

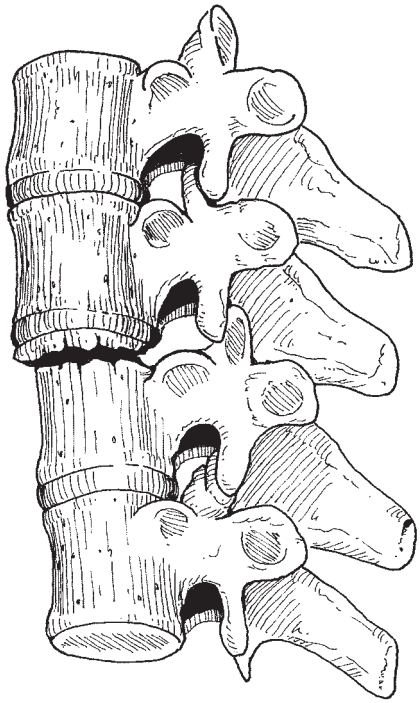


Figure 14. Drawing of a Holdsworth injury illustrates a fracture through the vertebral body, which is one component of this unstable thoracolumbar junction fracture-dislocation. The injury is associated with rupture of the posterior ligaments and fracture of the articular processes.

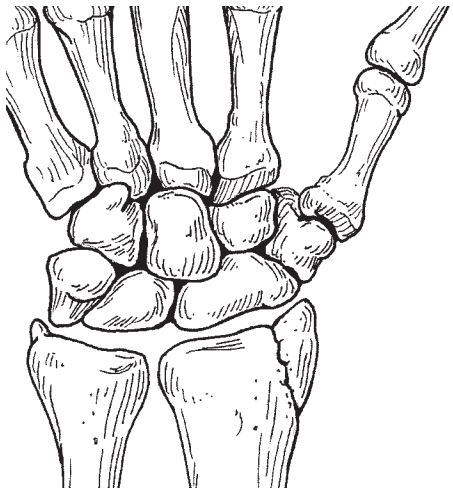


Figure 15. Drawing of a Hutchinson fracture shows how this oblique fracture of the radial styloid process extends into the wrist joint.

Holdsworth Fracture.—A Holdsworth fracture refers to an unstable spinal column fracture-dislocation at the thoracolumbar junction. The injury consists of rupture of the posterior ligaments, fracture of the articular processes, and fracture through the vertebral body (Fig 14) (43).

Sir Frank Wild Holdsworth (1904–1969) was a leading British orthopedist and a pioneer in the rehabilitation of spinal injuries. He held many high offices and received many honors, including knighthood in 1967 and honorary fellow of the American College of Surgeons.

Hutchinson Fracture.—A Hutchinson fracture, now an archaic term, refers to an oblique fracture of the radial styloid process with extension into the wrist joint (Fig 15) (44). The common names for this fracture—Chauffeur, Lorry Driver, Backfire—arose from the era of hand cranking to start motor vehicles (45). These archaic terms describe an injury by mechanism (a kickback of the crank handle) rather than by anatomy.

Jonathan Hutchinson (1828–1913) was a prominent British surgeon. He published an extensive article on rare fractures and dislocations (44) that included a detailed discussion of the styloid processes of the radius and ulna and references to the work of Colles and Smith.

Jefferson Fracture.—The Jefferson fracture is a complex burst fracture of the ring of the atlas (C1) (Fig 16). There is usually lateral spread of the lateral masses of C1 (46).

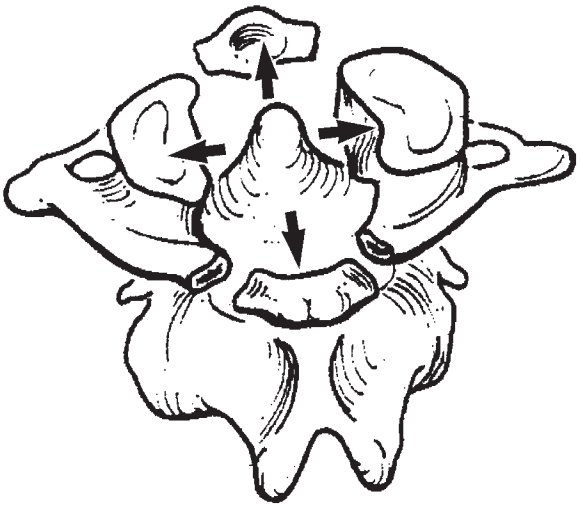


Figure 16. Drawing of a C1 vertebra depicts a Jefferson fracture, an unstable spinal injury consisting of a complex burst fracture (arrows) of the ring of the atlas.

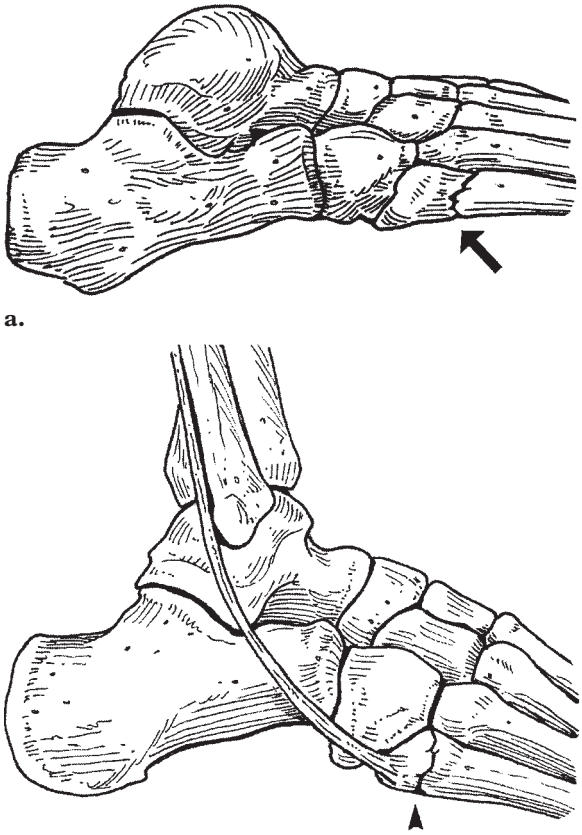
Sir Geofrey Jefferson (1886–1961) was a distinguished neurosurgeon in Manchester, England. He was appointed to the first chair of neurosurgery in Great Britain at the University of Manchester in 1939.

Jones Fracture.—A fracture at the base of the fifth (little toe) metatarsal distal to the metatarsal tuberosity is called a Jones fracture (Fig 17) (also known as a Robert Jones fracture). This fracture was described by Robert Jones in 1902 after he injured himself dancing (47–49). Many persons erroneously attribute this term to the more common fracture found at the base of the fifth metatarsal proximal to the metatarsal tuberosity.

Sir Robert Jones (1857–1933), who was the nephew of Hugh Owen Thomas, was the leading British orthopedic surgeon of the period. He was also a pioneer in radiology and published the first clinical radiograph less than 2 months after Roentgen's original report (50).

Kienböck Disease.—Kienböck disease is an aseptic necrosis affecting the carpal lunate (51).

Robert Kienböck (1871–1953) founded a private x-ray institute in Vienna, Austria, in 1899 and was one of the early teachers of radiology at the University of Vienna, becoming a professor in 1917. He was particularly interested in radiologic imaging of bones.



a.

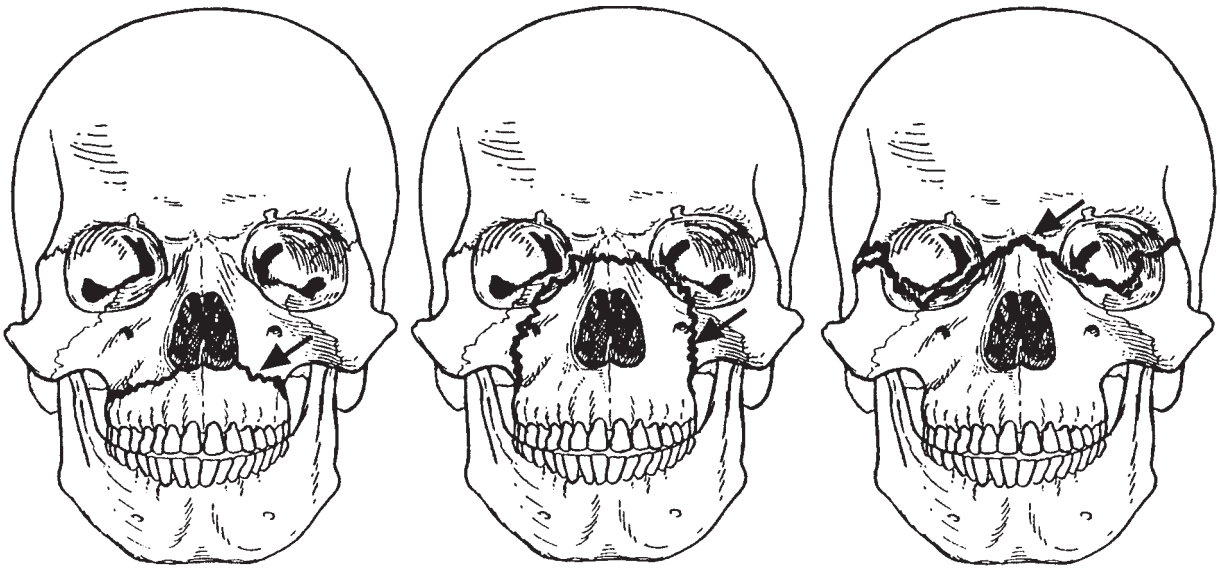
b.

Figure 17. Jones fracture. **(a)** Drawing illustrates the fracture originally described by Robert Jones, at the base of the fifth (little toe) metatarsal distal to the metatarsal tuberosity (arrow). **(b)** Second drawing shows the more common peroneus brevis avulsion fracture, found at the base of the fifth metatarsal (arrowhead) and proximal to the metatarsal tuberosity, which is often erroneously called a Jones fracture.

Lauge-Hansen Classification.—The Lauge-Hansen classification of ankle fractures is a complex system that uses the mechanism of injury to classify the fractures (6–10). (See also Weber Classification.)

Niel Lauge-Hansen (1899–1976) was a prominent Danish physician who performed classic studies in the 1940s and 1950s using cadaver specimens to elucidate the mechanisms involved in ankle injuries. From 1959 to 1961, he worked in Seoul, South Korea, and was made an honorary member of the Korean Medical Association.

Le Fort Fractures of the Face.—There are three types of Le Fort fractures involving the face. A type I Le Fort fracture is a horizontal fracture of the alveolar process of the maxilla, with the teeth contained in the detached fragment (Fig 18a). A type II Le Fort fracture is a unilateral or bilateral



a. b. c.

Figure 18. Le Fort facial fractures. **(a)** Drawing shows a type I Le Fort fracture, consisting of a horizontal fracture of the alveolar process of the maxilla with the teeth contained in the detached fragment (arrow). **(b)** Drawing shows a type II Le Fort fracture, consisting of a unilateral or bilateral fracture of the body of the maxilla in which the detached maxillary fragment (arrow) is pyramidal in shape. The fracture may extend into the floor of the orbit and into the hard palate and nasal cavity. **(c)** Drawing shows a type III Le Fort fracture, in which the entire maxilla and one or more facial bones are completely detached (arrow) from the craniofacial skeleton.

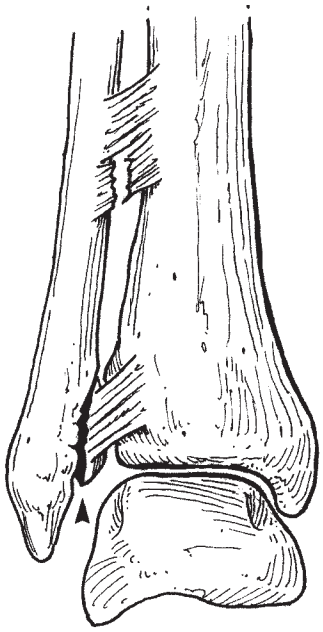


Figure 19. Drawing of a Le Fort ankle injury depicts a vertical fracture of the anterior medial portion of the distal fibula (arrowhead) and an associated avulsion of the anterior tibiofibular ligament.

fracture of the body of the maxilla in which the detached maxillary fragment is pyramidal in shape (Fig 18b). The fracture may extend into the floor of the orbit and into the hard palate and nasal cavity. In a type III Le Fort fracture, the entire maxilla and one or more facial bones are completely separated from the craniofacial skeleton (Fig 18c) (52,53).

Rene Le Fort (1869–1951) was the nephew and godson of Leon Le Fort, for whom the Le Fort fracture of the ankle is named.

Le Fort Fracture of the Ankle.—The Le Fort fracture of the ankle is a vertical fracture of the anterior medial portion of the distal fibula, with avulsion of the anterior tibiofibular ligament (Fig 19) (54).

Leon Clement Le Fort (1829–1893) was a distinguished French surgeon and the son-in-law of Joseph Francois Malgaigne. Le Fort is known for discovering direct communications between bronchial and pulmonary blood vessels. He also published papers on methods for resecting the knee and hip and was a leading advocate for the principals of asepsis before scientific bacteriology was developed. He is best known for his surgery for uterine prolapse (55).

Lisfranc Fracture.—A Lisfranc fracture refers to a fracture-dislocation or fracture-subluxation of the tarsometatarsal joints, typically the second through the fifth joints with lateral displacement of the metatarsals (Fig 20). It is named for Lisfranc,

a surgeon in Napoleon's army who described an amputation method through the tarsometatarsal joints (27,28,30,56). His technique saved a portion of the foot after distal injury or frostbite. "His description of amputation through the tarsal-metatarsal joints requires several pages to describe it, but it took only 1 minute for him to perform it—not too short a time for the unanesthetized patient" (56).

Jacques Lisfranc De Saint Martin (1790–1847) was the chief of surgery at the Hôpital de la Pitie in Paris. It was Lisfranc, known for his booming voice and choleric lectures, who referred to his teacher and colleague Dupuytren as "the brigand of l'Hotel Dieu." In 1815, Lisfranc also described the scalene tubercle on the first rib at the insertion of the scalenus anterior muscle. This tubercle is now known as Lisfranc's tubercle.

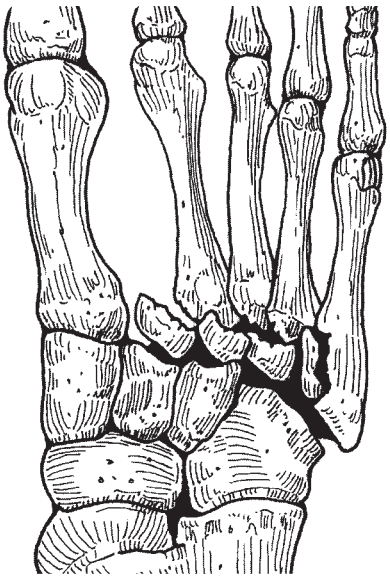


Figure 20. Drawing shows a Lisfranc fracture-dislocation, which typically consists of a fracture-dislocation of the second through fifth tarsometatarsal joints with lateral displacement of the metatarsals.

Maisonneuve Fracture.—The Maisonneuve fracture is a spiral fracture of the upper third of the fibula associated with a tear of the distal tibiofibular syndesmosis and the interosseous membrane (Fig 21). There is an associated fracture of the medial malleolus or rupture of the deep deltoid ligament (57).

Jacques Gilles Maisonneuve (1809–1897) was student of Dupuytren and, like his master, was skilled in polemics. He made many original contributions.

Malgaigne Fracture.—A Malgaigne fracture is a fracture-dislocation of one side of the pelvis, with both anterior and posterior disruption of the pelvic ring (Fig 22). The term is used to refer to a fracture through the ipsilateral ilium and pubic rami, or a dislocation of the sacroiliac joint and the pubic symphysis, or any combination of these. The lateral fragment contains the acetabulum and is unstable (58–61).

Joseph Francois Malgaigne (1806–1865) of France was one of the great surgical historians of the 19th century. His book on fractures and dislocations was the first comprehensive book on the subject.

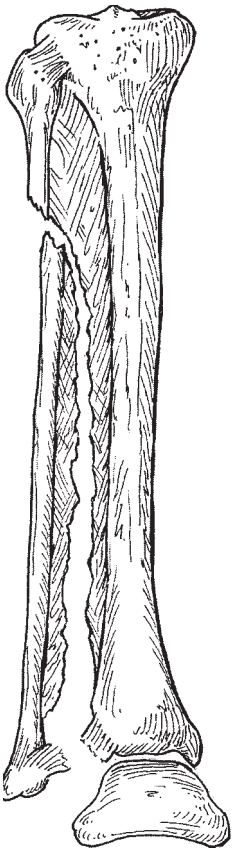
Monteggia Fracture.—A classic Monteggia fracture consists of a fracture of the proximal one-third of the ulna, with anterior dislocation of the radial head (Fig 2). This term may be used with other types of ulnar shaft fractures and radial head dislocations, but these types of injuries are best described by their anatomic appearance and the Bado classification (14–16,62).

Giovanni Battista Monteggia (1762–1815) was the greatest Italian surgeon at the beginning of the 19th century. He was an important observer of the natural history of syphilis and contracted a Hunterian chancre during dissection. He also wrote one of the earliest descriptions of poliomyelitis.

Osgood-Schlatter Disease.—Osgood-Schlatter disease is the term used to describe a chronic fatigue injury that affects the growth and development of the tibial apophysis at the site of the attachment of the patellar tendon to the tibial tuberosity (tibial apophysis) (63–67).

Robert B. Osgood (1873–1956), a distinguished Boston orthopedic surgeon, was one of the leaders of the American orthopedic effort in World War I and an important individual in the founding of the British Orthopaedic Association. Carl Schlatter (1864–1934) was a professor of surgery in Zurich, Switzerland, and performed the first total gastric resection.

Pellegrini-Stieda Disease.—Pellegrini-Stieda disease refers to the development of ossification in or near the tibial collateral ligament near the margin of the medial femoral condyle (Fig 23). Ossification is presumed to be the result of past healed trauma, such as a healed Stieda fracture (68–70). A Stieda fracture is an avulsion injury from the medial femoral condyle at the origin of the tibial collateral ligament (Fig 24).



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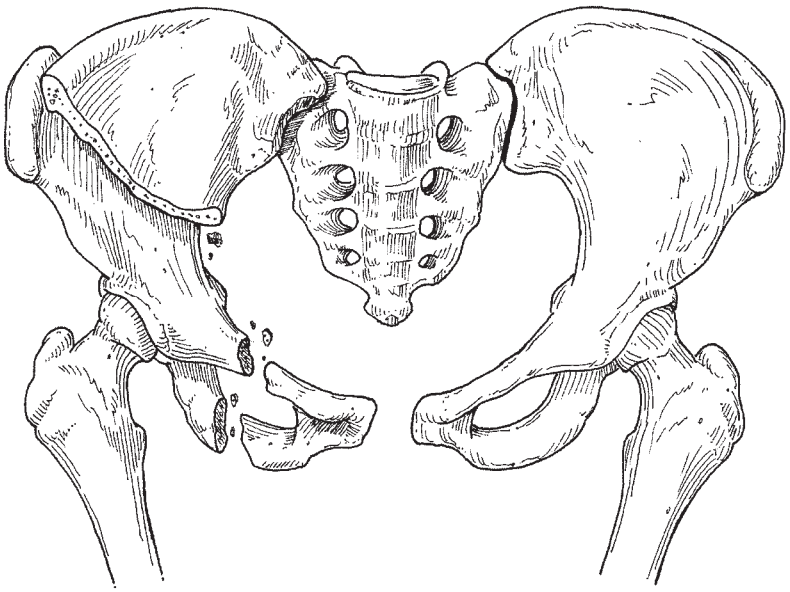
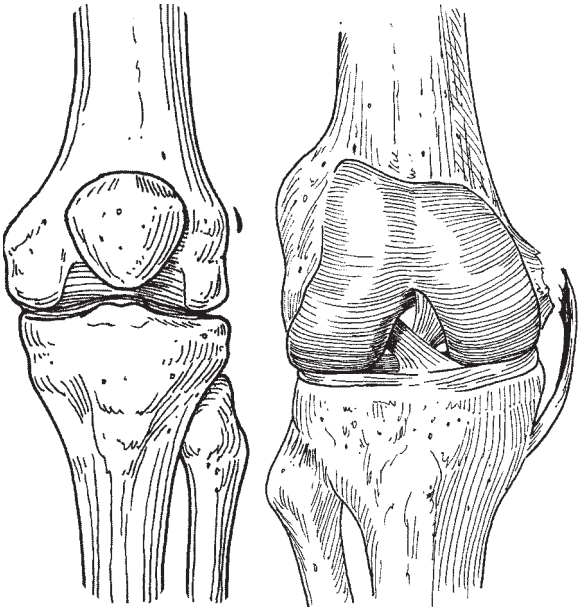


22.

Figures 21, 22. **(21)** Drawing illustrates a Maisonneuve fracture. This complex, unstable injury consists of a spiral fracture of the upper third of the fibula, an associated tear of the interosseous membrane and the distal tibiofibular syndesmosis, and an associated fracture of the medial malleolus or a rupture of the deep deltoid ligament of the ankle. **(22)** Drawing depicts a Malgaigne injury, which is a complex, unstable pelvic fracture involving one side of the pelvis with both anterior and posterior disruption of the pelvic ring. The lateral fragment contains the acetabulum.



23. 24.

Figures 23, 24. **(23)** Drawing of a knee affected by Pellegrini-Stieda disease shows ossification in or close to the tibial collateral ligament near the margin of the medial femoral condyle. **(24)** Drawing of a Stieda fracture demonstrates the avulsion from the medial femoral condyle at the origin of the tibial collateral ligament.

Augusto Pellegrini (1877–1958) was a surgeon in Florence, Italy, and Alfred Stieda (1869–1945) was a surgeon in Königsberg, Germany.

Piedmont Fracture.—Piedmont fracture is another name for the Galeazzi fracture. It was named after the Piedmont Orthopedic Society (71), which represents orthopedic surgeons in the Piedmont area of the Carolinas, including those in such cities as Raleigh-Durham and Chapel Hill, North Carolina.

Pott Fracture.—An archaic term, Pott fracture is loosely applied to a variety of bimalleolar ankle fractures. Pott originally described a partial dislocation of the ankle with a fracture of the distal fibular shaft and rupture of the medial ligaments of the ankle (72,73).

Percival Pott (1714–1788) was the leading surgeon in London for many years. He is remembered especially for his description of tuberculosis of the spine (Pott's disease), but he made many other important observations, not the least of

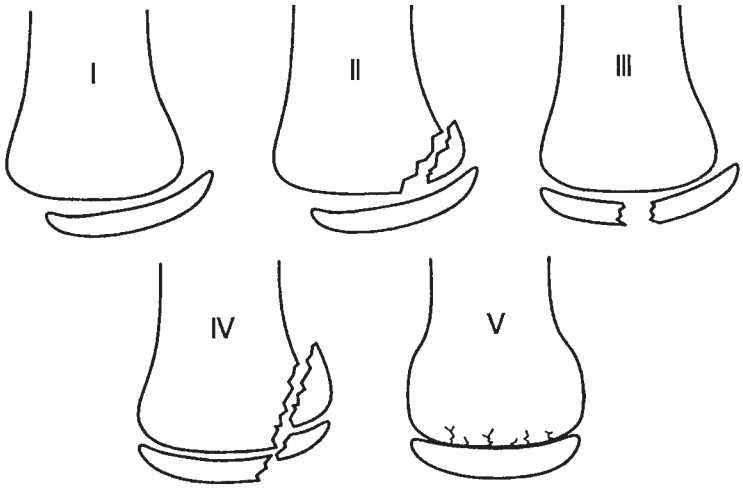


Figure 26. Diagrams illustrate the Salter-Harris growth plate epiphysis fracture classification: *I*, fracture through the growth plate with possible dislocation of the epiphysis; *II*, fracture through the growth plate plus a fracture through a portion of the metaphysis (this is the most common type of growth plate injury); *III*, fracture through the growth plate and the epiphysis; *IV*, fracture through the epiphysis, growth plate, and metaphysis; and *V*, crush injury to the growth plate.

which was his description of cancer of the scrotum in chimney sweeps. His report was one of the first to associate coal tar exposure with development of a cancer.

Pouteau Fracture.—Pouteau fracture is the name used in France for a Colles fracture (Fig 4) (74). (See also Colles Fracture.)

Claude Pouteau (1725–1775), a surgeon at the city hospital in Lyon, France, was an early advocate of cleanliness in surgery, evidenced by his insistence on hand washing and use of disposable paper dressings. He was a premier lithotomist (one who removed bladder calculi through an incision in the perineum while the unanesthetized patient was in the "lithotomy" position), achieving a mortality rate of only 3%.

Robert Jones Fracture.—See Jones Fracture.

Rolando Fracture.—A Rolando fracture is a comminuted Y- or T-shaped fracture-dislocation at the base of the thumb metacarpal (Fig 25). The dislocation accompanies the disruption of the articular surface of the thumb metacarpal (75,76).

Silvio Rolando (?–1941?) was a prominent surgeon in Genoa, Italy. He practiced in the first part of this century and specialized in genitourinary tract surgery.

Salter-Harris Classification.—Salter-Harris classification is the most commonly used system for categorizing growth plate injuries (Fig 26) (77).

Robert Bruce Salter (1924–), a prominent Canadian surgeon, is now semiretired as a "university professor" and professor emeritus of orthopaedic surgery and senior scientist emeritus, University of Toronto. Earlier he was chief of orthopedic surgery and later surgeon in chief at the Hospital for Sick Children, Toronto, University of Toronto. W. Robert Harris (1922–) is a prominent Canadian orthopedic surgeon who is now retired. He is a professor emeritus of surgery at the University of Toronto and a fellow of the Royal College of Physicians and Surgeons.

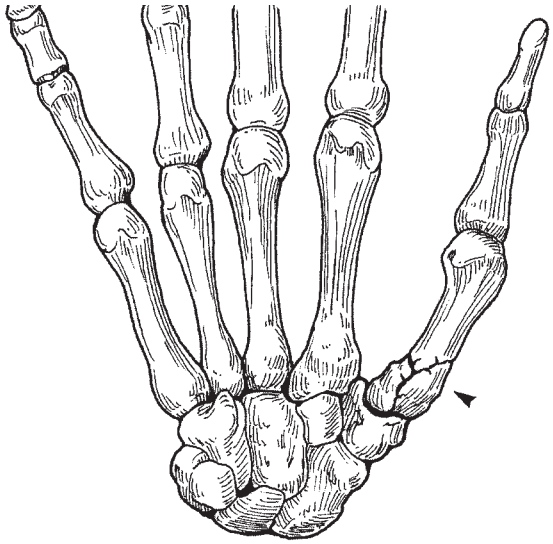


Figure 25. Drawing of a Rolando fracture shows the comminuted Y- or T-shaped fracture-dislocation at the base of the thumb metacarpal (arrowhead).

Segond Fracture.—A Segond fracture is a small, vertical fracture of the lateral aspect of the proximal tibia just distal to the tibial plateau (Fig 27). It has a high association with anterior cruciate ligament and meniscal injuries (78,79).

Paul Ferdinand Segond (1851–1912) was professor of surgery at the University of Paris and surgeon in chief at the Saltpetriere. Although Segond was one of the foremost "knee specialists"

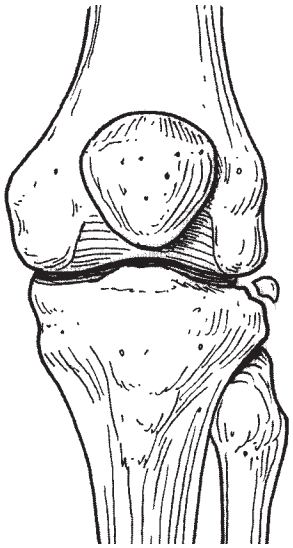


Figure 27. Drawing of a Segond fracture shows the small, vertical fracture of the lateral aspect of the proximal tibia, just distal to the tibial plateau.

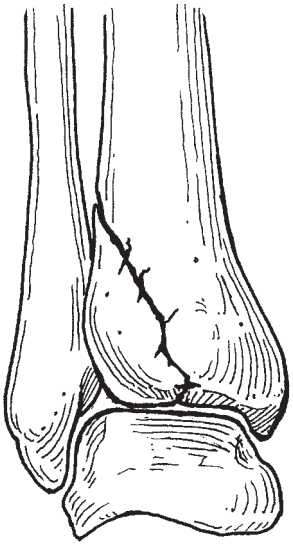


Figure 29. Drawing of a Tillaux fracture demonstrates an avulsion fracture of the anterior tibial tubercle at the attachment of the distal anterior tibiofibular ligament.

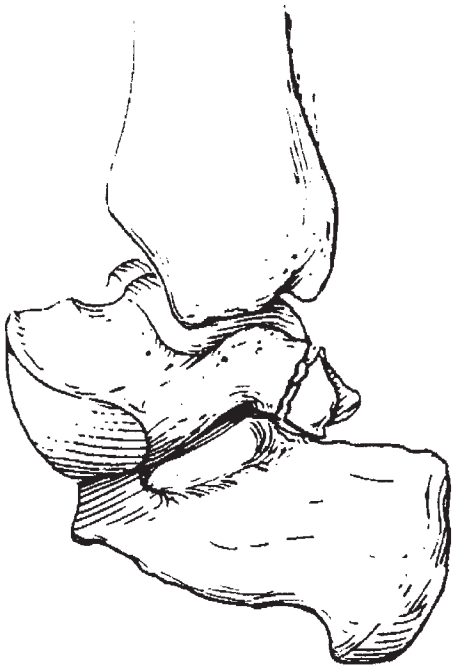


Figure 28. Drawing of a Shepherd fracture depicts the fracture of the lateral tubercle of the posterior process of the talus. This fracture should not be confused with an os trigonum, which it may simulate.

in 19th century France, his significant contributions in this area were overlooked, and he is chiefly remembered for his contributions to gynecologic surgery.

Shepherd Fracture.—The Shepherd fracture involves the lateral tubercle of the posterior process of the talus (Fig 28) (80). It may simulate an os trigonum.

Francis J. Shepherd (1851–1929) was born and trained in England but was offered a demonstratorship in anatomy at McGill University in Montreal in 1875. He emigrated to Canada and became a prominent individual in the Canadian history of surgery. He received many honors and was well known in the United States and Great Britain as well (81).

Smith Fracture.—The Smith fracture, which is also known as the reverse Colles, reverse Barton, or Goyrand fracture, is an injury of the distal radius and does not involve the articular surface (Fig 4). The distal fragment is displaced volarly in contrast to the Colles fracture, in which the distal fragment is displaced dorsally (82,83). (See also Goyrand Fracture.)

Robert William Smith (1807–1873) became the professor of surgery at Trinity College in Dublin, succeeding Colles, upon whom he performed the autopsy. He published the first pathologic description of neurofibromatosis, preceding that of von Recklinghausen by 33 years.

Stieda Fracture.—See Pellegrini-Stieda Disease.

Tillaux Fracture.—A Tillaux fracture is an avulsion injury of the anterior tibial tubercle at the attachment of the distal anterior tibiofibular ligament (Fig 29).

Paul Jules Tillaux (1834–1904) was a French surgeon and anatomist in the latter part of the 19th century. He described a condition known by numerous names, including Tillaux's disease,

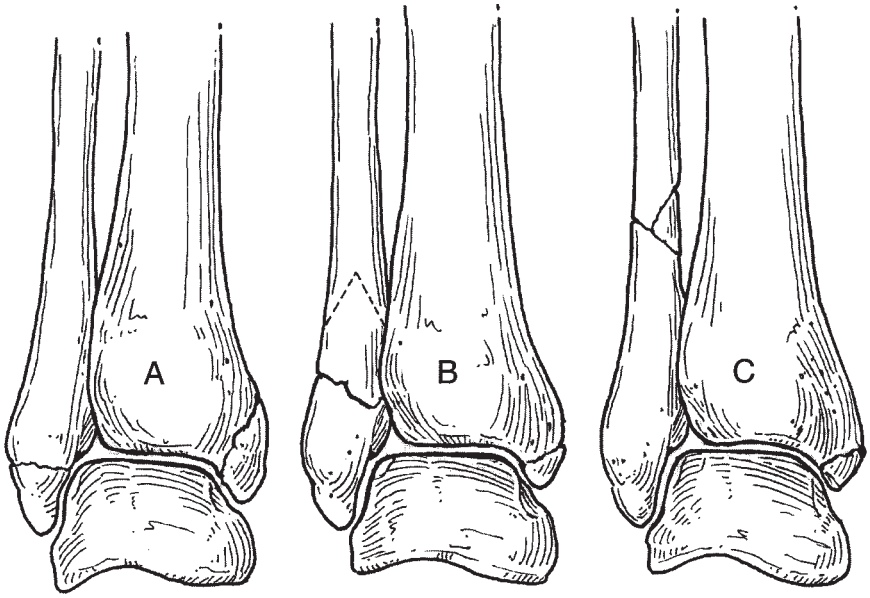


Figure 30. Drawings illustrate the Weber (Danis-Weber) classification of ankle fractures, types *A–C*. The classification is based on the location of the fibular fracture. The higher the fibular fracture, the greater the likelihood for ankle mortise insufficiency.

Tillaux-Phocas disease, and Cheatle disease, which consists of large multifocal, bilateral blue or brown breast cysts in menopausal or perimenopausal women. Tillaux never clinically described the fracture named for him, but he did exquisite anatomic studies detailing the results of various experimentally produced ankle injuries (4,84,85).

Weber Classification.—The Weber classification is a common system for categorizing ankle fractures (Fig 30). It is widely used because it is easily learned, and it provides a good prediction for how well the fractures will heal. In some publications, this classification system is referred to as the Danis-Weber classification. This system was first introduced by Danis in 1949 and later modified by Weber (11–13). Type A fractures are lateral malleolar fractures below the level of the ankle joint space. The syndesmosis and the deltoid ligament remain intact, but there may be an associated oblique fracture of the medial malleolus. Type B fractures are oblique fractures of the lateral malleolus that start at the level of the joint space and extend proximally. There may be an associated deltoid ligament tear or a transverse fracture of the medial malleolus. Type C fractures are fractures of the distal shaft of the fibula proximal to the ankle joint with an associated deltoid ligament tear or medial malleolar fracture. Both type B and type C fractures may also have an associated posterior malleolar fracture.

Bernhard Georg Weber (1929–) is a prominent orthopedic surgeon in St Gall, Switzerland. He has published extensively on many topics, including books on pseudoarthrosis, external fixators, and treatment of fractures in children.

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Appendix

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