Bone fracture

Definition

A bone fracture (aka bone fx) is a **soft tissue injury that is accompanied by a complete or incomplete break in bone**, resulting usually from trauma and/or pathological considerations.

There are several ways to describe a bone fracture. Various classification systems make it easier to organize and express these fractures among physicians and health professionals. Usually a combination of these various systems is implemented in order to simplify description of a fracture. A variety of fracture patterns are listed below:

Types of Fractures

- Closed fracture – Skin is intact over the fx and consequent hematoma
- Open fracture (aka Compound fx) – Break in the integument and underlying soft tissue leads directly into the fx and its hematoma.
- Simple fracture – One fx line, and only two bone fragments.
- Comminuted fracture (aka Fragmentation) – More than two bone fragments.
- Transverse fracture – One fx line that is directly perpendicular to the long axis of the bone; most unstable fracture and therefore it has a higher rate of non-union.
- Oblique fracture – One fx line that creates an oblique angle to the long axis of the bone.
- Spiral fracture – Severe oblique fx that rotates around the long axis of the bone; Caused by a rotational type injury.
- Longitudinal fracture – One fx line that is parallel to the long axis of bone.
- Impacted fracture – A fx caused by a compressive type force where the end of one part of the bone is driven into the metaphyseal region without displacement.
- Pathologic fracture – A fx through abnormal bone. Ex. Osteoporotic/osteonecrotic bone.
- Stress fracture – A fx caused by repeated and excessive loading on a bone. Ex. Occurs in runners.
- Greenstick fracture – Incomplete fracture in which the cortex of only one side is disrupted; seen in pediatric patients
- Avulsion fracture – Fx in which a tendon is pulled from bone, carrying with it a piece of the bone.
- Periarticular fracture – Fx close to, but NOT involving a joint space.
- Intra-articular fracture – Fx through the articular joint surface of a bone (usually requires surgery).

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Fracture Healing

Healing is an important part of the fracture process. After a fracture occurs, blood vessels that are destroyed leak blood into the surrounding area, forming a hematoma. Eventually, this blood ends up clotting, and provides a framework that helps section off the fracture site. This allows for inflammatory cells, fibroblasts, and new blood vessels to enter the area. These inflammatory cells and platelets release certain cytokines that trigger osteoprogenitor cells to activate, which in turn activate osteoblastic and osteoclastic activities in the vicinity. Therefore, even as early as one week after a fracture, our body starts to remodel the fractured bone ends and forms what is called a procallus. This uncalcified tissue provides a type of temporary connection between the fractured bones, but does not give any stability or allow for any weight bearing at all. The osteoprogenitor cells that were activated by the cytokines begin to deposit woven bone within the medullary cavity in a perpendicular fashion. Woven bone is ultimately replaced by lamellar bone which is stronger and filled with many collagen fibers that are deposited in a parallel fashion. Occasionally other cells will create fibrocartilage and hyaline cartilage around the fracture site, which will eventually ossify into bone via endochondral ossification; this is also commonly seen at the site of the physis in bones. (Intramembranous ossification is another type of ossification that occurs in the body where cartilage is not a precursor). This network of bone slowly connects via a bony callus, and by the second or third week heals to a point that weight bearing is possible. Initially, a surplus of bony callus is formed around the fracture site. As weight is placed on this fracture site, the portions of bony callus that are not stressed by this weight are slowly taken up or resorbed by the body. The bony callus is reduced until the original shape and structure are reformed. The whole process usually can take up to six to eight weeks depending on possible complications that may arise. Usually at that point, patients with a previously fractured bone will have to rehabilitate the affected area in order to gain close to 100% functionality. [2]

References

1. Blackbourne, Lorne H. Surgical Recall. Philadelphia: Lippincott Williams & Wilkins, 2008. Print
2. Kumar, Vinay, Nelso Fausto, and Abul Abbas. "Bones, Joints, and Soft Tissue Tumors." Robbins & Cotran Pathologic Basis of Disease, Seventh Edition. Philadelphia: Saunders, 2004. Print.

External links

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