A bone fracture (sometimes abbreviated FRX or Fx, Fx, or #) is a medical condition in which there is a damage in the continuity of the bone. A bone fracture may be the result of high force impact or stress, or a minimal trauma injury as a result of certain medical conditions that weaken the bones, such as osteoporosis, bone cancer, or osteogenesis imperfecta, where the fracture is then properly termed a pathologic fracture

Mechanism

Pathologic fracture – A fracture through a bone that has been made weak by some underlying disease is called pathological fracture. e.g., a fracture through a bone weakened by metastasis. Osteoporosis is the most common cause of pathological fracture.

Traumatic fracture – This is a fracture due to sustained trauma. e.g., fractures caused by a fall, road traffic accident, fight, etc.

Soft-tissue involvement

Closed fractures are those in which the overlying skin is intact

Open/compound fractures involve wounds that communicate with the fracture, or where fracture hematoma is exposed, and may thus expose bone to contamination. Open injuries carry a higher risk of infection.

- Clean fracture
- Contaminated fracture

Simplex/Multiplex – that is pretty straightforward

Fractura comminutiva - comminuted fracture the bone is splintered or crushed into numerous (> 6) pieces

Fractura transversa/obliqua - Transverse fracture: A fracture that is at a right angle to the bone's long axis // Oblique fracture: A fracture that is diagonal to a bone's long axis (more than 30°)

Fractura spiralis / longitudinalis

- **Spiral fracture:** A fracture where at least one part of the bone has been twisted. Spiral fractures often occur when the body is in motion while one extremity is planted. For example, a spiral fracture of the tibia (the shinbone) can occur in young children when they fall short on an extended leg while jumping. This occurrence is known as "toddler's fracture." Spiral fractures are also recognized as being suspicious in very young children since to obtain a fracture of this sort requires forceful twisting or jerking of the limbs. Child abuse (physical abuse) and certain conditions such as osteogenesis imperfecta (OI) are considered differentials when identifying spiral or torsion fractures
- **linear fracture** - fracture line runs parallel to the long axis of the bone

Fractura compressiva/impressiva

- **Compression fracture/Wedge fracture**: usually occurs in the vertebrae, for example when the front portion of a vertebra in the spine collapses due to osteoporosis (a medical condition which causes bones to become brittle and susceptible to fracture, with or without trauma). Acute fractures will cause severe back pain. Compression fractures which develop gradually, such as in

osteoporosis, may initially not cause any symptoms, but will later often lead to back pain and loss of height.
- **depressed fracture -** bone is pushed in (esp. skull and shoulder blade fractures)

Fractura incuneata

- overriding fracture - bone fragments overlap one another

Infractio/ f.partialis/f.incompleta

- **Incomplete fracture**: Is a fracture in which the bone fragments are still partially joined, in such cases, there is a crack in the osseous tissue that does not completely traverse the width of the bone.
- **Complete fracture**: Is a fracture in which bone fragments separate completely.

Classification offractures:

AO Classification 1st number = long bone 2nd number = bone segment Letter = fracture type (A,B,C) Then 3rd & 4th numbers classify fracture group & subgroup

první číslo – vyjadřuje postiženou kost (1 humerus, 2 předloketní kosti, 3 femur, 4 bérec, 5 páteř, 6 pánev, 7 ruka 8 noha)

druhý údaj – určuje segment kosti (u dlouhých kostí – 1 prox.epimetafýza, 2 diafýza, 3 distální epimetafýza)

- třetí údaj ukazuje typ zlomeniny – A-C, u každé části je konkrétní

Fracture **Healing:**

1: REPOSITIO = REDUCTIO fragmentorum

- is a medical procedure to restore fracture or dislocation to the correct alignment. This sense of the term "reduction" does not imply any sort of removal or quantitative decrease but rather implies a restoration: re ("back [to normal]") + ducere ("lead"/"bring"), i.e., "bringing back to normal."
- Use of plates, screws, and wires was first documented in the 1880s and 1890s. Early surgical fixation initially was complicated by many obstacles, such as infection, poorly conceived implants and techniques, metal allergy, and a limited understanding of the biology and mechanics of fracture healing.[1] During the 1950s, Danis and Muller began to define the principles and techniques of internal fixation.

2: FIXATIO = STABILISATIO fragmentorum

- (mechanical stability) intramedullar rods/ Internal plates and screws

Name the type of fracture

A, pathologica
B, spiralis
C, infractio, incompleta
D, obliqua
E, aperta/complicata
F, comminutiva

undisplaced transverse fracture of the shaft of both femurs – fractura corporis femorum transversa sine dislocatione
epidural hematoma in the left parietal region – Haematoma epiduralis in regione/regionis parietali sinistri
linear nondisplaced skull fracture – fractura cranii longitudinalis sine dislocatione
fracture of the left mandible and a fracture of the right mandibular body and angle – fractura mandibulae sinistrae et fractura corporis mandibulae dextrae et anguli

History of cast
The earliest methods of holding a reduced fracture involved using splints. These are rigid strips laid parallel to each other alongside the bone. The Ancient Egyptians used wooden splints made of bark wrapped in linen. They also used stiff bandages for support that were probably derived from embalming techniques. The use of plaster of Paris to cover walls is evident, but it seems it was never used for bandages. Ancient Hindus treated fractures with bamboo splints, and the writings of Hippocrates discuss management of fractures in some detail, recommending wooden splints plus exercise to prevent muscle atrophy during the immobilization. The ancient Greeks also used waxes and resins to create stiffened bandages and the Roman Celsus, writing in AD 30, describes how to use splints and bandages stiffened with starch. Arabian doctors used lime derived from sea shells and albumen from egg whites to stiffen bandages. The Italian School of Salerno in the twelfth century recommended bandages hardened with a flour and egg mixture as did Medieval European bonesetters, who used casts made of egg white, flour, and animal fat. By the sixteenth century the famous French surgeon Ambroise Paré (1517–1590), who championed more humane treatments in medicine and promoted the use of artificial limbs, made casts of wax, cardboard, cloth, and parchment that hardened as they dried.

These methods all had merit, but the standard method for the healing of fractures was bed rest and restriction of activity. The search for a simpler, less-time consuming, method led to the development of the first modern occlusive dressings, stiffened at first with starch and later with plaster-of-paris. The ambulatory treatment of fractures was the direct result of these innovations. The innovation of the modern cast can be traced to, among others, four military surgeons, Dominique Jean Larrey, Louis Seutin, Antonius Mathijsen, and Nikolai Ivanovich Pirogov.[7]

Dominique Jean Larrey(1768–1842) was born in a small town in southern France. He first studied medicine with his uncle, a surgeon in Toulouse. After a short tour of duty as a naval surgeon, he returned to Paris, where he became caught up in the turmoil of the Revolution, being present at the Storming of the Bastille. From then on, he made his career as a surgeon in France's revolutionary and Napoleonic armies, which he accompanied throughout Europe and the Middle East. As a result, Larrey accumulated a vast experience of military medicine and surgery. One of his patients after the Battle of Borodino in 1812 was an infantry officer whose arm had to be amputated at the shoulder. The patient was evacuated immediately following the operation and passed from Russia, through Poland and Germany. On his arrival at his home in France the dressing was removed and the wound found to be healed. Larrey concluded that the fact that the wound had been undisturbed had facilitated healing. After the war, Larrey began stiffening bandages using camphorated alcohol, lead acetate and egg whites beaten in water.

An improved method was introduced by Louis Seutin, (1793–1865) of Brussels. In 1815 Seutin had served in the allied armies in the war against Napoleon and was on the field of Waterloo. At the time of the development of his bandage he was chief surgeon in the Belgium army. Seutin's "bandage amidonnee" consisted of cardboard splints and bandages soaked in a solution of starch and applied wet. These dressings required 2 to 3 days to dry, depending on the temperature and humidity of the surroundings. The substitution of Dextrin for starch, advocated by Velpeau, the man widely regarded as the leading French surgeon at the beginning of the 19th century, reduced the drying time to 6 hours. Although this was a vast improvement, it was still a long time, especially in the harsh environment of the battlefield.

A good description of Seutin's technique was provided by Sampson Gamgee who learned it from Seutin in France during the winter of 1851–52 and went on to promote its use in Britain. The limb was initially wrapped in wool, especially over any bony prominences. Pasteboard was then cut into shape to provide a splint and dampened down in order that it could be molded to the limb. The limb was then wrapped in bandages before a starch coating was applied to the outer surface. Seutin's technique for the application of the starch apparatus formed the basis of the technique used with plaster of Paris dressings today. The use of this method led to the early mobilization of patients with fractures and a marked reduction in hospital time required.