**Case Study: Bone Fracture**

1.       **Describe the bone cells that are involved in generation of bone tissue.**

The three cells that are responsible for the development of the bone are the osteocytes, osteoblasts and osteoclasts. They are also involved in the process of bone remodeling and growth. The osteoblast acts as the bone forming cells. The osteocytes are the mature bone cells while the osteoclasts serve the purpose of breaking down and reabsorbing bone (Gautam et al., 2022).

2.       **Describe the steps of fracture repair.**

When one breaks or fractures a bone, they go through various stages of fracture repair before they can use their limb efficiently as before. The following are the steps or stages for fracture repair:

**Hematoma formation**

The body releases an alert to the cells when you are hurt and have a fracture and the cell starts their work immediately. After an injury the area hurts as witnessed in the case study where the Kynndal gets a huge knot on the leg. The knot is an indication of the initial process of fracture healing where the body swells to form a clot, to form a temporary frame for the next process of healing (Sheen & Garla, 2022).

**Fibrocartilaginous callus formation**

The process happens between 4 and 21 days after the initial injury where the end tips of the bone try to reunite or to stabilize each other. The white blood cells at this stage have cleared the blood of all debris and also of any bacteria. The body produces new bone cells that start forming the new bone tissue. At the site of the fracture, mesenchymal stem cells begin to differentiate into fibroblasts, chondroblasts, and osteoblasts.  As a result, the fracture site is covered with a collagen-rich fibrocartilaginous network and a hyaline cartilage sleeve.

**Bony callus formation**

The soft fibrocartilaginous is replaced by a bony callus week into bone recovery. When the bony callus hardens you will feel more like before the injury. In the case of Kyanndal, the swelling is likely to subside and the bone will start to harden (week 6-12 of fracture recovery). Blood vessels will start forming on the bone to support the growth

**Bone remodeling**

It involves the breakdown of any bone that develops in addition to the new bone to offer support to the area of fracture as it heals. The process is slow and takes time and requires bone support and care. The patient at this time has to take the right diet and engage in activities in a more cautious manner to allow the bone to develop.

3.       The physician indicated that Kyndall was lucky because the fracture occurred about 3 inches below the epiphyseal plate. Why is this important? What are some possible outcomes if the epiphyseal plate had been damaged?

It is important that the fracture occurred 3 inches below the epiphyseal plate because it meant that there was no need for surgery and a cast over the leg would help it heal. The epiphyseal plate is the primary area for the growth of the long bones and develops as the child grows. Damages to the area would require surgery to ensure that the plates are in the right state as they eventually close and form solid bones. The impact of damaged epiphyseal plates in children include deformities as the child grows and their longitudinal bones grow. It could also cause stunted growth of the bone if the plate closes earlier than it should (Tang & Zhao, 2021).

4**.       What type of fracture do you think occurred and why?**

The type of fracture that was diagnosed by Kynndal’s doctor is the fracture of the tibia based on the site of the swelling and pain areas. The fracture is a stable, closed or simple fracture since the doctors do not find it necessary to do many procedures to aid the restoration process. The symptoms also show bruising, swelling and tenderness without bones piercing through, thus a sign of slight fracture compared to oblique or comminuted fractures.

**References**

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