



**Fig. 1.8:** Right patella showing the attachments of quadriceps femoris

**5. Characters:** NO **MP HP**

A. It does not have:

- **M**edullary cavity,
- **P**rimary centre,
- **H**aversian system, and
- **P**erosteum.

B. It has articular or non-articular surface.

C. The articular surface is covered by hyaline cartilage.

D. It is lubricated by bursa or synovial fluid.

**6. Functions:** The exact function is not definitely known. However, the following functions are attributed.

**SESAMOID**

**S**erves as a mechanical advantage to the tendon.

**E**nsures (makes certain) the prevention of wear and tear of the tendon.

**S**tabilises the local circulation.

**A**lters the direction of pull of the muscle.

**M**aintains the local circulation.

**O**vercomes the pressure.

**I**nsures (protects) the vessels and nerves.

**D**iminishes the friction.

**Site:** Following are the sesamoid bones (Table 1.1).

**D. Fate of periosteum**

- a. At the ends of bone, it continues as fibrous capsule.
- b. The anterior longitudinal ligament blends with the periosteum and loses its identity in the middle of the sacrum.

E. **Blood supply:** It is mainly supplied by periosteal vascular plexus. These are the branches of muscular arteries.

F. **Nerve supply:** It has rich nerve supply through somatic nerves. They are sensory nerves. They carry pain fibres. This is the reason why fractures are extremely painful.

G. **Lymphatic:** Lymphatic vessels are abundant in the periosteum.

**2. Functions of periosteum**

- A. Osteogenic,
- B. Protective,
- C. Nutritional,
- D. Growth of the bone, and
- E. Repair of bone.

**3. Applied anatomy**

- If periosteum is removed, blood supply of the bone is lost. The bone underlying periosteum undergoes degeneration and death.
- Position of *nutrient* foramen of fibula is important clinically. When obtaining a graft surgically, the periosteum and nutrient artery are generally removed with the piece of bone. This helps graft to remain alive when transplanted to another site.
- When bone is fractured, the blood vessels and periosteum are damaged. These vessels bleed, and clot is formed between the broken ends of the fractured bone. It is called *fracture haematoma*.
- The periosteum is thick over the mandible. In fracture of mandible, the fractured bones are not displaced because of thick periosteum.
- Pain in Paget's disease is believed to result from the stretching of the periosteum.
- The inflammation of periosteum results in local pain and tenderness.

**SN-5 Epiphysis**

(*Epi*—above, *physis*—growth)

**Introduction:** The segment of bone which develops from secondary centre is called epiphysis. Secondary centre is one which develops after birth.

**1. Classification**

- A. Based on *number of epiphysis* (structurally).
  - a. **Simple:** Ends of long bone develop from many epiphyses. They fuse independently with shaft, e.g. femur.

1. **Characters**

- A. It is most
  - a. Active part of bone
  - b. Vascular part of bone, flooded in the lake of blood.
- B. It is the site of
  - a. Attachment of tendons, and ligaments,
  - b. Maximum pull, stress, strain and tension, and
  - c. Maximum growth.

2. **Types of metaphysis****A. Intracapsular**

- a. Metaphysis is present inside the capsule.
- b. Examples: Upper and lower ends of
  - I. Humerus, and
  - II. Femur

**B. Extracapsular**

- a. Metaphysis is present outside the capsule.
- b. Examples: Upper and lower ends of
  - I. Radius, and
  - II. Tibia

3. **Blood supply:** It is by following arteries

- A. Nutrient artery,
- B. Periosteal artery, and
- C. Juxtaepiphyseal artery.

4. **Applied anatomy**

- Metaphysis is susceptible to infection in the immature bone.
- Infection of long bone primarily affects metaphysis. The nutrient arteries in the region of metaphysis form hairpin bend. The constricted area of nutrient arteries may get blocked by thrombus. It results in necrosis. It is the common site of osteomyelitis in children.
- Infection can reach through the intracapsular metaphysis and cause septic arthritis.
- Since muscles, ligaments and joint capsules are attached close to metaphysis, this is likely to be damaged by sheering strain of the muscle.
- It is the region favouring haematogenous spread of infection.

**SN-7 Blood Supply of the Long Bone**

## 1. The blood supply of long bone (Fig. 1.12) is by following arteries

**A. Nutrient artery****a. Features**

- I. It is a branch of artery of the region.

## 2. Applied anatomy

- **Osteomyelitis:** The small embolus blocks the nutrient arteries at the site of hairpin bend. The distal part of the bone results into avascular necrosis. This condition is called osteomyelitis.
- Shaft of long bone is affected in congenital syphilis.

### SAQ-3 Growing End

1. The active end of the long bone is called growing end. It is plate of cartilage between diaphysis and epiphysis. Examples: All long bones.

#### 2. Features

- A. The part of the bone which develops from secondary centre is called epiphysis. The epiphysis which appears first and fuses with the diaphysis (shaft) last is called growing end.
- B. Each bone has two epiphyseal ends.
  - a. Growing end
  - b. Non-growing end
    - Growing end does
      - I. More work,
      - II. For longer time, and
      - III. Faster.
    - The non-growing end does
      - I. Less work,
      - II. For shorter time, and
      - III. Slow.
- C. Bone increases in length at growing end.
- D. The *growing end grows longer time and more rapidly* than the other end.
- E. The growing end is opposite to the direction of nutrient foramen. The direction of nutrient foramen is decided by a slogan. **"Towards the elbow I go, and away from the knee I flee"**.

Table 1.5 shows the growing end of different long bones.

**Table 1.5:** The direction of nutrient foramen and growing end of long bones

Bone	Direction of nutrient foramen	Growing end
Humerus	Downward	Upper end
Radius, ulna	Upward	Lower end
Femur	Upward	Lower end
Tibia, fibula	Downward	Upper end

## 3. Applied anatomy

- The knowledge of growing end of the concerned long bone is necessary for surgeons to manipulate the space. The situation arises when a boy / girl meets an