Introduction

Bone tumours are growth of abnormal cells in bones. Bone tumours may be benign or malignant. Benign bone tumours are relatively common, but malignant are rare. Also, bone tumours may be primary benign or malignant tumours that originate in the bone itself or metastatic malignant tumours that originate elsewhere in the body (for example, in the breast or prostate gland) and then spread to bone. In children, most malignant bone tumours are primary; in adults, most are metastatic[1].

Bone pain is the most common symptom of bone tumours. The pain can be severe. In addition, a lump may be noticeable. Sometimes a tumour, especially if malignant, weakness a bone, causing it to fracture with little or no stress (pathologic fracture).

A persistently painful joint or limb should be X-rayed. However, x-rays tend to show only that there is an abnormality suggestive of an abnormal growth, usually without indicating whether a tumour is benign or malignant. Computed tomography (CT) and magnetic resonance imaging (MRI) often help determine the exact

location and size of the tumour and give additional information as to the nature of the tumour, but these tests rarely provide a specific diagnosis[2].

Vascular tissue is ubiquitous and frequently gives rise to tumours and tumour like malformations in the skin, soft tissue, and viscera. In bone, the nutrient arteries penetrate the cortex and branch into an abundant network of small arteries and capillaries. The rich capillary network in the medullary cavity is drained to efferent venules and veins. The periosteal vessels supply the outer portion of the cortex. Communication between the periosteal and medullary vasculature is provided by anastomotic vessels within Volkmann's and Haversian canals. A rich network of periosteal lymphatics is present. The presence of medullary lymphatics can be best documented in abnormal conditions of lymph stasis. Despite the rich vascularity of bone, skeletal vascular lesions are rare, and consequently knowledge of their clinical and pathologic features is still limited[3].

AIM OF THE WORK

The aim of this study is to review the literature about different kinds of vascular bone tumour, types, diagnosis and treatment.

BLOOD SUPPLY OF BONE

Bone has a rich vascular supply, receiving 10-20% of the cardiac output. The blood supply varies with different types of bones, but blood vessels are especially rich in areas that contain red bone marrow[4].

Long bones:

- *Diaphyseal nutrient artery*: This is the most important supply of arterial blood to a long bone. One or 2 principal diaphyseal nutrient arteries first pass obliquely through the cortical bone. These arteries then divide into ascending and descending branches and supply the inner two thirds of the cortex and medullary cavity.
- *Metaphyseal and epiphyseal arteries*: Numerous metaphyseal and epiphyseal arteries supply the ends of bones. These blood vessels mainly arise from the arteries that supply the adjacent joint, anastomose with the diaphyseal capillaries, and terminate in bone marrow, cortical bone, trabecular bone, and articular cartilage. In growing bones, these arteries are separated by the epiphyseal cartilaginous plates.

- *Periosteal arterioles*: Several of these vessels supply the outer layers of cortical bone.

Large irregular bones, short bones, and flat bones:

These bones receive a superficial blood supply from the periosteum, as well as frequently from large nutrient arteries that penetrate directly into the medullary bone. The 2 systems anastomose freely.

Venous and lymphatic drainage of bone:

Blood is drained from bone through veins that accompany the arteries and frequently leaves through foramina near the articular ends of the bones. Lymph vessels are abundant in the periosteum[5].

Classification[3]

- **Benign vascular tumours:**
  1. Hemangioma.
  2. Lymphangioma.
  3. Cystic angiomatosis.
  4. Glomus tumour.
- **Malignant vascular tumours:**
  1. Angiosarcoma.
  2. Hemangiopericytoma.
  3. Epithelioid hemangioendothelioma.
  4. Kaposi's sarcoma.

Benign Vascular Bone Tumours

Hemangioma:

Definition

Hemangioma is a benign solitary tumour composed of newly vessels of capillary or cavernous types which occur in the medullary cavity and infrequently in the cortex or on the surface of bone[6].

Incidence:

Hemangiomas of bone are rare lesion accounting for less than 1% of primary bone tumours[7].

Age and sex:

Hemangiomas have a wide age distribution ranging from the first to eight decades of life, with nearly 70% of the cases diagnosed in patient between 30 and 60 years[2].

Hemangiomas are slightly more common in women than in the men[8].

Skeletal distribution:

Hemangiomas frequently occur in the craniofacial bones, predominately in the calvarium, and in some

series nearly 50% of the lesion occurs at this site. The spine is involved in approximately 20% of cases, especially the thoracic region. The major long tubular bones are most frequently involved in appendicular skeleton[8] (Fig. 1).

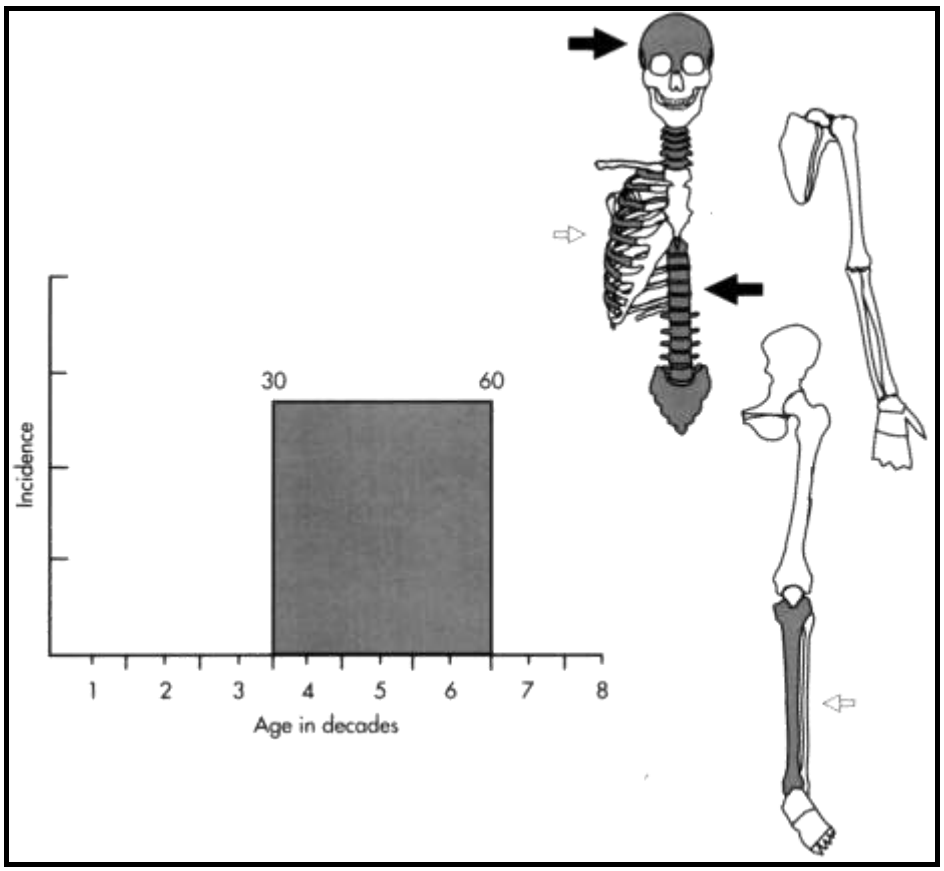

Fig. (1): Hemangioma, peak age incidence and frequent sites of skeletal involvement[8].

Clinical picture:

Most lesions are silent and discovered accidentally[9]. But in the vertebral hemangiomas that produce clinical symptoms are usually associated with back pain and muscle spasm followed in an acute episode of sever pain and neurologic symptoms of spinal cord compression . The lesion is usually associated with collapse of vertebral body or bulging cortex that compresses the spinal cord or nerve roots[10].

Radiographic features:

Plain X-ray:

Radiographic features or findings depend on the type of bone involved.

Flat bone:

Hemangiomas present as lucent, well demarcated defect. In flate bone[11], they markedly expand the bone contour and produce rarefaction in the radially or internal striations (Fig. 2).

The characteristic sunburst appearance of hemangioma is seen in skull lesions and is produced by fine spicules of reactive new bone in the periosteum radiating outwards from the center of the lesion.

The vascular nature of the lesion often is suggested by its honeycomb trabeculated appearance (Fig. 2). The overlying cortex is expanded and thinned, but complete cortical disruption and invasion to soft tissue are not present[12].

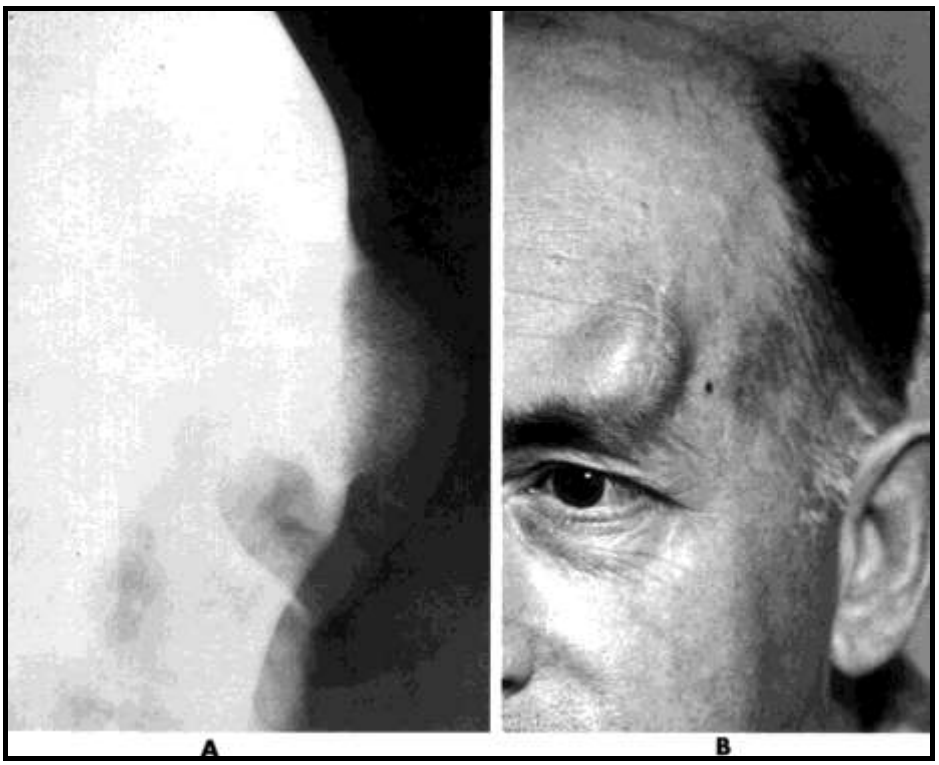

Fig. (2): Hemangioma of bone: Radiographic and gross features. A, Hemangioma of frontal bone with prominent striations of bone trabeculae traversing lesion. B, Clinical photograph of lesion shown in A[12].

Vertebra:

Vertebral hemangiomas appear on radiographs as an area of rarefaction traversed by thickened

vertical bone trabeculae, which give them a striated or corduroy like appearance. The majority of lesion in this location measures less than 1cm, large lesion can occupy the entire vertebral body [10] (Fig. 3).

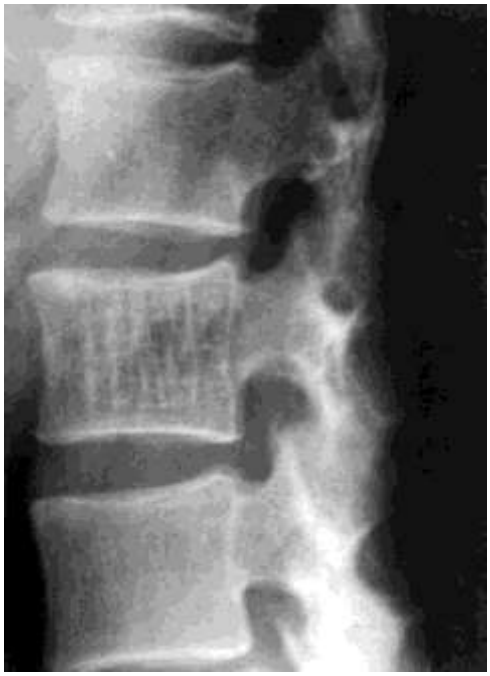

Fig. (3): Hemangioma of vertebra: Radiographic features. Lateral view of upper lumbar spine shows corduroy-like appearance of vertebral body produced by thickening of vertical bone trabeculae traversing hemangioma[10]

Hemangioma can be easily misdiagnosed as a solitary focus of paget's disease or metastatic cancer. However, in cases of hemangioma the pattern lacks the cortical thickening or "picture framing" which is characteristic of paget's disease[13]. Also the same appearance may be caused by multiple myloma, lymphoma and blood dyscrasia[14].

Tubular bone:

Hemangiomas that involve large bone can reach considerable size before they become symptomatic. Consequently, lesion of long tubular bones are usually larger than those of the skull and vertebral bodies.

They involve the metaphyseal and diaphyseal parts of long tubular bones and present radio-graphically as lytic areas and eccentric with bone trabecultion creating a soap bubble or honey comb appearance a result of proliferation of engorged vessels and thickened remolded trabeculae. Expansion of the bone contour with thinning of the cortex frequently seen[13] (Fig 4).

In extremely rare cases, hemangioma can present as an intracortical lesion and mimic other intracortical lesions that occurs more frequently such as ostiod ostoma and abcess. Hemangioma can be also present as a subperiostal lesion (Fig. 5).

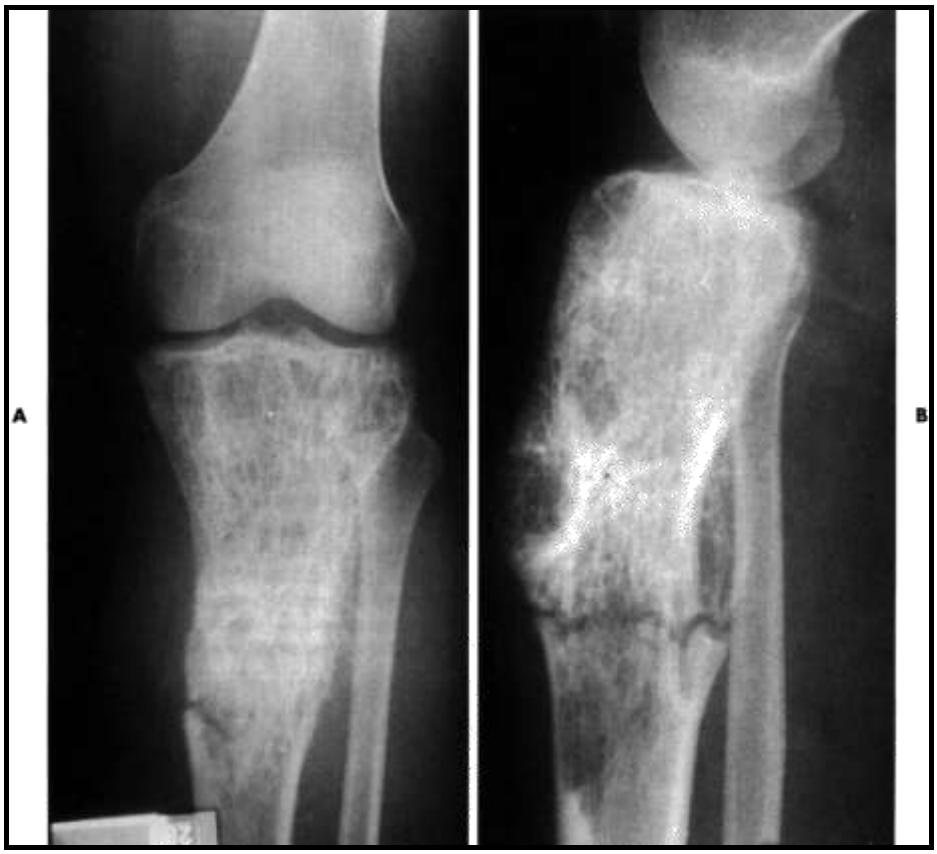

Fig. (4): Hemangioma of Tibia: Radiographic features. Anteroposterior (A) and lateral (B) radiographs of knee of young women who sustained pathologic fracture through large, previously asymptomatic honeycombed lesion occupying proximal half of tibia. Radiating spicules of periosteal reactive bone are prominent. Especially on lateral aspect, and suggested preoperative diagnosis of primary malignant bone tumour[13].

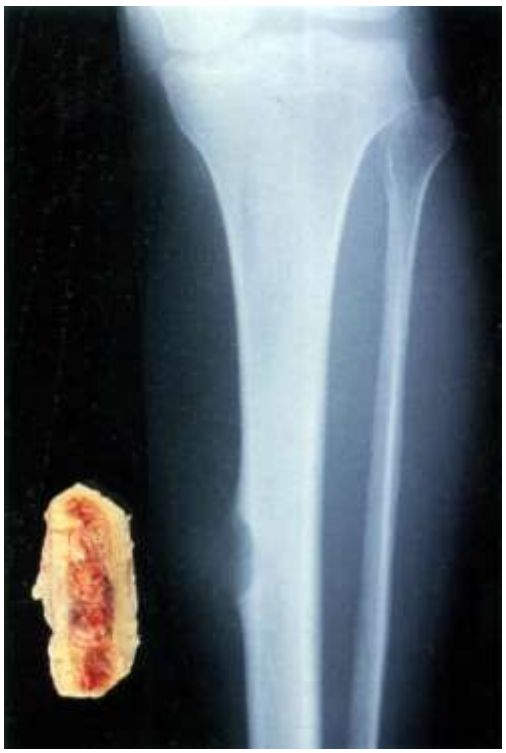

Fig. (5): Subperiosteal hemangioma: Radiographic and gross features. Antero-posterior radiograph shows lytic subperiosteal lesion of tibial shaft. Inset shows resection specimen.[11]

Computed tomography:

C.T imaging preferably, is highly specific in diagnosing vertebral hemangioma[7].

On transverse CT scans, a "polka dot" pattern is demonstrated, because the vertical trabeculae are imaged in cross section[15] (Fig. 6).

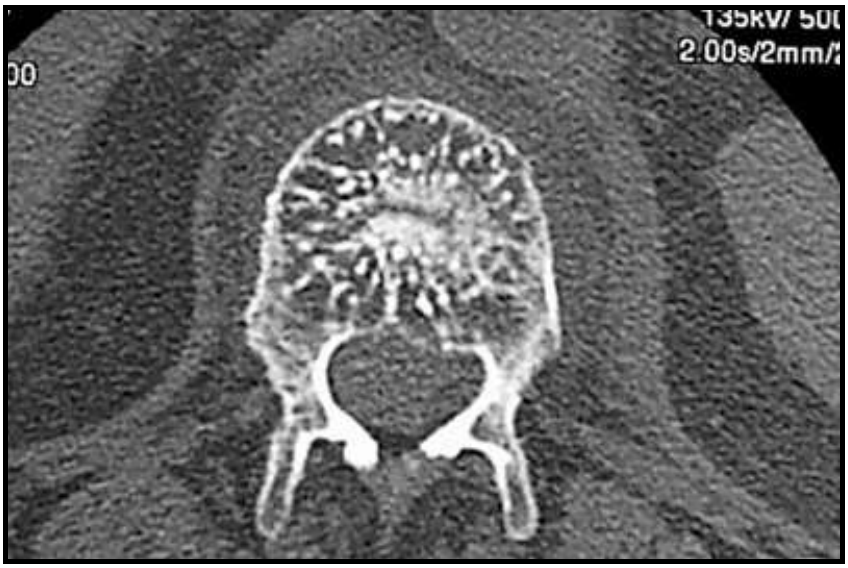

Fig. (6): Axial computed tomogram of lumbar vertebra containing hemangioma of vertebral body. Cross sections of thickened vertebral (weight-bearing) trabeculae produce polka-dot appearance typical of this lesion[15].

Magnetic resonance imaging (MRI):

Magnetic resonance imaging hemangioma generally reveals a low signal on T1 weighted images and high signal on T2 weighted images. In vertebral body hemangiomas, the loss of hematopoietic cells in the interstices of hemangiomas and apparent increase in fat can produce a high signal in T1-weighted images[16].

T1-weighted magnetic resonance imaging clearly demonstrates the lesion as a well demarcated area of high signal as a result of the apparent increase of fat[16].