presence of a *fracture of a malleolus;* the line of fracture may separate the whole of the lower end of the tibia.

(*b*) If, with signs of fracture of the lower end of the fibula, there be found increased lateral mobility in the ankle joint, it shows that the internal malleolus or the internal lateral ligament has been broken, and that the injury is a *Pott's fracture*, with reduction of the displacement.

(*c*) If there be no evidence of fracture of the bones of the leg, but the attempt to stand causes great pain, and movement of the foot causes crepitus deep in under the arch of the ankle, the surgeon may diagnose *fracture of the astragalus.*

(*d*) If there be acute pain over or behind either malleolus, with swelling and ecchymosis, feel carefully for the tendons which should be behind the bones, and if there be an unnatural depression behind, or an elongated prominence over either malleolus, or if, when the patient extends the foot, the tendon can be felt to slip forward on to the bone, with severe pain, the diagnosis of *dislocation of peroneus longus or tibialis posticus tendon* should be made. There may be some unnatural mobility of the foot in this injury.

(2) **There is obvious deformity about the ankle.** (*a*) **The foot is displaced outwards.**—This may be due to

(α) Pott's fracture;
(β) Dupuytren's fracture,
(γ) Subastragaloid dislocation of the foot.

(α) If the foot be displaced out, if its outer border be raised, with the sole looking down and out, and the inner ankle be very prominent, while there is a marked depression on the outer side of the leg above the ankle joint, the injury is a *Pott's fracture*, with persistence of the original displacement. The shape



of the inner malleolus, or the detection of a small movable fragment of bone below it, may show that this process of bone is broken; where this bone does not give way the internal lateral ligament is torn. When the deformity is reduced there may be found increased lateral mobility in the ankle.

(β) If the foot be displaced outwards to a considerable extent, and not at all, or only to a slight degree, everted, the inner ankle being very prominent, and nearer the sole than normal, while the breadth between the two malleoli is greatly increased, and the length of the leg, measured to the tip of the outer malleolus, is shortened, the injury is a *Dupuytren's fracture.* There is a depression over the fracture of the fibula, above the malleolus, as in the former case.

(γ) If there be no increased lateral movement in the ankle, no depression over the lower part of the fibula, but both it and the tibia be entire, and the length of the leg as measured to the tip of either of them be unaltered; and with this there be great prominence of bone in front of and below the inner ankle, while the foot is displaced out and everted, and the outer ankle is sunk in a depression, the injury is a *subastragaloid dislocation of the foot outwards.* This is usually combined with backward displacement of the foot, undue pointing of the heel, and shortening of the part in front of the ankle.

(*b*) **The foot is displaced inwards.**—This may be due to

(α) Dislocation of the ankle inwards;
(β) Subastragaloid dislocation of the foot inwards;
(γ) Dislocation inwards at the medio-tarsal joint.

(α) If the lower end of the fibula be very prominent on the outer side, and the astragalus and internal malleolus project on the inner side of the ankle, while the width between the malleoli is increased with the

ankle joint allowing of lateral movement, the injury is a *dislocation inwards of the ankle.* This is a very rare accident, and is always accompanied with fracture of one or both of the bones of the leg.

(β) If the foot be displaced inwards and the inner malleolus be sunk in a hollow caused by the inward projection of the foot, and on the outer side of the dorsum is a rounded prominence of the head of the astragalus in front of the outer malleolus, there is a *subastragaloid dislocation of the foot inwards.* This is generally combined with some amount of backward displacement of the foot, increasing the distance between the malleoli and the heel, and lessening the distance between the inner malleolus and the scaphoid, or the outer malleolus and the base of the fifth metatarsal bone.

(γ) If the relation of the malleoli to the heel be unaltered, but the anterior part of the foot be displaced inwards, the tubercle of the scaphoid bone being very prominent on the inner side of the foot, while the front of the os calcis projects on the outer side in front of the outer malleolus, and the cuboid and fifth metatarsal bone are displaced inwards, the surgeon will recognise a *dislocation inwards at the medio-tarsal joint.*

(*c*) **The heel is flattened,** *i.e.* has lost its natural prominence. This may be due to

(α) Dislocation of the foot forwards,
(β) Subastragaloid dislocation forwards;
(γ) Transverse fracture or the os calcis.

(α) If the projection of the heel be lessened or lost, and the length of the foot in front of the tibia and fibula, as measured from either malleolus to the extremity of the toe of the same side, or to the tubercle of the scaphoid or to the base of the fifth metatarsal bone be increased, there is a *dislocation of the foot forwards.* The dislocation may be partial or complete; when complete the malleoli are approximated to the sole, the tibia projects behind, and the upper surface of the astragalus can be felt in front of it. This is a very rare injury.



(β) If the projection of the heel be lost, and the length of the foot in front of the leg be increased, but the malleoli not approximated to the sole, the ankle still allowing some amount of passive movement, while in front of the lower end of the tibia the rounded head of the astragalus can be felt, and in front of that a depression, the surgeon may diagnose a *subastragaloid dislocation of the foot forwards.* This is an exceedingly rare accident.

(γ) If the heel be flattened, but the length of the foot in front of the malleoli is not increased, feel carefully along the tendo Achillis, and if at its extremity, which is above the heel, the portion of bone to which it is attached be felt movable, there is a *fracture of the os calcis.* There may be great, little, or no separation of the fragments, depending upon the extent to which the fibrous structures are torn.

(*d*) **The heel is elongated,** *i.e.* its prominence is increased; this may be due to

(α) Fracture or diastasis of lower end of tibia,
(β) Dislocation of the ankle backwards;
(γ) Subastragaloid dislocation of the foot backwards.

(α) If the heel project behind, and its relations to the two malleoli are unaltered, whilst above the ankle-joint there is a projection forwards of the tibia, and by drawing the foot forwards the deformity is corrected, and crepitus is elicited, there is a *fracture of the lower end of the tibia and fibula.* If the accident occur in an individual under eighteen years of age, and the anterior projection be rounded, and the crepitus not easily obtained, and soft in character, it is to be

recognised as a *diastasis of the lower epiphysis of the tibia.*

(β) If the heel be lengthened, and the front of the foot shortened, as measured from the malleoli, while the malleoli are approximated to the sole, all movements at the ankle joint being abolished, and if the lower ends of the tibia and fibula can be felt resting upon the scaphoid and cuboid bones, while the astragalus, if felt at all, is felt behind the tibia, between it and the tendo Achillis, the injury is a *dislocation of the foot backwards.*

(γ) If the heel be lengthened, and the front of the foot shortened, but the tibia and fibula are not resting on the scaphoid and cuboid, but are separated from those bones by the rounded and prominent head of the astragalus, which projects on the dorsum of the foot, in front of the tibia, the injury is a *subastragaloid dislocation of the foot backwards.* There may be some amount of passive flexion and extension still possible at the ankle joint.

(*e*) **The heel is raised.**—This deformity may be caused by

(α) Dislocation of the foot upwards;
(β) Fracture of posterior part of tibia and fibula;
(γ) Fracture of os calcis.

(α) If the malleoli are widely separated, with the skin tightly stretched over them, and their extremities approximated to, or actually reaching, the sole, while the length of the tibia is unaltered, and that of the leg, measured to the sole, is decreased, the injury is a *dislocation of the foot upwards* between the tibia and the fibula.

(β) If the heel be raised, the toes pointed down, and the breadth of the outer malleolus increased, while a vertical depression or groove along it shows that it is split into an anterior part continuous with the shaft



of the bone, and a posterior one adherent to the displaced foot; and, further, if there be a depression immediately in front of the lower end of the tibia, with crepitus on attempting to reduce the deformity, the surgeon is to recognise a *fracture of the posterior part of the lower end of the tibia and of the fibula,* with displacement of the foot and of the separated fragment up and back.

(γ) If the prominence of the heel be raised, and be movable apart from the rest of the foot, the surgeon will, of course, recognise a *fracture of the os calcis,* which in a young person under sixteen years of age may be a *separation of the epiphysis* of the bone. This injury is also referred to on page 233.

(*f*) **The heel is displaced outwards.**—This is a very rare deformity; but if the heel, without the anterior part of the foot, be displaced outwards, and be very prominent under the skin, and the arch of the foot be flattened, the injury is a *dislocation outwards of the os calcis.* Passive flexion and extension of the ankle joint is possible, but abduction and adduction of the foot are impossible. In this deformity measurements show that the relation of the internal malleolus and the scaphoid are unaltered, and the astragalus can be felt occupying its normal position under the tibia.

If the heel be found to be painful, tender, not displaced, but increased in width, and if on manipulation crepitus be detected in it, there is evidence of a *fracture of the os calcis.* The signs will vary somewhat with the amount of crushing of the bone. If the accident was strong inversion of the foot, which was immediately succeeded by eversion, and the arch of the foot be found flattened, and the malleoli approximated to the tendo Achillis, and there is pain in standing, with crepitus and mobility of a fragment of a bone on the inner side of the os calcis, the signs are believed to

indicate a *fracture of the sustentaculum tali.* In some cases a scale of bone on the outer side in connection with the middle slip of the external lateral ligament may be felt detached, movable, and giving crepitus when rubbed against the body of the bone.

If the malleoli be found approximated to the sole, not separated from one another more than the normal distance, and there be no, or but very slight, alteration in the length of the heel or of the anterior part of the foot, there is a *dislocation of the astragalus.* If the bone be displaced forwards, it will be seen and felt projecting under the skin of the dorsum of the foot, and not only its head, but its saddle-shaped upper surface, will be felt; the bone passes forwards and obliquely outwards or inwards. This dislocation may be confounded with the subastragaloid dislocation of the foot backwards and laterally; but it is to be distinguished from the latter by the absence of prominence of the heel, by the depression of the malleoli, by the loss of all flexion movement in the ankle, and by the detection of the upper articular surface of the astragalus, as well as the displaced head of the bone riding on the tarsus. When the astragalus is displaced backwards it will be found lying between the tibia and the tendo Achillis, and rotated. The detection of the displaced astragalus, of course, is necessary to establish the correctness of the diagnosis of this very rare dislocation.

Where the most careful examination fails to show any deformity of the ankle, any alteration in the measurements between the various bony points, or any mobility of any portions of bone, or crepitus, or displacement of any tendons, and yet, as a result of a twist or strain, the part is hot and swelled, movement in it is painful, and pressure in certain parts causes pain, the surgeon is to diagnose a *sprain.* By moving individual joints separately, the injured joint will be detected;



and by noting the points of tenderness and the movements which excite most pain, an estimate may be formed of the parts of the articulation which are most injured.

F. **Injuries of the foot.**—Under this head are included all those injuries of the foot which are not attended with deformity about the ankle, and which are therefore not liable to be confounded with fractures and dislocations of that joint. The diagnosis will mainly rest upon the history of the accident, and the existence of pain, loss of power, deformity, abnormal mobility, and crepitus. Œdematous swelling may mask deformity and obscure the other signs of these injuries, and in such cases the formation of the discoloured blebs, so characteristic of fractures of bones, may enable the surgeon to determine upon the existence of a fracture.

(1) When the pain and swelling are located in the instep, and on grasping the front of the foot and rotating or flexing it upon the heel firmly held in the other hand, crepitus is elicited; or when the swelling is great, preventing this manipulation and the observation of the outline of the metatarsus, and dark discoloured blebs arise, the surgeon should diagnose a *fracture of the metatarsus.* The position where the crepitus is felt will determine which bone is broken.

(2) The toes are to be separately examined, and on detecting any deformity, pain or swelling in any one of them, the surgeon should attempt to obtain movement in the length of each phalanx separately; and if he find abnormal mobility and crepitus he of course diagnoses a *fracture of a phalanx.* The last two injuries are produced by direct violence.

(3) If the relations of the heel and the malleoli are normal, but the distance between the malleoli and the bases of the first and fifth metatarsal bones is shortened, and these latter bones are very prominent on the

dorsum of the foot, the sole being preternaturally hollow, there is a *dislocation of the metatarsus upwards.* The internal cuneiform bone may be displaced with the metatarsus forming a marked prominence on the dorsum behind the base of the first metatarsal bone, and extending nearer the ankle than the outer part of the dorsal prominence. If, however, the dorsal prominence be formed by the anterior bones of the tarsus, being abrupt in front instead of behind, as in the former case, and the bases of the metatarsal bones be found lying beneath the tarsus and projecting into the sole, there is a *dislocation of the metatarsus downwards.*

(4) If the middle line of the front of the foot be not in a line with the axis of the leg, ankle, and instep, but be displaced to one or other side, and if the base of the metatarsal bone, towards which it is displaced, be unusually prominent, while the bone on the opposite side of the metatarsus is sunk in and cannot be felt so readily as usual, and if the front of the bone of the tarsus with which it articulates (cuboid or cuneiform) project, there is a *dislocation of the metatarsus laterally.*

(5) If a firm evidently bony projection be found on the dorsum of the foot, corresponding in position and shape to the scaphoid or one of the cuneiform bones, and the corresponding toes or toe be found shortened, the diagnosis of *dislocation of the scaphoid or cuneiform bone* must be made. Similarly, if the little toe be found shortened, the base of its metatarsal bone unduly prominent, and approximated to the outer malleolus, with a depression immediately behind it, and below this depression a bony mass be felt in the sole making the middle of the outer border of the sole project, a *dislocation of the cuboid* bone would be diagnosed.

(6) If at either of the phalangeal joints there be a deformity (a projection upwards of the base of the phalanx) with fixity of the articulation, there is a *dislocation of a phalanx.* This displacement may be partial or complete, purely dorsal or partly lateral also.



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## CHAPTER XV.

### THE GENERAL DIAGNOSIS OF SWELLINGS AND TUMOURS.

WHEN examining a swelling or tumour for the purpose of arriving at a knowledge of its nature, there are certain general facts to be ascertained and investigated in every case; it is from a knowledge of its exact physical characters that, in most cases, we are able to arrive at a recognition of its vital character. In this chapter it is proposed to examine the bearing of the various features of swellings upon the diagnosis of their nature, and to state the general rules by which the surgeon may be guided in the diagnosis of tumours.

I. The **history of its first appearance** is the first fact to be ascertained in respect of any swelling. This may present several varieties.

(A) **Congenital tumours.**—These include *malformations*, such as meningocele, encephalocele, spina bifida, attached fœtus, included fœtus, congenital dislocations, hydrocele, and hernia; *cystic tumours*, such as dermoid cyst, serous cyst of neck, axilla, perineum, etc., blood cyst, cystic hygroma; *solid tumours*, such as lipoma, fibrous tumour of gum, scalp, skin, sacral and coccygeal tumours; *hypertrophies*, seen particularly in the limbs; *vascular growths*, or the different varieties of nævus; and *thickenings* around bones in cases of intra-uterine fracture.