

forms a prominence in the thenar eminence, and, in addition, is displaced to the radial or ulnar side of its metacarpal bone. The thumb is shortened; the interphalangeal joint is flexed. A characteristic feature is the pronation of thumb in the ulnar displacement and supination in radial displacement.

CHAPTER XIX

INFLAMMATORY PROCESSES IN THE HAND

IN the vicinity of the carpus any *effusion* which is plainly recognisable can be situated only in the radiocarpal joint. The relations of such a swelling can be studied on the cadaver if the joint cavity is filled through a hole bored obliquely through the radius. Occasionally such an effusion will be seen in the living subject, and the clinical findings will then be found to correspond with those experimentally obtained. In the cases that I had occasion to see, the hand was held in slight abduction, and a flat, fluctuating swelling appeared upon the dorsum of the carpus. The upper boundary of the swellings was plainly formed by the posterior edge of the radial articular surface. The swelling showed considerable increase of tension when the hand was pressed upward toward the radius. In addition, a slight degree of abnormal mobility could be demonstrated between the radius and the carpus. In these cases, after inflammatory symptoms had subsided, absorption of the fluid took place when treatment by means of pressure was instituted. Inflammation of the carpal joints, in toto, is not distinguished by symptoms such as these, for the rigid capsules prevent the collection of a recognisable amount of fluid. Instead of a fluctuating tumour, *diffuse* swelling of the whole

region occurs. The question whether the process is intra- or extra-articular then arises.

In the two varieties most frequently met with in practice, the etiology of the case will solve the problem. Rheumatism and tuberculosis are intra-articular processes; consequently, a swelling which includes the whole carpus, appearing during the course of a rheumatic attack, or evidently of tubercular origin, is intra-articular. In subcutaneous injuries there is room for doubt, but the point at issue is of little consequence. A contusion is sure to injure the extra-articular soft parts, and may extend to the intra-articular structures as well. A sprain, on the other hand, will certainly do harm to the articulations, and may be complicated by some extra-articular hemorrhage. In these cases it is of little importance to be able to state whether the one or the other of the many complicated structures which form the hand have been harmed, outside or inside the articular cavities.

In wounds and cellulitis this statement does not hold true. It is necessary to decide whether the wound has penetrated the joint, whether the pus has eroded the capsule. The probe at once answers these questions. In cases of longer standing, in purulent processes due either to open wounds or to cellulitis, abnormal mobility of the carpus and crepitus will show whether the ligaments have been destroyed and the articular cartilages eroded.

TUBERCULOSIS OF THE CARPUS, which was previously merely alluded to, gives an unmistakable picture. The hand assumes a position of slight flexion, and is supported by the patient. All the phalangeal joints are fully extended; this is due to prolonged disuse. The

carpus is greatly swollen; at times it is wider than the metacarpus. Œdema covers the dorsum of the carpus and extends upward for some distance upon the forearm. The hand is like that of a giant, and the picture is completed by numerous granulating fistulæ situated upon the back, outer, and inner side, which discharge thin pus. Later, mobility and crepitus can be obtained in many instances.

Earlier stages of tuberculosis of the carpus can be recognised by the following symptoms: the appearance of the patient, spontaneous origin of the trouble, slow course, and diffuse swelling devoid of the cardinal signs of inflammation. The original focus of disease is frequently situated in the lower end of the radius or in the base of a metacarpal bone. Therefore, at this early stage, in addition to diffuse swelling of the carpus, the disease is more evident at the lower end of the radius or the base of some metacarpal, as the case may be.

In acute processes, at the lower end of the radius, the diagnosis between rheumatism and osteomyelitis may be made by means of the symptoms already mentioned in connection with these same diseases in the elbow-joint. It should be kept in mind that the radius is a more common site of osteomyelitis than the lower end of the humerus.

SYNOVITIS of the tendon sheaths of the wrist is a special variety of periarticular process. Anteriorly a large synovial sheath is common to the flexors of the fingers, and external to this is the separate sheath of the flexor longus pollicis. The sheath extends about two centimetres up the forearm and passes beneath the anterior annular ligament. Its lateral boundary may be indicated by a line extending diagonally from

the base of the thenar eminence to the metacarpophalangeal joint of the little finger. A swelling of this tendon sheath must consequently possess the following characteristics: 1, boundaries corresponding to the above description; 2, a narrower middle portion, where the annular ligament constricts the tumour, so that the portions in the forearm and in the palm are wider. If the swelling fluctuates, we are dealing with *tenosynovitis*, and as a rule many small ricelike bodies can be felt. If the tumour is merely elastic, the condition is one of so-called *fungus* (tubercular tenosynovitis)—that is, proliferation of granulation tissue without suppuration, formerly merely surmised, but now positively known to be of tubercular origin. Suppuration of the tendon sheath is accompanied by high fever, bluish-red discoloration of the skin of the palm, and œdema of the dorsum of the hand. The pus, by preference, burrows along the tendons and spreads upward upon the forearm. Occasionally a panaritium will extend in a similar fashion, and may therefore be discussed in this connection.

The word PANARITIUM (whitlow) originally included only an inflammation of the nail proper, but the term has gradually been applied to all suppurative inflammations of the fingers. Not including the inflammations of the nail bed, which are characterized by strict limitation to the structures of the nail, three forms of inflammation are met with. They are *phlegmon of the cellular tissues*, *suppuration of a tendon sheath*, and *periostitis of a phalanx*. The following points are of value in their diagnosis: *Periostitis*, as a rule, will affect an entire phalanx, causing a uniform enlargement of its whole circumference. *Suppuration of a tendon sheath* will corre-

spond to the anatomical distribution of these structures, and consequently appear only on the flexor surface and extend along all the phalanges. A *cellular phlegmon* will not remain confined either to a single phalanx or to the tendon sheath; its distribution will correspond to the cellular tissues irrespective of anatomical boundaries. In a given case, a glance will suffice to arrive at the correct diagnosis. If the swelling and redness extends along the radial side of a phalanx, or along the dorsum of two phalanges, or, in another case, along the flexor and ulnar surface of two phalanges, we may suspect that the inflammation affects the cellular structures, and not some anatomical unit. The distribution of the periosteum and cellular tissue requires no description, but the anatomy of the tendon sheaths deserves a few words of explanation. The sheaths of the flexor tendons are divided into two compartments—the phalangeal and the carpal. The phalangeal tendon sheath is a cylindrical tube, through which the tendon passes like a trochar through its canula. It ends blindly above, and is attached to the tendon. Movement is permitted by reduplications of the membrane, which folds and unfolds in response to motion. The upper limit of the synovial sheath is slightly distal to the middle of the palm. A suppuration of the sheath, consequently, extends from the terminal phalanx, along the flexor surface of all the phalanges, to the middle of the palm.

The thumb and little finger do not conform to this arrangement. The sheath of the little finger is not shut off above; it is directly continuous with the large carpal tendon sheath. The thumb boasts of a privileged and independent position, compared with that of the

other fingers, for its carpal sheath is distinct and continuous with that of its phalanges. For this reason, inflammation of the tendon sheaths of the little finger and of the thumb are more serious, as the process can readily extend to the great carpal sheath.

When the suppuration extends from the tendon sheath of the little finger along the small opening which is situated between the superficial and deep flexor tendon, and spreads to the large carpal sheath, the involvement causes an increase in the severity of the symptoms. The inflammation rapidly involves the whole palm, and spreads up to the lower part of the flexor surface of the forearm, passing under the annular ligament. The palm becomes a dark coppery red, and an extensive collateral œdema of the dorsum of the hand at once develops.

Suppuration of the other phalangeal sheaths may, however, also reach the great carpal sheath, not by direct extension, but by dissecting its way along the tendons themselves. The pus does not break through the dense palmar fascia, but points at the dorsum, after burrowing between the metacarpal bones. Most commonly it finds its way to the interval between fourth and fifth metacarpal, close to their heads; but at times, as has been stated, it may appear on the forearm.

The diagnosis of these various conditions can usually be made. If asked for a prognosis, be cautious, and do not limit the extent of the sloughing to a tendon sheath, if the process was originally a suppurative tenosynovitis. For it is not possible to predict whether or not a small piece of bone, or even an entire phalanx, may necrose.

At times it is impossible to decide whether a sup-

purative tenosynovitis or a periostitis is, or has been, in progress. After the first symptoms have subsided, an enlarged, sausage-shaped finger, with two or three fistulous tracts opening on the palmar surface, results. Usually one or all the phalanges are found necrotic in these cases. But, exceptionally, suppuration of the tendon sheath, accompanied by enormous thickening of the finger and numerous fistulæ, may run its course without injury to the bones. It is, therefore, necessary to probe the sinuses, and test for abnormal mobility of the phalangeal joints, before giving a prognosis. If one or all the joints show abnormal mobility, with faint crepitus, and the sinuses do not lead to roughened bone, ankylosis, without separation of a part of the phalanx, may be the final outcome.

The common carpal extensor sheath is infrequently the seat of suppurative processes. It is more often distended by a non-purulent effusion. The sheath is small, and ends toward the metacarpus in four small processes. The shape of the resulting swelling is quite characteristic.

Serous effusions into the various tendon and synovial sheaths of the carpus are readily recognised, if their distribution and extent are kept in mind. As they are unimportant, a more detailed description may be dispensed with. But one variety deserves mention. A patient complains of pain in his hand while engaged in his work. He is unable to locate the painful spot precisely. Examination of the wrist-joint shows no swelling, no inflammation, and no change in the soft parts. The case may be ascribed to rheumatism or even to malingering. Another physician may, purely by chance, take hold of the forearm while examining the

mobility of the wrist-joint, and thus discover the seat of the trouble; for the examining hand, which steadies the forearm, feels a peculiar crepitus. The disease is an inflammation of the tendon sheaths, accompanied by the development of *ricelike bodies*. They most commonly are found in the sheaths of the three muscles of the thumb which run obliquely across the lower part of the extensor surface of the forearm.

In conclusion, we may discuss a variety of small swellings found on the hand—GANGLION. Until recently three varieties were distinguished. On the cadaver of adults, small colloid cysts, adherent to the joint capsules, are found. Their size rarely exceeds that of a nut. They are called *cyst ganglia*. We further observe preformed diverticula derived from the joint capsule, or pathological diverticula, which are distended with viscid fluid and form the joint ganglia. Finally, a tendon sheath may be distended (hygroma), or, if only a part of the sheath or some diverticulum is dilated with fluid, a ganglion of the tendon sheath results. This was the accepted teaching until recently. Therefore, it was customary, first, to decide the variety to which a ganglion belonged. If a ganglion is situated between the tendons, can not be emptied and does not change in tension when manipulated, it is a cyst ganglion. If, however, it can be emptied by pressure, or at least grows less tense upon manipulation, it is a joint ganglion. About the wrist-joint ganglia usually are of the cystic variety. These small cysts, according to Payr, are the result of small inflammatory foci. Ganglia arising from the tendon sheaths do not exist.

In rare instances a hygroma may be of acute origin, most probably due to a preceding dry tenosynovitis

(with rice bodies) of the corresponding tendon sheaths. To open such a swelling, under the impression that it is an abscess, would constitute a grave error. Keep in mind that in acute hygroma, though accompanied by much pain, the swelling is not great, the skin not reddened, and the pain not of the intense throbbing character met with in abscesses.

Tuberculosis of the dorsal sheaths follows the same course as that already described in connection with the great carpal sheath. We have likewise observed "fungus" of the phalangeal tendon sheaths. When rupture occurs, it is accompanied by pain, but no pus is discharged. The fistula may heal, but the elastic swelling persists. New sinuses may develop later.