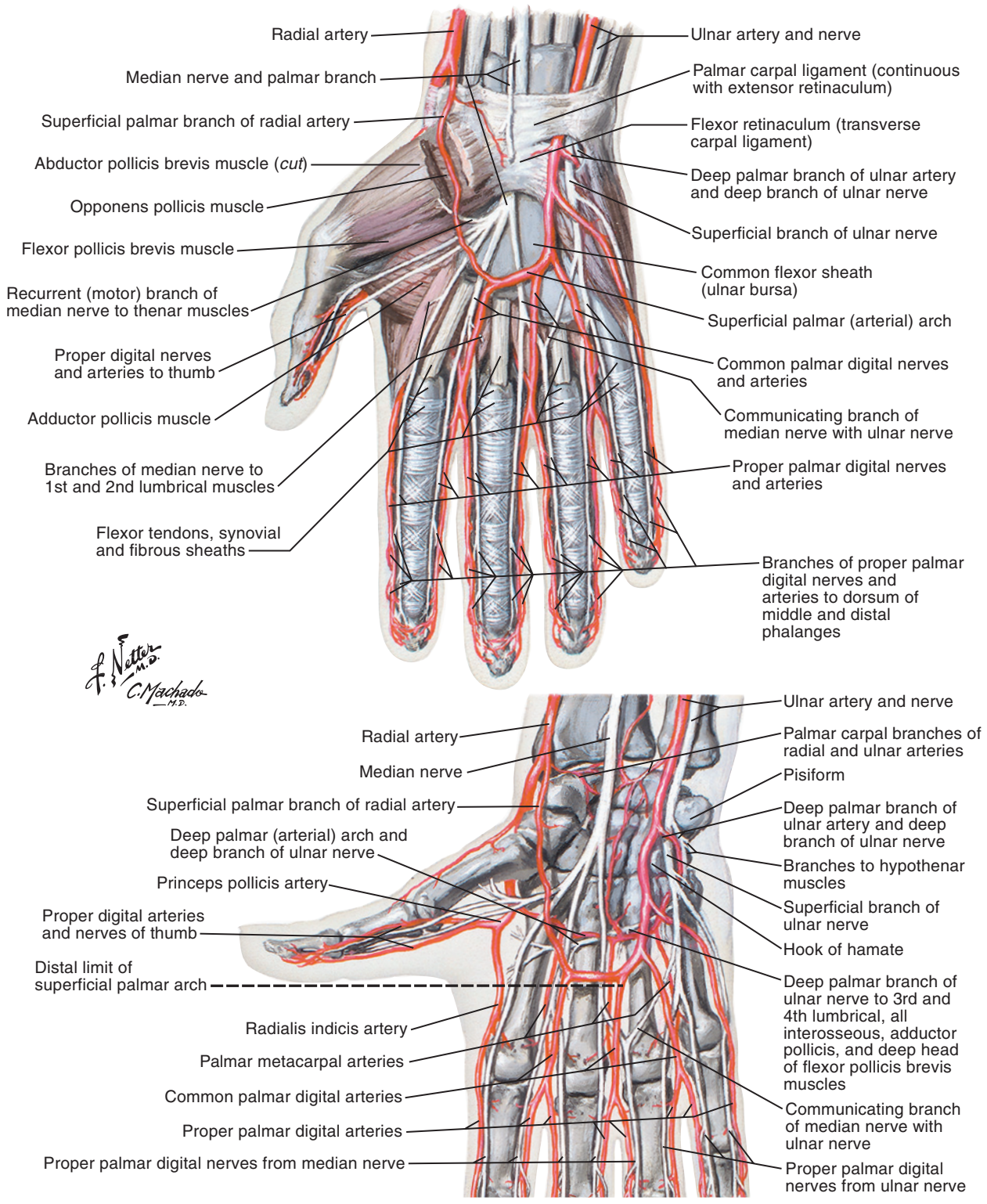

Figure 12.21 Arterial anatomy of the hand. (Reprinted from Netter Anatomy Illustration Collection. ©Elsevier Inc. All Rights Reserved.)

the inferior lateral brachial and posterior antebrachial cutaneous nerves (Fig. 12.3). After winding around the humerus in the spiral groove, it pierces the lateral intermuscular septum leaving the posterior compartment, to enter the anterior compartment in the distal arm. From here, it enters the forearm anterolaterally under the brachioradialis. The deep branch of the radial nerve pierces the supinator to eventually lie in the dorsal compartment supplying all extensor muscles in the forearm and terminating as the posterior interosseous nerve (Fig. 12.6). The superficial branch of the radial nerve accompanies the radial artery in the forearm, deep to brachioradialis until a point

approximately 8–10 cm proximal to the wrist, where it becomes superficial and dorsal to the brachioradialis tendon. At this level, it heads distally along the radial border of the wrist where it arborizes into multiple branches supplying the radial aspect of the dorsum of the hand and radial digits (Fig. 12.17).

CUTANEOUS NERVES OF THE FOREARM

The cutaneous nerves of the forearm (Fig. 12.10) are relatively constant structures proximally although can have variable branching patterns distally. An appreciation of their anatomic relationships helps prevent nerve injury that results in numbness and painful neuromas. Alternatively some of these nerves can be purposely harvested for use as nerve grafts.

The medial antebrachial cutaneous nerve enters the arm on the medial side of the brachial artery (Fig. 12.5), then accompanies the basilic vein as it pierces the deep fascia to become subcutaneous at the mid-portion of the arm (Fig. 12.21). It can be prone to injury while exposing the brachial artery, ulnar nerve, basilic vein or other operative approaches in the arm and forearm. Approximately 15 cm proximal to the medial epicondyle, the nerve divides into anterior and posterior branches. The posterior branches head towards the ulnar side of the forearm, to cross over the medial intermuscular septum and ulnar nerve, and ~90% of these branches cross at or proximal to the level of the medial epicondyle. The anterior branch crosses the elbow crease between the medial epicondyle and the biceps tendon, usually 2–3 cm lateral to the epicondyle. It supplies the medial aspect of the forearm (Fig. 12.12).

The lateral antebrachial cutaneous nerve is a direct continuation of the musculocutaneous nerve. In the arm, the musculocutaneous nerve passes from medial to lateral between the biceps and brachialis muscles (Fig. 12.11). At the level of the elbow, it emerges from under the biceps distally at its lateral border to become the lateral antebrachial cutaneous nerve. At a point just distal to the elbow, it pierces the deep fascia lateral to the biceps tendon and descends distally in the subcutaneous tissues of the anterolateral forearm and wrist to supply sensation to this area (Fig. 12.12). Proximally, it crosses deep to the cephalic vein, however can give rise to a small recurrent branch at this level that then travels proximally with the cephalic vein to supply the skin of the distal third of the anterolateral arm.

The posterior cutaneous nerve of the forearm arises from the radial nerve in the spiral groove (Fig. 12.3), and pierces the triceps fascia in the distal lateral arm, to become a superficial structure innervating the dorsal aspect of the forearm (Fig. 12.12).

GROSS REGIONAL ANATOMY OF THE HAND

The palmar aspect of the hand is a complex anatomic region. The important surface landmarks that should be noted include the thenar and hypothenar eminences, the thenar, mid-palmar, distal palmar and digital creases, and the pisiform bone.

Directly underlying the glabrous skin of the palm is the palmar aponeurosis (Fig. 12.16), a thick well-defined fascial layer deep to which lie all the major neurovascular structures in the palm (Fig. 12.22). More proximally, overlying the volar side of the carpus is the transverse carpal ligament (also termed the “flexor retinaculum”) forming the roof of the carpal tunnel.

The flexor tendons enter the hand through the carpal tunnel and lie deep to the main neurovascular bundles in the palm (Fig. 12.17). The flexor digitorum profundus and superficialis tendons enter their respective fibro-osseous tunnels at the level of the metacarpophalangeal joints corresponding to the position of the distal palmar crease (Fig. 12.20). The lumbrical muscles take origin on the radial aspect of each of the profundus tendons, and the deep palmar arch is located deep to this layer of tendons and lumbrical muscles, essentially lying on the palmar interossei and metacarpals (Fig. 12.11).

The median nerve enters the hand with all nine flexor tendons deep to the retinaculum, however prior to this, the median nerve gives rise to the palmar cutaneous nerve which does not enter the carpal tunnel (Fig. 12.9). After entering the carpal tunnel, the median nerve divides into four main branches, supplying the thenar muscles, sensation to the volar aspect of the thumb, the radial side of the index finger and the common digital nerves to the second and third web spaces.

After forming the roof of the carpal tunnel, the transverse carpal ligament continues ulnarly to form the floor of Guyon’s canal on the ulnar side of the hand (Fig. 12.20). The ulnar neurovascular bundle enters the hand through this tunnel as previously described, and the ulnar artery then forms the superficial arch. Within the canal, the ulnar nerve divides into its terminal branches. The deepest of the ulnar nerve fascicles forms the motor branch (deep branch) that dives directly posteriorly and eventually enters the palm deep to the flexor tendons but superficial to the interosseous muscles, and supplies all seven interossei, the third and fourth lumbricals, adductor pollicis, flexor pollicis brevis and the hypothenar muscles (Fig. 12.6).

The remaining two branches of the ulnar nerve leave Guyon’s canal distally to form the common digital nerve to the fourth web space, and the ulnar digital nerve to the small finger.

The dorsal aspect of the hand is slightly less complex. Within the subcutaneous tissues there are abundant superficial veins that can be used for recipient anastomosis, and these eventually form the cephalic and basilic systems at the wrist level (Fig. 12.18). Also in this plane, are the superficial branch of the radial nerve supplying the radial half of the dorsum, and the dorsal sensory branch of the ulnar nerve which supplies the ulnar half (Fig. 12.12).

Deep to the superficial veins and sensory nerves are the extensor tendons. These are bound to the dorsal aspect of the hand at the, radiocarpal level, by the extensor retinaculum dividing the tendons into six compartments. The first compartment (extensor pollicis brevis and abductor pollicis longus) and the third compartment (extensor pollicis longus) form the radial and ulnar borders of the anatomic snuffbox respectively (Fig. 12.19), and are useful landmarks when exposing the radial artery on the dorsal aspect of the hand (Fig. 12.18). The floor of the fourth compartment