Introduction

The hand is an intricate part of the body that plays an essential role in social functioning, expression, productivity, and interactions with our environment ***(Hegge et al., 2011).*** Skin/soft-tissue envelope of the hand is a complex structure that not only covers the underlying structures but also has specialized functional and sensory components. The thick glabrous skin of the palm withstands shearing forces encountered during daily activities and provides discriminatory sensory function that transfers touch, pain and temperature, whereas the dorsal skin is pliable and mobile that permits a wide range of motion of the hand such as fingers pinch and grip. Soft-tissue defects of the hand following trauma or tumor resection are frequently encountered in hand surgery and may result in a temporary or permanent disability if not managed appropriately ***(Upton et al., 1992).***

Hand injuries account for nearly 10% of hospital emergency department visits. Series of 1000 consecutive hand injuries showed the following distribution: 42% lacerations (cuts), 27% contusions (bruises), 17% fractures (broken bones), and 5% infections ***(Antosia and Lyn, 1998).*** Soft tissue defects in the hand can result from a variety of mechanisms including trauma, infection, and malignant disorders. Reconstructive surgeons who encounter these conditions must account for the unique requirements and challenges of soft tissue coverage specific to the hand. The optimal soft tissue reconstruction protects against the development of contractures and facilitates tendon and joint mobility, while maintaining durability and sensibility of the hand. This is particularly true in situations where palmar soft tissue coverage is required ***(Janis et al., 2011).*** Several reconstructive procedures and their modifications have evolved to provide the ideal soft tissue coverage of the hand. Conventionally, these included a range of options of primary wounds closure, skin grafts, local flaps, distant flaps, and micro-vascular free tissue transfer ***(Friedrich et al., 2009).***

However, selecting the most suitable type of soft tissue cover for a particular defect can be a challenging process. Furthermore, the abundance of currently available reconstructive techniques makes this task rather difficult, especially for the in experienced surgeon. When choosing one reconstructive method over the other, it is prudent that the surgeon have a sound knowledge of all available options, their limitations, complications and expected outcomes ***(Macey and Bruke 1995).***

A local flap consists of skin and subcutaneous tissue that is harvested from a site nearby a given defect while maintaining its intrinsic blood supply. When a soft tissue defect of the hand is not amenable to primary closure or skin grafting, local skin flaps can be a used as a reliable source of soft tissue replacement that replaces like with like. Flaps are categorized based on their composition, method of transfer, flap design and blood supply, yet flap circulation is considered the most critical factor for the flap survival ***(Rehim and Chung, 2014).*** Where there are no clinical restrictions, local flaps represent an ideal soft tissue cover for small and moderate soft-tissue defects. A surgeon who is well versed with the vascular anatomy of the hand and different types of local flap reconstruction will be able to treat a variety of defects without resolving to more complex methods of soft tissue repair. Nonetheless, one must also recognize the limitations of local flaps and be prepared to change treatment plan if the necessity arises ***(Rehim and Chung, 2014).***

Aim of the work

To collect data concerned with hand injuries to El Demerdash hospital in two years period from January 2016 to January 2018 and both years will be statistically plotted to each other.

To provide a clinical description of hand injuries with etiology and mechanism.

Anatomy of the Hand

The anatomy of the hand is complex, intricate, and fascinating. Its integrity is absolutely essential for our everyday functional living. Our hands may be affected by many disorders, most commonly traumatic injuries. For any physician or therapist treating hand problems, the mastery of such anatomy is fundamental in order to provide the best quality of care ***(Dickson et al., 2009)***.

Skeleton of the hand:

A- Carpal bones:

The carpus contains eight bones: arranged in two rows four in the proximal and four in the distal. In radial (lateral) to ulnar (medial) order, the scaphoid, lunate, triquetrum and pisiform make up the proximal row, and the trapezium, trapezoid, capitate and hamate make up the distal row. The pisiform articulates with the palmar surface of the triquetrum, and is thus separated from the other carpal bones, all of which articulate with their neighbours. The other three proximal bones form an arch which is proximally convex, and articulates with the radius and articular disc of the distal radio-ulnar joint ***(Standring et al., 2006).***

B- Metacarpal bones:

The hand has 5 metacarpal bones. From proximal to distal, each has a base, a shaft, and a head. The first metacarpal bone constitutes the skeleton of the thumb and is the shortest and most mobile. It is in contact with the trapezium proximally. The other 4 metacarpals contact with the trapezoid, capitate and hamate, and latero-medial surfaces of metacarpal bones. The heads of the metacarpal bones, which form the knuckles, articulate with the proximal phalanges ***(Moore and Agur 1995)***.

C- Phalanges:

The hand has 14 phalanges. Each finger contains 3 phalanges, but each thumb only has 2. Each consists of a body and two extremities. The body tapers from above downward, is convex posteriorly, concave in front from above downward, flat from side to side ***(McMinn, 1994).***

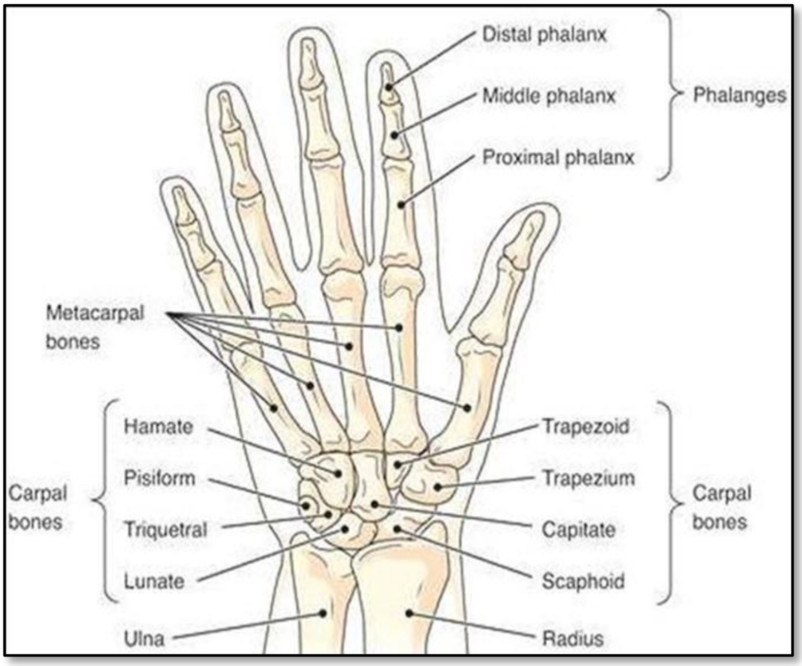


Figure (1): Bones of the hand

Joints and ligaments of the hand:

The hand contains some complex joints, including, from proximal to distal, the radiocarpal, intercarpal, carpometacarpal, MCP, and interphalangeal joints (figure 2).

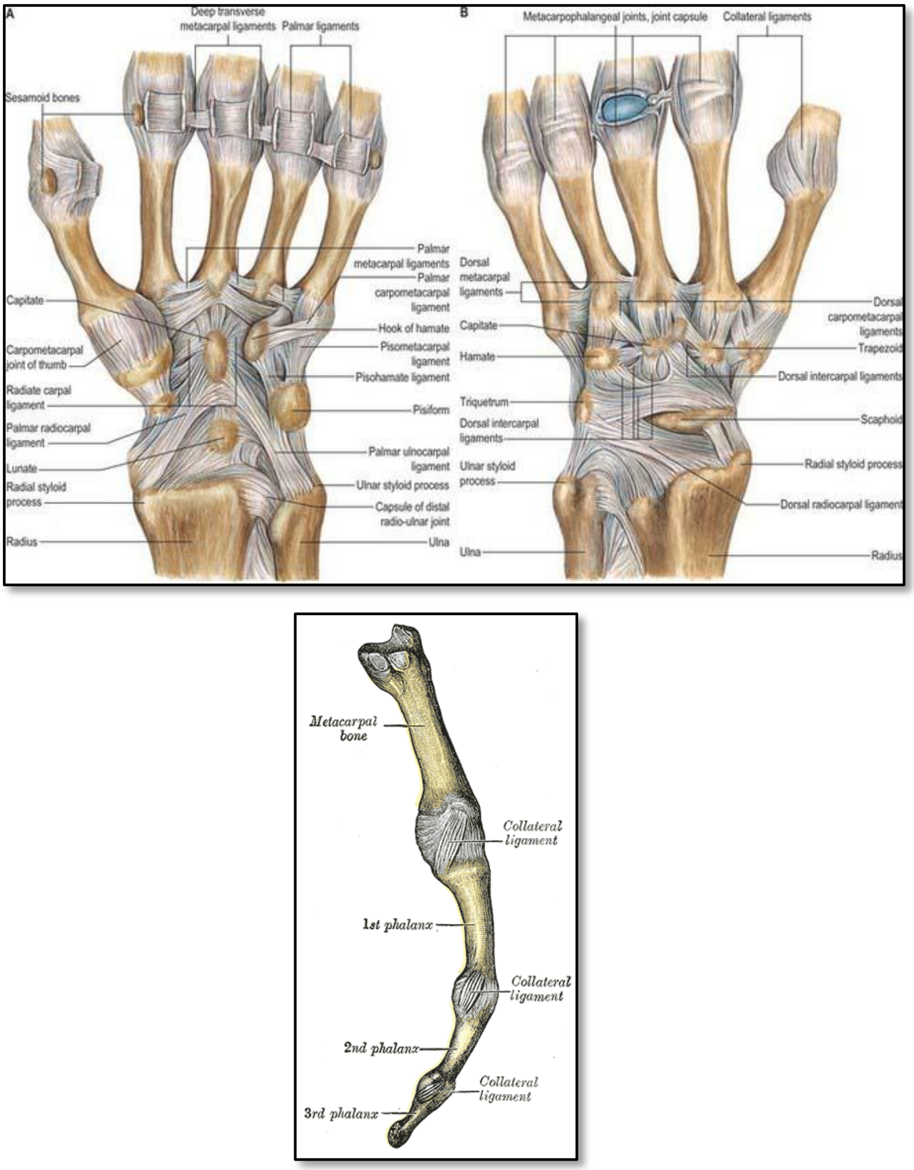


Figure (2): Joints and ligaments of the hand

A- Radiocarpal joint (wrist joint):

This joint constitutes the distal articular surfaces of the radius and the proximal articular surface of scaphoid, lunate, and triquetral bones. The type of joint is synovial spheroid. The capsule of the joint encloses it and includes the articular cartilaginous structures ***(Standring et al., 2006).*** Radial and ulnar collateral ligaments strengthen both sides of the joint. Palmar and dorsal radio-carpal ligaments cover the back and front of the wrist joint. The anterior interosseous nerve and a deep branch of the radial nerve innervate it. The main movements of the wrist joint are flexion, extension, ulnar and radial deviation. It can move in circumduction when a combination of these movements is used ***(McMinn, 1994).***

B- Intercarpal joints:

The intercarpal joints are formed between the distal and proximal row of the carpal bones and between every individual carpal bone. It is a synovial plane-type joint. The articular capsule surrounds these structures ***(McMinn, 1994).***

C- Midcarpal joint:

It is formed by the scaphoid, lunate, and triquetral bones in the proximal row, and the trapezium, trapezoid, capitate, and hamate bones in the distal row. The distal pole of the scaphoid articulates with two trapezial bones as a gliding type of joint. The proximal end of the scaphoid combines with the lunate and triquetrum to form a deep concavity that articulates with the convexity of the combined capitate and hamate in a form of diarthrodial, almost condyloid joint.In the midcarpal joint, 2 areas of variability have been identified. The first is in relation to the lunate bone. ***(McMinn, 1994).***

D- Carpometacarpal joints:

There are five joints in the wrist that articulate the distal row of carpal bones and the proximal bases of the five metacarpal bones. One variation is related to the carpometacarpal joint, more specifically the shape of the fourth metacarpal base. Studies have revealed that the most common variation in the carpometacarpal joint exists at the fourth carpometacarpal joint. The fourth metacarpal base has 5 distinct shapes ***(McMinn, 1994).***

E- Metacarpophalangeal joints:

The 5 MCP joints are formed by articulation between the heads of the metacarpal bones and the bases of the proximal phalanges. They are synovial condyloid joints surrounded by a synovial capsule. The capsule is pliable in the front and back and rigid on the sides. MCP joints can flex, extend, abduct, and adduct. Using a combination of these movements, they can move in a restricted circumduction movement. Strong and tight palmar and collateral ligaments support the joints volarly, radially, and ulnarly. Additionally, the deep transverse metacarpal ligaments connect the medial 4 joints to each other and hold the head of the metacarpal bones together ***(Green and Rowland, 1975).***

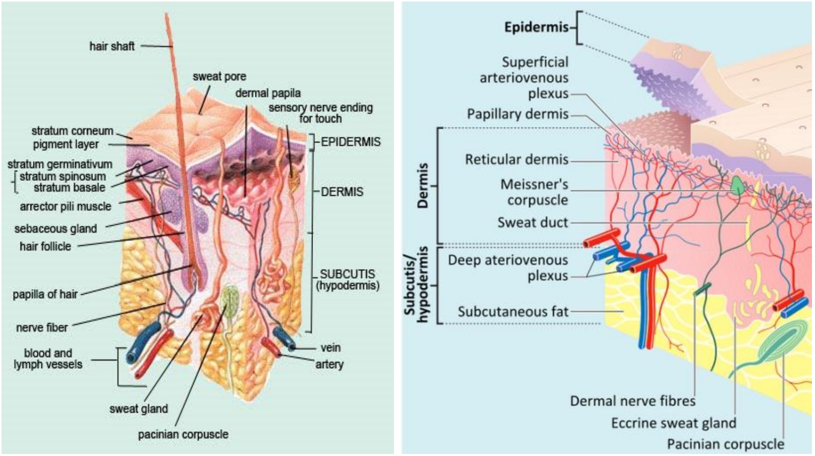
F- Interphalangeal joints:

These are located between the phalanges and are synovial hinge joints. Palmar and collateral ligaments support the joints in the front and sides. Interphalangeal joints can be flexed or extended ***(Green and Rowland, 1975).***

Skin and soft tissue:

The skin is the largest organ of the body and serves a number of vital functions **(figure 3)**. It functions as a semi permeable membrane and a barrier to toxic material and microbes, but it also contributes to homeostasis through temperature regulation and sensibility. This latter function - perception of stimuli- is most important in the hand, especially on the palmer surfaces of the fingers ***(Rayan and Akelman, 2012).*** Although skin in different parts of the body is fundamentally of similar structure, there are many local variations in parameters such as thickness, mechanical strength, softness, flexibility, degree of keratinization (cornification), size and number of hairs, frequency and types of glands, pigmentation, vascularity, innervation.

Two major types of skin are distinguished: type 1 covers large areas of the body and show important differences of detailed structure and functional properties. These are thin, hairy (hirsute) skin, which covers the greater part of the body, and type 2 is thick, hairless (glabrous) skin, which forms the surfaces of the palms of the hands, soles of the feet, and flexor surfaces of the digits ***(Standring et al., 2006).*** The skin over the dorsum of the hand is thin and mobile and this allows for flexion at the metacarpophalangeal and interphalangeal joints. The dorsal skin is frequently hirsute over the dorsal aspect of the proximal phalanges and the ulnar aspect of the dorsum of the hand. In comparison, the palm is adapted for padding and anchorage. The palmar skin and the skin over the volar surface of the digits is thick and hairless, and has a well-defined stratum lucidum, a higher density of nerve endings, and eccrine sweat glands, but no sebaceous glands ***(Rayan and Akelman, 2012).*** The thick glabrous skin of the palm withstands shearing forces encountered during daily activities and provides discriminatory sensory function that transfers touch, pain, and temperature, whereas the dorsal skin is pliable and mobile, and permits a wide range of motion of the hand such as finger pinch and grip ***(Hegge et al., 2011).***



Type 1 **Type 2**

Figure (3): Skin and its appendages

The palmar skin shows multiple cutaneous striations of papillary ridges, which are better developed in areas used for grasp. They assume a concentric orientation in the pulp. Apart from their legal importance, these ridges serve to improve the contact with objects during grasping to prevent slipping and they also play a role in the tactile functions of the digits by virtue of the distribution of Meissner's corpuscles ***(Naam et al., 2000).***

Palmar creases:

In the palm, there are three longitudinal and two transverse creases.

Longitudinal creases:

Longitudinal creases are the thenar, the central and the hypothenar. The most constant and easily differenciated is the thenar crease, due to the wide mobility of the carpometacarpal joint of the thumb. The central and hypothenar creases are the reflection of the mobility at the carpo-metacarpal joints of the ring and small fingers ***(Hegge, 2011).***

Transverse creases:

Transverse creases are the proximal and the distal. The distal crease starts at the ulnar side of the hand and finishes in between the middle and index fingers, as most of the hand functions are done with the ulnar fingers in flexion for power grasp, while the index and the thumb remain in extension for precision manipulation. The middle finger can either help the thumb and index for manipulation, or the ring and small fingers if more power grasp is needed. The proximal crease starts at the radial side of the hand along with the longitudinal thenar crease. Flexion of the metacarpo-phalangeal joints takes place in a transverse line between the origin of the distal palwarcrease on the uInar side and the proximal palmar crease on the radial side. Individuals with Down's syndrome just have one transverse palmar crease (Semian Crease) ***(Hegge, 2011).***

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Digital creases:

Usually, there are two creases at the level of each joint, being most prominent the proximal one. The palmar digital crease of the triphalangeal fingers is usually located at the proximal third of the proximal phalanx. The palmar digital crease of the thumb is longitudinally oriented and slightly proximal to the metacarpo-phalangeal joint while other interphalangeal creases (middle and distal) lie volar to the proximal and distal interphalangeal joints respectively ***(Moore and Agur 1995).***

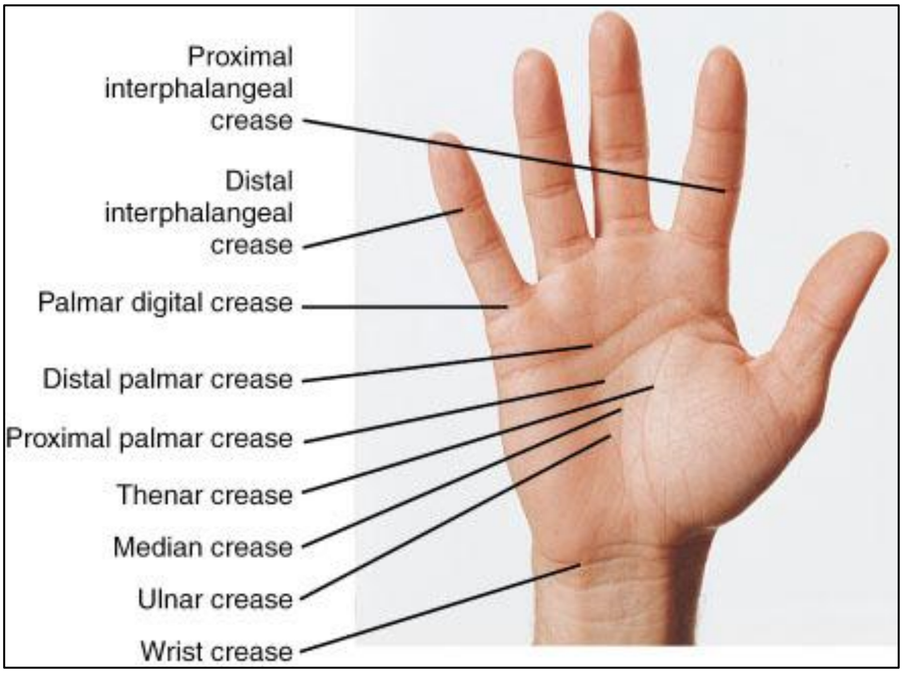

Figure (4): Skin Creases of the Hand

Distal wrist crease:

Although there usually are three wrist flexion creases, only the distal crease is of sufficient consistency to be used as a reliable landmark. The distal wrist crease is located over the proximal Carpal raw and passes over the Scaphoid waist in almost all instances and over the Pisiform 80% of the time. The lunate is consistently proximal to the distal wrist crease with its certain average of 9.2 mm from the crease, The radiocarpal joint is 13.5mm proximal to the distal wrist crease, and the center point of the distal radioulnar joint 21.1mm proximal to the wrist crease, on the lateral side of the wrist the distal wrist crease is within 1mm of the center of the Scapoid waist. The mid portion of Trapeziometacarpal joint averages 19.4mm distal to the wrist crease, on the ulnar side of the wrist; the Pisiform is directly under or slightly distal to the crease, the base of the ulnar styloid is on average 11.7mm proximal to the distal wrist crease ***(Doyle, 1975).***

Nail apparatus:

The nail apparatus consists of the nail plate, proximal and lateral nail folds, nail matrix, nail bed and hyponychium **(fig. 5).** The nail plate is embedded within the proximal and lateral nail folds. It is approximately rectangular in shape and is mostly convex in both longitudinal and transverse axes: there is considerable inter- and intra-individual variation. The thickness of the plate increases proximodistally from about 0.7 mm to 1.6