

## A Brief Overview of Wrist Anatomy for Students

R. K. Suri

Director Professor & HOD, Department of Anatomy, Vardhman Mahavir Medical College,  
Safadarjang Hospital, New Delhi

### Abstract

The objective of school education is not only confined to academics, but is also to promote and ensure good physical and mental health. In order to increase student awareness about physical health, it is imperative to highlight the basic anatomical facts of the human body to gain an understanding of possible derangements and their prevention. This paper is a humble attempt to provide a preliminary overview of wrist anatomy for students, especially at school level. It is expected that this information will sensitise students and teachers in facilitating the prevention of wrist injuries.

### Introduction

It is the wrist that enables humans to wear fashion accessories such as watches, bracelets and bangles. The wrist is the most common site where a physician examines the pulse of an individual. Wrist constitutes the junction of forearm and hand. The human wrist has a

Wrist Bones. Human wrist bones (carpals) are arranged in two rows; proximal and distal as depicted in Figure 1. The proximal row consists of scaphoid, lunate, triquetral and pisiform. The distal row comprises trapezium, trapezoid, capitate and hamate. Out of these carpal bones, capitate is the largest whereas pisiform is the smallest.

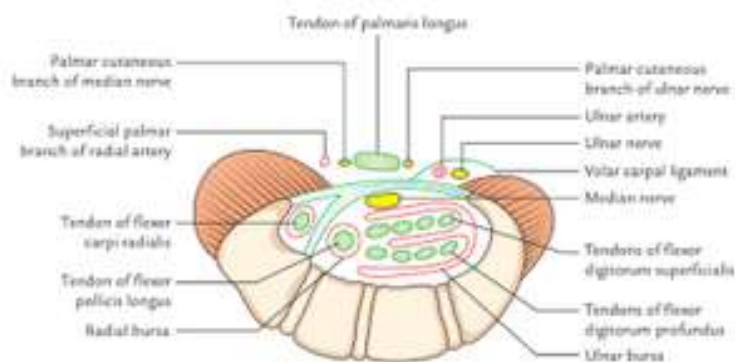


Fig. 11.5 Transverse section of wrist across the carpal tunnel showing structures passing superficial and deep to the flexor retinaculum.

complex anatomical structure that consists of eight wrist bones (carpals) arranged in two rows (proximal and distal) along with the distal ends of the forearm bones (radius and ulna). However, this paper focuses on the anatomical considerations and practical implications of the carpal bones.

Figure 1 Transverse Sections of Wrist (Singh V., *Textbook of Anatomy (Regional and Clinical) Upper Limb and Thorax*, 2014)

The surface of carpals facing the palm, i.e. their Palmar surface presents a concavity referred to as the carpal groove. A fibrous sheet called flexor retinaculum forms a bridge across the carpal groove and converts it into a passage called the carpal tunnel.

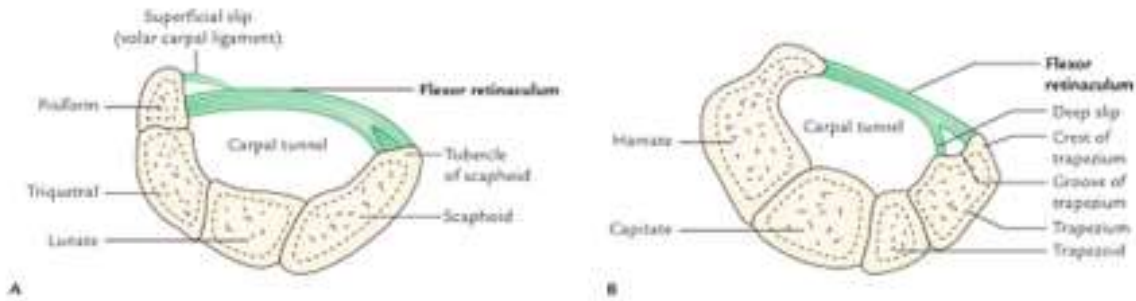


Fig. 11.4 Attachment of additional medial and lateral slips of the flexor retinaculum. A, at the level of proximal row of carpal bones; B, at the level of distal row of carpal bones.

Figure 2 Adapted from (Singh V., *Textbook of Anatomy (Regional and Clinical) Upper Limb and Thorax*, 2014)

It is important to emphasise that the two nerves supplying the hand muscles, namely the median and ulnar nerves, follow different routes of entry into the hand. The ulnar nerve courses superficial to the flexor retinaculum whereas the median nerve traverses the carpal tunnel. Therefore, it is not difficult to comprehend that any condition causing the narrowing of carpal tunnel would lead to compression of the median nerve resulting in neurological symptoms. This condition is known as ‘Carpal Tunnel Syndrome’. The syndrome is more frequently seen in females than in males (Singh, *Clinical and Surgical Anatomy*, 2007). The causes of median nerve compression in Carpal Tunnel Syndrome include tenosynovitis, osteoarthritis of the carpal bones, hypothyroidism, pregnancy and obesity (Singh, *Clinical and Surgical Anatomy*, 2007).

Interestingly, a very superficial cut on the front of the wrist can lead to an injury of the ulnar nerve. The reason is very simple. The ulnar nerve occupies a superficial position, making it vulnerable to injury. It implies that superficial cuts on the wrist cannot be ignored and must be paid due attention.

The injury to ulnar nerve results in a clinical deformity referred to as ‘Claw Hand’ (refer Figure 3). Another clinical deformity encountered in relation to the wrist is referred to as ‘Wrist Drop’ (refer Figure 4). It occurs

as a result of an injury to the radial nerve leading to the paralysis of the extensor muscles of the wrist and thus the unopposed action of

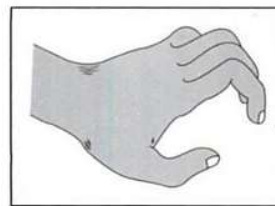


Fig. 2.16. The claw-hand due to combined lesions of median and ulnar nerves. Note the hyperextension of the MP joints and flexion of PIP and DIP joints.

Figure 3 *Claw Hand Deformity* (Singh, *Clinical and Surgical Anatomy*, 2007)

flexor muscles of the wrist (Singh, *Clinical and Surgical Anatomy*, 2006). Needless to mention, the condition is also accompanied by loss of sensation over i) lower part of the arm and a small portion over the back of the forearm; and ii) over some part of the dorsum of the hand (Singh, *Clinical and Surgical Anatomy*, 2006).

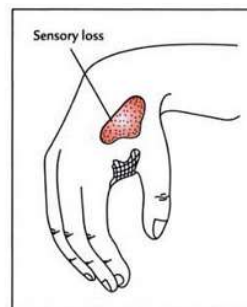


Fig. 2.13. The wrist drop resulting from radial nerve palsy.

Figure 4 *Position of the hand adopted in Wrist Drop* (Singh, *Clinical and Surgical Anatomy*, 2006)

### Development of Wrist Bones (Carpals)

The carpal bones begin to develop after birth. They are seen to appear at different ages (refer Table 1).

S. No.	Carpal Bone(s)	Age of Appearance
1	Capitate	1 Year (2 <sup>nd</sup> Month)
2	Hamate	1 Year (3 <sup>rd</sup> Month)
3	Triquetral	3 Years
4	Lunate	4 Years
5	Scaphoid, Trapezium & Trapezoid	4-5 Years
6	Pisiform	12 Years

Table 1 : Chronological Development of Carpal Bones (Kapur & Suri, Essentials of Surface & Radiological Anatomy, 1994)

These carpals can easily be visualised in the radiological films (refer Figure 5). Thus, a deformity or fracture of any carpal bone can be diagnosed by radiological investigation. The knowledge of the development of carpals is also utilised for age estimation of children by medico-legal experts.

### Injuries of Wrist Bones and their Prevention

#### Scaphoid fracture

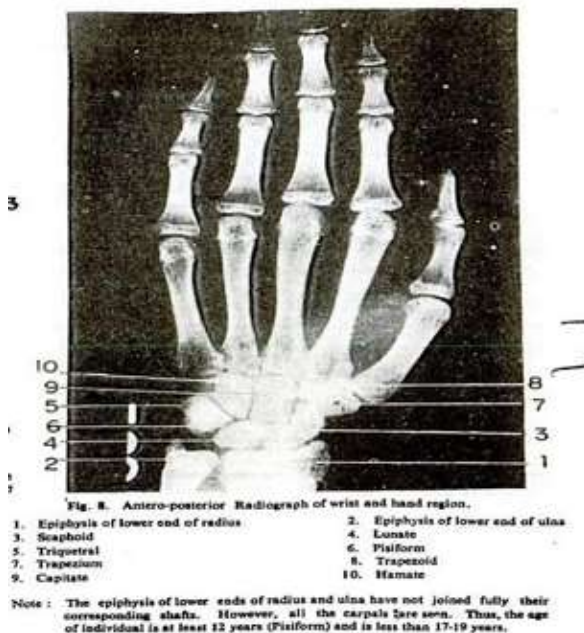
Scaphoid bone is the most commonly fractured carpal. The bone lies in the depression bounded by the tendons of the thumb. Pain or tenderness in this region indicates the possibility of an injury to the scaphoid bone. Fracture of the scaphoid bone usually results in pain and swelling at the base of the thumb. It is usually caused when a person falls on an outstretched hand with the body weight landing on the palm. Scaphoid fractures can occur in adults as well as in children. Scaphoid fractures are common injuries during road accidents and sports activities (Scaphoid Fracture of the Wrist, 2010).

There are some known complications of the scaphoid fracture that include non-union, avascular necrosis and arthritis (Scaphoid Fracture of the Wrist, 2010).

#### Lunate Dislocation

Lunate dislocations occur as a part of a major injury during a fall from a height or vehicular collision (Cluett, 2014). The median nerve is liable to injury following lunate dislocations.

Figure 5 Radiograph of Wrist and Hand Region (Kapur & Suri, Essentials of Surface and Radiological Anatomy, 1994).



### Prevention of Wrist Injuries

Wrist injuries can be prevented through the usage of protective equipment such as braces, wristbands, tapes, gloves and padding, especially in sports such as cricket where players are prone to wrist injuries caused by the hard leather ball, and in tennis where the use of wristbands is common.

### Conclusion

Information on wrist injuries and their prevention should be incorporated in the school curriculum so that students and faculty can together contribute towards the prevention of such injuries. It is worth mentioning that a balanced diet and regular exercise helps in maintaining bone and joint strength and development.

## References

- Cluett, J. (2014, May 16). Lunate Dislocation What is a lunate dislocation? (About.com Orthopedics) Retrieved July 8, 2014, from About.com Orthopedics: <http://orthopedics.about.com/od/wristconditions/qt/lunate.htm>
- Kapur, V., & Suri, R. K. (1994). *Essentials of Surface and Radiological Anatomy*. New Delhi, India: Jaypee Brothers.
- Scaphoid Fracture of the Wrist. (2010, May). Retrieved July 8, 2014, from <http://orthoinfo.aaos.org/topic.cfm?topic=A00012>
- Singh. (2006). *Clinical and Surgical Anatomy* (2nd ed.). Noida, Uttar Pradesh, India: Elsevier India.
- Singh. (2007). *Clinical and Surgical Anatomy* (2nd ed.). New Delhi, India: Elsevier India.
- Singh, V. (2014). *Textbook of Anatomy (Regional and Clinical) Upper Limb and Thorax* (2nd ed., Vol.I). Faridabad, Haryana, India: Elsevier Health Sciences.
- Wrist and Hand . (n.d.). Retrieved July 8, 2014, from Lake Charles Memorial Health System: <http://www.lcmh.com/Upload/VideoLibrary/Videos/43/wristandhandinjuries.pdf>