# **ANATOMY OF THE FOOT**



#### The plantar aponeurosis

Is a triangular thickening of the deep fascia
 Its apex is attached to the medial and lateral tubercles of the calcaneum.
 The base of the aponeurosis divides into five slips that pass into the toes



#### Muscles of the Sole of the Foot

The muscles of the sole are conveniently described in four layers from the inferior layer superiorly.

First layer: 1- Abductor hallucis 2- Flexor digitorum brevis 3-Abductor digiti minimi



# Second layer:

- **1-Quadratus plantae,**
- **2-Lumbricals**
- **3-Flexor digitorum longus tendon,**
- **4- Flexor hallucis longus tendon**



## *Third layer:* 1-Flexor hallucis brevis 2-Adductor hallucis 3- Flexor digiti minimi brevis





Fourth layer: 1- Interossei 2- peroneus longus tendon 3- tibialis posterior tendon

Unlike the small muscles of the hand, the sole muscles have few delicate functions and are chiefly concerned with supporting the arches of the foot. Although their names would suggest control of individual toes, this function is rarely used in most people



# Arteries of the Sole of the Foot Medial Plantar Artery

The medial plantar artery is the smaller of the terminal branches of the posterior tibial artery It ends by supplying the medial side of the big toe

# Lateral Plantar Artery

The lateral plantar artery **is the larger of the terminal** branches of the posterior tibial artery <u>forms the plantar arch</u>

➤at the proximal end of the first intermetatarsal space joins the dorsalis pedis artery



## Dorsalis Pedis Artery (the Dorsal Artery of the Foot)

On entering the sole between the two heads of the first dorsal interosseous muscle, the dorsalis pedis artery immediately joins the lateral plantar artery



# Nerves of the Sole of the Foot Medial Plantar Nerve

The medial plantar nerve *is a terminal branch of the tibial nerve* 

<u>Cutaneous branches: Plantar digital nerves run to the</u> <u>sides of the medial three and a half toes.</u> The nerves extend onto the dorsum and supply the nail beds and the tips of the toes

Remember it is similar to the median nerve

## **Lateral Plantar Nerve**

The lateral plantar nerve is a terminal branch of the tibial nerve







## **The Arches of the Foot**

A segmented structure can hold up weight only if it is built in the form of an arch. The foot has three such arches:

# 1-The medial longitudinal2-Lateral longitudinal3-Transverse arches

#### In the young child, the foot appears to be flat because of the presence of a large amount of subcutaneous fat on the sole of the foot.

# **1-The medial longitudinal**



## **2-Lateral longitudinal arch:**

Consists of: 1- *The calcaneum, 2-The cuboid 3-The fourth and fifth metatarsal bones* 



lateral longitudinal arch

# **3-Transverse** arch:

Consists of : *1-The bases of the metatarsal bones 2-The cuboid 3- The three cuneiform bones* 



transverse arch

#### **Mechanisms of Arch Support**

Examination of the design of any stone bridge reveals the following engineering methods used for its support

The shape of the stones: the stones are wedge shaped



shape of stones



staples



keystone

<u>The inferior edges of the stones are tied</u> <u>together:</u> This is accomplished by binding their lower edges together with metal staples

The use of the tie beams: a tie beam connecting the ends effectively prevents separation of the pillars and consequent sagging of the arch

<u>A suspension bridge</u>: multiple supports suspending the arch from a cable above the level of the bridge



tie beam

suspension bridge



<u>Maintenance of the Medial Longitudinal Arch</u> 1-Shape of the bones: for example, the sustentaculum tali holds up the talus The rounded head of the talus is the keystone

in the center of the arch

*2-The inferior edges of the bones are tied together by the plantar ligaments* The most important ligament is **the plantar calcaneonavicular ligament** 

## (spring ligament)

*3-Tying the ends of the arch together* are the plantar aponeurosis, and short muscles of the foot for example, *the abductor hallucis, the flexor hallucis longus* 



**4-Suspending the arch from above** are the tibialis anterior and posterior and the medial ligament of the ankle joint

#### <u>Maintenance of the Lateral Longitudinal Arch</u>

**1-Shape of the bones:** Minimal shaping of the distal end of the calcaneum and the proximal end of the cuboid.

The cuboid is the keystone.

*2-The inferior edges of the bones are tied* together by the long and short plantar ligaments *3-Tying the ends of the arch together*, FOR EXAMPLE, the plantar aponeurosis

## 4-Suspending the arch from above are the peroneus longus and

the brevis

Maintenance of the Transverse Arch 1-Shape of the bones: The marked wedge shaping of the cuneiform bones and the bases of the metatarsal bones 2-The inferior edges of the bones are tied together by the deep transverse ligaments, the strong plantar ligaments 3-Tying the ends of the arch together is the peroneus longus tendon.

**4-Suspending the arch from above are the peroneus** 

longus tendon and the peroneus

# <u>brevis</u>

# **Flat foot**

Is a condition in which the medial longitudinal arch is depressed or collapsed.

As a result,

1-The forefoot is displaced laterally everted.
2-The head of the talus is no longer supported
3-The body weight forces it downward and medially between the calcaneum and the navicular bone.

The causes of flat foot are both congenital and acquired

When a person wears high-heeled shoes, however, the distribution of weight changes so that the ball of the foot may carry up to 80% and the heel 20%. As a result, the fat pads at the ball of the foot are damaged, joint pain develops, and structural changes in bones may occur.



print of flat foo