

# Sole of Foot: FAQs, MCQs and Viva Voce

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## Frequently Asked Questions – Sole of the Foot

### 1. What are the functions of the sole of the foot?

? Weight bearing, shock absorption, locomotion, protection of vessels and nerves, and maintenance of foot arches.

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### 2. Why is the skin of the sole thick and hairless?

? To resist friction and pressure during walking and standing; hairless for better tactile sense and grip.

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### 3. What maintains the stability of the arches of the foot?

? **Static factors:** ligaments and plantar aponeurosis.

? **Dynamic factors:** muscles like tibialis posterior, peroneus longus, and intrinsic plantar muscles.

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### 4. How many muscles are present in the sole?

? 20 muscles arranged in 4 layers.

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### 5. Name the nerves supplying the sole.

? Branches of the **tibial nerve**:

- **Medial plantar nerve** (larger).
- **Lateral plantar nerve** (smaller).

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### 6. Which nerve of the sole corresponds to the median nerve of the hand?

? **Medial plantar nerve.**

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**7. Which nerve of the sole corresponds to the ulnar nerve of the hand?**

? Lateral plantar nerve.

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**8. Which muscles are supplied by the medial plantar nerve?**

? Abductor hallucis, Flexor digitorum brevis, Flexor hallucis brevis, and 1st lumbrical.

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**9. Which muscles are supplied by the lateral plantar nerve?**

? All remaining 14 intrinsic muscles of the sole.

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**10. What are the terminal branches of the posterior tibial artery?**

? Medial plantar artery and Lateral plantar artery.

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**11. What forms the plantar arch?**

? Continuation of the **lateral plantar artery**, completed medially by the **deep branch of the dorsalis pedis artery**.

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**12. What are the branches of the plantar arch?**

? Four plantar metatarsal arteries that divide into plantar digital arteries for adjacent sides of toes.

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**13. Which muscle helps maintain the transverse arch of the foot?**

? **Peroneus longus**.

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**14. Which muscles help maintain the medial longitudinal arch?**

? **Tibialis posterior, Flexor hallucis longus, Abductor hallucis, and Flexor hallucis brevis**.

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**15. What is the importance of plantar aponeurosis?**

? Supports the longitudinal arch, protects deep structures, and provides firm grip on the ground.

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**16. What is the plantar reflex?**

? Stroking the lateral sole causes plantar flexion of toes.

? Dorsiflexion of great toe with fanning of others = **Babinski sign** (UMN lesion).

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**17. What is the nerve root value of plantar reflex?**

? **L5–S1.**

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**18. What is Morton's neuroma?**

? Thickening of a plantar digital nerve between the **3rd and 4th metatarsals**, causing burning pain.

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**19. What is jogger's foot?**

? Entrapment of the **medial plantar nerve** under abductor hallucis ? pain in medial arch and first toe.

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**20. What are claw toes?**

? Deformity caused by paralysis of lumbricals and interossei ? hyperextension at MTP joints, flexion at IP joints.

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**21. What are the differences between medial and lateral plantar arteries?**

? Medial plantar artery: smaller, along medial border, supplies medial sole.  
? Lateral plantar artery: larger, forms plantar arch, supplies majority of sole.

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**22. How are the interossei arranged and what are their actions?**

? **Plantar interossei (3):** unipennate, adduct toes (PAD).  
? **Dorsal interossei (4):** bipennate, abduct toes (DAB).

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**23. Which tendon crosses the sole obliquely?**

? **Peroneus longus tendon.**

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**24. What is the main blood supply to the great toe?**

? **First plantar metatarsal artery** (from plantar arch) and branch from medial plantar artery.

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**25. Why is plantar abscess extremely painful?**

? Because tight fibrous septa of plantar fascia prevent expansion of pus ? marked pressure on nerves.

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## 26. What is the functional importance of lumbricals?

? Flex MTP joints and extend IP joints, helping balance during walking.

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## 27. What are the terminal branches of the lateral plantar nerve?

? **Superficial branch** (to skin and flexor digiti minimi) and **Deep branch** (to adductor hallucis and interossei).

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## 28. What are the effects of injury to the tibial nerve in the tarsal tunnel?

? Paralysis of intrinsic muscles of the sole, loss of plantar flexion and sensation over sole.

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## 29. Which artery supplies the heel region?

? **Calcanean branches** of posterior tibial and peroneal arteries.

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## 30. What is the clinical importance of the plantar arch?

? Rich anastomosis ensures collateral circulation; injury may cause deep hematoma due to its deep location.

### Multiple Choice Questions – Sole of the Foot

1. The thick central part of the deep fascia of the sole is known as:

- A. Flexor retinaculum
- B. Plantar aponeurosis
- C. Palmar aponeurosis
- D. Fibrous sheath

? **Answer:** B — *Plantar aponeurosis*

? It protects deep structures and maintains the longitudinal arch of the foot.

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2. The plantar aponeurosis is attached posteriorly to:

- A. Base of fifth metatarsal
- B. Navicular bone
- C. Medial process of calcaneal tuberosity

D. Cuboid bone

? **Answer:** C — *Medial process of calcaneal tuberosity*

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3. The plantar aponeurosis divides the sole into how many compartments?

- A. Two
- B. Three
- C. Four
- D. Five

? **Answer:** B — *Three* (medial, lateral, and central compartments).

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4. The plantar aponeurosis gives rise to vertical septa forming compartments of the sole.

Which muscle lies in the medial compartment?

- A. Abductor hallucis
- B. Flexor digitorum brevis
- C. Flexor digiti minimi brevis
- D. Quadratus plantae

? **Answer:** A — *Abductor hallucis* (along with flexor hallucis brevis).

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5. The plantar reflex is mediated through which spinal segments?

- A. L1–L2
- B. L3–L4
- C. L4–L5
- D. L5–S1

? **Answer:** D — *L5–S1*

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6. Dorsiflexion of the great toe with fanning of other toes on plantar stimulation indicates:

- A. Lower motor neuron lesion
- B. Upper motor neuron lesion
- C. Peripheral nerve injury
- D. Posterior tibial nerve injury

? **Answer:** B — *Upper motor neuron lesion* (Babinski sign).

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7. The plantar arch is mainly formed by:

- A. Medial plantar artery

- B. Dorsalis pedis artery
- C. Lateral plantar artery
- D. Peroneal artery

? **Answer:** C — *Lateral plantar artery* (completed by deep plantar branch of dorsalis pedis).

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**8.** The number of plantar metatarsal arteries arising from the plantar arch is:

- A. Two
- B. Three
- C. Four
- D. Five

? **Answer:** C — *Four* plantar metatarsal arteries.

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**9.** Which nerve supplies the medial 3½ toes and medial sole?

- A. Lateral plantar nerve
- B. Sural nerve
- C. Medial plantar nerve
- D. Saphenous nerve

? **Answer:** C — *Medial plantar nerve.*

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**10.** Which muscle is supplied by the medial plantar nerve?

- A. Adductor hallucis
- B. Flexor digiti minimi brevis
- C. Flexor hallucis brevis
- D. Quadratus plantae

? **Answer:** C — *Flexor hallucis brevis.*

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**11.** Which nerve of the sole corresponds to the ulnar nerve of the hand?

- A. Medial plantar nerve
- B. Lateral plantar nerve
- C. Sural nerve
- D. Calcanean branch

? **Answer:** B — *Lateral plantar nerve.*

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**12.** Which of the following muscles is NOT supplied by the lateral plantar nerve?

- A. Adductor hallucis
- B. Quadratus plantae
- C. Flexor digiti minimi brevis
- D. Abductor hallucis

? **Answer:** D — *Abductor hallucis* (supplied by medial plantar nerve).

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**13.** Which muscle of the second layer of sole straightens the pull of the flexor digitorum longus tendon?

- A. Flexor hallucis brevis
- B. Quadratus plantae
- C. Lumbricals
- D. Adductor hallucis

? **Answer:** B — *Quadratus plantae*.

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**14.** The lumbricals of the sole are supplied by:

- A. Only medial plantar nerve
- B. Only lateral plantar nerve
- C. Both medial and lateral plantar nerves
- D. Deep peroneal nerve

? **Answer:** C — *Both*: 1st lumbral by medial plantar; remaining three by lateral plantar.

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**15.** Which muscle abducts the great toe?

- A. Abductor digiti minimi
- B. Abductor hallucis
- C. Adductor hallucis
- D. Flexor hallucis longus

? **Answer:** B — *Abductor hallucis*.

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**16.** Which muscle maintains the transverse arch of the foot?

- A. Peroneus brevis
- B. Peroneus longus
- C. Tibialis anterior
- D. Soleus

?

**Answer:**

B

—

*Peroneus longus.*

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**17.** Which structure passes obliquely across the sole from lateral to medial side?

- A. Tibialis posterior tendon
- B. Flexor hallucis longus tendon
- C. Peroneus longus tendon
- D. Plantaris tendon

**? Answer:** C — *Peroneus longus tendon.*

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**18.** The dorsal digital arteries of toes are derived from:

- A. Dorsalis pedis artery
- B. Plantar arch
- C. Medial plantar artery
- D. Peroneal artery

**? Answer:** B — *Plantar arch.*

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**19.** Which artery is the main blood supply to the great toe?

- A. Lateral plantar artery
- B. Medial plantar artery
- C. Dorsalis pedis artery
- D. Peroneal artery

**? Answer:** B — *Medial plantar artery* (through its superficial branches and 1st plantar metatarsal).

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**20.** The flexor digitorum brevis muscle inserts into which phalanges?

- A. Distal phalanges of lateral four toes
- B. Middle phalanges of lateral four toes
- C. Proximal phalanges of lateral four toes
- D. Bases of all distal phalanges

**? Answer:** B — *Middle phalanges of lateral four toes.*

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**21.** The lumbricals of the foot perform which action?

- A. Extend MTP joints and flex IP joints

B. Flex MTP joints and extend IP joints

C. Flex all toe joints

D. Extend all toe joints

? **Answer:** B — *Flex MTP and extend IP joints.*

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**22.** The tarsal tunnel is located beneath which structure?

A. Inferior extensor retinaculum

B. Flexor retinaculum

C. Superior peroneal retinaculum

D. Peroneal sheath

? **Answer:** B — *Flexor retinaculum.*

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**23.** Injury to the tibial nerve at the tarsal tunnel leads to:

A. Foot drop

B. Loss of dorsiflexion

C. Loss of plantar flexion and sole sensation

D. Eversion deformity

? **Answer:** C — *Loss of plantar flexion and sensation on sole.*

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**24.** Pain between third and fourth toes during walking is characteristic of:

A. Tarsal tunnel syndrome

B. Morton's neuroma

C. Plantar fasciitis

D. Pes planus

? **Answer:** B — *Morton's neuroma.*

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**25.** The heel pad receives blood supply mainly from:

A. Dorsalis pedis artery

B. Posterior tibial artery

C. Peroneal artery

D. Both posterior tibial and peroneal arteries

? **Answer:** D — *Calcanean branches of posterior tibial and peroneal arteries.*

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## Viva Voce – Sole of the Foot

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**1. What is the main function of the sole of the foot?**

? To support body weight, absorb shock, aid locomotion, and protect underlying vessels and nerves.

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**2. Why is the skin of the sole thick and firmly bound?**

? For protection against friction and pressure during walking and standing; fibrous septa anchor skin to deep fascia.

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**3. What is the nature of skin on the sole?**

? Thick, hairless, with numerous sweat glands and no sebaceous glands.

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**4. What is the composition of superficial fascia in the sole?**

? Fibrofatty tissue with dense fibrous septa enclosing fat lobules, vessels, nerves, and sweat glands.

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**5. What is the function of superficial fascia in the sole?**

? Acts as a cushion and shock absorber during weight bearing.

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**6. What is plantar aponeurosis?**

? Thick central part of deep fascia of the sole, triangular in shape, attached posteriorly to medial process of calcaneal tuberosity.

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**7. What are the compartments of the sole formed by the plantar aponeurosis?**

? Medial, Central, and Lateral compartments.

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**8. What is the function of the plantar aponeurosis?**

? Protects deep structures, supports the longitudinal arch, and provides grip during walking.

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**9. Which muscle lies in the medial compartment of the sole?**

? *Abductor hallucis* and *Flexor hallucis brevis*.

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**10.** Which muscles lie in the lateral compartment of the sole?

? *Abductor digiti minimi* and *Flexor digiti minimi brevis*.

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**11.** What are the muscles in the first layer of the sole?

? *Abductor hallucis*, *Flexor digitorum brevis*, and *Abductor digiti minimi*.

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**12.** Name the muscles of the second layer.

? *Quadratus plantae* (*flexor digitorum accessorius*) and *four lumbricals*, along with tendons of *flexor digitorum longus* and *flexor hallucis longus*.

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**13.** Which muscles are found in the third layer of the sole?

? *Flexor hallucis brevis*, *Adductor hallucis*, and *Flexor digiti minimi brevis*.

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**14.** What muscles form the fourth layer of the sole?

? *Three plantar interossei* and *four dorsal interossei*.

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**15.** What are the actions of lumbrical muscles?

? Flex metatarsophalangeal joints and extend interphalangeal joints of toes.

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**16.** What are the actions of interossei muscles?

? Plantar interossei adduct (PAD) and Dorsal interossei abduct (DAB) the toes.

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**17.** Which nerve supplies the sole?

? **Tibial nerve**, through its branches: **medial and lateral plantar nerves**.

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**18.** Which nerve supplies the medial 3½ toes?

? **Medial plantar nerve**.

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**19.** Which nerve supplies the lateral 1½ toes?

? **Lateral plantar nerve**.

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**20.** What is the sensory supply to the heel?

? **Medial calcanean branches** of tibial nerve.

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**21.** Which artery forms the plantar arch?

? **Lateral plantar artery** (completed medially by deep branch of dorsalis pedis).

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**22.** How many plantar metatarsal arteries arise from the plantar arch?

? Four.

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**23.** Which artery supplies the great toe?

? **First plantar metatarsal artery** and branch of **medial plantar artery**.

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**24.** What are the terminal branches of the posterior tibial artery?

? **Medial and Lateral plantar arteries.**

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**25.** Which muscles are supplied by the medial plantar nerve?

? *Abductor hallucis, Flexor digitorum brevis, Flexor hallucis brevis, and First lumbrical.*

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**26.** Which muscles are supplied by the lateral plantar nerve?

? All other intrinsic muscles of the sole.

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**27.** Which muscle in the second layer straightens the pull of flexor digitorum longus?

? *Quadratus plantae.*

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**28.** What is the nerve root value of the plantar reflex?

? **L5–S1.**

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**29.** What is the clinical importance of the plantar reflex?

? Tests integrity of the corticospinal tract; dorsiflexion of great toe indicates UMN lesion (Babinski sign).

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**30.** What is Morton's neuroma?

? Thickening of plantar digital nerve between 3rd and 4th metatarsals ? burning pain in forefoot.

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**31. What is jogger's foot?**

? Entrapment of medial plantar nerve beneath abductor hallucis ? pain along medial arch and great toe.

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**32. What is tarsal tunnel syndrome?**

? Compression of tibial nerve beneath flexor retinaculum ? paresthesia and pain in sole.

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**33. Why are plantar abscesses so painful?**

? Tight fibrous septa prevent spread of pus, causing severe pressure on nerves.

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**34. What is the main venous drainage of the sole?**

? *Plantar venous arch*, draining into *posterior tibial veins*.

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**35. What maintains the transverse arch of the foot?**

? *Peroneus longus tendon, adductor hallucis (transverse head), and deep transverse metatarsal ligaments.*

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**36. Which structure maintains the medial longitudinal arch?**

? *Tibialis posterior, flexor hallucis longus, abductor hallucis, and spring ligament.*

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**37. Which muscle corresponds to the palmaris brevis of the hand?**

? *None*; the sole has no direct analogue.

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**38. Which muscle corresponds to flexor digitorum superficialis of the hand?**

? *Flexor digitorum brevis.*

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**39. Which muscle corresponds to flexor digitorum profundus of the hand?**

? *Flexor digitorum longus.*

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**40. What corresponds to the deep palmar arch of the hand in the foot?**

? **The plantar arch.**

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**41. What corresponds to the median nerve of the hand?**

? **Medial plantar nerve.**

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**42. What corresponds to the ulnar nerve of the hand?**

? **Lateral plantar nerve.**

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**43. What is the chief action of the intrinsic muscles of the sole?**

? Stabilize the arches and assist long flexors during walking.

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**44. What are claw toes?**

? Deformity due to paralysis of lumbricals and interossei ? hyperextended MTP joints and flexed IP joints.

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**45. What is pes planus?**

? Flat foot — collapse of medial longitudinal arch due to weak ligaments and fascia.

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**46. What is pes cavus?**

? High-arched foot caused by contracture of plantar fascia or imbalance of foot muscles.

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**47. Which muscle forms the “key-stone” of the foot arches?**

? *Tibialis posterior.*

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**48. What is the relation between plantar fascia and calcaneal spur?**

? Spur forms at the attachment of plantar aponeurosis to calcaneal tuberosity due to chronic traction.

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**49. What is the direction of the plantar arch?**

? Convex laterally, from the base of the fifth metatarsal to the first intermetatarsal space.

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**50. What is the clinical importance of the plantar arch?**

? Rich anastomosis with dorsalis pedis ensures collateral blood supply; deep position makes hemorrhage difficult to control.