

# JOINTS OF THE LOWER EXTREMITY

## **Pelvis as a whole:**

By connection of **os coxae** with **os sacrum** through **sacroiliac joint** and **symphysis** in the front, it is created a solid circle.

## Articulatio sacroiliaca

*Type:* **tough joint- amphiarthrosis**

*Articular surfaces:*

**facies auricularis ossis sacri**

**facies auricularis ossis ilii**

*Articular capsule:* **short, tough**

*Ligaments:*

**lig. sacroiliacum ventrale**

**lig. sacroiliacum dorsale**

**lig. sacroiliacum interosseum**

**lig. iliolumbale** from L4-5 to dorsal side of crista iliaca

*Movements:* **minimal**

## Articulationes cinguli

### Symphysis pubica

*Type:* **tough, cartilaginous connection**

**discus interpubicus**- at the back **eminentia retropubica** (palpable), there is sometimes a cleft inside

*Articular surfaces:* **facies symphysiales (os pubis)**

*Ligaments:* **lig. pubicum inferius = lig. arcuatum pubis** – from below, it holds even when the pelvic bones are spread out

**lig. pubicum superius**

# **Ligaments of pelvis**

**lig. inguinale**

**lig. sacrospinale**

**foramen ischiadicum majus**

(it is divided by the course of **m. piriformis**  
**into foramen suprapiriforme et infrapiriforme)**

**lig. sacrotuberale**

**foramen ischiadicum minus**

**lig. sacrococcygeum anterius**

**lig. sacrococcygeum posterius**

**membrana obturatoria**

**canalis obturatorius**

## **Pelvis as a whole:**

**Linea terminalis** separates the large and small pelvis from each other.

**Pelvis major** is a part of abdominal cavity

**Pelvis minor** contains a part of organs of genital and urinary systems.

The small pelvis in the woman presents important birth canal. In connection with this function, there are significant gender differences on the pelvis.

**Male pelvis** is higher and narrower

**Female pelvis** is lower and wider

## Gender differences of pelvis

### **Female pelvis:**

**sacrum** wider and shorter,

**promontorium** protrudes less into the **entrance**- oval shaped,

**coccyx** shorter and more movable,

**ala ossis illii**- in the frontal plane

**arcus pubicus**

**foramen obturatum** lower – triangular shape

**tubera ischiadica**- further from each other

**symphysis pubica**- lower

## Dimensions of the pelvis

- The largest dimension of newborn skull- **the length - 11,5 cm** must be consistent with dimensions of single **pelvic planes**
- The newborn head rotates during the birth so, that its largest dimension passes through the largest dimension of appropriate **plane**:

**aditus pelvis**

**amplitudo pelvis**

**angustia pelvis**

**exitus pelvis**



## External pelvis dimensions

**Distantia bispinalis** 26cm

**Distantia bicristalis** 29cm

**Distantia bitrochanterica** 31cm

**Conjugata externa**- upper edge  
of symphysis to the spinous  
proces of L5: 18 - 20cm

## **Articulatio coxae**

*Type:* **spherical, restricted – enarthrosis**

*Articular head:* **caput femoris**

*Articular pit:* **facies lunata acetabuli**, enlarged by **labrum acetabuli, pulvinar acetabuli**

*Articular capsule:*

**From margins of acetabulum**

**ventrally to linea intertrochanterica**

**dorsally to collum femoris**

*Ligaments:*

**lig. transversum acetabuli**

**lig. iliofemorale**

**lig. pubofemorale**  
**lig. ischiofemorale** } **zona orbicularis**  
**lig. capitis femoris**

*Movements:*

**flexion, extension**

**abduction, adduction**

**rotation**

# Articulatio genus

*Type:* **composed joint, trochlear**

## **Tibio-femoral part:**

*Articular head:* **condyli femoris**

*Articular pit:* **facies articulares**

**superiores tibiae, meniscus medialis,  
meniscus lateralis**

## **Patello-femoral part:**

*Articular head:* **facies articulares**

**patellae**

*Articular pit:* **facies patellaris femoris**

*Articular capsule:* **fibrous and synovial  
layers**

*Ligaments:*

**a) intraarticular**

**lig. cruciatum anterius**

**lig. cruciatum posterius**

**lig. transversum genus**

**b) extraarticular**

**Tendon of m. quadriceps femoris - lig. patellae**

**retinaculum patellae mediale**

**retinaculum patellae laterale**

**lig. collaterale fibulare**

**lig. collaterale tibiale**

**lig. popliteum obliquum**

*Synovial layer:*

**plica synovialis patellaris**

**plicae alares**

**corpus adiposum infrapatellare**

*Bursae:*

**b. suprapatellaris**

**b. profunda infrapatellaris**

**b. prepatellaris subcutanea**

**b. infrapatellaris subcutanea**

**b. prepatellaris subtendinea**

**b. anserina**



*Movements:*

**Flexion/extension - 4 phases:**

- 1. Initial rotation**
- 2. Rolling movement**
- 3. Slide movement**
- 4. Final rotation**

# Connections of tibia and fibula

# Articulatio tibiofibularis

*Type:* **plane joint**

*Articular surfaces:* **facies articularis tibiae**

**facies articularis capitis fibulae**

*Articular capsule:* **short, tough**

*Ligaments:*

- **lig. capitis fibulae anterius**
- **lig. capitis fibulae posterius**

*Movements:* **sliding, minimal**

## **Membrana interossea cruris**

Fibrous membrane between **margo interosseus** of tibia and **margo interosseus** of fibula.

## **Syndesmosis tibiofibularis**

*Type:* **fibrous connection**

*Surfaces:* **incisura fibularis tibiae, distal end of fibula**

*Ligaments:*

**lig. tibiofibulare anterius**

**lig. tibiofibulare posterius**

*Movements:* **minimal**

# **Articulatio talocruralis**

*Type:* **composed, trochlear joint**

*Articular head:* **trochlea tali**

*Articular pit:* **facies articularis malleoli lateralis, facies articularis inferior tibiae et facies articularis malleoli medialis - tibiofibular fork**

*Articular capsule:* **it is attached to margins of articular surfaces**

*Movements:*

**plantar and dorsal flexion**

*Ligaments:*

**lig. collaterale mediale = lig. deltoideum**

**pars tibionavicularis**

**pars tibiotalaris anterior**

**pars tibiocalcanearis**

**pars tibiotalaris posterior**

**lig. collaterale laterale**

**lig. talofibulare anterius**

**lig. calcaneofibulare**

**lig. talofibulare posterius**

## Articulatio subtalaris (talocalcanea)

*Typ:* **cylindrical joint**

*Articular head:* **facies articularis**

**talaris posterior calcanei**

*Articular pit:* **facies articularis**

**calcanearis posterior tali**

*Ligaments:*

**lig. talocalcaneum laterale**

**lig. talocalcaneum mediale**

**lig. talocalcaneum posterius**

**lig. talocalcaneum interosseum**

**(within sinus tarsi)**

# Articulatio talocalcaneonavicularis

*Type:* **spherical joint**

*Articular head:* **caput tali, facies articularis calcanea media et anterior tali**

*Articular pit:* **os naviculare, facies articularis talaris media et anterior calcanei, fibrocartilago navicularis**

*Ligaments:*

**lig. calcaneonaviculare plantare-fibrocartilago navicularis**

**lig. talonaviculare dorsale**



*Movements:* **combined**

**inversion - plantar flexion, adduction and supination**

**eversion - dorsal flexion, abduction and pronation**

## Articulatio calcaneocuboidea

*Type:* amphiarthrosis

*Articular surfaces:* **facies articularis cuboidea calcanei, os cuboideum**

*Ligaments:*

**lig. calcaneocuboideum plantare**

**lig. plantare longum**

## **Chopart's joint = art. tarsi transversa**

- **articular line: art. talonavicularis et calcaneocuboidea**

*Ligaments:* dorsal side:

lig. talonaviculare

lig. **bifurcatum:**

lig. calcaneonaviculare

lig. calcaneocuboideum

Plantar side:

lig. **calcaneonaviculare** plantare

lig. **calcaneocuboideum** plantare

## Articulatio cuneonavicularis

*Type:* composed, tough joint

Connection of three ossa cuneiformia with os naviculare, ossa cuneiformia between each other and os cuneiforme laterale with os cuboideum

*Ligaments:*

ligg. cuneonavicularia **dorsalia** et **plantaria**

ligg. intercuneiformia dorsalia, plantaria et interossea

ligg. cuneocuboideum dorsale, plantare et interosseum

*Movements:* minimal

**Lisfranck's joint= functional unit:**

**Articulationes tarsometatarsales**

**Distal row of tarsal bones and bases of metatarsal bones**

**A. os cuneiforme mediale - os metatarsale I**

**B. os cuneiforme intermedium et laterale - os metatarsale II et III**

**C. os cuboideum - os metatarsale IV et V**

**Articulationes intermetatarsales**

**Connections between bases of adjacent metatarsal bones.**

*Ligaments:*

**Dorsal side:**

**ligg. metatarsalia dorsalia  
et interossea**

**Plantar side:**

**ligg. metatarsalia plantaria**

**ligg. tarsometatarsalia dorsalia**

**ligg. tarsometatarsalia plantaria**

## Articulationes metatarsophalangeae

*Type:* transition between cylindrical and spherical joints

*Articular head:* **caput ossis metatarsalis**

*Articular pit:* **basis phalangis proximalis**

*Ligaments:*

**ligg. collateralia**

**ligg. plantaria** - fibrocartilagineae plantares

**lig. metatarsale transversum profundum**

*Movements:* **flexion and extension**

**in small range - abduction and adduction**



## Articulationes interphalangeae pedis

*Type:* **trochlear joint**

*Articular head:* **caput phalangis**

*Articular pit:* **basis phalangis**

*Ligaments:*

**ligg. plantaria - fibrocartilagineae plantares**

**ligg. collateralia**

*Movements:* **flexion and extension in  
restricted range**

## **Foot vault**

- It prevents compression of soft tissues in the foot
- It allows flexibility of the foot during walking

**transversal** – it is given by arch of ossa cuneiformia, it is held by interosseous ligaments, m. peroneus longus, m. tibialis anterior, m. adductor hallucis

**longitudinal** – top is talus, aponeurosa, lig. plantare longum, m. tibialis ant. et post., m. flexor hallucis longus, m. flexor digitorum longus, short muscles of foot