

# ORTHOTICS

Lec#10-11

# ORTHOTICS

- ◉ Derived from the greek word ORTHO meaning straight, upright or correct.

orthoses (also known as "orthotics") are custom foot supports.

- ◉ "an externally applied device used to modify the structural and functional characteristics of the neuromuscular and skeletal system"



# FUNCTIONS OF ORTHOTICS

- ◉ Prevent Deformity
- ◉ Assist function of a weak limb
- ◉ Maintain proper alignment of joints
- ◉ Protect against injury of a weak joint
- ◉ Allow for maximal functional independence
- ◉ Facilitate Motion



# ORTHOTIC CONSIDERATION

- ◉ Cost
- ◉ Energy efficiency
- ◉ Cosmesis
- ◉ Temporary versus permanent
- ◉ Encourage normal Movement



# ORTHOTIC INTERVENTION

- Ensure continued proper fit
- Donning/doffing orthosis
- Implement progressive wearing schedule
- Patient/caregiver teaching:
  - Skin Inspection
  - Care of orthosis
- Mobility training with orthosis

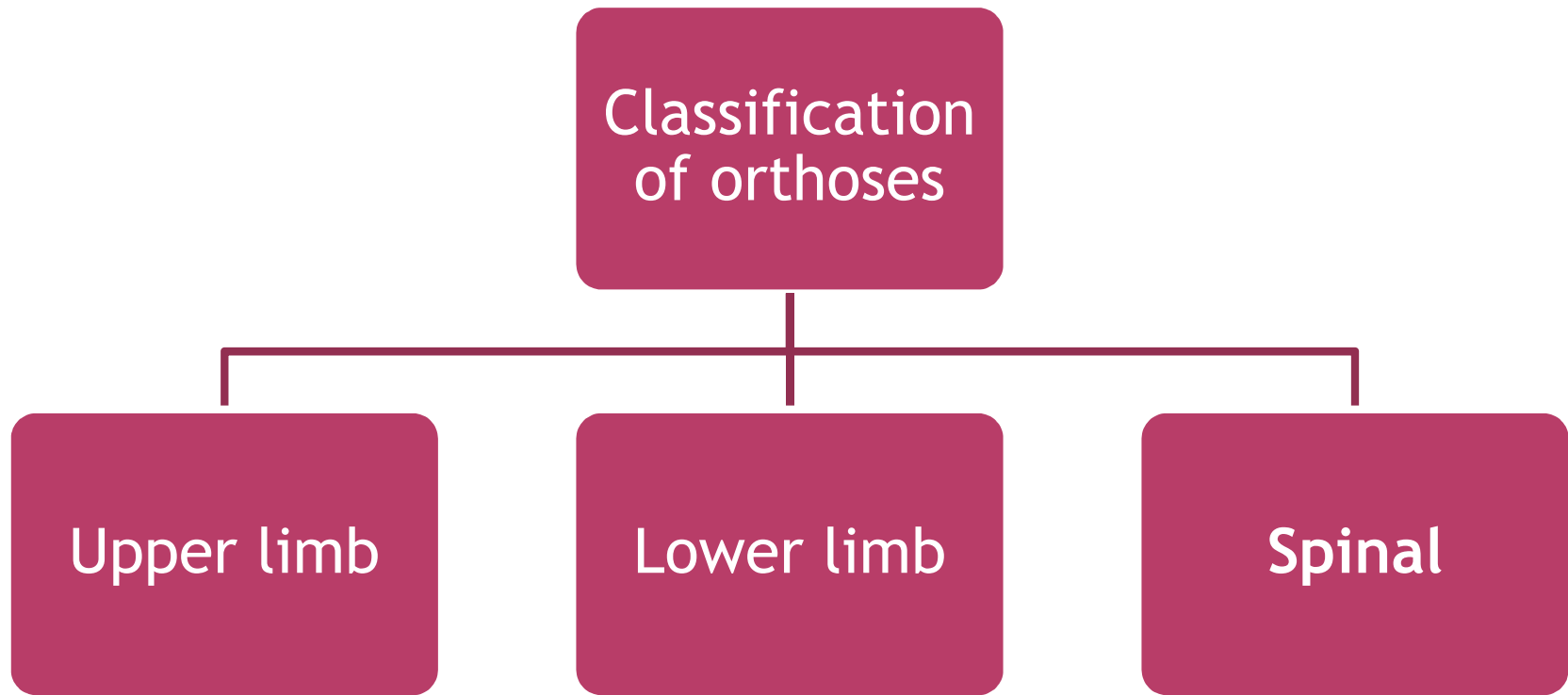


# Classification of orthoses

Upper limb

Lower limb

Spinal



# UPPER LIMB ORTHOSES

Most UL orthoses are directed toward  
creating usable prehension, and hand  
position



## DORSAL SPLINT

It prevents the flexor tendons in the hand and fingers from being stressed during injury.





## RESTING SPLINT (COCK-UP SPLINT)

Resting splints support your joints when you're resting and can help to ease pain and inflammation.



## AIRPLANE SPLINT

positions the patients arm out to the side at 90degrees of abduction the elbow is also flexed to the same degrees; the weight of the outstretched arm is borne on a padded lateral trunk bar and iliac crest band; a strap holds the device across the trunk; used to immobilize the shoulder following fracture of injury

# LOWER LIMB ORTHOSES



**Lower limb**

```
graph TD; A[Lower limb] --- B[Foot orthoses]; A --- C[Knee orthosis (KO)]; A --- D[Knee-ankle-foot orthosis (KAFOs)]; A --- E[Ankle-foot orthosis (AFO)];
```

**Foot  
orthoses**

**Knee  
orthosis  
(KO)**

**Knee-ankle-  
foot orthosis  
(KAFOs)**

**Ankle-foot  
orthosis  
(AFO)**

# SHOES

The foundation for an orthosis; shoes can reduce areas of concentrated pressure on pressure sensitive feet.



# SHOES

- A. Traditional leather orthopedic shoes or athletic sneakers can be worn with orthoses; attachments can be external or internal
- B. Blucher opening has vamps (flaps contain the lace stays) that open wide apart from the anterior margin of the shoe for ease of application
- C. Bal (balmoral) opening: has stitched down vamps not suitable for orthotic wear



# SHOES



Blucher opening



Balmoral opening

# FOOT ORTHOSES (FO)

A semirigid or rigid insert worn inside a shoe that corrects foot alignment and improves function may also be used to relieve pain.





# FOOT ORTHOSES (FO)

- ◉ May be attached to the interior of the shoe (an inserted pad) or exterior to the shoe (thomas heel)
- ◉ Soft inserts (viscoelastic plastic or rubber pads or relief cut-outs) reduce areas of high loading, restrict forces, and protect painful or sensitive areas of the feet.





## CUSHION HEEL

cushions, absorbs forces at heel contact; used to relieve strain on plantar fascia in plantar fasciitis



## METATARSAL PAD

located posterior to the metatarsal heads; **takes pressure off** the metatarsal heads and onto the metatarsal shafts; allows more push off in weak or inflexible feet

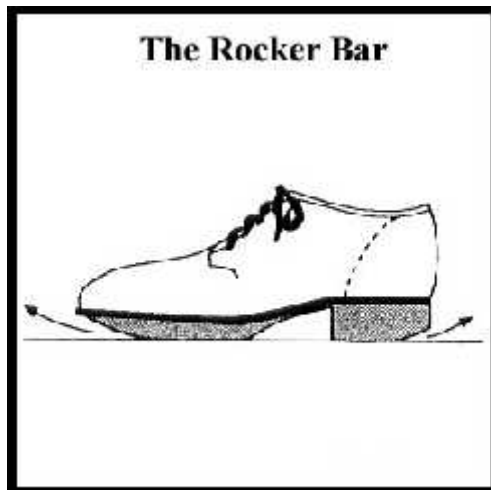
# HEEL LIFTS

- ◉ Accommodates for leg length discrepancy; can be placed inside the shoe (up to 3/8 inch) or attached to the outer sole.
- ◉ Accommodates for limitation in ankle joint dorsiflexion



## ROCKER BAR & ROCKER BOTTOM

- Rocker bar: located proximal to metatarsal heads; improves weight shift onto metatarsals
- Rocket bottom: builds up the sole over the metatarsal heads and improves push off in weak or inflexible feet. May also be used with insensitive feet



# KNEE ORTHOSES (KO)



# KNEE ORTHOSES (KO)

- control knee motion and provide added stability.
  - Post surgery KO protects repaired ligaments from overload
  - Functional KO is worn long-term after surgery or during selected activities
  - Examples include: Lenox Hill, Pro-Am, Can-Am, Don Joy

KO



Lenox Hill



Donjoy





## PATELLAR STABILIZING BRACES

- maintain alignment
- minimizes compression





## SWEDISH KNEE CAGE

provides gentle control  
for extreme  
hyperextension of the  
knee





## NEOPRENE SLEEVES

- Nylon coated rubber material
- Provide compression, protection
- Provide little stabilization unless metal or plastic hinges are added
- Can be used in other areas of the body such as the elbow and thigh etc

# KNEE-ANKLE-FOOT ORTHOSIS (KAFO)

Consists of a shoe attachment, ankle control, uprights, knee control, and bands for the calf and thigh





## CRAIG-SCOTT KAFO

commonly used  
appliance for  
individuals with  
paraplegia; consists of  
shoe attachments with  
reinforced foot plates  
ankle joints set in slight  
dorsiflexion, pretibial  
band, and single thigh  
bands



## OREGON ORTHOTIC SYSTEM

a combination of plastic and metal components allows for triplanar control in three plans of motion(sagittal, frontal, and transverse)



## FRACTURE BRACES

a KAFO device with a calf or thigh shell that encompasses the fracture site and provides support.



## STANDING FRAMES

Allows standing without crutch support may be stationary or attached to a wheeled mobility base





## PARAPODIUM

allows for standing without crutch support; also allows for ease in sitting with the addition of hip and knee joints that can be unlocked  
can be used on children with myelodysplasia

# ANKLE-FOOT ORTHOSIS (AFO)

Consist of a shoe attachment, ankle control, uprights  
and a proximal leg band



# SHOE ATTACHMENTS & STIRRUPS





## FOOT PLATE

a molded plastic shoe insert; allows application of the brace before insertion into the shoe, ease of changing shoes of same heel height.



## STIRRUPS

a metal attachment riveted to the sole of the shoe; split stirrups allow for shoe interchange solid stirrups are fixed permanently to the shoe and provide maximum stability



## SOLID ANKLE

allows no movement  
indicated with severe  
pain or instability

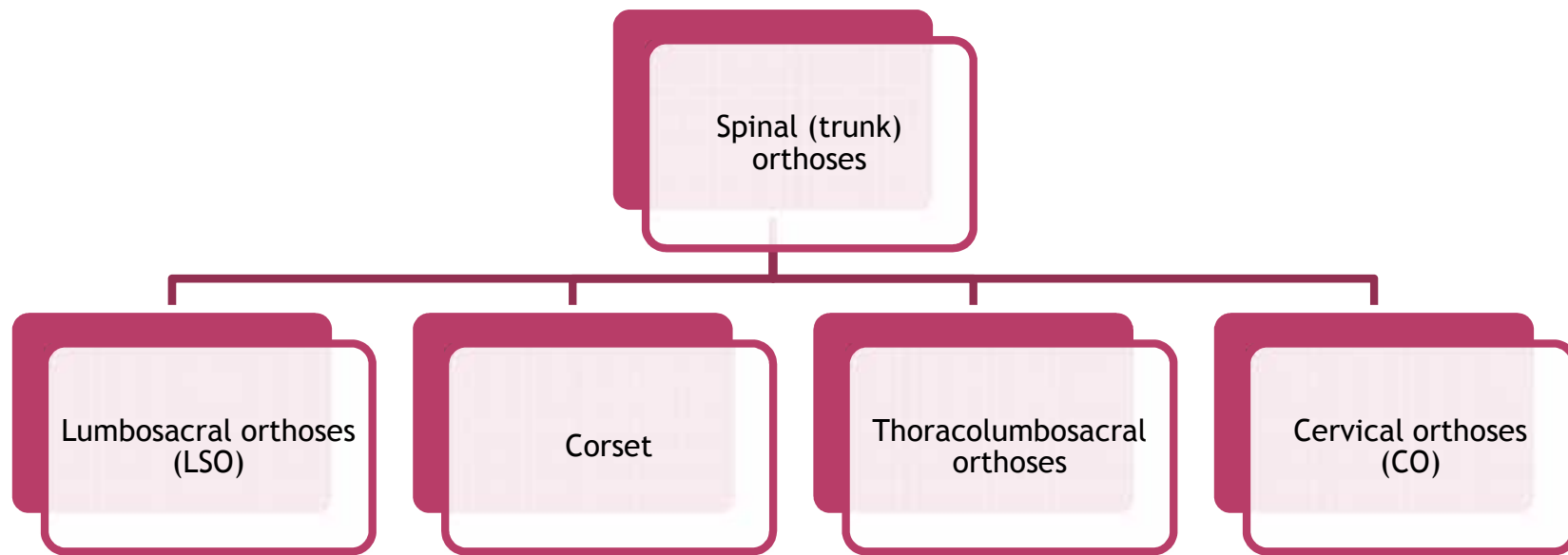


## FREE MOTION

provides mediolateral stability that allows free motion in dorsiflexion and plantarflexion

**SPINAL (TRUNK)  
ORTHOSES:  
COMPONENTS/TERM  
INOLOGY**





# LUMBOSACRAL ORTHOSES (LSO)

control or limit lumbosacral motions





## PLASTIC LUMBOSACRAL JACKET

provides maximum support by spreading the forces over a larger area more cosmetic but hotter



## CORSET

Provides abdominal compression, increases intraabdominal pressure; assists in respiration in individuals with SCI; relieves pain in low back disorders



THORACOLUMBOSAC  
RAL FLEXION,  
EXTENSION  
CONTROL ORTHOSES  
(TLS FE) (TAYLOR  
BRACE)

limit upper trunk  
flexion

# CERVICAL ORTHOSES (CO)

**control or limit cervical motion**





## SOFT COLLAR

- provides minimal levels of control of cervical motions; for cervical pain



## FOUR-POSTER ORTHOSIS

has two plates (occipital and thoracic) with two anterior and two posterior posts to stabilize the head; used for moderate levels of control in individuals with cervical fracture/SCI





## HALO ORTHOSIS

attaches to the skull by screws, four uprights connect from the halo to a thoracic band or plastic jacket; provides maximal control for individuals with cervical fracture or SCI