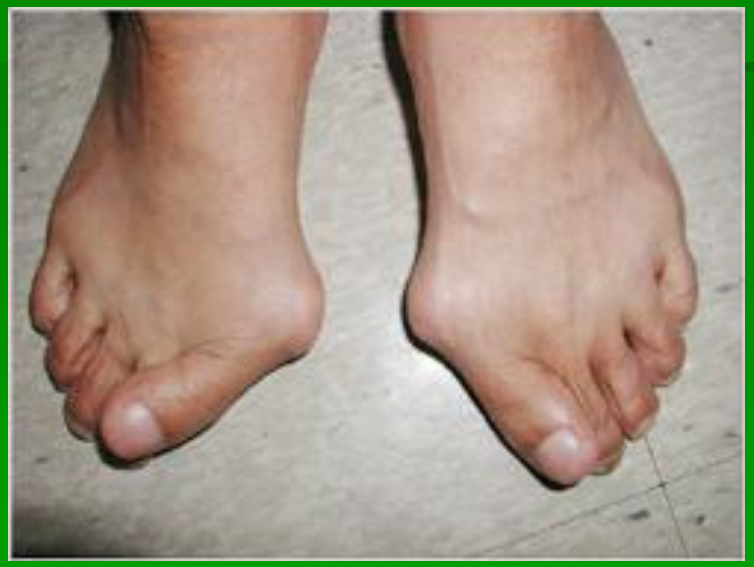
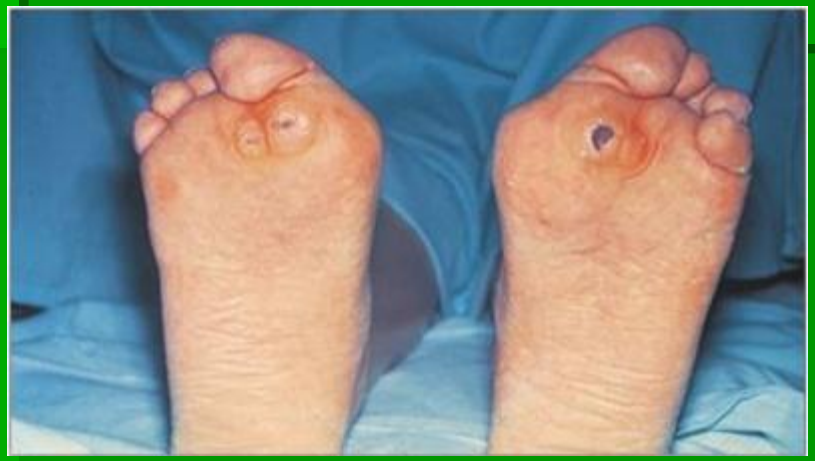
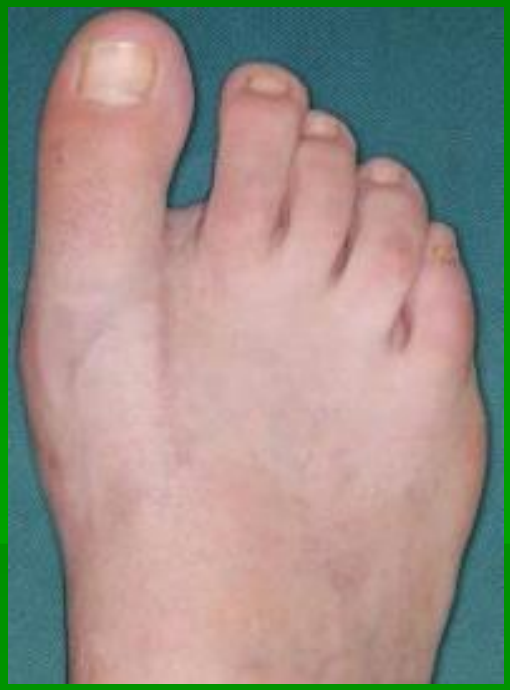
발가락의 변형과 통증

순천향 대학교 부천병원 재활의학과
김 상 현

발도 늙는다!!







Toe Deformity with Age

- Hallux valgus
- Hallux limitus
- Hammer toe, Claw toes
- Tailor's bunion

Hallux Valgus

- Increasing adduction of the 1st metatarsal toward the midline of the foot
- Enlargement overlying the medial or dorsomedial 1st metatarsal head

3515 people in St. Helena *BMJ 1965*

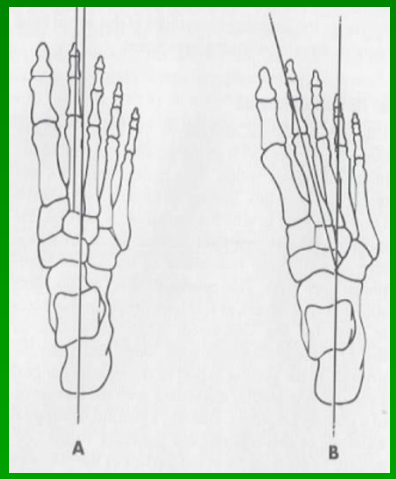
- 2% in unshod
- 16% in shoe-wearing men
- 48% in shoe-wearing women

Hallux Valgus

- **Primary factors**

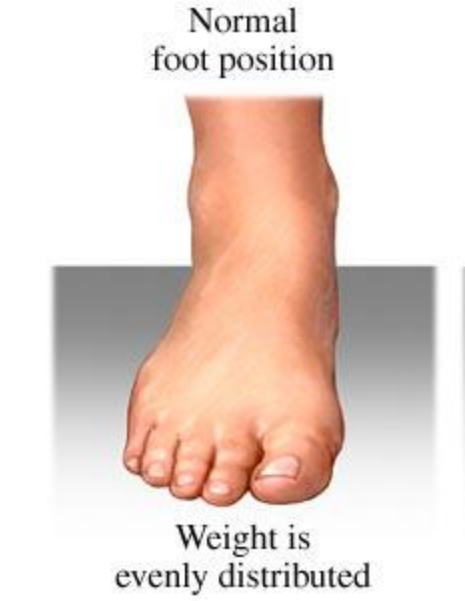
1) Pes planus
2) Achilles tendon contracture
3) Forefoot adductus foot type
4) Shape of metatarsal head
5) Rheumatic arthritis
6) Heredity Up to 77% reported "My mom had a bunion deformity!"

JBJS 1951



Hallux Valgus

- Associated mechanical foot types: **overpronation**



Hallux Valgus

- ✓ Gastrocnemius tightness

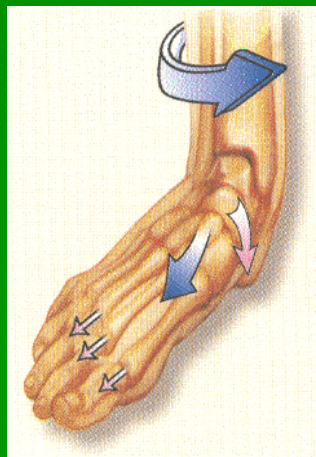
  →less than 5° ankle DF →midtarsal unlocking →subtalar pronation

- ✓ Transverse plane deformity

  1)IR →talus adduct within ankle mortise →closed kinetic pronation

  2)ER →body wt fall medial to subtalar joint axis

  →foot in pronated & abducted position



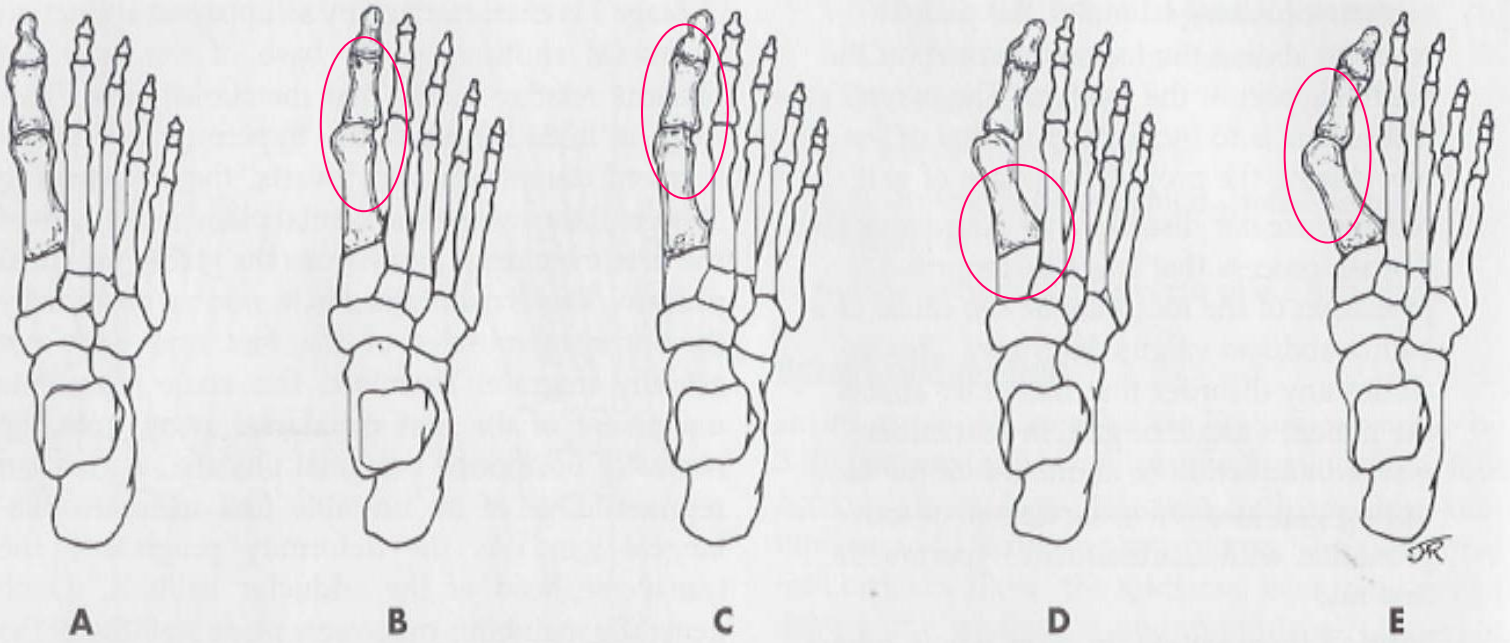
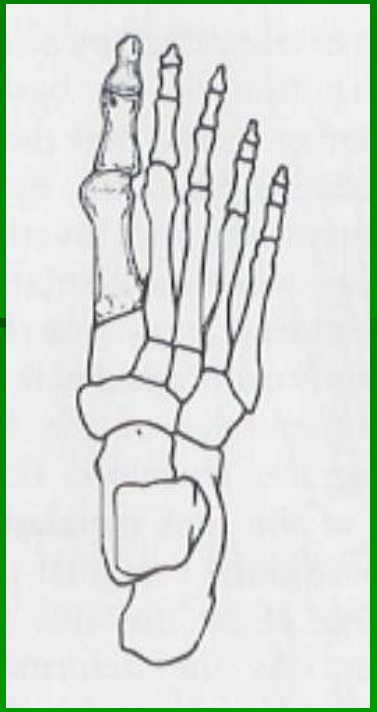
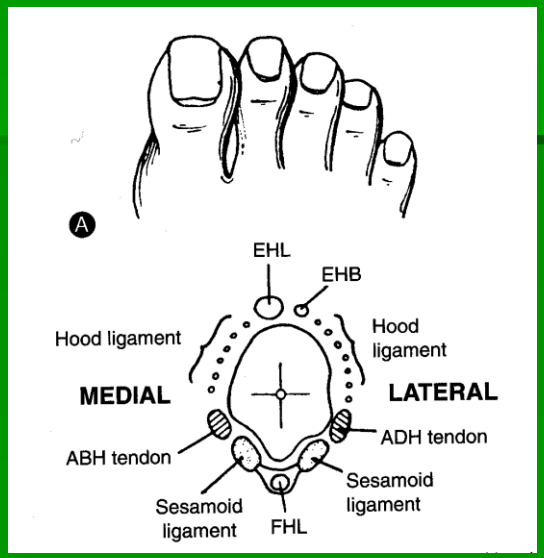


Fig. 2-4. Diagrammatic representation of the stages in the development of hallux abducto valgus as described by Root, Orien, and Weed. A, Normal foot. B, Stage 1: Lateral displacement. This stage is characterized by lateral deviation of the proximal phalanx relative to the first metatarsal head. C, Stage 2: Hallux abductus. This stage is characterized by abduction of the hallux against the second digit. D, Stage 3: development of metatarsus primus adductus. This stage is characterized by an increase in the intermetatarsal angle between the first and second metatarsals. E, Stage 4: dislocation of the first metatarsophalangeal joint. This stage is characterized by marked abduction of the hallux away from the first metatarsal, with loss of joint congruence. (*Redrawn with permission. From Root ML, Orien WP, Weed JH:* Clinical biomechanics: normal and abnormal function of the foot, vol. 2, *Los Angeles, Clinical Biomechanic Corp*, 1977.)

Hallux Valgus : Stage 1



- Lateral shifting of the proximal phalanx to 1st MT head
- Hypermobile 1st ray segment: dorsiflexes and inverts



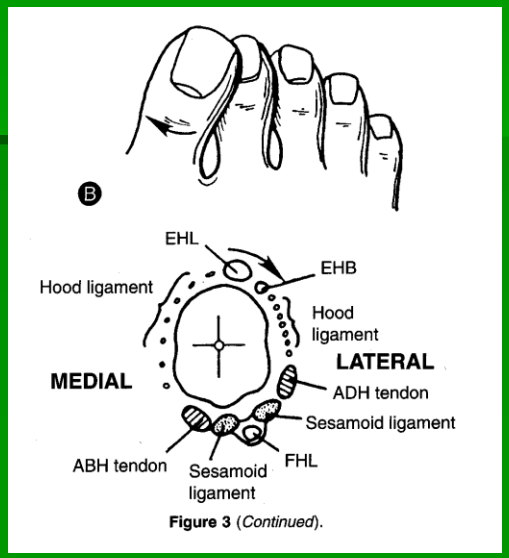
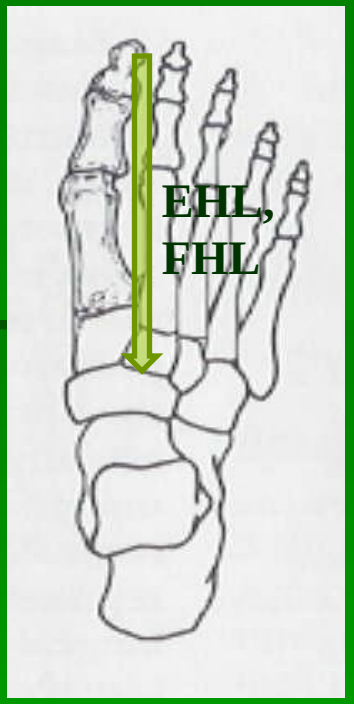


Figure 3 (*Continued*).

Hallux Valgus : Stage 2



- Actual <u>abduction of the hallux</u>

✓ Extrinsic muscles (EHL, FHL) : bowstring effect

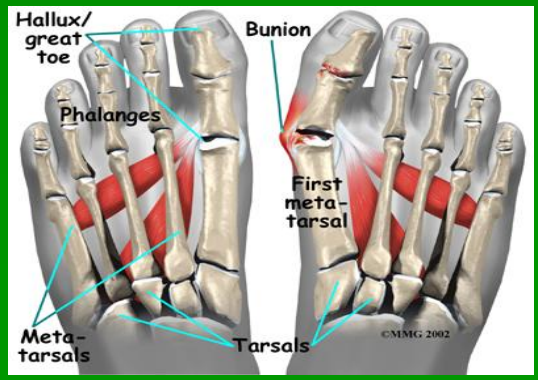
✓ Intrinsic muscles

1. Transverse head of adductor hallucis brevis

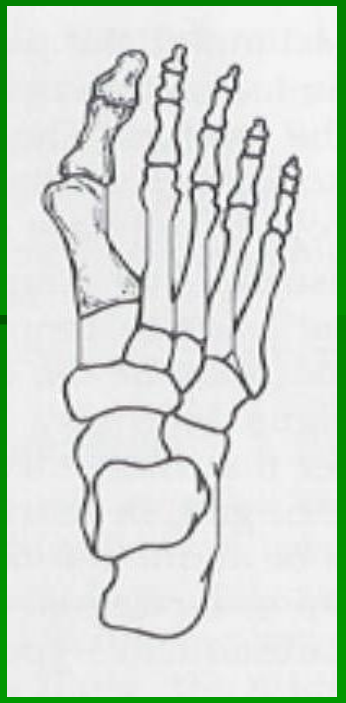
– pull base of proximal phalanx

2. Abductor hallucis brevis

– lose medial stabilizing effect



Hallux Valgus : Stage 3



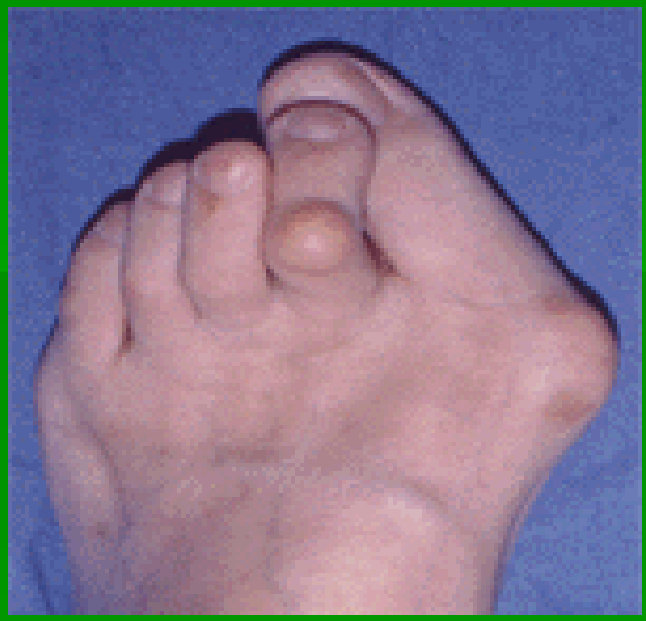
- Marked increase IMA angle btw 1st & 2nd metatarsals
- Sesamoid : increased lateral displacement
- Functional bony adaptation

  : Addition of more new bone at dorsolateral part of 1st MTH

  →Wider MT head

Hallux Valgus : Stage 4

- Frank subluxation or dislocation of the MP joint
- Apropulsive gait
- Hallux : underride or override the 2nd digit



Hallux Valgus

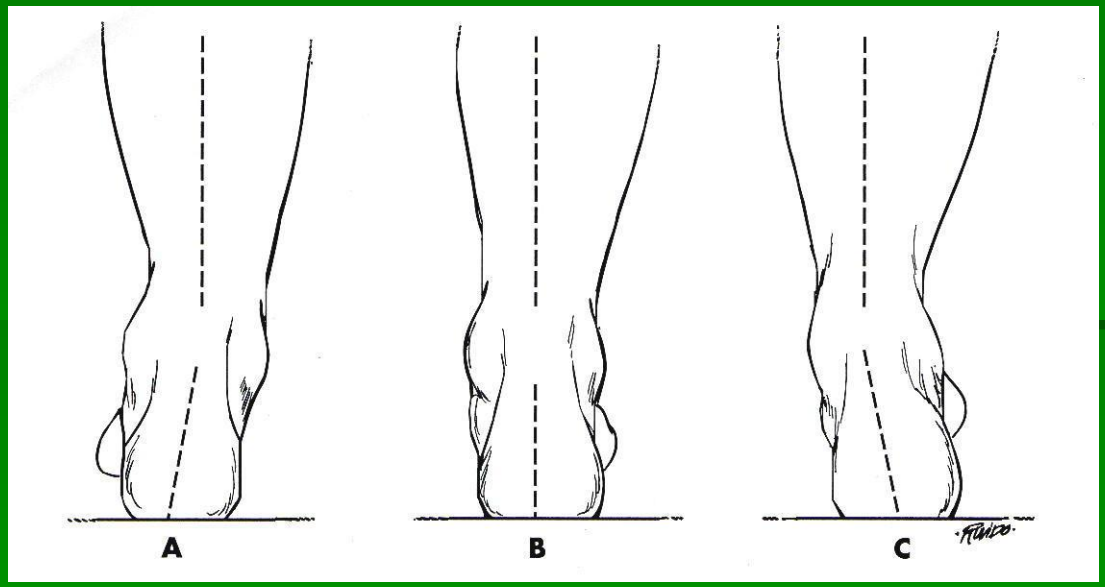
- **Clinical Presentations**

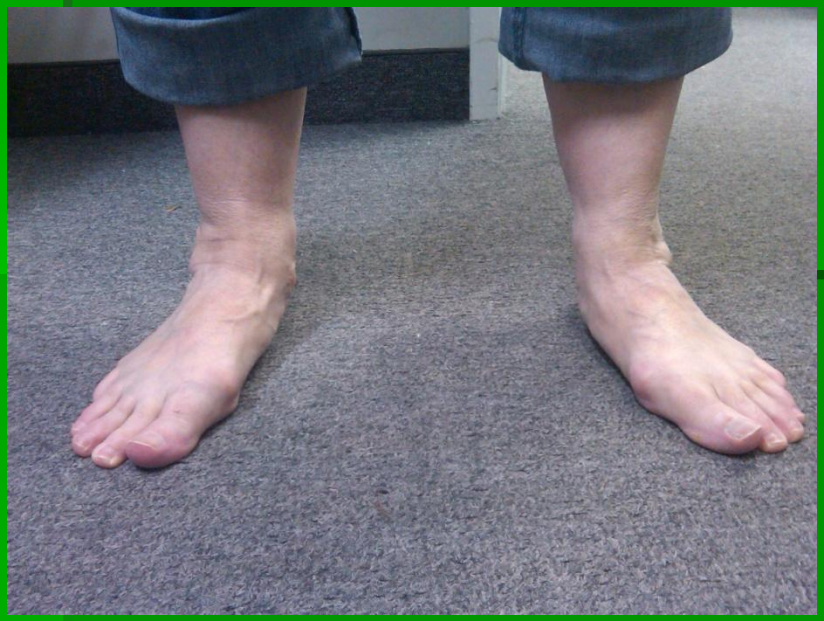
1) Obvious cosmetic deformity
2) Pain exacerbated by shoes, particularly narrow toe box
3) Pain over the medial eminence
4) Pain with first MTP joint motion
5) Pain may be under the second metatarsal head, and occasionally with impingement of the first toe on the second

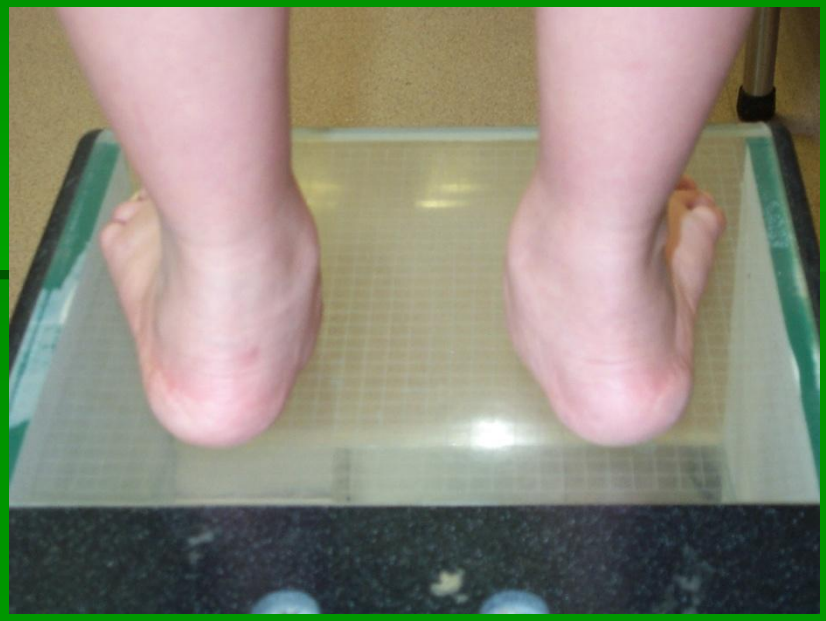
Hallux Valgus

- **Physical Examination**

1) Severity of the HV deformity & overpronation are assessed with the patient weight-bearing
2) Medial eminence tenderness
3) First MTP joint range of motion
4) First TMT joint hypermobility


A
B
C

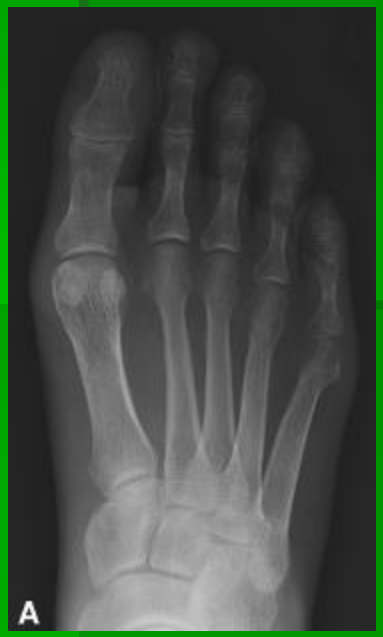


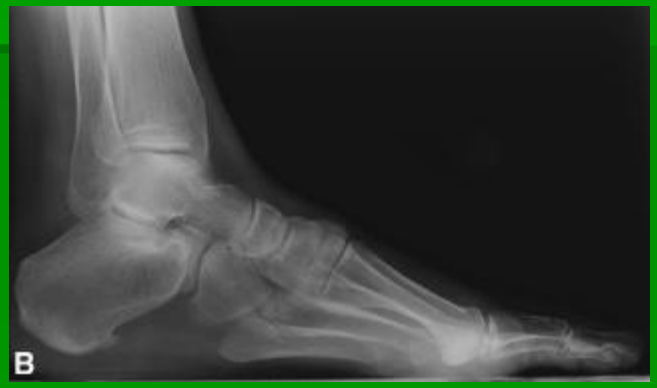


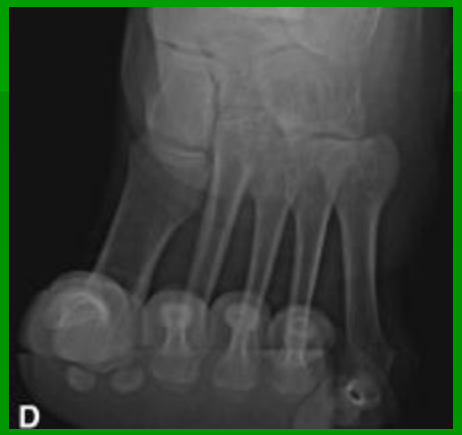
Hallux Valgus

Radiographic evaluation

- ✓ Wt bearing AP & lateral view
- ✓ Sesamoid view

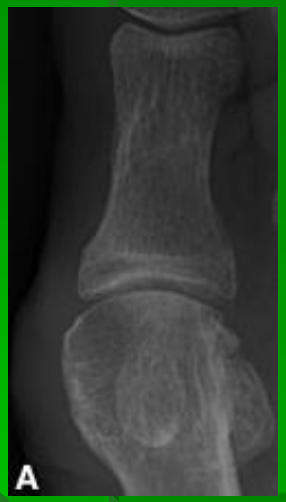




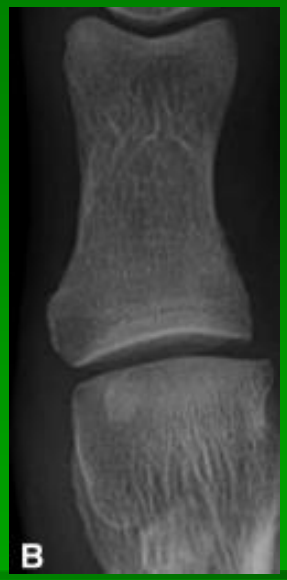


Hallux Valgus

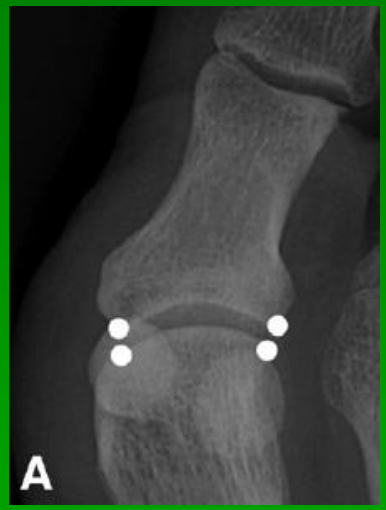
Radiographic evaluation

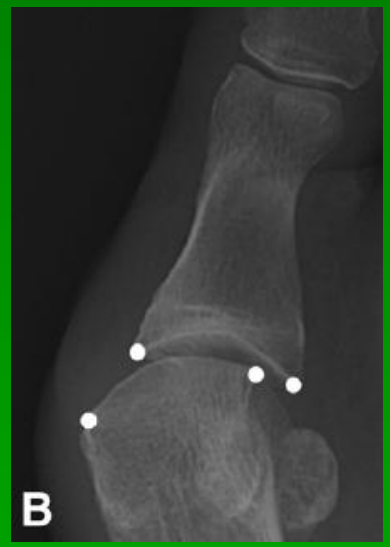


More HV



More stable
More degeneration
Hallux limitus,ridigus



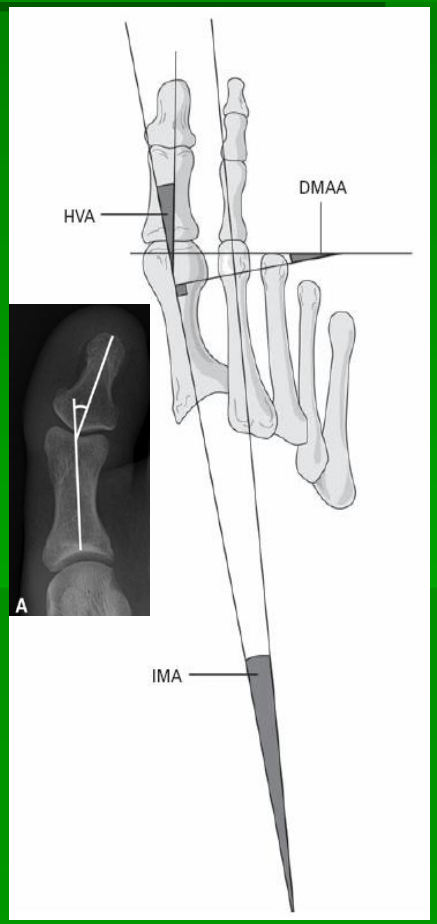


Incongruent more prone to progression
Erosion of exposed MT head cartilage

Hallux Valgus

Radiographic evaluation

- Hallux Valgus Angle (<15˚)
- InterMetatarsal Angle (<9˚)
- Distal Metatarsal Articular Angle (<10˚)
- Hallux Interphalangeus Angle (<10˚)



Mild: HVA~19˚, IMA~13˚

Moderate: HVA20~40˚,IMA14~20˚

Severe: HVA>40˚,IMA>20˚

No correlation btw radiologic severity &

SF36, Global Foot/Ankle Scale, Shoe comfort score *JBJS 2005*

Hallux Valgus

3 goals of non-operative management

1) Prevention & correction of deformity progression
2) Accommodation of the existing deformity
3) Redistribution of pressure

Hallux Valgus

Orthotic consideration

Shoes

-Wide, high, rounded or squared toe box

-Shoe upper c soft leather or pliable material

-Bunion-last shoe

-Extra depth shoe

-Rocker bottom

Ball & ring stretcher

Hallux Valgus

Orthotic consideration

Metatarsal bar

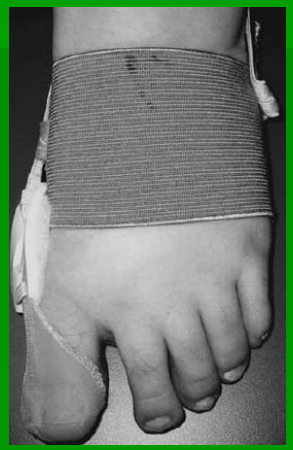
-For transfer lesions of lesser MT heads

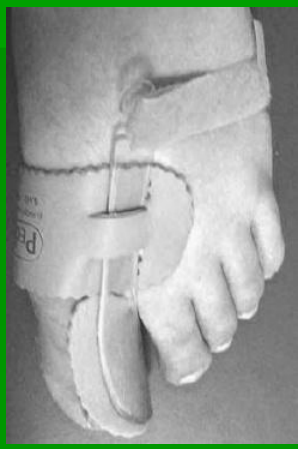
-Just proximal to lesser metatarsal heads

Splinting devices

-Apply varus stretch on the hallux MTP capsule

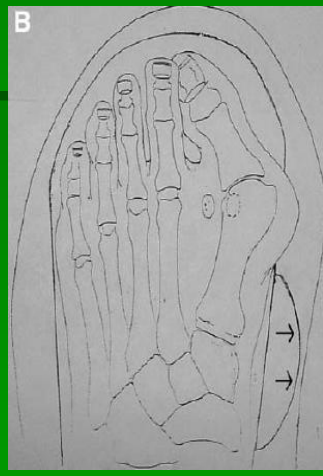
-Most are too bulky to fit into a shoe for daily wear





Hallux Valgus

Orthotic consideration



Bunion flare

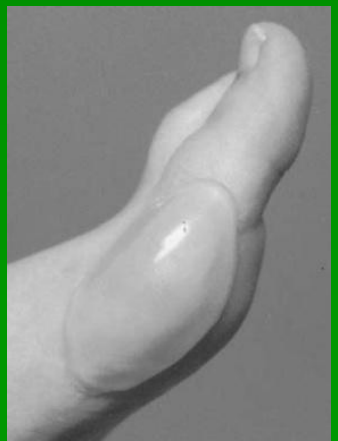
-Proximal to 1st MT head along medial side

-Relieve mechanical irritation of medial bursa

Bunion shields

-Latex or silicone

-Protect bunion



Hallux Valgus

Orthotic consideration

Functional foot orthosis

- ✓ Restrict abnormal pronation &
  recover nl effect of PL (stabilizing 1st-ray hypermobility)
- ✓ Remove abnl effect of the extrinsic & intrinsic foot muscles
- ✓ Slowing progression of deformity & ↓ clinical Sx

- ✓ Most effective in early stage of hallux valgus
- ✓ Stage 3 (IMA>14°): effectiveness↓

Hallux Valgus

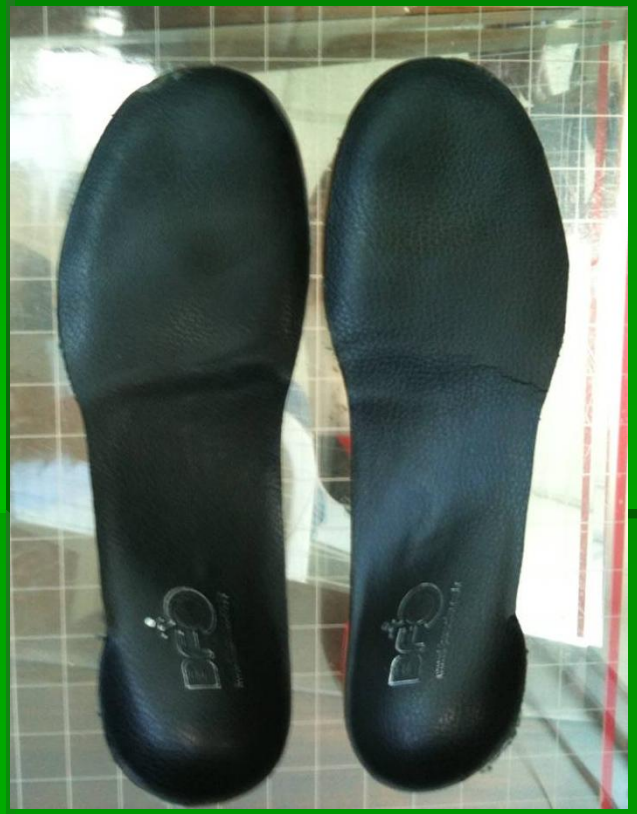
Orthotic consideration

Functional foot orthosis

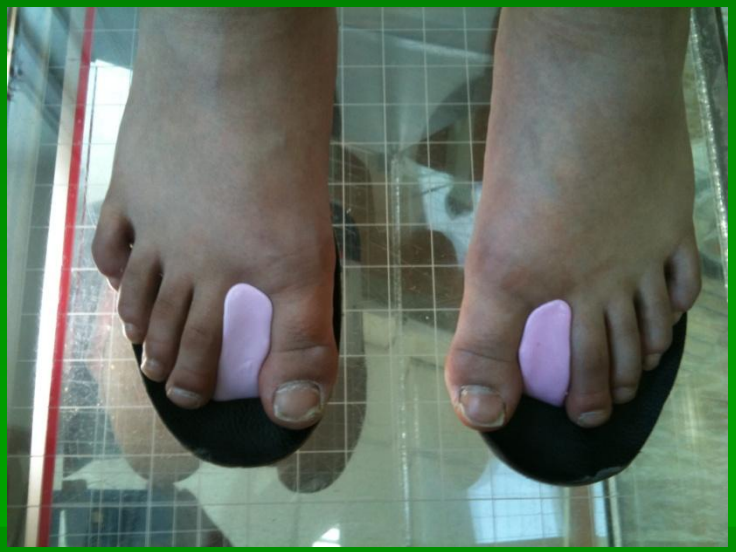
- ✓ Preoperatively: diminish symptom and reduce progression of the deformity prior to surgery & avoid more invasive surgical procedure
- ✓ Postoperative : beneficial in restoring normal function

Hallux Valgus

Functional foot orthosis



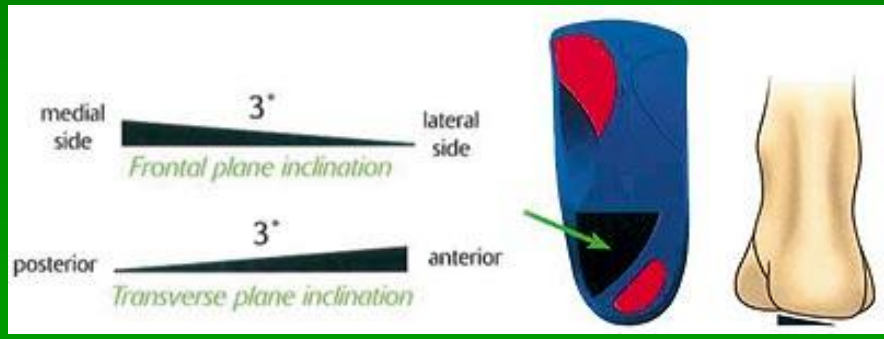
Silicone toe spacer



Hallux Valgus

Posting wedges

- ✓ Forefoot medial(varus) post.
- ✓ Forefoot lateral(valgus) post.
- ✓ Rearfoot varus(medial) post.
- ✓ Rearfoot valgus(lateral) post.

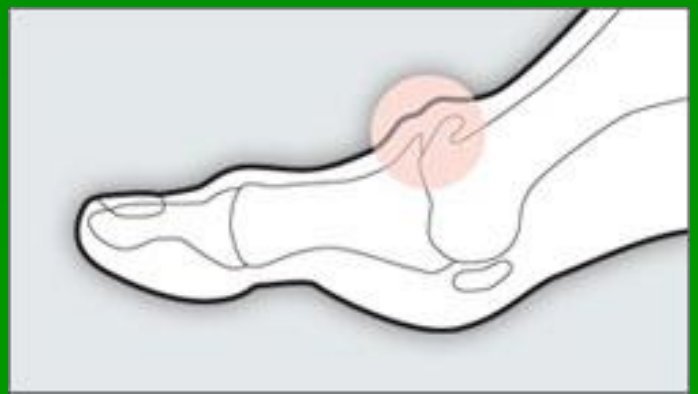


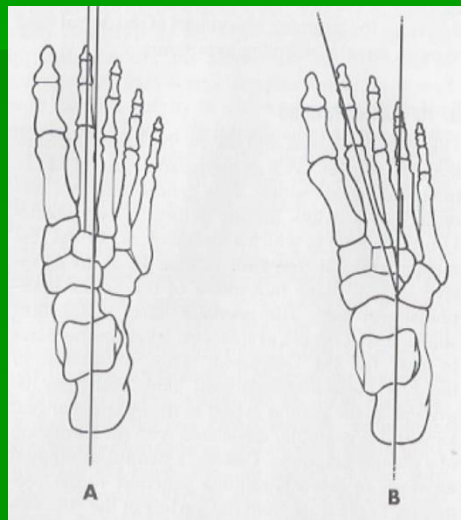
Hallux limitus

- Restriction of dorsiflexion of the first MTP joint

  Normal range : 65˚

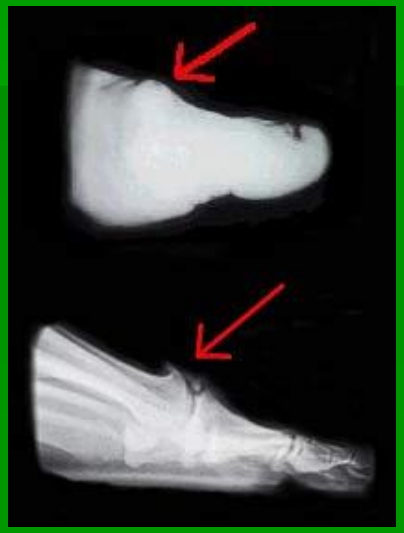
- Pronated foot type ➔ hypermobile first ray





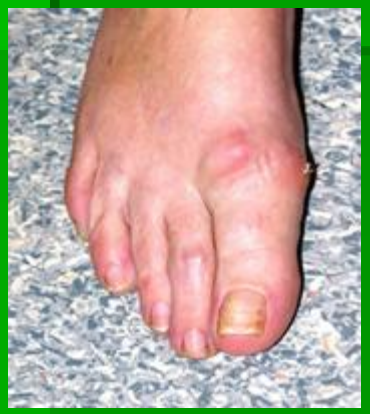
Hallux limitus

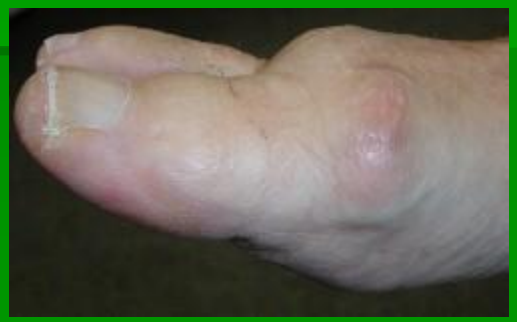
- Predisposing factors
  - ✓ Immobilization of 1st ray in dorsiflexed position d/t longstanding **subtalar pronation**
  - ✓ Osteoarthritis
  - ✓ Excessively long first metatarsal
  - ✓ Congenital or acquired dorsiflexed first-ray deformity

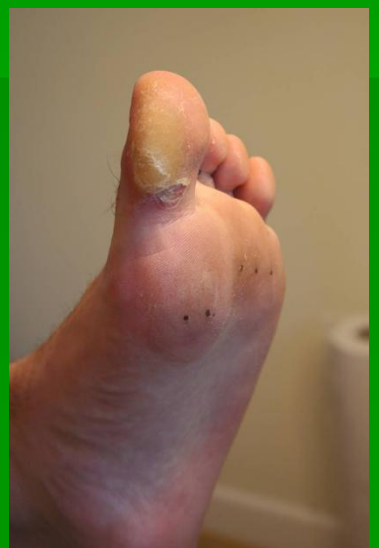


Hallux limitus

- Symptom & sign
  - ✓ Pain at 1st MTP hyperextension
    : 경사로, squatting, running, 하이힐
  - ✓ Swelling & bony prominence on dorsal 1st MTP
  - ✓ Hyperextension of IP joint, plantar callus IP joint







Hallux limitus

- Functional foot orthosis

✓ Midtarsal joint to be locked during midstance and propulsive phases

→ restore normal activity of peroneus longus

→ maintain 1st ray in a stable position

- Stiff sole shoe c extra depth, rocker bottom

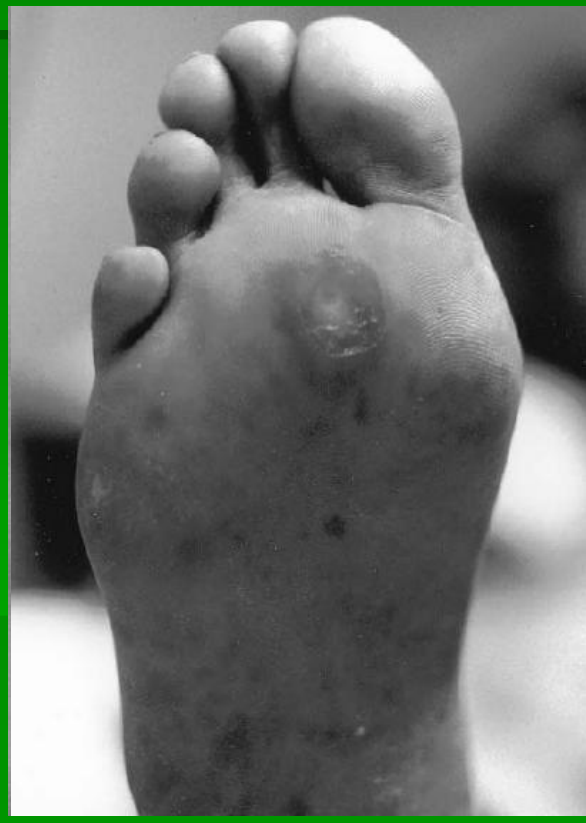
Hammertoe & Claw toes deformity

- Hammertoe deformity

  : PIP flexion; MTP,DIP extension

- Claw toes deformity

  : Multiple, exaggerated form of hammertoe



✓ Female > Male

✓ Isolated hammer toe: 2nd digit most common

✓ Pain from shoe pressure

→ Callus on dorsal IP joint, Callus on plantar MT head

Hammertoe & Claw toes deformity

- **Causes**

✓ Fashion footwear (high heel, narrow toe box, short length)

– "Buckling effect"

✓ Laxity of plantar capsule & atrophy of intrinsic muscles c age

✓ Trauma on collateral ligaments or extensor expansion

✓ Systemic arthritis

✓ Neuromuscular conditions

- Charcot-Marie-Tooth disease, CP, myelodysplasia

Hammertoe & Claw toes deformity

- **Treatments**

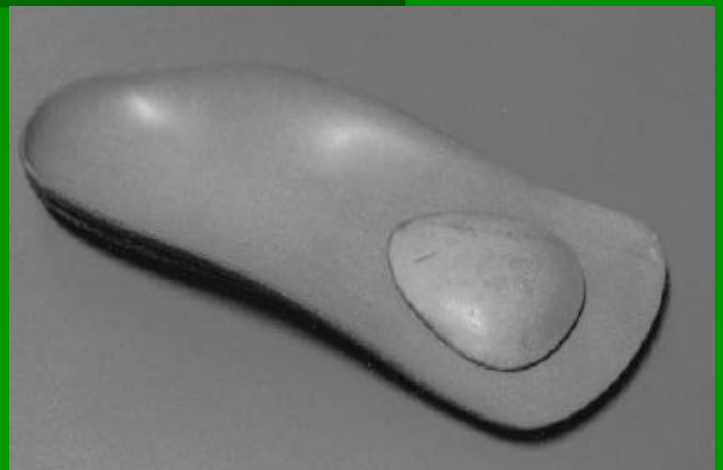
✓ **Goal : Pain reduce & care of ketatotic lesions**

✓ **Shoe c high toe box, soft leather upper**

✓ **Pads (foam, latex, silicone gel)**

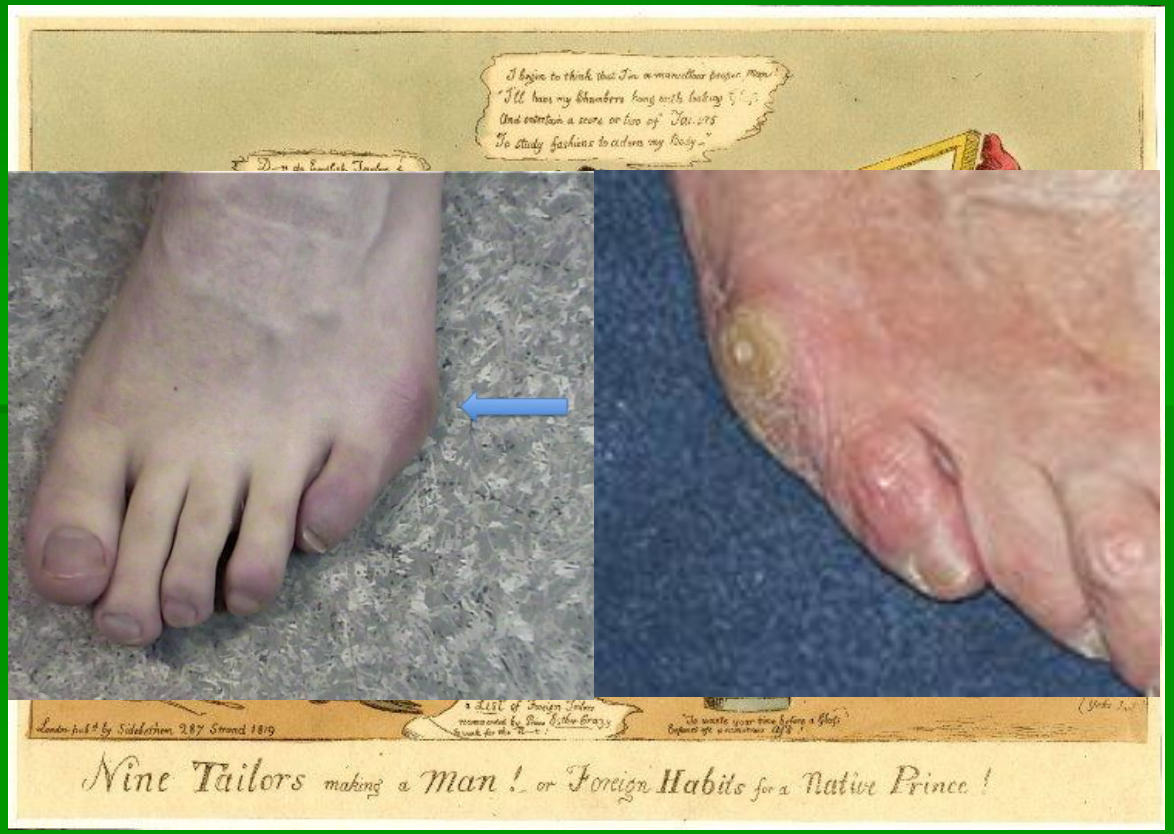
✓ **Functional foot orthosis (c metatarsal pad or metadome)**

✓ **Stretching of IP, MTP joint, strengthening exercise of intrinsic muscles**



Tailor's bunion

- Painful enlargement or prominence of 5th metatarsal head
- Adventitial bursitis or keratoma



Tailor's bunion

- Causes

✓ 5th metatarsal shaft lateral bowing

✓ Short 4th metatarsal

✓ Hypertrophy of 5th metatarsal

✓ Splay foot

✓ Systematic inflammatory arthropathies

Tailor's bunion

- Treatment

✓ Padding

✓ Widened toe box & soft leather upper

✓ Debridement of symptomatic callus

✓ Functional orthosis