

Foot & Ankle Surgery: common problems – current therapies

Zurich, Sep 4, 2014

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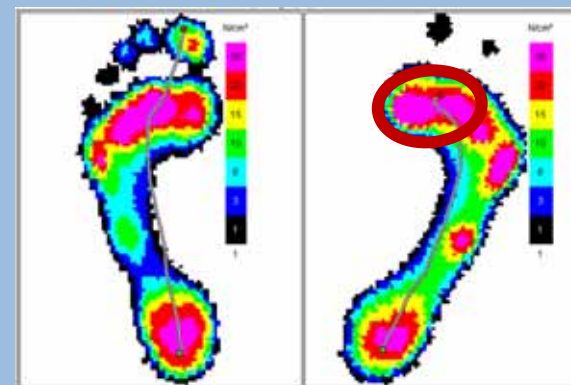
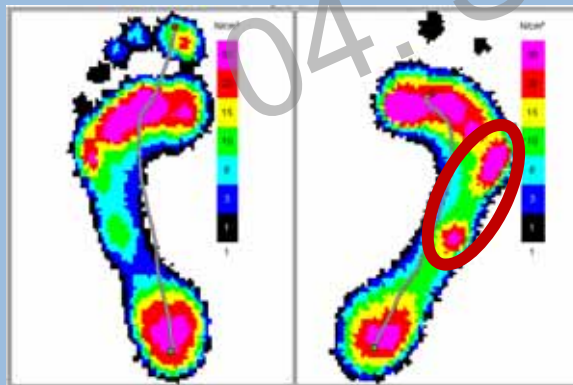
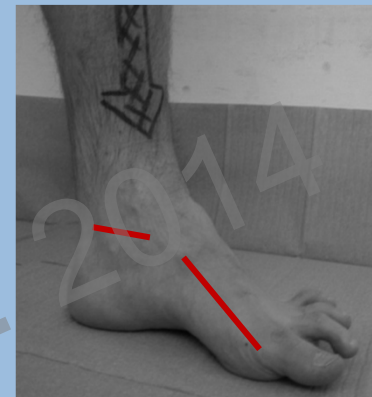
Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

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Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> Presentation



Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

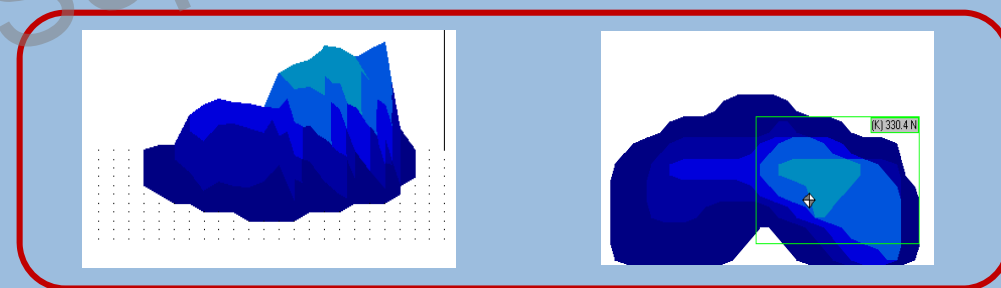
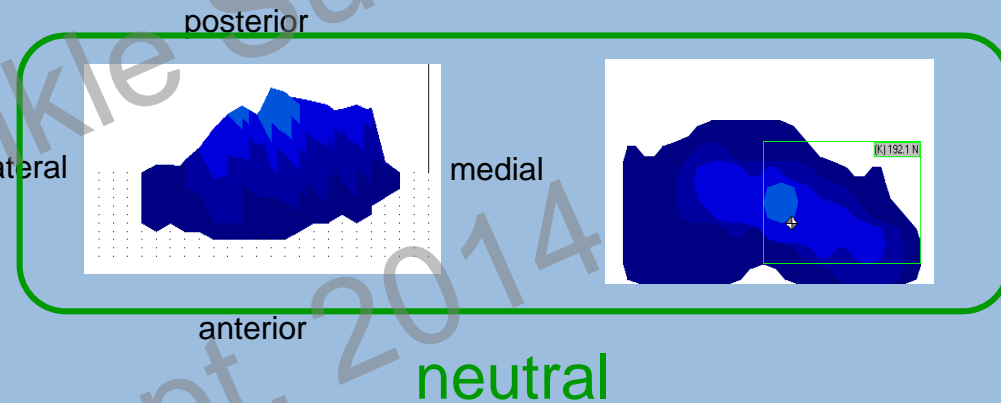
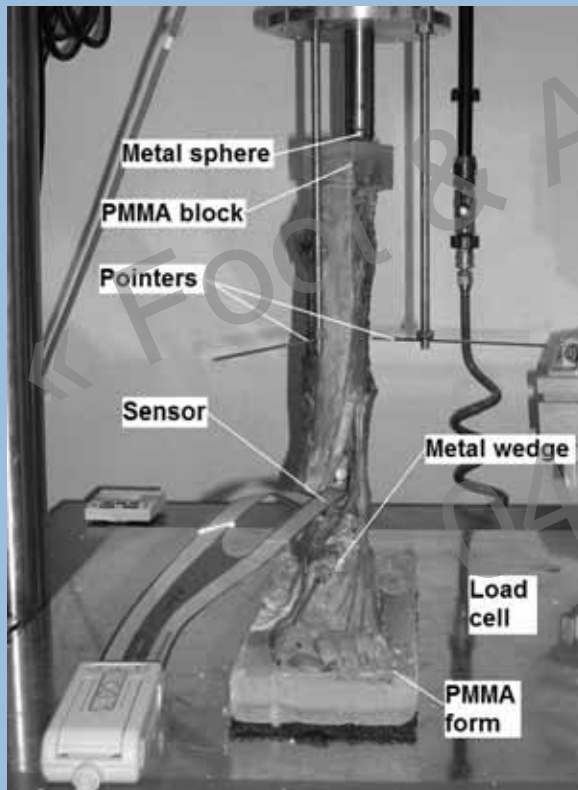
> Imbalance consequences

- lateral border overload
- anteromedial ankle overload
- ankle sprains

=> ankle arthrosis in longterm

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

- > Biomechanics (ankle joint pressure in pes cavovarus)



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- > Clinical presentation (anteromedial ankle arthrosis)



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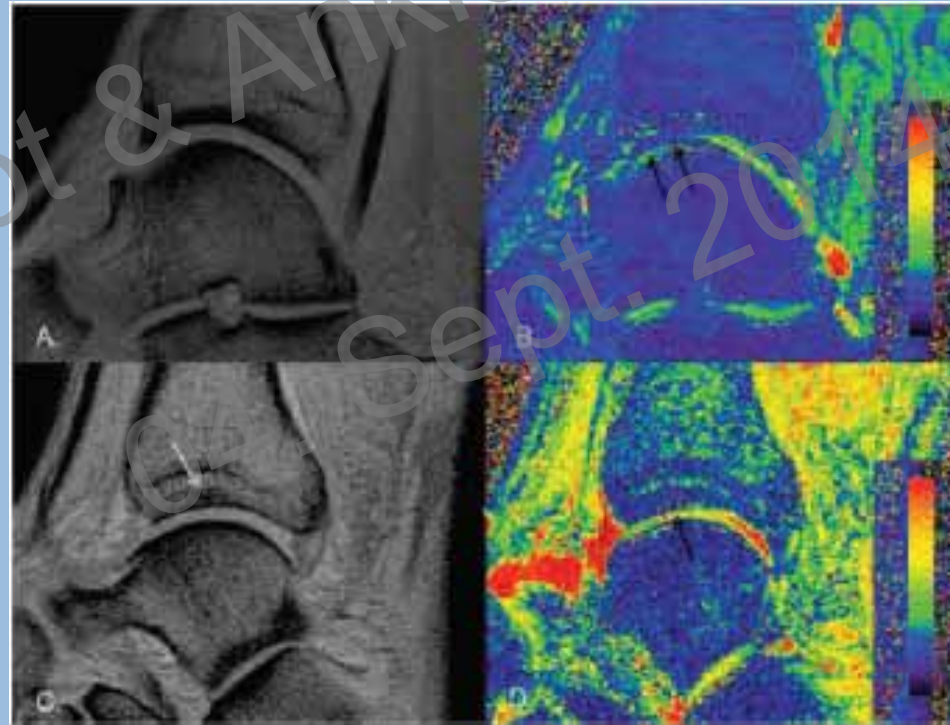
> Indication for surgery

- ongoing symptoms (overload, sprains) despite nonop treatment
- recurrent ulceration (neuropathy)
- signs of cartilage degeneration (ankle arthrosis)
- pre-emptive? => ankle arthrosis risk doubles with every 5° Meary's angle increase and 10 years of deformity's presence

Schmid T, Krause F. In progress: Correlation of ankle arthrosis and radiographic cavovarus deformity.

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

- > Biochemical T2* MR quantification of ankle arthritis in pes cavovarus.



Krause F, Klammer G, Benneker L, Werlen S, Mamisch T, Weber M. J Orthop Res. 2010; 28:1562-8

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> flexible or fixed deformity?

> etiology

- neurologic (static or progressive?)
- idiopathic
- posttraumatic
- residual clubfoot

> ankle arthrosis

> patient's demands

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> Surgical options

- TN-joint release
- PL to PB transfer
- lateralizing TA
- heel cord lengthening
- plantar fascia release
- lateral ligament repair / reconstruction
- 1st toe Jones procedure

- lateralizing calcaneal osteotomy
- metatarsal dorsiflexion osteotomy

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- > TN-joint release
- forefoot adduction



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> PL to PB transfer

- preserved PL function
- weakens 1st ray plantarflexion
- strenghtens weak PB
- alternatively TP or FHL to PB



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Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> Lateralizing TA to lateral cuneiforme

- Preserved function (4/5)
- Hindfoot stability
- lateral shift of ankle center of force
- generally in neurologic cavovarus feet



Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

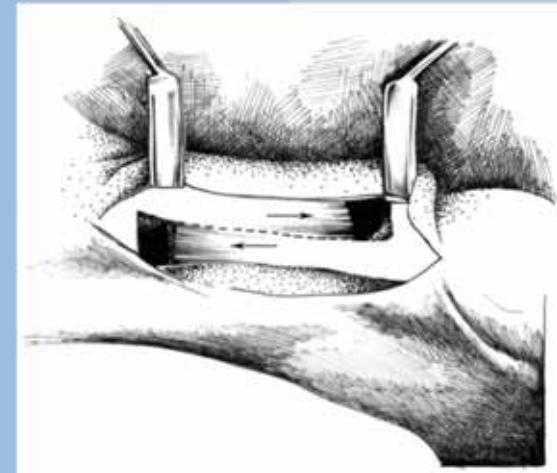
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Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

- > Heel cord lengthening
 - equinus contracture
 - Achilles lengthening (2cm, z-type)
 - Gastroc recession (Strayer's, Bauman's)



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- **lateralizing calcaneal osteotomy**
- metatarsal dorsiflexion osteotomy

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> Lateralizing calcaneal osteotomy

- lateral shift of weightbearing axis / center of force in ankle joint
- lateralize Achilles lever arm
- useful for recurrent ankle sprains



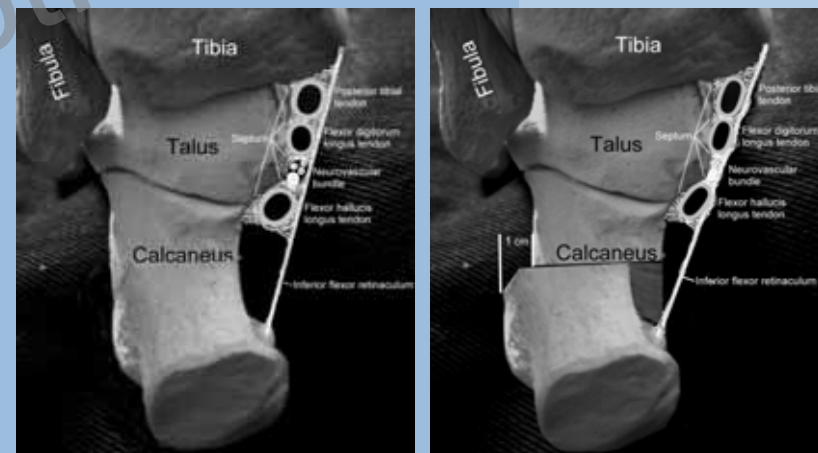
Malerba, F; De Marchi, F. Foot Ankle Clin. 10:523-540, 2005
Knupp, M et al.. Tech Foot Ankle Surg. 7:90-95, 2008
Krause F et al., Foot Ankle Int. 2010;31:741-7

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> Tibial nerve palsy with lateralizing calcaneal osteotomy

- in peripheral neuropathies, i.e. CMT
- enlarged and more sensitive tibial nerve compressed by inferior flexor retinaculum

-> compartment release



Krause FG, Pohl MJ, Penner MJ, Younger AS. Foot Ankle Int. 2009;30:258-61

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- **metatarsal dorsiflexion osteotomy**

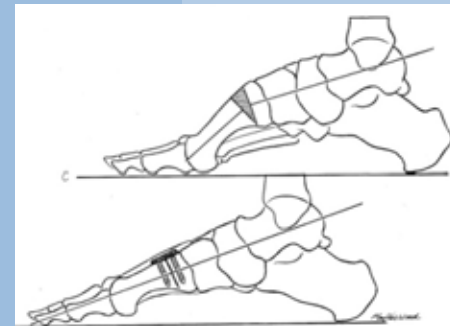
Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

> Metatarsal dorsiflexion osteotomy

- reduces plantarflexion of medial forefoot, MT I-III and hindfoot varus

> alternatively:

- reversed Cotton osteotomy (medial cuneiforme)
- 1st TMT fusion (arthritic)



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example: 55 years, male, office work

- > Poliomyelitis in childhood
- > ½ year anteromedial ankle pain and swelling
- > progressive equinus
- > no hindfoot sprains

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clinical findings

- > moderate cavovarus deformity
- > ankle d/p 0-5-35°, subtalar 1/3 reduced
- > Dorsiflexion painful
- > TA, TP- and peroneals functional
- > Coleman-Block-Test: fixed deformity
- > global muscle atrophy
- > no hindfoot instability

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decision making

> op

- younger age
- neurologic etiology
- fixed deformity
- anteromedial ankle arthrosis (2-3°)

> non-op

- low activity level

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preop



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> Op-technique

Arthrotomy: anteromedial missing cartilage 15 x 10 mm /talar and tibia, residual joint good

Cheilectomy, microfracturing

Achilles lengthening 2 cm

Lateralizing (sliding) calcaneal osteotomy, lateral wedge 5 mm, lateralization 8 mm

PL to PB transfer, TA to lateral cuneiform

dorsiflexion MT I osteotomy (wedge base 5 mm)

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postop



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5 years postop



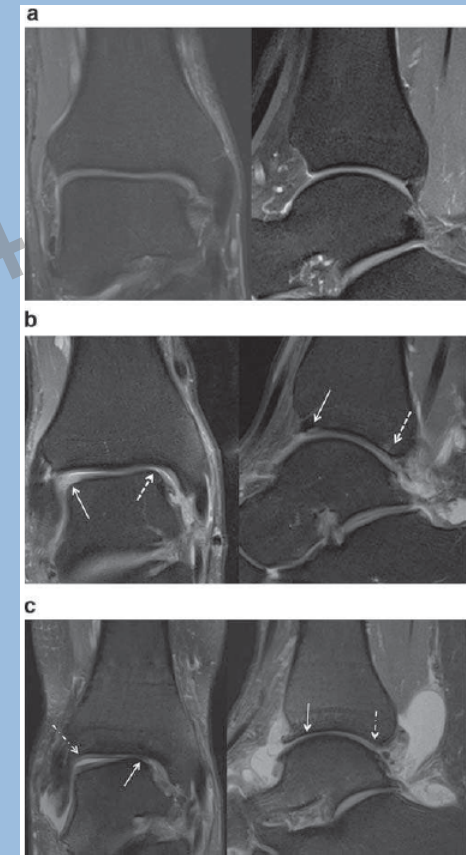
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Literature

Author	Number	Mean Age at Surgery	Etiology	Flexibility	Ankle Arthritis at Surgery	Procedure	Mean Follow-up (months)	Outcome (Mean)	Radiographic Findings at Follow-up	Evidence
Sammarco et al, 2001	21 15 pts	33	All neurologic	Flexible	None	A, B, H	71	AOFAS: from 46 to 89 Maryland Foot Score: from 72 to 90	Lateral talo–MT I angle decreased 6.5 degrees Arch height decreased 6.8 mm	III
Fortin et al, 2002	13 10 pts	51	All idiopathic	Flexible and rigid	Stage 1-3	A, B, D, F	33	Karlsson score: from 33 to 82	Not reported	III
Vienne et al, 2007	9 8 pts	25	Idiopathic and residual clubfoot	Flexible	Stage 0-2	A, C, D	37	AOFAS: from 57 to 87	Not reported	III
Ward et al, 2008	41 25 pts	16	All neurologic	Flexible	None	B, C, G, H, K	312 (26 years)	SF36 mental: 50 SF36 physical: 38 FFI pain: 35 FFI disability: 41 FFI activity limit: 22	OA most often in TMT 1 joints	IV
Kroon et al, 2009	19 15 pts	40	Idiopathic 11 Neurologic 4	Flexible and rigid	None	2xA, B, C, E, F, G, I	50	AOFAS: 83 FFI pain: 13 FFI activity limit: 13	Talo–first metatarsal angle from 22 to 17 degrees	IV
Irwin et al, 2010	22	48	All idiopathic	Rigid	Group 1 stage 0-1 Group 2 stage 2-3	A, B, C, D, G, H	60	AOFAS group 1: 86, group 2: 59 VAS: 21 and 40 resp.	Arthritis progression mainly in group 2	IV
Maskell et al, 2010	29 23 pts	43	All idiopathic	Rigid	None	A, B, C, D, E, J	51	AOFAS: from 45 to 90	Talo–first metatarsal angle from 9.9 to 2.4 degrees	III

Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

- > retrospective case series for evaluation of cavovarus realignment long-term outcome
 - > evidence of a lateral shift of the joint contact pressure or progression of arthrosis
 - > effect reliable and durable
 - > can anterior debridement / osteophylectomy in conjunction with cavovarus realignment relieve ankle impingement and symptoms of medial ankle arthrosis



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- > 11/1997 to 11/2008
- > 13 patients with cavovarus deformity
 - > 11 male, 2 female
 - > 6 neurogenic, 7 idiopathic
 - > average age 49.3 years
 - > mild to severe anteromedial ankle arthrosis (grades 1 to 3a, 2.2 on average)



Takakura Y,
JBJS Br,
1995;77B:50

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procedure	number
anterior debridement	13
lateralizing calcaneal osteotomy	13
dorsiflexion osteotomy	MT I: 7 MT I-III: 2
PL to PB transfer	8
lateralization of TA	9
Achilles lengthening	4
Fibula shortening	1
lateral ligament reconstruction	0

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- > average follow-up of 83 months, (range 33 – 134)
- > AOFAS Ankle Hindfoot Score from 45 to 75 points on average ($p < 0.001$)
- > gain in ankle dorsiflexion (8 degrees on average, $p < 0.001$)
- > no anterior impingement
- > no lateral hindfoot instability

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- > grading of the anteromedial ankle arthrosis remained unchanged during the 83 months follow-up period
- > postoperative lateral talo-1st metatarsal angle decreased significantly
- > complications: 1 CRPS
- > 2 failures (ongoing varus tilt of talus): 1 TAR, 1 subtalar fusion with lateral ligament reconstruction and deltoid release

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> successful case



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- > successful case



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- > successful case 2 years postop



Symptomatic cavovarus foot – how can I salvage joints while balancing the foot?

- > reliable and durable reduction of the deformity
- > no progression of the anteromedial ankle arthrosis (lateral shift of the joint contact pressure after realignment)
- > realignment per se provides hindfoot stability



Take home messages

- > good and durable outcome
- > full correction of varus talar tilt is the goal (but not mandatory)
- > no arthrosis progression



An aerial photograph of a dense European city, likely Bern, Switzerland. The image shows a grid of streets with numerous buildings featuring red-tiled roofs. A prominent bridge spans a river in the upper right quadrant. The text "Thank you!" is overlaid in the center in a white, sans-serif font.

Thank you!

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