

# ATYPICAL MIDFOOT-DRIVEN ADULT FLATFOOT

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## DISCLOSURES



Ø 3B: BESP, INC. (CONSULTANT)

Ø EXTREMITY MEDICAL, INC.

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## ACKNOWLEDGMENT

Ø AK WALLING III, MD

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TERMINOLOGY

∅ ADULT ACQUIRED FLATFOOT

∅ PTT DYSFUNCTION

∅ PTT INSUFFICIENCY

∅ DEFORMITY FROM DISEASED PTT

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AAF / PTTD

∅ "FEMALE / FAT / FIFTY"



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ATYPICAL FLATFOOT

∅ DEFORMITY THRU MIDFOOT

∅ DRIVEN BY ACHILLES / GASTROC

∅ PTT OFTEN STILL FUNCTIONAL

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PATHOANATOMY

Ø NEUTRAL-VALGUS ALIGNED FOOT

Ø ACHILLES/GASTROC CONTRACTURE

Ø PLANTAR LIGAMENTS OF MEDIAL COLUMN EXPOSED TO ACHILLES FORCES / BODY WT: ATTENUATE

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PATHOANATOMY

Ø MEDIAL COLUMN BECOMES UNSTABLE

Ø ABDUCTION / SAG THRU MIDFOOT

Ø EXCESSIVE LOAD / WORK ON PTT

Ø PTT ULTIMATELY BECOMES NON-FUNCTIONAL: AAF / PTT

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CLINICAL EXAM

Ø WHERE DO THEY HURT ?

Ø WHAT LIVES THERE ?

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STANDING EXAM

Ø ALIGNMENT / SYMMETRY

Ø SINGLE LEG HEEL RISE



The top photograph shows a person's feet on a platform, used for assessing alignment and symmetry. The bottom photograph shows a person performing a single leg heel rise, used for assessing the strength of the gastrocnemius muscle.

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SILFVERSKIÖLD TEST

Ø MUST ISOLATE GASTROC



The three photographs show the Silfverskiöld test procedure: the first shows the foot being held in a plantar flexed position; the second shows the foot being held in a neutral position; the third shows the foot being held in a dorsiflexed position.

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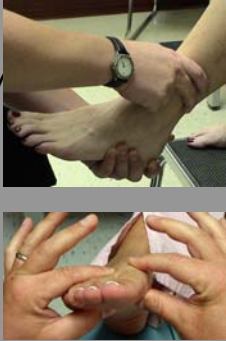
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CLINICAL EXAM

Ø DEFORMITY PASSIVELY CORRECTABLE ?

Ø "LACHMAN" TEST



The top photograph shows a person's foot being held in a plantar flexed position, used for assessing deformity. The bottom photograph shows a person's knee being held in a flexed position, used for the Lachman test.

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STANDING A/P ANKLE



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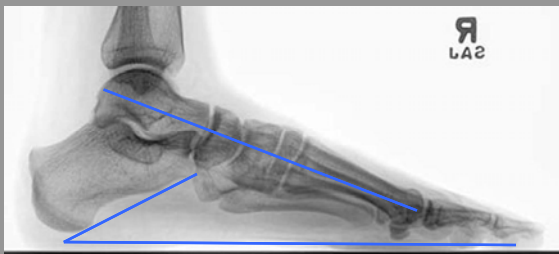
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STANDING LATERAL



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STANDING A/P FOOT



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DECISIONMAKING

Ø BONY CORRECTION IN FLATFOOT

Ø CHI, ET AL: CORR 365, 1999

Ø FORTIN & WALLING: CORR 365, 1999

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HINDFOOT VALGUS ?

Ø NO: MEDIAL COLUMN  
STABILIZATION / GASTROC

Ø YES: ...

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LOW CALCANEAL PITCH ?

Ø NO: MEDIAL COLUMN  
STABILIZATION / GASTROC /  
MEDIALIZING CALC OSTEOTOMY

Ø YES: ...

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MEDIAL COLUMN SAG ?

∅ NO: LATERAL COLUMN LENGTHENING / GASTROC

∅ YES: ...

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HF VALGUS / LOW PITCH / MF SAG

∅ MEDIAL COLUMN STABILIZATION / GASTROC / MEDIALIZING CALC OSTEOTOMY / LATERAL COLUMN LENGTHENING ...

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NONFUNCTIONAL PTT

∅ AS ABOVE + ...

∅ PTT / FDL TRANSFER +/- SPRING LIGAMENT RECONSTRUCTION

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**CASE 1: 64F**

- ∅ SYMMETRIC HINDFOOT
- ∅ UNABLE TO SLHR
- ∅ NONTENDER @ PTT / SWELLING & TENDER @ MIDFOOT
- ∅ FLEXIBLE DEFORMITY
- ∅ GASTROC CONTRX

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**CASE 1**



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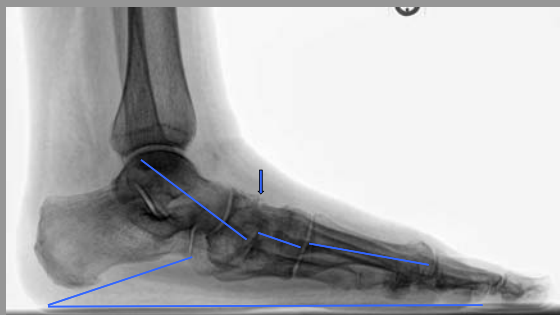
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**CASE 1**



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**CASE 1**

- ∅ SYMMETRIC HF
- ∅ CALCANEAL PITCH OK
- ∅ (+) MIDFOOT SAG
- ∅ INTACT PTT
- ∅ (+) GASTROC CONTRX

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**WHAT WOULD YOU DO ?**

- ∅ MEDIAL COLUMN / GASTROC ?
- ∅ MEDIAL COLUMN / MEDIAL CALC SLIDE / GASTROC ?
- ∅ MEDIAL COLUMN / LATERAL COLUMN LENGTHENING / GASTROC ?

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**CASE 1**

- ∅ MEDIAL COLUMN STABILIZATION
- ∅ GASTROC RECESSION

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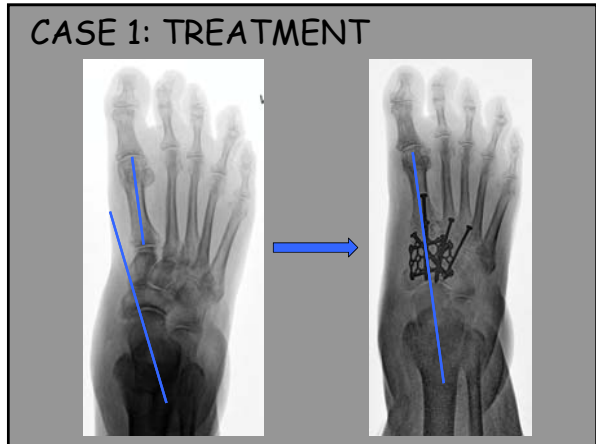
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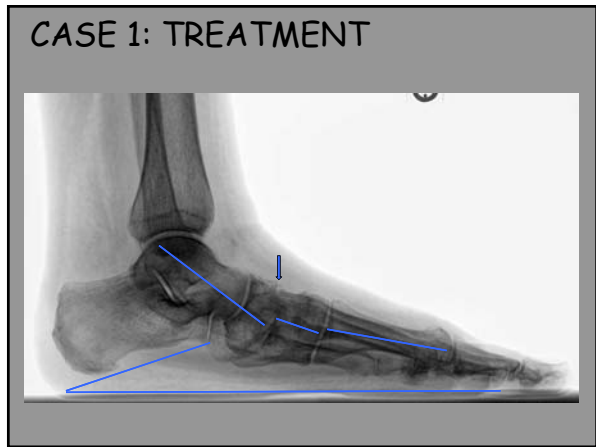
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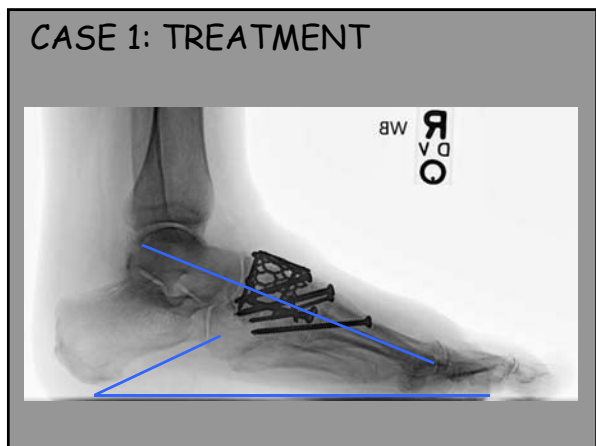
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**CASE 2: 58M**  
Ø INCREASED VALGUS HF  
Ø UNABLE TO SLHR  
Ø FLEXIBLE DEFORMITY  
Ø GASTROC CONTRX  
Ø RECENT SWELLING / TENDER @ PTT

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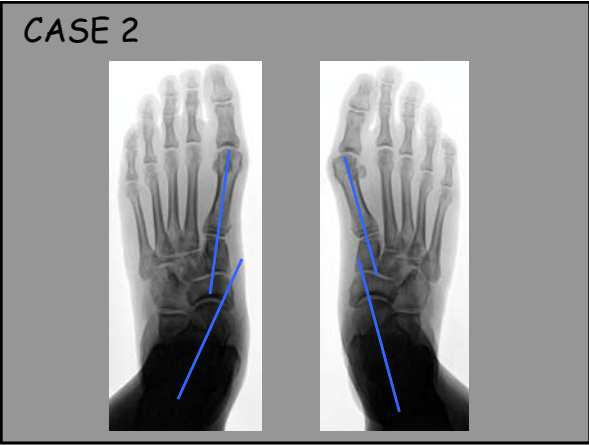
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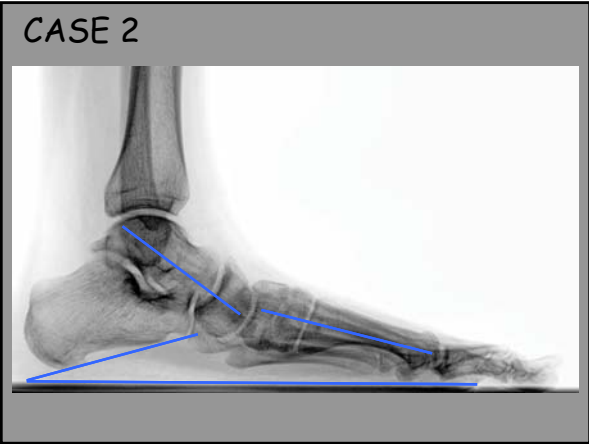
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**CASE 2**

∅ (+) HINDFOOT VALGUS

∅ (+) LOW CALCANEAL PITCH

∅ (+) MIDFOOT SAG

∅ NONFUNCTIONAL PTT

∅ (+) GASTROC CONTRX

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**WHAT WOULD YOU DO ?**

∅ MEDIAL COLUMN / GASTROC ?

∅ MEDIAL COLUMN / MEDIAL CALC  
SLIDE / GASTROC ?

∅ MEDIAL COLUMN / LATERAL COLUMN  
LENGTHENING / GASTROC ?

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**CASE 2: TREATMENT**

∅ MEDIAL COLUMN ARTHRODESIS

∅ CALCANEAL SCARF OSTEOTOMY (LCL)

∅ GASTROC RECESSION

∅ PTT / FDL TRANSFER

∅ SPRING LIGAMENT  
RECONSTRUCTION

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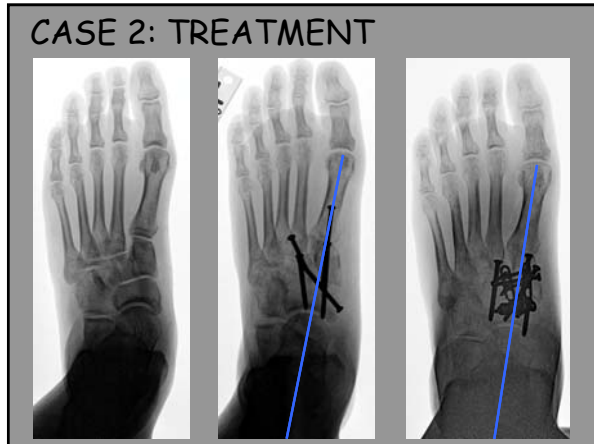
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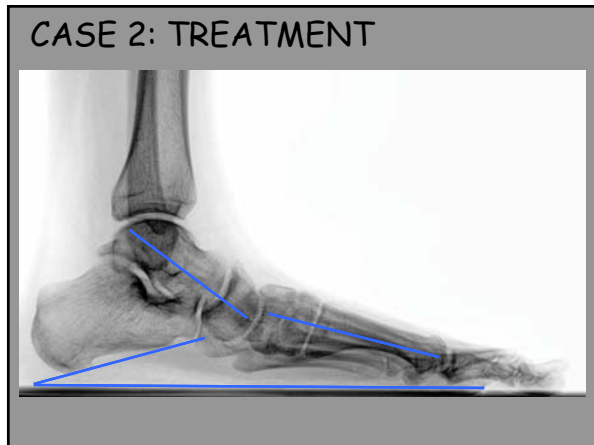
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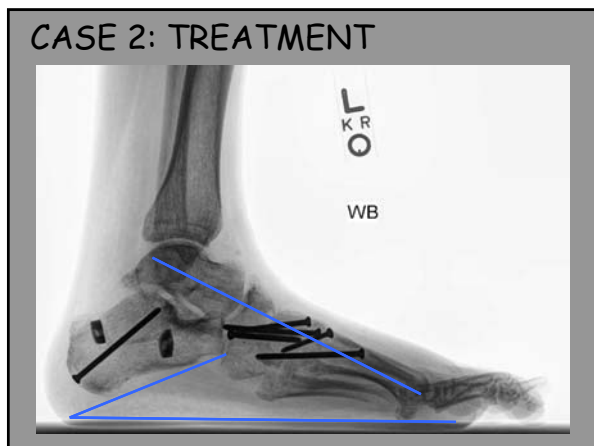
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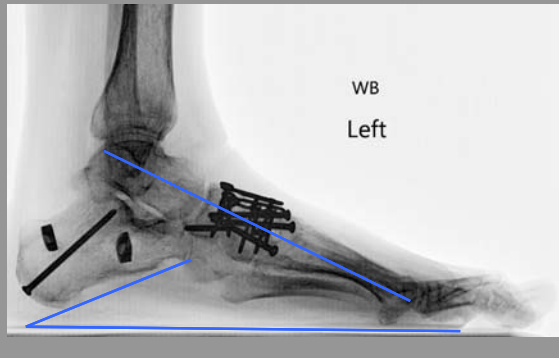
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### CASE 2: TREATMENT



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### SUMMARY

Ø THOROUGH EXAM / XR EVALUATION

Ø DECISIONMAKING ALGORITHM:  
HF VALGUS / CALC PITCH / MF SAG

Ø MEDIAL CALC SLIDE / LATERAL  
COLUMN LENGTHENING / MEDIAL  
COLUMN STABILIZATION / GASTROC  
RECESSION +/- PTT/FDL/SPRING LIG

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### REFERENCES

Ø CHI, ET AL: CORR 365, 1999

Ø FORTIN & WALLING: CORR 365, 1999

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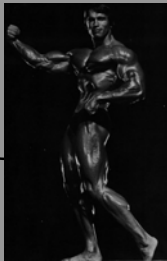
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### DYNAMIC STABILIZER OF HF

- ∅ ACTS PRIMARILY ACROSS TRANSVERSE TARSAL JNT
- ∅ FUNCTIONAL ANTAGONIST OF P BREVIS & P LONGUS
- ∅ ~ 2X STRONGER THAN P BREVIS / BUT SHORTER EXCURSION



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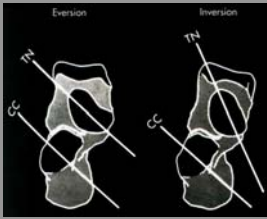
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### GAIT CYCLE

- ∅ PTT INVERTS HF AFTER FOOTFLAT
- ∅ AXES OF TN / CC NON-PARALLEL
- ∅ FLEXIBLE TO RIGID FOR PUSHOFF



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### GAIT CYCLE

∅ ACHILLES INSERTION SHIFTS MEDIAL TO SUBTALAR JNT AXIS

∅ RIGID LEVER IN TERMINAL STANCE



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### PATHOANATOMY OF AAF/PTTD

∅ NO HF INVERSION

∅ ACHILLES INSERTION REMAINS LATERAL TO SUBTALAR JNT AXIS

∅ WB AXIS OF LIMB SHIFTS MEDIALLY IN STANCE PHASE

∅ TT JNTS STILL UNLOCKED/FLEXIBLE

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### PATHOANATOMY OF AAF/PTTD

∅ MEDIAL ARCH RESTRAINTS EXPOSED TO ACHILLES FORCES / BODY WT: EVENTUALLY ATTENUATE

∅ ABDUCTION AT TALONAVICULAR JNT

∅ P BREVIS / LATERALIZED ACHILLES AS CONSTANT DEFORMING FORCES

∅ PRONATION OF 1ST RAY

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**PATHOANATOMY OF AAF/PTTD**

Ø FIXED EQUINUS CONTRACTURE OF  
HINDFOOT / ACHILLES

Ø HINDFOOT ARTHRITIC CHANGES

Ø DELTOID LIGAMENT ATTENUATES /  
VALGUS TILT OF TALUS

Ø ANKLE ARTHRITIC CHANGES

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