# TREATMENT OF FREIBERG DISEASE USING THE PERCUTANEOUS TECHNIQUE

Hands-On
Cadaver Seminar
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Celebration, Florida

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Foot & Ankle
Surgery

## Slide 1

**aE1** ali EL KO, 1/17/2024

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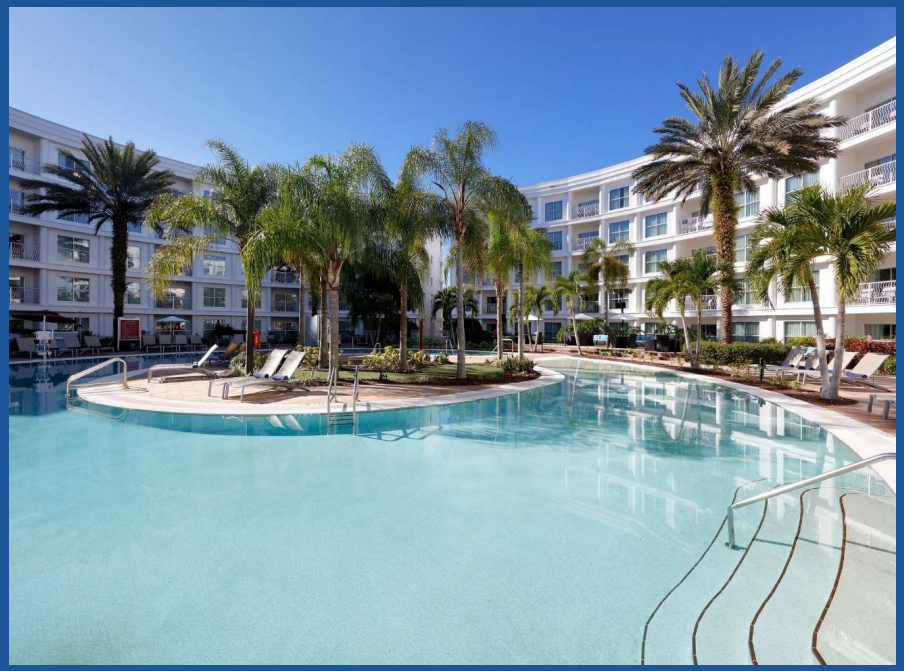


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# DEFINITION

It's an avascular necrosis affecting the second metatarsal head and much less commonly, the third and fourth metatarsal heads.

It was first described by Albert H.Freiberg (1914) and later by Köhler (1915)

Hence, it's also known as Köhler's second disease.

In young adolescents, mainly women

# PATHOGENESIS

- Identical to that of avascular necrosis of the femoral head
- Several theories have been proposed to explain the development of necrosis:
- the vascular theory
- The mechanistic theory (microtraumas)
- They are closely linked. Given the specific biomechanical characteristics of the foot, mechanical factors seem more likely, as the second metatarsal head is subject to greater mechanical demands during the normal gait cycle

# Gauthier Classification

- - Stage 0: subchondral necrosis of the upper portion of the metatarsal head. The cartilage may be intact or slightly fractured
- - Stage 1: progress to a necrotic osteocartilaginous fragment. The hyaline cartilage remains intact
- - Stage 2: deformation of the head by crushing with morphological abnormalities of the metatarsal neck
- - Stage 3: tearing of the cartilage with detachment of osteocartilaginous sequestrum, head completely deformed and flat with a loose intra-articular body
- - Stage 4: sequelae of the deformed head and metatarso-phalangeal arthrosis

# SYMPTOMS

Pain at the central metatarsal head accompanied by claudication that disappers with rest.

Patient sometimes refers to minor trauma, although the onset is more commonly spontaneous with no known cause

Pain becomes progressively more constant, a dorsal swelling may ultimately develop.

# DIAGNOSIS

Radiography provides characteristic images according to the phase of necrosis:

- in the first phase: no imaging abnormalities
- necrotic aeras (osteoporosis) gradually appear, alternating with aeras of condensation (sclerosis)
- that progress to osseous sequestrum and joint deformity
-in sequela phase, the metatarsal head is flattened with osteophytes


Bone scintigraphy can identify vascular abnormality at the metatarsal head
MRI can also provide data

# NON SURGICAL TREATMENT

- Stretching exercises
- Shoe recommendations
-Taping or strapping to rest stressed muscles and tendons
-Shoe inserts or orthotic devices
- Physical therapy


# MEDICAL TREATMENT

Indicated for the initial processes when threre is no radiological progression towards later stages of the disease. It consists:

-metatarsal bar-pad to cover the affected metatarsal heads
-suitable footwear with a rigid sole
-nonsteroidal anti-inflammatory drugs

Intra-articular infiltrations with anesthetic drugs and corticosteroids are contraindicated

# MIS TREATMENT

Surgery is indicated in more advanced symptomatic processes that do not respond to medical treatment

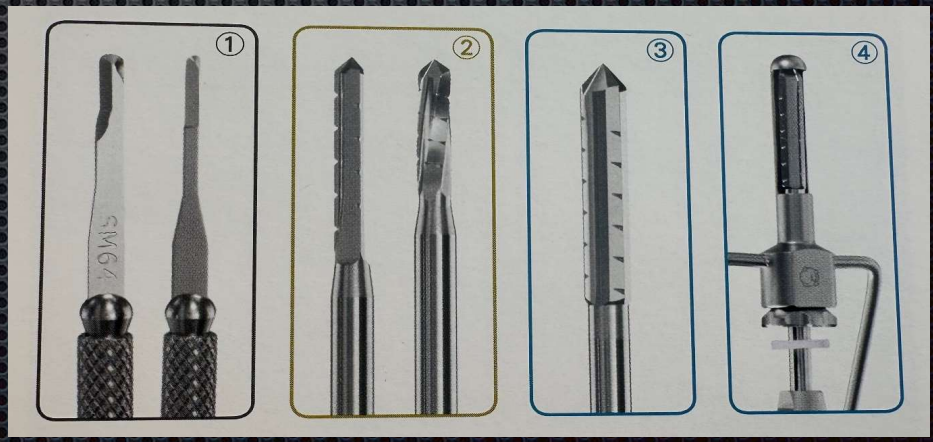
- ablation of loose bodies and osteophytes
- resection of the exostosis
- Extension osteotomy of the metatarsal head: closed upper wedge

Resection of the metatarsal head and base of P1 is contraindicated

# INSTRUMENTS

## PERCUTANEOUS SURGICAL PROCEDURES:

- INSTRUMENTS:
- Complete general instrument set
- Beaver 64 MIS and 67 scalpel blade
- Straight burr 2-15 and cylindrical burr 3.1-15 and burr sheath



# INSTRUMENTATION

# ANESTHESIA

- Complete ankle block or metatarsal block.

# FLUOROSCOPY

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# MIS TECHNIQUE

- The incision is made over the intermetatarsal space, between the second and the third metatarsal bones, at the level of the second metatarsal neck.
- The scalpel makes contact with the superolateral edge of the metatarsal neck
- Insertion of the small DPR rasp and the periosteum of the lataral aspect of the neck is removed

# DORSIFLEXION OSTEOTOMY

The straight burr 2-15 is inserted and the osteotomy is begun perpendicular to the axis of metatarsal bone. The burr is then withdrawn a few millimiters to spare the plantar surface of the metatarsal head. The process is continued to the medial then to the dorsal surface. The burr is applied a few times to the proximal edge of the osteotomy to open the wedge.

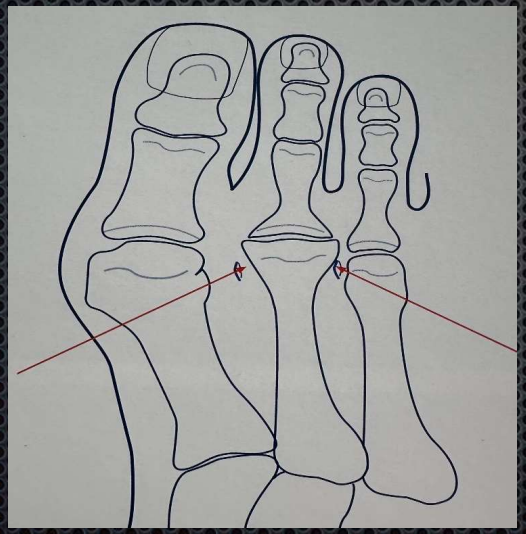
- Pressure is then applied dorsally to the head of the metatarsal and countertraction to the diaphysis, then closing the wedge by osteoclasia and placing the head in a greater dorsal position
- Modification of the surface of the articular cartilage that is now in contact with the base of P1.

# EXOSTOSECTOMY

The exostosis arises from the dorsal edge of the bone where the cartilage beguins.

A 0.5 to 1cm incision is made in the second intermetatarsal space at second metatarsal neck.

The Beaver 64 is inserted to the depht of the capsule wich is dissected with the DPR rasp to create a safety space for the burr



# EXOSTOSECTOMY

The cylindrical burr 3.1-15 is inserted and remove completely exostosis dorsally. If necessary, medial exostosectomy of the head is proceed by a new dorsal approach with the same gestures.

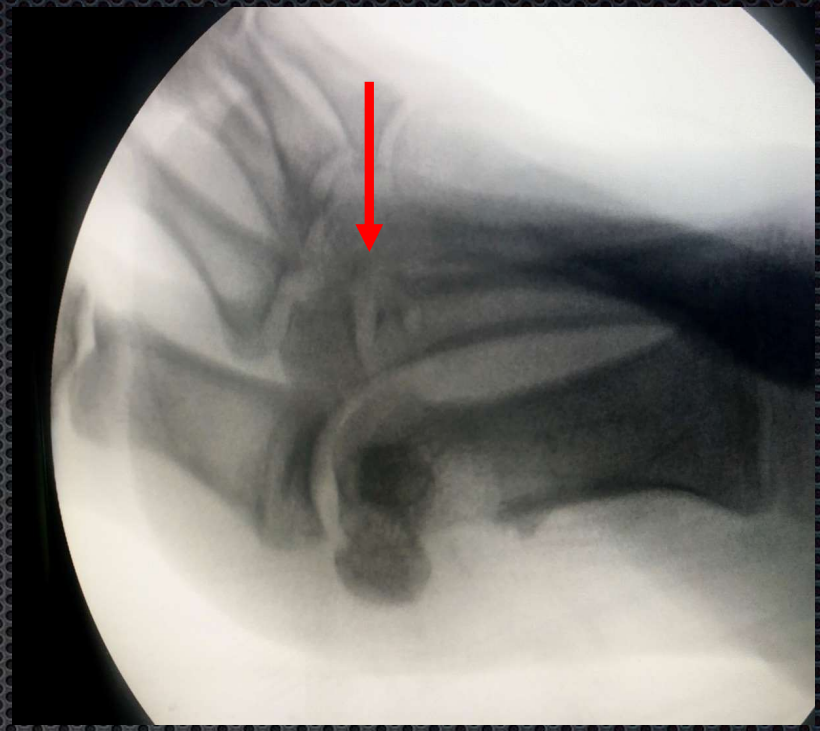
A Coban self-adherent compression bandage is applied

Crutches or walkers are usually NOT needed

# CASE 1


BEFORE


53 kVp
1,5 mA
73
24
42
33
0
1

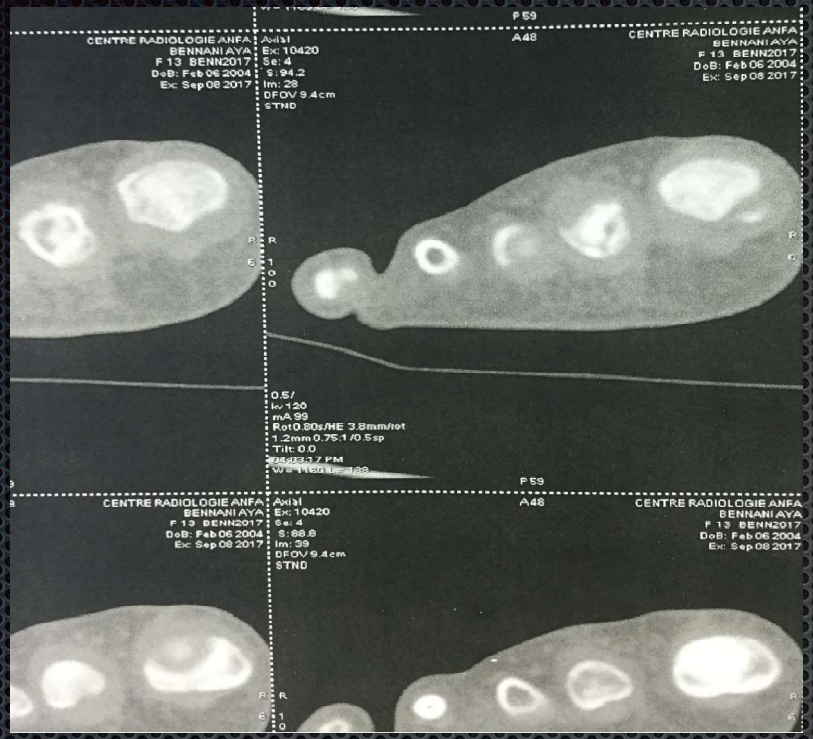



51 kVp
1,4 mA
73
52
33
0
1

# CASE 2


Young girl, 13Y

## BEFORE


CENTRE RADIOLOGIE ANFA
BENNANI AYA
F 13 BENN2017
DoB: Feb 06 2004
Ex: Sep 08 2017
Axial
Ex: 10420
Se: 4
S: 94.2
Im: 28
DFOV 9.4cm
STND
P 59
A48
0.5/
kv 120
mA 99
Rot 0.80s/HE 3.8mm/rot
1.2mm 0.75:1/0.5sp
Tilt: 0.0
04:03:17 PM
W = 1160 L = 123
Axial
Ex: 10420
Se: 4
S: 88.8
Im: 99
DFOV 9.4cm
STND


No VOI
kv 120
mA Mod
Rot 0.80s/HE 3.8mm/rot
1.2mm 0.75:1/0.6sp
Tilt: 0.0
04:03:17 PM
W = 934 L = 123
IRP
S 112
S 43
CENTRE RADIOLOGIE ANFA
BENNANI AYA
F 13 BENN2017
DoB: Feb 06 2004
Ex: Sep 08 2017
3D
Ex: 10420
Se: 3
Volume Rendering No cut
DFOV 6.5cm
SOFT



Post- op
40 days

3 months



AFTER 6 y

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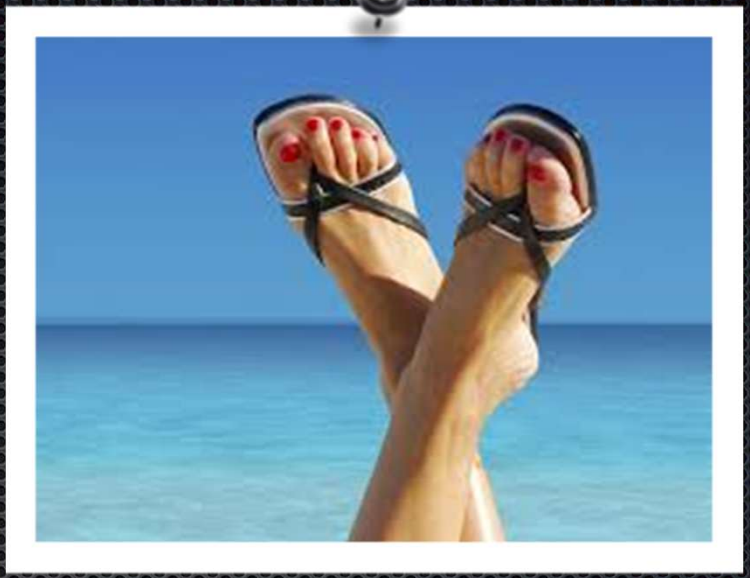
# CONCLUSION



- This percutaneous technique is a good choice for the treatment of Freiberg disease
- The results are comparable to those with open surgery but with the advantages of the percutaneous surgery.
- It has to remain in our surgical arsenal.

# THANK YOU

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