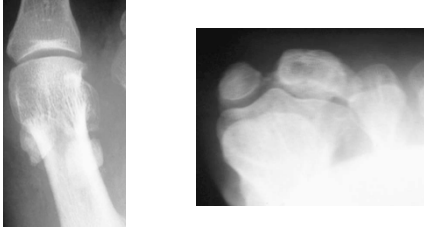


Sesamoid Disorders and Injuries in Dancers

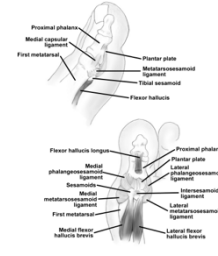


J. Chris Coetzee, MD
Twin Cities Orthopedics

Sesamoid complex Anatomy

Function

- Absorbs WB Forces
- Increase moment arm of FHB – PF power
- Stability of 1st MTPJ complex



Background



Background



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Anatomy

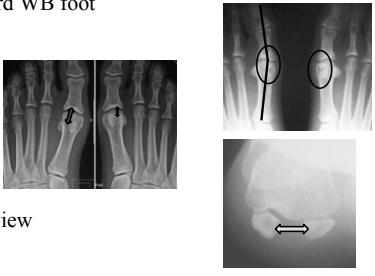
- Ossify - girls - 8
- boys - 12
- Bipartite - 10%
 - More common Medial
 - 25% bilateral
 - Rarely lateral
- Medial larger and more prone to injury

History

- | | |
|---|--|
| <p>Acute</p> <ul style="list-style-type: none"> • Turf toe • Sesamoid fracture • Traumatic Hallux valgus | <p>Chronic</p> <ul style="list-style-type: none"> • “Sesamoiditis” • Osteochondrosis • MTPJ DJD • Bipartite sesamoid |
|---|--|

Radiology


- Standard WB foot views
 - Axial view



The image shows three radiographic views of a foot. On the left, two standard weight-bearing views (anteroposterior and lateral) are shown with arrows pointing to the sesamoid bones. On the right, an axial view of the foot is shown with a double-headed arrow indicating the location of the sesamoid bones.

Sesamoid Fracture versus Bipartite

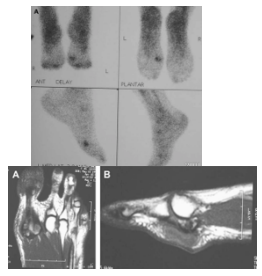
- 25% of bipartite sesamoids are bilat and 85% are symmetric
- Bilat fractures are rare
- Irregular pattern
- Sharp edges
- Widely displaced



The image shows two sets of radiographs. The top set shows two views of a foot with a bipartite sesamoid, where the two parts of the bone are separated but have a smooth, rounded appearance. The bottom set shows a view of a foot with a fracture, where the bone is broken into two pieces with sharp, irregular edges and a clear gap between them.

Further Studies

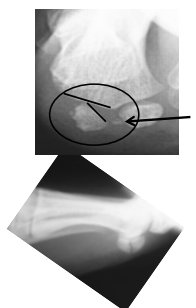
- 3 Phase Bone Scan
 - Fracture vs soft tissue problems
- MRI
 - Sagittal cuts
 - Fracture: Low intensity on T1
 - Stress #: marrow edema. Only slightly decreased T1



The image shows four radiographic images. The top two are labeled 'A' and 'B' and show a 3-phase bone scan of the foot. The bottom two are labeled 'A' and 'B' and show MRI scans of the foot in sagittal views, highlighting the sesamoid bone and surrounding soft tissue.

Fractures

- Crush injury/Severe trauma – seldom
- Stress fracture
 - “explosive” sports




The image shows two radiographic views of a foot. The top view is an anteroposterior view with a circle and arrow pointing to a small, hairline fracture line in the sesamoid bone. The bottom view is a lateral view of the same foot, also showing the fracture line.

Treatment

- Non-operative
 - Rest
 - Splint in PF
 - Unloading orthotic
 - Restrict DF

If that fails...

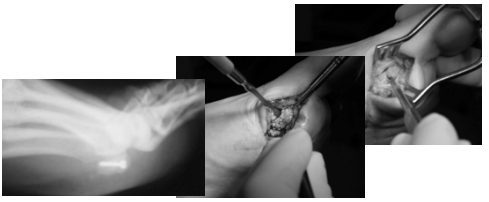


The image shows a close-up of a person's foot wrapped in a white medical splint, immobilizing the foot and ankle.

Fracture

ORIF

- Better in acute cases



The image shows a series of three images related to the surgical treatment of a sesamoid fracture. On the left is a radiograph showing the fracture. In the middle and right are intraoperative photographs showing the surgical approach, with the fracture being exposed and stabilized with a screw and washer.

Fracture treatment

Late bone graft

McBryde AM Jr, Anderson RB.
Sesamoid foot problems in the athlete.
Clin Sports Med 1988

- Bone graft from MT head
- 19 of 21 returned to full activity



Bone graft

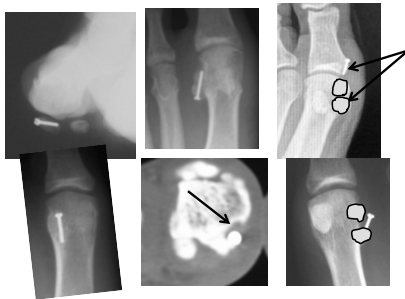
- Stress fracture nonunions
 - Minimal diastasis
- Chronic painful nonunions

Maybe not such a
⇒ good idea



Anderson RB et al: Autogenous bone grafting of Hallux Sesamoid nonunions. FAI 18(5) 1997

Fracture



- The majority of Sesamoid issues in Dancers are:

- “Sesamoiditis”
- Osteochondrosis

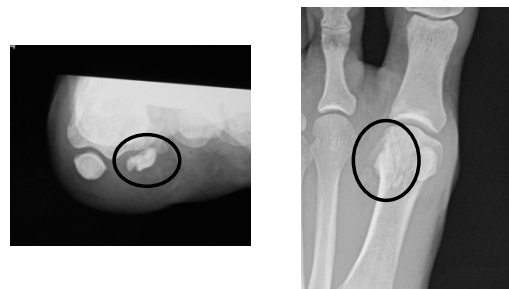
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The Beauty...



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Osteochondrosis



Sesamoidectomy

Partial

- Don't like it much
 - Not good pain relief
- Only when one fragment is small



Partial excision

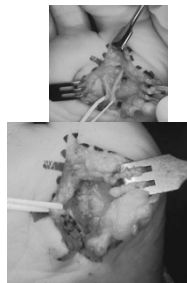
Biedert R, Hinterman B. Stress fractures of the medial great toe sesamoid in athletes. FAI2003;24(2):137-41.

- Proximal (or smaller) pole excision
- 6 athletes
 - All returned to normal activities in 6 months

Sesamoidectomy

Total

- ? transfer Abd Hall into defect
 - Prevents cock-up
- Lateral sesamoid
 - Plantar approach



Sesamoidectomy

Mann RA et al: Sesamoidectomy of the great toe. Orthopaedic Transactions 1985

- Significant morbidity
 - 50% had ongoing pain
 - 60% PF weakness
 - 33% had reduced ROM

Sesamoidectomy

- Brodsky J. Sesamoid excision for chronic non-union. In: Mann RA, Coughlin MJ, editors. Surgery of the foot. St. Louis (MO): CV Mosby; 1993
- Only 2 of 23 had post-op weakness in PF
- Overall excellent result as far as pain relief and function

Sesamoidectomy

Lee S et al. Evaluation of hallux alignment and functional outcome after isolated tibial sesamoidectomy. FAI 2005

- 90% returned to normal activity
- No change in IMA, HVA etc
- No change in Plantar Pressure
- 30-40 % has some ongoing discomfort

Medial sesamoidectomy

Bichara et al: Sesamoidectomy for hallux sesamoid fractures. FAJ. 2012 Sep

- 24 patients – 5 “elite athletes”
- 22 return to previous level of activity
- VAS pain down to 0.7 from 6.2 pre-op
- 1 iatrogenic hallux valgus

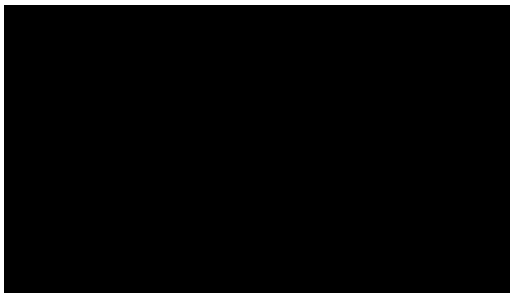
25

Myerson 2013

- 15 professional athletes
- Medial or lateral sesamoid resection
- 13 returned to career

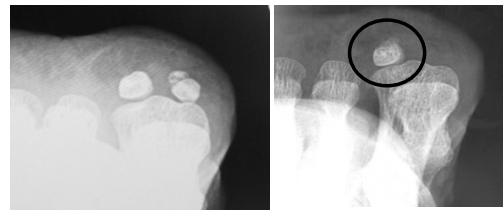
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Osteochondrosis



Medial excision

Seldom leads to issues with remaining sesamoid

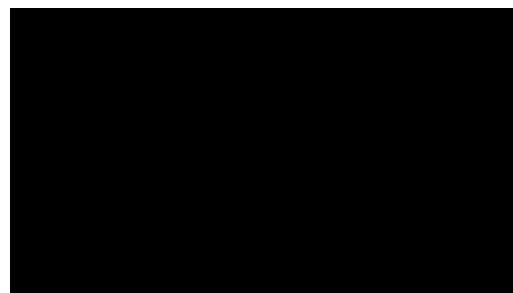


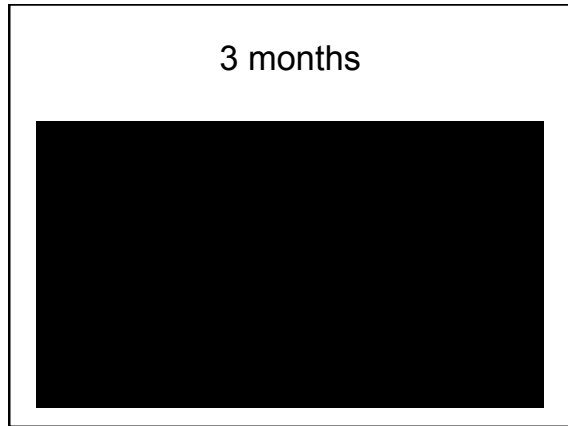
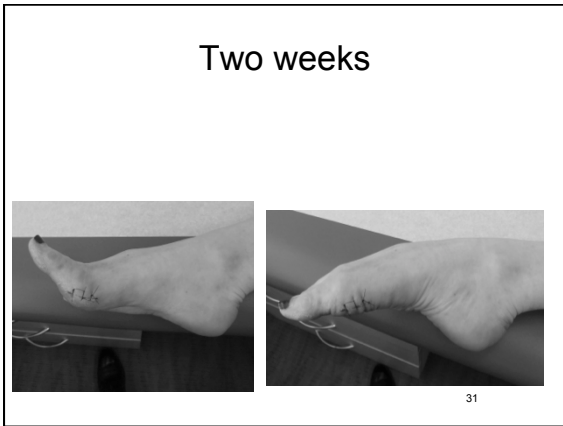
28



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Repair plantar structures





Special Considerations

- Beware of the dancer's psyche: "rest" and "quit" are often perceived as the same word. Late injury reporting is common, and pain is not viewed by most dancers as a reason to modify activity.

Rehab

- Courtesy of Meredith Butulis.

Rehabilitation Guidelines

Intervention/Weeks	1-8	9	10	11	12-24+
Modalities for effusion, tissue healing, pain, nerve desensitization	x	x	x		
Cast/Cam Boot/Orthotic with sesamoid cut out + general cushion + hard sole shoe. McConnell taping. (Wear from boot 6+ weeks)	x	x	x	x	x
Low level intrinsic foot strength	x	x	x	x	x
AROM (with calcaneus blocked from posterior impingement)	x	x	x		
Stationary Bike (Elliptical wk 8+)	x	x	x	x	x
Proprioceptive Progressions (en releve wk 10+)	x	x	x	x	x
Manual correction of pelvic alignment & Proximal n.m. re-ed (Coordination of hip ER + TA + adductors)	x	x	x	x	x
Stretch: Gastroc, Soleus, FHL in pain free ranges	x	x	x	x	x
Soft tissue mobilization (can also perform joint mobilization and PROM if needed). Avoid mobilization of fractured area.	x	x	x	x	x
Elastic band PReS-emphasize full ROM with high reps, low wt (yellow or red band)	x	x	x	x	x
Closed chain re-ed of plié and releve; start PWB on Reformer or total gym → standing eccentrics → unilateral		x	x	x	x
Dynamic Training: Include 2 foot → 2 foot, 2 foot → 1 foot, 1 foot → 2 foot, 1 foot → 1 foot					x

Rehabilitation Goals & Time Frames

Phase	Weeks post Sx	Goals for the Dancer	Notes
1	1-2	Pain/Swelling Control Protection	
2	3-8	Pain/Swelling Control/Nerve desensitization Scar remodeling Protect FHL/Protect from overpronation (tape/orthotics if needed) Normalize Gait Full ROM Demonstrate proper biomechanics locally and proximally on basic functional tasks of plié and releve Correct proximal faulty mechanics with manual therapy, Pilates, PWB neuromuscular re-ed	Initiate PT
3	8+	Begin gradual skill specific retraining 6+ weeks Full Strength and Endurance (25 unilateral relevés) Good Proprioception (30 sec eyes closed balance) Pass functional tests for pointe (recommended even if not en pointe): Topple test, Airplane test, Sauté test Pass functional tests for general sport (90% involved:uninvolved on unilateral long jump & triple hop)	Modified return to class at 6 weeks Functional Testing 10+ weeks Return to performance 12+ weeks Return to preinjury activity levels at 6+ months-2 years

Pointe Functional Tests

- Topple Test. Pass = 1 success; # of trials undefined.
 - <http://youtu.be/FoVF9CUV2H0>
 - Single pirouette turned out with clean landing to 4th
- Airplane Test. Pass = 4 successful/5 attempts
 - <http://youtu.be/DAcJ2nihD0M>
 - Pelvis stable & neutral in all 3 planes
 - No hopping, no touching hand or foot down
- Sauté Test. Pass = 8 successful/16 sautes
 - <http://youtu.be/stUfFrdXj1M>
 - Performed in parallel with arms crossed
 - Fully pointed foot (plantarflexed)
 - Land on the X
 - Good pelvofemoral control

Airplane



Saute



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Our results

Brad Moser, MD Minnesota Dance Medicine

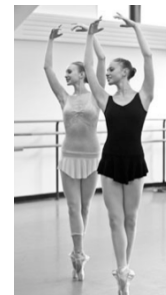


- 84 Sesamoid surgeries past 4 year

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Results

- Due to the unique circumstances of dance full return is not a given
- About 70% return to previous level
- Sport on softer surfaces and protective shoes = 85%



Thank you



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