



Navicular Stress Fractures

Dr Dan Bates (B.Med, BSc(HONS))
Sports Medicine Registrar

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Dr William Craddock - Assisted with notes for this talk
Eastern Suburbs Sports Medicine Centre
First floor Easts Tower , 9-13 Bronte Road
Bondi Junction, NSW 2022

Phone: (02) 9389 2766
Fax: (02) 9389 7154

www.drwilliamcraddock.com.au

Navicular Stress Fractures

Epidemiology

- Incidence 2.4-35% of all stress fractures (Jones MH. Clin Sports Med. 2006, Lee S. Foot Ankle Clin. 2004)
- More common in males (Jones MH. Clin Sports Med. 2006)
- Usual delay in diagnosis 4-7.2 months(Lee S. Foot Ankle Clin. 2004)
- Bilateral in 5%
- 30-50% complicated with delayed union

Aetiology

Limited evidence

- Pes cavus
- Pes planus
- Short 1st MT
- Long 2nd MT
- Metatarsus adductus
- Talar beaking
- Decreased subtalar ROM
- Decreased ankle ROM
- Medial narrowing of talonavicular joint

Some Evidence

- Sudden increase exercise intensity or duration
- Explosive push-off or change of direction sports
- Male

Ref' s

Jones MH. Clin Sports Med. 2006,
Lee S. Foot Ankle Clin. 2004

Pathophysiology

Tarsal kinematics

- During heel strike shear stress is focused on the middle 1/3rd of the Navicular as the navicular is squashed between the talus and the cuneiforms

Blood supply

- Water shed area in the middle of the navicular at the anastomosis of
 - Dorsal branch of Dorsalis Pedis
 - Plantar branch Medial plantar artery

Presentation

History

- Insidious onset
- Dorsomedial pain with exercise along the arch
- Progresses with lesser degrees of exercise to finally pain at night
- Recent increase in training load
- Sprinters, jumpers, change of direction athletes

Presentation

Examination

- Pain on the N-spot - Dorsal aspect of the navicular
- Pain on hop with plantarflexion
- Assess for
 - Excessive pronation
 - Restricted ankle Dorsiflexion
 - Tarsal coalition
 - Mortons foot

Investigation

X-ray

- See changes at 3-6 weeks
- Lucency in middle 1/3rd of bone
- Detected 81% of complete and 24% incomplete fractures
- Classification
 - Type 1 - Linear lucency
 - Type 2 - Sclerosis of fracture edge and callous formation
 - Type 3 - periosteal reaction and callus formation
 - Type 4 - Mixed pattern

Bone scan

- Changes at 24-48 hours
- Positive on all 3 phases
- Sensitivity 100%
- Specificity - poor
- Negative - rules out
- Positive - requires clinical correlation

Investigations

MRI

- Sensitive
- More specific than Bone scan
- Some bony resolution
- Does not differentiate between bony oedema of Bone stress or AVN.

CT

- Gold standard - Fine slice
- Type 1 - Dorsal cortex fracture
- Type 2 - Dorsal cortex into body
- Type 3 - Through to other cortex
- Subclassification - Avascular, cystic and sclerotic

Treatment

NWB rest

NWB cast 6 weeks the

- Pain free - Functional weight bearing a graduated rehab
- Pain - Boot until pain free the pain free step
- Ongoing pain repeat CT at 6-8 weeks
- 86-100% success (Jones MH. Clin Sports Med. 2006, Lee S. Foot Ankle Clin. 2004)

Treatment

WB rest

No cast activity restriction - 50% Full return to activity

No activity restriction - 20% Full return to activity

(Jones MH. Clin Sports Med. 2006, Lee S. Foot Ankle Clin. 2004)

Treatment

Surgery

- Percutaneous screw
- 82% full return to sport
- +/- bony grafting for displaced or no union fracture
- NWB cast for 4-6 weeks post procedure
- Indications
 - Complete fracture
 - Displaced fracture
 - Non-displaced fracture with sclerosis
 - Failed conservative management

What are the differences?

TABLE 4
Differences of Treatment (Least Square Means)^a

Treatment 1	Treatment 2	<i>P</i>
NWB	SURG	.6441
NWB	WBR	<.0001
SURG	WBR	.0003

^aNWB, non-weightbearing; WBR, conservative, weightbearing permitted; SURG, surgery.

What do you do if NWB fails?

TABLE 5
Results of Secondary Treatment Following Failure of
Initial Weightbearing Permitted/Cast Management^a

Treatment	Variable	N	Standard			
			Mean	Deviation	Minimum	Maximum
NWB	Age, y	3	17.6	4.04	14	22
	Onset of treatment, mo	3	6	7.0	1	14
	Weeks in cast/boot	3	4.6	1.2	4	6
	Time to full activity return, mo	3	7.6	3.5	4	11
SURG	Age, y	18	23.5	8.0	15	45
	Onset of treatment, mo	18	4.27	6.1	0	24
	Weeks in cast/boot	17	16.8	13.4	2	44
	Time to full activity return, mo	17	6.82	1.8	3	8

^aNWB, non-weightbearing; SURG, surgery.

Treatment Summary

- NWB in cast for 6 weeks
- If still sore on N-spot repeat cast or Boot and re-CT at 6-8 weeks
- If fails again surgery
- Elite athlete?
 - Possible increase in rate of return with surgery although not statistically significant
 - May decrease issues with calf wasting associated with cast
 - May increase risk of repeat fracture with too early return
- Return to sport - average is 5-6 months

Tick the other boxes

Address

- Mid foot Pronation
- Ankle dorsiflexion
- Underlying coalition
- Calf strength
- Gradual return to running

Thanks