Results of Calcaneal Osteotomy & Flexor Digitorum Longus transfer in Stage II Acquired Flatfoot Deformity

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Introduction

Acquired flat foot - common problem between 45-60 years

Loss of medial arch - collapse of foot & flattening

Women affected more

Multi-factorial causes
Causes of acquired flat feet (Adult)

- Posterior tibial tendon dysfunction
- Sub-talar arthritis
- Mal-united calcaneal fractures
- Tarsal coalition
- Tarsal tunnel syndrome

- Could be flexible or fixed.
Anatomy - Posterior Tibial Tendon

• Origin - Interosseous membrane & adjacent surfaces of tibia & fibula

• Part of deep posterior compartment of calf

• Tendon forms in distal third calf

• Behind medial malleolus

• Area of relative hypovascularity

• Has very broad insertion in foot
Posterior Tibial Tendon

- Axis posterior to ankle & medial to sub-talar joint
- Ankle plantar flexor
- Sub-talar invertor
- Forefoot adductor
- Elevation of medial arch
- Locks transverse tarsal joints, rigid lever for toe-off phase
Causes of deformity

- Relative hypo-vascularity
- Sharp angle turn of tendon behind medial malleolus
- Involvement of synovium at early stage & limited space
Pathogenesis of deformity

• No primary inversion
• Achilles lies lateral to subtalar joint; progressively shorten and tight
• Heel valgus
• Attenuation of spring ligament
• Midfoot abduction; forefoot supination
• Loss of arch; increased load on 1\textsuperscript{st} MT
Pathological findings

• Synovitis & hypovascularity
• Degenerative micro-tears initially
• Stretching & attenuation of tendon
• Further macroscopic tears
• Loss of arch - flat foot
• Sub-talar joint arthritis
Symptoms

- Pain
- Deformity
- Loss of medial arch
- “Too many toes” sign
- Achilles contracture
  - Hindfoot valgus
Single-limb heel rise
Investigations

- Radiographs- AP & LATERAL weight bearing
- MRI
- Ultrasound
Classification
Johnson and Strom (1989)

- **Stage 1** - tenosynovitis- normal length
- **Stage 2** - Flexible hind foot valgus- further sub divided
- **Stage 3** - rigid hind-foot valgus
- **Stage 4** - ankle valgus (Myerson 1996)

Stage II

- Various treatment options depending on stage
- Medial displacement calcaneal osteotomy (MDCO)
- MDCO with Flexor digitorum longus (FDL) transfer
- Lengthening of lateral column
- Gastrocnemius slide

- Used alone or in combinations
Our Study

- Retrospective study (2012 to 2015)
- 23 patients with symptomatic stage II flexible AFFD
- Medial sliding calcaneal osteotomy and FDL transfer
Methodology

• **Inclusion criteria**
  - Asymmetrical flexible flat foot deformity
  - Pain and swelling on medial aspect of ankle
  - Single heel raise test positive
  - Reduced/ Absent strength of inversion (MRC< grade 2), with mobile hind-foot
Methodology

• Exclusion Criteria

❑ Infection
❑ Diabetes
❑ Hindfoot arthritis
❑ Neuroarthropathy
Methodology

- Failed conservative management for 6 months
- MRI confirmation
- Combined medial slide calcaneal osteotomy along with FDL transfer
- Manchester Oxford Foot Questionnaire (MOXFQ) scoring Preop & Postop
- Follow up 2 wks (ROS), 6 weeks & later at 3, 6, and 12 months
Manchester-Oxford Foot Questionnaire

• Established validated patient-reported outcome measure for foot and ankle Surgery

• Comprise three subscales: Pain, walking/standing and social interaction
Manchester-Oxford Foot Questionnaire

- 16-item questionnaire
- Answers on five-point Likert scale
- Each item scored from 0-4
  None of the time(0)
  Rarely(1)
  Some of the time(2)
  Most of the time(3)
  All of the time(4)
Three subscales:

- Pain (5 questions)
- Walking/standing problems (7 questions)
- Social interaction (4 questions)

Raw scale scores converted to metric from 0 to 100

MOXFQ contd.

- Single index score calculated. .. elaborate

100/ max. possible score X Actual score
Surgical steps

- Supine with sandbag under ipsilateral buttock
- Osteotomy performed before FDL transfer
- Oblique incision made behind & approximately 2 cm distal to lateral malleolus, taking care of *sural nerve*
• Osteotomy is performed 45° to sole

• Distal segment of calcaneum displaced medially for 1 cm

• Held by cannulated, partially-threaded, 6.5 mm cancellous screw

• Lateral wound closed & sandbag removed

• Medial incision made along line of Posterior tibial tendon & extended distally to expose tendon of FDL
• Diseased PTT is excised

• FDL is harvested up to knot of Henry & divided distally

• 4.5 mm drill hole in navicular & FDL rerouted through navicular from plantar to dorsal

• Sutured back on itself using No.2 Ethibond keeping adequate tension and foot in inversion
• Wound closure, back slab in moderate equinus and varus for 2 weeks

• At 2 weeks – Removal of stitches

• Below-knee fibrecast applied in neutral position for further four weeks

• At 6 weeks, air cast boot applied and physio started
Post op

- Non-weight-bearing for six weeks
- At 6 weeks – cast off, X-rays
- Weight bearing as pain allows, physiotherapy
- Follow up: 3, 6, 12 months and scoring at 6 and 12 months
Calcaneal osteotomy and FDL Transfer
Results

- Total 23 patients
Socio-demographic data

- Age range: 36 - 77 yrs
- Average age: 58.86 yrs
- Average FU: 25 months (Range: 4-46 m)

- Mobility status: all patients were fit, active and healthy
- Home circumstances: They all were independent and did not require any social support
MOXFQ Single Index Score

Preop Single Index Score: 65.65
Postop Single Index Score: 33.5
Complications

• One patient progressed to stage IIC, for which Evan's procedure was done.

• Patient is doing very well post operative

• Two patients had calcaneal screw removal due to undue prominence
Summary

• Common condition

• Stage IIB AFFD – Controversial Treatment

• Medial sliding calcaneal osteotomy with FDL Transfer is well established procedure

• We have good outcome in our series of Flexible flat foot
Thank you