

Calcaneal osteotomy and tendon transfer for management of adult acquired flat foot

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The Egyptian Orthopedic Journal; 2018 supplement (2), December, 54: 62-66

Abstract

Introduction

Adult acquired flat foot is means a fallen or lost medial longitudinal arch that may or may not be symptomatic. This complex foot deformity involves changes of the ankle and foot that affect the entire lower extremity and gait cycle. Maintaining the longitudinal arch of the foot involves dynamic and static structures.

Objective

The aim of this study is to evaluate the efficacy of use of calcaneal osteotomy with or without tendon transfer for management of early stages of adult acquired flat foot to illustrate advantages and disadvantages of this procedure in progress of the disease.

Patients and Methods

A prospective study on Twenty patients with twenty feet 20 patients older than 18 years with adult acquired flexible flatfoot stage 2. Patients were evaluated pre and postoperatively using AOFAS score. Patients followed up for a minimum of 6 month with the mean follow up period was 9.90 month (range 6- 15 month). The duration of symptoms before the operation ranged from 11 month to 18 month with an average 13.55 (SD was 2.305).

Results

AOFAS score improved from mean 53.05 ± 4.904 preoperative to 88.80 ± 3.205 postoperatively. Clinically, all patients have satisfactory level of function. Radiologically, the mean AP talo-first metatarsal angle improved from 18.50 ± 8.036 preoperatively to 6.85 ± 5.112 postoperatively. The mean lateral radiographs (talo-first metatarsal angle) improved from 19.40 ± 7.437 preoperatively to 8.40 ± 7.366 postoperatively. Complications include, 3 cases with sural nerve injury, 1 case with persistence pain & swelling and 1 case developed talonavicular nonunion.

Conclusions

While MDCO is a reliable corrective method in all cases with hind foot valgus deformity. FDL transfer should be done only for cases of PTTD grade 2 and lateral column lengthening for cases of forefoot abduction. Medial column procedures are suitable for cases with forefoot supination (cotton osteotomy), if there is instability or arthritis fusion is the best. We recommend further study with large sample size and longer term follow up to confirm these results.

Key words

Adult acquired flat foot, stage 2, AOFAS, FDL transfer, MDCO.

Introduction

Adult acquired flat foot is defined as loss of medial longitudinal arch that may or may not be symptomatic. This complex foot deformity involves changes of the ankle and foot that affect the entire lower extremity and gait cycle. Maintaining the longitudinal arch of the foot involves dynamic and static soft tissue structures, in addition to the bone and joint architecture. The challenge is understanding the interaction of these structures so that appropriate treatment can be offered to the patient when soft tissue and body

structures fail. [1,2]

The aim of this study is to evaluate the management of adult acquired flat foot. This is a prospective clinical study aiming to evaluate the efficacy of use of calcaneal osteotomy with or without tendon transfer for management of early stages of adult acquired flat foot to illustrate advantages and disadvantages of this procedure in progress of the disease.

Patients and Methods

A prospective study for surgical treatment of adult acquired flat feet. The study was done in Kasr El-Aini University Hospital and Razi Orthopedic Hospital from September 2012 to June 2014 (date of last surgeries). The study was conducted on 20 elderly patients older than 18 years with adult acquired flexible flatfoot stage 2. We exclude rigid flatfoot, advanced stages of adult flat feet, recurrent cases and patient with collagenic disease. All patients were evaluated preoperatively using AOFAS score history talking included; name, age, sex, address, occupation, special habits, any medical co morbidity and medications.

All patients were examined clinically for evaluation of the flexibility of the hindfoot and forefoot, tightness of tendoachilis or gastrocnemius. Radiological examination; including AP and Lateral views of the foot and

ankle weight bearing; all patients included in the study were followed prospectively for a minimum of 6 month, the mean follow up period was 9.90 month (range 6- 15 month). The duration of symptoms before the operation ranged from 11 month to 18 month with an average 13.55 (SD was 2.305). Follow up for the patient after the operation ranged from 6 months to 15 month with an average 9.90 (SD was 2.732).

Surgical technique:

MDCO The patient was positioned supine with a bolster under the ipsilateral hip and tourniquet was applied. A four centimeter oblique incision over the lateral aspect of the calcaneal tuberosity behind the peroneal sheath was performed. The tuberosity was cut from lateral to medial with a sagittal saw and completed with an osteotome **Fig. (1)**.

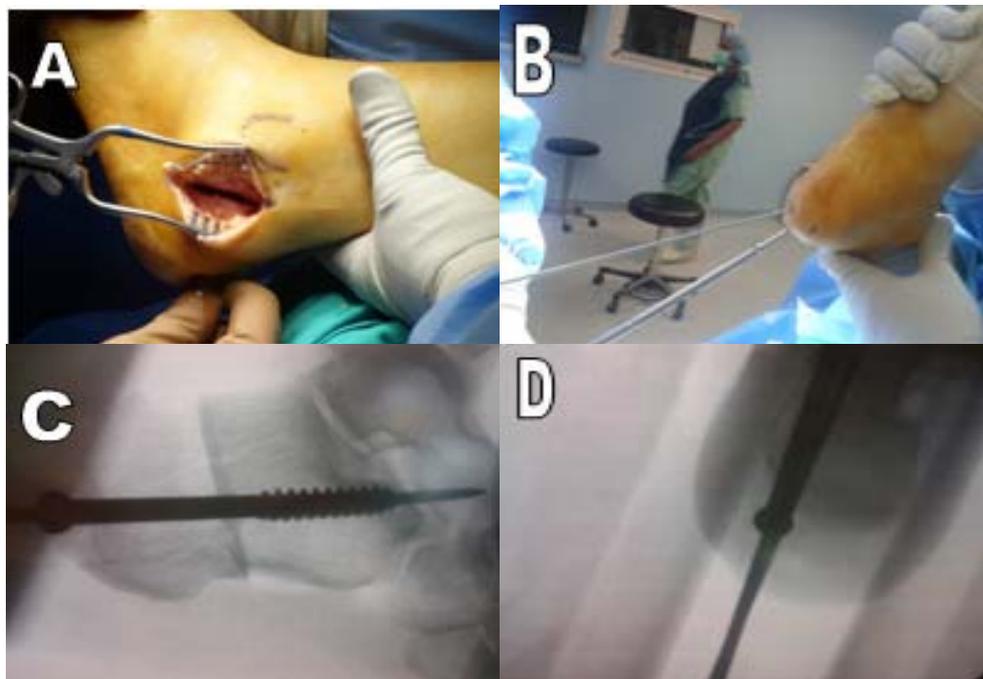


Fig. 1: (A). osteotomy at calcaneal tuberosity). (B) cannulated screw positioning. (C) and (D) image photo

FDL transfer

A medial incision was then performed down to the medial column of the foot, beginning behind the medial malleolus, passing over the navicular tuberosity and following the inferior border of the first metatarsal (**Fig. 2**).



Fig. (2): Incision for FDL transfer, beginning behind the medial malleolus, passing over the navicular tuberosity and following the inferior border of the first metatarsal.

The sheath of the posterior tibial tendon was opened and the tendon debrided. The flexor digitorum longus tendon sheath was opened just below the medial malleolus. The knot of Henry was identified, a distal tenodesis of flexor hallucis longus (FHL) and FDL

was made and the FDL was cut. A dorsal to plantar drill hole was made at the navicular tuberosity, and a pull out sutures attached to FDL and passed through the navicular some time we use anchors to attach FDL to the navicular bone (**Fig. 3**).

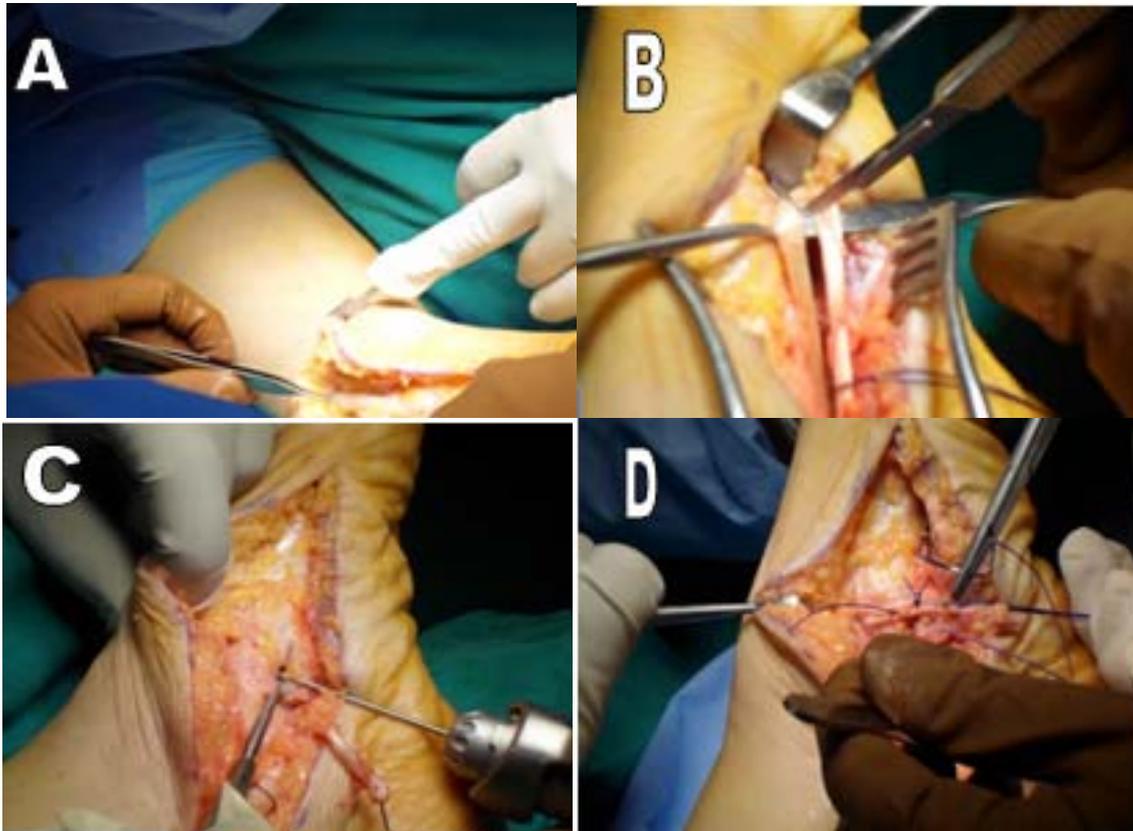


Fig. 3: (A) Tibialis posterior thickening. (B) FHL and FDL. (C) Drilling at the navicular. (D) passing the FDL tendon of by pull out suture.

Lateral Column Lengthening:

An incision is made 5 to 7 cm in length, starting just distal to the calcaneocuboid joint. The anterior process is visualized and an osteotomy is made parallel to and 1 cm proximal to the joint with a small oscillating saw. Using a laminar spreader, the osteotomy is opened and filled with (ipsilateral) tricortical iliac crest graft.

Medial column procedure:

A dorsal longitudinal incision is made over the level of the medial cuneiform. Use a microsagittal saw to create a transverse osteotomy through the medial cuneiform only, taking care to avoid penetrating the plantar cortex. Insertion a tapered piece of graft into the osteotomy to complete the correction. fixed with stable.

Gastrocnrmius recession and Tendoachilis lengthening:

For gastrocnemius recession a 3to 5 cm incision over medial head Gastrocnemius musculotendinous junction. Release of the anterior fascia over the head. Percutaneous tendo-Achilles lengthening is another less invasive option for Achilles tendon lengthening. Hoke's technique of triple-cut hemisection is the standard by which most PTAL is performed.

Results

As regarding operative details, our operative time ranged from 90minutes to 180 minutes. Intra operative blood loss was minimal, we use tourniquet. *Surgical procedures:* MDCO 19 patient, FDL 4, lateral column procdures 5 cases. Stryer 4, tendoachilis lengthening 2, accessory navicular 2 and tibialis posterior debridement 1. For medial column procedures 8 cases (either cotton osteotomy, lapidus fusion,

talonavicular or naviculo cuneiform fusion) **Fig. (4)**. The follow up for the patient after the operation ranged from 6 months to 15 month with an average 9.90 (SD was 2.732). The evaluation of the patients was clinically and radiological.

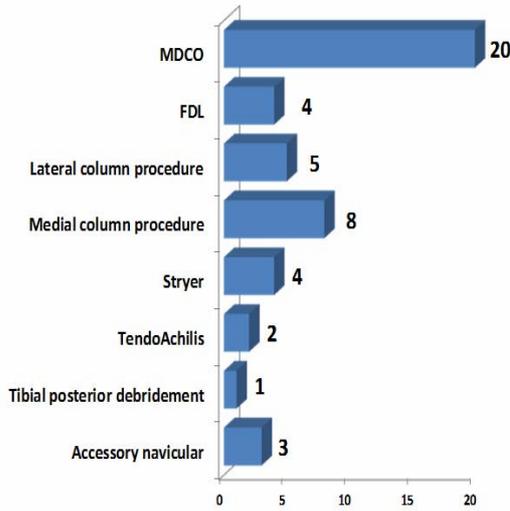


Fig. 4: Surgical procedures groups

Clinical evaluation:

We use AOFAS score for clinical and functional evaluation usually applied at last follow up and all the

patient are submitted to the score. The score improved from mean 53.05 ± 4.904 pre operative to 88.80 ± 3.205 (**Fig. 5**). All patients have satisfactory level of function except two cases.

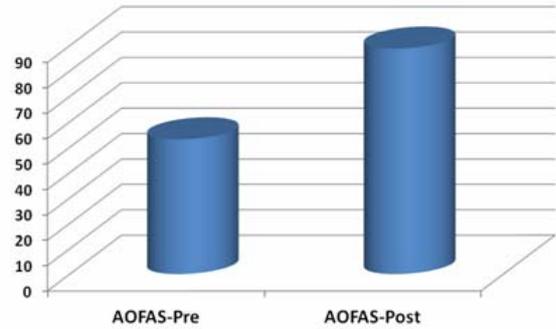


Fig. 5: AOFAS score pre and postoperative

Radiological evaluation:

Weight-bearing radiographs, including anteroposterior talo–first metatarsal and latera talo–first metatarsal before surgery, 6 month after surgery then measures are taken. The mean AP improved from 18.50 ± 8.036 pre operative to 6.85 ± 5.112 post operative. The mean lateral improved from 19.40 ± 7.437 pre operative to 8.40 ± 7.366 post operative (**Table1**).

Table 1: Radiographic measurements

X ray	Minimum	Maximum	Mean	Std. Deviation
AP.PRE	6	35	18.50	8.036
AP .POST	2	23	6.85	5.112
LAT.PRE	4	33	19.40	7.437
LAT.POST	1	26	8.40	7.366

We have 3 cases of sural nerve injury 1 case persistence pain and swelling and 1 case of talonavicular non union .For the case of persistent pain and swelling the patient told that pain improved more than pre operative but the proplem was significant swelling at the end of the day she can not wear shoe this for 9 months post operative .On x ray mid foot arthritis observed.

because of the variety of underlying etiology and grades of deformity.[3]

There is a wide variation in the approach to surgical treatment of stage II acquired adult flatfoot deformity among academic foot and ankle surgeons. Most surgeons employed a combination of bony and soft-tissue procedures that preserved the subtalar and talonavicular joints.[4]

Discussion

AAFD is a complex problem with a wide variety of treatment options. No single procedure or group of procedures can be applied to all patients with AAFD

MDCO and FDL most of recent support this technique Myerson, follow 32 patients with stage-II posterior tibial tendon dysfunction with calcaneal osteotomy and flexor digitorum longus tendon transfer. (AOFAS) improved from mean 48 to 84 post operative at mean 20 month follow up one patient failed

surgery and arthrodesis done.[5]

Pomeory follow 20 cases of stage 2 posterior tibial tendon insufficiency were treated with heel cord lengthening, flexor digitorum longus to medial cuneiform tendon transfer, lateral column lengthening, and medial displacement calcaneal osteotomy the mean follow-up is 17.5 months. The mean AOFAS score improved from 51.4 preoperative to 82.8 postoperative. Radiograph measurements have demonstrated statistically significant correction of the pes planovalgus deformity. From all the previous we conclude that no single procedur done for all the patient, every patient should be evaluated individually.[6]

Conclusions

All cases with hind foot valgus MDCO should be done. FDL transfer done only for cases of PTTD grade 2, lateral column lengthening for cases of fore foot abduction. Medial column procedures done according to every case if there is fore foot supination, cotton osteotomy is the best, if ther is medial column

instability or arthritic fusion is the best. We recommend further study with large sample size and longer term follow up to confirm results, also the role for spring ligament repair for clinical and radiological evaluation at the treatment of stage 2 adult flat foot.

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