

## **TARSAL COALITION**

[rigid pes planus, and peroneal spastic pes planus.]

Peroneal spasm actually is an acquired shortening of the muscle-tendon units of the peroneal muscles. Inversion stress by the examiner, produces a stretch reflex of a shortened muscle-tendon unit. The exact cause of “peroneal spasm” is still uncertain, and the causes may be multiple.

It was Slomann, having the benefit of radiography, who suggested that lateral oblique radiographs of the foot to profile the calcaneonavicular bar would explain many cases of rigid, painful pes planus with peroneal spasm.

### **Pathogenesis**

The cause of tarsal coalition is due to a failure of primitive mesenchyme to segment by cleavage in the 27- to 72-mm fetus and produce the normal peritalar joint complex.

Although probably present since birth, the bar does not ossify until 8 to 12 years old. Before this period, because of the malleability of the cartilage there may be some subtalar movement. It is believed that as the cartilage ossifies, hindfoot stiffness results, and the patient's ability to withstand the stress of vigorous childhood activity declines.

The coalition might be bony (synostosis), cartilaginous (synchondrosis), or fibrous (syndesmosis). Incomplete coalitions, that is, cartilaginous or fibrous, usually are the more symptomatic.

Genetic: Autosomal dominant with variable penetrance. Study showed that first degree relatives involved in 25% had calcaneonavicular coalitions, and 14% had talocalcaneal or some other type of tarsal fusion

### **Clinical**

Pain is usually medial side in case of talo-calcaneal coalition [TCC] and in the sinus tarsi with Calcaneo-navicular coalition [CNC]

Classical deformity is Valgus heel. In a large series: 22% had typical valgus deformity; 70% Neutral position; 10% varus deformity.

Limitation of subtalar and midtarsal movement with pain and spasm in the peronei is classical

There may be disuse atrophy of the calf .

Spasm of the Peroneal muscle may be apparent.

### **X ray**

AP, Lateral, 45° medial oblique, Harris Beath view

X ray: May demonstrate coalition

Ball socket ankle joint

Beaking: Head and neck of talus

Apparent narrowing of Talo-Calcaneal joint (Posterior)

Elongation of the anterior calcaneal Process (TNC)

[Ant eater nose sign]



**CT** Coronal CT with hips and knees in 20° flexion. Gold standard

**Bone scan:** used as screening when symptoms are equivocal

**MRI** more sensitive than CT for fibrous or cartilagenous but it's role is yet to be defined

**Natural course** untreated cases: 50% of CNC and 20% of TCC are asymptomatic

## **Treatment**

A trial of reduced activity or cast immobilization or both is recommended. A patient may be rendered asymptomatic for varying periods or even indefinitely after 4 to 6 weeks in a cast. If patients reach their 20s with few or no symptoms, they frequently remain asymptomatic .

**Non-operative:** One third may respond

1. Shoe modification
2. Cast immobilizing 6 wks
3. Activity modification
4. NSAID's

## **Factors which may predict a favourable outcome of non-operative**

1. Skeletally mature
2. Non athletic
3. Ankylosed subtalar joint in neutral
4. TCC is may be less symptomatic than CNC

## **Operative treatment**

Informed consent: May need arthrodesis later

## **Calaneo-navicular bar:**

Usually present at younger age [<12 years]

If symptoms does not settle, excise the bar

Ollier's approach to expose sinus tarsi

## **Talo-calcaneal bar**

Usually present at older age [>12 years]

> 50% of the middle facet across Subtalar joint/Triple arthrodesis

< 50% and subtalar joint normal, needs Excision

In older children [over 14 year] Triple arthrodesis

## **Prognosis**

25% recurrence

Persistence of symptoms

If degenerative joint, arthrodesis is indicated.

## **EXCISION OF THE BAR**

Ollier's approach

- Make an Ollier incision; preserve the branches of the intermediate dorsal cutaneous branch of the superficial peroneal nerve crossing the incision
- Identify the muscle belly of the extensor digitorum brevis. Raise the muscle by sharp dissection from the confines of the sinus tarsi in a proximal-to-distal direction until the entire sinus tarsi and anterior process of the calcaneus are identified.
- Identify the talonavicular and calcaneocuboid joints by manually rocking the forefoot-midfoot segment on the hindfoot. The bar runs from the anterior process of the calcaneus just lateral to the anterior facet anteriorly and medially to the lateral and dorsolateral margin of the navicular. If the exact location of the articular margins of the calcaneocuboid or talonavicular joints is questionable, open the capsules of these joints just enough to identify the articular surfaces.

- Use small Hohmann retractors around the waist of the bar to improve exposure. At the calcaneal origin of the bar, place a ½-inch osteotome parallel to the floor of the sinus tarsi, and cut up to but not through the medial cortex of the bar. Direct the upper cut at the dorsolateral aspect of the navicular medially, plantarward, and obliquely at about 30 degrees from the vertical plane. Complete this osteotomy through the bar. By placing the osteotome in the inferior cut, fracture the bar through its medial cortex, and smooth it with a rongeur. A rectangular piece of bone should be excised. In this manner, the chance of damaging the anterior facet of the subtalar joint or the inferior aspect of the head and neck of the talus is reduced.
- Generous resection of the bar is recommended. Because the tendency is to remove less than an optimal amount of bone, we recommend a lateral oblique radiographic examination on the operating table after resection. Usually, a 1.5- to 2.5-cm segment of bar is removed. Leave the lateral fourth of the articular surface of the talus uncovered by navicular to ensure adequate removal.
- Using an absorbable suture woven through the proximal margin of the extensor digitorum brevis muscle, interpose the muscle in the depths of the defect by passing a small, straight needle medially through the defect, carrying the suture and the muscle with it into the defect.
- Bring the ends of the suture out through the skin medially, pass them through a broad felt pad, and tie them firmly.
- The use of bone wax with Gelfoam on the raw surfaces after resection is an alternative to muscle interposition.
- Although subtalar motion improves, we have not had it equal that of the uninvolved side in unilateral cases, and 50% of normal is, in our opinion, a good result. The patient and parents should understand this before surgery.
- Jayakumar and Cowell reported that 23 of 26 (88%) feet were symptom-free after excision of the bar. With an average follow-up of 6 years, complete relief of symptoms occurred in 68% of the feet, and more than 25 degrees of subtalar inversion was restored in 58% of the feet.

## Talocalcaneal Coalition

Peroneal spasm frequently is present, but the cardinal sign on physical examination is marked reduction or absence of subtalar motion. This is in contrast to the calcaneonavicular bar, which may allow varying degrees of subtalar motion. Tenderness in the sinus tarsi, over the talonavicular joint, along the peroneal tendons, and especially medially over the sustentaculum tali, may be present. Heel valgus and loss of the normal longitudinal arch usually occur in varying severity.

Harris and Beath suggested a radiographic projection {the *posterosuperior oblique projection*}. It is taken with the patient standing on the cassette, with the knees flexed enough to remove the calf shadow from the beam, and the cone is angled 45 degrees to the cassette and directed toward the heel. Harris and Beath later recommended less of an angle of projection, however, finding the 30- to 35- to 40-degree angles more likely to show the coalition. We have found in taking the coalition view that 35- to 40- to 45-degree angles to the long axis of the calcaneus are the most common angles showing the coalition

Other signs include beaking of the head of the talus at the dorsal articular margin , broadening or rounding of the lateral process of the talus as it impinges on the calcaneal sulcus, narrowing of the posterior talocalcaneal joint space, and loss of the middle subtalar joint, all seen on the lateral view of the foot.

### Treatment

A trial of conservative treatment is recommended, including reduced activity, 4 to 6 weeks in a short leg walking cast followed by a period of wearing firm arch supports, and possibly a steroid injection within the sinus tarsi.

In the study of Kitaoka et al., 11 patients who had resection of the coalition of the middle facet had a mean follow-up of 6 years (range 2 to 13 years). Clinical results were rated as excellent for five feet, good for four, fair for three, and poor for two. They noted that

although most of the patients had successful clinical results, many had a residual functional deficit.

In older patients, especially in patients in whom degenerative changes have occurred either at the talonavicular joint or at the talocalcaneal joint, triple arthrodesis is indicated. In the absence of talonavicular arthrosis, isolated subtalar arthrodesis has been found to be effective as well.

In a younger patient (9 to 12 years old) with symptomatic middle facet **tarsal coalition**, resection of the bar has gained popularity. This is done through a medial incision over the sustentaculum tali, and on CT at 3-mm intervals, the bar should not measure more than 2 to 3 cm in length on CT cuts and should be confined to the middle facet.

Begin an incision at the proximal margin of the navicular, curving it slightly dorsally, passing distal to the tip of the medial malleolus 1 to 2 cm plantar to its distal tip. At that point, curve the incision slightly plantarward, ending 3 to 4 cm proximal to the tip of the medial malleolus. The neurovascular bundle should course obliquely across the proximal end of the incision.

The flexor digitorum longus tendon passes over the central portion of the coalition. Open the sheath, and retract it dorsally or plantarly