

“Treatment of Tarsal Condition: A Retrospective Review of Cases Done Over 5 Years”

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Tarsal coalition is defined as the joining of two or more bones of the foot. This may be the result of a failure of segmentation or secondary to a degenerative disease process, medical condition or the result of trauma to the foot.

The two most common coalitions are the calcaneo-navicular and the talo-calcaneal coalitions. Although other coalitions have been reported, calcaneo-navicular and talo-calcaneal coalitions show about equal prevalence in the literature. Talo-navicular coalitions become apparent between the ages of 3 – 5, calcaneo-navicular coalitions between 8 – 12, and talo-calcaneal coalitions between 12 – 16 years of age. Coalitions range from fibrous to cartilaginous to complete osseous unions. Patients do not become symptomatic until the second decade of life when the bones of the foot begin to ossify. Patients typically report the history of an ankle sprain or repeated ankle sprains.

Discussion

Tarsal coalitions were first mentioned in the literature by Buffon in 1796. Cruveilhier is credited with the first anatomic description of a calcaneo-navicular coalition. Zuckerkandl in 1877 first described a middle facet talo-calcaneal coalition and Pfitzner in 1896 first described a posterior facet coalition. Anderson described a talo-navicular coalition in 1896 and Holland is credited with the description of the calcaneo-cuboid coalition. Slomann first linked the association of calcaneo-navicular coalition to peroneal spastic flatfoot in 1921 and theorized about bar resection in the treatment. Badgley in 1927 was the first to describe the operative technique. Harris and Beath associated talo-calcaneal coalition to peroneal spastic flatfeet in 1948.

Tarsal coalition has been shown to have an overall prevalence in the population of approximately 1%. The prevalence may be overestimated because not all patients with a tarsal coalition are symptomatic enough to seek medical treatment for their coalition. Incidences reported in the literature tend to vary from 1.5 6%. Harris and Beath demonstrated an incidence of 2% (74 / 3600) in a study of Army recruits examined.

Rankin and Baker examined basic trainees at Fort Dix and found an incidence of 0.4% (24 / 60000). Shands and Wentz found an incidence of 0.9% of painful feet in a pediatric clinic.

The mode of inheritance is felt to be by an autosomal dominant trait.

Leonard surveyed the relatives of symptomatic patients with coalitions and found that 39% had asymptomatic coalitions.

Patients who become symptomatic with a tarsal coalition will often complain of an ankle sprain or recurrent ankle sprains. On physical exam there is a loss of subtalar motion which is more pronounced with talo-calcaneal coalitions. There may also be tenderness to palpation over the sinus tarsi in a calcaneo-navicular bar and over the middle facet which may be palpated anterior to the medial malleolus in the talo-calcaneal bar. Patients will be noted to have excessively flat feet and the heels will remain in valgus on heel rise.

Radiographs

Calcaneo-navicular coalitions have been best visualized historically by a 45° internal oblique of the foot. The talo-calcaneal coalition initially best imaged by ski jumper's view a 45° axial of the heel.

Radiographic changes noted on the lateral would alert the examiner as to the possibility of a coalition. Of note were the anteatler's nose and its association with calcaneo-navicular coalition and the talar beaking and its association with talo-calcaneal coalition. Since the mid 1980's and the advent of computer tomography (CT) coalitions that were once not well imaged or completely missed have now been defined more clearly. CT does an excellent job of defining osseous coalitions but does not show fibrous or cartilaginous unions very well. Magnetic resonance imaging (MRI) has shown these fibrous and cartilaginous unions in far greater detail to radiographs and CT.

Treatment options range from conservative casting with limited success to surgical including resection of the bar to arthrodesis. Bar resection has been advocated if the patients do not demonstrate adjacent joint degeneration.

Calcaneo-navicular bar resection has had extremely favorable results with success rates reported by various authors between 77 – 100% in long term outcome studies. It is recommended to resect at least a 1 cm block from the bar and to not make a wedge resection due to the potential reformation of the bar. The void that remains may be left alone or may be filled with either extensor digitorum brevis tendon or fat graft. The bone edges from the resection additionally may be covered with bone wax or left alone.

The surgical treatment of talo-calcaneal coalitions is less clear. Johnson and Comfort reported 80% success rates with resection when less than one third of the total subtalar joint surface area was involved. Wilde, et al found that greater than 16° valgus and greater than 50% of posterior facet involvement were predictors of a poor outcome. Luhmann and Shoenecker reported in 1998 that despite having 21° valgus and greater than 50% posterior facet involvement some patients still had favorable results and advocated resection with the potential second surgery of an arthrodesis if the surgery proved unsuccessful. The middle facet is approached medially with retraction of the flexor hallucis longus and the defect created is then filled with a fat interposition graft. More recently authors have proposed subtalar arthrodeses instead of the traditional salvage procedure of the triple arthrodesis. The authors advocate the preservation of as many joints as possible to preserve as much normal motion as possible. In the degenerative foot with a coalition the treatment has been to perform a triple arthrodesis to protect the midtarsal joints. In the skeletally immature patient one additional treatment option is to perform an extraarticular subtalar fusion as described by Grice and Green

Methods

We performed a chart review and phone survey of all the tarsal coalitions that failed conservative management and underwent bar resection in the orthopaedic practice of our hospital between 1999 and 2004. A total of 14 coalition resections in 10 patients were performed during the study period. There were 8 calcanealo-navicular and 6 talo-calcaneal coalitions. Of the patients in the study group 5 patients (8 coalitions) were available to undergo a phone interview.

The phone interview consisted of a series of questions concerning whether they were satisfied with the surgery, how they were functioning since the surgery and what limitations their feet placed in their activities of daily living. The responses of the phone interview were compiled and given grades ranging from excellent (no limitations and no pain) to good (minimal limitations and no pain) to fair (some limitations and minimal pain) to poor (moderate to severe limitations and moderate to severe pain). Four of the eight coalitions had excellent results, one had good result of minimal limitations, and two had a fair result consisting of minimal pain and some limitations.

There were no poor results in the study group and to our knowledge none required additional surgery. The average duration of follow up for the phone interview was 34.25 months (21-54 months).

Conclusion

We found in our study population that by performing resection of the bar in those patients failing conservative management regardless of the adjacent segment disease in order to preserve as much motion as possible that the patients did fairly well. We had 62.5% good to excellent results with this treatment algorithm in those patients available to complete the phone questionnaire. We found no poor results in those available responders. None of the patients required additional surgeries in the follow up period of nearly 3 years on average. By performing a resection of the bar we find that patients are satisfied with approach and have the advantage that some patients do not have to undergo fusion of the foot at such a young age.

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Patients do not become symptomatic until the second decade of life when the bones of the foot begin to ossify and patients become more active in sports. Patients typically report the history of an ankle sprain or repeated ankle sprains. Diagnosis is made by clinical history, physical exam and radiographic imaging. Calcaneo-navicular bar by 45° oblique radiograph and talo-calcaneal bar by computer tomography. Treatment options begin with conservative immobilization and range to surgical resection of the bar with or without interposition arthroplasty to arthrodesis for refractory cases. We performed a retrospective review of the cases done in our hospital over the last 5 years. A total of 14 coalitions in 10 patients were performed. All patients were treated with resection and depending on stability an interposition tendon graft.

5 of the 10 patients were available to answer a phone questionnaire and reported 62.5% good to excellent result. We believe that resection of the bar with preservation of the joints in the foot is a reasonable approach in the treatment of tarsal coalition.

Bibliography

Badgley CE: Coalition of the calcaneus and the navicular. Arch Surg 1927; 15: 75-88.

Comfort TK, Johnson LO: Resection for symptomatic talocalcaneal coalition. J Pediatr Orthop 1998 May-Jun; 18(3): 283-8.

Cowell HR: Diagnosis and management of peroneal spastic flatfoot. Instr Course Lect 1975; 24: 94-103.

Harris RI, Beath T: Etiology of peroneal spastic flatfoot. J Bone Joint Surg Br 1948; 30: 624-34.

Leonard MA: The inheritance of tarsal coalition and its relationship to spastic flat foot. J Bone Joint Surg Br 1974 Aug; 56B(3): 520-6.

Luhmann SJ, Schoenecker PL: Symptomatic talocalcaneal coalition resection: indications and results. J Pediatr Orthop 1998 Nov-Dec; 18(6): 748-54

Mann RA, Baumgarten M: Subtalar fusion for isolated subtalar disorders. Preliminary report. Clin Orthop 1988 Jan; (226): 260-5.

Rankin EA, Baker GI: Rigid flatfoot in the young adult. Clin Orthop 1974 Oct; 0(104): 244-8.

Shands AR, Wentz IJ: Congenital anomalies, accessory bones, and osteochondritis in the feet of 850 children. Surg Clin North Am 1953; 33: 1643-66.

Vincent KA: Tarsal coalition and painful flatfoot. J Am Acad Orthop Surg 1998 Sep-Oct; 6(5): 274-81.

Vu, L, et al: Tarsal Coalition. E Medicine 2005 March.

Wilde PH, Torode IP, Dickens DR, Cole WG: Resection for symptomatic talocalcaneal coalition. J Bone Joint Surg Br 1994 Sep; 76(5): 797-801.