TARSAL COALITION

Ethel M. Wright
Ron Lieberman, D.P.M.
Mark Brekke, D.P.M.
Murray Reicher, M.D.
Donald Green, D.P.M.

Cowell and Elener[1] in 1983, defined tarsal coalition as an abnormal union between two or more bones. This union leads to restriction or limitation of the subtalar joint.[2] The subtalar coalition may lead to primary[3] and secondary[3-5] signs of coalition which may be visualized on standard radiographs. The most reliable sign of a coalition is the C sign.[6] The C sign has often been referred to as the "Halo effect."[7] The Halo effect is increased bone density or overlap secondary to stresses along the talar dome, posterior facet, and sustentaculum tali. Buckholz[8] used the terms bar and bridge to describe coalitions. A bar is a union between extra-articular bones and a bridge is a union between intra-articular bones.

Coalitions may be asymptomatic or symptomatic.[9] Asymptomatic cases usually become symptomatic in the adolescent[10] due to abnormal pedal biomechanics.[11] Ankle strain or sprain,[12,13] increased body weight,[14] increased activities,[15] and locomotion on uneven terrain can all lead to symptoms, especially in the young[16] as the lesion ossifies.[17]

The frequency of tarsal coalitions is unknown, but the literature reports a range of 1% to 2%.[18,19] Tarsal coalitions are rare, and 90% affect the talocalcaneal or the calcaneonavicular bones.[20] The talonavicular coalition is the third most commonly affected,[20] and is often bilateral. It is very rare for the calcaneocuboid and the naviculocuneiform coalitions to be affected.

There are varied histologic presentations for coalitions. The tissue type of the coalition varies from fibrous to cartilaginous to osseous[21] or a combination of these types. The characteristics of the tissue types will be evaluated in this article. A review of literature on associated anomalies, anatomy, pathomechanics, classifications, incidence, differential diagnosis, and treatment of tarsal coalitions is included. A case study on the unusual medial posterior facet talocalcaneal coalition will be presented.

ASSOCIATED ANOMALIES AND SYNDROMES

Tarsal coalitions have been associated with symphalangism,[22-26] metatarsal anomalies and cuneiform coalitions,[27,28] reduced numbers of osseous structures,[29] carpal coalitions,[30-32] major limb abnormalities,[30] ball and socket ankle joint,[33] Nievergelt-Pearlman syndrome,[34-36] middle ear ossicle fusions,[37] Apert syndrome,[38] general osteopenia of the tarsal bones,[39] small patella syndrome,[40] and congenital vertical talus.[41]

SUBTALAR JOINT ANATOMY

The dorsal aspect of the calcaneus has three articular facets, the posterior, the middle, and the anterior facets. The posterior facet is the largest and is separated from the other facets by the sinus tarsi laterally, and by the sinus canalis medially. A synovial capsule also separates the posterior facet from the other facets. The middle facet lies on the dorsal aspect of the sustentaculum tali. The anterior facet is on the dorsal aspect of the calcaneal anterior beak. The middle and anterior facets may be separated, confluent, or united. The corresponding plantar facets of the talus articulate with the previously mentioned facets to form the subtalar articular sites (Fig. 1).

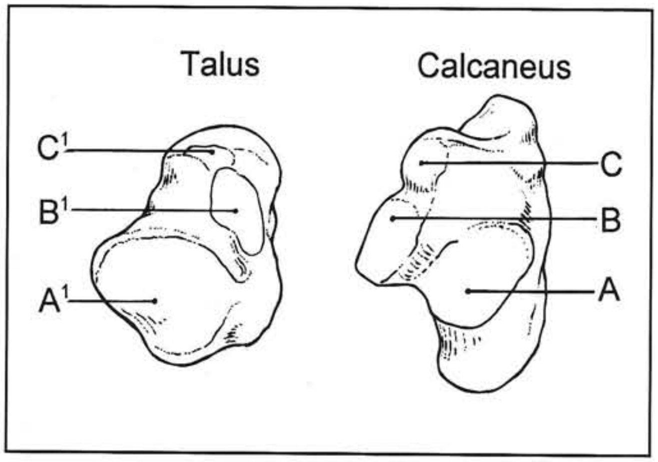

Figure 1. The Three Subtalar Joint Articular Surfaces:
A. Posterior facet of the subtalar joint of the calcaneus.
A¹. Posterior facet of the talus.
B. The middle facet of the calcaneus.
B¹. The middle facet of the talus.
C. The anterior facet of the calcaneus.
C¹. The anterior facet of the talus.

PATHOMECHANICS

Normally, 10 degrees of dorsiflexion is required at the ankle joint in normal gait. The subtalar joint requires 4 to 6 degrees of eversion at heel contact, and 8 to 12 degrees of inversion is needed from this position by toe off. The longitudinal axis of the midtarsal joint requires 4 to 6 degrees of inversion, while the first metatarsophalangeal joint needs 75 degrees dorsiflexion in normal gait.

The concerted actions of the joints and the strength of the muscles enable the foot to pass from pronation to supination for the fluid motions evidenced in gait. Pronatory changes are necessary to allow shock absorption and to accommodate for uneven terrain. Pronation primarily involves calcaneal eversion, and talar plantarflexion and adduction while the leg internally rotates. The supinatory changes are necessary to align the foot into a rigid lever for the act of propulsion. In gait, supination primarily involves calcaneal inversion, and talar dorsiflexion and abduction while the leg externally rotates.

A tarsal coalition may restrict or limit the motions of the foot and cause an abnormal gait pattern. The abnormal tarsal unions may restrict subtalar joint motion. In the very young, this restricted motion can lead to accommodative supination and pronation of the ankle joint. This may ultimately lead to a "ball and socket" ankle joint. In more mature bones, this may lead to bone spurring. Dorsiflexion and plantarflexion may occur at the midtarsal joint. The abnormal dorsiflexion and plantarflexion in the talonavicular joint may cause the talar beaking.

Participation in athletics usually requires more joint motions than are needed in normal gait. As noted previously, fibrous and cartilaginous coalitions may be asymptomatic with normal gait and athletics. It is the ossification of these lesions that may decrease available joint motion to the point that the onset of pain is accelerated.

CLASSIFICATION

There are several classifications of coalitions. The classifications may be based on tissue type, etiology, anatomy, completeness of the coalition, surgical type, and/or location.

Buckholz[44] describes the coalitions as fibrous (syndesmosis), cartilaginous (synchondrosis), and osseous (synostosis). Permanent[20] classifies the coalition as congenital or acquired. Pfitzner[45] in 1896 described the congenital type as an extension of an accessory ossicle into adjacent tarsal bone(s). LeBoucq[46] in the same year proposed the theory of impaired segmentation and undifferentiation of primordial mesenchymal tissue which resulted in coalitions. Harris[47] in 1955 noticed fetal coalitions and this discovery supported LeBoucq's proposal. Many studies have been conducted to investigate the genetic inheritance of coalitions. Leonard[48] in 1974 concluded that hereditary transmission of tarsal coalitions is an autosomal dominant inheritance of varied penetrance.

The acquired type of coalitions may occur secondarily to juvenile rheumatoid arthritis, advanced rheumatoid arthritis, juvenile ankylosing spondylitis, neurotropic joint disease, infections,[49] Kohler's disease, neoplasms, and after minor or major trauma or surgery.[50-53]

Tachdjian names the coalition in accordance with the bones participating in the union.[38] The descriptive terms complete, incomplete, or rudimentary are used to indicate how complete the coalition is.[10,54] A complete coalition is the fusion of a joint with no available motion. An incomplete coalition is the partial fusion of a joint with limited motion. The rudimentary coalition is a joint with an adjacent bone extending into the joint space and causing a restriction or limitation of motion.

The surgical classification[55] evaluates the maturity or immaturity of the union, denotes an extra-articular from an intra-articular union, and assesses for arthritic or secondary adaptive changes. This classification also includes surgical recommendations. Pontious et al.[56] use the term synarthrosis for intra-articular joints, synostosis for extra-articular joints, and synarthrostosis for a combination of the two.

INCIDENCE

The actual incidence of tarsal coalitions is unknown, since most are diagnosed when the patient has symptomatic episodes. Some of the fibrous and cartilaginous coalitions are asymptomatic[57] and are overlooked on radiographic interpretation.

As asymptomatic coalitions ossify, they become symptomatic. Ossification of coalitions occurs at different times for different coalitions. The talonavicular will ossify at 3 to 5 years, the calcaneonavicular at about 8 to 12 years, and the talocalcaneal at about 12 to 16 years.[17] Stormont and Peterson[9,10] determined that 50% of subtalar coalitions are bilateral.

Sex predilection of tarsal coalitions is unknown. Several authors have conflicting reports on the male to female ratio.[59] If a large and randomly-populated study proves that there is a sex predilection, then the autosomal dominant inheritance theory could be disproved. Rankin and Baker[60] have determined that there is no race preference.

CLINICAL SUBJECTIVE

The clinical findings for coalitions may include pain. Usually the pain will occur after athletics or increased activities, after prolonged standing or after walking on uneven terrain. The pain usually has an insidious onset, but is often more significant after activities. The pain can be relieved with rest or limitation (restriction) of subtalar and midtarsal joint motion. Muscle spasms (e.g. peroneus brevis, peroneus longus, tibialis anterior, or tibialis posterior), sinus tarsi syndrome, lateral or medial ankle pain, ankle joint instability or tarsal tunnel pain, may be the initial or long term symptoms of tarsal coalition. Often the clinical findings are vague, and may lead to a misdiagnosis unless a complete physical examination is performed.

DIFFERENTIAL DIAGNOSIS

The signs and symptoms may initially mimic several different pathologies that require a differential diagnosis.[13,55] Acromegaly, arthritides, Charcot joint, corrected clubfoot, diffuse idiopathic skeletal hyperostosis, hypermobile flatfoot, infection, sinus tarsi syndrome,tarsal tunnel syndrome, trauma, and tumor are among the more common entities that must be differentiated.

CLINICAL OBJECTIVE

Physical examination will usually reveal restricted subtalar joint pronation and/or supination. When peroneal spasm is not found, passive subtalar joint motion may elicit pain. The foot may be flexible or rigid and is not always a flatfoot. These findings lead to an increased suspicion of a coalition. The physical examination should be performed non-weight bearing for assessment of passive range of motion, and weight bearing to evaluate active subtalar motion and gait analysis. A study by Pontious et al.[56] in 1993 determined that pedal plantar pressures and the biomechanics of the foot in gait are altered secondarily to coalitions. This includes asymptomatic talonavicular coalitions.

Often, limited inversion may be accentuated by peroneal spasms. The muscular tonicity of the peroneals affords a protective maneuver by decreasing painful tarsal motion.[18] Peroneal spasms may occur to prevent motion in the tarsal region.[61] Outland and Murphy[52] stated that peroneal spasms have been noted in complete coalitions where there is no motion to prevent. Colwell and Elener[1] associated peroneal spasms with shortening of the peroneals.

The shortened peroneals may be secondary to the chronic everted position of the calcaneus. In this position, the foot may have a pes valgo planus appearance. The utilization of the Hubscher maneuver may prove a rigid pes plano valgus foot type. Slomann[62] in 1921 and Badgley[63] in 1927 determined that tarsal anomalies may cause a peroneal spastic flatfoot. Harris and Beath[18] in 1948 determined that tarsal anomalies have an etiology of peroneal spastic flatfoot. These peroneal spasms were tonic not clonic as monitored by electromyographic studies. However, many times coalitions do not lead to peroneal spasms. There are also etiologies to the peroneal spastic foot other than coalition.

In some children, a ball and socket ankle joint[64] has formed secondary to the limitations of the subtalar joint motion (Fig. 2.) This abnormal shape of the ankle joint allows for inversion and eversion to occur proximal to the subtalar joint. The disadvantage of this ankle joint is the instability which increases the probability of ankle injuries. This usually occurs in coalitions that coalesce in the very young.

Figure 2. The rounded talar dome demonstrates a ball and socket ankle joint.

RADIOGRAPHIC INTERPRETATION

The diagnosis of a tarsal coalition involves a complete history and physical examination followed by routine radiographic analysis. The initial conventional radiographic analysis utilizes the dorsoplantar, lateral, and medial oblique views. The dorsoplantar and lateral views should be taken with the patient in their angle and base of gait, which will present the functional angles and positions.[77,78]

This standard approach may be adequate to reveal the calcaneonavicular, the talonavicular, and the calcaneocuboid coalitions (Figs. 3A-3C). However these views may be inadequate for determining the individual involvement of the posterior and middle facets of the talocalcaneal joint.[3,67,71,79,80] Further radiographic analysis for talocalcaneal coalitions may involve the Harris-Beath views[18, 66] and the Isherwood medial and lateral oblique views.[81] The suggested angles for the Harris-Beath modified views are determined from the lateral view of the conventional radiograph. A longitudinal axis of the sustentaculum tali and the plane of support axis intersect to give Angle X. The central ray of the radiographic beam is angled at Angle X and ± 5 degrees. These views will aid in the diagnosis of a talocalcaneal coalition (Figs. 4A-4C).

The extent of articular involvement in adolescents with talocalcaneal coalitions can be determined by the CT scan. However non-osseous unions may be difficult to view with this method.[73] The best method to observe non-osseous unions is through the use of MRI. This technology may become the standard for confirming the diagnosis of talocalcaneal and other coalitions (Figs. 5A, 5B).

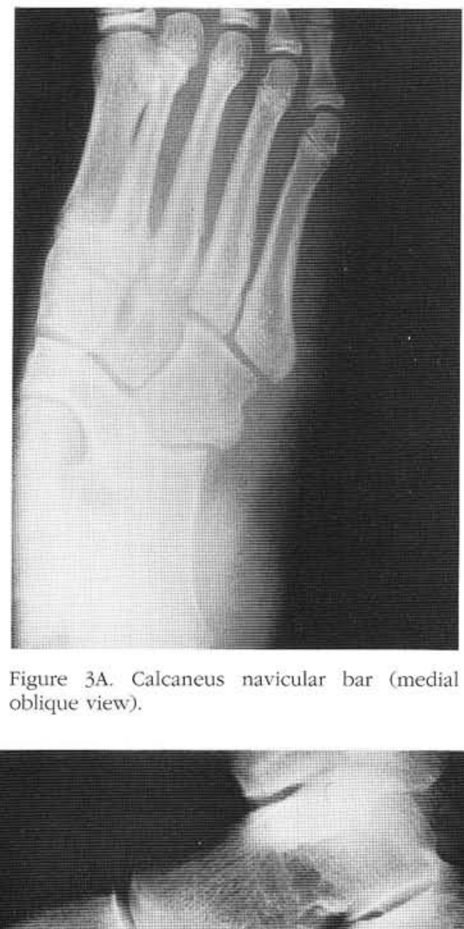

Figure 3A. Calcaneus navicular bar (medial oblique view).

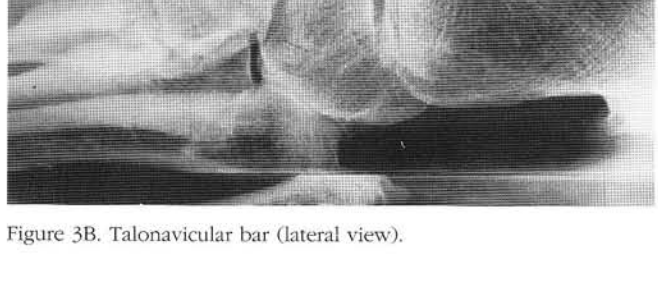

Figure 3B. Talonavicular bar (lateral view).

Figure 3C. Calcaneal cuboid coalition (lateral view).

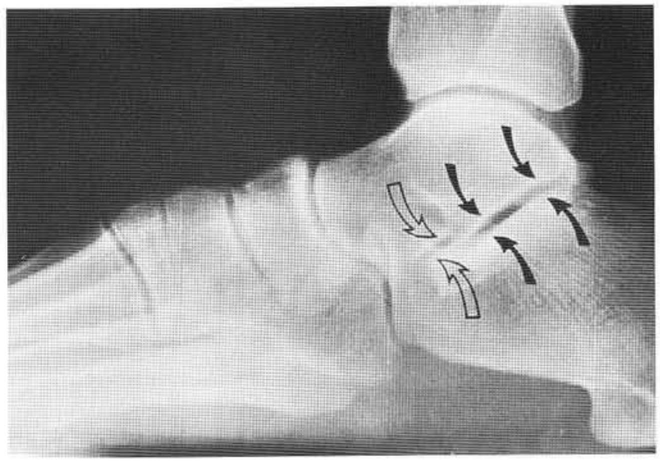

Figure 4A. The lateral x-ray view can be used to estimate the general angulation of the posterior facet of the subtalar joint.

Figure 4B. The x-ray beam is directed at this angle and ± 5 degrees.

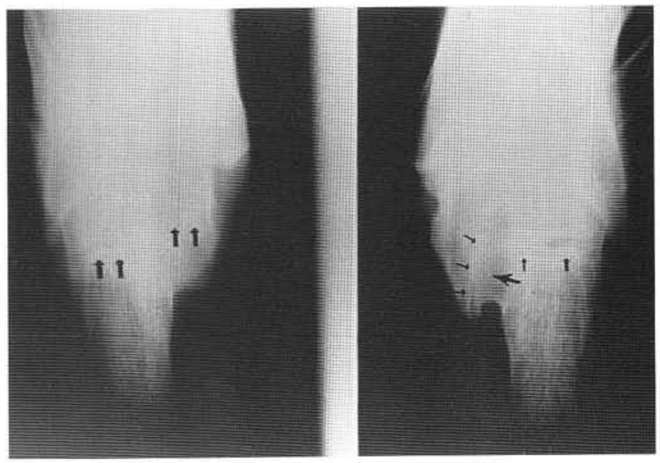

Figure 4C. The Harris-Beath x-ray view generally will show irregularity as well as angulation of the middle facet of the subtalar joint (usually the middle and posterior facet are parallel to each other with the middle facet being slightly higher.

In the case study, conventional radiographic techniques were used to help confirm the diagnosis of an incomplete coalition. The views obtained were the lateral views in the relaxed stance position and in the neutral stance position. A common peroneal block is suggested to prevent guarding and pain about the joint if a peroneal spasm is present. A complete fusion has the osseous block to prevent movement. The incomplete coalition may have enough motion to reach or surpass the neutral position.

There are other special studies that have been noted in the literature that include tomography, Tc99 MDP, and arthrography. Tc99 MDP and arthrography are invasive studies. All of these studies are unreliable[73] and not often used to evaluate tarsal coalitions.

TREATMENT

Upon confirmation of a coalition, there are many conservative therapeutic modalities and surgical techniques available for patient management. Some of the conservative modalities for coalitions are anti-inflammatory drugs, casting, intra-articular injections, orthotic devices, padding, physical therapy, and shoe modifications.

When conservative methods have been applied, and there is continued recalcitrant pain, surgical treatments are offered to the patient. In adolescent coalitions without arthritic or secondary osseous changes, the best option may be a surgical procedure. The surgical options may include one or a combination of the following: resection of coalition with or without soft tissue interposition,

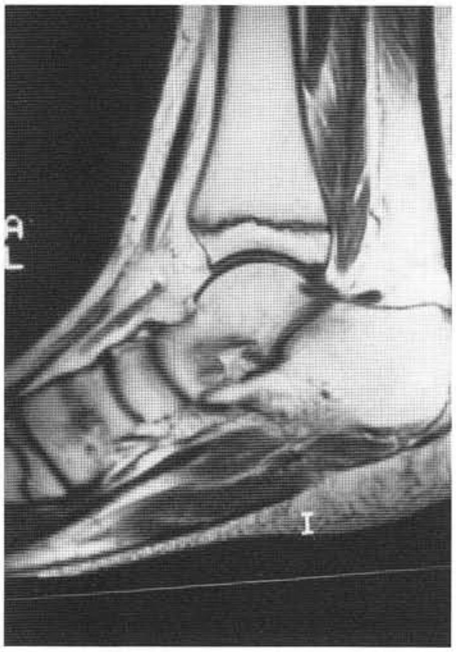

Figure 5A. Sagittal view MRI. These studies can not only confirm the diagnosis of talocalcaneal coalitions, but also can help to estimate the percentage of the talocalcaneal articulation that is involved with the coalition.

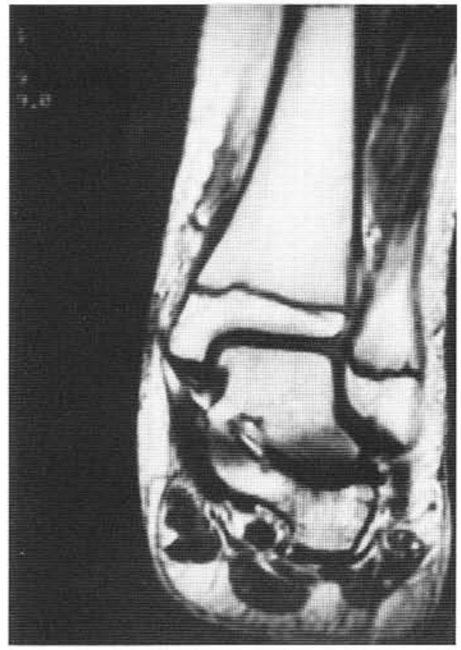

Figure 5B. Coronal view demonstrates a middle facet talocalcaneal coalition.

arthroeresis, isolated arthrodesis, and triple arthrodesis. For example, the surgical procedure for a talocalcaneal coalition may be a resection of the union. A resection is suggested in cases that have less than 50% of the articular surface involved when arthritic changes are not present.

CASE STUDY

An eleven-year-old white female in good health who participates actively in sports, complained of painful feet and ankles. She complained of vague symptoms from a dull aching to a sharp pain inferior and posterior to the medial malleolus. The left foot was more symptomatic than the right foot. Her pain had an insidious onset, but was increased with participation in athletic activities. Relief from her discomfort was noted after rest periods.Conservative professional treatment with functional orthosis had initially relieved her symptoms, but in the last year her left foot had once again became symptomatic. The pain occasionally was burning in nature. Once again the symptoms increased with activities such as sports, and were relieved with rest.

The lower extremity physical examination revealed that the neurovascular status was intact bilaterally. There were no signs of tinels, valleix, or neuroma about the medial aspect of the left foot. Muscle testing indicated that the muscles were present, symmetrical, and functioned normally bilaterally. Tenderness was noted along the tibialis posterior tendon just inferior to the medial malleolus of the left foot. There was no pain noted about the navicular. A tender palpable lump which was non-mobile and non-fluctuant was noted inferior and posterior to the medial malleolus of the left foot.

The biomechanical examination demonstrated a subtalar joint range of motion of 27 degrees on the right and 19 degrees on the left. The left subtalar joint had restricted supination with inversion noted only to the perpendicular. There was excessive eversion available. The forefoot was inverted relative to the rearfoot in a neutral subtalar joint position with the midtarsal joint maximally pronated. This was a structural forefoot varus seen bilaterally. A severe pes plano valgus compensation was noted bilaterally.

Gait analysis revealed exaggerated depression of the medial longitudinal arch, significant forefoot abduction, and excessive calcaneal eversion *bilaterally*. The patient remained pronated throughout gait.

The conventional radiographs included the dorsoplantar, lateral, and medial oblique of the left foot (Figs. 6A-6D). The lateral view had a positive

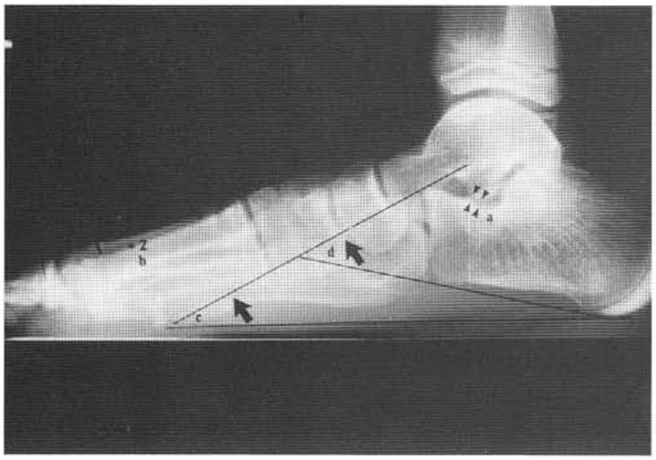

Figure 6A. The lateral view of the left foot demonstrates:
a. A positive Kirby sign. (The lateral process of the talus obliterates the sinus tarsi).
b. A positive Seiberg index. (The neck of the first metatarsal being more elevated from the second metatarsal than the base.)
c. A high talar declination angle.
d. A high lateral talocalcaneal angle.

Figure 6B. Lateral view of the right foot.

Figure 6C. Dorsoplantar view of the left foot demonstrates:
a. A normal metatarsus adductus angle.
b. A low forefoot adductus angle. (Forefoot abductus angle)
c. Mild irregular shape of the talar head.
d. A high Kite's angle.

Figure 6D. Dorsoplantar view of the right foot.

Kirby sign (the lateral process of the talus obliterates the sinus tarsi). A positive Seiberg index was noted bilaterally (the distance between the dorsal surfaces of the first metatarsal and the second metatarsal was higher at the neck level than the basilar level). This demonstrates a metatarsus primus elevatus. Also, on the lateral view, an anterior break in the cyma line and a navicular cuneiform fault was noted. A high talar declination angle and a high lateral talocalcaneal angle were seen.

On the left foot, a pronounced set of oblique lines was noted proximal to the sustentaculum tali. This suggested an irregular change to the posterior facet of the talocalcaneal joint. The medial aspect of the posterior facet was present, yet vague and superimposed on the more normal appearing lateral aspect of the posterior facet. The lateral surface of the posterior facet of the talocalcaneal joint was more readily apparent than the medial aspect on the normal lateral radiograph. Since the abnormal irregular oblique joint structure of the posterior facet was superimposed over a relatively normal lateral appearing aspect, a more medial involvement was suggested (Figs. 7A, 7B).

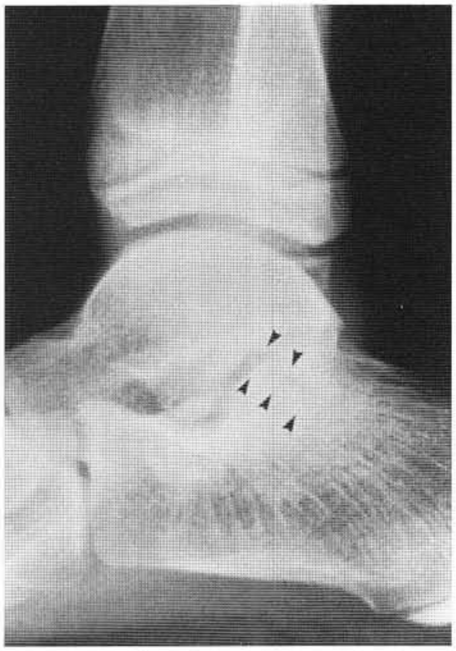

Figure 7A. An irregular parallel oblique structure of the posterior facet of the subtalar joint is noted on the left rearfoot area in the region of the posterior facet of the talocalcaneal joint in the relaxed stance lateral radiograph.

Figure 7B. This is not seen on the right radiograph.

The dorsoplantar view revealed a normal metatarsus adductus angle, a small forefoot adduction angle, a mild irregular shape of the talar head, and an increased Kite's angle. In general the radiographs revealed a significant pes plano valgus bilaterally, with continuous and open growth plates as was expected for an 11-year-old female. Although an oblique and irregular joint space was noted on the medial aspect of the posterior facet of the left talocalcaneal joint, no signs of arthritic changes were seen. The differential diagnosis centered on a tarsal tunnel syndrome, symptomatic collapsing pes valgo planus, and tarsal coalition.

Conservative treatment via orthotics was administered, and the patient's symptoms essentially resolved within two weeks of orthotic use. The patient was scheduled to return as needed or in one year for re-evaluation. After one year of orthotic use, the patient once again became symptomatic, but her left foot was much more symptomatic than the right foot.

The clinical findings of limited subtalar joint motion support the radiographic presentation noted on the lateral relaxed stance and the lateral neutral position views (Fig. 7C). As stated earlier, the ability of the patient to move from a relaxed

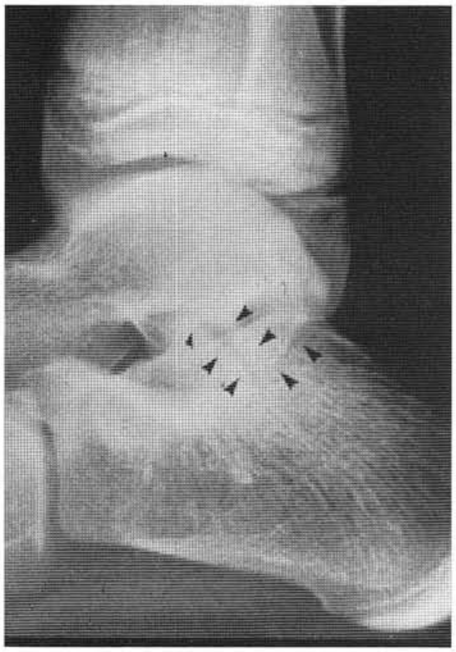

Figure 7C. The neutral stance position radiograph continues to show the oblique irregularity to the medial surface of the posterior facet of the subtalar joint. This also demonstrates that subtalar joint motion is available from the maximally pronated positions.

pronated position to a neutral or slightly supinated position signifies motion. Therefore, an incomplete union was clinically expected. MRI studies were ordered, and signs of an incomplete union were noted at the medial aspect of the posterior facet of the subtalar joint (Fig. 8A, 8B). The conventional radiographs suggested a coalition. The MRI can confirm an incomplete union of a tarsal joint.

The irregular findings on the MRI were located about the medial aspect of the posterior facet of the talocalcaneal joint. There were two interfacing areas that made up the irregular structures. The inferior structure, located on the calcaneus, was superior and posterior to the sustentaculum tali. This inferior structure was angulated from postero-inferior to antero-superior. The superior structure was located on the medial aspect of the talus. The extension of the superior structure was just proximal to the talar neck, and also angulated from postero-inferior to antero-superior. The position of this coalition was able to limit supinatory motions yet did not seem to block pronatory motions. Less than thirty percent of the medial aspect of the facet was involved in the bony and fibrocartilaginous union.

Surgical resection of the coalition was suggested. The surgery was carried out with the patient supine. A left mid-thigh tourniquet at 250 mmHg was utilized for 100 minutes. The incision was planned to avoid the posterior tibial artery and nerve (Fig. 9A). A C-shaped incision began posterior to the medial malleolus and extended distally just proximal to the navicular. The incision was carried deep, and the flexor retinaculum was incised between the tibialis posterior and the flexor digitorum longus tendons. The flexor digitorum

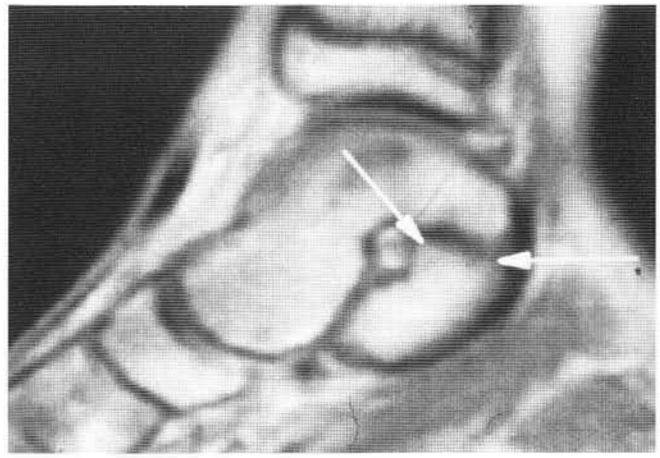

Figure 8A. A sagittal plane MRI cut demonstrates irregularity in the posterior facet of the subtalar joint on the medial surface.

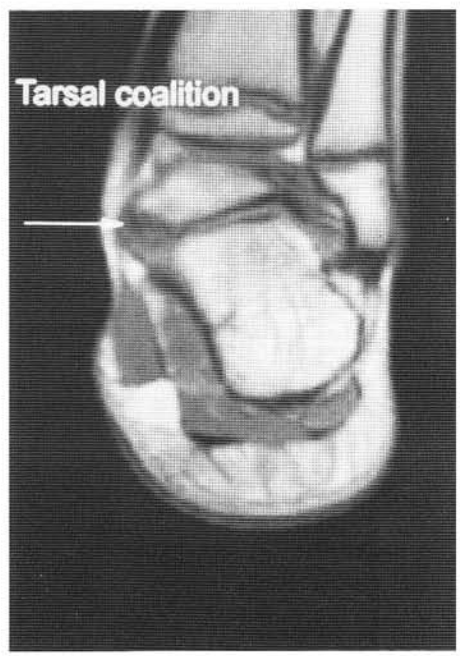

Figure 8B. The coronal (frontal) plane MRI also demonstrates the coalition at the medial aspect of the posterior facet of the talus of the talocalcaneal articulation.

longus was reflected inferiorly and the tibialis posterior was reflected superiorly (Fig. 9B). The periosteum was incised and reflected, exposing the medial prominence of the posterior facet (Fig. 9C).

The prominent bone was resected from the calcaneus with an osteotome (Fig. 9D). A natural separation occurred at the fibrocartilaginous union (Fig. 9E). This area was further resected with a rongeur until a more normal appearing cartilaginous joint space was seen. The posterior superior talar portion of the prominence was then resected to develop a smooth medial border of the posterior facet of the talocalcaneal joint (Figs. 9F, 9G).

Intraoperatively passive supination motion was increased. A closed suction drain was used in the closure of the surgical site. A short-leg removable cast was also applied over the sterile dressings. The cast was removed in two weeks, and by the fourth week the patient was without complaints, and continued to gradually increase her activities. Postoperative radiographs no longer demonstrated the pronounced set of oblique lines noted proximal to the sustenaculum tali that were indicative of this coalition (Figs. 10A, 10B). The patient remained in her orthoses and commenced soccer practice in four months. Due to the coexistence of significant pes valgo planus bilaterally, functional orthotic therapy was continued. Additional surgical stabilization may be necessary in the future if significant uncontrollable symptoms occur associated with the severe pes valgo planus. At ten months postoperative, the patient is participating in volleyball and soccer with no significant complaints.

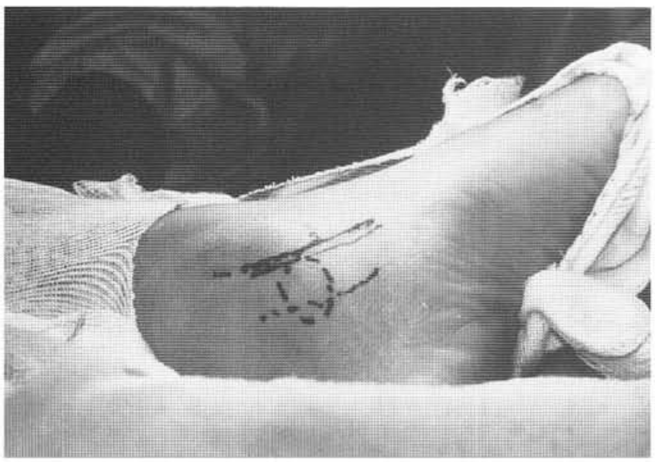

Figure 9A. The left foot is viewed from the medial surface. The tibialis posterior is marked. The neurovascular bundle is marked with a dotted line and the bony prominence or the mass is noted in a circular fashion inferior and posterior to the medial malleolus.

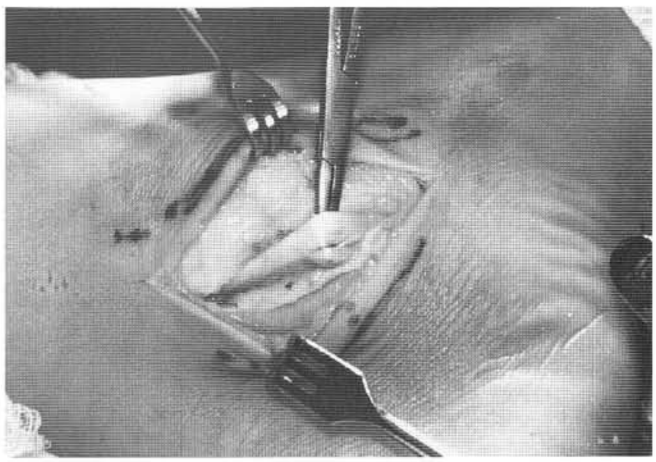

Figure 9B. The tibialis posterior tendon is identified in the incisional area.

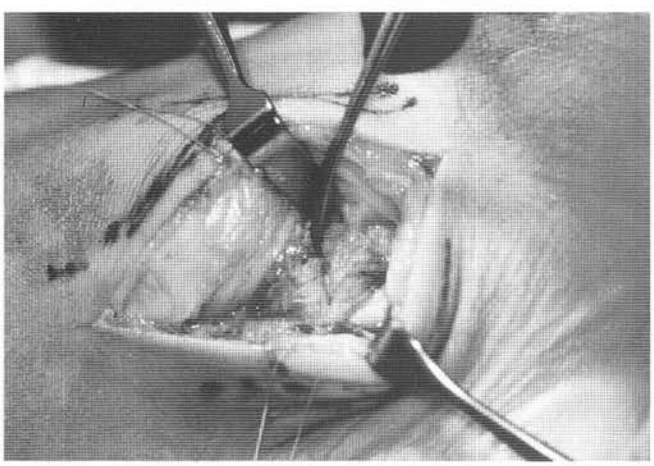

Figure 9C. The tibialis posterior is reflected superiorly. The flexor digitorum longus is reflected inferiorly, demonstrating the underlying bony prominence once the periosteum has been reflected.

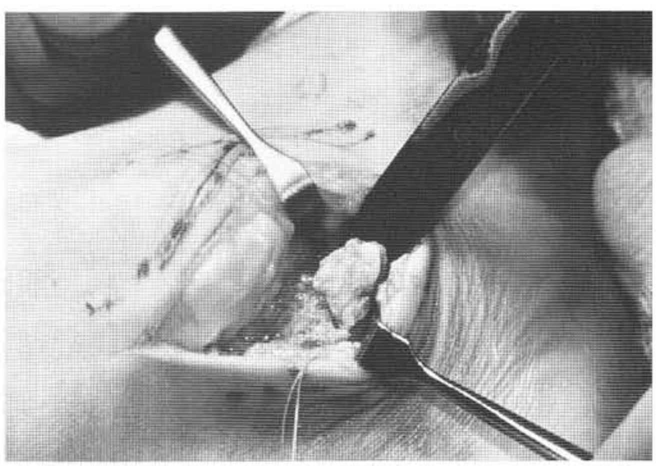

Figure 9D. The calcaneal portion of the prominence is resected with a osteotome.

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Intraoperatively passive supination motion was increased. A closed suction drain was used in the closure of the surgical site. A short-leg removable cast was also applied over the sterile dressings. The cast was removed in two weeks, and by the fourth week the patient was without complaints, and continued to gradually increase her activities. Postoperative radiographs no longer demonstrated the pronounced set of oblique lines noted proximal to the sustenaculum tali that were indicative of this coalition (Figs. 10A, 10B). The patient remained in her orthoses and commenced soccer practice in four months. Due to the coexistence of significant pes valgo planus bilaterally, functional orthotic therapy was continued. Additional surgical stabilization may be necessary in the future if significant uncontrollable symptoms occur associated with the severe pes valgo planus. At ten months postoperative, the patient is participating in volleyball and soccer with no significant complaints.

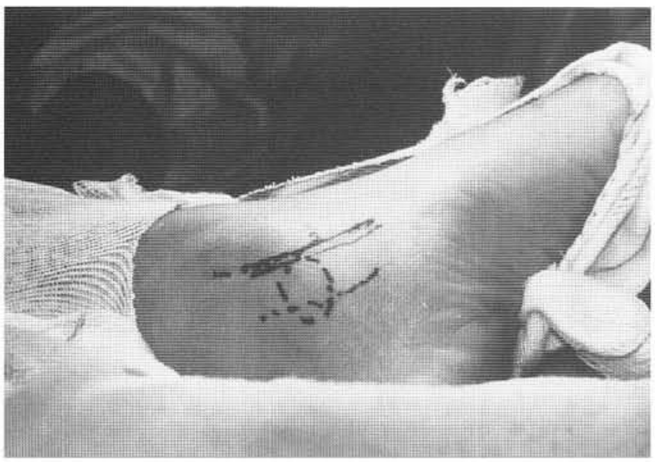

Figure 9A. The left foot is viewed from the medial surface. The tibialis posterior is marked. The neurovascular bundle is marked with a dotted line and the bony prominence or the mass is noted in a circular fashion inferior and posterior to the medial malleolus.

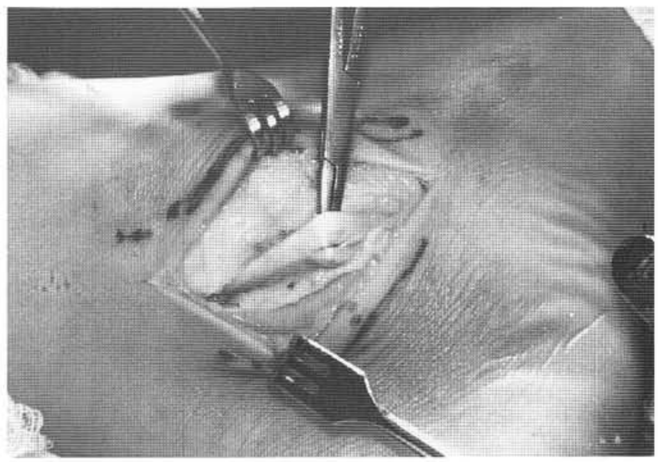

Figure 9B. The tibialis posterior tendon is identified in the incisional area.

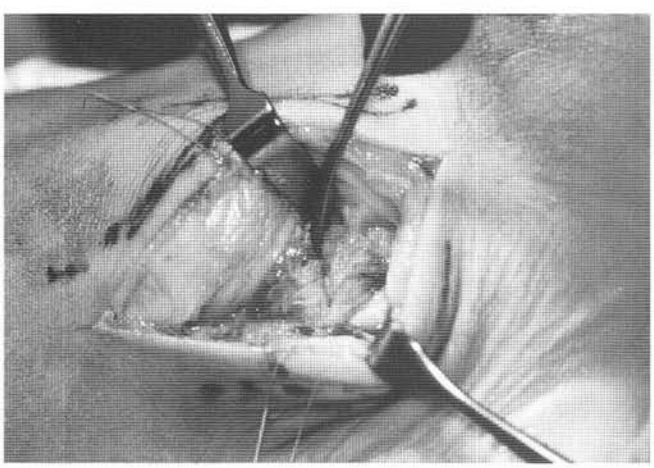

Figure 9C. The tibialis posterior is reflected superiorly. The flexor digitorum longus is reflected inferiorly, demonstrating the underlying bony prominence once the periosteum has been reflected.

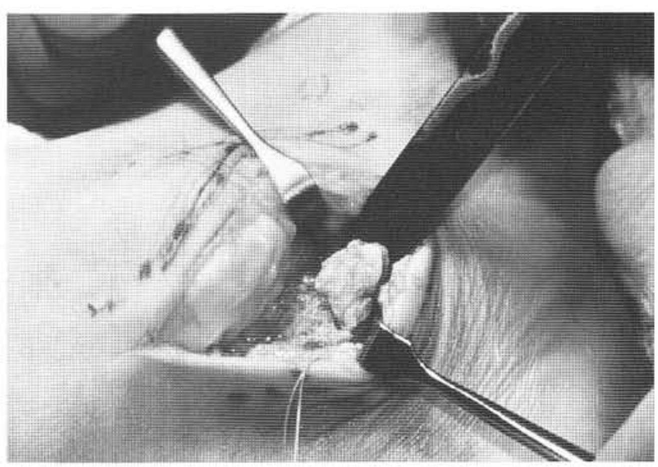

Figure 9D. The calcaneal portion of the prominence is resected with a osteotome.

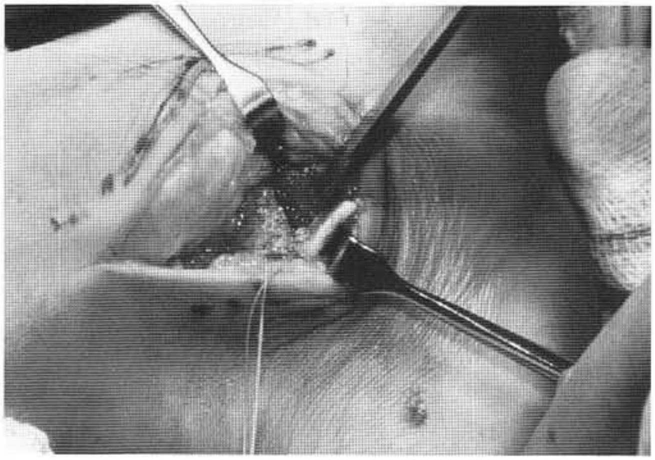

Figure 9E. A natural separation occurred at the fibrocartilaginous union.

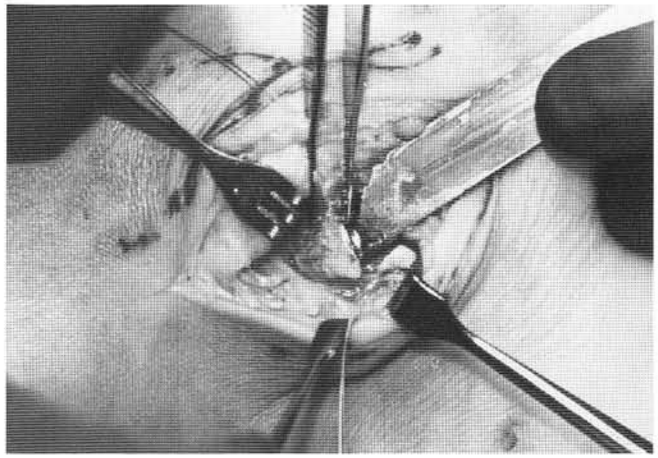

Figure 9F. Once the normal cartilaginous joint surface between the talus and calcaneus can be noted, the posterior superior talar portion of the coalition is resected.

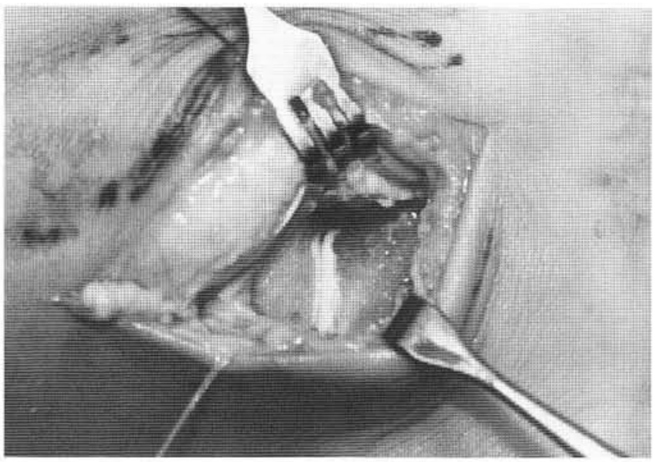

Figure 9G. Once the coalition has been removed, the normal medial aspect of the posterior facet of the talus can be visualized.

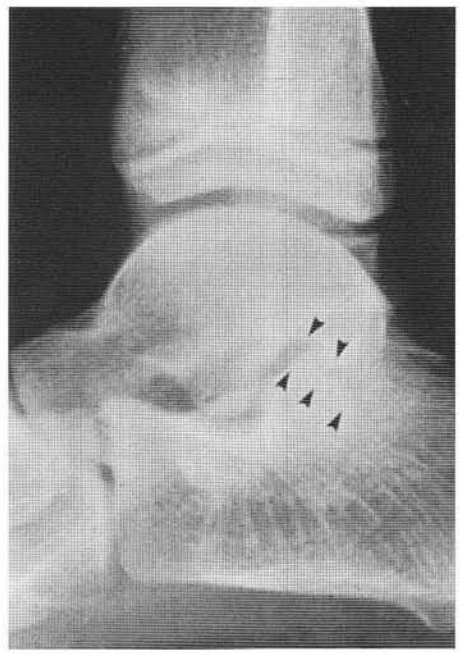

Figure 10A. Preoperative lateral radiograph, oblique irregular surface is noted.

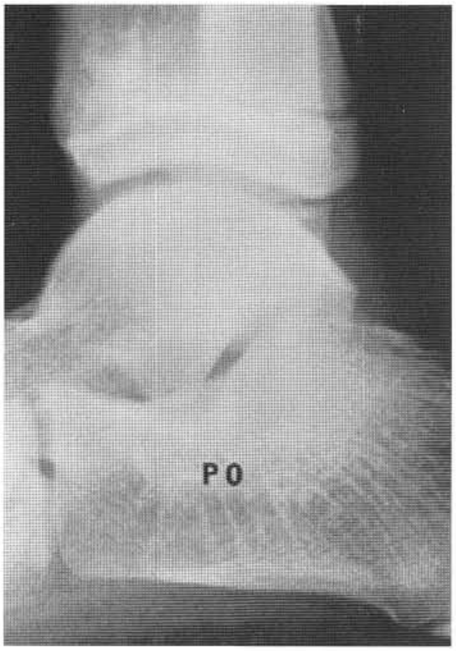

Figure 10B. Postoperative radiograph. The irregularity has been eliminated.

SUMMARY

Surgical resection proves to be a beneficial mode of treatment[82] in a talocalcaneal coalition that involved less than 50% of the articular surface. Successful resection allows continued motion of the involved joint and eliminates pain. Since resection is effective only if no significant secondary osseous changes are present, it is mainly done in the young. Arthrodesis is the preferred surgical procedure when greater than fifty percent of the joint is involved in the union, or when arthritic or significant structural changes have occurred. Yen et al.[83] determined that talocalcaneal resections yield good therapeutic results when the previous criteria are followed. In cases where significant calcaneal valgus is visualized, an additional surgical procedure may be necessary.[83]

In this case report, radiographic and magnetic resonance imaging confirmed the diagnosis of an incomplete coalition of the talocalcaneal joint. Close examinations of the posterior facet on radiographic and magnetic resonance imaging studies revealed a more prominent visualization of the medial aspect of the joint. The medial joint was more oblique in direction, and irregular in appearance. In the normal presentation, this area is vague and hard to discern due to the superimposed lateral aspect of the talus and calcaneus. Pronatory positional changes were noted with the conventional radiographs. The ability to commence supinatory motions from the relaxed pronatory position which ends in the neutral or only slightly supinated position signifies a limitation of supination. Since some subtalar joint motion is available an incomplete union is noted. Asymmetrical limited supinatory motion with available symmetrical pronatory motion may portend an incomplete posterior facet coalition on the medial side.

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