Clinical Policy Title: Subtalar arthroereisis (implant)

Coverage policy

Select Health of South Carolina considers the use of subtalar arthroereisis to be investigational and, therefore, not medically necessary.

Limitations:

All other uses of subtalar arthroereisis are not medically necessary.

Alternative covered services:

- Orthotics.
- Physical therapy.
- Prescription drug therapy.
- Short leg walking cast or brace.
- Surgical procedures including, but not be limited to, the following:
  - Arthrodesis.
  - Osteotomy.
  - Tendon transfer.

Background
Flatfoot (also called pes planus, pes planovalgus or “fallen arch”) occurs when the tendons that form the medial arch of the foot fail to pull together properly, allowing the entire sole of the foot to touch the floor while standing. Flatfoot is characterized as flexible (the medial arch flattens upon standing but normalizes during non-weight bearing) and rigid (unaltered by weight bearing). It may result in alteration of foot biomechanics, subsequent foot misalignment, lower extremity pain and limited physical activity.

The etiology can be congenital or acquired through wear-and-tear stresses, injury to the tendon or bone, arthritis and neuropathy. Most children are born with very little arch in the feet. As they grow and walk, the soft tissues along the bottom of the feet tighten, which gradually shapes the medial arches (AAOS 2013). If flexible flatfoot continues into adolescence, a child may experience symptoms requiring treatment (AAOS 2013, Dare 2014). Other factors that can increase the risk for flatfoot include obesity, diabetes (e.g., Charcot foot), aging and pregnancy (AAOS 2013, Stolzman 2015). Pain may be located in the medial, plantar or lateral parts of the foot and extend into the lower extremities depending on etiology (Toullec 2015).

Most persons with flatfoot are asymptomatic and require no intervention. In general, treatment is indicated when a patient becomes symptomatic or withdraws from physical activity, but there is some debate regarding treatment necessity and best options. Treatment options typically begin with conservative medical management such as foot exercises, orthoses and physical therapy. Acute painful flatfoot may require strict cast immobilization. Surgical options comprise arthrodesis, osteotomies and numerous combinations of procedures to correct the underlying pathology (Toullec 2014, Dare 2014). Surgery is associated with operative morbidity and longer-term sequelae, with eventual transfer of energy to non-fused joints, nonunion and growth plate disturbances.

Subtalar arthroereisis:

Subtalar arthroereisis (also called sinus tarsi implant or extra-osseous talotarsal stabilization) involves extra-articular placement of an implant that looks like a threaded cylinder within the sinus tarsi, with the goal of limiting excessive abnormal rotations of the tarsus. First described in congenital childhood flatfoot more than 60 years ago, subtalar arthroereisis is typically performed in conjunction with other tendon or bone procedures. As the least invasive surgical approach for flatfoot, it offers technical simplicity and rapid recovery but may not fully correct flatfoot. The main drawback is regular sinus tarsi pain, requiring removal of material while avoiding secondary correction loss (Toullec 2015).

The United States Food and Drug Administration (FDA) does not regulate surgical procedures such as subtalar arthroereisis. However, FDA has cleared several implants used in the procedure for commercial use as Class II devices (FDA 2016, product code HWC).

Searches

Select Health of South Carolina searched PubMed and the databases of:

- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services (CMS).

We conducted searches on August 1, 2016. Search terms were: "Subtalar Joint" (MeSH), "Joint Prosthesis"(MeSH), "Subtalar Joint/surgery"(MeSH), "Subtalar Joint/therapy" (MeSH), "Flatfoot" (MeSH) and free text terms “arthroereisis” and “arthroerisis.”
We included:

- **Systematic reviews**, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic reviews use predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.

- **Guidelines based on systematic reviews.**

- **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

**Findings**

Two systematic reviews (Hayes 2012 [updated 2015], Metcalfe 2011), one overview (National Institute for Health and Clinical Excellence [NICE] 2008) and three clinical practice guidelines (NICE 2009, Lee 2005, Harris 2004) provided the basis for this policy. The reviews concur that evidence supporting the use of subtalar arthroereisis consists of small case series and case reports lacking long-term follow-up. The largest body of literature evaluated subtalar arthroereisis in pediatric populations. The most common indication for surgery was treatment of persistent, symptomatic flexible flatfoot, and most patients underwent concomitant procedures such as Achilles tendon lengthening. Studies varied in instrumentation, procedure, outcome measurement and etiology, particularly between adult and pediatric patients. Two recent case series (116 total patients, 130 total feet) not included in the reviews confirm these findings (Ozan 2015, Saxena 2016).

Subtalar arthroereisis for children has been used for decades and is a relatively simple intervention. The evidence suggests it has a lower risk of morbidity, shorter recovery time and favorable safety profile compared with other established surgical approaches. As no controlled studies have been published, it is not possible to determine definitive patient selection criteria or relative safety or efficacy of various implant devices. To note, other surgical options for symptomatic flatfoot, such as osteotomies and/or fusions, lack similar evidence from high quality comparative studies.

Evidence-based guidelines reflect the uncertainty in the evidence base and the clinical controversy surrounding the utility of subtalar arthroereisis in pediatric and, to an even greater extent, adult populations. NICE recommended using the procedure in selected children with persistent mobile flatfoot due to neuromuscular disorder, skeletal dysplasia or systemic ligamentous laxity, whose treatment is supervised by a multidisciplinary team; the procedure may be indicated rarely in highly selected adult patients (NICE 2009). Two guidelines by the American Orthopaedic Foot and Ankle Society (AOFAS) stated long-term results of arthroereisis in adults have not been established, and the procedure in children remains controversial among surgeons (Lee 2005, Harris 2004). There appears to be greater acceptance of the procedure among podiatrists than orthopedists.

Shah (2015) conducted a web-based survey of AOFAS members for current practices regarding subtalar arthroereisis. A total of 572 respondents completed the survey (32% response rate), of whom 401 (70%) practice in the United States. Among United States practitioners, 40% have performed subtalar arthroereisis, and 60% of those still perform the procedure. Common indications were painful congenital flatfoot, posterior tibial tendon dysfunction and flatfoot associated with accessory navicular. These results suggest while many doctors have performed subtalar arthroereisis, a significant number no longer do. Most doctors who still perform this procedure have removed the implants, commonly for pain.
Summary of clinical evidence:

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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</thead>
<tbody>
<tr>
<td>Hayes (2012, updated 2015)</td>
<td><strong>Key points:</strong></td>
</tr>
<tr>
<td>Subtalar arthroereisis for treatment of flatfoot</td>
<td>• Systematic review of six retrospective small case series of children and three case series of adults (10 to 37 patients per study).</td>
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<tr>
<td></td>
<td>• Update included one prospective comparison study, one prospective data analysis, two retrospective case series, one retrospective cohort study and one retrospective analysis.</td>
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<td>• Most common indication= flexible flatfoot.</td>
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<td>• SA consistently improved pain, functionality and radiographic findings not responsive to conservative treatment; effects observed for up to 12 years following the procedure.</td>
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<td></td>
<td>• Favorable safety profile; pain and sinus tarsi tenderness being the most frequent complications. Infrequent explanation due to pain, implant dislocations or fractures.</td>
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<td>• Large-scale RCTs comparing long-term outcomes of SA with other surgical interventions are needed to establish the efficacy and safety.</td>
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<tr>
<td>Metcalfe (2011)</td>
<td><strong>Key points:</strong></td>
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<tr>
<td>Subtalar arthroereisis for pediatric flexible flatfoot</td>
<td>• Systematic review of 76 case series and case reports.</td>
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<td>• Eight of nine radiographic parameters showed significant improvement in increased static arch height and joint congruency; calcaneal inclination angle demonstrated the least change.</td>
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<td>• Complications including sinus tarsi pain, device extrusion and under-correction: overall complication rates (4.8% to 18.6%); unplanned removal rate (7.1% to 19.3%) across all device types.</td>
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<td>• Interplay between osseous alignment and dynamic stability within the foot may contribute to procedure effectiveness. Qualitative outcome data based on disease specific, validated outcome tools may improve current evidence and permit comparison of future study data.</td>
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<tr>
<td>NICE (2008)</td>
<td><strong>Key points:</strong></td>
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<tr>
<td>Sinus tarsi implant insertion for mobile flatfoot</td>
<td>• Review of eight case series and four case reports (643 total feet), including only one case series of 23 adults (28 implants).</td>
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<td>• Overall quality: Low. Variation in procedures (design, size, instrumentation/insertion), unclear patient selection criteria.</td>
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<td>• Many patients also had concomitant Achilles tendon procedures or other procedures.</td>
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<td>• Can be done bilaterally or unilaterally but no evidence available about efficacy of bilateral implantation or laterality (left/right implantation).</td>
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<td>• Indications for this procedure are different in pediatric and adult populations.</td>
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<td>• Lack of consensus from experts on efficacy and safety, clinical utility, need for additional research and the use of biodegradable and non-biodegradable implants.</td>
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**Glossary**

**Calcaneum** – Heel bone.

**Pes planus** – A condition in which the arch of the instep is flattened so that the entire sole rests upon the ground during weight-bearing.

**Pes valgus** – A deviation of the foot outward at the talocalcanean joint.

**Posterior tibial tendon** – One of the tendons of the leg that attaches the calf muscle to the bones on the inside of the foot. Its main function is to hold up the arch and support the foot when walking.
**Pronation** – Rotation of the medial bones in the midtarsal region of the foot inward and downward forcing the foot to come down on its inner edge and turn outward.

**Sinus tarsi** – Small canal which runs under the skin of the foot between the ankle and heel bone.

**Subtalar arthroereisis** – A surgical placement of a device below the talus (ankle bone) to limit excessive talar motion and calcaneal eversion (pronation).

**Talocalcanean joint** – Located in the rear foot between the heel bone and the talus bones.

**Talus** – Lower ankle bone that sits between the heel bone and tibia and fibula.

**References**

**Professional society guidelines/other:**


**Peer-reviewed references:**


Clinical trials:


CMS National Coverage Determinations (NCDs):

No NCDs identified as of the writing of this policy.

Local Coverage Determinations (LCDs):


**Commonly submitted codes**

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

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<thead>
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<th>CPT Code</th>
<th>Description</th>
<th>Comments</th>
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<td>28899</td>
<td>Unlisted procedure, foot or toes</td>
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<tr>
<td>0335T</td>
<td>Extra-osseous subtalar joint implant for talotarsal stabilization</td>
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<td>M21.40-M21.42</td>
<td>Flat foot [pes planus] (acquired)</td>
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<tr>
<td>Q66.50-Q66.52</td>
<td>Congenital pes planus</td>
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<table>
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<th>HCPCS Level II Code</th>
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<td>S2117</td>
<td>Arthroereisis, subtalar</td>
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