Technical Note

Naviculocuneiform Arthroscopy

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Abstract: Surgical interventions at the naviculocuneiform joint are not uncommon to deal with various pathologies of the joint and correction of different foot deformities. To minimize the soft tissue dissection, naviculocuneiform arthroscopy has been described. The purpose of this Technical Note is to report the details of this arthroscopic approach.

The naviculocuneiform joint is composed of the navicular proximally and the 3 cuneiforms distally. It has the medial, middle, and lateral naviculocuneiform articulations sharing the same capsular envelope. The medial articulation is typically the largest, followed by the middle and lateral articulations. It has multiple ligamentous attachments and tendons that either attach to or course across its articulation.

Surgical interventions at this joint is not uncommon for many pathologic foot etiologies, including primary arthritis of the naviculocuneiform joint, degenerative joint disease secondary to pes planovalgus and pes cavus, avascular necrosis of the navicular, Muller-Weiss disease, naviculocuneiform dislocations, dislocation of the navicular, symptomatic coalition, dorsal boss, synovial chondromatosis, or Charcot reconstruction. Arthrodesis of the naviculocuneiform joint is used for the correction of medial column insufficiency or realignment of forefoot varus. Patients with planovalgus feet, cavovarus feet, and degenerative arthritis who also have an apex of deformity at the naviculocuneiform joints are indicated for naviculocuneiform fusion. Sag at this joint is an important component of the flatfoot deformity. Failure to address medial column instability could lead to continued deformity and poor patient outcomes. Naviculocuneiform arthrodesis is an important piece of the armamentarium to address all aspects of flatfoot deformity. Naviculocuneiform arthroscopy has been described to provide a minimally invasive approach to this joint. The purpose of this Technical Note is to report the technical details of naviculocuneiform arthroscopy. It is indicated for excision of symptomatic medial coalition or dorsal boss of the joint, synovectomy, and arthrodesis in synovial chondromatosis with joint destruction. Arthroscopic arthrodesis of this joint is indicated in arthrosis of the joint or as a surgical component to stabilize the medial column in correction of the cavus or adult acquired flatfoot deformity. This arthroscopic approach can be combined with tendoscopy of distal tibialis anterior to deal with distal tibialis anterior tendinosis or bursitis associated with chondral thinning and/or osteophyte formation at the medial naviculocuneiform joint. It is contraindicated in correction of symptomatic flexible flatfoot in adolescents. Hoke or Miller procedure should be combined with osteoperiosteal flap advancement, and an open approach is preferred. Symptomatic coalition at the plantar side of the naviculocuneiform articulations is a contraindication as the lesion cannot be reached arthroscopically. Necrosis of the navicular is a relative contraindication if extensive bone resection is needed or the bone is collapsed. It requires strut graft reconstruction and cannot be performed arthroscopically. Synovial chondromatosis without joint destruction is also a contraindication as complete synovectomy without removal of the cartilage is not possible with this arthroscopic approach (Table 1).
Technique

Preoperative Planning and Patient Positioning

The source of pain should be determined at the naviculocuneiform joint during preoperative assessment. Detailed history taking and clinical examination are essential to define the problem. Radiographs, computed tomography, and magnetic resonance imaging are useful investigations to confirm the diagnosis.

The patient is in supine position with the legs spread. A thigh tourniquet is applied to provide a bloodless operative field. A 2.7-mm 30° arthroscope (Henke Sass Wolf, Tuttlingen, Germany) is used for this procedure. Fluid inflow is by gravity, and no arthropump is used.

Portal Placement

Three portals are used for the naviculocuneiform arthroscopy: the medial portal at the plantar medial corner of the medial naviculocuneiform joint; the middle portal at the dorsal junction between the medial and middle naviculocuneiform joints; and the dorsolateral portal at the dorsolateral corner of the lateral naviculocuneiform joint. The cuneiform and navicular bones are outlined, and the portals are marked under fluoroscopic guide (Fig 1).

Medial Naviculocuneiform Arthroscopy

Three- to 4-mm incisions are made at the medial and middle portals. The subcutaneous tissue is first bluntly dissected down to the bones by a hemostat. Next, the subcutaneous tissue between the portals is bluntly dissected from the underlying bone. This creates the initial working space for medial naviculocuneiform arthroscopy.

Clearance of Dorsal Bone Surfaces and Synoveoctomy. The medial and middle portals are interchangeable as the viewing and working portals. The medial portal is chosen as the viewing portal in this case, and the dorsal capsuloligamentous tissue is resected with an arthroscopic shaver (Dyonics; Smith & Nephew, Andover, MA) via the middle portal. Any inflamed synovium if present is resected (Fig 2). After clearance of soft tissue from the lateral half of the dorsal surface of the medial naviculocuneiform joint, the arthroscope is switched to the middle portal, and the capsuloligamentous tissue of the medial half of the dorsal surface of the medial naviculocuneiform joint is resected with the shaver via the medial portal.

Resection of Dorsal Boss or Osteophytes. The presence of dorsal boss or osteophytes may obscure the dorsal joint line. These should be resected if they cause impingement symptoms. Resection of the bone spur can also expose the joint space and facilitate subsequent preparation of fusion surfaces in case of naviculocuneiform arthodesis.

The medial and middle portals are interchangeable as the viewing and working portals. The medial portal is chosen as the viewing portal in this case. The bone spurs should be cleared from overlying soft tissue with the arthroscopic shaver and should be completely exposed from their apex to the flat bone surfaces of the medial cuneiform and navicular bone away from the medial naviculocuneiform joint. The bone spurs are resected with an arthroscopic burr (Dyonics; Smith & Nephew) via the middle portal. Resection of the spurs should be started from flat bone surfaces of the medial cuneiform and navicular bone toward the joint to

| Table 1. Indications and Contraindications of Naviculocuneiform Arthroscopy |
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| **Indications**             | **Contraindications**       |
| 1. Symptomatic medial coalition |     |
| 2. Symptomatic dorsal boss   | 1. Symptomatic flexible flatfoot in adolescents |
| 3. Synovial chondromatosis with joint destruction | 2. Symptomatic coalition at the plantar side of the naviculocuneiform articulations |
| 4. Symptomatic arthritis     | 3. Extensive necrosis of the navicular |
| 5. Correction of cavus or adult acquired flatfoot deformity | 4. Synovial chondromatosis without joint destruction |
| 6. Distal tibialis anterior tendinosis or bursitis associated with chondral thinning and/or osteophyte formation at the medial naviculocuneiform joint | |

Fig 1. Naviculocuneiform arthroscopy of the left foot. The patient is in supine position with the legs spread. Three portals are used for the naviculocuneiform arthroscopy. The medial portal is at the plantar medial corner of the medial naviculocuneiform joint. The middle portal is at the dorsal junction between the medial and middle naviculocuneiform joints. The dorsolateral portal is at the dorsolateral corner of the lateral naviculocuneiform joint. The cuneiform and navicular bones are outlined and the portals are marked under fluoroscopic guide. (DLP, dorsolateral portal; LC, lateral cuneiform; MeC, medial cuneiform; MeP, medial portal; MiC, middle cuneiform; MiP, middle portal; Na, navicular.)
ensure complete removal of the spurs (Fig. 3). After resection of the bone spurs at the lateral part of the joint, the arthroscope is switched to the middle portal, and the bone spurs at the medial part of the joint are resected with the arthroscopic burr via the medial portal.

Identification of the Joint Surfaces. After clearance of soft tissue and bone spurs, the joint space is exposed. The articular cartilage can be examined for any degeneration (Fig. 4). This can be facilitated by plantarflexion of the forefoot. If medial naviculocuneiform arthrodesis is indicated, the medial naviculocuneiform arthroscopy of the left foot. The patient is in supine position with the legs spread. The medial portal is the viewing portal. The bone spurs at the medial part of the joint are resected with an arthroscopic burr via the medial portal.

Fig 3. Naviculocuneiform arthroscopy of the left foot. The patient is in supine position with the legs spread. The medial portal is the viewing portal. The dorsal boss of the medial cuneiform is resected by an arthroscopic burr. (AB, arthroscopic burr; DB, dorsal boss.)

Fig 4. Naviculocuneiform arthroscopy of the left foot. The patient is in supine position with the legs spread. The medial portal is the viewing portal. The medial naviculocuneiform joint (arrowhead) is examined. (McC, medial cuneiform; Na, navicular.)
and middle portals are interchangeable as the viewing and working portals for the arthrodesis procedure. The articular cartilage is denuded by means of a small arthroscopic osteotome (Acufex; Smith & Nephew) and an arthroscopic shaver. Micro-fracture of the subchondral bone is then performed with an arthroscopic awl (Acufex, Smith & Nephew). If dorsiflexion of the first ray is indicated for correction of cavus deformity, a dorsally based wedge arthrodesis of bone can be resected at the joint level by means of a 2-mm Isham straight-flute Shannon burr (Vilex, McMinnville, TN) via the portals.21,22

Fig 5. Naviculocuneiform arthroscopy of the left foot. The patient is in supine position with the legs spread. (A) The middle portal is the viewing portal, and the medial portal is the working portal. (B) The degenerated part of the joint (star) is resected by an arthroscopic burr. (AB, arthroscopic burr; MeC, medial cuneiform; MeP, medial portal; MiP, middle portal; Na, navicular.)

Fig 6. Naviculocuneiform arthroscopy of the left foot. The patient is in supine position with the legs spread. (A) The middle portal is the viewing portal, and the dorsolateral portal is the working portal. (B) The lateral naviculocuneiform joint (arrowhead) is exposed. (DLP, dorsolateral portal; LC, lateral cuneiform; MiP, middle portal; Na, navicular.)
Table 2. Pearls and Pitfalls of Naviculocuneiform Arthroscopy

| Pearls | Pitfalls |
|--------|----------|
| 1. Blunt dissection of soft tissue down to the bone after making the portals | 1. Surface landmarks should not be relied on for placement of the portals and should be checked under fluoroscopy. |
| 2. Stay of arthroscopic instruments at the surface of the bones | 2. In case of naviculocuneiform arthrodesis, the screws should be inserted from the cuneiforms to the navicular to avoid malposition of the screws. |
| 3. Checking the position of the arthroscopic instruments if in doubt | |
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