Muller-Weiss Syndrome – Salvaging the Medial Column

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The talonavicular joint is still less understood than other joints of foot and ankle. Being a ball-and-socket joint, it accounts for a significant amount of midfoot motion. There are various pathologies at and around the talonavicular joint that result in typical instabilities and deformities of the foot and ankle. Their treatment, however, are often unclear and make the surgeon scratch his or her head. The purpose of this paper is to present two solutions for pathologies in the controversy of “move me or fuse me”.

1. Müller-Weiss Syndrome

Müller-Weiss Syndrome is a rare disease that typically affects middle-aged females. The navicular bone undergoes avascular necrosis with consequent failure of its function. Typical clinical and radiological findings are hindfoot varus, flattening or collapse of the medial longitudinal arch accompanied by tenderness of the medial and dorsal midfoot and midfoot pain on weightbearing. Furthermore, loss of volume with increased radiodensity of the navicular bone, a comma-like shaped configuration of the navicular bone due to compression, and a subsequent medial and/or dorsal protrusion and fragmentation of the navicular bone.

Currently, there does not exist a gold standard in treating patients with Müller-Weiss Syndrome. Ideally, operative correction should restore the navicular height and realign the naviculo-cuneiform joint to restore the medial column and prevent naviculo-cuneiform instability. Therefore, most surgeons prefer extended fusions including the naviculo-cuneiform joint. Others believe that a triple arthrodesis is necessary for talocalcaneal realignment, however. Isolated fusion of the talonavicular joint is certainly the best option in terms of limiting the reduction of hindfoot mobility. However, standard techniques with screw fixation may not be able to withstand the remaining forces resulting from the external rotation of the talar head and adduction forces of the navicular, respectively. Therefore, we started to use, in addition to medial screw fixation, a lateral tension band technique to overcome these forces.

Surgical Technique
• Medial approach to the talonavicular joint and debridement
• Second lateral incision over the fractured navicular and removal of the fractured fragments
• Reduction using a tension-bending technique and fixation by staple (Uni-CP)
• Medial stabilization with 2 cannulated 5.5 mm screws
Casuistic

Ten feet (10 patients; 8 females, 2 males; age 63 ± 16.7 [range, 34-83] years) with advanced deformity of Müller-Weiss-Syndrome (3 Maceira’s stage III and 7 stage IV) were treated with isolated TN arthrodesis using the tension band technique. Standard angles were measured to determine the amount of correction achieved through the operative treatment. The minimum follow-up was 24 (range, 24-43) months.

Trabeculation was seen to cross the fusion site on radiographs in 8 patients after 2 and in 1 patient after 3 months. One case needed revision after 13 months due to implant failure; after additional screw fixation, bony healing was achieved 2 months later. At last follow-up, all cases described a high level of satisfaction. Postoperatively, the AOFAS score improved from 33 (range, 18-48) to 88.3 (range, 79-100) (P< .0001) points, the AP talocalcaneal angle increased from 14.2 (range, 1-22) to 22.7 (range, 12-30) degrees (P=.0007), and the calcaneal pitch increased from 10.3 (range, 3-22) to 14.7 (range, 8-22) degrees (P=.0006).

2. Subtaler and naviculo-cuneiform fusion for break-down of the medial arch

Acquired adult flatfoot deformity that is seen with increasing incidence, has been mostly attributed to posterior tibial tendon dysfunction. As, in this pathology, the peritalar joints have become unstable, the talar head moves typically medial- and plantarwards; whereas, the navicular is moving into abduction and supination, resulting in abduction and supination of forefoot. If the deformity has become rigid, triple or diple arthrodesis are advocated for successful treatment.

Most conflicting is, however, the situation where the acquired flatfoot deformity has its origin more distally due to break-down of medial arch. Posterior tibial tendon function may be preserved or not. Radiologically, a sagging in the naviculocuneiform or tarsometatarsal joint line can be seen. If this deformity is addressed by a triple or diple arthrodesis, the instability of these joints will not be addressed. In contrary, the hindfoot fusion may increase the load to these joints, which, in turn, may lead to further break-down of the arch. The inclusion of these joints into triple or diple arthrodesis will result in a tremendous stiffness of overall foot. We thus started with a new concept of combining a subtalar joint arthrodesis with an arthrodesis of naviculo-cuneiform joints.
Surgical Technique

- Medial approach to the naviculo-cuneiform, talonavicular and subtalar joints
- Opening / distracting the subtalar joint, and debridement
- Opening / distracting the naviculo-cuneiform I-III joints, and debridement
- Talocalcaneal realignment, and screw fixation of subtalar joint; if valgus left, adding a medial sliding osteotomy through an additional lateral approach
- Realignment of medial arch and screw fixation of navicular to cuneiform II, and cuneiform I to navicular; then, adding a medio-plantar tensioning plate

Case Report
**Casuistic**

Between June 2009 and May 2012, 28 surgeries in 26 patients (mean age 65.7 [44.1-80.4] years; females, 21; males, 5) with stage III PTT dysfunction were performed. All patients showed a hindfoot valgus alignment as well as a sagging at the level of the naviculocuneiform joint. Two patients underwent bilateral fusions, one of which the procedure was performed in a single stage. A medial sliding osteotomy of the calcaneus was necessary in 13 feet (46.4%) where neutral hindfoot alignment was not achieved solely by subtalar fusion. Intraoperatively, the PTT was found to be ruptured in 5 feet (17.8%), partially ruptured/elongated in 14 feet (50.0%), whereas it was intact in 9 feet (32.2%). The talonavicular coverage angle decreased from 37.4 to 23.4 degrees (p<0.001) in the axial plane, the lateral talus-first metatarsal angle increased from -23.3 to -11.0 degrees (p<0.001) and the calcaneal offset on the Saltzman view decreased from 16.2 to 1.1 mm (p<0.001).

**Conclusions**

The talonavicular joint remains a fascinating joint that needs to be better understood. Deformities that originate at talonavicular joint can obviously efficiently treated be fusion of the neighbor joints, e.g. the subtalar and naviculo-cuneiform joints; whereas, if the talonavicular joint is diseased, its isolated fusion in a correct position is capable to realign the neighboring joints.