Joint Sparing Surgical Options for Ankle Arthritis - What's the latest?

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1. Introduction

As 63% of the patients with ankle joint arthrosis present with a malaligned hindfoot, corrective osteotomies have gained increasing popularity for the treatment of early- and midstage arthrosis.

2. Aims of osteotomies

Hindfoot malalignment leads to a focal static and a dynamic overload within the ankle joint. Whilst standing, the center of force transmission is medialized in the varus ankle and lateralized in a valgus ankle. The forces within the joint are amplified by activation of the triceps surae: the Achilles tendon becomes an invertor in varus deformities and an evertor in valgus deformities. Subsequently the aims of a corrective osteotomy are to (1) realign the hindfoot, (2) transfer the ankle joint under the weight bearing axis and (3) normalize the direction of the force vector of the triceps surae.

3. Joint preserving procedure (JPS) or joint non-preserving?

- As the results of ankle arthroplasty are inferior to replacement of the other joints of the lower extremity, osteotomies of the foot and ankle may be used more aggressively than for example around the knee.

- There are no comparative studies between JPS and arthrodesis / ankle replacements.

- Advanced stages of arthrosis (Takakura stage IV) have been shown not to benefit from osteotomies only. However, both, ankle arthroplasty and ankle fusion, require a normally aligned hindfoot and a plantigrade foot. Therefore, alignment surgery may be indicated before arthroplasty.
Generally, corrective osteotomies are indicated in early and midstage asymmetric arthritis (medial / lateral or anterior / posterior), preserved range of motion in the joint and stable ligaments (consider ligament reconstruction).

**4. Influence of the subtalar joint**

The adjacent joints and, particularly, the subtalar (ST) joint may have a major influence on the evolution of ankle joint OA: As the ST joint allows for movement in the frontal plane, it may compensate for deformities. However, in case of instability it may aggravate the deformity and possibly accelerate degenerative wear.

Furthermore, specific configurations of the ST joint morphology in patients with asymmetric wear patterns of their ankle joint have been described. There are significant differences in the frontal plane orientation of the ST joint when comparing patients with varus / valgus type ankle joint arthritis with the healthy population. Furthermore, particularly patients with tilted ankle usually present with a flat surface of the ST joint which does only allow for a very limited amount of inversion / eversion.

**5. Technical annotations:**

The correction of the axis should be performed whenever possible in the center of rotation (CORA). That means, deformities above the ankle should be addressed by a supramalleolar osteotomy (SMOT), for those below the ankle an osteotomy of the calcaneus is recommended. However, in an unstable ST joint, the calcaneus osteotomy may lead to a paradox load shift in the ankle joint and may therefore fail to normalize the pressure distribution in the ankle joint.

Additional deforming forces resulting from unbalanced tendons (particularly the peroneal and the tibialis posterior tendon) and from the mid- and the forefoot (for example a plantarflexed first metatarsal) should be included in the preoperative planning.
6. Suggested Reading


2. Colin, F; Horn Lang, T; Zwicky, L; Hintermann, B; Knupp, M: Subtalar Joint Configuration on Weightbearing CT Scan. Foot & ankle international / American Orthopaedic Foot and Ankle Society [and] Swiss Foot and Ankle Society. 2014

3. Hayashi, K; Tanaka, Y; Kumai, T; Sugimoto, K; Takakura, Y: Correlation of compensatory alignment of the subtalar joint to the progression of primary osteoarthritis of the ankle. Foot & ankle international / American Orthopaedic Foot and Ankle Society [and] Swiss Foot and Ankle Society. 29: 400-406, 2008.


