MINI-SYMPOSIUM: SURGICAL RHEUMATOLOGY

(iii) The lower limb in the rheumatoid arthritis patient.
Focus on the hind, mid and forefoot and the ankle

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Abstract
Rheumatoid arthritis (RA) is a systemic disease which involves multiple joints. The primary target of RA is the synovial membrane. In 90% of RA patients symptoms related to the foot or ankle will eventually develop. Usually, symptoms appear in the toes and forefeet first, then in the hindfeet or the back of the feet, and finally in the ankles. The goal of any intervention on a RA patient is to improve functional ability and thus self-support of the patient, objective evaluation of the surgical procedure and its impact on the patient can be difficult. The potential chronic course of RA makes evaluation of a specific surgical procedure and its effect on the patient difficult to interpret. But it also implies that correct planning of the sequence of these procedures is important. The management of the RA patient requires a multidisciplinary approach. An overview of the different options at the forefoot, mid- and hindfoot and ankle joint are given.

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Introduction
Rheumatoid arthritis (RA) is the most common inflammatory joint disease, affecting about 1% of the population. It is more common in women than men. Treatments options are focussed on reduction of pain and improvement in mobility. The goal of any intervention on a RA patient is to improve functional ability and thus self-support of the patient. The potential chronic course of RA makes evaluation of a specific surgical procedure and its effect on the patient difficult to interpret. The management of the RA patient requires a multidisciplinary approach; the role of the surgeon is to improve functional ability for the patient by reconstructing a deteriorated joint by total joint arthroplasty (TJA). For the lower extremity, besides joint destruction treatment, correction of malalignment is also used either in conjunction with arthroplasties or in order to postpone TJA or even prevent it.

This implies that weight bearing radiographs of the knee, ankle, hindfoot and forefoot are essential for the planning of the different treatment options.

Indications for surgery
In the rheumatoid patient total hip and total knee arthroplasty are established procedures with excellent long-term results with respect to pain relief, quality of life.
and cost effectiveness. Although this paper will focus on ankle, hindfoot and forefoot surgery in the rheumatoid patient, the systemic character of the disease needs a broad approach, which has to include assessment of the hips and knees. Changes in any of the lower extremity joints will affect gait. The main goal of treatment is a stable comfortable weight-bearing foot. In general, if multiple joints are affected and if they all affect functionality, which is rare, the surgical preference list would be hindfoot, forefoot, ankle, hip, and then knee. A common combination is the valgus hindfoot, forefoot problems and valgus in the knee: correcting the first two might postpone knee prothesis surgery.

Pain location can be used as a basis for treatment options, especially in the less involved joints (i.e. Larsen I and II): A simple guide for pain location and pathology at the ankle and midfoot level is:

- Anterior: ankle joint.
- Medial: tibialis posterior tendon synovitis and talonavicular joint.
- Lateral: subtalar joint.

**Hindfoot pathology**

The subtalar joint is affected in 60% of RA patients, with the midfoot involved in 40–60%. Tibialis posterior synovitis and subsequent rupture will cause a cascade of deformities: valgus deformity of the hindfoot, instability of the tarsometatarsal joint, external rotation in the first metatarsal, and pronation of the hallux. Finally, a progressive abduction moment in the knee will result in a progressive valgus deformity in this joint. Treatment options are focussed on prevention of this cascade of events:

- Synovectomy of the tibialis posterior tendon.
- Talonavicular arthrodesis, if local arthritis and destruction of this joint predominates and a neutral to slight valgus alignment of the hindfoot. Due to this local arthrodesis, the subtalar movements are blocked as well (“the key that locks the door”), although this local arthrodesis is known for its high rate of non-union.
- Triple arthrodesis (subtalar, talonavicular and cuboid-calcaneal joint), in the presence of valgus ≥10°, and fixed rotational deformities in the midfoot (Fig. 1).

**Forefoot pathology**

The hand and foot are known to show the first symptoms of RA. The forefoot is affected in up to 90% of RA patients, and usually both feet are involved in different ways. The variation is due to differences in synovitis between various joints, as well as differences in weight bearing. The common picture (Fig. 2) involves dislocation of the metatarsalphalangeal (MTP) joints, a hallux valgus, a compensatory varus position of the fifth toe. The plantar fatpad is dislocated distally (underneath the toes) due to the dorsally and proximally dislocated proximal phalanges at the MTP level (Fig. 3). Consequently, the lesser toes claw, resulting in difficulties wearing shoes. The latter is usually the reason for patients seeking medical attention. However, by this time the disease process in the foot is well advanced, and few preventive measures are possible. Treatment options should aim to restore the contact of the toes (especially the plantar...
side of the hallux) with the ground. Such treatments include:

- Shoe adaptations, such as insoles with retrocapital support for the metatarsal heads.
- Surgical correction of forefoot deformities
  - Hallux valgus correction, by arthrodesis of the MTP-I joint or minimal resection of the proximal phalanx (e.g. Mayo procedure). A resection arthroplasty (i.e. Keller–Brandes procedure) is considered inferior in the RA forefoot.
  - Resection arthroplasty (i.e. oblique subcapital resection of the metatarsal heads). In the presence of plantar foot ulcers: debridement with resection and systemic antibiotics depending on culture.

Figure 3  Rheumatoid foot: subluxated MTP joints.

Figure 4  Mobile-bearing ankle prosthesis (Buechel Pappas) preoperative and postoperative.

Figure 5  Mobile-bearing ankle prosthesis (improved tibial fixation, CCI).

- Oblique metatarsal osteotomies and MTP I relocations (prerequisite: radiographic normal joints or only subluxated).

Ankle pathology

The standard surgical treatment for a severely painful and diseased ankle joint is arthrodesis. In general, an arthrodesis produces a painless and stable ankle at the expense of loss of motion. With longer follow-up there is an increased risk of the development of osteoarthritis in the joints of the ipsilateral foot and possible injury to the knee due to an increased extension movement at this joint. For a comfortable gait with an ankylosed ankle an altered motion of the ipsilateral knee and midtarsal joints is required. Total ankle replacement using a mobile-bearing prosthesis is a valid treatment option for the severely affected joint and an alternative to arthrodesis, with near normal kinematics of the ankle prosthesis, thus reducing the risk of secondary arthritic changes to the adjacent joints in the foot. The long-term results (10–16 years results) of a mobile ankle prosthesis show a mean survival of 88% with revision being the endpoint. Bone fixation of the tibial component can be improved (Figs. 4 and 5), as is suggested by a recent roentgen stereophotogrammetric analysis (RSA) study on micromotion of the tibial component. Although ankle prostheses show promising clinical results they cannot compete (yet) with the excellent long-term results of total hip and total knee prostheses.
Treatment options for ankle pathology:

- Ankle prosthesis, if ankle deformity is less than 10° valgus or varus. If the hindfoot deformity exceeds this, the valgus deformity should be corrected first (triple arthrodesis). The varus might be corrected in the same procedure with a medial malleolar osteotomy (Doets 2007).
- Ankle arthrodesis
  - For failed prosthesis.
  - Severe osteonecrosis of the talar dome.
  - Severe deformities of the hind and midfoot, without corrective possibilities.

Discussion

The goal of any intervention in an RA patient is to improve functional ability and thus self-support of the patient. Objective evaluation of the surgical procedure and its impact on the patient can be difficult. The potential chronic course of RA makes evaluation of a specific surgical procedure and its effect on the patient difficult to interpret. The management of the RA patient requires a multidisciplinary approach; the role of the surgeon is to improve the functional ability of the patient by planning preventive conservative but also surgical procedures. The goal is to keep the RA patient mobile with a minimum of surgical procedures with nevertheless a maximum effect on functionality. In the end, reconstruction of a deteriorated joint by TJA may be necessary. Even more so, the preoperative state of the joint/extremity determines the extent of postoperative functional gain. Thus, postponing TJA too long will give less functional benefit.

References