Introduction: For severe cases of osteoarthritis (OA), a degenerative joint disease, no effective disease modifying treatment is available. Joint distraction is a relatively new approach in the treatment of OA. During distraction there is no mechanical contact of the articular surfaces while intra-articular intermittent fluid pressure is maintained during walking. In addition, after distraction subchondral sclerosis diminished. In short term follow-up studies joint distraction as treatment for ankle and hip OA has been shown to be clinically beneficial. As recommended by Backwalter in the Lancet, we performed a long-term follow-up study with objective parameters of joint distraction in the treatment of ankle OA.

Patients and methods: Patients with severe ankle OA, who were considered for joint fusion (arthrodesis), were treated with joint distraction in an open prospective study (n = 57, mean age of 44 ±11yr). In addition, a randomized controlled trial was performed (n = 17, mean age of 44 ±10yr) to evaluate whether joint distraction had better outcome than debridement. Distraction (5 mm on radiographs) of the tibio-talar joint was carried out for 3 months during which full weight bearing was allowed. A standardized protocol including physical examination, assessment of pain, mobility and functional ability was used for evaluation. In addition, changes in radiographic joint space width (JSW) and subchondral sclerosis were measured, using “Ankle Images Digital Analysis” (AIDA’s), on standardized radiographs taken at UMC Utrecht (n=24 patients). To date in the open study, 38 patients have a follow-up of more than 1 year. Of these patients 27>2yr, 19>3yr, 10>4yr, 7>5yr, 6>6yr and 1>7years follow-up. The randomized study has a follow-up of 1 year.

Results: In the open prospective study, clinical benefit was obtained in more than 70% of the patients (n=38), the average score for function decreased by 38% (p<0.0001), the average score for pain improved by 69% (p<0.0001) and the average score for clinical condition increased by 120% (p<0.0001). At the same time joint mobility increased by 8% (ns).

Most interestingly, the improvement of parameters increased over time. E.g. at 3 years of follow-up (n=19), function and clinical condition were statistically significantly improved compared to the outcome at one year (+20%; p<0.03 and +43%, p<0.05, respectively). This progressive clinical benefit was maintained during the entire period of follow-up. Despite standardization, radiographs of only 17 out of 24 patients were suitable for evaluation. In 12 out of 17 patients (more than 70%) a joint space narrowing of more than 10%, on average 47.1 ±8.6%, existed in the affected joint before treatment when compared to the contralateral ankle joint. In these patients the average JSW increased by 17% (p<0.04) one year post-surgery. Also JSW improved over time: e.g. 3 years post-surgery JSW increased by an additional 10% (p<0.05) compared to the JSW at one year of follow-up. Subchondral sclerosis was found in 10 out of the 17 patients. One year post-surgery subchondral bone density decreased, on average, by 10% (p=0.003). Subchondral sclerosis remained diminished in the years of follow-up and improved over time (ns).

In the randomized controlled trial, joint distraction showed significantly better results than debridement for pain (p=0.03), function (p=0.04), and clinical condition (p<0.05). Radiographic structural changes were better after joint distraction than after debridement, although not statistically significant.

Conclusion: From the present results it can be concluded that joint distraction, in the case of severe ankle osteoarthritis may be a treatment of choice. The long-term efficacy of joint distraction in the treatment of severe ankle OA at relatively young age proves the concept of joint distraction in the treatment of OA. In the light of increased ageing, and the limited life span of the endoprosthesis, evaluation of joint distraction in the case of knee and hip OA is valid. Considering the high prevalence of OA and the lack of a remedy for this disorder, joint distraction as a treatment of severe OA may have great medical, social, and economic impact.

References

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Figure 1: Clinical results of joint distraction in an open prospective study. Average scores for pain, function, clinical condition, and mobility are given before treatment and yearly after treatment (the average for n=38 after 1 year, n=27 after 2 yrs., n=19 after 3 yrs., n=10 after 4 yrs., n=7 after 5yrs., n=6 after 6 yrs., and n=1 after 7 yrs.)

Figure 2: Changes in joint space width and subchondral sclerosis after joint distraction, assessed using AIDA. Values of the contralateral ankle, the affected ankle before treatment, and the affected ankle yearly after treatment are shown (the average for n=12 after 1 year, n=10 after 2 yrs., n=7 after 3 yrs., n=3 after 4 yrs., and n=2 after 5 yrs.).

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