

ISO-C 3D vs. Fluoroscopy basierte navigierte retrograde Anbohrungen der Osteochondrosis dissecans tali.

Iso-C 3D vs. Fluoroscopy based navigated retrograde Drilling of osteochondral Lesions

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Introduction

Osteochondral lesions on the talus are described as detachment of a cartilage fragment with or without participation of subchondral bone. The aim of the operative treatment of osteochondral lesions of talus stage I and II is the revascularisation of the defect. The difficulty of the operative treatment is the localisation of the lesion. Anterolateral lesions are accessible by arthroscopy treatment, but the handling of the dorsomedial lesions is much more difficult and often only reachable by an osteotomy of the medial malleolus. On the basis of a cadaver study the precision, radiation exposure and the operative set-up of Iso-C-3D- and fluoroscopy-based navigation was evaluated in this study.

Material and methods

On 14 anatomic specimen posteromedial lesions were created via medial malleolus osteotomy. Therefore a special sleeve of 4 mm diameter was created. As navigation system the Surgigate, Medivision, Oberdorf, Switzerland and an Optotrack 3020 optoelectronic localizer (Northern Digital Inc) was used. Set-up for the fluoroscopy-based navigated drillings: The module "C-arm" was utilised. Following 3 projections (a.p., lateral, oblique) were acquired with the navigated C-arm (Exposkop 8000®, Fa. Ziehm, Nürnberg). Set-up for the ISO C 3D - based navigated drillings: The Iso-C3D-C Siremobil® was utilised. With a rotation of 190° around the isocentre 100 single images were generated. This data set was transferred via Navi- Link®-interface (Fa. Siemens) to the navigation system in the mode of Iso-C-3D- navigation. As tool a 3.2 mm drill with a length 110 mm (Fa. Mathys, Bochum) was used. To analyse the precision after the navigated drilling an

Iso-C3D was obtained as well as a CT scan. Beyond it, the result was controlled macroscopically via medial malleolus osteotomy. The postoperative data set of ISO-C-3D and the CT was analysed in the DICOM viewer eFilm Workstation™ (Merge eFilm, Milwaukee, WI, USA). Both groups were compared with regard to operation time (min), radiation time (s) and precision.

Results

The radiation time of Iso-C-based navigation was significantly higher (ISO C 3D = 23 sec. [22-24 sec.]) than of fluoroscopy 14 sec. (11-17 sec.). It was possible to hit the lesion in 7 of 7 cases (100%) with the use of the Iso-C-3D on the contrary of fluoroscopy-based navigation, where only 5 of 7 (72%) lesions could be hit exactly. No difference was noticed relating to the methods of evaluation. Loosening of the reference base with the fixation pin could not be observed in any case.

Discussion

The usage of retrograde drillings as a minimal-invasiv treatment of osteochondral lesions of the talus is described as effective and sparing. The intraoperative identification of the lesion is quite difficult because of the anatomic shape of the talus and a narrow jointspace. Especially the frequently affected posteromedial lesion is hard to localise, so that incorrect drillings can often occur. The images generated by fluoroscope turned out to be insufficient. The localisation of the lesion was complicated. With the dataset of the Iso-C-3D Siremobil® (Siemens, Germany) the lesion was adjusted in multiplane layers and the trajectory planned without any problems. The intraoperative usage of Iso-C3D imaging for the immediate control after drilling is another advantage of this method. It is a moot question whether or not higher success rates can be attained with the use of Iso-C-3D based navigation compared to conventional methods. This will be evaluated in following clinical studies.