INTRODUCTION:
A well-known consequence of partial meniscectomy is the premature degenerative change of the articular cartilage in the knee joint. The objective of this study was to examine the influence of medial partial meniscectomy, as it is performed during the treatment of radial tears in the posterior horn of the medial meniscus, on maximum contact pressure, contact area and meniscal hoop strain in the lateral and medial knee compartments. Hence, the authors hypothesize that the meniscal load transmission function in both compartments of human knee joints is influenced by such a partial meniscectomy.

METHODS:
Ten cadaveric human knee joints (44.5 ± 15.5 yrs) were prepared for measurements of tibiofemoral contact pressure (CP\textsubscript{max}), mean contact area (CA) and meniscal hoop strains. To gain repeatable access to the posterior aspect of the medial meniscus a well-described osteotomy method\textsuperscript{1,2} was used. Bilateral measurements were carried out with intact meniscus and after partial posterior horn meniscectomy of 10 mm width and 20% and 50% depth, and finally full segmental resection (Fig.1). The tibiofemoral contact mechanics (CP\textsubscript{max}, CA) were measured using calibrated thin, flexible pressure sensors (K-Scan Type 4000, Tekscan Inc., South Boston, MA, USA). The hoop strains occurring at the meniscal horns were recorded using miniature strain transducers (DVRT-3, Microstrain Inc., Williston, VT, USA).

RESULTS:
CP\textsubscript{max} ranged between 1.5 and 2.0 MPa under an axial load of 500 N and between 2.7 and 3.2 MPa under 1000 N axial load (Fig.2). The flexion angle had no influence on CP\textsubscript{max}; 20% and 50% resection did not change CP\textsubscript{max} significantly (p > 0.03; p > 0.08). After 100% resection CP\textsubscript{max} significantly increased by 47% up to 68% depending on flexion angle and load case (p < 0.025). No effects of CP\textsubscript{max} for the lateral compartment were noted across all flexion angles and meniscus states. Increasing the load from 500 N to 1000 N increased CA significantly (p < 0.025). No significant differences were observed between the anterior and posterior horns and also not between the intact and the partially meniscectomized (20% and 50%) states. Only 100% segmental resection led to a significant decrease of hoop strain in the anteromedial horn (p = 0.025).

DISCUSSION:
In this work it could be shown that partial meniscectomy of 50% or lower resection depth of the posterior medial horn at a resection width of 10 mm, as it is typically carried out in case of radial tears, had no significant influence on CP\textsubscript{max}, CA and meniscal hoop strain in the medial and lateral knee joint compartments. Consequently the hypothesis, that the examined contact parameters and the meniscal strain in both, the medial and the lateral knee joint compartments are influenced by a partial medial meniscectomy could not be confirmed. In contrast, Lee et al. found significant changes of CP\textsubscript{max} already after a 50% depth partial meniscectomy in case of longitudinal tears, which requires the resection of a broader part of the meniscus\textsuperscript{2}. Hence, it seems likely that the increase of CP\textsubscript{max} caused by removal of meniscal tissue strongly depends on the resection width at a given resection depth.

SIGNIFICANCE:
From a biomechanical point of view, our in vitro study suggests that the medial joint compartment is not in danger of accelerated cartilage degeneration up to a resection limit of 50% meniscal depth at 10 mm width. This might have implications for the clinical indication of a wedge osteotomy, which is recommended after partial meniscectomy associated with varus malalignment and preexisting articular cartilage degeneration.

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