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**Biomechanical modeling and design optimization of cartilage myringoplasty using finite element analysis**

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**Purpose:** The purpose of this study was to determine the acoustic transfer characteristics of cartilage for optimal cartilage tympanoplasty.

**Material and methods:** Cartilage specimens of the tragus were obtained from fresh human cadavers and were investigated by means of an ear canal-tympanic membrane model. The parameters of tragus were determined by curve fitting and cross calibration to Zahnert's study. The cartilage plate was reconstructed for ear drum perforation to our 3-dimensional middle ear biomechanical model. The optimal thickness of cartilage tympanoplasty was calculated by using finite element analysis.

**Result:** Reducing cartilage thickness lead to an improvement of its acoustic transfer qualities. From an acoustic point of view, the 0.3-mm cartilage plate seems to be preferable compared with tympanic membrane vibration.

**Conclusion:** Tragal cartilage is useful for reconstruction of tympanic membrane from the perspective of acoustic properties. The acoustic transfer loss of cartilage can be reduced by decreasing its thickness. A thickness of 0.3 mm is regarded as a good compromise between sufficient mechanical stability and low acoustic transfer loss.