

论著

## 不同材料镫骨赈复体术后听力效果的有限元分析

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摘要

[摘要] 目的 探讨不同材料的镫骨赈复体对镫骨置换术后听力效果的影响。方法 根据复旦大学附属中山医院提供的人体正常耳CT扫描结果, 用自编软件将CT扫描数字化并导入PATRAN重建三维有限元模型, 应用动力学的传导振动原理, 对正常的听小骨结构进行动力数值计算分析, 并与目前已报道的试验结果对比。对同种置换方式下采用不同材料(不锈钢、钛合金、生物陶瓷)的镫骨赈复体所重建的听骨链结构进行动力数值计算分析, 并与正常的听骨链结构力学行为进行对比。结果 本文所建立的中耳三维有限元模型形态符合人体中耳, 由该模型计算所得频率响应曲线与新鲜颞骨测试所得频率响应曲线其大小及分布基本一致。钛合金材料的镫骨赈复体振幅和正常人体的镫骨底板振幅最为接近, 生物陶瓷次之, 而不锈钢镫骨赈复体最差。结论 采用钛合金镫骨赈复体术后听力恢复最好; 钛合金是一种理想的制作镫骨赈复体的材料。

关键词 [听小骨](#); [有限元](#); [赈复体](#); [手术效果](#); [材料](#)

分类号

## Finite element analysis of hearing improvement of the stapes protheses with different materials

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Abstract

Objective To evaluate the hearing improvement of the stapes protheses with different material. Methods The CT data of ossicular chain from Zhongshan Hospital of Fudan University were digitalized and imported into PATRAN( a world class commercial software ) to build a 3 dimensional finite element model (FEM). Then the normal ossicular model was analyzed based on dynamic transmitting vibration principles and the calculation results were evaluated and compared with the results of previous studies. The ossicle models reconstructed by the stapes protheses with different materials were analyzed based on dynamic transmitting vibration principles and compared with the normal ossicular chain. Results The ossicle 3D model established in the present study is in accord with biological structure of the human. The frequency reaction curves obtained by the model proposed in the present study agreed well with the fresh temporal bone ones. The amplitude of titanium alloys stapes protheses was almost the same as that of the normal ones, the second is bioceramics, the last is stainless steel. Conclusion The hearing improvement of the stapes protheses with titanium alloys is the best, titanium alloys is a desirable material for stapes protheses.

Key words [ossicle](#); [finite element method](#); [protheses](#); [surgery effect](#); [material](#)

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