

# The Study of Effects of Changes of the Elastic Modulus of the Materials Substitute to Human Hard Tissues on Mechanical State in the Implant-bone Interface by Three-dimensional Anisotropic Finite Element Analysis

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## Abstract

The aim of this research was to approach the effects that changes in the elastic modulus of materials substitute for human hard tissues had on the stress distribution in the bone surrounding the implant and the deviation of displacement of implant. In this research a three-dimensional anisotropic finite element analysis model of osseointegrated cylindrical implant in mandible was constructed through CT scanning. The results showed that in this model, the bone-implant case changes in the elastic modulus within 10000~400000M Pa of the materials resulted in much significant changes in magnitude of stress and displacement of implant. The results also showed that the smaller the elastic modulus, the less the magnitude of stress distribution on the condition that the pattern of dynamic and static loading direction were axial. As the magnitude of elastic modulus was within 27000~10000M Pa, the magnitude of stress distribution in level direction presented relatively lower value. The results suggest that the research of elastic modulus is a feasible method of evaluation of biomechanical compatibility of materials substitute for human hard tissues.

**Key words:** material substitute to human hard tissues    elastic modulus    implant    biomechanical compatibility  
three-dimensional finite element analysis

## · 方法介绍 ·

### 钳夹牵引治疗陈旧性颞下颌关节前脱位

况明才 叶 伟

陈旧性颞下颌关节前脱位, 由于纤维组织增生, 咀嚼肌痉挛, 手法复位难以奏效, 应以手术为主配合手法复位。我科采用下颌角下切口, 器械牵引治疗陈旧性颞下颌关节脱位, 收到明显效果, 介绍如下。

手术方法: 全麻下, 距双侧下颌角 1.5 cm 皮肤作长约 2 cm 横切口, 切开皮肤、皮下及颈阔肌, 注意识别和保护面神经下颌缘支。显露下颌角。适当分离内外侧骨面的咀嚼肌, 用柯克氏钳钳夹下颌角, 向下牵拉下颌骨。当髁状突低于关节结节平面时, 向后上方推动下颌骨髁状突可顺利滑入关节窝。复位成功后, 分层关闭颈部伤口。术后限制下颌运动 2 周。

近几年来, 第三军医大学大坪医院颌面外科共收治陈旧性颞下颌关节前脱位患者 6 例, 男 2 例, 女 4 例, 最大年龄 42 岁, 最小 30 岁。脱位时间最长 35 d, 最短 20 d。经外院多次手术复位未成功转来。全麻下采用双下颌角下切口, 钳夹下颌骨牵引复位, 术后颌间结扎限制下颌运动 2 周。全部患者痊愈出院, 无一例发生并发症。

该法操作简单易行, 切口较隐蔽, 创伤小, 具有不损伤关节周围正常解剖结构的优点。

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