Biomechanical analysis of the reconstruction method following total spondylectomy

2001 Fiscal Year Final Research Report Summary

Biomechanical analysis of the reconstruction method following total spondylectomy.

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一般

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Research Institution

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Research Abstract

Only a few studies have investigated the biomechanical properties of the reconstruction method following total spondylectomy for spinal malignant tumors. Biological bony fusion is required for the maintenance of spinal stability in patients with long-term life expectancy. The most recent reconstruction techniques include a titanium mesh cage filled with autologous bone as an anterior strut. The need of additional anterior instrumentation with posterior pedicle screws and rods in the reconstruction following total spondylectomy is controversial. It has been well defined, in previous studies, that biomechanical stress is necessary for bone remodeling and fusion. Therefore transmission of mechanical stress to the grafted bone inside the titanium mesh cage must be an important factor for fusion and remodeling. No published reports comparing the load-sharing properties of the different reconstruction methods fllowing total spondylectomy exist. The purpose of this finite element analysis was to compare the effect of two reconstruction methods, posterior instrumentation versus anterior/posterior instrumentation, on load sharing through a titanium mesh cage following total spondylectomy.
This experiment shows that from the viewpoint of stress-shielding, the reconstruction method using additional anterior instrumentation with posterior pedicle screws, stress shields the titanium cage to a greater degree than does the system using posterior prdicle screw fixation alone. A reconstruction method with no anterior fixation should provide adequate stress for remodeling of the bone graft inside the titanium mesh cages.

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