An experimental study on the influence of spinal shortening on the spinal cord

2000 Fiscal Year Final Research Report Summary

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Research Project

Project/Area Number

11671425

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Orthopaedic surgery

Research Institution

kanazawa University

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Keywords

total spondylectomy / spinal shortening / spinal reconstruction

Research Abstract

Spinal column shortening is one of the effective modality in reconstruction of total spondylectomy. We studied morphometric and physiologic changes of the spinal cord in spinal column shortening using animal models.
[Methods] Total spondylectomy of T12 was performed after 2 above and 2 below spinal instrumentation in 16 dogs. Spinal column was gradually shortened until the lower endplate of the T11 contacted onto the L1 upper endplate (maximum of 20 mm).
[Results] The dural sac and the spinal cord did not change their shapes until 8 mm (44%) shortening. From 8 mm to 11.5 mm (64%) shortening, the dural sac was

deformed like an accordion while the spinal cord maintained its shape. In more than 11.5 mm shortening, the dural sac buckled and became like spanworm, and the spinal cord was compressed by the buckled dura in its concave side. In the spinal cord evoked potentials study, no significant changes could be seen until 11.5 mm shortening, but augmentation of amplitude was recorded at more than 11.5 mm shortening. At 20 mm (100%) shortening, positive going potentials were seen at the level of upper endplate of the L1 vertebra.
[Conclusion] The morphometric change of the spinal cord and the dural sac in association with spinal column shortening can be characterized in three phases ; (phase 1) no deformity of the dural sac and the spinal cord, (phase 2) shrinking and buckling of the dural sac, (phase 3) spinal cord deformity and compression by the buckled dura. The phase 1 is the safety range of for the spinal cord. The phase 2 is the warning range, and the phase 3 is the critical range.

Research Products (7 results)

All | Other

All | Publications

[Publications] 富田勝郎: "Surgical Strategy for Spinal Metastases"Spine. 26(3). 298-306 (2001)

[Publications] 川原範夫: "Closing-Opening Wedge Osteotomy to Correct Angular Kyphotic Deformity by a Single Posterior Approach"Spine. 26(4). 391-402 (2001)

[Publications] 川原範夫: "胸椎角状後弯症に対する骨切り矯正術"臨床整形外科. 34(4). 479-487 (1999)

[Publications] 川原範夫: "脊椎後変症に対する矯正骨切り術"中部整形外科災害外科学会雑誌. 41(2). 401-402 (1998)

[Publications] 小林忠美: "Titanium cageを応用した脊椎全摘術後の胸・腰椎再建術"脊椎脊髄ジャーナル. 11(9). 823-827 (1998)

[Publications] Katsuro Tomita: "Surgical Strategy for Spianal Metastes"Spine. 26(3). 298-306 (2001)

[Publications] Norio Kawahara: "Closing-Opening Wedge Osteotomy to Correct Angular Kyphotic Deformity by a Single Posterior Approach"Spine. 26(4). 391-402 (2001)