Hinge fracture

Open-door laminoplasty is a classical decompression method used to treat cervical spondylotic myelopathy. However, hinge fracture displacement (HFD) is a commonly occurrence during this procedure. The current study aimed to investigate the safety and efficacy of a combined imbrication axle reconstruction and Z-type titanium plate fixation method for HFD during open-door laminoplasty.

Patients and methods: Intotal, 617 patients with cervical spondylotic myelopathy who underwent C3-7 open-door laminoplasty from March 2015 to October 2018 were included in this retrospective study. In total, 73 patients developed HFD during surgery. Of them, 43 underwent combined imbrication axle reconstruction and Z-type titanium plate fixation (IRZF group) and 30 underwent traditional titanium plate fixation (TF group). Data such as the operative time, intraoperative blood loss volume, and distribution of fractured hinges were recorded. Both groups were compared in terms of improvement in neurological function, cervical curvature index, hinge fusion rate, incidence of C5 palsy, severity of axial symptoms, and development of complications.

Results: The figure of operative time and intraoperative blood loss in the IRZF group was slightly higher than the TF group, but the differences were not significant ($P > 0.05$). Further, there was no significant difference between the groups in terms the number of fractured segments and distribution of fractured hinges ($P > 0.05$). The cervical curvature index did not decline in the two groups ($P > 0.05$). The IRZF group had a higher hinge fusion rate than the TF group at 3 (79.6% vs. 57.1%) and 12 (93.9% vs. 74.3%) months postoperatively ($P < 0.05$). There was no significant difference in the incidence of C5 palsy between the two groups (9.3% vs. 6.7%) ($P > 0.05$). However, the TF group had more severe axial symptoms than the IRZF group ($P < 0.05$). The neurological function of the two groups increased postoperatively as per the Japanese Orthopaedic Association scoring system ($P < 0.05$). Nevertheless, there was no significant difference in terms of neurological function at any observational time points ($P > 0.05$). One patient in the TF group with hinge nonunion underwent laminectomy due to lamina displacement into the spinal canal and nerve root compression.

Conclusion: In patients with HFD, IRZF facilitates more intimate contact between the lamina and the lateral mass and therefore, achieves fractured hinge fusion without additional surgical trauma. This technical improvement can significantly promote neurological recovery, decrease the severity of axial symptoms, and prevent the development of spinal cord or nerve root re-compression [1].

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Liu FJ, Li N, Chai Y, Ding XK, Yang H, Li PF. Safety and efficacy of combined imbrication axle reconstruction and Z-type titanium plate fixation for hinge fracture displacement during open-door laminoplasty. J Neurol Surg A Cent Eur Neurosurg. 2022 Dec 8. doi: 10.1055/a-1995-1598. Epub ahead of print. PMID: 36482005.