

Cervical lift-up laminoplasty

Although reconstructive [cervical laminoplasty](#) is commonly performed after resection of spinal [intramedullary tumors](#) of the [cervical spine](#), its biomechanical rigidity of laminoplasty framework remains unclear. The objective of this study was to examine the structural reliability of a unique method of cervical lift-up basket laminoplasty by using computed tomography (CT)-based finite element analysis (FEA) and clinical radiological evaluation. A finite element model of cervical laminoplasty was created based on CT images using FEA software. Cervical lift-up basket laminoplasty (Basket) was compared with the standard style of open-door basket laminoplasty (Open-door). Clinical subjects for radiological evaluation comprised 33 patients who underwent cervical lift-up basket laminoplasty after resection of spinal intramedullary tumors. An FEA-equivalent stress histogram showed that stress was moderately dispersed around the basket. Virtual displacement of the spinous process of the Basket model was equivalent to that of the Open-door model in any direction of posterior-to-anterior, right-to-left, or top-to-bottom force. In the clinical analysis, radiological data with a minimum postoperative period of 6 months were obtained in a total of 28 out of 33 patients. No patients underwent revision surgery because of implant-related complications. No significant differences in C2-C7 angle or cervical tilt angle were observed between pre- and postoperatively. The structural rigidity of cervical lift-up basket laminoplasty was equivalent to the open-door style on the FEA. Clinical radiological evaluation suggested that there were no serious adverse events associated with cervical laminoplasty, although the longer postoperative follow-up is mandatory. ¹⁾

Performing cervical laminoplasty after wide laminectomy may be technically demanding. The unique technique of cervical lift-up laminoplasty using titanium basket plates was applied for the reconstruction of cervical laminae after wide laminectomy for the resection of intradural tumors.

Materials and methods: This technical study included 14 cases that could be followed periodically for at least 6 months after surgery. Participants were 8 male and 6 female, with a mean age of 41.6 years (range, 13-71 years). Tumors were intramedullary in 11 cases and extramedullary in 3 cases. After resection of intradural tumors, custom-designed titanium baskets were fitted to expand the spinal canal. Combining baskets of different sizes are also possible for each side at one level. A mixture of hydroxyapatite granules and collagen was packed into the basket. The reconstructed posterior laminae were secured using titanium mini plates. The fascia of the paravertebral muscles was sutured to the spino-ligamentous complex to further stabilize the posterior elements of the cervical spine.

Results: No wounds or implant problems requiring revision surgery were recognized. Imaging analysis demonstrated no significant change in C2-C7 angle cervical range of motion between before and after surgery, suggesting sequential spinal stability at the base of the laminae.

Conclusions: This technical note suggests that cervical lift-up laminoplasty with titanium basket plates appears practical and useful as a procedure to reconstruct cervical laminae after wide laminectomy.

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Naito K, Nakanishi Y, Takami T. Cervical Lift-up Basket Laminoplasty after Resection of Spinal Intramedullary Tumors: A Finite Element Analysis and Clinical Image Evaluation. *Neurol Med Chir* (Tokyo). 2022 Sep 30. doi: 10.2176/jns-nmc.2022-0172. Epub ahead of print. PMID: 36184479.

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Shirosaka K, Naito K, Yamagata T, Yoshimura M, Ohata K, Takami T. [Cervical lift-up laminoplasty](#) with

titanium basket plates after resection of intradural tumor. J Craniovertebr Junction Spine. 2018 Jan-Mar;9(1):26-31. doi: 10.4103/jcvjs.JCVJS_127_17. PubMed PMID: 29755233; PubMed Central PMCID: PMC5934960.

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