ID Design Press, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2019 Feb 28; 7(4):603-605.
https://doi.org/10.3889/oamjms.2019.106
eISSN: 1857-9655
Case Report

Single - Door Cervical Laminoplasty Using Basket Laminoplasty Device: A Case Report

Tjokorda GB Mahadewa[1*], Dewa PW Wardhana[1], Sri Maliawan[1], Junichi Mizuno[2], I Putu Eka Widyadharma[3]

[1]Neurosurgery Department, Faculty of Medicine, Udayana University, Bali, Indonesia; [2]Shin Yurigaoka Hospital, Tokyo, Japan; [3]Neurology Department, Faculty of Medicine, Udayana University, Bali, Indonesia

Citation: Mahadewa TGB, Wardhana DPW, Maliawan S, Mizuno J, Widyadharma IPE. Single - Door Cervical Laminoplasty Using Basket Laminoplasty Device: A Case Report. Open Access Maced J Med Sci. 2019 Feb 28; 7(4):603-605. https://doi.org/10.3889/oamjms.2019.106

Keywords: OPLL; Single door cervical laminoplasty; Basket laminoplasty device

***Correspondence:** Tjokorda GB Mahadewa. Neurosurgery Department, Faculty of Medicine, Udayana University, Bali, Indonesia. E-mail: tjokmahadewa@hotmail.com

Received: 08-Dec-2018; **Revised:** 08-Jan-2019; **Accepted:** 26-Jan-2019; **Online first:** 21-Feb-2019

Funding: This research did not receive any financial support

Competing Interests: The authors have declared that no competing interests exist

Abstract

BACKGROUND: The management of the cervical canal stenosis as a result of ossification of the posterior longitudinal ligament (OPLL) is still evolving. Anterior and posterior approaches are still much in demand by the surgeons. In Japan, a posterior approach is more well-known to be used as the case OPLL is often on the populace. Single-door laminoplasty technique or “Hirabayashi” often used with either autograft or allograft, with or without an additional miniplate.

CASE PRESENTATION: In this case report, we would like to report the treatment of tetraparesis patients with “basket laminoplasty” using a special device with some advantages, not only providing stability of the lamina but also at the same time providing bone-graft container/basket for the benefit of the patient's bone fusion.

CONCLUSION: Basket laminoplasty device is an excellent choice for cervical OPLL. We believe the use of this device is very favourable for long-term patient outcome.

Introduction

Cervical root syndrome problems, such as cervical disc herniation and spondylosis including OPLL, often occur as one of the causes of cervical myelopathy. Because the result of conservative treatment in OPLL is unpromising, surgical treatment is selected in most cases [1]. The surgical management of OPLL is still in debate, whether it is better dealt with the anterior approach, posterior approach, or the combination of both.

It was agreed among experts that for a single-level spinal OPLL without canal stenosis, the anterior procedure is a better option, while in multi-level canal stenosis OPLL laminoplasty procedure can further facilitate the use of adequate decompression [2], [3], [4]. We reported a case of a patient who was successfully treated by open-door basket laminoplasty devices.

Case Presentation

A 65 years-old male presented with a history of weakness and numbness that were started from the legs. He also complained about stiffness and pain in his neck for two years. They were followed by arm weakness, especially at the left side. Sagittal and axial T2WI MRI revealed edema of the spinal cord and hyperintensity changes on C4-6 due to spinal canal compression by OPLL (Figure 1). On myelogram, there was a blockage of cerebrospinal fluid (CSF) flowed at the level C4-6 (Figure 2).

Further neurological findings were grade I-III tetraparesis and hypoesthesia of the arms and legs with increased deep reflexes. No history of trauma was documented. He received conservative management from a neurologist, but he considered himself not improved. He was then planned for a surgical decompression by the laminoplasty procedure.

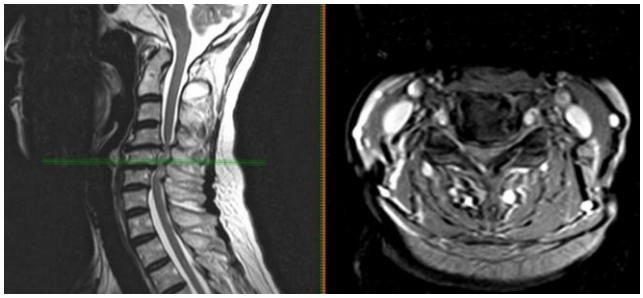

Figure 1: MRT2WI shows significant cord compression and intramedullary hyperintensity changes

A cervical midline skin incision was made from C2 spinous processes until C7. After the automatic retractor was placed, we discovered hypertrophic facet joints on C4-6, and C3-C7 lamina was exposed. The bone gutter of the medial border of the facets was made from C4-C6 both sides by using a high-speed drill.

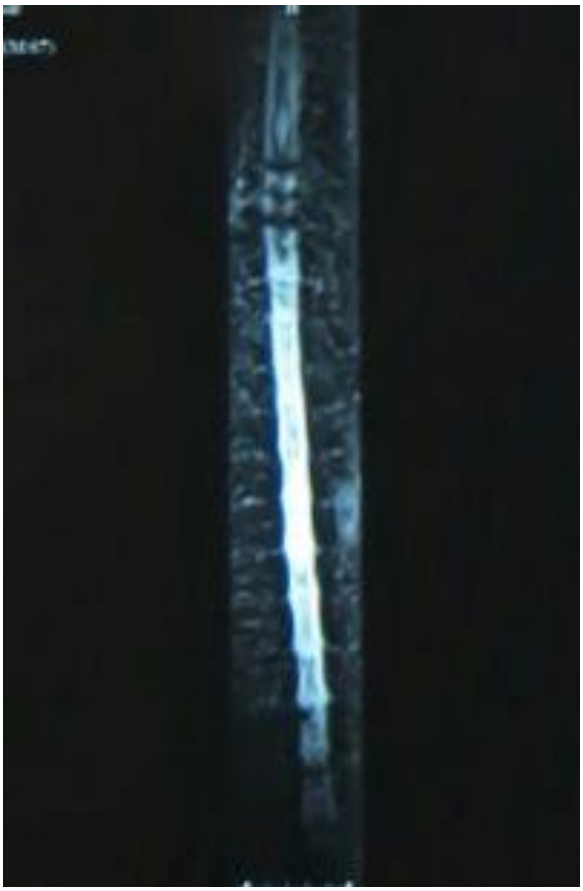

Figure 2: MR myelogram showed CSF blockage from C4-6 levels

By preserving the inner cortex of the lamina, we opened the lamina door gently from C4-C6 and basket laminoplasty devices were placed to maintain the door opening about 10 mm with titanium screws (1.5 mm in diameter, and 5 mm length) on the facet and lamina side (Figure 3). At this stage, the dural pulsation was observed, and after completing homeostasis a drainage tube size 10.0 was placed, an osteoligament reconstruction was done, and fascia-skin was closed by sutures. The patient was bed-rested for 3 days after the procedure, and with gradual ambulation, he was started mobilisation using a collar brace for 3 months.

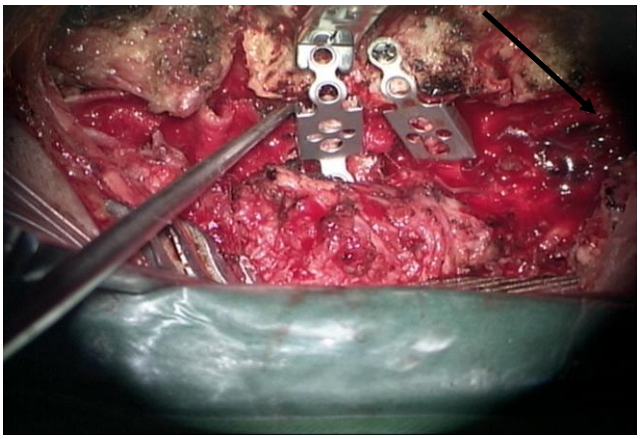

Figure 3: Intraoperative view of basket laminoplasty devices (arrow)

The patient made a good recovery. Motor paralysis improved remarkably, and gait disturbances were reduced. Upon discharge, the patient was able to sit using a wheel-chair and move all extremities against gravitational force. He continued the rehabilitation program for 6 months where he managed to get a partial resolution of his neurological deficits. A follow-up CT Scan was taken one month after the surgery, that revealed satisfactory implants position and sagittal balance of the neck segments (Figure 4).

Figure 4: CT Scan revealed acceptable space for the cord and neck spine alignment

Discussion

Hirabayashi first described a technique of expansive open-door laminoplasty in 1991 [3]. In the beginning, a thread was used to hold the lamina of the spinous processes. But lately, various forms of spacers were available, although some surgeons still not confident to use them and some still use autograft [4], [5], [6], [8]. The tendency to use mini-plates or hydroxyapatite spacer to maintain the opened side have emerged, with 53.1% of the studies reported the use of mini-plates or hydroxyapatite spacer. The use of this hardware did not give a negative effect on the outcomes (p = 0.196) [5], [7]. Most of the previous studies failed to present sufficient data to conclude the pre and postoperative occurrence of post-laminoplasty kyphosis.[7-10] The use of spacers or miniplate does not affect significantly (p = 0.889) in spinal deformities or the neurological outcomes [5], [6].

Surgeons are still faced with some options regarding this procedure: using mini-plate without material for bone fusion, using materials such as hydroxyapatite bone-fusion, or using autograft with or without miniplate [6], [8]. Because of these choices, it is necessary to choose one device that is capable of carrying all the advantages stated above, easy to install, affordable, not adding foreign substances to the patient, ensuring bone fusion, sufficient to stabilise, not causing deformities, and does not cause neurologic deficits.

Basket system allows for the bone graft to be held in place, which maximises the speed of bone fusion. Screw placement is simpler than conventional miniplate because the basket is holding the lamina during the procedure. The results of pure titanium are faster osseointegration and lower artefacts. The unique shape of the laminoplasty basket is holding lamina properly and prevent itself from falling into the spinal canal.

In short, the device can provide all of the conditions stated above. Now the device has been used widely especially in Japan which does have many cases of cervical OPLL. To our best knowledge, our case was the first case outside Japan where this device was used. In terms of placing the device, we found it fairly easy in installation with no additional tools needed to place it.

In conclusion, basket laminoplasty device is an excellent choice for cervical OPLL. We believe the use of this device is very favourable for long-term patient outcome.

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