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ORIGINAL ARTICLE

The clinical outcome of lateral mass fixation after decompressive laminectomy in cervical spondylotic myelopathy

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KEYWORDS

Lateral mass fixation;
Subaxial cervical spine;
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Abstract Lateral mass cervical fixation is the technique of choice for posterior cervical stabilization of the lower cervical spine in the cases of cervical spondylotic myelopathy. It is used for patients who had extensive, multiple-level laminectomies with reversed cervical lordosis.

Objective: The aim of this study was to evaluate the outcome of decompressive laminectomy of cervical spondylotic myelopathy with lateral mass fixation compared with decompressive laminectomy only without fixation.

Patients and methods: The study was conducted on 32 patients operated for cervical decompressive laminectomy with lateral mass fixation using polyaxial screws and rods at different levels of the subaxial cervical spine named group I, compared with 30 patients operated for cervical decompressive laminectomy only without lateral mass fixation named group II.

Results: Group I comprised 22 males (68.8%) and 10 females (31.2%), the age ranged from 36 to 63 years. Group II comprised 18 males (60%) and 12 females (40%), the age ranged from 40 to 66 years with a mean of 51 ± 7.73. In group I, the mean operative time was 110 ± 14.16 min, the mean hospital stay was 4 ± 1.76 days and the mean blood loss was 480 ± 193.04 ml. In group II, the mean operative time was 75 ± 24.38 min, the mean hospital stay was 3 ± 1.57 days, and the mean blood loss was 220 ± 111.22 ml. There was a clinically significant difference as regards neck pain and brachialgia. In group I, neck pain improved in 68.8% and brachialgia improved in 83.3% but in group II, neck pain improved in 46.7% and brachialgia improved in 61.5%. Myelopathy and sphincteric disturbance showed clinical improvement but without clinically significant difference of both groups.

Conclusions: Lateral mass fixation of the cervical spine after cervical laminectomy is safe and reliable with few complications. It also improves neck pain and brachialgia.

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1. Introduction

Lateral mass cervical fixation is the technique of choice for posterior cervical stabilization for treating instability of the lower cervical spine after extensive multiple-level cervical laminectomies with reversed lordosis.[2,14] It is safe and reliable, but it is difficult to be used in patients with abnormal cervical anatomy as it may lead to injury of the spinal nerves or the vertebral arteries during the insertion of lateral mass screws.[2,22] Roy-Camille was the first to insert screws into the lateral mass of the cervical spine in 1964 in France followed by Louis and Magerl in Switzerland.[15,17]

There are many different techniques of posterior cervical fixation as posterior wiring,[3] Halifax clamps,[1] posterior plate and screws,[9] and finally fixation using polyaxial screws and rods .[23] Wiring is rarely used as it is used only if the lamina and spinous process of the posterior element of the subaxial spine are intact and it could not be used in cases where laminectomies have been required for the decompression or exposure of target lesions.[3,12] The main disadvantage of wiring is that it provides less fixation strength in comparison with other rigid instrumentations.[3] Halifax clamps may provide better fixation strength than wiring but are still not optimal.[1] Lateral mass screws with plate fixation require precise contour tailoring for each patient and are thus extremely difficult for practical application.[9] Recently, the technique of using polyaxial screws in conjunction with rod systems for the fixation of the lateral mass was greatly increased as it can avoid the above-mentioned disadvantages.[16–19]

2. Patients and methods

The study was conducted on 2 groups. 32 patients operated for cervical decompressive laminectomy with lateral mass fixation using the modified Magerl technique at various levels from C3 to C7 according to the patient's requirements named group I, compared with another 30 patients operated for cervical decompressive laminectomy only without lateral mass fixation named group II. All the patients were operated in the Neurosurgery Department of the Main Alexandria University Hospital and the classification of the patients into group I and group II was random and the 2 groups were nearly the same as regards the clinical presentations, the cord signal, and the number of levels affected. Informed consent was obtained from all the patients before study.

All the patients were operated in prone position with the head slightly flexed. Posterior midline approach was done followed by dissection of the paravertebral muscles with exposure of the lamina extending from C1 to C7. In group I the dissection extended laterally till full exposure of the lateral mass and facets. The lateral border of each lateral mass was dissected which is a very important step for placing of the screws. The screws were placed into lateral mass of the affected levels of the subaxial cervical spine before laminectomies so that the bony landmarks can be used for better orientation. The entry point of the screw was identified 2 mm inferior and 2 mm medial to the center of the lateral mass using a high speed drill with a trajectory 30 mm lateral and 30–45 mm superior more or less parallel to the spinous process. The spinous processes should be fixed during the process of drilling and screw placement. Fluoroscopy was not necessary during the placement of the screws, but required whenever we felt not confident enough or after the screws were inserted. The patient then underwent laminectomy for decompression, then the rod was inserted and the screw nuts were tightened. Finally the posterior lateral aspects of the lateral mass and the facet joint underwent decortication for bony fusion using bone grafts. Drainage catheters were placed before the closure of the wound.

The patients were followed up for at least 6 months. Plain X-ray cervical spine was done in AP and lateral study before discharge from the hospital and at 2 months interval later on. The patients were recommended to wear hard cervical collar for at least 6 weeks postoperative, bony fusion recorded within this period of follow up.

3. Results

The 2 groups were operated, group I comprised 32 patients (100%) operated with decompressive laminectomy with lateral mass fixation. It comprised 22 males (68.8%) and 10 females (31.2%), the age ranged from 36 to 63 years with a mean of 48.0 ± 8.68. Group II comprised 30 patients (100%) operated upon by decompressive laminectomy only without fixation, it comprised 18 males (60%) and 12 females (40%), the age ranged from 40 to 66 years with a mean of 51 ± 7.73 (Table 1).

In group I, neck pain was the most commonly present in all the 32 patients (100%) followed by brachialgia in 18 patients (56.3%). Myelopathy was present in 26 patients (81.3%) according to the JOA-score, grade 1 myelopathy in 16 patients (61.6%), grade 2 myelopathy in 7 patients (26.9%) and only 3 patients (11.5%) with grade 3 myelopathy. Sphincteric disturbance was present in 11 patients (34.4%). In group II, neck pain was present in 30 patients (100%) followed by brachialgia in 26 patients (86.7%). Myelopathy was present in 28 patients (93.3%), grade 1 myelopathy in 10 patients (35.7%), grade 2 myelopathy in 14 patients (50%) and 4 patients (14.3%) with grade 3 myelopathy. Sphincteric disturbance was present in 10 patients (33.3%) (Table 2).

In group I, the operative time ranged from 90 to 140 min with a mean of 110 ± 14.16 min, the hospital stay ranged from 2 to 7 days with a mean of 4 ± 1.76 days and the blood loss ranged from 250 to 800 ml with a mean of 480 ± 193.04 ml. In group II, the operative time ranged from 45 to 120 min with a mean of 75 ± 24.38 min, the hospital stay ranged from 1 to 6 days with a mean of 3 ± 1.57 days and the blood loss ranged from 100 to 450 ml with a mean of 220 ± 111.22 ml (Table 3).

In group I, 18 patients (56.3%) were operated from C3 to C6 levels followed by C3–7 in 8 patients (25%), 4 patients (12.5%) from C4 to C7 and lastly 2 patients (6.2%) from C4 to C6 (Table 4).

A total of 268 screws were used most of them (252 screws)(94%) were 3.5 mm in thickness and 16 screws (6%) were 4 mm as revision screws. 6 screws were used in 2 patients (6.3%), 8 screws were used in 22 patients (68.7%), and 10 screws were used in 8 patients (25%). The length of screws varied from patient to patient and according to the level of fixation we found that 14 screws (5.2%) were 12 mm in length, 70 screws (26.1) 14 mm, 160 screws (59.7%) 16 mm and finally 24 screws (9%) 18 mm (Table 5).

As regards the complications, we found no recorded cases of spinal cord injury or spinal nerve root injury in both groups. In group I screw pullout occurred in 4 screws of 268 screws