

Surgical Outcome of Posterior Cervical Foramenotomy

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ABSTRACT

Objective: Objective of the study was to evaluate the surgical outcome of posterior foraminotomy in patients with cervical spondylotic radicular symptoms.

Material and Methods: This descriptive observational study was conducted at the department of neurosurgery lady reading hospital Peshawar from July 2012 to June 2018 (6 years). The author has personal experience of 29 patients during the study period. All consecutive patients who underwent posterior cervical foraminotomy for cervical spondylotic radiculopathy included in the study, irrespective of their age and gender. After approval from the hospital ethical committee, informed consent was taken from patients or their relatives. The patients were followed up improvement of symptoms and post-operative complications. The data was entered in a specially designed Performa. Patients' data was analyzed using SPSS version 21.

Results: We had total 29 patients during the study period who full fill the inclusion criteria. Most (65.5%) of our patients were men. Age of the patients ranged from 23-66 years with the mean age of 44.5% year. The most common level involved was C6-7 (41.4%) followed by C5-6 (37.9%). The most common operative indications for cervical radiculopathy was lateral soft disc herniation followed by osteophyte formation and foraminal stenosis. Post operatively arm pain relieved in almost all patients. Pins and needles, improved in 79.3% cases. Post-operatively neck pain and superficial wound infection was observed each in one (3.4%) case. One of our patients improved initially, but after 2 months had recurrent of symptoms and needed anterior cervical discectomy.

Conclusion: We conclude from our study that cervical spondylotic radiculopathy patients respond well to posterior cervical foraminotomy. This procedure is having an acceptable complication rate. This is an effective and safe procedure. This approach can be an alternative treatment choice in patients with cervical radiculopathy secondary to lateral disc herniation, and or foraminal stenosis.

Keywords: Cervical spondylosis, radiculopathy, foraminotomy, cervical disc herniation, foraminal stenosis.

INTRODUCTION

Mechanical compression of a cervical nerve root due to disc herniation, osteophyte or foraminal stenosis resulting in sensory or motor deficit is called degenerative or spondylotic cervical radiculopathy. Cervical radiculopathy is a potentially disabling disease affecting quality of life.^{1,2} Treatment options for cervical spondylotic radiculopathy are anterior and posterior approaches.^{1,2,3}

The most popular anterior approach is an anterior cervical discectomy and fusion (ACDF) and the recommended posterior approach is posterior cervical

foraminotomy (PCF)⁴. Anterior discectomy popularized after it was 1st introduced by Cloward in 1958.⁵⁻⁷ However, in the anterior approach, there are chances of damage to vital structures (as trachea, esophagus, and carotid artery), loss of motion segment, increase chances of adjacent level degeneration and complications related to the graft (failure, displacement, donor site pain /infection).^{2,8-2}

In comparison the posterior cervical foraminotomy for cervical radiculopathy was introduced by Scoville and Spurling in 1946.^{2,5,13} Posterior cervical foraminotomy is an attractive treatment option in

selected number of patients with cervical radiculopathy. This procedure has the benefit of maintaining range of movement of the spine, minimizes the chances of adjacent level degeneration and early return to work.

MATERIALS AND METHODS

This descriptive observational study was conducted at the department of neurosurgery lady reading hospital Peshawar from July 2012 to June 2018 (6 years). The author has personal experience of 29 patients during the study period. All consecutive patients who undergone posterior cervical foraminotomy for cervical spondylotic radiculopathy during the study period were included in the study, irrespective of their age and gender. We excluded patients with recurrent cervical radiculopathy, cervical radiculopathy with causes other than degenerative reasons, those treated conservatively or operated through anterior approach. We also excluded patients with spondylotic radiculopathy but had central disc, Kyphotic deformity or unstable spine.

After approval from the hospital ethical committee informed consent was taken from patients or their relatives. Medical record of the patients was analyzed for demographic data, clinical features, neuroimaging, treatment, and outcome (improvement in symptomatology and complications). Magnetic resonant imaging was done in patients to confirm the diagnosis of cervical radiculopathy and Computed tomography scan was done to confirm the cause of radiculopathy (as foraminal stenosis, osteophyte or lateral disc herniation). Plain x-ray was done to see the spine alignment, disc space height and Kyphotic deformity. Nerve conduction study (NCS) and electromyography (EMG) was done in some cases to confirm the level causing symptoms if more than one level was involved. The data was entered in a specially designed Performa. Patients' data was analyzed using SPSS version 21.

RESULTS

We had total 29 patients during the study periods. The age of the patients were in between 23-66 years with the mean age of 44.5 years. In our study, 65.5% (19/29) were male and the rest were female. Other results are:

Clinical Features: As given in table 1.

Table 1: *Clinical symptoms.*

Clinical Features	Number of Patients	% age
Arm pain	29	100%
Neck pain	14	48.3%
Motor weakness	02	6.9%
Pins and needles	29	100%

Cause of Radiculopathy: Given in table 2.

Table 2: *Cause of cervical radiculopathy.*

Cause	Number of Cases	% age
Lateral soft disc herniation	15	51.7%
Foramen stenosis	8	27.6%
Osteophyte formation	6	20.7%
Total	29	100%

Post-operative Improvement: Given in table 3.

Table 3: *Improvement.*

Symptom/sign	No of Patients who Improved	% age
Arm pain	29	100%
Pins/needles	23	79.3%
Motor weakness	2 (n=3)	66.6%

Post-operative Complications: Given in Table 4:

Table 4: *Complications.*

Complications	No of Patients	% age
New Neck pain	1	3.4%
Superficial Wound infection	1	3.4%
Reoperation	1	3.4%
Segmental instability/kyphosis	1	3.4%

DISCUSSION

The degenerative changes in the spine are more common in middle to old age men. This has been

reported in various studies. In a study of 34 cases male were 26 and female 8 patients and their age range was 36-68 years with the mean age of 53.6 years.² Another study also reported that cervical degenerative radiculopathy is common in men (54.3%) and the age range is 34 – 66 years.¹⁵ We have almost the same results in our study, we had 65.5% men and the mean age was 44.5 years (23-66 years).

The indications of surgery in patients with cervical radiculopathy are foraminal stenosis, lateral intervertebral disc herniation and osteophyte formation. Particularly, when there is a failure of medical treatment for cervical radiculopathy or progressive neurodeficit.^{2,3,12,14} In our study the most common reason for radicular symptoms were lateral soft disc herniation (51.7%) followed by foraminal stenosis (27.6%) and osteophyte formation (20.7%).

The most common level with cervical radiculopathy involved is C6-7 followed by C5-6 level. In a study of 35 cases the most common level was C6-7 (51.4%, 18/35) followed by C5-6 level in 28.8% cases.¹⁵ Here our results are almost the same. We have the common level C6-7 (41.4%) in the comparatively young age group and C5-6 (37.9%) level in the comparatively old age group.

It has been reported that posterior cervical foraminotomy provides symptomatic relief in almost 90% of the cases with cervical radiculopathy.¹⁶ In our study almost all the patients had improvement of arm pain and pins and needles improved in 79% cases. Other studies have almost the same results. Some studies have published that in almost 64-96% of patients who undergone posterior cervical foraminotomy for cervical degenerative foraminotomy have good outcome.^{16,17} In one of the studies it is concluded that arm pain relieved in 80-90% cases.¹ It was also concluded in the same study that numbness slowly recovers and sometimes may persist. Weakness may take 6-12 weeks to return to normal. However, Pins and needles starts improving immediately.¹ We had three patients (10.3%) with motor weakness in the arm of which two (n = 3: 66.6%) patients improved during the study period. In another study the overall success rate was 88.5% of the cases.¹⁵

The possible complications with posterior cervical foraminotomy are neck pain, root injury, cerebrospinal fluid leak, epidural hematoma, radiculitis and wound infection.¹⁸⁻²⁰ It has been reported that injury to the nerves and spinal cord occurs in 1 – 2% cases.¹ In a study of 34 cases, no such post-operative complications reported.² In our study, we had one

(3.4%) patient with superficial wound infection which was treated conservatively.

Postoperative neck and shoulder pain is observed in 18-60% of the cases. This is due to more muscle dissection and muscle stripping and can be decreased by limited tissue dissection. Previous study have reported 10 – 20% cases with neck pain.^{2,21} We observed that only one (3.4%) new patient had post-operative neck pain. His post-operative neck x-ray and MRI was satisfactory. He had some depressive features as well and was treated conservatively with anti-depressants. It has been observed that, by doing limited tissue dissections and preserving capsule of the facet joint, mobility and stability of the motion segment can be maintained.²²

One of the concerns with the posterior cervical foraminotomy is that if we resect more than 50% of the facet joint this may lead to same level degeneration, Kyphotic deformity and segmental instability.^{2,12,22-24} **Segmental instability** means that motion more than 2 mm at the operative segments on dynamic imaging.² However, other studies reported that even after extensive facetectomy motion segment of the spine will remain stable if all anterior elements and one of the posterior elements in the form of supra-spinous and intra-spinous ligaments remain intact.^{22,25,26} Youlas et al¹⁵ reported that in their 35 patients no segmental instability and kyphosis was observed. Clarke et al²¹ followed up 303 patients who underwent single level posterior foraminotomy. Same level disc degeneration was observed in 5% (3.2%/5yrs) cases and adjacent level in 6.7% cases after 10 years. In our follow up period, no such complications were observed. This may be because limited resection (< 50%) of the facet joint or short follow-up period.

Patients after **posterior cervical foraminotomy** may have persistent symptoms and may need a reoperation. Studies have reported that the common causes for reoperation are **wrong diagnosis, wrong side, wrong level** or **inappropriate root decompression**.¹⁶ It has been reported that up to 4 – 7% of patients who undergone posterior cervical foraminotomy may need reoperation.¹⁷ While after anterior cervical discectomy and fusion reoperation may be needed in 4 – 14% cases.^{24,27} Here the results vary in different studies. In a study 151 cases who underwent posterior cervical foraminotomy, the overall reoperation rate was 9.9% (15/151) within 2 years and the same level reoperation was 6.6% (10/151).²⁴ In our study only one patient (3.44%) had

recurrence of symptoms due to the same level disc disease that was operated through the anterior approach.

CONCLUSION

We conclude from our study that cervical spondylotic radiculopathy patients respond well to posterior cervical foraminotomy. This procedure is having an acceptable complication rate. This is an effective and safe procedure. This approach can be an alternative treatment choice in patients with cervical radiculopathy secondary to lateral disc herniation, and or foraminal stenosis.

Additional Information

Disclosures: Authors report no conflict of interest.

Human Subjects: Consent was obtained by all participants in this study.

Conflicts of Interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

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