

REPRINT

BENHA MEDICAL JOURNAL

**SURGICAL TREATMENT OF
CERVICAL RADICULOPATHY BY THE
POSTEROLATERAL APPROACH**

Nasser M. Sayed Ahmed MD

**Published by
Benha Faculty of Medicine**

*Volume 19 Number 3
Sept. 2002*

SURGICAL TREATMENT OF CERVICAL RADICULOPATHY BY THE POSTEROLATERAL APPROACH

Nasser M. Sayed Ahmed MD

Department of Neurosurgery, Faculty of Medicine,
Benha University Hospital Zagazig University, Egypt

Abstract

Objectives: the posterior approach in the surgical management of cervical radiculopathy to decompression cervical nerve root represents an extremely effective treatment with successful relief of radiculopathy resulting from the unilateral or foraminal nerve root compression due to cervical disc herniation or spondylotic spurs.

Aim: the aim of this work was the study of the causes, radiological finding, and assessment the result of the management of patients with upper limb radiculopathy due to cervical nerve root compression, all the patients had been underwent posterolateral surgical decompression.

Clinical material and methods: thirty patients with unilateral symptomatic radicular pain of the upper limb had been subjected to posterolateral surgical decompression of cervical nerve root at one level in 26 cases and two levels in 4 cases. Cervical MRI was done for all the patients to establish the diagnosis of cervical nerve root compression. All the patients were operated upon on the prone position.

Results: the results of posterolateral decompression of cervical nerve root was excellent (100%), the intense pain of radiculopathy is almost relieved in all patients had been underwent surgical decompression without any considerable complications. The main duration of follow up was (20) months rang from 2-36 months.

Conclusion: proper preoperative patient selection is highly important, and the entire patients should have typical symptoms of cervical root compression. The posterolateral approach for cervical nerve root decompression is safe and extremely effective, with rare or almost no complications.

Key Words: cervical nerve root decompression, posterolateral cervical approach, radiculopathy, cervical foraminotomy.

Introduction

Cervical radiculopathy is a common disorder in the general population, and usually most of the patients are responding to non-operative management, while surgical treatment is usually a wise consideration in the patient with persistent and quite incapacitating radiculopathy in about 10% of symptomatic patients. Tarlov., 1996. Degeneration of the cervical disc, disc protrusion, roughening of the facet joint, reactive hypertrophy of facet, and spondylotic spurs, are leading to foraminal stenosis, which is the commonest cause of cervical radiculopathy in the adult population. Disc herniation is seldom caused by trauma Tarlov., 2000. The posterior approach to decompression of the spinal cord and nerve roots is used less frequently since the development of the anterior approach to the cervical spine. James and Melville 1995. Patients with a major abnormality that is central, broad based, and anterior disc protrusion will benefit from surgery by the anterior approach, and those with a definitive abnormality that is lateral or in the foramen can be treated by

posterior approach. Cervical MRI supplemented by plain X-ray in different views are the image of choice to permit clear-cut delineation of the pathological entity, which makes the assignment of the patient to either technique more exact. Complications of the posterolateral approach are rare, by preoperative proper selection of the patients according to clinico-radiological diagnosis, proper positioning of the patient and by using intra-operative X-ray to establish the correct pathological spinal level, using high-speed drill to remove the bone, and utilizing the microsurgical instruments can be made the results are one of the most effective and gratifying operations in the field of neurosurgery Murphey et al., 1973. Failures generally occurred because of errors in diagnosis of disc fragments that are missed during surgery.

Patients and Methods

Over a period of 3 years from January 1999-December 2001, 30 patients were operated upon for definitive cervical radiculopathy by surgical decompression of the cervical nerve root (s) through a posterolateral approach. A clinical

presentation of the patients (Table 1) was confirmed with radiological studies (Table 2). The exclusion criteria for the posterolateral cervical approach were clinically; isolated neck pain, bilateral radiculopathy and associated myelopathy, and radiologically; central, broad base, anterior disc protrusion and /or osteophytes. The result of posterolateral cervical nerve root decompression in our series was 100%, all the patients reported relief of their symptoms, without any post-operative considerable complications, and no any patient showed recurrent symptoms of radiculopathy at the follow up period.

Operative technique :

All the patients underwent surgical decompression (Table 3) for one level in 26 patients (86%), and two levels in 4 patients (14%), and all the patients were operated in prone position. The patient's head was immobilized with the Mayfield head holder. In every case preoperative antibiotics were administered for 24 hours and continued for 5 days post-operatively. Localizing the pathological level by using X-ray in each case to avoid

miss leveling and for this reason we did not depend on the manual counting of the spinous process to confirm the correct level. Bone removal was initiated in the medial part of the facet joint, lateral third of the lamina and a medial portion of the pedicle by using a high-speed drill under continuous irrigation to avoid excessive heat generated by the drilling of the bone. A hand drill may have a greater risk of slippage due to irregularities of the surface. A fine karrison rongeur (1mm-2mm) can be used to widen the exposure if it could be easily placed, otherwise the angled fine curettes (2/0-3/0) must be used to remove the roof of the foramen or widen the canal of the nerve root. The majority of the lateral 2/3 or 1/2 of the facet joint was maintained. Once the dural sac, axilla and shoulder of the nerve root and the dural sleeve over the root have been exposed these structures are carefully inspected by using the microsurgical instruments, coagulating epidural veins by bipolar, the nerve root was clearly identified. A characteristic telltale fold of the dura at the level of the junction of the nerve root with the main dural

surface overlying the spinal cord was seen especially in large disc herniation (fig1) in 18 patients (60%), the presence of the dural fold is a fairly reliable indication of a mass beneath the nerve root. The removal of a disc fragment was done in 22 patients (73%) by using a pointed blade No 11 to incise the posterior longitudinal ligament in infero-lateral direction away from the spinal cord and nerve root sleeve. If the herniated disc fragment will not present itself, we used right-angle hook with a 360-degree sweeping motion to get out any fragment that traversed the posterior longitudinal ligament. Large fragment extending above and /or below the interspace was removed by more extending the removal of the lamina above and below, but if medial extension is needed, the medial part of the pedicle must be drilled to give a more medial angle of exposure. The osteophytic spur or hump was present in 8 patients (26%) a fine diamond burr or a small reversed-angle curette was used to reduce it.

Results

Thirty patients underwent sur-

gery for cervical radiculopathy secondary to intervertebral disc herniation and/or spondylotic foraminal stenosis. Criteria for surgery were limited to radiculopathy in the distribution of the nerve root. The characteristics of the clinical presentation and operative procedures are shown in the table 1, 3. Two levels of posterolateral nerve root decompression was done in 4 patients all of them were at C4-5, and C5-6 one level for disc protrusion and the other for foraminal stenosis due to osteoarthritic changes in the same side. The average age of the patients undergoing surgery was 45 years. In 26 patients (86%) a single-level nerve root decompression were done, 8 patients for only decompression without discectomy and 18 patients for decompression with discectomy, the majority of the patients 19 cases had an abnormalities at C5-6, and 11 patients (36%) with C6-7 disc protrusion. Relieve of the radicular pain was obtained in all patients (100%). No recurrent symptoms of the radicular pain were observed in any patients at the follow up period up to 2 years. Improvement of the motor weakness was

achieved in 3 patients out of 5 immediately postoperative and the remaining 2 patients recovered over few months with physical therapy. Few patients (5 out of 21) had shown improvement of their

preoperative depressed reflexes. No postoperative complications or morbidity were noticed as regard to wound healing and/or neurological conditions of the patients.

Table (1) clinical presentation:

| Clinical features | Number and (%) |
|---------------------------------|----------------------|
| <i>Total Number of patients</i> | 30 (22M, 8F) |
| <i>Age</i> | 22 y → 61y (main45y) |
| <i>Symptoms:</i> | |
| Neck pain | 12 (40%) |
| Pain and numbness of UL | 30 (100%) |
| Weakness of UL | 5 (16%) |
| <i>Duration of symptoms</i> | |
| | 3 weeks → 3 years |
| <i>Signs:</i> | |
| Pain on neck movement | 30 (100%) |
| Weakness of regional muscle | 5 (16%) |
| Dermatomal hypoesthesia | 30 (100%) |
| Tendon reflex changes | 21 (70%) |

Table (2) radiological investigation:

| Radiological investigation and finding | Number and (%) |
|--|----------------|
| <i>Cervical plain X-ray</i> | |
| Loss of cervical lordosis | 22 (70%) |
| Foraminal stenosis on oblique view | 8 (26%) |
| Dynamic instability | 0 |
| <i>Cervical MRI</i> | |
| Posterolateral disc herniation | 18 (60%) |
| Obliteration of the nerve root foramen by osteophytic spur | 12 (40%) |
| Central cervical disc herniation | 0 |
| Intra-pyranchemal cord changes | 0 |

Table (3) type of surgical procedure:

| Operative procedure | Number | Level of cervical pathology | | |
|----------------------------------|---------|-----------------------------|----------|---------|
| | | C4-5 | C5-6 | C6-7 |
| Decompression without discectomy | 4(13%) | 4 cases | 4 cases | ----- |
| Decompression with discectomy | 18(60%) | ----- | 12 cases | 6 cases |
| Removal of osteophytic spur | 8(27%) | ----- | 3 cases | 5 cases |

Table 4 : Factors favoring excellent surgical outcome

- 1- Persistent unilateral cervical radiculopathy
- 2- Failure of conservative treatment for at least 3 weeks in acute cases
- 3- Clinical feature must be confirmed and identified by cervical MRI
- 4- Prone position to avoid pitfalls of sitting position
- 5- Localized the proper pathological level by using intraoperative X-ray
- 6- High-speed drill supplemented by microsurgical instruments in all cases
- 7- 8-12mm of the nerve root must be exposed for good decompression

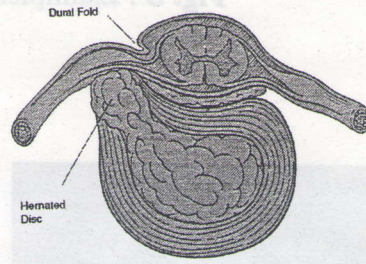
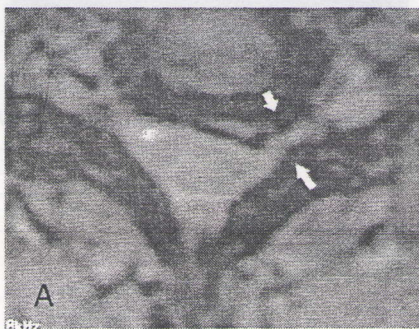
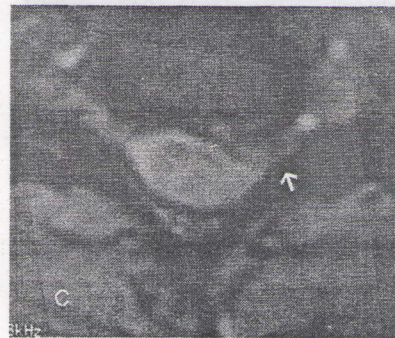


Fig. 1 : Telltale fold of the dura.

Fig. 2 : Examples of pre-operative cases.



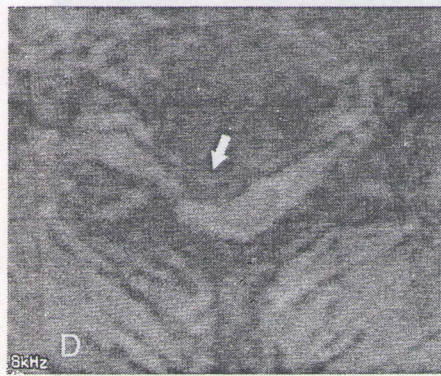
A- Osteophytic foraminal stenosis



C- Discogenic foraminal stenosis.

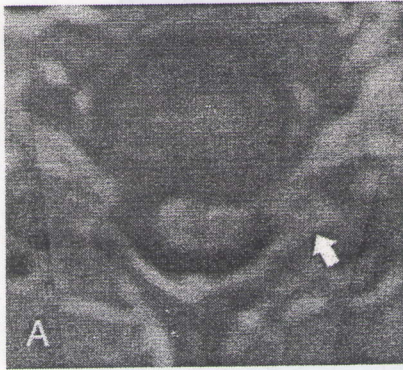


B- Rupture disc.

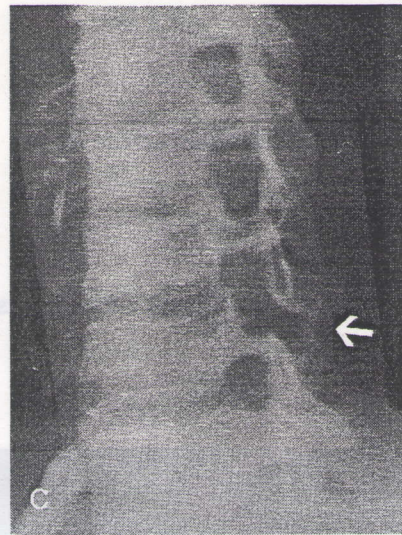


D- Disc protrusion.

Fig. 3 : Examples of post-operative cases.



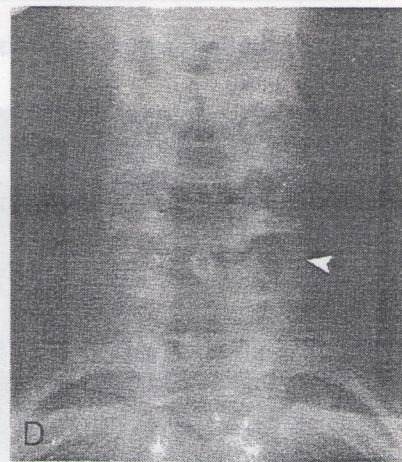
A- Lamino-foraminotomy in MRI.



C- Foraminotomy in oblique view.



B- Preservation of disc height.



D- Lamino-foraminotomy in A-B view.

Discussion

Spurling and Scoville in 1944, had reported the identification of specific root syndromes secondary to lateral cervical intervertebral disc rupture, and by 1951, they had described the posterior decompression keyhole operation to remove disc material and /or osteophytes Spurling and Scoville., 1995. In their initial series, they reported 90% good and excellent results in patients with radiculopathy. Later on they reported excellent results about 96% with posterior decompression in a series of 381 cases Scoville et al., 1951. Other authors (Raaf., 1969, Fager, 1977 and Murphey et al., 1972), have also reported excellent result over 96% with this approach. In our series the result was 100% because all our patients showed a complete relieve of their symptomatic radiculopathy and returned to their work and former physical activity. In 1983, Henderson et al, reported a 91.5% success rate in a series of 846 patients, Simeone and Dillin 1986 reported a 96% good or excellent outcome, and in 1990 Aldrich reported a better results by using a microsurgical

compression. Adamnson, 2000, reported excellent results obtained in 97% of patients, who returned to their preoperative employment and baseline level of activity after microscopic posterior cervical laminoforaminotomy. No any postoperative morbidity in our series was reported because many factors were contributed to get this result with minimal postoperative morbidity table (4). In series of 2035 cases Roberts and Collias, 1995, reported 0.2% of postoperative morbidity, including transient increased root deficits, wound infection or dehiscence, and two cases of paradoxical air embolism with severe brain damage indicate the potential risk of the sitting position, two patients developed major postoperative neurological deficits directly related to the surgical manipulation, one due to direct cord injury and the other was secondary to cord retraction. According to Tarlov, 2000, complication of the posterolateral approach are rare, postoperative hematoma can occur as with any operation. Infection and wound problems are infrequent. Stability is not an issue, as the disc and the opposite facet are structurally intact. He

has never seen a recurrence of a bona fide cervical disc herniation. Published reports of the success of the anterior approach in the treatment of cervical root compression do not show better or even the same results when compared by posterior approach Herkowitz et al., 1990 and Raynor, 1983. Murphey, et al., 1973, and Tarlov 2000, called the results of the posterolateral operation for cervical root compression is the most gratifying operation of any neurosurgical procedure for both the patient and physician.

Conclusions

All patients selected for surgery should have unilateral radicular signs and symptoms, the patients with acute presentation should have undergone a trial for conservative treatment for at least 3 weeks before the final surgical decision is made. Cervical MRI is a diagnostic modality of choice to confirm the diagnoses of posterolateral disc herniation and cervical nerve root compression. The posterior approach, laminectomy and foraminotomy, provides a reliable, safe, and very effective procedure for treatment of the lateral cervical

disc protrusion and nerve root compression. According to the clinico-radiological criteria for a posterolateral approach for nerve root decompression, the result will be excellent without any considerable complications and/or failed surgical procedure. So for patient with a major abnormality that is in lateral position or in the foramen, the posterolateral cervical decompression is an appropriate approach of choice.

References

- Adamnson T. E. (2000)** : Microscopic posterior cervical laminoforaminotomy for unilateral radiculopathy: result of a new technique in 100 cases. *J Neurosurg (Spine)* 95: 51-57.
- Fager C. (1977)** : Management of cervical disc lesions and spondylosis by posterior approaches. *Clin Neurosurg* 24:488.
- Fager C. A. (1989)** : Atlas of spinal Surgery. Philadelphia; Lea & Febiger.
- Henderson C. M., Hennessy R. G., Shuey H. J. and Shackelford E. G. (1983)** : Posterior-

lateral foraminotomy as an exclusive operative technique for cervical radiculopathy: A review of 846 consecutively operated cases. *Neurosurgery* 13:504-512.

Herkowitz H. N., Kurz L. T. and Overholt D. P. (1990) : Surgical management of cervical soft disc herniation. A comparison between the anterior and posterior approach. *Spine* 15:1026-1030.

James C. Collias and Melville P. (1995) : Roberts: posterior surgical approaches for cervical disc herniation and spondylotic myelopathy. In Schmidek HH and Sweet WH. *Operative Neurosurgical Techniques*. W. B. Saunders Company. Chap 146; 1805-1816.

Murphey F., Simmons J. and Brunson B. (1973) : Ruptured cervical discs: 1939 to 1972. *Clin Neurosurg* 20:9.

Raaf J. A. (1969) : Surgical treatment of patients with cervical disc lesions. *J Trauma* 9:327.

Raynor R. B. (1983) : Anterior or posterior approach to the cervical spine: An anatomical and radi-

ographic evaluation and comparison. *Neurosurgery* 12:7-13.

Scoville W. B., Dohrmann G. T. and Corkill G. (1976) : Late results of cervical disc surgery. *J Neurosurg* 45:203-210.

Scoville W. B., Whitcomb B. B. and Mclaurin R. L. (1951) : The cervical rupture disc: Report of 115 operative cases. *Trans Am Neurol Assoc* 76:222-224.

Simeone F. A. and Dillin W. (1986) : Treatment of cervical disc diseases : Selection of operative approach. *Contemp Neurosurg* 8 : 1-6.

Spurling R. and Scoville W. B. (1955) : Lateral rupture of the cervical intervertebral discs: A common cause of shoulder and arm pain. *Surg Gynecol Obst* 78:350-362.

Tarlov E. (2000) : Cervical Nerve Root Compression: Surgical Treatment by the Posterior Approach. In Kaye AH and Black PM. *Operative Neurosurgery*, 1st edition, London, Hartcourt publishers. 1785-1791.

Tarlov E. (1996) : Extradural spinal cord and nerve root compression from benign lesions of the cervical area and their man-

agement by the posterior approach. In: Youmans JR, Neurological surgery. Philadelphia: WB Saunders, 2241-2252.