

# Management of cervical radiculopathy, anterior and posterior surgical approach-a comparative study

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## Abstract

**Introduction:** Cervical radiculopathy is a condition caused by the compression of a nerve root in the cervical spine. Among the various pathologies which affect the nerve root, degenerative processes in the spine are the most common. The aim of this study was to compare anterior and posterior approaches in management of cervical radiculopathy.

**Material and methods:** Twenty-five patients performed anterior decompression and fusion of the affected level and thirteen patients underwent nerve root decompression through posterior open foraminotomy.

**Results:** There were 28 patients complained of neck and scapular pain and 10 patients with scapular pain before surgery. Thirty-three patients had no pain after surgery, 3 patients had persistent pain in the same sites. The mean ( $\pm$  standard deviation) score improved from  $5 \pm 3.6$  to  $16 \pm 2.3$  in the anterior decompression and fusion group and from  $4 \pm 4.1$  to  $15 \pm 1.6$  in the posterior foraminotomy group. The increase of the score after surgery in each nerve root decompressed level was statistically insignificant ( $P > 0.05$ ).

**Conclusion:** Cervical radiculopathy can be a debilitating disease that can cause patients significant impairment. Rapid diagnosis and treatment of this condition is required to facilitate the return of the patient to their normal state of health. Anterior and posterior surgical approaches are equally effective in management of this condition.

## Introduction

Cervical radiculopathy is a condition caused by the compression of a nerve root in the cervical spine. Among the various pathologies which affect the nerve root, degenerative processes in the spine are the most common. In 1926, Elliot described how radicular symptoms could arise through narrowing of the intervertebral foramen secondary to spur formation in either the Luschka or zygoapophyseal joint [1]. In 1928, Stookey described a clinical syndrome of cervical nerve root compression caused by herniated masses [2]. The clinical overlap between cervical radiculopathy and peripheral nerve entrapment syndromes and their nearly ubiquitous nature makes understanding of and identification of these entities mandatory for all practitioners [3,4]. Cervical radiculopathy can be a debilitating disease that can cause patients significant impairment. The effect of this can be significant both economically, from lost work and compensations, and psychologically, from prolonged pain and impaired social functioning [5,6]. Treatment of cervical radiculopathy ranges from conservative treatment which included collar, NSAIDs, bed rest, and cervical epidural injection to surgical treatment [7]. In the first half of the last century, only posterior surgery was performed for cervical spinal pathologies. In 1940s, posterior foraminotomy was introduced for managing cervical radiculopathy [8]. Although the intervention was small but insufficient visibility because of hemorrhage from extradural venous plexuses and traumatic handling of the nerve root when removing the disc herniation or spurs were problems [9]. In 1950s, anterior surgery was developed for the cervical spine. It gradually replaced the posterior foraminotomy for cervical radiculopathy. However, anterior fusion sometimes may lead to many complications [10,11]. In 1970, anterior surgery without fusion was introduced for cervical radiculopathy. It is less invasive,

allow earlier rehabilitation but kyphotic deformity occurred frequently [12]. In 1980s, the development of microsurgical instruments and operating microscopes revived the posterior foraminotomy [13]. No difference in the results were reported previously between the anterior and posterior approaches [14,15]. In this series, we tried to compare both approaches in management of cervical radiculopathy.

## Material and methods

Thirty-eight patients with cervical radiculopathy complained of neck pain beside symptoms in upper limb and fingers. The inclusion criteria cervical disc herniations manifesting as radiculopathy. Both computed tomography (CT) scanning and

magnetic resonance imaging (MRI) were performed for all patients. Patients with segmental instability, central disc herniation, ossification of the posterior longitudinal ligament (OPLL), or cervical myelopathy were excluded. Twenty-five patients performed anterior decompression and fusion of the affected level (Figure 1) and thirteen patients underwent nerve root decompression through posterior open foraminotomy (Figure 2). Surgery was performed in both groups after at least four months of conservative treatment. Informed consent

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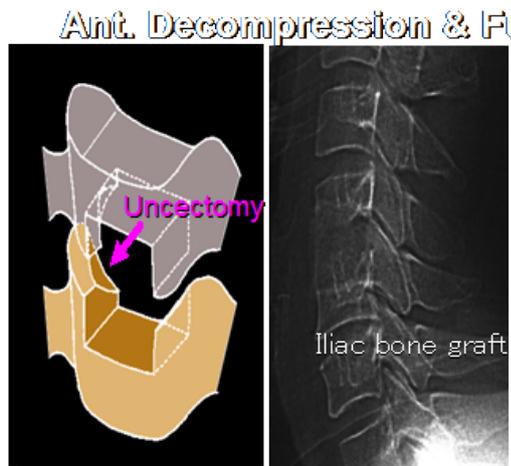


Figure 1. Anterior surgical approach for management of cervical radiculopathy.

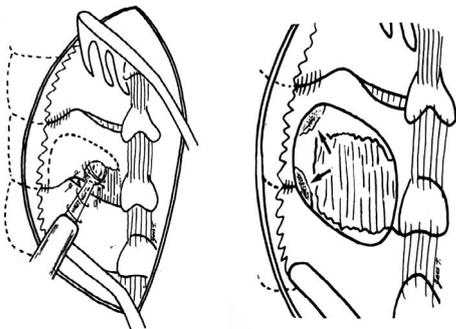


Figure 2. Diagram showing boundaries of posterior foraminotomy.

was obtained from all patients before surgery. Age of the patients at surgery ranged from 32 to 67 years in anterior group and from 34 to 71 years in the posterior group. The duration of symptoms before surgery ranged from 6 to 24 months in the anterior group (Average 9 months) and from 5 to 22 months in the posterior group (Average 8 months). Surgical complications such as hematoma, infection, dural damage, neurologic deficit, recurrence, and instability were documented during the follow-up period. Patients assessment was depending on cervical radiculopathy severity score of twenty points [16]. The system in which the normal score is 20, consists of four categories: (1) Subjective symptoms; (2) Ability to work; (3) Finger functions; and (4) Objective signs. This system scores the severity before and after treatment. Score 8 or less is an indication for surgery. All patients completed the follow up period of 3 years.

Statistical analysis: Comparison between the two groups was made using the independent two-sample t test for continuous variables. Fisher's exact test was performed for categorical variables. A two-tailed p value of < 0.05 was considered significant.

## Results

Age of the patients at surgery ranged from 32 to 67 years in anterior group (Mean 45 years) and from 34 to 71 years in the posterior group (Mean 46 years). There was no significant difference between groups for sex ratio, age, or symptom duration.

The involved nerve roots were C5 in 5 patients, C6 in 11 patients, C7 in 7 patients and C8 in 2 patients in the anterior group and were C5

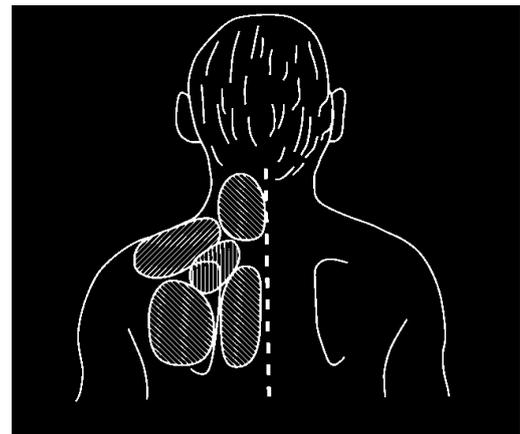


Figure 3. The 5 subgroups of neck and scapular pain.

in 2 patients, C6 in 7 patients, C7 in 2 patients, and C8 in 2 patients in the posterior group.

There were 28 patients complained of neck and scapular pain and 10 patients with scapular pain before surgery. Thirty three patients had no pain after surgery, 3 patients had persistent pain in the same sites, and two patients developed pain in a new sites in the nuchal and suprascapular regions (Figure 3).

The mean ( $\pm$  standard deviation) score improved from  $5 \pm 3.6$  to  $16 \pm 2.3$  in the anterior decompression and fusion group and from  $4 \pm 4.1$  to  $15 \pm 1.6$  in the posterior foraminotomy group. The score increased in all patients indicating that the decompression of the involved root was effective. The increase of the score after surgery in each nerve root decompressed level was statistically insignificant ( $P > 0.05$ ).

## Discussion

In clinical studies on the neck and scapular pain, unavoidable difficulties are encountered in determining the site of the pain. Patients do not always describe the site because they seldom know its anatomical name. So, it is easier for the patient and to the doctor to choose the site of pain from 5 subregions in the neck and scapular regions. Through this approach, the painful sites were identified in all patients and also by comparing the preoperative and postoperative sites of pain, new pain that could develop after surgery was detected. This also help in detecting the source of pain and assessing the efficacy of the treatment. Yoss [14] divided the region into 3 subregions (nuchal, scapular and interscapular). Murphey [15] divided them into 2 (nuchal and scapular). The number of their subgroups are relatively low compared to the number of the nerve roots supplying the area.

Posterior foraminotomy decompresses the nerve root alone. Therefore, the root would prove to be the origin of the neck and scapular if the pain is relieved with the radicular symptoms in the arm and fingers.

Early postoperative assessment is essential for verification of the effect of surgical decompression of the nerve root. In the present study, Pain completely disappeared in 94% of the patients one month after surgery. Evaluation of pain in the other studies usually depends on the final follow up score. So, it is difficult to determine if the pain relieve was due to surgical decompression of the involved nerve root or a natural remission of pain originating from other sites [17].

No difference in results has been reported between anterior and

posterior approaches [18]. Also, there are no difference in cases with bony spurs or those with disc herniation [7]. In our study, we reached also to the same conclusion.

## Conclusion

Cervical radiculopathy can be a debilitating disease that can cause patients significant impairment. Rapid diagnosis and treatment of this condition is required to facilitate the return of the patient to their normal state of health. Anterior and posterior surgical approaches are equally effective in management of this condition.

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