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Technical Notes & Surgical Techniques

Clinical outcome of **cervical** spondylosis myelopathy in preoperative and postoperative period

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ABSTRACT

In clinical practice of neurological spine surgery it is necessary to explain the prognosis to the patients will empower patients if he or she ready subjecting himself to a surgery. It has to be answered in a scientific way based on studies done. This work study the clinical prognosis in clinical features in the pre and post-operative period taking the pre and post-operative symptoms and signs into consideration in cases of cervical myelopathy with spondylotic changes. We had analyzed 40 patients using the JOA (Japanese Orthopaedic Association score). We evaluated the clinical signs and symptoms of cervical spondylotic myelopathy in patient at pre and post-operative stage for a span of 3 months with the help of JOA. Cervico-spondylo-myelopathy were confirmed by neurological examinations and imaging studies (X-ray, CT and MRI). All patients underwent anterior cervical discectomy with titanium cage fusion. A JOA score of 12 or more was considered as normal.in our study. All our patients had various types of outcome in clinical features and a significant improvement was found in all the patients after 4 weeks of surgery. All underwent a single technique of cervical discectomy with cylindrical titanium cage fusion. No mortality was noted and majority of the patients had a better outcome with a score of > 12. Any gross improvement can be expected only after 4 weeks and the surgical technique has a very low morbidity and mortality rate.

1. Introduction

Cervical spondylotic myelopathy (CSM) condition arises in neck region due to compressed spinal cord or if spinal cord is squeezed which leads to wear-and-tear changes in the spine as we age. Cervical spondylosis is an age old disorder which are very often occurs in patients over the age of 50 mostly affecting the bone joints and discs in *cervical* spine of neck region [1]. Most of the people seems to be symptomatic in their middle age around 50 years where the symptoms exaggerate due to dis degeneration and new osteophyte formation. CSM causes multifactorial degenerative changes in spinal canal and neural foramina because it carries nerve impulses to many body parts and so contribute to narrowing of cervical spine [2], due to which patients experience a wide variety of symptoms including weakness and numbness in forearms, lack of coordination. CSM can arise from other disease conditions that cause spinal cord compression, even though if they are not related to disk degeneration. Cervical myelopathy causes severe pain due to sensory or motor changes such as electrical shock sensation, numbness, and paresthesias [3]. The pathologic causes are various starting from osteophyte formation to small vessel ischemia to the spinal cord causing myelomalacia leading to weakness of all 4 limbs in which the corticospinal tract is affected as a last measure. It is mainly characterized of ischaemia causing due to small vessel obstruction and degeneration of the spinal cord. It also appears to thicken ligamentum flavum narrowing is and the spinal canal. Static factors may cause compressed neural structure directly and radiculopathy and/or myelopathy sign and symptoms could be visible [2,4,5].

Among various approaches for treating CSM, cervical interbody fusion approaches, Cloward's technique of iliac crest bone graft for cervical interbody fusion [4,5], use of interbody cylindrical, perforated cages with plasmapore coating and PEEK CAGES are most often preferred [6,7]. People who could not be treated with above option and continue suffering for a period of 2 years or more are mostly subjected to surgery [8,9]. The post-operative clinical outcomes following decompression for patients coexisting CSM have been inadequately studied. The Japanese Orthopaedic Association (JOA) score is widely used to assess the severity of clinical symptoms in patients with cervical compressive myelopathy and is currently accepted as the standard tool for assessment in Western countries [10]. In this study, we evaluate clinical outcomes in patients with CSM and ascertain post-operative progress in myelopathy with the help of Japanese Orthopaedic Association score.

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2. Materials and methods

2.1. Ethics statement

This study was designed and approved by institutional Ethics Committee of the Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai, India. It was performed as prospective study and a prior consent was obtained from each patient for participating in this study.

2.2. Study design and patient population

This prospective study was conducted during January 2012 to December 2015. Patients were confirmed of cervico spondylo myelopathy confirmed by neurological examinations and routine radiographs includes X-ray, C spine AP/lateral, computed tomography (CT, Philips Brilliance 16) and MRI (1.5-T system (Magnetom Symphony, Siemens Medical Solutions, Malvern, PA, USA). Patients were evaluated for cervico spondylo myelopathy and included in this study if they were advised for surgery. Accordance with the approved guidelines of institution, the decision to perform surgery as treatment for CSM was decided. Patients with traumatic spinal injury, ventral compressive lesion, previous thoracic surgery, thoracic disc herniation, concomitant cervical, lumbar lesions, primary cervical cord pathology or other neuromuscular disorders were excluded from the study. Patients were clinically evaluated using Japanese Orthopaedic Association score pre and post-operative stage for a span of 6 months. All patients went through anterior cervical discectomy using cylindrical titanium cage fusion. Most of the patients had disc osteophyte complex which was removed and the appropriate size of cage of number 8 mm, 10 mm and 12 mm were used. X ray was taken which revealed patients with CSM having canal diameter maximum of 12 mm with features of myelopathy and inter pedicular distance with maximum length of 23 mm had features of myelopathy (Fig. 1). Saggital image of MRI of cervical spine showing c5–c6 disc prolapse (Fig. 2). Axial image in MRI showed c5–c6 disc compressing the spinal cord (Fig. 3).

2.3. Surgery procedure

All the patients were given general anaesthesia. During operation, the neck was kept in extended position. For a single level, the transverse sin crease incision was used and for multiple levels vertical incision was used in order to avoid excessive retraction of trachea and oesophagus. The sin was incised and the subcutaneous fat if any, was separated. The separation of longuscolli muscle was done in the midline if the vertebral body. Lateral separation up to uncinated process was made and self-retaining retractors were placed below the muscle edges of longus colli. The anterior osteophyte was drilled, followed by disc removal in piecemeal fashion. The Casper retractor was applied to widen the space and the posterior osteophyte was removed. Any bone fragments were completely scooped out and space was then fused with fuzer cylindrical titanium cages. Small gel foam was placed for haemostatic in the centre of the cage. Wound was closed after placing a small drain below the muscle plane in tracheoesophageal groove to prevent post-operative wound collection.

Fig. 2. Saggital image of MRI of cervical spine showing c5–c6 disc prolapse.

2.4. Japanese Orthopaedic Association score

Japanese Orthopaedic Association score (JOA) scoring system consider a minimum score of 12 or above as normal function. A post-operative clinical improvement of symptoms was taken in consideration based on the recovery rate (RR) = (postoperative JOA score − preoperative JOA score) / (max score − preoperative JOA score) × 100%. A score of 75 to 100% was designated as excellent, 50 to 74% as good,

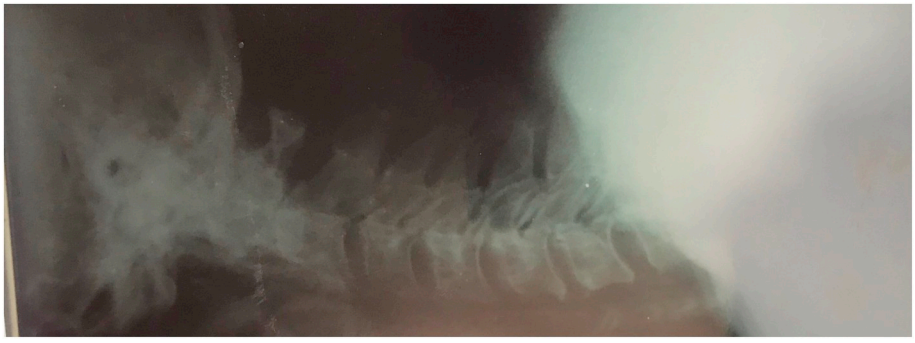

Fig. 1. X-ray revealed patients with CSM having canal diameter maximum of 12 mm with features of myelopathy and inter pedicular distance with maximum length of 23 mm had features of myelopathy.

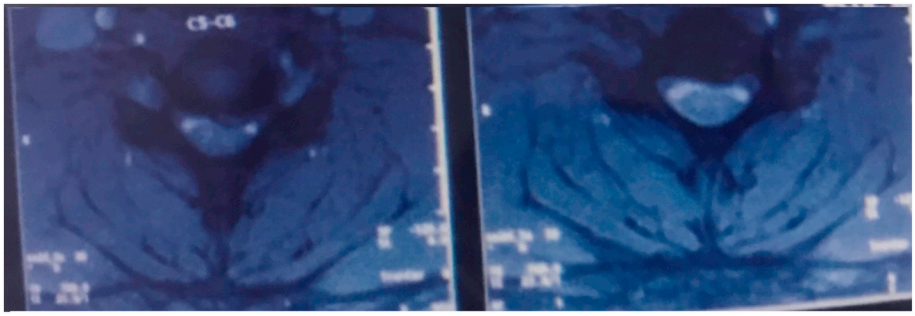

Fig. 3. Axial image showing c5–c6 disc compressing the spinal cord.

25 to 49% as fair and 0 to 24% as poor [10].

3. Results

This study evaluated a number of 40 cases at Sri Ramachandran institute of higher education and Research, Porur (SRIHER), Chennai, India. SRIHER is tertiary care hospital provides health care in all major discipline with intake of > 3000 patients daily. During the period 2012–2015, 40 cases of CSM, including 28 men and 12 women, ranging in age from 42 to 62 years, with a mean age of 52.5 years. Patients were followed for a period of 6 months.

In the patient group analyzed by us only 10% had severe compression and features of corticospinal tract compression. All the patients in our study were subjected to anterior approach and cervical discectomy with fusion was used (Fig. 4). All the patients were fused with cylindrical titanium cages after discectomy and osteophyte removal. The 3 months follow up showed that patient with score of 9–12 had maximum improvement and gained a score > 12. Based on JOA score, 26 (65%) patients had score between 9 and 12 and 14 (35%) had score > 12 during pre-operative stage. After operation this number for score > 12 was upsurge to 26 (65%) and 28 (70%) after a month and three months follow up respectively. Recovery rate Score was excellent in 13 (33%) cases during four week month follow up. No morbidity was noticed, except for one patient, who had a wound infection and because of airway compromise he had to undergo tracheostomy (Table 1 & 2).

Table 1
Japanese Orthopaedic Association (JOA) score of 40 enrolled cases.

Score	Pre-operative evaluation (n)	Post-operative follow up (4 weeks) (n)	3 months follow up (n)
> 12	13	26	30
9–12	25	11	9
< 9	2	3	0

Table 2
Recover rate score post-surgery.

Recovery rate Score	Post-operative follow up (3 weeks) (n)	3 months follow up (n)
Excellent	13	28
Good	24	11
Fair	3	1

4. Discussion

The compressed spinal cord produced the syndrome of spinal cord dysfunction also called cervical spondylotic myelopathy. It occurs in up 10% patients with symptomatic cervical spondylosis being most common cause of myelopathy in adults over 55 years [11–14]. Conservative treatments are widely used unless there is requirement of surgery although these conservative treatments include pharmacologic treatments, lifestyle modifications, neck immobilization, and physical modalities are associated with poor prognostic outcome. Surgery are planned and being the last option when conservative treatment results in progression of symptoms, presence of myelopathy for > 6 months or over a year [4]. After surgery, the progress of recoveries varies between patients. Some patients experience a slow and stepwise deterioration, and pain [15]. Some patients experience a good recovery and prolonged periods of stability; however, often following minor neck injuries abrupt worsening occurs. Treatment options for cervical spondylotic myelopathy, specifically when and if to operate, remain controversial. There is no consensus regarding the indications and timing for surgical treatment of cervical spondylotic myelopathy [16].

Here we reported post-surgery complications of cervical spondylosis

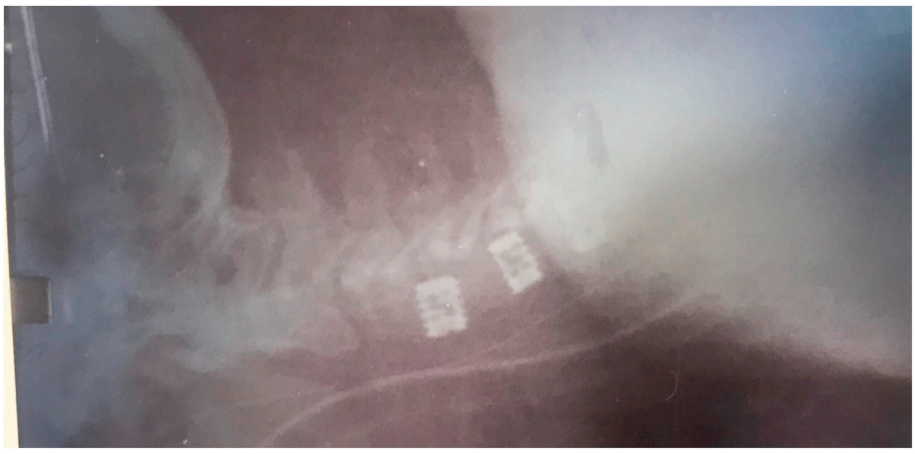

Fig. 4. X-ray images of cervical spine after the surgery, patients were subjected to anterior approach and cervical discectomy with fusion was used.

myelopathy and analyzed the surgery clinical outcome according to JOA score. We also presumed that pre-operative complication would be better with anterior approaches for CSM and post-operative improvement might be related with duration after surgery. In this present study, we evaluated 40 cases based on JOA score, which showed that after operation recoveries was good post treatment and in 26 (65%) patients after a had recovery rate score > 12 at JOA score. Earlier study interpreted that female gender and higher degrees of cervical mobility are potential risk factors for deterioration [17,18] however in our study the number of female patients was less than males. Overall, 50 to 80% of patients are reported to be improved after surgery, while 5 to 30% are worse or subsequently deteriorate [12]. Surgical complications occur in up to 16% of patients and include death in approximately 1% [11–14].

Most of patients in this study had only early posterior osteophytes were given a 2 weeks of conservative management with analgesics, cervical collar and IFT to the neck. When these conservative measures failed we subjected to surgery. When there was directly anterior parrot beat osteophyte and a posterior osteophyte they were directly taken up for surgery and the post op JOA score analysis was done at appropriate intervals. Better clinical improvement after surgery was seen based on JOA score after 3 months only.in our study we found all the compressive surgeries were better approached and handled anteriorly than a posterior approach to cervical spine. All patients with confirmed CSM were treated with anterior cervical discectomy and they were followed for three months period post operation. An analysis of post-operative clinical features was based on Japanese Orthopaedic Association score. The 3 months follow up showed that patient with score of 9–12 had maximum improvement and gained a score > 12. The recovery rate was excellent in 13 (33%) and 28 (70%) at 4 weeks and 3 months' time respectively. Better clinical improvement after surgery was seen based on JOA score after 3 months only.

Various studied have been done to appreciate an optimal surgical approach, though it is not always clear to select one above other [19–22]. An anterior approach offers few advantages like direct decompression of pathologies in the anterior cervical spine, a muscle sparing dissection which minimize postoperative pain, negligible rate of infection. Generally surgeon prefer anterior approaches with CSM of level 1 or 2 and posterior approaches with level 3 or more as in such case risk involved are more if anterior approaches used. The posterior approach allows a wider decompression and offers the prospect to avoid procedural problems resulted from a short neck, barrel chest, or previous anterior cervical surgery during anterior procedure [4]. The only limitation of our study was that the evaluation period was bit short and the lack of long-term outcome limited the strength of the conclusions in regards to any benefit of the procedure. Any gross improvement can be expected only after 3 weeks and the surgical technique has a very low morbidity and mortality rate.

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