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Anterior Surgical Approach to Cervical Spine with Fusion : An Appraisal of 55 Cases

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Ramesh Chandra, - *Patna*

Surgeons are always attracted by any surgical technique which ensures direct visual attack on the pathology. Anterior surgical approach to vertebral bodies and subsequent fusion is now an accepted and established procedure of choice in cervical vertebral body or disc diseases.

Bailey and Bagley [1] were the first to describe in 1952 the anterior approach to cervical spine by 'trough-onlay fusion' for stabilisation of traumatic and postsurgical dislocations and destructive vertebral lesion. Dr. Le Roy C. Abbot is credited to have suggested this approach. In 1954, Walker and Smith operated upon a patient by anterior approach and a year later Robinson and Smith [2] were the first to standardise myelopathy. Cloward [3] adopted a 'dowel graft' technique to fuse the adjacent bodies of vertebra in a cylindrical fashion. Mayfield [4] preferred the Smith-Robinson's approach with modifications for routine cases of cervical spondylosis. Simmons and Bhalla [5] described a key stone graft and showed the fusion rate to be 100%.Verbiest [6] advocated the use of tibial cortical graft in traumatic dislocations. Ramani [7] et al used 'Kiel" bone for interbody fusion. Surgical microscope has been used for the dissection of the disc with gratifying visualisation [8], [9], [10]. Robertson [8] reviewed the anterior operations for herniated cervical disc and for myelopathy and was impressed by the best results in one level disease and advocated avoidance of fusion to avoid the complications of donor site surgery and implanation of a nonvital structure. Acrylic has been used for internal stabilisation [11], [12], [13]. Till 1975 there were cases of caries spine of cervical vertebral bodies operated through anterior approach in India. The author in 1975 presented a paper on anterior surgical approach to vertebral bodies ' in the Annual Conference of the Neurological Society of India at Chandigarh in which 15 cases of cervical vertebral and disc diseases were included. Later the author conducted a survey in 1979 and could collect nearly 200 such cases who were known to have been operated by the Neurosurgical colleagues in India by anterior approach. Subsequently the use of surgical microscope in this approach have also been presented by Indian Neuro Surgeons. Excellent results and relatively easy approach rendering and avascular field, direct access to the pathology and almost uneventful post operative course, have nearly replaced the posterior approach by anterior approach for the various conditions like cervical spondylosis, tuberculosis, tumour and trauma of the vertebral body and the disc. In the present study 55 cases operated by the author have been analysed as regards their outcome following the anterior surgical approach.

Material and Methods

The total number of cases under observation have been 55, encountered between 1973 to 1985, with a postoperative follow-up of 6 months to 6 years. All these cases were treated conservatively in pre-operative phase for various cervical vertebral body or disc diseases and had been refractory to conservative therapy prior to undertaking surgery. Cloward and Walker and /or Robinson - Smith procedures with some modifications were adopted as surgical technique. The patients were selected on the following criteria :

1. Complete clinical neurological examination.
2. Plain X-Ray cervical spine in most instances indicating some radiological lesion suggestive of trauma, tuberculosis, tumour or spondylosis.
3. Adequate trial of conservative therapy viz. medicines, cervical collar, traction and rest etc., having been of no benefit.
4. Myelogram of cervical region confirming the pathology in the disc or vertebral body or in its alignment.

A firm cervical collar or 4 poster collar was given for a month after discharge and physiotherapy was instituted. The patients were followed up for varying periods ranging from 6 months to 6 years, following operation.

Surgical technique

Under general anaesthesia the patient was placed in supine position under Cervical Holter's or Skeletal traction with neck extended and rotated slightly to the right. The left iliac crest and hip were also prepared and a sandbag was placed underneath to make it more prominent. A skin incision of 4 - 5 cm length was made over the neck on the left side following Langerhan's line up to midline and 4 cm above the clavicle for exposing C5-6 interspace. Minor adjustments were made depending upon the number of spaces and the particular spaces to be exposed. Platysma was cut along the incision line and the cleavage was made along the anterior border of the sternocleidomastoid muscle. The muscle along with the carotid sheath was retracted laterally and the pretracheal fascia with trachea and oesophagus was retracted medially to expose the vertebral bodies disc spaces and longus coli muscle. The prevertebral fascia and tissue were dissected off the body and disc. The relevant disc space was identified by a check X-Ray of cervical spine (lateral view) while putting a spinal needle in the space. Fracture-dislocation or erosion of vertebra could be identified. The disc pathology was dealt by Cloward's or Robinson-Smith's technique. Whenever single or double disc spaces were to be dealt, Cloward's technique of removing cylindrical bone incorporating disc and adjacent bodies up to posterior longitudinal ligament was adopted. The hole was plugged by a corresponding size of 'dowel' (Bone graft) obtained from the left iliac bone below and behind anterior superior iliac spine taken by the Cloward's dowel graft extractor. In case 3 spaces were to be dealt, the middle or the least involved disc was taken out piecemeal till the posterior longitudinal ligament was reached or remained even short of it. No attempt was deliberately made to expose the anterior aspect of dura. A wedge shaped bone graft from iliac crest or made from the 'dowel' graft was pushed in to snugly fit in the dic space so curetted. After haemostasis the platysma and skin were closed in two layers. In some cases a rubber drain was put in for 24 hours where some bleeding or oozing was likely in immediate postoperative period.

In those cases where the pathological vertebral body like fracture or erosion was removed, a quadrilateral bone graft was obtained from iliac crest and was made to snugly fit in the space created after removal of pathological vertebral body and/or disc.

Observations

Table 1

Table 1

Table 2 - Clinical presentation (total 55)

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Table 3 - Aetiology (total 55)

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Table 4 - Surgery - disc space operated

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Table 5 - Post operative complications

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Table 6 - Pattern of improvement

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Discussion

Anterior surgical approach has now been accepted as the procedure of choice for lesions lying anteriorly in the vertebra, disc [1], [2], [3], [4], [5], [6], [8] and cord [18], [19], [20], [21]. The anterior approach not only renders the pathology directly accessible, the blood loss is minimal, safe for vital structures, and has a benign post operative course. All these make it more acceptable than posterior approach. Cloward's technique with some modifications has been used for cervical lesion affecting one or two spaces. Wherever 3 spaces are involved the spaces which are clinically suspected or myelographically confirmed to be showing marked defect are operated by Cloward's technique while the 3rd or the least affected or the uppermost space is operated by Smith-Robinson's technique. This modification is considered necessary to maintain the strength of the anterior column of the vertebral body. Although no attempt is done to dissect the posterior longitudinal ligament but the soft disc material and osteophytes accessible through the cylindrical hole are all removed piecemeal. Invariably the cord is decompressed and bulges through the holes. In Smith-Robinson's technique, unlike Cloward's the disc material is removed piecemeal as far posteriorly as possible but not necessarily reaching upto posterior longitudinal ligament and a wedge shaped bone graft is placed. Smith-Robinson's claim that the osteophytes tend to melt away is also substantiated in the present series. Robertsons [8] and Joanes [14] et al have reported better results and less complications in disectomy without fusion. Kadoya [15] et al and others here and abroad have improved results further with microsurgical dissection of disc. It is conceivable that single or double spaces lesions will not

only benefit by the use of surgical microscope in through dissection and in the absence of any fusion the complications may be further reduced with affecting the stability. In our series, all patients had fusion.

In patients with diseased vertebra the excision of the vertebra is followed by a suitable graft from the iliac specially in tuberculosis. In three cases of fracture dislocation the usual excision of traumatically avulsed disc and fusion by Cloward's technique has been supplemented by a thin plate of cold curve acrylic over the fused disc and fixed by screws, above and below. This helped in maintaining an effective internal stabilization and prevented dislocation once the external skeletal traction was removed. Several recent reports in the literature have supported the use of acrylic prosthesis. However, in the present series the result was satisfactory in two of them and the third developed oesophageal fistula in the postoperative period possibly due to concomitant injury to the oesophagus at the time of injury and added further by trauma due to the acrylic. Balmaseda [16] et al have also reported the occurrence of oesophageal cutaneous fistula in cord injury as a complication of anterior cervical fusion. In all the operated cases post operative spinal support was given in the form of cervical collar for 4 to 6 weeks except in dislocation where 4 poster brace was used.

The benign post operative course in the series was evidenced by reduced frequency of complications. The notable complication was temporary hoarseness in 7 (12%) patients. The frequency of this complication in the literature is also rare and temporary [16], [17], [18]. In all cases the hoarseness disappeared within 3 months. Possibly it has been due to endotracheal intubation and retraction of trachea during operation. All the operations in the present series were done on the left side of neck avoiding any injury to the recurrent laryngeal nerve although a remote possibility of an aberrant nerve is there.

The pattern of improvement in the present series speaks well of the surgical technique. Nearly 85% improved in motor power while the spasticity and sensory deficits have shown improvement in 75% and 67% respectively. The reflex and sphincters showed improvement in 58% and 55% respectively. The various modalities of improvement were gradual and progressive in the post operative period and reached a stationary phase after a varying period. The patients with tuberculosis and disc lesion showed better qualitative improvement out of all the aetiological factors and the pattern and extent of improvement were not significantly affected by the longer duration of the disease specially in tuberculosis.

The clinical presentation is myelopathy in 47 (85%) cases. Although 23 had mixed presentation, radiculopathy/neuropathy as a single entity was present in 8 (16%) cases only. This is unlike the western series where anterior surgical approach to the cervical spine became popular mostly in cervical spondylosis with radicular signs and symptoms. Possibly we are racially tolerant to pain. It is true that we have seen many patients of cervical spondylosis with radicular symptoms and signs in initial phase. We do not treat them by surgery as the primary procedure and most of these patients get better with conservative measures like analgesics, cervical collar, short wave diathermy and intermittent cervical traction etc. It is likely that they may have been getting intermittant radicular pain, which is either tolerable with the above measures or became tolerable in the course of time. In such situation these patients report only when they have developed other progressive signs and symptoms like spasticity and other features of myelopathy or intolerable pain. The history of the patients in the group of myelopathy of mixed type proved this contention. It is also observed that patients with myelopathy alone are the ones in which there is central disc herniation of one or more spaces, while ones with

mixed presentation usually had central as well as lateral disc herniation. The patients in this mixed group came late in their course of disease despite the recurrent radiculopathy and it is only after having developed spasticity and para or quadreparesis that forced them to come for operative treatment. This may be one of the reasons for the difference in presentation in present series compared to the western groups.

There were 11 patients with history of trauma which included 4 patients who were operated in acute stage with fracture dislocation. Barring patients with fracture dislocation where the traumatic avulsion of the disc is apparent, in all other cases of trauma the effect of trauma causing avulsion or subsequent degeneration of the disc may not be apparent initially. In all such acute cases the treatment had been skeletal traction for few weeks. This may render some improvement in the neurological status. However, after some time the improvement may become stationery or later may present with myelopathy or with persistence of previous neurological deficits. This indicated the degeneration of the disc subsequent to trauma and the myelogram depicted the defect pertaining to the affected disc. In all such cases Cloward's technique has been used with good results.

Sumary and Conclusion

1. From 1973 to 1985, 55 cases of cervical vertebral or cervical disc lesion were operated. 42 were discogenic, two had tuberculosis and 11 cases belonged to trauma group including 4 patients with fracture dislocation in acute stage.
2. The age of the patient varied from 12 to 65 years with average mean age of 42 years and 49 of them were males.
3. Pain in the neck or radicular pain or paraesthesia was present in 24 cases (44%), while paresis of varying degree was present in 30(54.5%) and 20(36%) had sphincter disturbance.
4. The presentation was myelopathy alone in 24, neuropathy/radiculopathy in 8 and combination of myelopathy and neuropathy in 23, thus 47 patients (85%) had myelopathy as the clinical presentation.
5. The anterior surgical approach by Cloward's technique was used in single space or double space lesions while Smith-Robinson's technique was adopted in the third space or in the least involved space if lesions were present in more than two space. If the lesion like tuberculosis or erosion or fracture of vertebra was noted, the pathological vertebra and disc were removed to obtain decompression and a suitable smugly fitting bone graft.
6. The post operative complications were minimal and the most important being temporary hoarseness and urinary infections. Three patients (5.4%) died in the post operative phase.
7. The patients were followed-up from six months to six years and the pattern of improvement indicated mild to significant improvement in paresis in 33 out of 39(85%). The spasticity also improved in 27 out of 36(75%). Sensory changes, reflex and sphincter disturbances improved in about 55 to 60% cases.
8. The relatively easy approach, avascular field, direct visualisation of pathological lesion, benign postoperative course and qualitative better outcome make the anterior surgical approach to cervical spine the operation of choice.

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