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Anterior Cervical Discectomy without Interbody Fusion

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Cervical spondylotic myelopathy (CSM) is a controversial disease entity. The exact pathogenesis of the disease is not clearly understood. CSM was originally attributed to posterior protrusion of the degenerated intervertebral disc material. Vascular insufficiency, narrowing of the cervical spinal canal, varying degrees of cord attrition during movements of the cervical spinal column etc. have also been implicated. In the face of the disputed pathogenetic mechanisms, various modalities of treatment have been advocated - conservative treatment with a cervical collar, anterior discectomy with or without interbody fusion, decompressive laminectomy - without the superiority of the one therapeutic approach. Till date no conclusive on the superiority of the one operative approach over the other has been presented. Phillips et al [1], Gregorius et al [2], Grandal and Batsdorf [3], Martins [4], Jeffrey [5], Mann et al [6] favoured the anterior approach, Epsteir et al [7], Gorter [8], Fager [9], Gonzales - Feria [10] and Wiberg [11] seem to favour posterior approach. To further add to the uncertainty Lees and Turner [12] and Nurick [13] reported that surgical treatment may not be superior to conservative therapy. The anterior approach to the cervical disc disease was described by Smith and Robinson [14]. Cloward [15] described the insertion of a dowel to achieve interbody fusion. Hirsch [16] performed anterior discectomy without fusion. Since then Martins [4], Murphy and Gado [17], Wilson and Campbell [18] Benini et al [19], Cuatico [20], Rosenorn et al [21], Husag and Probst [22] have reported good results and adequate post operative fusion on follow-up.

We are presenting 68 patients with cervical disc disease operated upon by the anterior approach without interbody fusion during the period August 1979 through July 1985.

Clinical Material

There were 10 females and 58 males in this study. The youngest patient was 22 years old and the oldest 60 years old. Forty five percent of the patients were in the fourth and fifth decade of life (Table 1).

Table 1 - Age and sex

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The onset of disease was insidious in all patients. A preceding history of trauma to the neck, most often indirect, was related to the onset in only seven patients. Forty patients i.e. 60% presented within one year of their symptoms. The longest duration of their symptoms was 12 years. The course of the illness was progressive in all the patients (Table 2).

Table 2 - Duration of symptoms

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Clinical Features : (Table 3)

Table 3 - Clinical profile

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1.**Pain**

Thirty patients presented with pain as a major complaint. Discogenic pain characterized by diffuse pain in the back of the neck, interscapular region with radiation to occipital region and shoulder was seen in 15 patients; two patients had radicular pain. The other patients had local pain only.

2.**Motor**

Wasting of the upper limbs was seen in 15 patients with fasciculation in 7 patients. Motor weakness and spasticity resulting in varying degrees of disability of dextrous movements of the upper limbs and ambulation was seen in all except two patients. Motor weakness was seen in, 66 patients in one or other limb. Quadriparesis was seen in 46 patients (67%) whereas 13 patients had weakness in the upper limbs only. Paraparesis and hemiparesis was seen in the remaining 7 patients. Spasticity was seen in 47 patients (70%) of which three-fourth (36) had involvement of all four limbs and in 11 patients only the lower limbs was involved. Flexor spasms were observed in three patients only. Quite characteristically, in these groups of patients the severity of spasticity seemed to be out of proportion to the degree of weakness.

3.**Sensory**

Sensory impairment was attributed to paresthesias and numbness. Paresthesias were encountered in 16 patients, four of which did not have any demonstrable numbness. hypoesthesia or joint sense impairment suggesting posterior column involvement was seen in 58 patients - 50% of which demonstrated a graded loss involving all four limbs. In 15 patients the sensory level was in the middorsal segments. Radicular sensory impairment was seen in two patients; two patients had a Lhermitte's sign.

4.**Autonomic disturbances**

Urinary disturbances in the form of hesitancy, urgency and frequency were seen in 28 patients. Importance and constipation were complained by four patients.

Radiological Investigations

Plain X-rays of the cervical spine showed osteoarthritic changes in the form of localized reduction of disc spaces, anterior and posterior osteophytes in 55 patients. Thirteen patient had normal X-rays. None of the patients had a congenital cervical canal stenosis. Positive contrast myelography was done in every patient using Metrizamdie or Iophendylate. A good clinico-radiological correlation was an essential pre-requisite in deciding for a surgical procedure. A total of 96 discs (including 3 reoperations) were removed from 68 patients. Forty-five patients had a single disc removal and 21 patients underwent two disc removal 19 of which were adjacent discs (Table 4). Two patients

underwent three disc removals, all of which were in contiguity. None of the patients underwent interbody fusion. The commonest site of disc prolapse was C5-C6 and was seen in 44 cases.

Table 4 - Levels of discs removed

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(Fig. in brackets denotes the no. of patients in whom single discs were removed).

Surgical Technique

The patients were operated through a transverse skin crease incision from the right side of the neck (except in 8 cases where they were operated from the left side). The annulus of the relevant disc space was incised and disc curetted out under microscope. Attempts were made to visualise the posterior longitudinal ligament but this was not incised or removed unless there was a herniation of disc through a defect in the posterior longitudinal ligament. All attempts were made to remove the osteophytes. The end plates were not removed, but while curetting the disc material some part of the end plates could have been damaged in occasional cases. No interbody fusion was performed in any of these cases either with a bone graft or acrylic. Postoperatively all patients were instructed to wear a cervical collar when ambulatory for a period of 6 months.

Results

Various grades of improvement were experienced by the patients. Patients were considered as completely recovered when the patients were completely asymptomatic and did not demonstrate any neurological deficit. Patients were considered as partially recovered when the patient improved symptomatically from the preoperative status but had some residual neurological deficit which was much less than prior to surgery. At the time of discharge from the hospital (usually on the seventh postoperative day) 46 patients (67%) showed an overall improvement while three had deteriorated. Of the 55 patients who came for follow-up, 37 patients had a follow-up of more than 6 months (25 patients for more than one year). Eighteen patients had follow-up period of less than six months, eleven of which were less than 3 months. Overall results at follow-up examinations showed that 16 patients recovered completely (30%); 31 patients showed partial improvement (56%). Four patients deteriorated on longterm follow-up although three of these had experienced partial improvement in the immediate postoperative period. There had been no trauma to the neck to account for the deterioration on follow-up (Table 5). Repeat myelographic studies showed unchanged myelographic defects in all the patients. Three patients were reoperated; while one refused reoperation. Following reoperation one patient improved, one is static and the third is lost to follow-up. A detailed analysis of the results are shown in Table 6. Overall follow-up results were correlated with the number of discs removed and the duration of symptoms prior to surgery. At the time of discharge there does not seem to be any significant difference between the two categories. However on longterm follow-up, results seemed to be better with single disc excision (Table 7). Patients with shorter duration of symptoms less than one

year appear to do better than those with a longer duration of symptoms prior to operation (Table 8) in the post operative period. But there was no significant difference on long term follow-up. Postoperative X-rays were taken at varying intervals following surgery in flexion and extension and were available in 32 cases. All patients showed reduction in the disc space with body fusion in nine patients (Figures 1, 2 & 3c).

Table 5 - Overall postoperative results

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Table 6 - Postoperative course and follow up

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Table 7 - Relation of number of discs removed and results

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Table 8

Table 8

- ***Post operative X-ray showing fusion at C4-5 following anterior discectomy without interbody fusion***
- ***Post operative X-ray showing fusion at C3-4 and C6-7 following anterior discectomy without interbody fusion***
- ***Post operatively X-ray showing subluxation at C4-5 level following anterior discectomy at C3-4 and C4-5 without interbody fusion***
- ***X-ray of the same patient following traction showing reduction in subluxation***
- ***X-rays of the same patient showing fusion at C3-4 and C4-5 level after 10 months of surgery***

Post Operative Complications : (Table 9)

Anterior cervical discectomy without interbody fusion is not without its share of complications. One patient suffered a tear in the vertebral artery while attempting to remove a lateral osteophyte. Mediastinitis characterized by fever, retrosternal discomfort and dysphagia was suspected in two patients and responded to conservative treatment. Vocal cord paralysis leading to hoarseness of voice was encountered in 3 patients which improved in two patients on follow-up. Other complications were transient dysphagia, wound infection, Horner's syndrome and lobar collapse. Three patients experienced postoperative deterioration. Subluxation was seen in two patients of which one occurred on the 4th postoperative day as a result of accidental manipulation of the neck in the radiology department. This improved with skull traction (Figure 3a-b). Another patient required the insertion of a dowel. However he was lost to follow-up. The third patient did not demonstrate any subluxation but improved with skull traction and cervical collar. Delayed subluxation following a minor trauma was recorded in one patient, which improved with skull traction. Three patients had recurrence of symptoms requiring reoperation at the same level.

Table 9 - Post operative complications

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Discussion

Controversy continues regarding the treatment of cervical spondylotic myelopathy. Although earlier reports have questioned the usefulness of the anterior surgical approach, later reports have re-emphasized this mode of therapy. The precise surgical modality-anterior discectomy with or without fusion or cervical decompressive laminectomy - is still a bone of contention.

The anterior surgical approach to remove the degenerated disc was first utilized by Smith and Robinson [14] and later modified by Cloward [15]. Rosomoff [23] reported on 50 patients operated by the anterior approach with fusion. Twenty per cent of the patients were symptom-free and completely normal on neurological examination. Another 20% patients did not have any symptoms nor did they have any functional disability but had exaggerated jerks. Overall 70% had a major benefit or returned to normal. Candall and Batsdorf [3] reported that 70% patients had recovered completely or had improved significantly from their pre-operative status; none of the patients had deteriorated. They have advised an anterior approach fusion in cases wherein one or two level discs are involved. Philips [1] while comparing the results of conservative therapy, posterior decompressive laminectomy and the anterior approach has unequivocally advocated the anterior approach. In his study 74% patients improved by this approach while only 37% improved on conservative treatment and 50% with the decompressive laminectomy. Martins [4] demonstrated 90% improvement by the anterior approach. None of the patients deteriorated. Gregorious [2] in a restospective study showed that there was a significant statistical difference between patients operated by the anterior Cloward approach and those who underwent laminectomy; postoperative disability tending to improve with the former. However, they noted that there were some cases of excellent results with longterm follow-up after laminectomy too. Their results indicate a trend towards better postoperative follow-up results by the anterior approach. Mann [6] et al reported single stage multilevel anterior decompression with or without fusion. Improvement in the disability status was seen in all cases; none of the patients showed clinical evidence of progression of myelopathy. They could not point out any specific prognostic factors except that patients with a severe deficit and a long duration symptoms did not do as well as others. In midst of these encouraging reports Lunsford [24] et al have reported disappointing results with 50% patients experiencing no improvement or deterioration after surgery. It may be pointed out that the microscope was not used in these cases. Galera and Tove [25] could demonstrate only 39% immediate postoperative improvement which further lessened on longterm follow-up. However analysis of their cases showed that 62% of their patients had a narrow spinal canal and 90% showed pathological changes at two or more sites where as only 65 discs were removed from 51 patients. In our study overall improvement of 67% was obtained at the time of discharge. On long term follow-up, 48 of 55 patients (87%) had improved, of whom 16 had recovered completely. Postoperative deterioration was seen in only three patients.

Posterior decompressive laminectomy with or without dural grafting, removal of the ventral osteophytes and foraminotomy has had its share of proponents. Epstein [7] et al reported 90% improvement with decompressive laminectomy with facetectomy and removal of ventral osteophytes. Wide laminectomies with facetectomy could predispose to cervical instability. However Stoops and

King [26] have shown that bilateral partial facectomy does not produce any spinal instability. Till recently laminectomy was the only mode of treatment available and various authors reported improvement in CSM in 70% of the patients [8], [9], [27]. Wiberg [11] demonstrated that while the progression of myelopathy was arrested in 95% of the patients, both early and late results disclosed improvement in 80% patients.

Spasticity was relieved in 65% of patients by the time of discharge to a variable degree - one of these had complete recovery. Pain was relieved partially in 17 of the 20 patients. Immediate relief in motor weakness and sensory impairment was obtained less often (41% & 48% respectively) but improvement gradually, although slowly, on long term followup in 75% patients.

Did the duration of symptoms substantially influence the postoperative results ? Analysis of Table 7 shows that although there is no appreciable difference in the results immediately after surgery, longterm results tend to show better results in those with a duration of symptoms of less than one year. Mann [6] et al showed a statistically significant correlation with duration of symptoms; those with symptoms lasting for over 5 years did not do as well. Lansford [24] did not find any statistical correlation between the preoperative duration of symptoms and the out come. Bishara [28] showed that 80% of the patients who improved had symptoms of less than 2 years. Phillips [1] emphasized that best results were obtained early in the course of the disease (less than 1 years) by the anterior approach.

None of the patients in this series had an interbody fusion. Hirsch [16] first introduced the concept in 1960 and the procedure has since been advocated mainly for spondylotic radiculopathy. Lansford [24] reported patients with spondylotic myelopathy operated with or without interbody fusion but did not find any difference in the postoperative results. Mann [6] et al performed simple discectomy without fusion if the anterior indentation was less than 4 mm, and anterior trephination with fusion if the anterior indentation was more than 4 mm and showed consistent improvement. Similarly, Jomin [29] et al demonstrated comparable results with the Cloward's operation and discectomy without fusion. Irrespective of the operative technique 45-50% with symptoms of spinal cord involvement improved.

Various donor-site related complications especially persistent pain and hematoma formation necessitating a longer convalescent period have been observed [6], [15], [21]. Persisting neck pain attributable to ligament strain has also been reported. Spinal instability is an infrequent complication when interbody fusion is not done. This was seen only twice in this series. Martins [4] showed bony fusion in 70% of the patients even though interbody fusion was not done

Single-stage multilevel discectomy does not seem to increase the risk of postoperative complications. Infact, the surgical results too do not reveal any difference in the immediate postoperative period. However, on long term follow-up patients who had a single disc fared better. This could be related to the underlying damage to the spinal cord and roots which was restricted with single level compression as compared with multiple discs. Mann [6] et al have operated at more than one level disc in a single stage in a large number of cases, with no significant change in outcome. Lansford [24], [30] also performed single stage multilevel descectomy but did not demonstrate any difference in outcome.

To summarize, based on our experience with the anterior approach interbody fusion is not required. Use of the operative microscope helps to achieve adequate removal of disc and osteophyte thus satisfactorily decompressing the neural elements, while at the same time avoiding postoperative spinal instability.

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