
Treatment of Cervical Spondylotic Myelopathy by Anterior Interbody Fusion

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Cervical spondylosis is fundamentally a degenerative disorder starting in the intervertebral disc and progressing with advancement in age to involve more than one disc. The disorder is common in this country as it is elsewhere. Cervical spondylotic myelopathy (CSM) is the commonest disease of the cervical spinal cord after the age of 40 years. As an operative procedure in the treatment of myelopathy both anterior and posterior approaches are used. Raynor [1] writing on the treatment of this disorder said that the choice of anterior or posterior approach to the cervical spine may be governed by the prejudices of the surgeon and his familiarity with a specific approach. There could be some truth in that statement. In cervical spondylosis the pathology lies anteriorly and the anterior surgical approach to remove the degenerated disc along with osteophytes and to stabilise the spine by interbody fusion is widely believed to be superior to laminectomy, which is merely a decompressive procedure [2], [3].

It is believed by some that anterior approach is useful when one or two interspaces are involved and it is contra-indicated when bony canal is developmentally narrow [4], [5]. Dr. Cloward [6], [7], [8] from Honolulu and more recently Dr. Kadoya [9] et al from Japan have shown that spondylotic pathology in the anterior cervical spine can be dealt with effectively at any number of levels and the anterior approach can be used in the treatment of myelopathy in a developmentally narrow canal.

I have done anterior cervical discectomy with interbody fusion in over 300 cases of cervical disc disorder in conditions like radiculopathy, myelopathy, persistent cervical pain and/or a combination of these presentations. The results in 150 cases treated earlier have been published elsewhere [10], [11]. Cloward technique [6], [7] was then used. More recently I have used Smith and Robinson technique [12], [13] and microdissection of the osteophytes. Since June 1983 till November 1985 a series of 25 cases of cervical spondylotic myelopathy have been treated over a period of three and half years by using this technique. The follow-up has been up to April 1986.

Summary of cases

Of the 25 cases 22 were males and three were females. Majority of the patients were in the age group between 41 and 50 years as shown in Table 1. There was only one case above the age of sixty years and two younger cases were between 21 and 30 years. The canal size is shown in Table 2. The canal is measured from C3 to C7 levels. The film focus distance is 150 cms, and correction for magnification has not been applied. Most of us use Burrows classification [14]. He has specified the film focus distance of 180 cms or 6 feet. If this distance is shortened the magnification becomes more. The factor of film object distance has also to be taken into consideration. Due to this variable factors there is no consensus concerning criteria for a developmentally narrow canal. If magnification factor was applied some of the cases would have shown narrow canal.

Table 1 - Age incidence of myelopathy

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Table 2 - Mean sagittal diameter in 21 cases of CSM treated by anterior fusion

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Preoperative neurological evaluation included pain in the neck, radiculopathy and different grades of myelopathy. All the 25 cases had suffered from pain in the neck with restriction of spinal movements. Myelopathy was graded according to the classification of Nurick [15]. As shown in Table 3 fifteen cases were in II and III grades i.e. they had difficulty in walking and hampering of full time work in some cases. Nine cases had no difficulty in walking although they had signs of myelopathy and hence fell in the mild variety (Grade I). Table 4 shows the incidence of radiculopathy in these cases. All 17 cases had evidence of radiculopathy. It was unilateral in 12 cases and bilateral in 5 cases. Signs and symptoms of radiculopathy included pain, paraesthesiae, clumsiness in the fingers and weakness of the arms.

Table 3 - Classification of disability

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Table 4 - Associated radiculopathy

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With grade I myelopathy the duration of symptoms varied from few months to less than one year. All grade II and III cases had symptoms for more than one year. Bladder symptoms were present in only one case aged 64 years. Eight cases (one third) had history of high blood pressure but under control. Only one case had significantly high blood pressure (systolic above 200 mm Hg). In the rest it was mild or well controlled. Diabetes was present in five cases and in three there were both diabetes and high blood pressure.

Myelogram was carried out in all using myodil^R as the contrast medium. Fusion was carried out at all levels showing significant indentations. Deliberate attempt was not made to demonstrate myelographic block in extension. In this series there was no evidence of block or obstruction to the flow of myodil purely because of hypertrophy of ligamentum flavum or hypertrophy of posterior facets or thickening of laminae [16]. In all 42 interbody fusions were carried out in these 25 cases as shown in Table 5. When the myelographic indentation was thought to be insignificant fusion was not carried out at that level. For example in one patient there was sequestered disc at C 6/7 and significant indentation at C 5/6 and C4/5. There was also some indentation at C 3/4 but it was not significant and fusion was carried out only at three levels and only disc removal at C3-4.

Table 5 - Level of fusion in CSM Total no. of cases=25

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Operative Technique

Smith and Robinson technique was used but head was not turned too much to one side. The spine was approached from the right side. Longus colii muscles were detached till anterolateral surfaces of the vertebral bodies were well seen. Disc tissue and hyaline cartilage along with overhanging osteophytes were excised. Microscope was then wheeled in and osteophytes were excised along with unconvertbral joints and posterolateral corners of the vertebral bodies, particularly the upper one where roots travel obliquely. Posterior longitudinal ligament was preserved most of the times. Excision of osteophytes was done with Codman and Shurtlet 3/0 and 2/0 upbiting curettes or 1 mm and 2 mm punches. Drill was used less frequently. Posterior ridge of the vertebral body was excised with 3 or 4 mm chisels. Fusion was carried out with horse shoe shaped graft taken from the anterior iliac crest.

Operative Results

The operative results of myelography have been tabulated in Table 6. Twenty three out of 25 cases (92%) showed improvement in grades. All the nine cases in Grade I have shown excellent results improving to Grade 0 and have gone back to work. All the three females in this series were in this group. One of them working in the farm has been advised not to carry heavy weight on the head. One case in Grade IV did not improve but deteriorated and within one year has become totally incapacitated. Eight dock workers were in Grade II and III. Seven of them have improved in Grade and have resumed work, but they are not doing their normal heavy work of carrying heavy weight on the neck and shoulders. Seventeen cases had significant radiculopathy. In 14 the radicular pain has completely disappeared. One case has not shown satisfactory improvement and one case has shown late improvement at the end of three months. Significant cervical pain had disappeared in all patients but mild pain in the neck has persisted in 13 patients.

Table 6 - Operative results

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Overall improvement in 23 out of 25 cases or 92%.

Discussion

With better understanding of the dynamics of the spine the concept of surgical treatment of cervical spondylotic myelopathy has changed in recent years. The pathology in spondylosis lies anterior to the cord and many times osteophytes arising from the posterior borders of the vertebrae at the level of the degenerated disc causes compression of the cord and the roots. Excision of the offending elements appear logical. Anterior approach seem convincing and rational. An ideal spondylotic surgery should decompress cord and the roots, cause distraction of the vertebral bodies and achieve stabilisation by interbody fusion. The concept of motion segment of the spine is gaining popularity and according to Junghans [17] if there is degeneration in the anterior motion segment i.e. the intervertebral disc then the whole motion segment is altered. In cervical spondylosis the anterior part of the motion segment is altered and if elements of posterior motion segment are excised by doing a decompression

laminectomy the dynamics of the spine are jeopardised. Anterior surgical approach removes decompression, distracts the spine, create stability and preserves the posterior motion segment. Certain amount of justifiable criticism has been levelled against laminectomy [1], [9]. It cannot reduce kyphosis or angulation, cannot resect large disc protrusion, cannot prevent abnormal flexion and extension movements which may be harmful and it can induce a new pathological factor of post operative scar. Scar tissue can produce root sleeve fibrosis which can interfere with blood supply by way of arterial spasm, episodic loss of autoregulation and permanent occlusion. It has been shown [18] that scar tissue compressing the cord can produce as less a sagittal diameter as 6 mm, between scar tissue and posterior surface of the vertebral body, and cause central cord syndrome.

Developmentally narrow canal should not be a contraindication for anterior approach [19]. Kadoya [9] in a series cases of developmentally narrow canal could achieve satisfactory decompression in all cases by excising all compressive elements meticulously by microsurgical techniques. In the present series there was no problem with anterior approach at one, two or three levels. Two cases with established neurological deficit have not shown improvement. Besides the only case over the age of sixty had associated significant diabetes and high blood pressure. These cases exemplify that cervical spondylotic myelopathy has multiple factors contributing to its pathogenesis.

Buckling of the ligamentum flavum causing block in extension has been an argument in favour of laminectomy. It is now believed that after anterior cervical fusion the ligamentum is stretched and buckling does not occur in extension. It is not necessary to excise the ligament after interbody fusion in those cases showing block in extension on myelogram.

Ogino [20] et al have done autopsy studies in cases of spondylosis with developmentally narrow canal. They have shown reeducation if effective space available for mobility of spine and then transverse ridges cause anterior indentation of the cord. Clinically excision of these ridges followed by interbody fusion resulted in improvement in myelopathy. In the present series due to variation in film focus distance the true sagittal diameter has not been calculated.

There have been no series complication in the present series except for the formation of retropharyngeal abscess in one case. The recovery has been good after drainage of pus without removing the bone graft. The neck was immobilised in a collar and antibiotics were given for three weeks. The graft has taken up well. Among the rest the post operative convalescence was smooth with not more than ten days stay in the hospital. There was no incidence of vocal cord paralysis or injury to major blood vessels [21]. Slight anterior protrusion of the dowel is not considered a complication. At the end of six months all cases have shown good bony fusion with not a single case showing non union or pseudarthrosis.

Cervical spondylosis is essentially a degenerative disorder of disc at multiple levels associated with advancing age. When the canal is narrow myelopathy appears early even with small osteophytes. It is rare to get myelopathy without contribution of degenerating pathology in the spine or a narrow canal. Removal of multiple disc and fusion improves myelopathy but, it is argued, alters physiological loading pattern of the spine. This may well be true, but the argument that fusion precipitates degeneration in adjoining disc has not been clinically correlated.

I have operated upon all disc spaces showing significant indentation of the myodil^R column. So far no case has come for reoperation at an adjoining space. I have also not encountered a case requiring fusion at more than three levels. By our understanding of the biomechanics of the spine and pathogenesis of cervical spondylosis anterior approach to the spine appears to be the answer to the

treatment of most cases of cervical spondylotic myelopathy.

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