

Microsurgical Anatomy of the Disc Space in Degenerative Cervical Disc Disease

Volume: 06**Issue: 2S****December 1988****Page: 107-110**

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Anterior cervical discectomy has gradually become the standard mode of therapy of degenerative cervical disc disease, since its introduction by Smith and Robinson [1], and subsequently by Cloward [2]. Degenerative cervical disease has been variously referred to as spondylotic discs and non-spondylotic disc or hard and soft discs. This study deals with our observations of the anatomy of the cervical disc space during the procedure of microdiscectomy.

Materials and Methods

Seventy-five consecutive patients (69 males and 6 females) with degenerative cervical disc disease, presenting with radiculopathy, myelopathy or a combination of both, ranging from 20 to 60 years of age were operated upon by the anterior route during the period 1983 to 1986. Diagnosis was established from the history, clinical findings and neuroradiological investigations which included plain X-rays and myelography using either myodil or metrizamide. Discography was not done and spinal CT was performed in only a few cases.

All cases were operated upon by the same surgeon and the operating microscope was used in all cases. The approach was from the right side always (recurrent laryngeal nerve paresis was not a problem; transient being encountered in only 3 patients). During the operation the disc space and adjacent structures were studied carefully, in particular the anterior osteophytes depth of the disc space, consistency and site of the disc material, the posterior osteophytes and the posterior longitudinal ligament (PLL).

Results

Study of the disc anatomy intra-operatively revealed that they could be divided into mainly two groups, with characteristic features. These were designated as Type I and Type II disc spaces. Features characteristic of Type I were narrow disc space, hard posterior osteophytes, anterior osteophytes usually present and consistency of disc material fibrous to soft (Table 1). Type II had normal disc spaces, absence of posterior osteophytes, occasional soft cheesy osteophytes posteriorly and consistency of disc material soft to gelatinous (Table 2). There were 37 cases of Type I and 32 of Type II. In addition there were 6 cases which did not clearly confirm into either category, having certain

features of both types. These were designated as Type III (Table 3).

Type I - 37 cases:

Characteristics:

Narrow disc space

Hard post. osteophytes

Disc material fibrous to soft

Levels of disc disease

C3-4 - 3

C4-5 - 8

C5-6 - 24 4

C6-7 - 17 11

Type of prolapse: post. long ligament

Table 1

Table 1

Disc material beyond osteophytes (2-6 mm) - 26

Significant disc material between PLL & DURA - 4

Osteophytes -

Antr. 27

Post. All cases

Type II - 32 cases:

Characteristics:

Normal disc space

Absence of hard post. osteophytes

Soft cheesy osteophytes

Present occasionally

Disc material-Soft to gelatinous

Levels of disc disease:

C3-4 - 0

C4-5 - 7

C5-6 - 23 3

C6-7 - 8 3

C7-11 - 1

Type of prolapse: post. long ligament

Table 2

Table 2

Significant disc material between PLL & DURA - 4

Soft cheesy post. Osteophytes 5

Table 3

Table 3

No. of osteophytes - Disc space slightly narrow

- Disc material fibrous-3

Small post. osteophytes upper edge only

Ant. osteophytes small - Disc material very soft -2

No. post osteophytes

Disc space slightly narrow - Disc material gelatinous 1

Post. long ligament intact in all cases.

The commonest level involved in all types was C5-6 followed by C6-7 and C4-5. Among Type I cases there were 22 central prolapses of which 11 had breached the PLL. The rest were lateral prolapses or combined. Significant disc material was found beyond the osteophytes in 26 cases. Sixteen of the Type II discs were central prolapses and 12 had lateral prolapse. Nine of these had breached the PLL. Significant disc material was found between the breached PLL and dura in 4 cases each of Type I and Type II discs.

Hard posterior osteophytes were always present in Type I discs. Commonly they formed a continuous bony ridge along both vertebral edges. Laterally these merged with osteophytes in relation to the posterior portion of the unconvertible joint. Type II and Type III discs occasionally had osteophyte like excrescences posteriorly but these were cheesy in consistency and could be removed easily. Breach of the PLL was encountered a little more frequently in Type II discs (60%) than in Type I discs (50%) (Table 4). The breach was usually lateral or paramedian. The central portion being thicker and more firmly attached was seldom breached.

Table 4

Table 4

Discussion

Our observations have revealed two very distinct types of degenerated diseased cervical disc space. Hard posterior osteophytes are the hallmark of Type I disc space with a narrowed disc space and fibrous disc material. Type II disc space had soft disc material in a normal sized disc space. In Type I discs one had the difficult proposition of removing a fibrous disc in a narrowed disc space and excision of the hard posterior osteophytes along with the posterior portion of the unconvertible joints. It may be recalled that this joint forms the anterior relation of the intervertebral foramen. therefore to decompress the root one must drill off the posterior portion of the uncinat processes. The vertebral artery lies in relation to anterior portion of the uncinat processes and so to avoid injury to the artery it is safe to remove only the posterior portion of the uncinat processes. These problems were not encountered in Type II disc but breach of the PLL was little more frequently encountered. This necessitates the careful inspection of the PLL and further in Type II spaces to look for extended disc material. Clear characterization of the two distinct types of disc spaces with different micro-surgical

anatomical features enables the surgeon to plan an appropriate operative strategy, since the problem and equipment needed for each type of operation are different.

1. Smith C W, Robinson R A, Treatment of cervical spine disorders by anterior removal of the intravertebral disc and inter body fusion

Journal of Bone & Joint Surgery (Am) Page: 40 A: 607-624, 1958

2. Cloward R B, The anterior approach for removal of ruptured cervical discs

Journal of Neurosurgery Page: 15: 602-617, 1958
