

Lumbar disc surgery : A retrospective study of 150 cases

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INTRODUCTION

Refractory low back pain resulting from a herniated nucleus pulposus uncommonly requires surgical intervention. One hundred fifty cases underwent lumbar disectomy over a 6 year period, and all the operations were performed by single surgeon. The majority of patients had pain relief, but a certain percentage of patients had persistent leg paresthesias, or recurrent symptoms over the course of time. The procedure failed to completely relieve symptoms in 20 patients and two were definitely worse after the surgical intervention. The statistics are reviewed, surgical technique described and the problems and options of management of herniated lumbar discs explored.

MATERIAL AND METHODS

All patients were fully evaluated by single surgeon and all relevant baseline investigation completed. This included a routine urine analysis, blood counts, haemoglobin and plain X-Ray of the lumbar spine. Note was made of any anatomical variation in the lumbar-sacral region, viz sacralization or lumbarization. (It is worthwhile to note that plain X-Ray of lumbo - sacral spine is not of much relevance in the initial management of possible

herniated lumbar disc.)

The patients were then assessed by a physiotherapist and prescribed flexion back exercise and taught about posture and back care in detail. A lumbar corset was given to those patients who found it comfortable and useful in performing activities of daily living.

Analgesics and non-steroidal anti inflammatory drugs (NSAIDs) were prescribed for all patients, the dosage and duration of treatment depending upon the need of each individual patient.

The above measures were prescribed over a period of 3 to 6 weeks, and if patients were not better, further investigation were ordered. Initially lumbar myelography was the only option available, but over the last several years CT scans has become readily available as an alternative. In prescribing a particular investigation over another, the cost factor is crucial. Once clinically correlating pathology was demonstrated on the myelogram or CT scan, the problem was again discussed with the patient, and the option of continuing conservative treatment offered. Thus surgery was definite end option, having thoroughly exhausted all available non-operative treatment modalities.

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Table 1 : Showing the age, sex, affected side and affected levels

Total number of cases - 150											
Sex		Average Age in year		Affected side			Affected Level				
							Single			Multiple	
M	F	M	F	R	L	B/L	L ₃ -L ₄	L ₄ -L ₅	L ₅ -S ₁	L ₃ -L ₄ -L ₅	L ₄ -L ₅ -S ₁
108	42	35	40	60	78	12	3	85	45	3	14
Ratio		Mean Age									
2:3	1	37.5									

Radiological Diagnosis:

An accurate X-Ray diagnosis prior to surgery is of paramount importance. Myelography is most readily available locally but there are times when the water soluble dye becomes scarce. Of recent, CT scan has become available and it provides a good alternative for both the physician and patient.

Of all the investigative modalities available, a CT Discogram is the accurate investigative tool to judge the anatomical state of degeneration of the disc. (7). The MRI, however, is more sensitive and specific than the CT scan in judging soft tissue relationship in the neural canal, and it is probably the investigation of choice in most centers where it is available and affordable. The CT scan and MRI are both non-sensitive investigation tools and this is the reason for their preference over myelogram. Recent reports have raised speculations on the role of the ultrasonogram (USG) in studying disc degeneration. Encouraging reports suggest that, as a screening procedure to judge disc degeneration, USG may be an ideal tool. Where the technical expertise is available, in the dubious case, a lumbar epidural venogram can also be of incalculable help.

In our set-up whether a patient has a myelogram or CT scan depends on several factors:

1. Which facility is operational.
2. Whether or myelographic dye is available.

3. What the patient can afford to spent investigations. Very occasionally, a single patient may require both investigations to plan surgery. Lesions in the L5-S1 regions may be sometimes be difficult to assess on myelogram and if clinical parameters are not clear, a CT scan or MRI may be preferred over myelogram. The quality of X-Rays, which are such great importance in planning and executing surgery, are not consistent, and pose a serious problem to the surgeon in our present situation.

Surgical Technique

The patient is placed in the prone position under general anaesthetic with endotracheal intubation. All the operations performed by the senior author were done in the semi-jack-knife position. The knee chest position which is more desirable, was not possible on our operating room table.

A marker X-Ray was then done to identify the level of pathology. This practice has helped to reduce the size of the surgical incision and prevented exploration of wrong level which has happened to author on one occasion.

Using electrocautery, haemostasis is secured at each step and the disc and overlying ligamentum flavum are exposed. The ligamentum flavum is excised using a sharp knife and the epidural fat then comes into view. The margins of the superior laminae are then nibbled with a rongeur to

expose the nerve root which is then gently retracted to expose the disc space. The patterns of discs herniation encountered were:

- Lateral herniation, causing posterior lateral displacement of the root which is often stretched over the disc mass.
- Axillary herniation with disc tissue caught between the nerve root laterally and the dura medially.
- Large centro-lateral, supra axillary bulge causing pressure in the root or the axillary portion of the nerve.
- Sequestered disc fragment causing compression and adhesion around the involved root.

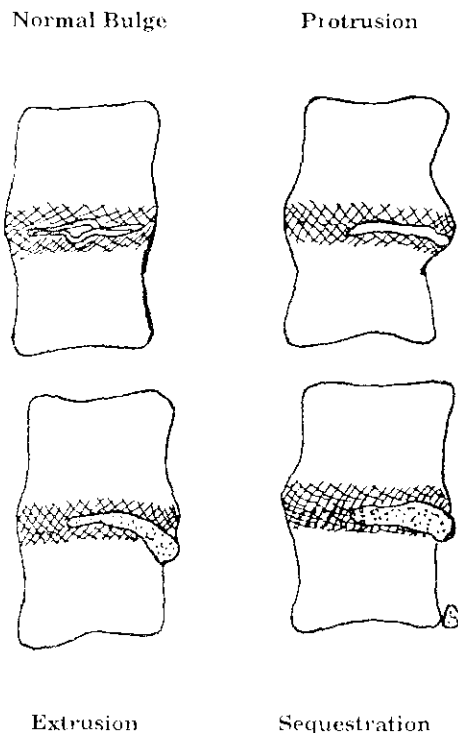


Illustration 1 - showing the different types of Disc Herniation

Amongst the patients in this series around 50% (75 patients) demonstrated a significant degree of nerve root adhesion to surrounding tissues, causing difficulty in decompression of the nerve. In some, the dura was firmly adherent to the surrounding

ligamentum flavum, and the utmost care was required to prevent injury to neural tissues. The margins of the facet joints were carefully chipped off with an osteotome in some difficult cases.

The aim of surgery was two fold:

- Disectomy of the ruptured intervertebral disc.
- Adequate decompression of the involved nerve root/s.

Disectomy was carefully but thoroughly completed using straight as well as up cutting and angled ronguers. The amount of disc tissue removed may give some indication as to the adequacy of the decompression. Bleeding can be very troublesome, but can always be controlled with patient surgical technique. Epidural sinusoidal veins can be carefully cauterized with bipolar diathermy when available. Otherwise most bleeding can be stopped by gently packing with cotton pledgets. Use of high current electrocautery is dangerous and should be used extremely cautiously. Any complication is carefully attended and the wound closed in layers in the standard manner.

Surgical Complications:

- Dural Tears : 8
- Neurological Deficit : 2
- Exacerbation of Leg Pain (Temporary) : 10

There were no intra-operative fatalities and there was no serious blood loss, requiring transfusion in any patient. We do not routinely order any blood, as we have not found it to be necessary. However in re-operation on the spine, it may be wise to have blood available as bleeding from scarred tissue can pose problems. In this series, two patients require re-operations, one for a new disc herniation at a higher level, two years after the first intervention; the other for unrelieved pain, in a patient who had missed sequestered disc fragment at a higher level than the level which was explored.

Eight patients had dural tears. Six of these occurred during surgery and were repaired successfully using continuous sutures with 5-0 dextron. A difficult tear may require mobilization of flap of fat or muscle. One patient presented one week after discharge from the clinic with CSF leakage from the surgical wound. This patient had no dural tear during the surgical procedure. His leak did not subside with rest, and on exploration a linear tear in the dura was found just above the margin of the superior facet. The patient had undertaken a bumpy bus ride very soon after discharge, and it is assumed that this may have been the etiological factor for the tear. Knowing the status of our roads and buses, it is important to advise patients against taking bus rides for about 4 to 6 weeks post operatively. Another presented to the clinic on the 7th post operative day with dural leakage. This subsided completely after rest for one week. Since he did not give a history of trauma or any unusual physical activity, it must be assumed that an unrecognized dural tear must have occurred during surgery.

Two patients had worsening of neurological deficit. One patient had permanent glove and stocking type of paresthesia affecting the entire leg and foot. She had weakness of ankle flexion and extension. When last seen the patient was free of back pain and ambulating satisfactorily, but the sensor motor deficit was permanent, at follow up one year post surgery. The second patient was young male who demonstrated a cauda equina like syndrome post operatively. He had troublesome epidural sinusoidal bleeding, but the procedure was not unusual in any way. The L4-5 disc on the (R) side was explored. The patient made a slow improvement of his deficits and was discharged ambulating independently. He had severe S1 root weakness bilaterally along with anaesthesia around the perianal and genitalia regions.

There were 10 patients with exacerbation of leg pain and paresthesias post operatively, without associated neurological

worsening. All these patients showed gradual improvement. They all received a short weaning course of steroids, which was generally reserved for patients with lot of nerve root pathology or with pre-existing significant neurological deficit. Of recent, we have started to give a bolus dose of 4 mg Dexamethasone during the surgical procedure whenever there are extensive root adhesions and when the neural tissues have to be handled more than usual.

There were 3 patients with long standing pre-operative neurological deficits and in all these patients there was anaesthesia around the groin and genitalia. Two male patients also complained of loss of libido. Post operatively over the ensuing months, both patients had improvement of the libido, but there was permanent alteration of sensation around the groin and genitalia in all 3 patients.

Major weakness in the leg (toe extensors) and loss of retarded ankle jerk was a common finding in patients with L4-5 and L5-S1 disc herniation respectively.

Errors In Treatment:

1. Inaccurate X-Ray Diagnosis : 8
2. Wrong Level Exploration : 2
3. Poor Patient Selection : 4

It is extremely important for the surgeon to familiarise himself with interpretation of X-Ray to plan surgical treatment. There is only limited interaction between the surgeon and radiologist and simple mistakes in X-Ray interpretation and labelling may lead to catastrophic complications if the surgeon is in the habit of doing surgery by just depending upon the X-Ray reports. Amongst the 8 cases, there were 3 cases of wrong CT interpretation 3 cases of wrong interpretation of myelograms and 2 cases of wrong labelling of sides. If a habit is made examining patient just prior to anaesthesia, the clinical findings will assist in clarifying any doubt regarding the X-Rays.

Two patients had exploration of the wrong level, one was prior to the use of

routine X-Ray markers and the second case was a patient with a two level herniation in which the major pathology was not clearly defined on a CT study.

Amongst the four patients who were labelled as poor selection, 3 were hysterical women and one was man seeking compensation and job related gains. These factors may have been picked by a detailed Minnesota Multiphasic Inventory Personality screening test, which we do not carry out.

Long-term Results of Treatment:

Out of the 150 patients reviewed (last patients was operated 8 months back) 41 patients have come back on repeated occasion with one complaint or another. This includes the patients with neurological deficits (2), hysterical personality (3), job gain (1) and acute sciatic pain(10). The remaining 24 patients complained of a nagging paresthesia and leg pain of an episodic nature. They were relieved with rest and analgesics. Four of them received a short course of steroids, in addition to all 10 patients who had acute sciatic pain in the immediate post operative period. All the patients with residual back and leg pain seemed to get better with time, and the objective parameters definitely improved steadily. If questioned seriously, these patients felt that they were not completely well and appeared to harbour apprehension about repeat episodes of back pain. One of these patients, did have a re-herniation of the disc at different level 2 years after the first intervention, and was successfully operated upon the second time. One patient (a young female) presented 1 year after surgery with acute onset paraplegia, which was irreversible, from transverse myelitis. This patient subsequently expired.

Of the remaining 109 patients it can be assumed that:

1. They are completely relieved of their symptoms.
2. They are unable to come for follow-up for new complaints for one reason or

another.

3. They are back to functional level of activity and can manage with some residual symptoms.

DISCUSSION

The key to a successful outcome in lumbar disc surgery is a combination of accurate diagnosis, good surgical technique and proper patient selection. In this series, nearly (27%) patients had some complaints persisting on a long term basis after surgical treatment. Although only 2 patients were definitely worse after surgery, 41 of the total of 150 patients had minor recurrent symptoms over one to several years after surgery.

There is no difference of opinion that most important elements of treatment in acute lumbar disc herniation is an adequate period of best rest. In the supine position, the intra-discal pressure can be significantly reduced(5,6,9).

The average duration of symptoms in the patients in this series was 8 months, the shortest 8 weeks and the longest 5 years, with interval periods of well being in between attacks of disabling back and leg pain. All patients had thoroughly exhausted available avenues of non-operative treatment. In addition to rest, analgesics and NSAIDs, a standard program of back care was prescribed and enforced on all patients. Traction was used only in a few cases, for logistical reasons. Mechanism of pain relief with traction techniques are controversial, and some authorities believe that traction is an effective methods of enforcing bed rest. Thus all the patients in the series had an adequate trial of conservative treatment, and the surgical options was always an open one (excepting those patients who had absolute indication for surgery viz. increasing neurological deficits unrelieved severe pain). A recent trial of conservative treatment versus of 5 year there was no significant difference in the level symptoms in the two groups of patients(3). However, the absence from work was considerably greater in the group of operated patients.

The cost of treatment over the years was almost the same.

The experience shows that in the absence of progressive major neurological deficits, the option of continuing conservative treatment must be offered to the patients who have not benefited from the first or second 6 weeks trials of conservative treatment. Amongst the patients in this series there were 14 errors in initial diagnosis. The reasons for this are several fold:

- a. Patients are unable to undergo repeat investigations when these are deemed necessary, for economic reasons.
- b. Complete or near complete absence of a therapy centered dialogue between the radiologist and surgeon. Often times, an additional view of a pathological focus might provide more information to plan surgery, and this opportunity is lost.
- c. Large majority of patients are referred to this surgeon with a view to effect a cure, and they are often from out of town. Failure to understand the patient's personality and other related factors may have resulted in the improper selection amongst some, for surgical treatment. This became obvious only later, after surgery.

Manipulative reduction of disc herniation have been tried, but much skepticism remains. In well defined posterior facet syndromes and S-I joint displacements, manipulative treatment has been found beneficial (5).

The most profound presentation of a herniated lumbar disc is the cauda equina syndrome, and this is an absolute urgent indication for surgical intervention. Three patients in this series with anaesthesia around genitalia and sexual dysfunction, were operated upon on an average 6 months after onset of symptoms. Their recovery was incomplete, as already mentioned. Motor weakness which is of recent onset and significant or of a progressive nature is also an important index of judgement.

Weakness of the Extensor Hallucis Longus (EHL) was very common finding amongst 85 patients who presented with a L4-5 disc lesion, 70% had weakness of the EHL, which was profound, and only 50% of these recovered fully after surgery, although there was functional disability from this. Patients with such acute or chronic motor weakness are not indications for urgent intervention and conservative treatment must be exhausted.

In one study amongst 300 patients, after at least 6 weeks of conservative treatment pre-operatively, epidural steroid injection was given and 81% showed relief temporarily. A short-term relief can be expected in 80% of patients; for 34% relief for as long as 6 months was noted (6). (In our institution, epidural injection both pre and post operatively with Depomedrol is offered to selected patients, with disc and with spondylitic back pain, under controlled conditions by an anesthesiologist, and the result are encouraging.)

Over half of century ago, an occasional laminectomy was performed for lumbar disc disease and the extruded disc fragment was identified as chondromata. The technique involved extensive bilateral laminectomy followed by opening of the dura and palpation of the disc bulge digitally after retraction of the nerve fibres. It was the classic presentation in 1941 by Mixter and Barr that defined the patho-physiology and mechanics of posterior protrusion of the lumbar intervertebral disc. Most of the open techniques in vogue today are modifications of this. The general principles are to remove the extruded disc, causing as little nerve handling and minimizing the excision of bony tissue.

Microlumbar disectomy is gaining popularity in centers all over the world. The principles emphasis are:

1. Small incision, minimizing trauma and hastening post op. recovery.
2. Preservation of all epidural fat.
3. Preservation of all non-herniated intervertebral disc material and

4. Blunt perforation of the annulus than a sharp incision.

In experienced hands, the results are encouraging. However one level disc percutaneous lumbar disectomy can be carried out through small incision, but certain long-term comparative studies fail to show a significant advantage(7). The use of fiberoptic headlight, magnification, bipolar cautery and fine instruments have all added to the refinement of treatment measures. It is noteworthy to mention at this point that the spinal artery of Adamkiewicz rarely originates in the lumbar spinal canal, and injury to this vessel may be the cause of an unexplained post operative cauda equina syndrome.

Our series represents a group of patients who were unable to attend to their daily activities with disabling back pain. The results of surgery are far from fully satisfactory, but the large majority of patients were definitely better. Those of us who tend to see significant numbers of surgical failure become increasingly pessimistic and skeptical about the relative values of surgery. Occasionally, a carefully executed surgical procedure in which the surgeon is completely satisfied, is the one in which there are recurring complaints. A careful analysis of the patients shows that

there are definite indications for surgery. Patient selection and educational is of prime importance. Minor motor weakness, long standing sensory motor deficits may not recover with surgery, and patients must be enforced. Despite our difficulties, we are able to provide all these measures for maximum post operative recovery. Some patients have benefited by post operative epidural Depomedrol injections at 2 months, 3 months, 6 months, and 14 months, respectively. Nerve root fibrosis from chronic compression, surrounding nerve root adhesions are important surgical findings and these may be the cause in recalcitrant pain. We must not forget the lumbar disectomy, relieves mechanical nerve compression, and there is no doubt that there are many other causes of pain, other than compression.

In conclusion, as accurate a diagnosis as possible is essential prior to any surgical intervention. A thorough trial extended conservative treatment should be exhausted prior to opting for surgery. And after an adequate and thorough surgical procedure, the patient must be carefully educated on long-term back care measures, strengthening exercise programme and periodic reassessments must be made when the results are not predictable or satisfactory.

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