MICROSURGICAL MANAGEMENET OF THE LUMBAR INTERVERTEBRAL DISC-DISEASE

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SUMMARY

100 consecutive patients operated on for sciatica pain. Microsurgical discectomy between April 1984 and February 1985 were evaluated retrospectively. This paper gives preoperative clinical data, endresults of surgery, rate of complications and true recurrent herniations.

The results were good, both soon after operation and at later follow-up (between 1 and 3 years). Complete or significant pain relief was achieved in 92% of patients; %93 were able to return to their normal physical activities. The frequency of complications was significantly low.

Key Words: Microsurgery, Lumbar discectomy, Small extent of surgery.

INTRODUCTION

In patients with intractable pain after lumbar disc surgery the extensive surgical intervention may be considered as risk factor (1,2). The quality of the surgery is thereby reduced and sometimes indeed put question (3). The opinion that a considerable proportion of the complaints must be attributed to excessive surgical trauma, in particular to the muscle, articular facest and the contents of epidural was supported by many of experienced surgeons (4,5,6,7).

For this reason the operation of lumbar discectomy has been improved steadily since its introduction by Mixter and Barr in 1934 (8). The addition of microsurgical technique may be the most recent means to refine the process of lumbar discectomy (3,9,10-12). The criteria of this improvement or refinement are smaller incision with less dissection of muscle, maintenance of epidural fat by gentle manipulation of the contents of the epidarul space, meticulous hemostasis and adequate removal of the herniated disc and displaced fragments with more accuracy, using the suitable refined instrumentarium and microscope for profiting from its magnified vision and brilliant illumination (13).

This report of our 100 consecutive patients operated on under microsurgery confirms the advantage that the above mentioned procedure offers over the conventional surgical technique.

MATERIALS, METHODS AND RESULTS

The study covers 100 consecutive patients with a lumbar disc herniation operated upon using the microsurgical technique from April 1984 to February 1985. The postoperative follow-up period was 1 to 3 years which was orientative of the final results achieved. 58 were male and 42 were female patients. The average age was 46 years with a range between 18 to 70 years. Indications for operation were the presence of unequivocal radicular symptoms with acute paresis or after a reasonable trial of bedrest for at least 14 days had failed to relieve their sciatica.

A group of seven patients previously treated with chemonucleolysis and six patients previously operated on using the conventional technique elsewhere were also included here.

Physcial examination and plain x-ray films of the chest and the lumbar vertebrae preceded neurophysiological (EMG) and neuroradiological investigations (myelography, computed tomography).

All patients had sciatica pain. In 75 % of patients the sciatica was associated with low back pain. In 44% of patients there was only pain as unique subjective complaint. Pain was accompanied in 49 patients by sensory disturbance, in only 3 by motor weakness. The duration of the present episode of preoperative pain was less than one month in 25% of patients; mo-

re than 3 years in 22%. Preoperatively, 23% of patients were taking bedrest and medication by family doctor; 28% were undergoing physiotherapy; 9% were under chiropractic therapy. 13% of patients had previous low-back surgery; 7 of those 13 patients were undergoing chemonucleolysis and 6 had standard discectomy (Table I). The preoperative clinical and neurological findings are given in Table II.

Preoperatively, 100% of patients had a plain x-ray investigation; 68% had a myelogram; 88% had a CT; 42% had EMG.

The correspondence of clinical, surgical, neuorophysiological and neuroradiological findings is given in detail in Table III. The highest correlation was between findings of clinical examination and that of operation (97%). The lowest correlation was ascertained between findings of EMG and that of operation. (69%).

49% of disc pathology occured at the L4/5 and L5/SI level, 2% at the 3/4 level. Flavectomy and interlaminar fenestration were done at one level in 88 patients, at two levels in six patients. The incidence of hemilaminectomy was only at one level in six patients (Table IV). Intraoparetively, in the majority of patients, a subligamental location of the migrated disc fragments were detected (36%). A subligamentous rupture was defined as disc material outside the annulus fibrosis but constrained by the posterior longitudinal ligament. Epidural free ruptures were defined as disc material within the intervertebral canal or the intervertebral foramen entirely behind the posterior longitudinal ligament. 34% of our patients had free nuclear material within the spinal canal or the neural foramen (Table V). Analysis of the operative findings in 7 patients in whom chemonucleolysis failed showed that 5 of those 7 patients had a sequestered disc; 2 of those were found to have firm adhesions of nerve roots to the posterior ligament without any evidence of space occupying disc disease. 4 of the other six patients who had been previously treated by standard discectomy elsewhere had also a true recurrence of disc herniation; two had a new disc herniation at a different level.

The technical details of our microsurgical procedure refer to that which were described by Caspar (3) and Yaşargil (12).

Intraoparatively, in one patient a dural tear with CSF leakage and in one patient with a recurrent disc herniation a partial nerve root damage occured. None of these complications caused deterioration of preoperative neurological signs or a complicated course.

Preoperative disturbances of vesical and/or bowel control in 3 patients were totally normalized in 2 and partially normalized in one patient postoperatively. Claudicatio intermittents which was preoperatively present in 3 patients had disappeared only partially after surgery.

Blood loss during the operation was few and no patients required blood transfusion.

Operating level was never mistaken.

One patient had no immediate relief of leg pain with deterioration of preoperative neurological findings so reexploration was carried out before discharge but nothing was found to account for the pain and increasing neurological deficits; nothing was done additionally and the patient went on to complete relief.

All of the 100 patients were treated prophylactically with trimethoprim plus sulfamethoxazzole. All of the patients were usually mobilized within 72 hours; mild physical activity was allowed in the first 14 days, then more intense physical rehabilitation was under taken in the ensuing 4 weeks.

The postoperative complications are listed in Table VI.

During the follow-up period of from 1 to 3 years 2 patients required reoperation for true recurrent disc herniations at the same level and 1 patient for a new disc herniation at another level.

End-results of surgery including post-operative pain relief are given in detail in Table VII. Complete or significant pain relief was postoperatively achieved in 92% of the patients. In 3% of patients who had clinically claudicatio intermittens nervosa and radiologically osteophytic spurs of vertebrae the pain was unchanged. Since many of the patients were not professionally employed we preferred to determine the pain relief and capacity to assume the aged-defending normal physical activity as the two most important criteria for the assessment. Of our follow-up patients, 93% were able to return to normal activities without pain or minimal amounts of discomfort after very heavy activity. In the latter cases, the pain was always responsive to short periods of rest. Three patients suffered from continued pain and required a continued postoperative chiropractical and physical therapy. Three other patients with continued pain after heavy activity and progressive degeneration at the operated level required a career change for continued employ-

ment. One patient had a complicated course without any genuine neurological deterioration and response to any kind of supportive care.

Table I: Preoperative data in 100 patients with microsurgical disc operation.

	Number of Patients
A. Subjective complaints on admission	
Only pain	44
Pain associated with sensory disturbance	49
Pain associated with motor weakness	3
Pain associated with both sensory disturbance and motor weakness	4
B. Location of pain	
Right-sided sciatica	5
Left-sided sciatica	7
Right-sided sciatica with low back pain	33
Left-sided sciatica with low back pain	42
Bilateral sciatica with low back pain	13
C. Duration of history	
Less than one month	25
1 to 6 months	21
6 to 12 months	11
1 to 3 years	21
More than 3 years	22
D. Conservative therapy before surgery	
Only bedrest and medication by family doctor	23
Ambulatory physical therapy	28
Chiropractic care	9
Inpatient	30
E. Previous surgery	13
Standard discectomy	6
at same level and site	4
at different level	2
Chemonucleolysis	7
at same level	7
at different level	0

Table II: Preoperative clinical and neurological findingsin 100 patients with microsurgical discectomy in lumbar region

	Number of Patients
Disturbances of sensation	83
Weakness of muscles	71
Atrohpy of muscles	9
Reflex abnormality	64
Positive ipsilateral straight-leg raising test	70
Positive contralateral straight-leg raising test	4
Limitation of mobility of lumbar spine	70
Tenderness of paravertebral muscles	68
Scoliosis	58
Disturbances of vesical and/or bowel control	3
Cauda syndrome	1
Claudicatio intermittens nervosa	3

Table III: Correlation between diagnostic modes and operative findings.

Correspondence of findings in	Positive (%)	Negative (%)
Myelography and CT	90	10
Myelography and clinical examination	91	9
Myelography and operation	90	10
CT and clinical examination	94	6
CT and operation	94	6
Operation and clinical examination	97	3
EMG and clinical examination	71	29
EMG and operation	69	31

Table IV: Extent of surgery

Surgical approach	Number of Patients
Fenestration at one level	88
Fenestration at two levels	6
Hemilaminectomy at one level	6

Table V: Operative findings at 106 levels in 100 patients. *

	Number of Levels	Total (%)
Epidural free sequestration	36	34
Subligamentous migrated sequestration	38	36
Subligamentous soft protrusion	27	25
Adhesions of nerve roots without significant space occupying disc disease	2 **	2
Epidural varicosis with soft disc protrusion	3	3

x Since 6 patients were operated on at 2 levels, the sum of the levels is 106.

xx After chemonucleolysis.

Table VI: Postoperative complications.

	Number of Patients
Sterile wound seroma	3
Subcutaneous wound infection	1
Leukopenia due to intake of Indometracine	1
Allergic skin reaction against wound plaster	1
Thrombophlebitis	1
Reoperation before discharge	1

Table VII: Clinical summary of postoperative end-results.

		Per cent of Total
A. Pain (in total of 100 patients) relieved	1. excellent	55
	2. good	23
	3. satisfactory	14
	4. moderate	5
	5. unchanged	3
	6. worsened	0
B. Sensory improvement	1. excellent	23
	2. good	35
	3. satisfactory	8
	4. moderate	6
	5. unchanged or worsened	28
C. Motor improvement	1. excellent	24
	2. good	32
	3. satisfactory	14
	4. moderate	6
	5. unchanged or worsened	24
D. Reflex	1. good improved	16
	2. unchanged	78
	3. worsened	3

DISCUSSION

The main goals of the micro-lumbar discectomy would be reducing the chance of recurrence and undesirable side effects by accomplishing the minimum of surgical trauma and the efficient removal of disc material as much as feasible, thereby enhancing the wellbeing of patients and preparing them for a swifter return to normal health. The two advantages of using the microscope in the lumbar disc surgery are magnified vision and brilliant illumination which allow neurosurgeons to refine standard operation and carry out discectomy safer by reducing the chance of dural laceration, nerve root trauma and great vessel injury because the surgeon can identify the neighbouring structures better, even down into the intervertebral space. A small incision and small extent of surgery diminishes paraspinal muscle disruption, trauma to the articular facets and the contents of edidural space so that the chance of the postoperative pain, instability and adhesions should be reduced. Other advantages of this fashion is less bleeding as epidural veins can be identified and coagulated quicker and easier (14).

Corresponding to pain relief and capacity to work, the resuls of microsurgical discectomy are in 80 to 95% good (15,9,14,16,11). The further improvement will be expected by reducing the multiple segmental approach and an even better selection of patients (15,13).

One of the main objections to microsurgical lumbar discectomy has been that spinal stenosis cannot be treated adequately by that means (17). This objection was justified by the results of our three patients who had preoperatively clinical signs of claudicatic intermittens nervosa and radiologically osteophytic spurs of vertebrae. Those could not benefit from the surgery. Williams (18) stated in his study that 19% of the

failures of microsurgical discectomy were due to spinal stenosis that had not been detected on preoperative computed tomography scans. However, the results of our patients in this study cannot support his statement that microdiscectomy should be limited to patients who have a herniated lumbar disc that has not been previously operated on since in six patients who were previously operated on by standard discectomy elsewhere fully success was achieved by this operative fashion. In this respect our results cover that of other authors (19,20), using the microscope at reoperation for failed lumber disc surgery offers a safer and gentle dissection by better distinguishing the nervous structures from the epidural postsurgical scar tissue and recurrent disc fragments.

On the other hand, microsurgical lumbar disc surgery limiting bone resection, conserving the ligamentum flavum and taking care of peri-radicular fat, thus reducing the epidural dead space decreases scar formation due to adhesion (13).

In comparison to the results achieved by using the microsurgical technique a uniformaly low percentage (under 80%) of results being satisfactory was reported (15).

Without analysing each symptom in detail the results of this study give rise to be pleased to find that all but seven of the 100 patients treated with this surgical technique made a complete recovery on the social plane. Complete or significant pain relief was achieved in 92% of patients. These results corresponding with the others in this field (15,20,14,11) certainly were influenced first by the selection of patients who were with radiologically proven disc lesions and unequivocal radicular symptoms and second by traumatic relief of neural compression thanks to the assistance of microsurgical technique.

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