

CORRELATION OF EPIDURAL FIBROSIS AND THE SIZE OF LAMINA DEFECT PERFORMED ON OPERATION

Tansu MERTOL MD., Bilgehan BİLGE MD., Kemal YÜCESOY MD.,
Zafer YÜKSEL MD., Arif ÖSÜN MD.

SUMMARY :

In this study, 1000 patients in the ages of 20-60 are evaluated retrospectively according to their surgical approaches. 36 and 7 patients who had fibrosis after hemipartial and hemilaminectomy respectively were reported. We have never observed re-operation due to fibrosis in the patients underwent operation by a total laminectomy. Also, we have never seen re-operation due to fibrosis by total laminectomy. For these reasons, we compare the epidural fibrosis and the size of lamina defect and considered that hemilaminectomy should be preferred to hemipartial laminectomy if one wants to prevent patients from reoperation due to fibrosis.

Key words : Lumbar discectomy, peridural fibrosis, laminectomy

INTRODUCTION

Peridural fibrosis/scar formation is a major problem in the lumbar disc surgery. A lot of procedures have been reported to prevent this postoperative complication by researchers (8, 10, 11). This fibrotic tissue may bind the dura and nerve roots to surrounding structures and may limit the mobility of nerve root (9). Therefore, post-operative pain in patients with peridural fibrosis after lumbar discectomy, and complications with morbidity after re-operative procedures in this patient group are more prominent (8, 9). Although the exact source of the fibrosis has yet to be established, fibroblast invasion from the posterior muscles is reported to be one of the causes (6). In some recent studies it is purposed that the fibrosis occurred both anterior and posteriorly and has found some relationship with surgical procedure applied (9). In this retrospective study, we compared the presence and the extent of the epidural fibrosis in conjunction with the surgical method applied in the lumbar discectomy procedure.

MATERIAL AND METHOD

We reviewed 1000 patients (584 female and 416 male) who under went spinal surgical intervention with the diagnosis of lumbar spinal stenosis, lumbar discopathy and trauma between the years 1984-1995 in the Dokuz Eylül University, Faculty of Medicine, Department of Neurosurgery. Mean age was 41,6 (18-60). The patients who had common characteristics

such as pre and postoperative instability, diseases affecting immune system were excluded. Instability is suspected in patients in whom hyperflexion and extension radiographic examinations showed malalignment of the vertebral bodies. Myerding and Mariquet-Taillard measurement methods are used to confirm instability in our patients. Their blood cell counts and biochemical study results were in the normal limits. In the surgical incision, no regeneration problem such as hypertrophic scar tissue formation was seen. The etiologies in the first operation were as follows; lumbar discal hernia (LDH) in 914 cases, (multilevel herniation in 220 patients). Lumbar spinal stenosis in 72 (co-existing LDH in 14) and trauma in 14 patients. Surgical procedures applied in the first operation were as follows; laminectomy in 843, hemilaminectomy in 60, and total laminectomy in 97 cases. Respectively 94 re-operations in 86 patients were performed (46 male and mean age 42.8).

Clinical criteria for re-operation were; no improvement in the pain and life quality post-operatively, no regression in the neurological deficits and/or new deficits without peroperative surgical complications, deep intervertebral space infection and CSF fistula. Radiologically, fibrotic or granulation tissue which make compression on the neural structures, residive disc material at the same operative level and region and hematoma were our re-operation criteria. We both used clinical and radiological findings before deciding to re-operation in a patient with failed back syndrome. As

* Dokuz Eylül University, Faculty of Medicine, Department of Neurosurgery 35340, İzmir.

diagnostic neuroradiologic examinations, we used computerized tomograph without and with contrast enhancement and magnetic resonance imaging especially with Gadolinium medium. Radiologically the ethiological factors and the surgical procedure applied are summarized in Table I. The mean operation time was 102 (56-420) days.

Table 1. Ethiological factors and the surgical procedure applied in the patient who went re-operation.

Ethiology	Laminathomy	Hemilaminectomy	Total laminectomy
Fibrosis	44	7	none
Residive disc	21	none	none
Infection	2	none	none
Hematoma	1	1	1
CSF fistula	3	1	1

Peroperative findings and the postoperative histopathological findings were different in this re-operated patient group and this is summarized in Table II. In 15 patients with radiologically shown peridural fibrosis or scar formation, compressing the dura and or the root, no pathology detected peroperatively.

Table 2. The ethiological classification according to the per and postoperative findings.

Ethiology	Laminathomy	Hemilaminectomy	Total laminectomy
Fibrosis	36	7	none
Residive disc	13	none	none
Infection	1	none	none
Hematoma	1	1	1
CSF fistula	3	1	1
No pathology	15	none	none

In 56 patients who went re-operation because of fibrosis or rezidive disc material, laminatomy were performed in their first surgical procedure. 24 of these cases laminatomy was made changed to hemilaminectomy and in 8 cases to total laminectomy. In 40 cases laminatomy defect widened a little bit and 7 of these patients went to a third operation procedure because of fibrosis. Total laminectomy performed in 6 of these

last group. One case 3 and three cases had 2 re-operations because of fibrosis.

DISCUSSION

Lumbar discectomy is successful for most patients. However a small group of patients experience persistent or recurrent sciatica. When recurrent herniation and bony stenosis have been ruled out, the neurological findings is usually that of epidural fibrosis/scar tissue (1, 10).

Therefore the sciatica is often ascribed to this fibrosis (3, 10). Following lumbar spinal surgery, fibrotic tissue may replace the epidural fat, binds the nerve roots and the dura. This causes some clinical and neuro-radiological findings (1). There is controversial reports regarding the source of this fibrosis and scar formation (1, 2, 8, 9). Key and Ford first described the nerve root compression after lumbar laminectomy and hypothesized that the annulus fibrosis was the source of the scar tissue, in 1948 (4). La Rocca and MacNabb in 1974 proposed that the fibrosis was caused by invasion of fibroblasts from the injured posterior erector spinae muscles. They mentioned the migration of the fibroblasts in the postoperative epidural hematoma in their theory (4, 8). In order to reduce fibrosis, numerous materials such as gelfoam, gelfilm, silastic sheeting, bone-wax, steroids, hemostatic agents, dacron, carboxymethylcellulose, elastaseipoly lactic acid, sodium hyaluronate have been inserted between the dura and the posterior spinal muscles (5, 7, 8, 9). Jacobs et al reported that fat alone had the best results in preventing nerve root entrapment in their study in which they used dogs and compared fats, gelfoam and depot of steroids (4). But these procedures are not effective againts the scar tissue anteriorly around the nerve roots. In recent studies it is mentioned that fibrosis may occure both anterior and posteriorly and correlates with the area of the surgical dissection (9).

In our clinical material, following laminectomies, we found the reoperation cases significantly lower

than the patients with laminotomy or hemilaminectomies because of the peridural fibrosis. We believe that not encountering re-operation in cases where total laminectomy is performed, is not because of the fact that there is no fibrosis but because of no clinical findings about any compression on the neural structures.

In the literature, there are a lot of reports about the source of the fibrosis and the methods to prevent this procedure but the correlation between the surgical procedure applied and the resultant fibrosis is not studied extensively.

REFERENCES

1. Annertz M, Jönsson B, Strömquist B, Holtas S. No relationship between epidural fibrosis and sciatica in the lumbar postdiscectomy syndrome. *Spine* 20: 449-453, 1995.
2. Blaauw G, Braakman R, Gelpke G, et al. Changes in radicular function following low-back surgery. *J Neurosurg* 69: 649-652, 1988.
3. Davis RA. A long term outcome analysis of 984 surgically treated herniated lumbar discs. *J Neurosurg* 80: 415-421, 1994.
4. Hinton JL, Warejcka DJ, Mei Y, et al. Inhibition of epidural scar formation after lumbar laminectomy in the rat. *Spine* 20: 564, 570, 1995.
5. Kitano T, Zerwekh J, Edwards M, et al. Viscous carboxymethylcellulose in prevention of epidural scar formation. *Spine* 16: 820-823, 1991.
6. Langenskiöld A, Valle M. Epidurally placed free fat graft visualised by CT scanning 15-18 years after discectomy. *Spine* 10: 97-98, 1985.
7. Mikawa Y, Hamagami H, Shikata J, Yamamuro T. An experimental study on prevention of postlaminectomy scar formation by the use of new materials. *Spine* 11: 843-846, 1986.
8. Songer MN, Rauschning W, Carson EW, et al. Analysis of peridural scar formation and its prevention after lumbar laminotomy and discectomy in dogs. *Spine* 20: 571-580, 1995.
9. Songer MN, Ghosh L, Spencer D. Effects of sodium hyaluronate on peridural fibrosis after lumbar laminectomy and discectomy. *Spine* 15: 550-554, 1990.
10. Spengler, DM, Quелlette EA, Battie M, et al. Elective discectomy for herniation of a lumbar disc. *J Bone Joint Surg.* 72: 230-237, 1990.
11. Tuite G, Stern JD, Doran SE, et al. Outcome after laminectomy for lumbar spinal stenosis. *J Neurosurg* 81: 699-706, 1994.