

LASER DISCECTOMY IN CERVICAL DISC HERNIATIONS

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ABSTRACT:

Since March 1993, percutaneous intradiscal laser nucleotomy had been used in our department for the treatment of a selected group of patients with herniated cervical disc disease. We operated 59 patients until January 1996. Among these, 48 cases whose follow-up periods were longer than one year was included in this study. 78% of them were favoured during their late follow-up. Open surgery was proposed in five cases, and three of them were operated. Overall improvement in minor motor, sensorial and deep tendon reflex deficits were 77.4%, 60.7%, respectively. We recommend laser nucleotomy as an alternative treatment procedure for cervical disc herniations, and it can be performed with a low complication rate.

Key words: Cervical disc, laser.

INTRODUCTION

Unlike the surgical treatment of a lumbar disc herniation, the operative approach to cervical soft disc herniations has remained controversial (10). Various operative approaches have been described (6, 7, 8, 11, 14). The policy has evolved to perform an anterior approach for central disc protrusions, a posterolateral microdiscectomy is used exclusively for posterolateral sequestrations, and either an anterior or posterior approach is used for paramedian disc protrusions (2). The success rates for lateral soft disc herniations after anterior and posterolateral approaches have been reported as 100% and 93% while these values for central disc herniations have been 94% and 75%, respectively (10). Against these excellent results, these approaches are invasive techniques and they may be associated with postoperative complaints stemming from either operation sites or prolonged usage of a rigid collar, and postoperative complications (which are seen in 2-4% of cases) (5).

After the introduction of ND-YAG laser as a new advance in the treatment of herniated lumbar disc disease, many neurosurgeons had used this technique since laser discectomy was a safe, minimal invasive and short-lasting procedure (3, 4, 15). Since 1993, we have been using laser discectomy in selected group of patients suffering from either lumbar, or cervical soft disc herniations. In this report, we recommend laser discectomy as an alternative surgical approach in the

treatment of selected cases with cervical soft disc herniations.

MATERIAL AND METHODS

In selected patients with cervical disc herniations, we have been performing percutaneous intradiscal laser nucleotomy (PILN) since March 1993. Patients having the following criteria were chosen for laser nucleotomy (LN):

1. Symptom of radicular pain corresponding to the level of non-sequestered disc herniations which were observed on computerized tomography or magnetic resonance imaging,
2. Failure in adequate conservative therapy,
3. No osseous pathologies such as vertebral stenosis, facet impingement, lateral recess stenosis, advanced degenerative disc disease or spondylolisthesis,
4. No advanced neurological deficit,
5. No hemorrhagic diathesis,
6. No sign of myelopathy.

Fifty-nine patients having these criteria were treated with PILN. But only 48 of these patients could have been followed at least one year postoperatively and these are included in this report. Among them 25 were female and mean age was 48 years. The mean period for their complaints was 46 months. 26 cases had left radicular symptoms. Their preoperative neurological examination revealed minor motor deficits in 31 (64.5%), sensorial deficit in 28 (58.3%) and deep tendon reflex deficits in 20 (41.6%) cases.

During the operation, patient lay supine and the disc space was punctured via a right anterior approach.

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The procedure was done with local anesthetic infiltration under fluoroscopic control on anteroposterior and lateral projections. A 12 cm, 18 G needle was introduced through the skin toward the diseased disc space. The trajectory of the needle should be medial to carotid sheath and lateral to thyroid gland, trachea and oesophagus. Before entering the disc, the position of the needle was controlled on A/P and lateral projections. The final placement of the needle tip in the center of the disc was performed on lateral projections, and for lateral irradiations both projections were again applied to place the needle tip correctly. Nd-YAG 1.06 Mm laser was introduced via a sterile 400 Mm core optical fiber through this needle. The standart irradiation condition that we preferred for a cervical disc was; the output power of 10 watts with an interval of 1 second, and repetition times of 80 or 100 pulses (800-1000 joules). The pauses between pulses were 1 second unless patient would have any complaint. Although some modifications were done on one or more of these parameters during the procedure according to the intraoperative complaints of patients, we never exceeded 1000 joules. All patients were treated outpatiently. An oral antibiotic was given for one week, and medical therapy with analgesic, antiinflammatory and myorelaxant drugs and cervicollar, continued 15 days postoperatively. Patients were examined immediately after the procedure, and invited for control at the first month and then every three month. Mean period for follow-up was 17 months.

RESULTS

Among 48 patients, 4 were operated with open surgery before PILN. We modified irradiation conditions in 19 (39.5%) patients during the procedures since they were complaining about increased neck and arm pain or burning. Only 7 patients had severe discomfort. We observed a close relationship between the decompressive effect of PILN and the clinical findings. In 42 (87.5%) patients, we achieved relief of arm pain during the immediate postoperative period. However in 3 cases, pain reduced, and in the other 3 cases remained the same as in the preoperative state. Most of patients had minor and short-lasting complaints localized on the puncture site: minor motor deficits which were observed in 31 patients before PILN disappeared in 10 (32.2%), improved in 7 (22.5%), and remained the same in 14 (45.1%) patients in the immediate postoperative examination. Sensorial deficits were

present in 28 cases in their preoperative examination, and in 7 (25%) of them, sensorial deficits were disappeared in their early postoperative period. Deep tendon reflex deficits of the upper extremities were observed in 20 patients before PILN, and in 5 (25%) of them improved in their immediate postoperative examination.

During postoperative follow-up period, no patients were reoperated with PILN because of the persistence of their symptoms. Open surgery after PILN, was indicated in 5 (10.4%) cases, and three of them were operated. During their surgery, we observed the carbonated disc tissue but the compression on the nerve root had already been existing. Other two patients are still waiting favour from the medical therapy.

In the late postoperative follow-up, the number of patients with minor motor deficits decreased from 21 to 7 when compared with the early postoperative examinations. Overall improvement for the minor motor deficits was 77.4%. Sensorial deficits were still remaining in 11 of the 19 patients who had sensorial deficits was 60.7%. Upper extremity deep tendon reflex deficits disappeared in 7 of the 15 patients whose early postoperative examinations revealed deficits. Overall improvement in deep tendon reflex deficits was 65%. When we investigated the satisfaction of the patients from PILN, we observed favourable results in 38 (79.1%) cases, and these cases had relief of pain completely (Table 1). We have not faced with any complication during the procedures. Patients had no septic complication in their follow-up periods.

DISCUSSION

Previous experimental studies provide that PILN may reduce the pressure exerted on nerve root by the herniated disc (1, 9, 12, 13). The shrinkage and vaporization of a small volume of nucleus pulposus may allow a reduction in intradiscal pressure which results as a decrease in the herniation. It is true that PILN and other percutaneous procedures do not substitute for conventional surgical methods completely, because they can not remove a herniated mass. But in selected patients having the appropriate criteria, relief of the symptoms may be achieved with this safe and relatively non-invasive modality (4).

With the open surgery, the success rates for lateral soft disc herniations after anterior and posterolateral approaches have been reported as 100% and 93% while these values for central soft disc herniation have been 94% and 75% respectively (10). Among our pa-

Table 1. Summary of clinical response after PILN for cervical disc herniations.

preoperative		early postoperative			late follow-up				
deficits		state of deficits			deficits		state of deficits		
	cases	abs.	imp.	same		cases	abs.	same	recov.
Motor	31	10	7	14	Motor	21	14	7	77.4%
Sensory	28	7	-	19	Sensory	19	8	11	60.7%
DTR	20	5	-	16	DTR	15	12	7	65.0%
		abs.	imp.	same			abs.	imp+ same	recov.
PAIN	48	42	4	4	PAIN	42	38	10	79.1%

The changing of the neurological deficits and pain are shown according to the findings observed during the immediate and late postoperative periods. Abbreviations: abs. (absent), imp. (improved), recov. (recovery rate), DTR (deep tendon reflex).

tients, we found the rate of good results after PILN as 79.1%. The immediate relief of radicular symptoms in the early postoperative examination may prove the ability of the procedure in decreasing the pressure on the affected nerve root during the acute stage. This effect seemed lasting also in the late follow-up period. Improvement of the minor motor, sensorial and deep tendon reflex deficits were 77.4%, 60.7% and 65%, respectively and these results predicted the effectiveness of LN in selected cases with cervical disc herniation.

During the procedure, it was possible to see the smoke exhausted from the hole of the needle tip, the intradiscal pressure may increase. Patient usually express this situation as a sense of stretching on neck. But this sense often resolves after allowing its exhaust by taking probe out of the needle and opening its lumen with the mandrin. We modified the laser irradiation conditions in 18(37.5 %) patients who had severe burning sense or pain on neck or arm during the procedure in order to reduce the heat generated on nerve roots. Except one patient, all tolerated the procedure easily after modifications.

We believe that PILN with a low complication rate, is a safe, minimal invasive and short lasting procedure for effective treatment of nonsequestered herniated cervical intervertebral disc disease. This technique may also be preferred in cases whose discal herniations are borderline for PILN when there are high risks for general anesthesia.

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