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Results of Lumbar Disc Percutaneous Laser Disc Decompression (PLDD) with One Year Follow up in Iran

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Abstract: Disc protrusion is a very common disorder and usually responds to conservative treatment, but in some patients surgical interventions are inevitable. Percutaneous Laser Disc Decompression (PLDD) is an interventional procedure replacing surgery in some cases of disk protrusion. This study was conducted to evaluate the results of CT guided PLDD. PLDD was performed on 40 patients, who didn't respond to conservative therapies for protrusion. The intervention was carried as an out patient therapy and patients were followed for one year. One week after PLDD, 32 patients (80%) were satisfied with the intervention. At 1, 6 and 12 months follow ups; 31 patients (77%), 30 (75%) and 28 (70%) were satisfied, respectively. No significant complication occurred during the procedure. CT guided PLDD is a useful therapeutic modality in patients suffering disc protrusion which don't respond to conservative treatment.

Key words: PLDD, low back pain, lumbar disc protrusion, interventional procedure, computed tomography, guidance

INTRODUCTION

Herniated lumbar disc is one of the most common disabilities of modern human (Black, 1995). It is estimated that 60-70% of the adult population suffer from low back pain at some time in their lives (Choy, 1995a). Most cases of herniated disc get remission by conservative methods, but some patients need to intervention (Choy, 1995a). The older surgical interventions; such as open discectomy, fusion or laminectomy were associated with wide bone and soft tissue disruption and complications such as instability, infection and epidural fibrosis. The most conservative surgery, microdiscectomy, was associated with failed back surgery syndrome (Black, 1995). Percutaneous Laser Disc Decompression (PLDD) with its low complication rate, high efficacy and short hospitalization is an ideal substitute for the above mentioned surgical methods. PLDD is based on the concept that the intervertebral disc, when contained by the annulus or dorsal longitudinal ligament, is a closed hydraulic space and a small reduction in the intradiscal volume by PLDD results in a marked reduction of pressure in the enclosed space (Case *et al*., 1995; Choy *et al*., 1995). PLDD has been under clinical trial for last 2 decades. The first experiences of PLDD were conducted with fluoroscopic guidance and the latter one with the CT guidance. The purpose of this prospective study, is to evaluate the results of PLDD with CT guidance in one year follow up.

MATERIALS AND METHODS

During 3 years, 40 patients with resistant low back pain and radiculopathy were included in our study.

Our patients were referred from low back pain clinic. In the low back pain clinic; the patients were examined by neurosurgeon and neurologist. If the clinical examination was compatible with radiculopathy, MRI was requested for its confirmation. After confirmation of radiculopathy with MRI and neurological examination, the patients were treated with conservative methods for 3 weeks.

The patients who did not response to conservative methods were offered for CT guided PLDD. Severe disc dehydration, osteophyte formation, rupture of posterior longitudinal ligament, free fragment disk herniation, or previous surgery at the level of radiculopathy was considered as exclusion criteria. Informed consent was obtained for all patients.

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Table 1: Level of disc herniation

Level	Number
L2-L3	1
L3-L4	3
L4-L5	30
L5-S1	6

CT guided PLDD was performed on an out patient basis. A total of 40 interventions were carried on 40 patients. The patients were placed on the CT table on prone position. Following that we took a short such image of the lumbar spine. The interested disc was scanned with a section thickness of 3 mm and a Table 1 advancement of 3 mm on a GE advantage 9800 CT scanner. We used Nd-YaG laser sonic (Hearious Company) with a 400 u core optical fiber. To be sure that the laser beam is parallel to end plates and there will not be thrmal injury to the end plates we tilted the gantry if needed. We did not use any special premedication except local anesthesia after preb. The disc space was inserted with G14 Jamshidi needle. After insertion of needle we use to inject 2 cc water and provoke patient's radiculopthy to be sure correct level is chosen. The laser was tuned to deliver 10-20 watt (mean 15 watt). The pause between each delivery was 10-20 sec. The total delivered energy was 1200-1600 J. Patients' vital signs were under control before and immediately after procedure. The Leg Straightening Test (LST), was controlled before and immediately after PLDD, too. Patients were under observation for 2 h after PLDD then we discharged them. They were advised to have complete bed rest for 24 h. We recommend the patients to gradually return to their normal lives in 2 weeks. They were followed at 1 week, 1, 6 and 12 months periods. For evaluation of the results we divided the outcome to good response and poor response, regarding to leg straightening test and patient satisfaction scale score. Statistical analysis was performed by SPSS ver 11.5.

RESULTS

There were 7 women and 33 men in our study. The mean age of our patients was 38 years (16-54 years).

All 40 interventions were carried out without intra or postoperative complications such as bleeding, neurologic complication or infection. One patient did not improve week after PLDD and he left the study for surgical intervention. The distribution of disc herniation is showed in Table 1.

According to the patients' satisfaction after one week, 32 patients (80%) had good response and 7 patients had improved slightly. On month after intervention 31 patients (77%) were continuing in good response group.

After 6 and 12 months the number of satisfied patients was 30 (75 %) and 28 (70%), respectively. The leg straightening test changed to normal in 28 patients (70%) at one week. It was normal in 25 patients (62.5%) at 1st month. The normal leg straightening test was detectable in 23 patients (57.5%) and 22 patients (55%) at 6 and 12 months, respectively.

There was no difference between the patient's satisfaction in patients who were older than 40 year and younger than 40 year. The level of disc herniation and the total delivered energy did not have effect on the results of PLDD.

DISCUSSION

PLDD is a treatment modality for patients who suffer from lumbar disk herniation. The potential advantages of this procedure included: reduced procedure time, minimally invasive nature, reduced risk of complications, avoidance of general anesthesia, performance with an outpatient basis, reduced recovery time, reduced soft-tissue and bone injury (Gangi *et al*., 1996).

Failure rate in treatment of disc treatment of disc herniation with Nd: YAG in Black (1995) study has reported 8% in comparison with 25% by KTP laparoscope and 26% with automated percutaneous discectomy.

Overall long term success rate of PLDD in Gupta *et al*. (1996) study was 85% and Gangi *et al*.(1996) reported a success rate of 76.5%.

Our findings indicate that PLDD, With CT guidance is an effective treatment of lumbar disc herniation.

In a large clinical experience with 389 PLDD procedures, Choy (1995b) has reported success rate of 75% for a mean fallow up of 60 month. The results of Choy (1995b) study are near to our results. The small difference may be to the fact that his study was including the cervical disc as wall as lumbar disc. The age range in his study was also larger than our study. His conclusion that patient's age doesn't have influence on the result of procedure is similar to our finding. For analysis of the results, Choy (1995b) use the McNab criteria. McNab criteria are based on subjective and objective items together, but, we separated the objective and subjective items analysis.

CONCLUSION

CT guided PLDD seems to be a safe, relatively noninvasive and effective treatment modality for carefully selected patients.

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