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Percutaneous Coblation nucleoplasty in patients with Contained lumbar disc prolapse: One year follow-up in a Prospective case series

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ABSTRACT

Background:clinical outcome data was analyzed for 100 patients withcontained disc herniation who underwent percutaneous discdecompression procedure using Coblation® technology,after failing to respond toconservative management.

Patients and Methods: Patients presented with clinicalsymptoms of discogenic low back pain and/or leg painFollow-up data was collected up to 12 months.Patient gender distribution was 68% female, 32% male, witha mean age of 39 years.With mean duration of back pain of 8.57 ,ranging from 3 to 17 month and mean duration of leg pain of 4.36 .ranging from 2 to 10 monthaccording to visual analogue scale for pain assessment.The mean pre-procedure pain level for all patients wasReported as 7.56 for back and 7.72 for leg while average pain level was 4.86 for back and 3.42 for leg at the 12-month follow-up post procedure period. And according to Oswestry disability index for functional assessment. The mean pre procedure index was 31.48 range from 23-40. It decreased after 12 month to 13.82 range from 5-32.

Results: The results of this analysis indicated that PDD usingCoblation technology, isan effective procedure for patients presenting withdiscogenic back and/or leg pain who have failed conservativetherapies.

Keywords: Percutaneous disc decompression, nucleotomy,contained disc herniation, Coblation, Nucleoplasty,radiofrequency.

Introduction

Chronic low back pain is the most common ailment inmodern industrial societies. It ranks first amongmusculoskeletal disorders, resulting in serious financialand social consequences **.** Because of its highlyspecialized role and relatively susceptible nature, theintervertebral disc is the focal point of pathology for mostlow back pain, including sciatica, though the mechanismand pathway of pain generation and conduction has notbeen elucidated **(1).**

Kuslich *et al.*(2) identifiedintervertebral discs as capable of generating pain in thelow back, along with facet joints, nerve root dura,ligaments, fascia, and muscles. Many investigators haveestimated that, in a substantial percent of patients withchronic low back pain, the lumbar disc is the principlepain generator **(3, 4).** While the uncertainty continues asto whether discogenic pain is mediated via a chemical,mechanical, neural, or combination of the abovemechanisms, primary discogenic pain has been reportedin 39% of chronic low back pain patients by Schwarzer *etal.*(3) and 26% of the patients by Manchikanti *et al.* (4)Pain arising from the posterior annulus of the intervertebraldisc can present as buttock, hip, groin, and lower limbpain without direct involvement of the nerve root**.**

It is a commonly held belief that compressive forcesapplied to the intervertebral disc play a role in causingdisc degeneration resulting in discogenic pain. The natureof the association between

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mechanical force and discdegeneration remains obscure, however it is evident thatmechanical, physical, chemical and pharmacologicalfactors must maintain a precarious equilibrium for properregulation of cellular activity and tissue morphology .Hydrostatic pressure plays a very important role in theregulation of nutrient supply to the disc [(5)].

Conservative therapy, minimally invasive interventions, integration and non-fusion surgery achieve good results, but their limitations are obvious [(6)].
Discogenic low back pain had been treated surgically for centuries, but surgery did not achieve significant benefit until Mixter and Barr [(7)].

Surgical treatment of intervertebral disc herniation such as open discectomy, microdiscectomy, and laminectomy are oftentargeted for patients with uncontained or large herniations,and/or sequestered discs. Patients presenting with smallcontained herniated discs who have not responded toconservative non-invasive treatment, are often notconsidered as surgical candidates. Study conducted by Carragee *et al.* [(8)] indicated that patientswith contained disc herniation, measuring less than 6 mmanterior-posterior (AP) measurement had a success rateof only 24% after discectomy.

However, over the last three decades, minimally invasivepercutaneous techniques using an intradiscal approachhave evolved as a viable option [(9)].Common disc operations include discectomy for radiculopathy from herniated lumbar disc, decompressive laminectomy for symptomatic spinal stenosis with or without degenerative Spondylolisthesis, and fusion for nonradicular low back pain with degenerative changes. Although discectomy and/or spinal fusion are known to be effective in immediately relieving back pain, long-term results have been less favourable [(10)].

Variation in satisfactory results of lumbar disc surgery is remarkable, ranging between 56% and 92% [(11)]. The common disadvantage of disc surgery is sacrifice of part, or most, of the functions of spine, leading to possible acceleration of disc degeneration [(12)].In recent years, there has been a gradual shift to lessInvasive treatments for protruded lumbar intervertebral disc.

These include lumbar chymopapain chemonucleolysis (LCC)[(13),] automated percutaneous lumbar discectomy (APLD), percutaneous laser lumbar discectomy (PLLD), intradiscal electro thermal annuloplasty (IDET), microendoscopic discectomy (MED) [(14)].And more recently, minimally invasive nuclear decompression—known as nucleoplasty.Lumbar disc prolapse, protrusion or herniation accounts for less than 5% of all low back problems, but is the mostcommon causes of nerve root pain. LCC, APLD, PLLD andMED have been shown to reduce the pressure on lumbar intervertebral disc. LCC started in 1964 and has a long-term success rate between 66% and 88%. However, LCC has the potential risk of paralysis secondary to transverse myelitis and an anaphylaxis rate estimated at 0.3–0.5% [(15)].

APLD, which was first proposed in 1984, is regarded as a safe procedure for contained disc herniation. But for patients in the non fragment-contained group, the recurrence rate reaches 38% .PLLD is a laser-based system introduced by a needling the nucleus pulposus. Success rates range from 63% to89%, with pain relief lasting over 12 years. But complications are not rare, including moderate to severe intraoperative pain, low back pain and spasm after surgery .Major drawbacks with IDET have been its question able efficacy, the time necessary to thread the wire, and intraoperative pain experienced by patients during the procedure when the annulus is heated [(16)].

For MED, with a magnified view via an operating microscope, the deep structures can be seen more clearly to reduce the risk of nerve root injury. But it remains unclear whether MED offers better clinical outcomes than conventional procedures [17].

More recently, Coblation nucleoplasty, a minimally invasive therapeutic option for patients with intervertebralDisc degeneration has been introduced. Based on CoblationTechnology using bipolar radiofrequency energy [17].

The safety and efficacy of the PDD procedure using Coblation technology has been carefully analyzed in three separate studies by Chen *et al.*[18]that no change in temperature is detected at 5 mm away from the tip of the wand ,and that after two channels are created within the disc, intradiscal pressure decreases dramatically.

Azzazi *et al.* [19]assessed the safety and clinical outcome of the nucleoplasty procedure in well selected cases. Coblation technology was used in 50 patients, who had radicular leg pain due to contained disc herniation or focal protrusion, Clinical outcome was assessed by the Visual Analog Scale and Oswestry Disability Index Questionnaire. The mean Visual Analog Scale score decreased from 8.2 to 1.3 at the 1 year evaluation. The Oswestry Disability Index Questionnaire decreased from 62.2 to 9.6 at the 1 year follow-up

Eichen *et al.* [20]By evaluation of Twenty-seven eligible studies (22 prospective trials and 5 retrospective trials) were included and pooled analyses as well as various subgroup analyses (differentiation between cervical and lumbar disc herniations, comparisons with alternative treatments such as epidural steroid injection) were performed based on their data. Significant pain reduction and improvement in functional mobility after nucleoplasty were observed at every time point. Nucleoplasty showed a total complication rate of 1.5%, with the individual rates being 0.8% for cervical and 1.8% for lumbar nucleoplasty

Ren *et al.*[21]by evaluationof 172 patients underwent percutaneous nucleoplasty. Excellent or good patient satisfaction was achieved in 87.9% of patients after 1 week, 72.4% after 1 year, 67.7% after 3 years, and 63.4% at the last follow-up

Adakli *et al.*[22] compared early and long-term efficacy of lumbar radiofrequency thermocoagulation (RFTC) nucleoplasty and targeted disc decompression (TDD) in patients with lumbar radiculopathy The medical records of 37 patients undergoing TDD (Group D) and 36 patients undergoing lumbar RFTC nucleoplasty (Group N) patient satisfaction ratio was 67.5% in the Group D, compared to 75% in the Group N

Cincu *et al.* [23] In this retrospective study there a total 50 patients who underwent intradiscal Coblation therapy. At 24 months follow up VAS was four points and ODI was 7.2. There were no complications with the procedure including nerve root injury, Discitis or allergic reactions. The authors concluded nucleoplasty appears to be safe and effective

PDD using Coblation (Nucleoplasty) technology is a promising treatment option for patients with contained disc herniation, presenting with discogenic axial back pain and/or leg pain that have failed conservative therapies [23].

Aim of the study

To evaluate the efficacy of Coblation discectomy technique in patients with lumbar disc lesions (bulge, protrusion and contained herniation) with or without leg pain caused by radicular encroachment.

PATIENTS and METHODS

From October 2013 to December 2016, 100patients who met inclusion criteria underwentpercutaneous disc decompression (PDD) with Coblationtechnologywas recruited in this outcome analysis.

Inclusion criteria:were as follows: Radicular pain resistant to previous medical treatment and physiotherapy for a period of at least 3 months, Signs of nerve root irritation, Magnetic resonance imaging (MRI) evidence of small and medium-sized herniated or protruded contained lumbar discs correlating with the patient's symptoms and physical findingsand Preserved disc height (< 50% loss).

Exclusion criteria: Age older than 70 years, Significant spinal stenosis, Fracture in lumbar region, Infection in lumbar region, Tumor in lumbar region,Spondylolisthesis, Large (≥ 6 mm) or non-contained disc herniation on MRI and Previous disc surgery at the suspected level.

PDD using Coblation technology was performed on anoutpatient basis under local anesthesia and monitoredanesthesia care in an operating room using steriletechnique. The same physician performed all proceduresin a prone using a uniportalapproach under fluoroscopic guidance, entering the discfrom the side of predominant pain. A 17-gauge six-inchlong, fig **(1)** Crawford type spinal access cannula was introducedinto the disc using a posterolateral extrapedicularapproach. The access cannula was positioned at the junction of the annulus andNucleus.

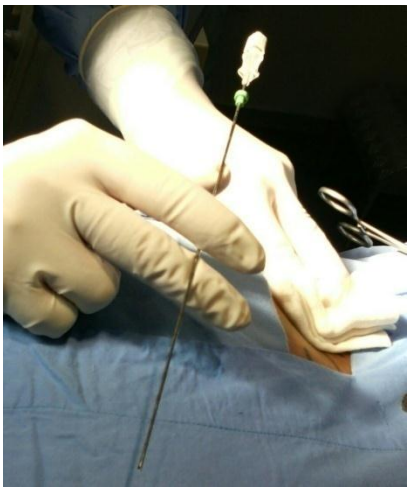


Fig (1) Crawford type spinal cannula

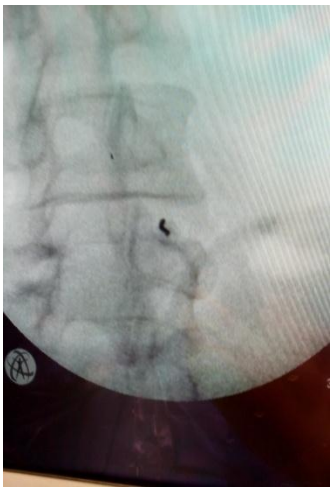


Fig (2) position of the cannula in antero - posteriorprojection

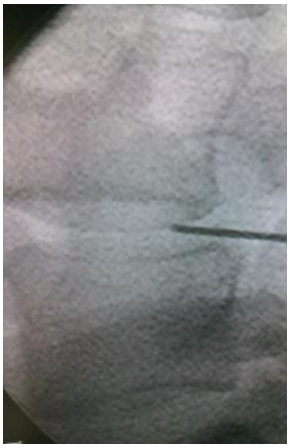


Fig (3) position of the wand bevond the inner

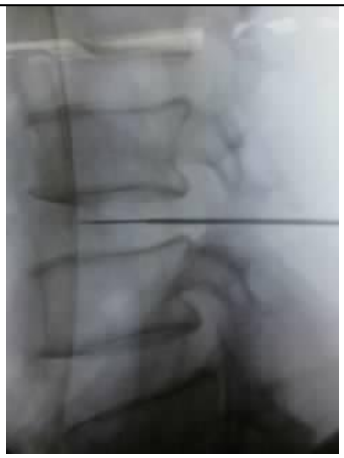


Fig (4)the wand in contact with the annulus

Underfluoroscopy in the anterior-posterior projection, this wasregarded at a site just medial to the medial border of thepedicles above and below the disc space, **Fig (2)**. The Perc-DLEtissue ablation and coagulation spinal wand (ArthroCare,Inc. - Sunnyvale, CA) was placed into the access cannulaand was advanced until the tip of the wand wasapproximately 5 mm beyond the tip of the cannula, assuring that the active portion of the wand was beyond the inner layer of the annulus and was placed in the nucleus**(Fig. 3).**

A circumferential reference mark on the shaft ofthe spine wand was placed adjacent to the needle hub atthe entry site, marking the proximal channel limit. Thewand was advanced until it came into contact with theannulus on the opposite side **(Fig. 4)**.

The depth stopmarker on shaft of the Perc-DLE spine wand was advanced close to the needle hub to designate the distal channelinglimit. The process of decompression involved advancingthe wand, in ablation mode, at a speed of 0.5 cm/sec and, similarly, retraction of the wand was performed incoagulation mode at a speed of 0.5 cm/sec. A total of sixchannels were created at the twelve, two, four, six, eight, and ten o'clock positions.

Postoperatively, patients were permitted to perform limitedwalking, standing, and sitting as needed during activitiesof daily living. Patients were returnedto sedentary or light work after two weeks and wereprovided with home exercise instructions by a qualifiedphysical therapist.Data was collected at 1, 3, 6 and 12 months. The outcomemeasures used were the patient's report of pain intensityusing a visual analogue scale of 0 to 10 (with 0 being no pain and10 being the most severe pain), andimprovement in functional status determined by Oswestry disability index.

Follow-up Characteristic:

Of the 100 patients,(12)patients were excluded from the follow-ups (4) patient at 6 months and(2)at 12 months and(4)at 3 month and (2)at 1 month due to re location another (10) cases had suffered re-injury, and underwent open surgery, while(4) patient underwent spinal fusion and fixation All patients were included in the analysis of outcomes.

Outcome Measures:

A Visual Analog Scale (VAS) "a numeric pain scale of 0 to 10 (with 0 being no pain and 10 being the most severe pain)" was administered, and filled out by the patient pre-procedure, and 1 month post-procedure, three months, six months and one year post-procedure. The treating physician performed assessments at the above intervals, along with information regarding occupational status, analgesics usage, and patient satisfaction. Improvement in functional capacity was calculated based onOswestry disability score pre-procedure, 1 month 3 months 6 months, and one year post-procedure.

All patients complained from back and leg pain. None of the patients suffered from neurological deficit preoperatively.

The study was done after approval of ethical board of Al-Azhar university and an informed written consent was taken from each participant in the study.

Statistical analysis;

Demographics of the 100 patients included in the study are illustrated in Table1. Patient gender distribution was 32% female, 68% male, with a mean age of 39.64 ± 7.85years, ranging from 21 to 55 years. All our patients complained of both back pain with leg pain. The average duration of back pain was 8.57 ±3.76 months, ranging from 3 month to 17months. The average duration of leg pain was 4.36 ±1.79 months, ranging from 2 months to 10 months. 60% of patients complained of right sciatica, and 40% of left sciatica. 52% of disc herniation was at L4-5 level, 22% at L5-S1 level,

12%was L3-L4 &L4-L5, 10% was "L4-5 & L5-S1" .and 4% was L3-L4. 20% of patients had low activity level, 48% had moderate, and 32% had high activity level regarding their work and daily life activity.

Table (1): -- Demographics-

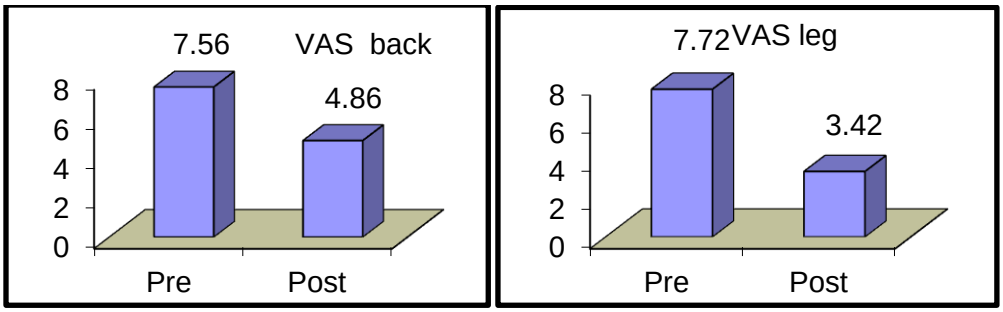
sex	Female	32.0% (32)
	Male	68.0% (68)
Age (years)	Mean ± SD	39.64 ± 7.85
Duration of back pain "M"	Mean ± SD	8.57± 3.76
Duration of leg pain "M"	Mean ± SD	4.36 ± 1.79
Side of leg pain	Right side	60.0% (60)
	Left side	40.0% (40)
Level	L4-5	52.0% (52)
	L5-S1	22.0% (22)
	L4-5 & L5-S1	10.0% (10)
	L3-4&L4-5	12.0%(12)
	L3-4	4.0%(4)
Activity level	Low	20.0% (20)
	Moderate	48.0% (48)
	High	32.0% (32)

By comparing the Mean of the visual analogue scale "VAS" for the back, VAS for the leg, subjective work capacity, and the Oswestry disability index. Preoperative and post operative of each item. There is statistically significant difference in the following results table (2) figure (5) P-value < 0.01Hiley Significant.

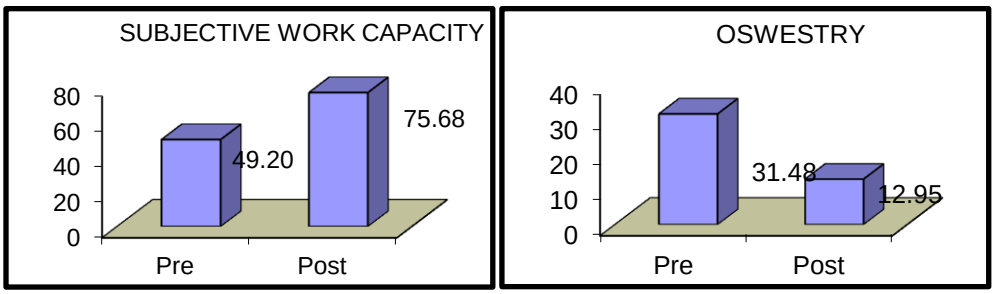
Table (2) results of mean vas back, vas leg, subjective work capacity and Oswestry index pre and one year post operative

		Pre	**Post**	**Paired t-test**	
				t	**P-value**
VAS back	Mean ± SD	7.56 ± 1.12	4.86 ± 1.44	20.335	0.001
VAS leg	Mean ± SD	7.72 ± 1.03	3.42 ± 1.48	31.421	0.001
SUBJECTIVE WORK CAPACITY	Mean ± SD	49.20 ± 17.96	75.68 ± 13.41	15.265	0.001
OSWESTRY	Mean ± SD	31.48 ± 4.32	12.95 ± 7.23	28.624	0.001

P-value < 0.05 Significant-value < 0.01Hiley Significant-value > 0.05 Non Significant



Pre- and postoperative the mean of VAS for back pain Pre- and postoperative the mean of VAS for leg pain



Mean Subjective work capacity preoperative and post operative Mean Oswestry index preoperative and post operative

Fig (5)

Using paired sample t test, there was statistically highly significant difference between mean preoperative and post operative for VAS back and leg and subjective work capacity and Oswestry index. all the patients were taking analgesics, 48% of patients were talking NSAID, 38% were on Steroids in plus to the NSAID, and even 14% of patients were taking Tramadol also. Post operatively all the patients stopped taking Steroids, and Tramadol, on 1 month post-operative 64% of patients were medication free, 36% were taking NSAID , On 12 months post-operatively 70% of patients were medication free 30% used NSAID.

(Table3) *Demographic of analgesic intake pre-operatively, 1 month, and 12 months post-operatively*

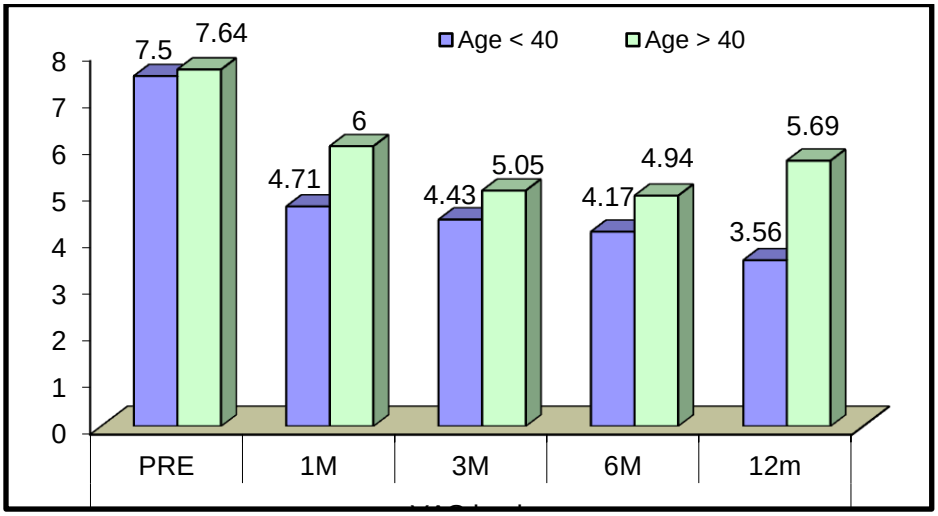
ANALGESICS	PRE	1 month	12M
TRAMADOL	14	NO	NO
STEROIDS	38	NO	NO
NSAID	48	36	30

We decided to study the results depending on the Age of the patient; we divided the patients into two groups. Those who are 40 years or younger, and those who are older than 40 years. By comparing the Mean of VAS back, VAS leg,, Subjective Work Capacity, and total Oswestry index between two groups there is statistically significant difference in the following results table(4) figure (6)P-value < 0.01Hiley Significant

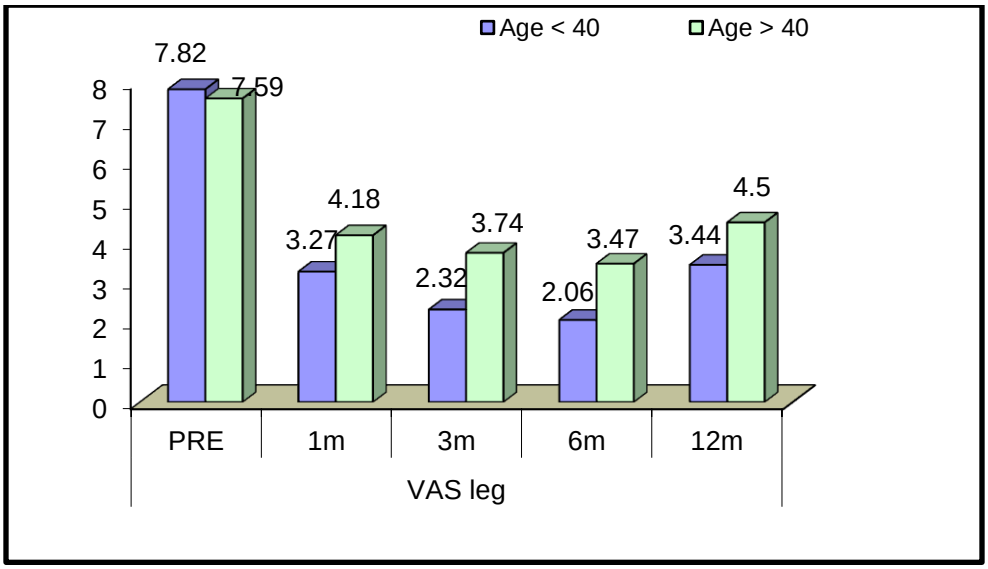
Table (4) comparison between mean vas back, vasleg, subjective work capacity and Oswestry index pre and post operative between two age groups of patients below and above 40 years.

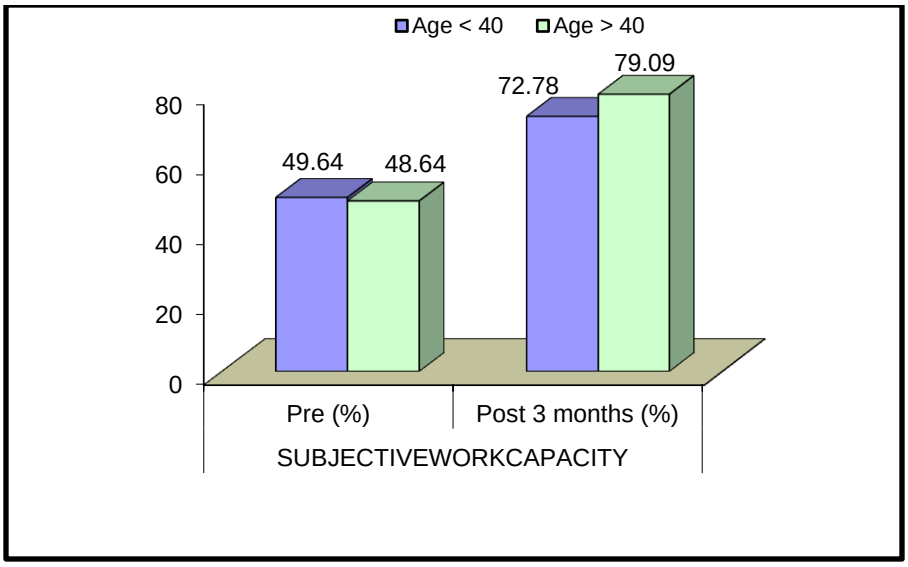
		Age < 40	Age > 40	Independent t-test	
		56%	44%	t	P-value
VAS back					
PRE	Mean ± SD	7.50 ± 1.16	7.64 ± 1.08	-0.601	0.549
1M	Mean ± SD	4.71 ± 1.50	6.00 ± 1.22	-4.615	0.001
3M	Mean ± SD	4.43 ± 1.51	5.05 ± 1.06	-2.200	0.030
6M	Mean ± SD	4.17 ± 1.21	4.94 ± 1.79	-2.339	0.022
12m	Mean ± SD	3.56 ± 1.70	5.69 ± 1.60	-5.612	0.001
VAS leg					
PRE	Mean ± SD	7.82 ± 1.08	7.59 ± 0.95	1.117	0.267
1m	Mean ± SD	3.27 ± 1.87	4.18 ± 1.60	-2.578	0.011
3m	Mean ± SD	2.32 ± 1.78	3.74 ± 1.50	-4.025	0.001
6m	Mean ± SD	2.06 ± 1.90	3.47 ± 1.56	-3.559	0.001
12m	Mean ± SD	3.44 ± 1.35	4.50 ± 1.48	-3.315	0.001
SUBJECTIVEWORKCAPACITY					
Pre (%)	Mean ± SD	48.64 ± 18.63	49.64 ± 17.58	0.277	0.782
Post 3 months (%)	Mean ± SD	79.09 ± 13.61	72.78 ± 12.56	2.438	0.021
OSWESTRY					
PRE	Mean ± SD	31.64 ± 4.51	31.27 ± 4.12	0.423	0.673
1M	Mean ± SD	9.50 ± 8.06	14.50 ± 7.86	-3.028	0.003
3m	Mean ± SD	8.65 ± 7.00	14.29 ± 5.55	-3.953	0.001
6M	Mean ± SD	10.48 ± 4.53	15.06 ± 5.25	-4.131	0.001
12m	Mean ± SD	12.05 ± 5.26	16.25 ± 6.24	-3.179	0.002

*: Chi-square testP-value < 0.05 SignificantP-value < 0.01Hiley SignificantP-value > 0.05 Non Significant

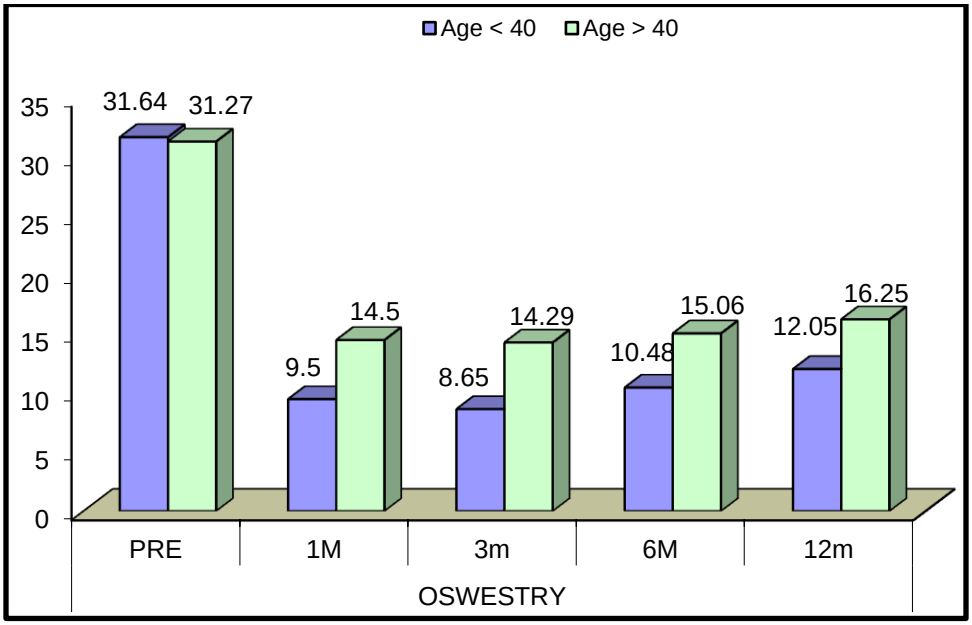


Results of Pre- and postoperative the mean of VAS for back pain between different age groups





Results of Pre- and postoperative the mean of subjective work capacity between different age groups



Results of Pre- and postoperative the mean of Oswestry index between different age groups

Figure (6)

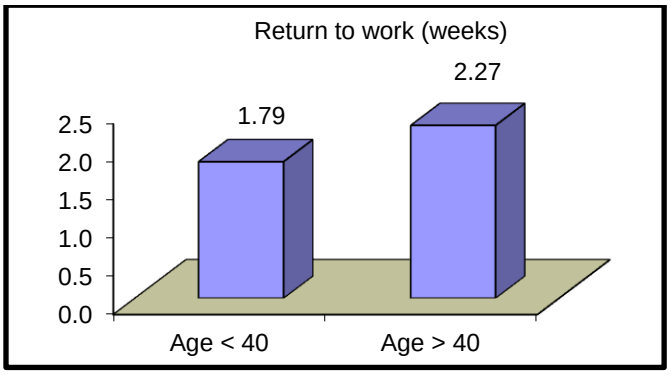
By comparing the results preoperative and postoperative in the age groups, there is difference between the two groups, with better improvement in VAS back, VAS leg, Subjective Work Capacity, and total Oswestry in the first group whose age 40 or less comparing to the second group whose age more than 40. Table (4) figure (6)

With Evaluation of return to work in different age groups post operative there is statistically significant difference in the following results table (5) figure (7) P-value < 0.01Hiley Significant

Table (5)comparison the results of mean of return to work between two age groups post operative

		Age < 40	**Age > 40**	**Independent t-test**	
		56%	**44%**	**t/X²***	**P-value**
Return to work (weeks)	Mean ± SD	1.79 ± 0.74	2.27 ± 0.74	-3.080	0.003

*: Chi-square test P-value < 0.05 SignificantP-value < 0.01Hiley SignificantP-value > 0.05 Non Significant



Figs (7) return to work

By comparing the results in the age groups, there is short time to return work post procedure in the first group whose age 40 or less comparing to the second group whose age more than 40.

Evaluation of patient satisfaction on 12 months post-operative only 25% of our patients answered the question negatively, and 75% of our patients were satisfied with the results of the procedure. But putting in mind the nature of the social background of our patients we are not absolutely comfortable to the results of patient satisfaction Table (6) (Fig 8).

Table (6) results of patient satisfaction post operative

		Percentage
Satisfaction	No	25.0%
	Yes	75.0%

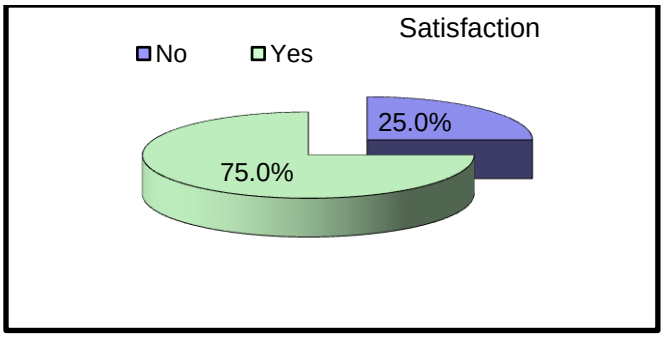


Fig 8: *patient Satisfaction.*

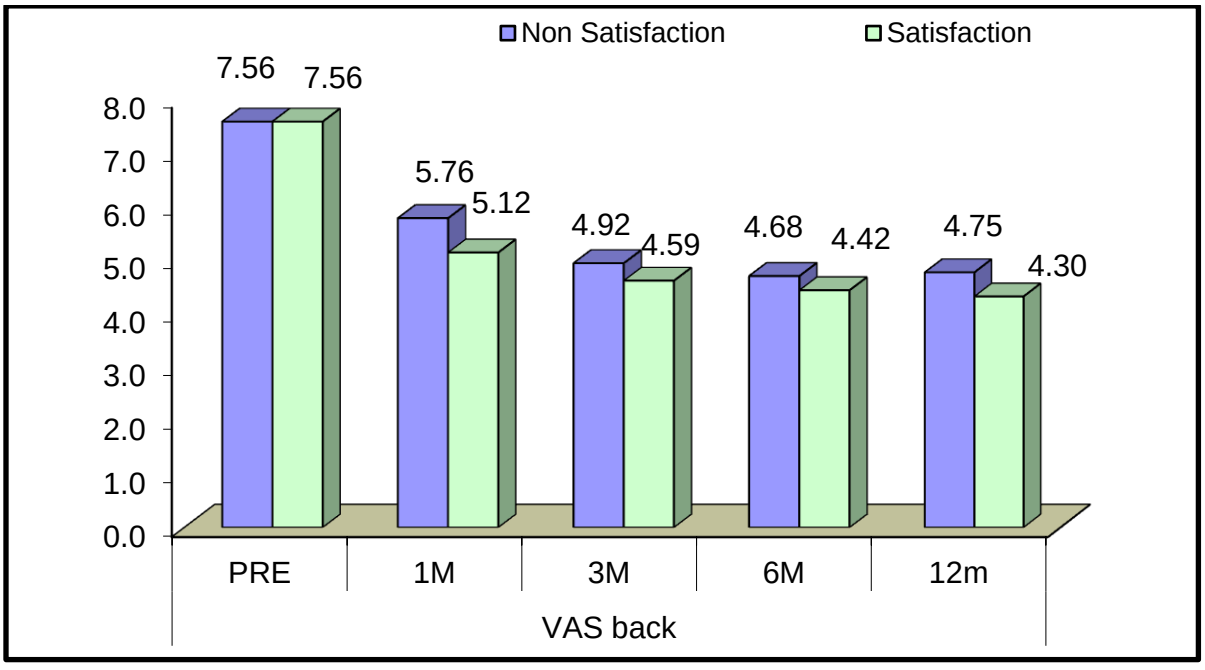
By comparing the mean of vas leg ,vas back, subjective work capacity and Oswestry index in the satisfaction groups preoperative and postoperative there is statistically significant difference in the following results table (7)figure (9) P-value < 0.01Hiley Significant

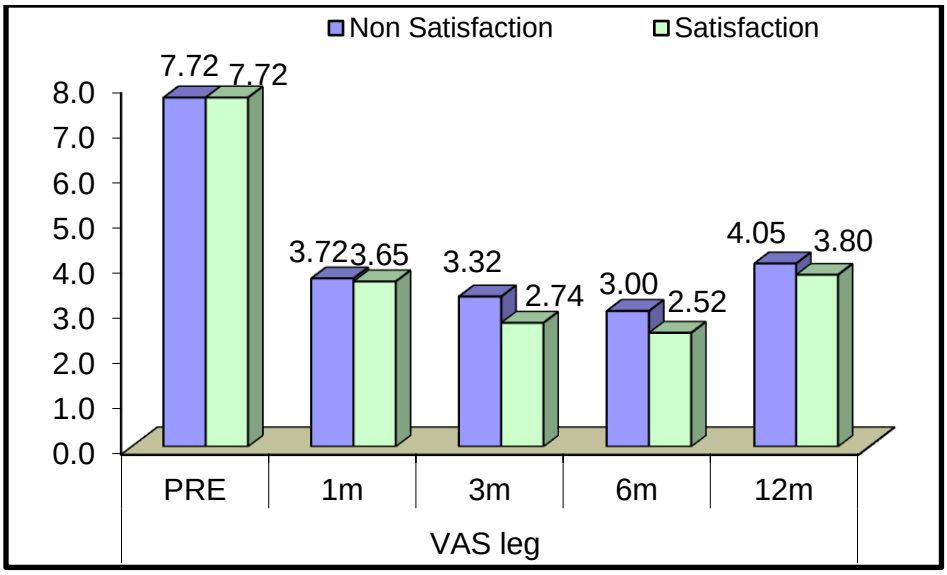
Table (7) results of the mean vas leg, vas back, subjective work capacity and Oswestry index in the satisfaction groups preoperative and postoperative.

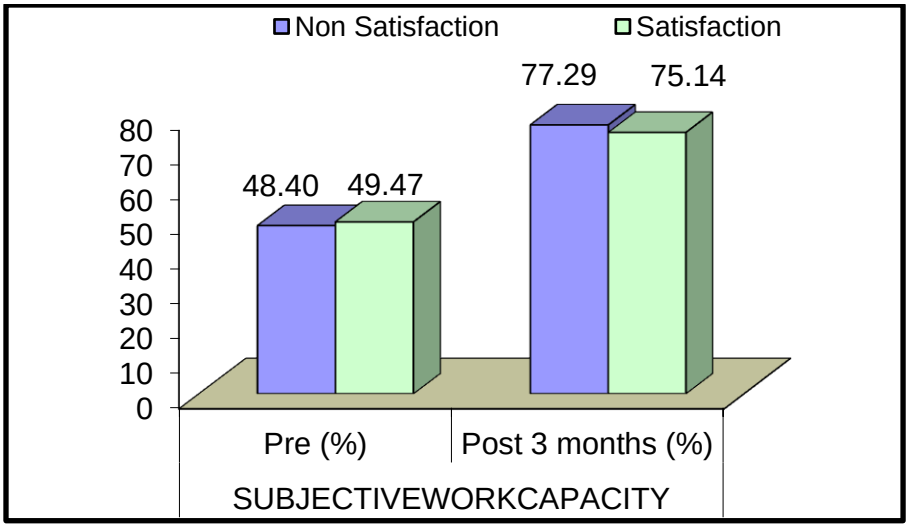
		Non Satisfaction	**Satisfaction**	**Independent t-test**	
		25%	**75%**	**t**	**P-value**
VAS back					
PRE	Mean ± SD	7.56 ± 1.12	7.56 ± 1.13	-2.746	0.007
1M	Mean ± SD	5.76 ± 1.16	5.12 ± 1.59	-0.983	0.328
3M	Mean ± SD	4.92 ± 1.15	4.59 ± 1.45	-0.709	0.480
6M	Mean ± SD	4.68 ± 1.36	4.42 ± 1.58	-0.941	0.350
12m	Mean ± SD	4.75 ± 2.12	4.30 ± 1.90	-1.915	0.059
VAS leg					
PRE	Mean ± SD	7.72 ± 1.10	7.72 ± 1.01	-2.360	0.020
1m	Mean ± SD	3.72 ± 1.67	3.65 ± 1.86	-2.228	0.028
3m	Mean ± SD	3.32 ± 2.15	2.74 ± 1.65	1.253	0.213
6m	Mean ± SD	3.00 ± 1.54	2.52 ± 2.00	-0.953	0.344
12m	Mean ± SD	4.05 ± 1.64	3.80 ± 1.45	0.129	0.898

SUBJECTIVEWORKCAPACITY					
Pre (%)	Mean ± SD	48.40 ± 17.95	49.47 ± 18.08	4.200	0.001
Post 3 months (%)	Mean ± SD	77.29 ± 12.60	75.14 ± 13.71	1.622	0.108
OSWESTRY					
PRE	Mean ± SD	31.60 ± 3.79	31.44 ± 4.51	-0.860	0.392
1M	Mean ± SD	12.92 ± 8.20	11.14 ± 8.36	3.031	0.003
3m	Mean ± SD	12.96 ± 8.06	10.08 ± 6.44	2.487	0.015
6M	Mean ± SD	13.41 ± 5.37	12.11 ± 5.33	0.495	0.622
12m	Mean ± SD	16.55 ± 5.61	12.84 ± 5.92	-0.486	0.628

*: Chi-square test P-value < 0.05 SignificantP-value < 0.01Hiley SignificantP-value > 0.05 Non Significant




Non Satisfaction
Satisfaction
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
7.72
7.72
3.72
3.65
3.32
2.74
3.00
2.52
4.05
3.80
PRE
1m
3m
6m
12m
VAS leg


Non Satisfaction
Satisfaction
80
70
60
50
40
30
20
10
0
48.40
49.47
77.29
75.14
Pre (%)
Post 3 months (%)
SUBJECTIVEWORKCAPACITY

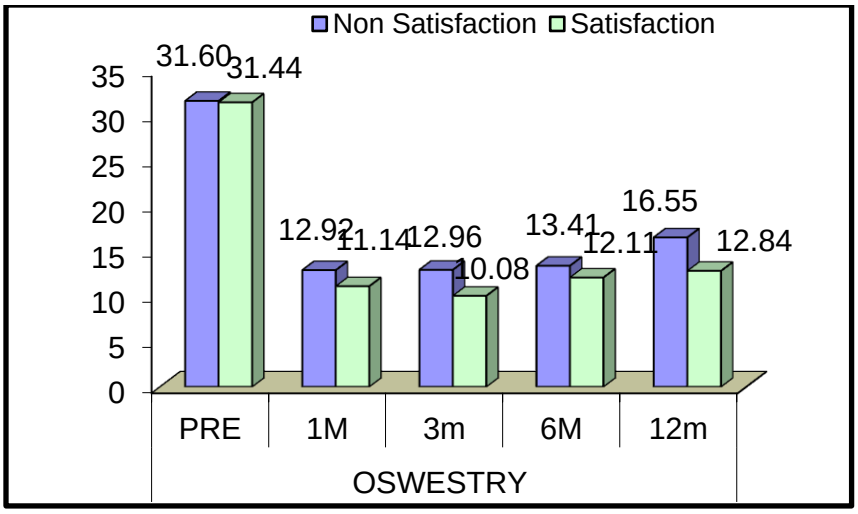


Fig (9)

By comparing the results there is decrease in vas leg and vas back and subjective work capacity and Oswestry index in satisfaction group more than non-satisfaction group.

DISCUSSION

Nucleoplasty has certain advantages over other minimally invasive techniques. Because the temperature is kept low during ablation, burning of surrounding tissues is minimized. The procedure is under the physician's complete control, unlike chemonucleolysis, which is dosage dependent. In addition, pressure changes are immediate, whereas chemonucleolysis with may require as long as 7 days for completion [(24)].

Nucleoplasty also can be performed from either side of the affected disc, not just from the ipsilateral symptomatic side. Thus, treatment approaches are not limited to one site only. Because of these advantages, nucleoplasty has the potential to be a safe and effective treatment for herniated discs[(25)].

Other minimally invasive intradiscal techniques such as chemonucleolysis, percutaneous nucleotomy, percutaneous discectomy, and laser treatments have been shown to reduce intradiscal pressure, but have their limitations. Chemonucleolysis involves a higher risk of severe complications, especially with inexperienced physicians .Chemonucleolysis with chymopapain can lead to fatal anaphylaxis , cartilaginous endplate damage, and hemorrhage [(25)].

In our study the mean VAS for back declined from 7.56 ± 1.12 pre operative to 4.86 ± 1.44 at 12 months, and from a high of 7.72 ± 1.03 pre operative to 3.42 ± 1.48 at 12 months for leg pain. But the proportion of patients with 75 % was satisfied at 12 months.

This may be related to the intricate metabolic function of the intradiscal matrix, which is highly sensitive to biochemical changes related to intradiscal pressure, rather than the treatment modality applied. Further, reestablishment of the delicate balance of nutritional exchange within the disc impacts the synthesis and breakdown of the intradiscal matrix [(24)].

Nucleoplasty theoretically allows reestablishment of normal nutritional exchange by achieving a reduction in volume, which in turn, causes a reduction in intradiscal pressure. Though the treatment may initially restore normal physiological function to the matrix, further injury, whether due to trauma, aging, or disease, may hinder or reverse the effects with time.

In contrast to the thermal surgical techniques used during laser procedures, Coblation achieves molecular disintegration of nuclear material within the disc with significant reduction of heat generation, avoiding thermally damaging vaporization and pyrolysis and reducing collateral damage to surrounding tissues [(26)].

Histological analyses and temperature distribution studies have been conducted to determine the effects of Coblation on the disc and endplate during Nucleoplasty. Results indicate very little damage or necrosis in surrounding disc tissue or endplate cartilage with relatively low temperature readings within the disc during the procedure. [(27)]

A study into the effect of Coblation plasma technology on disc tissue supports the notion that Coblation incites favorable biochemical responses in cytokines in the nucleus of a degenerative disc.The healing response observed in this study raises the question of whether plasma discectomy may have efficacy beyond simple disc decompression, with the potential additional benefits of reduced inflammation and tissue regeneration[(28)].

We also would like to point out that the degree of annular disruption can have a significant impact on the long-term outcome following disc decompression. During many types of surgical interventions, the method of annulotomy used during the procedure (such as the box or slit incision) diminishes integrity of the disc, leading to a decrease in strength of 40-50% , an increase in severe and early disc degeneration [(29)], and a delay in annular healing . Additionally, excessive nuclear tissue removal may lead to accelerated disc degeneration and instability [(30)]. Thus, percutaneous disc decompression using a small diameter access cannula minimizes annular damage.

By comparing the results preoperative and 12 month postoperative in the age groups, there is difference between the two groups, the mean VAS back decline from 7.50 to 3.56 in age group below 40 year and from 7.64 to 5.69 in age group above 40 year and the mean VAS leg decline from 7.82 to 3.44 in age group below 40 year and from 7.59 to 4.50 in age group above 40 year, the mean Subjective Work Capacity increased from 49.64 to 79.09 thee month post operative in age group below 40 year and from 48.64 to 79.09 in age group above 40 year, and mean total Oswestry index decline from 31.64 to 12.05 in age group below 40 year and from 31.27 to 16.25 in age group above 40 year.

By Evaluation of patient satisfaction on 12 months post-operative. Only 25% of our patients answered the question negatively, and 75% of our patients were satisfied with the results of the procedure. But putting in mind the nature of the social background of our patients we are not absolutely comfortable to the results of patient satisfaction.

This analysis demonstrates an encouraging outcomefollowing PDD using Coblation technology, a minimally- invasive technique forpatients with contained disc herniation presenting withdiscogenic low back pain and/or leg pain. Overall, at 12months, Whileother minimally invasive procedures, such as laser assisted disc decompression, demonstrate complicationrates of 1-2%, including Discitis, transient temporaryparasthesias, [(31)] And lesion of the endplate perforation of the aorta,Nerve root damage,Needle tract heating and Cauda equina syndrome [(32)],nocomplications were observed during or after the PDDprocedure using Coblation technology.

CONCLUSION

Our data indicates that PDD using Coblationtechnology is safe, effective and a

promising treatment option or patients with contained disc herniation, presenting withdiscogenic axial back pain and/or leg pain who have failed conservative therapies.

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