

# CLINICAL EXPERIENCE WITH AUTOMATED PERCUTANEOUS DISCECTOMY

S J Yeo, B K Tay

## ABSTRACT

*This study was performed to evaluate a group of patients undergoing automated percutaneous lumbar discectomy. All patients had disc pathology at L4/L5 and L5/S1 documented on CT scan and/or MRI. The range of follow-up was between 3 months and 20 months. The average hospital stay was 2 days (range 1-3 days). A total of 21 patients underwent the procedure and 18 were available for assessment. Of these, 12 patients improved. Of the patients that did not, two subsequently underwent surgical discectomy. There was one failed procedure but no other intra- or post-operative complications. The results of the study indicate that percutaneous discectomy has a demonstrable low morbidity and can be performed under local anaesthesia. However, proper patient selection is important for successful results.*

**Keywords:** percutaneous discectomy, herniated disc.

SINGAPORE MED J 1993; Vol 34: 313-315

## INTRODUCTION

Herniated lumbar discs resulting in back and leg pain represent a major cost in terms of hospitalisation, work loss and compensation. Traditional surgical therapy for herniated lumbar discs is not always successful because of soft-tissue injury, delayed bony instability, and epidural fibrosis. Open surgery also involves both the risk of anaesthesia as well as an extended recuperation period. For all these reasons, less invasive approaches have been sought.

In 1985, Onik et al<sup>(1)</sup> introduced a nucleotome for automated percutaneous discectomy (Fig 1). This 2 mm blunt-tipped suction cutting probe was designed for simultaneously aspirating and cutting disc material. The nucleotome is 8 inches long and has a rounded tip and a closed end with a single side port. The probe functions on the same principle as the guillotine cutting instrumentation used for arthroscopic surgical procedures. Suction-aspiration and cutting occur concurrently. The procedure involves a C-arm directed placement of the nucleotome with the patient under local anaesthesia (Fig 2). Aspiration of the disc takes 10 to 20 minutes. It is generally not necessary to administer narcotics after the procedure or to admit the patient for overnight observation.

As with the standard surgical indications, it is designed to treat patients with predominant leg pain secondary to herniated lumbar discs, who have failed conservative therapy. Patients with the typical findings of positive straight-leg raising, neurological weakness, wasting, diminished sensation, and reflex changes make the best candidates.

A thin-slice axial examination by CT or magnetic resonance imaging (MRI) is essential to determine that the herniated disc is contained within the posterior longitudinal ligament and that subligamentous disc material has not migrated above or below the disc spaces. MRI and/or CT are also important in excluding those patients with associated spinal stenosis, spondylolithesis, or degenerative facet disease. In ad-

Fig 1 - The nucleotome probe

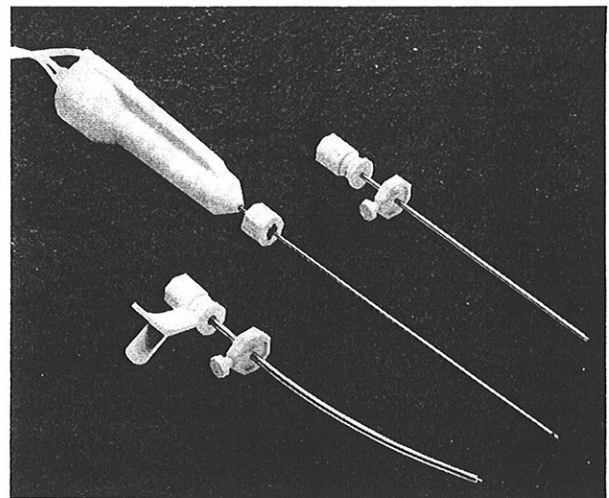
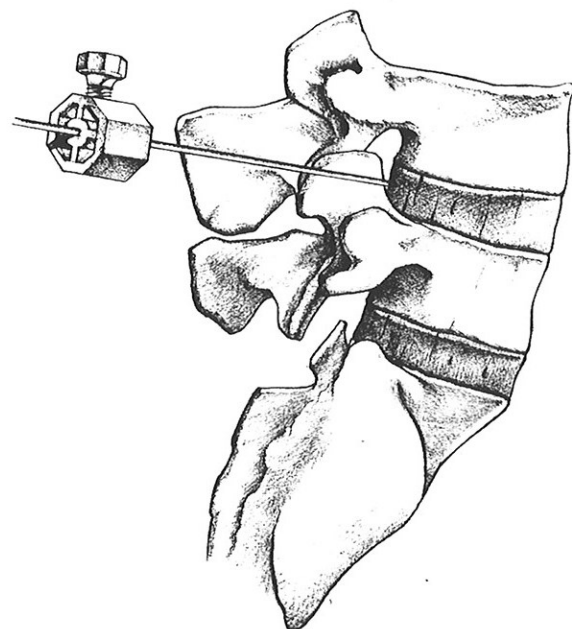


Fig 2 - This diagram shows the posterolateral approach that the nucleotome takes to the disc space



Department of Orthopaedic Surgery 'C'  
Singapore General Hospital  
Outram Road  
Singapore 0316

S J Yeo, FRCS (Edin)  
Registrar

B K Tay, FRCS (Edin), FRCSEd (Ortho), FAMS  
Senior Consultant

Correspondence to: Dr S J Yeo

**Table I - Preoperative rating of symptoms**

	Patients (n=18)	Percent	Scale
Back pain	17	94%	7.4
Leg pain	15	83%	8.6
Numbness	5	28%	5.4
Weakness	4	22%	6.3

**Table II - Post-operative rating of symptoms for Patients who improved following percutaneous discectomy**

	Patients (n=12)	Percent	Scale
Back pain	12	100%	3.8
Leg pain	8	67%	1.8
Numbness	3	25%	4
Weakness	3	25%	3.3

dition, those with massive disc herniation (compromise of greater than 50% of the thecal sac) should not be treated with percutaneous lumbar discectomy since the literature shows that 90% of these patients have a free fragment<sup>(2)</sup>.

#### MATERIALS AND METHODS

Of the 21 patients that underwent percutaneous discectomy, 3 patients were lost to follow-up. Hence, the study group consisted of 18 patients. The average age at the time of the procedure was 32 years (range 19-48 years). There were 11 men and 7 women. None of the patients had worker's compensation or no fault claims. The percutaneous discectomy was performed by one of two independent surgeons. All follow-up data were collected by telephone interview by an unbiased independent observer (YSJ). Every patient had preoperative symptoms suggestive of a one level unilateral herniated lumbar disc situated at L4/L5 or L5/S1, which was confirmed either by CT scan or MRI or a combination of these studies. None of these patients was believed to have sequestered fragments based on their preoperative studies. Preoperative and post-operative pain and symptomatology was noted on a pain scale used in previous studies<sup>(3,4)</sup>. Using this scale, from 0-10 according to severity, patients were asked to rate their low back pain, leg pain, weakness and numbness pre-operatively and at follow-up. The average follow-up for all patients was 11.5 months (range 3-20 months).

#### RESULTS

Seventeen patients (94%) reported preoperative back pain. Patients with preoperative back pain had an average rating of 7.4. Fifteen patients (83%) reported preoperative radicular or leg pain. The pain rating in those reporting leg pain was 8.6. Five patients (28%) reported preoperative numbness. The degree of numbness was 5.4. Four patients (22%) reported preoperative weakness in the affected extremity. The weakness was rated 6.3 in those patients claiming to have preoperative lower extremity weakness (Table I).

The average time out of work pre-operatively was 2-3 weeks (range 0-12 weeks). The average hospitalisation time for patients undergoing percutaneous discectomy was 2 days (range 1-3 days)

Of the 18 patients who underwent percutaneous discectomy, 15 patients (83%) were able to return to work at follow-up. Two (11%) of the 18 patients underwent surgical discectomy

**Table III - Post-operative rating of symptoms for Patients with no improvement following percutaneous discectomy**

	Patients (n=6)	Percent	Scale
Back pain	6	100%	8
Leg pain	6	100%	8
Numbness	-	-	-
Weakness	1	17%	8

at 8 and 10 months after percutaneous discectomy because of persistent or increasing symptoms. This left a group of 16 patients who had undergone percutaneous discectomy but did not undergo surgical discectomy. Of these 16 patients, the average time of return to work after the procedure was 2-3 weeks (range 0-4 weeks). Only one patient never returned to work but she did not undergo a second procedure.

At follow-up, 12 patients (67%) had improved. Of these patients, all still had residual back pain rated at 3.8, but only 8 patients had residual leg pain rated at 1.8. Only 3 patients had residual numbness and only 3 patients had residual weakness. (Table II).

Of the 6 patients that did not improve, there was one failed percutaneous discectomy and 2 patients who subsequently underwent surgical discectomy. The remainder continued to complain of back pain rating 8 and leg pain rating 8. (Table III).

The hospital charges for percutaneous discectomy averaged \$2,110, while the average costs for surgical discectomy was \$5,340.

#### DISCUSSION

None of the patients undergoing automated percutaneous discectomy was made worse by the procedure or suffered any complications. The success rate was 67%. The criteria for success were:

- (1) Moderate to complete pain relief,
- (2) Improvement in the functional status (if the patient was working prior to injury, he or she should have returned to work), and
- (3) Satisfaction of both patient and doctor.

A potential criticism of this study might be that it was retrospective and not prospective. However, all patients were consecutively done and the objective basis for success was return to work and secondary procedures performed. The two outcome measures would not be affected differently had the study been performed prospectively.

The pain and neurological ratings examined in this study were subjective criteria, but they clearly show superior results when compared to the pre-operative ratings.

The two patients who underwent surgical discectomy only had CT scan to identify the level of disc pathology. One of these patients was found at operation to have had a sequestered disc which was missed in the axial cut of the CT and MRI would have been a more sensitive radiological investigation.

Success rate in other previous studies have approached approximately 80%<sup>(4-6)</sup>. Perhaps this lower success rate in our study can be attributed to a learning curve needed to master the technique as suggested by Onik<sup>(5)</sup>.

The results of surgical disc excision should approximate a 90% rate of success<sup>(7-9)</sup>. At the present time, the lower morbidity associated with percutaneous discectomy has to be weighed against its lower success rate, and the decision has to be made

for each patient individually. However, in patients not electing to undergo surgery (for lumbar disc herniation) their statistical chance of relief approach those of surgical discectomy at an average of 4 years<sup>(10)</sup> and therefore it may be justified to pursue a minimally invasive approach.

#### CONCLUSION

Preliminary data indicate that automated percutaneous discectomy has the potential to replace some open surgical procedures and thereby decrease hospital costs, patient morbidity and post surgical rehabilitation time.

#### REFERENCES

1. Onik G, Helms C, Crimsberg L, Hoaglund FT, Morris J. Percutaneous lumbar discectomy using a new aspiration probe. *AJNR* 1985; 6:290.

2. Freis JW, Abodeely DA, Vilungo JG, Yeager VL, Graftey WR. Computer tomography of herniated and extended nucleolus pulposus. *Comput Assist Tomogr* 1982; 6:874.  
3. Kalanovitz N, Viola K, Goldstein T, Dawson E. A multicentre analysis of percutaneous discectomy. *Spine* 1990; 15:713-5.  
4. Davis GW, Onik G. Clinical experience with automated percutaneous lumbar discectomy. *Clin Orthop* 1989; 238:98-103.  
5. Maroon JC, Onik G, Sternau L. Percutaneous automated discectomy: A new approach to lumbar surgery. *Clin Orthop* 1989; 238:64-70.  
6. Schweigel J. Automated percutaneous discectomy: Comparison with chymopapain, in automated percutaneous discectomy. San Francisco: University of California Press, 1988:155-60.  
7. William RW. Microlumbar discectomy: a conservative surgical approach to the virgin herniated lumbar disc. *Spine* 1978; 3:175-82.  
8. Spengler DM. Lumbar discectomy: results with limited disc excision and selective foraminotomy. *Spine* 1982; 7:604-7.  
9. Kahanovitz N, Viola K, McCulloch J. Limited surgical discectomy and microdiscectomy: a clinical comparison. *Spine* 1989; 14:29.  
10. Weber H. Lumbar disc herniation: a controlled prospective with ten years of observation. *Spine* 1983; 8:131-40.

## ASIAN CONFERENCE ON CLINICAL PHARMACOLOGY AND THERAPEUTICS 1993

organised by Gadjah Mada University

Date : 31 October to 4 November 1993

Venue : Ambarukmo Palace Hotel

&

Campus of Gadjah Mada University  
Yogyakarta  
Indonesia

For further information, please contact:

Secretariat/Organizing Committee  
AC-CPT'93  
Department of Clinical Pharmacology  
Faculty of Medicine  
Gadjah Mada University  
P.O. Box 1136  
Yogyakarta 55011  
Indonesia  
Tel : (62) 274-63596/902548  
Fax : (62) 274-61196  
Telex : 25135 ugm ykia