

Comparison Study of Cost Effectiveness, Complications Hospital Stay in Conventional Versus Micro-Discectomy

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ABSTRACT

Objective: To study of cost effectiveness, complications and hospital stay in conventional V/S micro-Discectomy.

Study Design: Experimental randomized controlled trail.

Placed and Duration of Study: My study held in Neurosurgical department of Lahore General Hospital Lahore , duration of study was six months and follow-up was of 06 months after discharge from ward.

Sample Size: Forty patients for herniated lumbar Disc diagnosed on MRI were divided into two groups of 20 each.

Results: Mean age of patients range from 15 to 75 years in group A (open Discectomy) out of 20 patients. 14 patients (70%) stayed < 5 days and 6 patients (30%) stay in hospital > 5 days. In group B 20 patients (100%) Hospital stay < 5 days. C.S.F leak in group A (5%). In group B No. CSF leak recorded in group A. 04 patients (25%) wound infection in Group B, 01 patient (5%) wound infection. Group A patient got prolong hospital stay, on average < 5 days due to extensive dissection and more chance of complication, in comparison Group B patient has less hospital stay, average > 3 days and they are cost effective due to less use of medicines and less chance of complication.

Conclusion: Both surgical technical are equally good and effective regarding pain relief but in term of hospital stay and post-operative wound infection microdiscectomy show superior results than conventional Discectomy.

Key Words: Micro-discectomy, Conventional Discectomy.

INTRODUCTION

Prevalence of lumbar disc herniation is higher than other regions after magnetic resonance imaging (MRI). Approximately 20% to 30% percent is noted in different studies. Lumbar disc herniation clinically causes problems to 1-2% of population in their life. Lumbar disc herniation is more common in males as compared to females. The incidence of herniated disc is common between fourth and fifth decades of life because peoples are active in their work/jobs during this period. Lumbar disc herniation represents with backache that eventually radiates to one or both legs¹⁰ lumbar disc herniation mostly occurs at L4-L5 or at L5-S1 levels pain due to lumbar disc herniation affects the lower back, buttocks, thigh, peri-anal region and

mostly radiates into foot or till toes. Sciatic nerve get irritated and producing these symptom. In lumbar disc herniation sciatic nerve is mainly affected in such patients and produces symptoms like numbness, tingling, burning sensations throughout in lower limbs, more marked in feet. Mostly burning sensation occurred in hips and legs in few of cases². Radicular pain in lower Limbs caused because of herniation of nucleus pulposis after tear in annulus fibrosis into the spinal canal which causes pressure on thecal sac and adjacent nerve roots.

The constellation of symptoms can include numbness and weakness that most often consists solely of leg pain that radiates postero-laterally due to compression on the lumbar nerves L4-L5 and S1

(sciatic nerves) due to compression on the nerve roots, it causes sensory abnormalities in the genitalia, anus or perineum often accompanied with loss of bladder and sphincter control (cauda equina syndrome) as well as progressive loss of sensation or motor function in the legs, are ominous signs and warrant urgent evaluation and treatment³.

Lumbar disc herniation on the total is less than 5% of all low back pain problems. Among the lumbar disc herniation the most common levels are L4-L5 and L5-S1. Indications of disc surgery include intractable lumbar pain and leg pain with altered bladder function and progressive muscle weakness which can lead to foot drop. The aim of surgery is to provide rapid relief of pain (back/leg) and numbness restoration of leg/foot weakness but recovery of motor power can be slow, due to longitivity of signs prevalence.

Inclusion Criteria

- Age 15-75 years.
- Persistent radicular pain lasting more than 6-8 weeks.
- Disc herniation which causing compressed of 1/3 of spinal canal.

Exclusion Criteria

- Previous lumbar disc surgery at same level because of adhesion formation and foraminal Stenosis.

Open Discectomy

It is performed under general anesthesia, after making the appropriate prone position, the operating doctor start doing surgery after paint and drape, skin incision (5-7cmm) made for single level disc. Muscles are separated from the bones (lamina) above and below the affected disc. Then self-retaining retractors applied which hold the muscles and skin away from the surgical sit to create clear view of vertebrae and disc being operated upon. In some cases bone and ligaments may be removed according to surgeon desire to gain access to the operating protruding disc. In most of cases Ligamentum flavum is removed along with over hanging laminar bones, then protruded disc is removed carefully to keep protected the relevant nerve tissues.

After making necessary exposure, then the

protruded disc along with other fragments of disc/ligaments are removed. This is done under proper visualization. The purpose of magnification is the better visualization of nervous tissue and other structures. Routinely no material is used to replace the disc tissue that is removed. Wound closed with staplers. The patient is awaked and shifted to the recovery room.

Micro-Discectomy

It is performed under General Anesthesia, making prone positions, through small incision (15-20mm) approximately. We inject local anesthesia at operating site.

In first step back muscles (erector spine) are lifted off the bony arch (Lamina) of the spine. These muscles are lying vertically then can be retracted easily. Then surgeon is encountered with lamina of the same side, which can be drilled, if necessary. Then disc space is approached by removing Ligamentum flavum and over hanging Laminae bone, then we use the microscope to visualize the nerve root. Then with special instruments the protruded disc is removed.

Immediate result of surgical treatment of symptomatic lumbar disc herniation in terms of pain relief is reported to have high success, ranging between (70-95%) which are very encouraging.

Surgical discectomies either through an open method or using more advanced microscopic approaches are indicated for all those patients with persistent incapacitating backache and sciatica after at least 06 weeks of treatment or in those patient with early or rapid progressive neurological deficits.

The complications related to discectomies can be complicated by dural tears, discitis, nerve root damage, spinal instability and post-operative convalescence can be lengthy⁴. Surgeons, who are doing routine Discectomy showed take in consideration that the degenerative part of disc left behind during operation have tendency to recur/reherniate.

Microdiscectomy is considered the “Gold Standard” for the treatment of disc herniation⁵. The benefits of the minimally invasive approach is that the patient get quick relief from the backache and radiating pain because of less muscle trauma. While minimally invasive approach may seem ideal, there is learning curve associated with execution of the procedure, patient safety outcome⁶.

Recent advances in diagnostic imaging technology have made surgeons enable to do the minimal exposure and extensive exposure of vertebrae can be avoided. This is the reason that less invasive surgical techniques have been developed.

Micro-Discectomy which uses a magnifying scope, operative loupes or microscope, allows us for great illumination of the surgical field. Minimally invasive techniques have advantage on other conventional methods that smaller and minimal disruption is minimized. Visualization of neural structures (Dura, roots, Disc space) improved significantly. This is the reason for successful surgery.

Micro surgery has some complications but has faster postoperative recovery and fewer untoward outcome in comparison to conventional Discectomy. Risks includes residual disc pieces, incomplete removal of rupture and occasionally operating wrong level ⁷.

Immediate postoperative success rates ranging from 70-91% in herniated disc surgeries have been observed. In long-term follow-up the available limited data shows that success rate declines after 3 to 10 years up till 60-70%. Postoperative success rates can be improved with better preoperative and nursing care ⁸.

Cost Effectiveness

As we know conventional Discectomy is gold standard procedure but microdiscectomy has some advantages on it. In micro-discectomy there is small incision and less tissue trauma and less bony work and very scanty bleeding.

In conventional Discectomy, patient needs 2 to 3 days antibiotics and painkillers. But in micro-discectomy only (02) doses of antibiotics are needed (pre-operative and post-operative) and painkiller are required on necessary basis. Patient of conventional Discectomy get mobilized late and his hospital stay lengthened and cost of treatment is also increased due to costly antibiotic and painkillers. While patient with micro-discectomy get ambulated early due to less trauma to tissues and can be discharged from ward, which remain very economical for the hospital.

Hospital Stay

We divided patient in two groups, group A (conventional Discectomy) and group B (microdiscectomy).

In Group A, from 20 patients 14 (70%) stayed for

< 5 days and 6 patients (30%) stayed in hospital for > 5 days.

In Group B, all 20 patients (100%) stay in hospital for < 5 days.

RESULTS

In this study 40 patients were operated 20 patients in each group. In both groups male and female ratio was same. Patients included for this study has age ranging from 15-75 years.

In group A (open Discectomy) mean age was 40-70 10.58 years and in group B (Microdiscectomy) the mean age of patient was 42.30 + 13.60 years (P value = 0.680).

CSF Leak

In group A (Open Discectomy) from 20 patients, 19 Patients (95.0%) had no CSF leak and 1 patient (5.0%) had CSF leak. In group B (Microdiscectomy) no CSF leak was recorded.

Table 1: *Distribution of patients according to treated group and CSF leak.*

Surgery Group	CSF		Total
	No	Yes	
Open Discectomy	19 (95.0%)	1 (5.0%)	20
Microdiscectomy	20 (100.0%)	0 (.0%)	20
Total	38 (95.0%)	2 (5.0%)	40
p-value 0.487			

Chi Square test 2.105

This variable had shown an insignificant statistical difference between the two groups i.e. (P-value 0.487).

Wound Infection

Wound infection was seen in both groups. In group A (Open Discectomy) from 20 patients, there were 16 patients (75.0%) without wound infection i.e. normal healing and only 4 patients (25.0%) had wound infection. In group B (Microdiscectomy) 19 patients (95.0%) had not wound infection i.e. normal healing, 1 patient (5.0%) had wound infection.

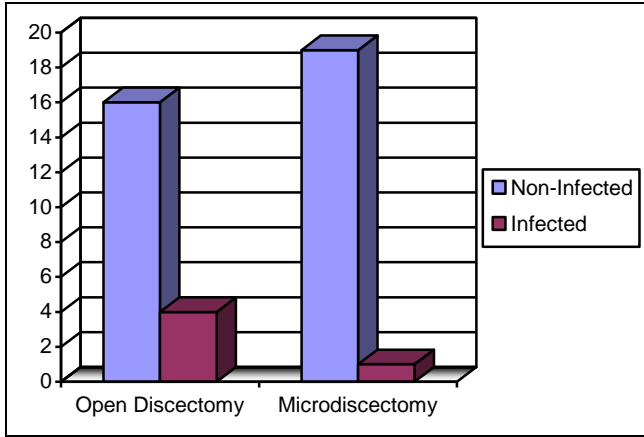


Fig. 1: Showing the Comparison of infection rate in open VS Microdiscectomy, Blue bar showing patient without infection and Red bar showing infected Patient.

Table 2: Distribution of wound infection in both Groups.

Wound Infection	Group A N (%)	Group B N (%)	Total N (%)
No	16 (75.0%)	19 (95.0%)	35 (87.5%)
Yes	4 (25.0%)	1 (5.0%)	5 (12.5%)
Total	20 (100.0%)	20 (100.0%)	40 (100.0%)
P value	0.342		

There is an insignificant statistical difference of wound infection between the two groups i.e. (P-value = 0.342).

Hospital Stay

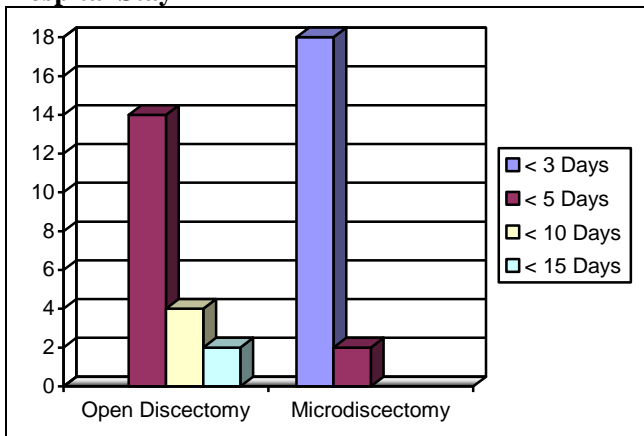


Fig. 2: Comparative of Hospital Stay in open V/s Micro-Discectomy.

DISCUSSION

I performed this study to compare the cost effectiveness, complications and hospital stay, along with advantages of Micro-Discectomy over open Discectomy.

Patient is included in this study was majority of them were male, on average it is noted age of male patient was less than female patient.

It is noted in open Discectomy the ward stay was long than the patients of micro-discectomy. The average hospital stay was 05 days in open Discectomy and 3 to 5 days in micro-discectomy. My results is not in comparison to previous study which documented that the neurosurgical ward stay of micro-discectomy patients over more than open Discectomy patients⁵ but in Chinese research results coincide with our research results. The average stay in micro-discectomy group was ranging from weeks to days and in open discectomy it was more than few weeks⁹.

In my study the length of hospital stay of both groups is less than 1 week.

In open Discectomy most of patient go home at 5th post-operative day. Few of them who developed complications like CSF leak or wound infection, then stay was between 10-15 days. Maximally a open Discectomy patient stayed 15 days in our ward.

In comparison the micro-discectomy patient stay was short. They were discharged on the 3rd day and few were discharged less than 3rd day of post-surgery.

The second parameters of cost-effectiveness were also evaluated in this study. Because of long hospital stay and more chances of complications, the cost of surgery enhances three folds in open-discectomy as compared to micro-discectomy. In Micro-Discectomy, hospital stay was between 2 to 3 days. Only two doses (1 pre-op & 2nd post-op) of antibiotics and minimal analgesia were required. It was because of less tissue trauma so the cost of micro-Discectomy was much less than group A patients. In group A patient required antibiotics for 5 days, also analgesia requirement in similar proportion. In open Discectomy 4 patient got infected, there requirement of costly antibiotics enhances. Also painkiller requirement was increased to three folds approximately.

With increasing Neurosurgeon’s experience the rate of disc surgery complication like CSF leak is also diminishing⁹.

One patient develop wound infection in group A while four patients develop wound infection in group B. It was noted that infection rate was high in

microdiscectomy (group A) as compared to open Discectomy (group B). The results of this study also have similarities in their outcome.

To my experience of this study it is noted that if surgery (open or micro) remains uneventful post-operatively their long term follow-up remain satisfactory, no recurrence or failure can develop.

In long term follow up study of ¹⁰ shown that in overall Discectomy surgeries the complication rate in herniated lumbar disc at L4-5 and L5-S1 was only 6 percent. So the result of ¹⁰ are comparable with this study.

A research results coincide with our study result regarding neurological outcome ⁵. The parameters of this specific study include incision size operating time, postoperative hospital stay and cost effectiveness. These parameters quite similar with our study.

Above mentioned study goes in favor of recommendation of microdiscectomy than the open Discectomy. In this minimally invasive surgery the length of ward stay, per operative bleeding and use of antibiotics plus analgics was grossly less than conventional discectomy ⁹ so the former procedure (micro-discectomy) is cost-effective in our terms and conditions.

The discussion regarding literature reviews and the study lead to the point that both procedure (open and micro-discectomy) are very effective. But micro-discectomy has advantage in terms that it is fascinating for both surgeon and patients. Neurosurgeons are adopting this technique because it has less hospital stays, cost effective and less complications. For patients micro-discectomy is attractive because after this procedure, patient get mobilized early and resume there jobs. Microdiscectomy is cosmetically more acceptable because of small incision and minimal scar.

Keeping in view of recent advances the disc surgery is also advancing. Its technique is revolutioning towards a day care surgery after the development of endoscopic Discectomy technique. But this procedure of endoscopic surgery is new to neurosurgeons and everyone is not familiar of it.

So the microscopic Discectomy has replaced the conventional Discectomy, because of its cost effectiveness, loss complications and shorten hospital stay.

On the basis of above discussion one can suggests that micro-Discectomy is the superior surgical treatment option for herniated disc patients diagnosed after MRI.

CONCLUSION

Both techniques are good and effective but micro-discectomy showed better results in terms of cost effectiveness, less complication and short hospital stay. So the researcher suggest that Micro-discectomy should be opted as routine Discectomy operation.

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