

# Spinal or General anaesthesia for lumbar spine microdiscectomy Surgery...does it matter?

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## Abstract

**Background :** Prospective randomised study comparing immediate postoperative pain and satisfaction levels in patients having spinal versus general anaesthesia for single level lumbar microdiscectomy.

**Methods:** Fifty consecutive patients were recruited and prospectively randomised into two equal groups, with half the patients receiving a spinal anaesthetic and the remainder a general anaesthetic.

A comprehensive postoperative evaluation was carried out documenting any anaesthetic complication, pace of physiological and functional recovery and patient satisfaction.

**Results :** Spinal anaesthesia patients achieved the milestones of physiological and functional recovery more rapidly and reported less postoperative pain. However the requirement for urinary catheterisation in this group was significantly higher.

**Conclusion:** Despite better postoperative pain and functional outcomes for the spinal anaesthetic group and reported higher level of satisfaction when compared with general anaesthesia, the higher level of urinary retention in this group makes it impossible to perform this surgery as a day case procedure.

## INTRODUCTION

The surgical management of a prolapsed lumbar disc was first described by Mixter and Barr<sup>(7)</sup> in 1934. Less invasive procedures are nowadays commonly performed, leading to reduced recovery time and early discharge home from the hospital, which also leads to financial considerations in terms of cost savings<sup>(14)</sup>. Microdiscectomy for herniated lumbar intervertebral disc has been proven to be clinically superior to more conventional methods when performed as an outpatient procedure<sup>(2,4,5,9,13)</sup>.

Different anaesthetic techniques have been used for lumbar spinal surgery. In this normally healthy and co-operative group of patients all undergoing surgery requiring less than 90 minutes of anaesthesia, the type of anaesthesia employed has traditionally been left to the individual preference of the Anaesthetist. Patients may favour general anaesthesia (GA) due to traditional considerations of being completely pain free during the surgery and also unaware of the procedure. However, spinal anaesthesia (SA) has demonstrated to be as good, if not better than GA in terms of pain during the surgery and postoperatively in patients who underwent

lumbar spine surgery<sup>(3)</sup>. Furthermore, given the potential for complications associated with passive recumbence in the prone position, the understandable preference of recovery nurses for an alert interactive patient, and our anecdotal impression that those patients undergoing spinal surgery somehow seemed to feel better and fare better, we needed to confirm whether this was true and why. Several studies have compared both anaesthetic techniques by measuring physiological variables. In our study we have compared patient satisfaction between spinal versus general anaesthesia in patients who underwent single level lumbar microdiscectomy.

The aim of the study was to determine whether the mode of anaesthesia chosen for patients undergoing lumbar microdiscectomy surgery has any significant influence on the immediate outcome in terms of postoperative pain, functional recovery and patient satisfaction.

## MATERIAL AND METHODS

Fifty consecutive healthy and co-operative patients ASA I-II undergoing single level lumbar microdiscectomy was

included in the study from January 2003 to March 2004. All patients who agreed to partake gave written informed consent to participate in the study and also for the procedure they were going to undertake. The exclusion criteria included history of severe cardiac disease, bleeding dyscrasias, infectious process, previous lumbar surgery and multilevel lumbar surgery. Patients were randomised to either the GA or SA group using a computer generated randomisation table. All procedures were carried out by the same surgical and anaesthetic teams. Each specific mode of anaesthesia was standardised. Patients in the GA group were anaesthetised with Propofol 2.5 mg/kg, Alfentanil 3mcg/kg and Atracurium 0.1mg/kg to facilitate endotracheal intubation and mechanical ventilation. General anaesthesia was maintained with the use of Isoflurane 0.5%-1% conveyed with a mixture of 70% air in O<sub>2</sub> (FiO<sub>2</sub>=0.4). Neuromuscular block was antagonised with Neostigmine 0.4mg/kg and Atropine 0.02mg/kg at the end of the surgical procedure. After achieving a general anaesthesia patients were then logrolled onto a prone position frame<sup>(8)</sup> and special care was taken to protect the patient's arms, face, eyes and airway.

Patients in the SA group received their block in a sitting position with hyperflexion of the lumbar spine. After the lower back was prepared and draped, the skin was infiltrated with 2-3 ml of 1% Lignocaine. Then a 25 gauge 3.50 IN BD Whithacre Needle (Beckton Dickinson S.A., Madrid, Spain) spinal needle was placed one or two levels above the herniated disc. Two point five to 2.8ml of 0.5% Bupivacaine was injected into the subarachnoid space and 0.2mg of Morphine was administered intrathecally. Patients were returned to the supine position and logrolled to the prone position frame once a stable spinal level was achieved.

In both groups, a perfusion of 0.9% Saline (5ml/Kg) was administered and every drop in the intravascular pressure below 100mmHg was treated with an intravenous injection of Ephedrine (3mg).

At the end of the surgical procedure, the patient was rolled to a supine position on a bed and transferred to the recovery room.

Postoperative analgesia was administered in the form of oral Paracetamol (1g) and Codeine phosphate (60mg) every 6 hours and subcutaneous Morphine (10mg) on demand.

Comprehensive postoperative evaluation concentrated on documenting any complications specific to the particular

mode of anaesthesia, recording the pace at which the various milestones of physiological and functional recovery were reached and the level of patient satisfaction with the type of anaesthesia used. The following variables were recorded: pain level using a visual analogue scale (VAS) at 4, 8 and 24 hours; patient level of satisfaction during the stay on the ward using a scale 0-10, time of the first request for analgesia; total consumption of analgesia; functional recovery (time of first drink, first food and first steps after surgery). Nausea, vomiting and urinary retention was also recorded.

## STATISTICAL METHODS

The differences between the values of the variables in the two groups of anaesthesia (SA vs. GA) were checked by means of statistical tests. In order to determine whether parametric tests could be used, we first confirmed the homogeneity of the variances and the normality of the distributions of the variables by using a Levene's test and a Shapiro-Wilk's W test for normality, respectively. Their results showed that in most of the cases either the null hypothesis of homogeneous variance (e.g., Level of Pain 8h,  $p<0.01$ ) or that of normal distribution of the data (e.g., Level of Pain 24h,  $p<0.05$ ) should be rejected, thereby suggesting the convenience of using nonparametric tests.

Consequently, we used the Mann-Whitney U-test, because this is the most powerful nonparametric alternative to the corresponding parametric test, the t-test for independent samples (see for instance (Siegel&Castellan, 1988) <sup>(11)</sup>). In all cases, results were considered significant if  $p<0.05$ . All the analysis were carried out with the statistical software package Statistica® 6.0 (StatSoft, 2001) <sup>(12)</sup>.

## RESULTS

Demographic characteristics did not differ between the two groups. The distribution of men and women in both SA and GA groups was comparable as well as the distribution in relation to the level of surgery.

**Figure 1**

Table 1

DEMOGRAPHIC DATA		
	SA Group	GA Group
Age (years)	24-70	24-82
Gender ratio (M/F)	13/12	14/11
L4-L5	12	14
L5-S1	13	11
SA: Spinal anaesthesia	GA: General anaesthesia	

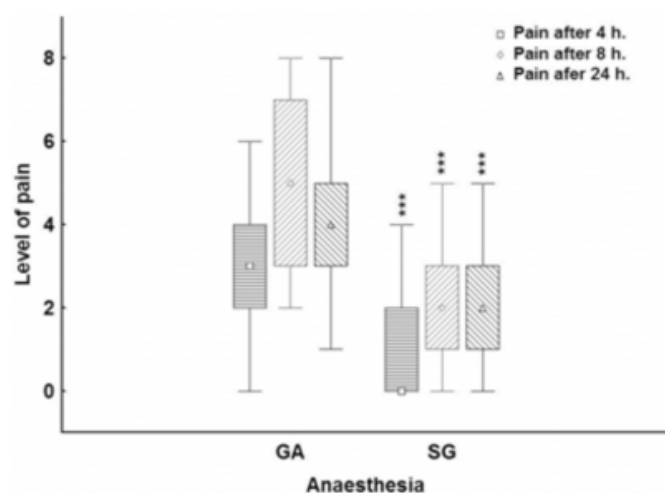
No serious complication specific to their particular mode of

anaesthesia occurred in either group. Thirteen out of the twenty-five patients in the SA group required temporary urinary catheterisation (9 males and 4 females), while among the GA group only 4 patients required urinary catheterisation (3 males and 1 female). (52% vs. 16%,  $p < 0.05$ , for a Relative Risk of 3.5). There were no complications pertaining the Gentamycin covered catheterisation, which was tolerated without complaint.

The results for the level of pain after surgery for both groups at the different times considered are shown in Fig. 1. It is apparent that the reported level of pain is always significantly lower for the SA group. A similar result holds for the reported level of comfort (Fig. 2); where this group performs significantly better than the GA group.

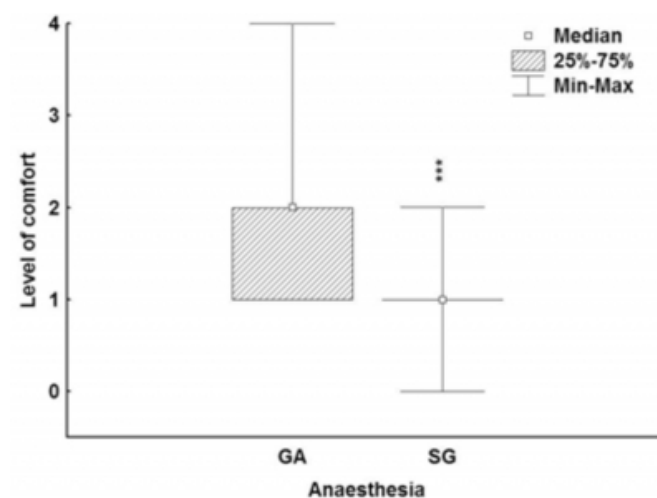
**Figure 2**

Figure 1: Levels of pain after 4 (square), 8 (diamond) and 24h (triangle) after surgery. Both the general anaesthesia (GA, left) and the spinal anaesthesia group (SG, right) are shown. Symbols: median of the distribution; boxes: %25-25% quartiles; whiskers: range of variation. Asterisks indicate differences between both groups for each of the times considered (\*\*\*:  $p < 0.001$ ).



**Figure 3**

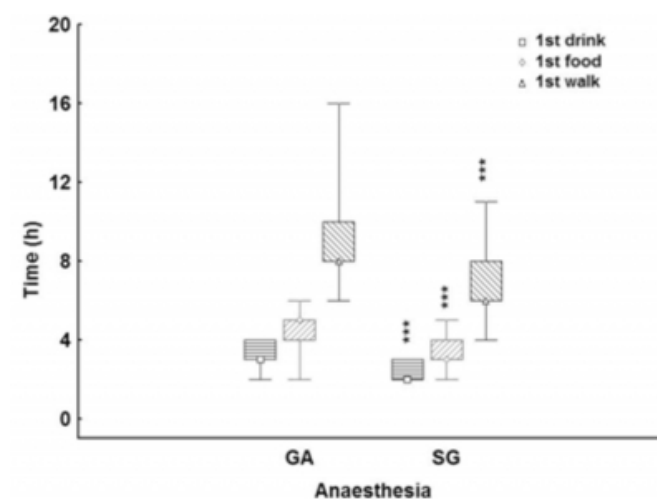
Figure 2: Levels of comfort after surgery. Both the general anaesthesia (GA, left) and the spinal anaesthesia group (SG, right) are shown. Symbols, boxes, whiskers and asterisks as in the previous figure.



The relationship between the level of pain reported and the administration of subcutaneous morphine is shown in Fig. 3 (both groups of anaesthesia were considered together). It is clear that only those patients reporting significantly higher levels of pain at each time received the analgesic.

**Figure 4**

Figure 3: Time elapsed from surgery to the first intake of liquid (square), food (diamond) as well as to the first walk (triangle). Both the general anaesthesia (GA, left) and the spinal anaesthesia group (SG, right) are shown. Symbols, boxes, whiskers and asterisks as in previous figures.



Both groups also presented differences in terms of the times from surgery to the first intake of liquid and food, as well as that of the first walk (Fig. 4). Patients in the SA group took significantly less time in eating and drinking, and also

walking for the first time after surgery as compared to those of the GA group.

### Figure 5

Figure 4: Levels of pain reported by those patients who did (right) and did not receive (left) subcutaneous morphine after 4 (square), 8 (diamond) and 24h (triangle) of the surgery. Both groups of patients (i.e., spinal and general anaesthesia) were considered together. Symbols, boxes and whiskers as in the previous figures. Asterisks indicate differences between the group with and without morphine (\*\*\*:  $p < 0.001$ )



## DISCUSSION

General and spinal anaesthesia are both used for lumbar spine surgery. As previous studies have suggested, SA seems to be superior to GA in terms of postoperative pain and in decreasing perioperative undesirable results. However, no studies in the English literature have compared patient satisfaction evaluating functional recovery variables.

In our study SA has demonstrated to be superior to GA from the patient's satisfaction point of view. Pain level reported by GA patients was always higher than SA patients and the difference was especially significant at 8 hours. Similarly there are significant differences in the level of comfort, SA patients reporting a better level of comfort in general.

In terms of functional recovery, SA patients have a more rapid recuperation. The time of the first drink was where bigger differences appeared and the time of the first steps where fewer differences are seen.

A previous study by Dagher et al<sup>(1)</sup> shows similar results with SA patients performing better from the functional recovery point of view and scoring better pain level. In our study, by contrast, morphine was used as postoperative analgesia. We have analysed the data both in general as well as in each group. Analysing both groups together, patients

who received morphine postoperatively reported a higher level of pain with similar significance at 4, 8 and 24 hours. If we discard data errors, this shows clearly that what patients reported was pain post surgery and not pain post morphine. Analysing each group alone, there are no differences in the SA group, although in this group only 3 patients received morphine. In the GA group the results correspond with the analysis done in general, indicating that the differences seen were in fact due to GA patients.

In our study there is no significant difference between gender and level of pain. In contrast, there seems to be a direct relation between the age of the patient and the level of pain, especially in the SA group, with a higher level of pain in older patients.

Spinal anaesthetic patients reported a higher incidence of urinary retention, which differs with previous studies where both anaesthetic techniques have been compared<sup>(6,10)</sup>. In our study all the patients received intrathecal morphine, which has been associated to an increment in urinary retention. The high rate of bladder retention, which is both clinically and statistically significant, effectively eliminates the possibility of outpatient surgery as commonly practiced (D/C after 2-4 hours). This would have a serious impact both with readmissions and financial cost of surgery. Since the end of the study, the use of intrathecal morphine has been discontinued and the incidence of urinary retention has decreased dramatically, although this fact has not been audited yet.

Blinded to an extent by not having experienced the alternative, both groups appeared satisfied with their anaesthetic. However the level of satisfaction was significantly higher in the SA group.

## CONCLUSION

Spinal anaesthesia ensures better operating conditions, better postoperative pain control and a quicker postoperative recovery when compared to general anaesthesia for single level lumbar spine surgery. However, the high rate of urinary retention when using intrathecal Morphine as one of the spinal anaesthetic agents makes its use unacceptable from the clinical and financial point of view when outpatient surgery is intended. If single level microdiscectomy surgery is to be performed in the outpatient setting, the spinal anaesthetic technique must ensure adequate postoperative analgesia and should keep complications such as urinary retention to a minimum.

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