

# A Comparison Of Low Dose Lignocaine Fentanyl Subarachnoid Block And Local Anaesthesia/Propofol Infusion For Outpatient Knee Arthroscopic Procedures

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## Abstract

Knee arthroscopies are being increasingly performed as day care procedures both under local anaesthesia and subarachnoid block. This study was designed to compare local anaesthesia and lumbar subarachnoid block for outpatient knee arthroscopies in terms of intraoperative haemodynamic changes and surgical condition, postoperative pain, postoperative side effects and discharge time. Fifty adult patients (ASA grade I and II) of 16-75 years were randomly divided into two groups. Group A received lumbar subarachnoid block with 20mg of 1% lignocaine hydrochloride and 20µg fentanyl citrate. Group B received an infusion of 1% propofol started at 1-3.5mg/kg/hr and titrated to patient comfort. 15-20ml of 2% lignocaine hydrochloride with 1:2,00,000 adrenaline was injected into the knee joint and an additional 2-3ml was injected into the portal sites. It was observed that:- a) outpatient knee arthroscopy can be effectively conducted under local anaesthesia with propofol infusion and selective subarachnoid block.

b) "Ability to void" prolongs the discharge time in the subarachnoid block group

## INTRODUCTION

Knee arthroscopy is a surgical procedure used to visualise, diagnose and treat problems in the knee joint.

There has been a shift in the surgical practice from an inpatient care to an outpatient care. Since knee arthroscopy is mostly done on an outpatient basis it is desirable to have an appropriate anaesthetic technique with minimum patient discomfort and an uneventful recovery thus allowing an early discharge of the patient from the hospital.(1)

The traditional method of subarachnoid anaesthesia often proves problematic in the outpatient setting due to delayed motor recovery(2,3). The use of conventional dose lignocaine hydrochloride may be associated with significant haemodynamic instability and possibility of transient neurological damage(4), while reducing the dose of the local anaesthetic may produce an inadequate block.

By utilizing the synergism between intrathecal local anaesthesia and opioids it may be possible to augment the subarachnoid block without delaying recovery(5). The addition of an opioid may help to overcome the problem of an inadequate block when small dose lignocaine

hydrochloride is used alone. The addition of fentanyl citrate may provide a more reliable anaesthesia with a more stable haemodynamic response and an infrequent incidence of transient neurological symptoms(6,7).

The use of local anaesthesia for knee arthroscopy has been found to be associated with early discharge of the patient from the hospital(8,9,10). However the use of local anaesthesia alone may not be a comfortable experience for the patient.

Propofol is a popular drug used for ambulatory conscious sedation techniques because it has a short context sensitive half-life even with a prolonged period of infusion and is also associated with low incidence of nausea and vomiting(11,12,13). Therefore when propofol is used along with local anaesthesia it may provide more comfort to the patient.(14,15)

The purpose of the study was to compare the use of low dose lignocaine hydrochloride/ fentanyl citrate subarachnoid anaesthesia and local anaesthesia/propofol infusion for outpatient knee arthroscopic procedures with regards to intraoperative haemodynamics and surgical condition,

recovery profile and discharge time.

## **MATERIALS AND METHODS**

After obtaining hospital ethics committee approval and written informed consent from the patients a prospective randomized controlled study was conducted on patients, belonging to ASA I or II in the age group 16 to 75 years undergoing ambulatory knee arthroscopic procedures at Sir Ganga Ram Hospital, New Delhi.

A power analysis was initially conducted to determine the necessary sizes of the two groups. We assumed an alpha error of 0.05 and a beta error of 90%. To show a 20 minutes difference in discharge times to power of 90%, the groups would require 23 patients each. Therefore, 50 patients were enrolled into the study. Using computer generated randomization they were divided into 2 groups of 25 each to receive either a low dose lignocaine hydrochloride - fentanyl citrate subarachnoid anaesthesia or local anaesthesia with propofol infusion.

## **ANAESTHESIA TECHNIQUE**

The patients were familiarized with the visual analogue scale (VAS) during the preanaesthetic check up. On arrival in the operation theatre non-invasive blood pressure (NIBP), ECG and pulse oximeter were set up. An 18G cannula was inserted in the non-dominant forearm vein and an infusion of Ringer lactate started. The patients were given midazolam 1-2mg and fentanyl citrate 20-30mcg, to allay the anxiety and ondansetron 4mg intravenously to prevent emesis. Both the groups were administered oxygen through venturi mask throughout the procedure.

**Group A: Low Dose Lignocaine Hydrochloride -Fentanyl Citrate Subarachnoid Anaesthesia**

Under all aseptic precautions the subarachnoid space was located in L3-L4 or L4-L5 interspace with the patient in lateral position using 25g pencil point spinal needle. The spinal injectate was 20mg of 1% heavy lignocaine hydrochloride and 20<sup>?</sup>g of fentanyl citrate.

**Group B: Local Anaesthesia - Propofol Infusion**

An infusion of 1% Propofol was started at 1-3.5 mg/kg/hr and titrated to maintain a level at which the patient was comfortable. An additional bolus of propofol 10-20 mg was given as needed. 15-20ml of 2% lignocaine hydrochloride 1:200,000 adrenaline was injected into the knee joint. An additional 2-3 ml of 2% lignocaine hydrochloride 1:200,000

adrenaline was also injected at the portal sites.

Injection diclofenac sodium 75mg deep intramuscularly was given before the completion of surgery. In both the groups further sedation was provided with intermittent midazolam and analgesia with fentanyl citrate. If the patient was unduly anxious or still in pain after midazolam and fentanyl citrate the procedure was converted into general anaesthesia and the patient excluded from the study.

The pulse rate, non invasive blood pressure (NIBP) and oxygen saturation were recorded every 2 minutes for first 10 minutes and then every 5 minutes thereafter.

Intra operative surgical condition was assessed as-

GOOD - no patient movement

FAIR - slight straining but surgery possible

POOR - patient straining requiring conversion to general anaesthesia

Postoperative pain was assessed every half an hour after surgery and on discharge of the patient. Pain was graded by the visual analogue scale as follows-

No pain 0 points

Mild pain 1-3 points

Moderate pain 4 – 8 points

Severe pain 9-10 points

Untoward postoperative side-effects like nausea, vomiting, pruritus and inability to void were recorded.

The time when the patient was discharged was recorded.

Discharge criteria included -

1. Vital signs (pulse and blood pressure) within 20% of the pre-operative value for more than 60 minutes.
2. Sedation score of 2 points
3. Able to stand up and remain standing for >2 min
4. Nausea and vomiting score of 2 points
5. Visual analogue scoring for pain 0-3points
6. Able to tolerate oral fluids
7. Voided urine at least once.
8. Accompanied by an adult escort

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Rescue pain was treated by 50 mg tramadol hydrochloride intravenously.

Nausea was treated with metoclopramide 10mg intravenously

Pruritus was treated with promethazine 25mg intramuscularly

The patients were followed up telephonically after discharge from the hospital for two days and were evaluated for pain at the operative site, nausea/ vomiting, backache and headache.

The quantitative data, representing age, weight, height, haemodynamic variables, discharge time, surgery time and anaesthesia time was evaluated using the Student's – t test and the qualitative data representing postoperative side effects and intraoperative surgical condition was evaluated using the Chi-square test. A  $p < 0.05$  was considered to be significant.

## OBSERVATIONS AND RESULTS

The demographic data is given in table 1 and was comparable.

### Figure 1

Table 1: Demographic Data

	Group A	Group B	P value
	n= 25	n = 25	
Age	36.0±13.4	36.2±13.7	0.773
Sex (M/F)	14/11	18/7	0.239
Weight (Kg)	67.1±9.7	68.0±9.3	0.413
Height (cm)	160.1±5.1	163.9±5.1	0.679

Values expressed as mean + S.D.

$P < 0.05$  significant

Haemodynamic changes recorded are shown in table 2, 3 & 4 and there was no significant difference between the study groups.

### Figure 2

Table 2: Haemodynamic Changes Pulse (beats/min)

	Group A	Group B	P value
	n= 25	n = 25	
Pre-op	66.4±9.8	77.3±9.8	0.622
Intra-op	81.8±9.5	74.8±6.7	0.093
Post-op	78.8±6.0	76.3±7.6	0.269

Values expressed as mean + S.D.

$P < 0.05$  significant

### Figure 3

Table 3: Haemodynamic Changes Systolic blood pressure (mmHg)

	Group A	Group B	P value
	n= 25	n = 25	
Pre-op	129.8±14.0	124.8±6.9	0.608
Intra-op	122.6±10.9	119.7±10.3	0.825
Post-op	122.0±5.4	121.1±6.3	0.703

Values expressed as mean + S.D.

$P < 0.05$  significant

### Figure 4

Table 4: Haemodynamic changes Diastolic blood pressure (mmHg)

	Group A	Group B	P value
	n= 25	n = 25	
Pre-op	80.4±6.72	75.9±5.9	0.944
Intra-op	77.7±7.97	73.8±12.6	0.607
Post-op	76.3±6.4	73.9±5.4	0.890

Values expressed as mean + S.D.

$P < 0.05$  significant

The intraoperative surgical condition (table 5) was “Good” (group A 23 patients & group B 22 patients) in majority of the patients in both the groups. None of the patients in either group required conversion to general anaesthesia.

### Figure 5

Table 5: Intra-Operative Surgical Condition

	Group A	Group B
	n= 25	n = 25
GOOD	23	22
FAIR	2	3
POOR	0	0

p-value 0.637

$p < 0.05$  significant

VAS at the time of transferring the patient to the recovery room, 30 minutes later and at the time of discharge are shown in table 6,7 & 8. The difference was not statistically significant.

**Figure 6**

Table 6: Post - Operative Pain (recovery room)

	Group A n= 25	Group B n = 25
VAS 0		
0 point	15	19
1-3 points	10	6

*p-value 0.125*

*p<0.05 significant*

*VAS 0 – visual analogue score on shifting to recovery room*

**Figure 7**

Table 7: Post-Operative Pain (recovery room)

	Group A n= 25	Group B n = 25
VAS 30		
0 point	12	15
1-3 points	13	9
4-8 points	0	1

*p- value 0.107*

*p<0.05 significant*

*VAS 30 - visual analogue score 30 mins after shifting to recovery room*

**Figure 8**

Table 8: Post-Operative Pain ()

	Group A n= 25	Group B n = 25
VAS D		
0 point	12	12
1-3 points	13	13

*p- value 0.430*

*p<0.05 significant*

*VAS D - visual analogue score at time of discharge*

The postoperative side effects were minimal in both the groups(table 9). In group A 1 patient had pruritus and 3 patients had vomiting whereas none of the patients in group B complained of either pruritus or vomiting. None of the patients in either group were sedated and all were able to void before discharge. The results were not of any statistical significance.

**Figure 9**

Table 9: Postoperative Side-effects (Recovery Room)

	Group A n= 25	Group B n = 25	P value
Pruritus	1(4%)	0(0%)	.312
Vomiting	3(12%)	0(0%)	.236
Sedation	0(0%)	0(0%)	.*
Inability to void	0(0%)	0(0%)	.*

*.\* - no statistics computed*

*Values expressed as mean + S.D*

*P< 0.05 significant*

Patients were followed up after discharge (table 10) for two days and were evaluated for pain at the operative site, headache, backache and nausea/vomiting. 4 patients in group A compared to 6 in group B had pain at the operative site. 3 patients had headache, 2 patients had backache and 4 patients had nausea/vomiting in group A compared to none in group B.

**Figure 10**

Table 10: Postoperative Side-effects ( After Discharge)

	Group A n= 25	Group B n = 25	P value
Pain	4(16%)	6(24%)	.480
Headache	3(12%)	0(0%)	.114
Backache	3(12%)	0(0%)	.353
Nausea/vomiting	4(16%)	0(0%)	.062

*Values expressed as mean + S.D*

*P< 0.05 significant*

There was no statistical difference between the groups with respect to surgery time and anaesthesia time (table 11). However there was a statistical significant difference ( $p=0.001$ ) with respect to discharge time in both the groups, with group A having a mean value of  $150.7 \pm 26.8$  minutes and group B having a mean value of  $99.1 \pm 11.0$  minutes.

**Figure 11**

Table 11: Surgery, Anaesthesia & Discharge time

	Group A n= 25	Group B n = 25	P value
S. Time	44.6+16.5	41.2+12.1	0.670
A. Time	65.4+17.5	62.6+14.0	0.806
D. Time	150.7+26.8	99.1+11.0	0.001

*Values expressed as mean + S.D*

*P< 0.05 significant*

*S. Time - Surgery Time, A. Time - Anaesthesia Time, D. Time - Discharge Time*

## **DISCUSSION**

The need to adapt to the ambulatory setting has led to significant changes in the anaesthetic technique and choice of technique. Although spinal anaesthesia appears feasible for reasons of speed, simplicity and reliability, it has proven problematic for ambulatory surgery. The main concerns with spinal anaesthesia is the occurrence of post dural puncture headache with the use of large gauge spinal needles and occurrence of transient neurological symptoms with use of conventional dose lignocaine hydrochloride.

The availability of fine gauge spinal needles and the results of recent studies using minidose lignocaine opioid spinal anaesthesia raise the possibility that this technique might be the adaptation necessary to reestablish spinal anaesthesia, in the outpatient setting (5,6,7)

Some authors have reported a high degree of success and efficiency in performing arthroscopy of the knee under local anaesthesia alone (16) or with minimal sedation (14,15).

Local anaesthesia in combination with an intravenous propofol infusion enhances patient comfort without compromising rapid recovery. Propofol is popular in day care procedures as it is associated with rapid, clear headed recovery and has an inherent anti-emetic property (12,13,17).

In our study both the groups were comparable with regards to the haemodynamic changes and there was no statistical significant difference.

The intraoperative surgical condition was "Good" in both the groups that is the surgery was possible without any patient movement or discomfort and none of the patients required conversion of the procedure to general anaesthesia.

In the recovery room the postoperative side-effects like pruritus, vomiting and sedation were minimal in both the groups. Only 1 patient (4%) in group A compared to none in group B had pruritus, whereas 3 patients (12%) in group A had vomiting compared to none in group B. Patients in both the groups were pain free in the immediate postoperative period, in the recovery room. Only 1 patient (4%) in group B, had a VAS score of 4 points 30minutes after being shifted to the recovery room requiring rescue analgesia with injection tramadol hydrochloride 50mg intravenously.

On following up, the patients after discharge, 4 patients in group A (16%) and 6 patients in group B (24%) had pain at the operative site which was not found to be statistically

significant. However, these patients required treatment with oral analgesics. Ben - David et al(18) in their study reported an incidence of early postoperative pain of 20% in the minidose lignocaine fentanyl subarachnoid group compared to 44% in the local anaesthesia/propofol infusion group. The difference in the incidence of pain in the local anaesthesia/propofol infusion group in our study and that conducted by Ben-David et al(19) can be attributed to the difference in the perception of pain by the patient groups in both the studies. In our study, 3 patients (12%) in group A developed headache after discharge, out of which 2 patients were managed conservatively at home and had no clinical features suggestive of postspinal dural puncture headache. Only 1 patient out of the 3 had clinical features suggestive of postspinal dural puncture headache and had to be admitted to the hospital for treatment. These findings though not of statistical significance were of clinical significance. Ben-David et al(18) reported 4% incidence of transient neurological symptoms compared to 3.6% incidence reported by Maryanorysk M. et al (20) while using low dose lignocaine. However no incidence of transient neurological symptoms occurred in our study.

The discharge time in group A ( low dose lignocaine fentanyl subarachnoid block group) was 150.7±26.8 minutes compared to 99.1±11.0 minutes in group B ( local anaesthesia with propofol infusion group). This finding was of statistical significance (p<0.05). The discharge in our subarachnoid block group is comparable to that of Maryasorysk et al (19) who have reported a discharge time of 145±38 mins in the minidose lignocaine fentanyl subarachnoid group compared to 180±3 mins in the conventional dose lignocaine spinal anaesthesia group. Vaghadia et al(20) in their study comparing small hypobaric lignocaine fentanyl spinal anaesthesia with conventional dose hyperbaric lignocaine have reported discharge time of 122 mins in the low dose hypobaric lignocaine fentanyl subarachnoid block group. Ben -David et al (18) however have reported a discharge time of 73.5 minutes in both minidose lignocaine fentanyl subarachnoid group and local anaesthesia with propofol infusion group.

The prolonged discharge time of 150 mins in group A in comparison to 99 mins in group B can be attributed to the fact that the patients in our study were required to void urine before discharge whereas in studies conducted by Chilvers et al (7) and Ben - David et al(18) patients were not required to void before discharge after low dose lignocaine fentanyl

subarachnoid block. Based on comparison with low dose lignocaine fentanyl subarachnoid block group in which voiding was required (19) before discharge, discharge time is reduced by 25-30 minutes.

To conclude, we suggest that outpatient knee arthroscopy can be effectively conducted both under local anaesthesia with propofol infusion and selective subarachnoid block as both these techniques are associated with stable intraoperative haemodynamics and good operating conditions. There is a good degree of patient comfort with excellent recovery profile and minimal postoperative side effects associated with both these techniques. Although the criteria of ability to void prior to discharge in ambulatory set up prolongs the discharge time in the selective subarachnoid block group this can be circumvented if the patient is allowed to go home without voiding with the advice about the potential for urinary retention and to provide them with a mechanism for medical intervention should this be necessary.

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