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A comparative study between spinal anaesthesia with 0.75% ropivacaine versus total intravenous anaesthesia outpatient knee arthroscopy

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Abstract
Background: A Comparative study between spinal anaesthesia with 0.75% ropivacaine versus total intravenous anaesthesia for outpatient knee arthroscopy
Materials and Methods: This is a prospective, randomised study conducted out on 120 patients of either sex, aged 18-65 years, ASA grade I and II scheduled to outpatient knee arthroscopic surgeries under spinal anaesthesia and TIVA.
Results: Spinal anaesthesia group had shown significantly lesser requirement of postop analgesia, good quality of recovery and attainment of early ambulation and cost significantly less compare to TIVA group. All the results were significant statistically and have correlated well with the studies in reference.
Conclusion: We concluded that Patients administered Spinal anaesthesia with 0.75% ropivacaine had significantly lesser requirement of postop analgesia, with good quality of recovery from anaesthesia, lesser duration of hospital stay, early attainment of ambulation and is considerably cheaper when compared to patients administered General anaesthesia with I-gel or Laryngeal mask airway using Total intravenous anaesthesia with propofol infusion. Hence, this study concludes that Spinal anaesthesia with 0.75% ropivacaine is a safe and better choice of for ambulatory surgeries when compared to total intravenous anaesthesia with propofol using I-Gel.

Keywords: Ropivacaine, Knee arthroscopy, Spinal anaesthesia, TIVA, Sensory block

Introduction
Arthroscopic knee surgery is most commonly performed minimally invasive surgical procedure in orthopaedics. Arthroscopy has evolved from a diagnostic tool to a therapeutic tool capable of treating a wide range of injuries and disorders. While arthroscopy has resulted in an overall decrease in morbidity compared with open techniques, it is still an invasive procedure and inherently involves risks and can be done as out patient procedure. Spinal anesthesia and short general anesthesia (GA) are most common used techniques for knee arthroscopy. Ropivacaine is a new long-acting local anesthetic with a greater therapeutic ratio than other long-acting local anesthetics. The advantage of Ropivacaine is that it produces less motor blockade, when used in lower doses and can be very useful for ambulatory surgeries. Ropivacaine is available as isobaric drug, in two concentrations of 0.5% and 0.75% seem to have less toxic effects on the central nervous system and on the cardiovascular system, producing decreased degree of motor block in heavily myelinated (Motor) fibres and faster onset of block in lightly myelinated (Sensory) fibres i.e., greater differential effect. Hence well suited to orthopaedic surgeries because a good sensory motor dissociation may facilitate early rehabilitation. Total intravenous anaesthesia (TIVA) can be defined as a technique of general anaesthesia using a combination of agents given solely by the intravenous route and in the absence of all inhalational agents including nitrous oxide. TIVA has become popular, practical and possible only in relatively recent times. The result is an easy to use modern system of providing anaesthesia, which allows rapid, precise and independent control of amnesia, hypnosis and analgesia. The dynamic trend of surgical practice from an inpatient to outpatient convention has urged us to modify our anesthetic technique to suit the ambulatory setting. The primary goal of ambulatory anesthesia is rapid recovery leading to early patient discharge with minimal side effects. With the availability of

rapid, short-acting anesthetic, analgesic, sympatholytic and muscle relaxant drugs, as well as improved monitoring devices, it has been possible to minimize the adverse effects of anesthesia on the recovery process. The aim of the study is to compare spinal anaesthesia using 0.75% ropivacaine with total intravenous anaesthesia in outpatient knee arthroscopy surgeries.

Materials and Methods

Study design: Randomised study.
Sample size: 120 patients.
Sample size calculation: Sample size was calculated using software Epi InfoTM [7], with the assumption of alpha error to be 5% and beta error to be 20% i.e. 95% confidence interval and 80% power of study. Assumption of exposed group taken to be 95% with 10% margin of error. Thus a sample size of 120 patients was taken with 60 patients in each group.

Subjects & selection method: All participants were randomly divided into two groups (Group SA and Group TIVA) by a computer generated randomization table.
Group SA: Patients received Spinal Anaesthesia with 0.75% ropivacaine 3 ml (22.5mg)
Group TIVA: Patients received TIVA (Ondansetron 0.1mg/kg ▪ Glycopyrrolate 10 µg /kg ▪ Fentanyl 1µg /kg General Anaesthesia was induced in all the patients with 2.5mg/kg bolus of Propofol which is followed by intravenous administration of 2 mg/kg Succinylcholine. Airway secured with oral I-Gel or LMA and maintained with continuous propofol infusion between 25-75mcg/kg/min titrated to clinical response)

Inclusion Criteria:
1. Patients with age 18-65 years
2. ASA grade I/II with no known drug allergy.
3. Elective cases posted for knee arthroscopy

Exclusion Criteria
1. ASA grade III and IV
2. Patients allergic to any drugs.
3. History of seizure disorder.
4. Patient refusal.
5. Patients with neurological disorders and neuropathies or receiving medications known to influence neuromuscular junction
6. Skin infection at spinal sites.
7. Patients with renal, hepatic, cardiovascular and respiratory diseases.

Technique Methodology
Patients who were allotted to SA group received Spinal Anaesthesia with 0.75% ropivacaine 3 ml (22.5mg) patient was preloaded with an I.V. infusion of 500 ml of Ringer Lactate solution with 18G cannula, 5 min before surgery. Under all aseptic precautions, the subarachnoid block was performed with a 25G Quincke needle at the L3-L4 interspace. 0.75% ropivacaine 3ml infused at subarachnoid space at L4-L5 space slowly. The patient was repositioned gently to supine position 60 without elevation of extremities and tested for sensory sensation with pinprick and motor power by asking the patient to lift their legs.
Patients who were allotted to TIVA Group received pre-oxygenation given with 100% oxygen for 3minutes. Pre-anaesthetic medication drugs are given in the dosage as follows on morning of surgery ▪ Ondansetron 0.1mg/kg ▪ Glycopyrrolate 10 µg /kg ▪ Fentanyl 1µg /kg General Anaesthesia was induced in all the patients with 2.5mg/kg bolus of Propofol which is followed by intravenous administration of 2 mg/kg Succinylcholine. Airway was secured with an appropriate sized oral I-Gel or laryngeal mask airway. Anaesthesia was be maintained with continuous propofol infusion between 25-75mcg/kg/min titrated to clinical response. Propofol infusion was stopped 5 minutes before completion of surgery.

Data Recording
The following parameters were assessed Intraoperatively, • Intraoperative heart rate baseline, 3,5,10,15,30,60,90 minutes • Mean arterial pressure at baseline, after induction, every 5min for first 15min and every 15min for 2hr from start of operation in operative room. • Side effects like hypotension, bradycardia, respiratory depression Patients were shifted to the Postoperative Anaesthetic Care Unit (PACU) after complete evaluation of recovery from anaesthesia After completion of procedure, patients of both groups were shifted to the Postoperative Anaesthetic Care Unit (PACU) after complete evaluation of quality of recovery from anaesthesia and assess the following parameters were assessed at 6hr, 12hr, and 24hr, Heart rate, Mean arterial pressure,SpO2,time of first analgesic request, quality of recovery, post op complications (nausea, vomiting, sore throat, PDPH)

Statistical Analysis
Data was presented as mean, standard deviation, median (range), or percentage, as appropriate. Study data was entered into the SPSS software (version 21, SPSS) and was analysed with the chi-square test for qualitative and student t-test for quantitative variables, between the trial and control groups, P values less than 0.05 was considered significant.

Results

Table 1: Distribution of study participants based on age (n=120)

Age group	Group SA		Group TIVA	
	Number	%	Number	%
21-30 years	12	20	12	20
31-40 years	23	38.33	24	40
41-50 years	17	28.33	17	28.33
51-60 years	8	13.33	7	11.67
Total	60	100	60	100

Chi square value=0.088 p=0.99

Above table shows distribution of age group in both groups and by non-parametric chi square test the distribution was found insignificant difference p=0.99.

Table 2: Distribution of study participants based on age (n=120) mean

	Group SA	Group TIVA	P value
Age in years (Mean ± SD)	40.7±8.2	40.47±8.17	0.877

The mean age in Group SA is 40.7± 8.2
The mean age in Group TIVA is 40.47±8.17
p-value of 0.877 derived using the independent T-test shows statistically insignificant, there is no marked variation between the two groups

Table 3: Distribution of study participants based on gender (n=120)

Sex distribution	Group SA	Group TIVA	P value
Male	42(70%)	43(72%)	0.84 NS
Female	18(30%)	17(28%)	0.84 NS
Total	60(100%)	60(100%)	

*Chi Square test was applied to test statistical difference in proportions

Majority of the study participants were males (72%), while 17% of them were females and p value is 0.84 which is statistically insignificant

Table 4: Distribution of study participants based on weight (n=120)

	Group SA	Group TIVA	P value
Weight in kg (Mean ± SD)	74.27±9.3	74.1±9.33	0.922

*ANOVA was applied for comparison of means

Mean weight of the patients was 74.2 in Group SA and 74.1 in group TIVA. Both groups were comparable in terms of weight of the study participants. P value is 0.922 which is statistically insignificant.

Table 5: Distribution of study groups based on intra operative and postoperative heart rate(n=120)

Heart rate (bpm) (Mean ± SD)	Group SA	Group TIVA	P value
Baseline	81.88±4.16	81.92±4.12	0.965
3 min	81±4.03	81.22±3.87	0.764
5 min	91±3.61	91.22±3.44	0.736
10 min	73.63±1.9	73.77±2.09	0.718
15 min	67.92±2.36	67.93±2.36	0.969
30 min	69.82±3.07	69.7±3.09	0.835
45 min	68.12±2.7	68.18±2.66	0.892
60 min	72.48±2.07	72.5±2.01	0.964
90 min	79.68±9.37	79.63±9.25	0.976
6 hour	104.5±10.37	104.83±10.3	0.861
12 hour	75.82±8.11	75.78±8.28	0.982
24 hour	81.02±4.12	81.25±3.89	0.75

**ANOVA was applied for comparison of means*
#Kruskal wallis test was applied for comparison of means

The above table shows changes in mean intraoperative heart rate among study participants of two groups at different time intervals. The mean difference between the groups was >0.05 which was statistically insignificant.

Table 6: Distribution of study groups based on intra operative and postoperative systolic blood pressure (n=120)

SBP (mmHg) (Mean ± SD)	Group SA	Group TIVA	P value
Baseline	120.75±13.49	120.58±13.44	0.946
3 min	110.65±14.13	110.98±14.23	0.898
5 min	109.2±11.27	109.03±11.1	0.935
10 min	102.54±10.1	102.37±9.89	0.927
15 min	100.45±8.63	100.28±8.44	0.915
30 min	105.58±9.53	105.92±9.32	0.847
45 min	115.92±9.81	115.75±9.82	0.926
60 min	121.42±11.2	121.55±11.2	0.948
90 min	111.33±12.03	111.3±11.98	0.988
6 hour	116.67±14.89	117±14.96	0.903
12 hour	123.27±10.65	120±19.92	0.265
24 hour	123.27±10.65	122.97±10.53	0.877

**ANOVA was applied for comparison of means*
#Kruskal wallis test was applied for comparison of means

The above table shows intra operative and post operative changes in mean systolic blood pressure among study participants of two groups at different time intervals. The mean difference among the groups was not found to be statistically significant as the p value is >0.05.

Table 7: Distribution of study groups based on intra operative and postoperative diastolic blood pressure (n=120)

DBP (mmHg) (Mean ± SD)	Group SA	Group TIVA	P value
Baseline	75.58±12.85	75.43±12.73	0.949
3 min	67.38±9.11	67.43±9.1	0.976
5 min	65.98±6.43	66.07±6.32	0.943
10 min	61.02±5.73	60.93±5.71	0.937
15 min	59.35±5.39	59.27±5.42	0.933
30 min	62.67±5	62.72±5.04	0.957
45 min	73.92±11.35	73.58±11.46	0.873
60 min	78.93±8.3	79.1±8.22	0.912
90 min	68.42±8.56	68.58±8.69	0.916
6 hour	74.97±11.71	75.38±11.79	0.846
12 hour	82.93±9.41	82.9±9.38	0.985
24 hour	80.03±12.67	82.37±9.24	0.251

*ANOVA was applied for comparison of means
#Kruskal wallis test was applied for comparison of means

The above table shows intra operative and post operative changes in mean diastolic blood pressure among study participants of two groups at different time intervals. The mean difference among the groups was found to be statistically insignificant as p value >0.05.

Table 8: Distribution of study groups based on intra operative and post operative Mean arterial pressure (n=120)

MAP (bpm) (Mean ± SD)	Group SA	Group TIVA	P value
Baseline	90.15±10.77	90.05±10.81	0.96
3 min	79.2±11.33	79.1±11.28	0.961
5 min	75.82±6.28	76.08±6.13	0.814
10 min	69.68±4.94	69.93±4.83	0.78
15 min	65.72±2.88	65.8±2.96	0.877
30 min	73.87±6.21	73.9±6.15	0.976
45 min	88.65±10.46	88.25±10.56	0.835
60 min	86.63±9.4	86.93±9.41	0.862
90 min	83.48±8.63	83.77±8.7	0.858
6 hour	87.3±10.04	87.02±10.03	0.877
12 hour	87.3±7.81	87.35±7.8	0.972
24 hour	87.12±9.78	86.78±9.71	0.852

*ANOVA was applied for comparison of means
#Kruskal wallis test was applied for comparison of means

The above table shows intra operative and post operative changes in mean arterial pressure among study participants of two groups at different time intervals. The mean difference among the groups was not found to be statistically significant as p value was >0.05.

Table 9: Distribution of study groups based on intra operative and post operative SpO2 (n=120)

SPO2 (%) (Mean ± SD)	Group SA	Group TIVA	P value
Baseline	99.07±0.9	99.03±0.9	0.8
3 min	97.35±1.49	97.33±1.53	0.99
5 min	98.82±0.96	98.82±0.95	0.99
10 min	96.92±1.31	96.9±1.35	0.9
15 min	96.92±1.36	96.88±1.4	0.9
30 min	99.33±0.6	99.32±0.6	0.9
45 min	96.7±1.44	96.68±1.49	0.99
60 min	96.78±1.38	96.8±1.44	0.9
90 min	98.75±0.92	98.77±0.93	0.9
6 hour	98.82±0.84	98.78±0.9	0.834
12 hour	98.67±0.86	98.72±0.85	0.748
24 hour	98.85±0.83	98.83±0.87	0.914

*ANOVA was applied for comparison of means
#Kruskal wallis test was applied for comparison of means

The above table shows intra operative and post operative changes in mean SpO2 among study participants of two groups at different time intervals. The mean difference among the groups was fount to be statistically insignificant as p value >0.05.

Table 10: Distribution of study participants based on time of first analgesic request (n=120)

	Group SA	Group TIVA	P value
Time of first analgesic request (Mean ± SD)	120.83±10.92	46.2±16.5	<0.001

The above table shows first analgesic request time (mean) between the two groups. In SA group the mean of first analgesic request 120.83 ±10.92 minutes post-operative whereas in TIVA group mean is around 46.2±16.5 minutes post-operative. It states that pain occurs early in TIVA group as compared to SA group and it shows significant difference between the two groups as p value is <0.001.

Table 11: Distribution of study participants based on Post op Complications (n=120)

Post-op complications	Group SA	Group TIVA	P value
Nausea	6(10%)	51(80%)	<0.001 HS
Vomiting	9(15%)	33(55%)	<0.001 HS
Sore throat	0	36(60%)	<0.001 HS
PDPH	16(26.67%)	0(0%)	<0.001 HS

*Independent t-test

The above table shows Post-operative Complications comparison between SA and TIVA group. In SA group post-op complications like nausea, vomiting's, Sore throat, post-dural puncture headache (PDPH) are less compared to TIVA group and it shows statistically highly significant difference with P value <0.001

Table 12: Distribution of study participants based on cost analysis (n=120)

	Group SA	Group TIVA	P value
Cost analysis (Rs) (Mean ± SD)	5034.43±428.24	8810.30±353.98	<0.001

The above table shows comparison of cost analysis among study participants of two groups at different time intervals. The mean difference among the groups was found to be statistically highly significant. As p value is <0.001 It shows that Group TIVA is significantly costlier than Group SA.

Table 13: Distribution of study participants based on quality of recovery(n=120)

Quality of recovery	Group SA	Group TIVA	P value
Felt well most of the time	58(96.67%)	4(6.67%)	<0.001
No needed help from nurse or anesthetist	37(61.67%)	8(13.33%)	<0.001
No problem with breathing	53(88.33%)	12(20%)	<0.001
No muscle and back pain	50(83.33%)	15(25%)	<0.001

The above table shows the comparison of quality of recovery between SA group and TIVA group shows Quality of Recovery is more in SA group comparing to TIVA group and shows statistically highly significant difference between the two groups as p value <0.001.

Discussion

According to literature, knee arthroscopy is a minimal invasive surgery performed for minor surgical trauma, reduced morbidity and shortens the hospitalization period. Therefore, this type of surgery before total knee arthroplasty (TKA) could be considered a minor procedure with minimum postoperative complication [23]. Knee arthroscopy is a surgical procedure that allows doctors to view the knee joint without making a large incision (cut) through the skin and other soft tissues. Arthroscopy is used to diagnose and treat a wide range of knee problems.

Spinal anaesthesia also called spinal block, subarachnoid block, intradural block and intrathecal block, is a form of neuraxial regional anaesthesia involving the injection of a local anaesthetic or opioid into the subarachnoid space, Spinal Anaesthesia allows the patient to stay awake during the operation without feeling any pain.

Total intravenous anesthesia (TIVA) is a technique of general anesthesia which uses a combination of agents given via syringe pump exclusively by the intravenous route without the use of inhalation agents (Gas Anesthesia) [24] Additionally to TIVA, Target Controlled Infusion (TCI) [25] is an algorithm based user-friendly technique for the caregiver.

The present study compared two methods of anaesthesia, Spinal Anaesthesia using 0.75% ropivacaine and Total Intravenous Anaesthesia using propofol infusion with I-gel for knee arthroscopic surgeries. Study design consists of 120 patients belonging to both sexes, aged between 18-55 years, with American Society of Anaesthesiologists (ASA) physical status I or II who are posted for knee arthroscopy under total intravenous anaesthesia / spinal anaesthesia will be included in the study. Clinical examination and routine investigations will be done to all patients.

Then it was found that first analgesic request was earlier and quality of recovery was better, early ambulation, cost of treatment, post op complications was lesser in Spinal Anaesthesia with 0.75% ropivacaine as compared to Total intravenous anaesthesia.

Similar to our study Gebhardt *et al.* [1] had reported Spinal anaesthesia with 40-mg CP 1% leads to a significantly earlier discharge and is cheaper compared with general [2]. Spinal had faster recovery than general anaesthesia with patients reaching discharge criteria significantly earlier [117 min (66 to 167) versus 142 min (82 to 228), P = 0.0047]. Pain occurred significantly earlier in the general anaesthesia group (P = 0.0072). Just as in our studies where In SA group first analgesic request is at 120 minutes post-operative whereas in TIVA group it is around 46 minutes post-operative (P=0.869)

Comparison of Age: As it is evident that both the groups had patients from all age groups ranging from 18-65 years. The mean age for Group SA is 40.7with an SD ± 8.2years and for that of Group TIVA is 40.47 with an SD ±8.17 years.

Comparison of Gender Distribution: Each group contains a variable number of gender distribution amongst which males are more predominant than females in our study.

Volker Gebhardt *et al.* [22] conducted similar to our study in which fifty patients were randomly allocated into two groups of 25 patients each to receive either general anaesthesia or spinal anaesthesia. There were no significant differences in personal data between the groups.

Comparison of Intraoperative and Post Operative Heart Rate: Comparison of Intraoperative heart rate at 3min, 5min, 10min, 15min, 30min, 45min, 60min, 90min shows statistically no significant difference between the two groups with P value >0.05.Similarly,post operatively 6hrs, 12 hrs and 24 hrs later also both the groups show statistically no significant difference as p value >0.05. Heart rate well maintained throughout the intraoperative period in both groups. Similar to our study Volker Gebhard *et al.* [22] compare Spinal anaesthesia with chloroprocaine 1% versus total intravenous anaesthesia for outpatient knee arthroscopy shows no significant difference between the two groups. Heart rate well maintained throughout intraoperative period in both groups.

Comparison of Intra-Operative and Post-Operative Systolic Bp

Comparison of Intraoperative systolic blood pressure at 3min,5min,10min,15min,30min,45min,60min,90min shows statistically no significant difference between the two groups with P value >0.05.Similarly,post operatively 6hrs ,12 hrs and 24 hrs later also both the groups show statistically no significant difference as p value >0.05. Similar to our study Volker Gebhard *et al* [22] compare Spinal anaesthesia with chloroprocaine 1% versus total intravenous anaesthesia for outpatient knee arthroscopy shows no significant difference between the two groups.

Comparison of Intra-Operative and Post-Operative Diastolic Bp

Comparison of Intraoperative diastolic blood pressure at 3min,5min,10min,15min,30min,45min,60min,90min shows statistically no significant difference between the **two** groups with P value >0.05.Similarly,post operatively 6hrs ,12 hrs amd 24 hrs later also both the groups show statistically no significant difference as p value >0.05. Similar to our study Volker Gebhardt *et al.* [22] compare Spinal anaesthesia with chloroprocaine 1% versus total intravenous anaesthesia for outpatient knee arthroscopy shows no significant difference between the two groups.

Comparison of Intra-Operative Mean Arterial Pressure

Comparison of Intraoperative Mean arterial pressure at 3min,5min,10min,15min,30min,45min,60min,90min shows statistically no significant difference between the two groups with P value >0.05.Similarly,post operatively 6hrs ,12 hrs amd 24 hrs later also both the groups show statistically no significant difference as p value >0.05. Mean arterial pressure is well maintained throughout the intraoperative period in both groups. Similar to our findings Volker Gebhardt *et al.* [22] compare Spinal anaesthesia with chloroprocaine 1% versus total intravenous anaesthesia for outpatient knee arthroscopy in a total of 50 patients (women/men, 18 to 80 years old, ASA I to III) undergoing outpatient knee arthroscopy were included shows no significant difference between the two groups in Mean arterial pressure.

Comparison of First Analgesic Request

Comparison Of first analgesic request time (mean) between the two groups. In SA group first analgesic request is at 120minutes (mean) post-operative whereas in TIVA group it is around 46 minutes (mean) post-operative. It states that pain occurs early in TIVA group comparative to SA group and it shows significant difference between the two groups with P value <0.001.

Similarly, Volker Gebhardt *et al.* [22] compare Spinal anaesthesia with chloroprocaine 1% versus total intravenous anaesthesia for outpatient knee arthroscopy in a total of 50 patients, Pain occurred significantly earlier in the general anaesthesia group with P= value 0.0072 compare to Spinal anaesthesia with chloroprocaine 1%.

Study conducted by Ayşe Lafçı *et al.* [18] was to compare Spinal anesthesia versus general anesthesia with a laryngeal mask airway in patients undergoing radiofrequency ablation for varicose veins and found that duration of hospitalization was shorter in the patients who received general anesthesia with a LMA. At one hour post surgery, the mean pain scores were significantly higher in the general anesthesia group than in the spinal anesthesia group (1.7±0.1 cm vs 0.1±0.1 cm) ($p< 0.001$). This was similar to our study.

A Harsten *et al.* [15] Conducted a study to compare the effects of general anaesthesia (GA) and spinal anaesthesia (SA) on the need for postoperative hospitalization and early postoperative comfort in patients undergoing fast-track total knee arthroplasty,

On contrary to our study, During the first 2 postoperative hours, GA patients had higher pain scores ($P< 0.001$), but after 6 h As opposed to our study the SA group had significantly higher pain scores ($P< 0.001$) according to Harsten's study Subjects in the GA group used fewer patient-controlled analgesia doses and less morphine ($P< 0.01$), and were able to walk earlier compared with the SA group ($P< 0.001$).

J Wong *et al.* [9] conducted a study where he compared the recovery profiles, postoperative complications, perioperative OR utilization times, and times to discharge of patients undergoing ambulatory knee arthroscopy under spinal anesthesia (SA) or general anesthesia (GA). Patients in the GA group had more pain than the SA group (61% vs 15%, P <0.01), and a higher incidence of analgesic use (59% vs 7.5%, P <0.01).This was similar to our study.

Comparison of Post Op Complications

In our study SA group post-op complications like nausea, vomiting's, Sore throat, post dural puncture headache (PDPH) are less compared to TIVA group and it shows significant difference with P value <0.001.

In Gebhardt *et al.* [22] study the side effects like nausea, vomiting, discomfort were less with spinal when compared to total intravenous anesthesia. This was also similar to our study where In SA group post-op complications like nausea, vomiting's, Sore throat, post-Dural puncture headache (PDPH) are less compared to TIVA group and it shows statistically significant difference with P value<0.001.

In study conducted by Ayşe Lafçı *et al.* [18] The incidence of vomiting was significantly higher in the general anesthesia group than in the spinal anesthesia group just like in our study.

J Wong *et al.* [9] study The incidence of backache was higher in the SA group (35 vs 13.6%, $P< 0.05$) than the GA group.

However, the incidence of sore throat was higher in the GA compared to the SA group (25% vs 2.5%, P <0.01).

Comparison of Treatment Cost

In our study Cost analysis between SA group 5034 INR (mean) with SD 428.24 INR and TIVA group 8810 INR (mean) with SD 353.98 INR which states that spinal anaesthesia is cheaper than general anaesthesia with P value<0.001.

Similar to our study Volker Gebhardt *et al.* [22] study shows Cost analysis shows spinal anaesthesia to be cheaper than general anaesthesia. Assuming total costs of 30.06€ per case for spinal and 52.70€ for general anaesthesia the comparative cost ratio for both anaesthesia techniques was 0.57.

Claudio Camponovo *et al.* [16] Conducted a retrospective study to evaluate the clinical impact of the introduction of spinal 1% 2-chloroprocaine compared to general anesthesia at the ARS Medical Clinic They observed a clinically significant reduction in terms of cost of materials and employers involved patients' care (53 vs 78 swiss franks) when spinal 1% 2-chloroprocaine was used very similar to our study where 0.75% Ropivacaine was used.

Comparison of Quality of Recovery

In our study Quality of Recovery was more in SA group comparing to TIVA group and shows significant difference between the two groups with p value 0.001.

Findings similar to our study Volker Gebhardt *et al.* [22] study shows before patients left the day-surgery centre, we evaluated their satisfaction and perception of anaesthesia and recovery with the validated German translation of the nine point QoR-9 questionnaire. In addition, they had to answer questions on overall satisfaction on a four-point scale: if they felt uncomfortable during induction of anaesthesia and if they would choose the same technique again if necessary. Finally, the whole anaesthetic procedure was rated using grades 1 (best) to 6 (worst). There were no significant differences in postoperative satisfaction and quality of recovery between the groups, except for the question asking if patients 'felt uncomfortable after anaesthesia'. This tended to be ticked as 'more yes than no' and 'more no than yes' significantly more often in the general anaesthesia group (P = 0.0096). All 49 patients would recommend their allocated anaesthesia technique if they were asked.

In A Harsten *et al.* [15] study GA group were able to walk earlier compared with the SA group (*P*< 0.001) as opposed to our study.

Michael F. Mulroy *et al.* [8] Conducted a study to compare Spinal, Epidural, and General Anesthesia for Outpatient Knee Arthroscopy. Recovery times, operating room turnover times, and patient satisfaction were recorded by an observer using an objective scale for recovery assessment and a verbal rating scale for satisfaction. Post anesthesia care unit discharge times for the general and epidural groups were similar (general = 104+/-31 min, epidural = 92+/-18 min), whereas the spinal group had a longer recovery time (146+/-52 min) (P = 0.0003).

As opposed to our study Spinal Anaesthesia with 0.75% ropivacaine provides bettery quality of recovery and later analgesia administration than Total intra venous Anaesthesia.

Conclusion

Patients administered Spinal anaesthesia with 0.75% ropivacaine had significantly lesser requirement of postop analgesia, with good quality of recovery from anaesthesia, lesser duration of hospital stay, early attainment of ambulation and is considerably cheaper when compared to patients administered General anaesthesia with I-gel or Laryngeal mask airway using Total intravenous anaesthesia with propofol infusion. Hence, this study concludes that Subarachnoid blockade with 0.75% ropivicaine is a safe and better choice of for ambulatory surgeries when compared to total intravenous anaesthesia with propofol using I-Gel.

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