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Original Article

Comparison between Spinal Anesthesia using Hyperbaric Prilocaine with Nalbuphine or Fentanyl Supplementation in Lower Limb Surgeries

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ABSTRACT

Background: The best medications for spinal anesthesia are becoming more important as more & more surgeries are moved to outpatient facilities.

Aim of the work: This study aims to compare the length of postoperative analgesia and motor & sensory block characteristics between spinal anesthesia employing hyperbaric prilocaine, nalbuphine, & fentanyl in lower limb procedures.

Patients and methods: The research included ninety patients & was a prospective, randomized, double-blind clinical trial. at Al-Azhar University Hospitals in Cairo, & was approved by the Scientific & Ethics Research Committee. Each of the three groups consisted of thirty patients. ***Group P:*** using hyperbaric prilocaine 50 mg prilocaine only, ***Group PF:*** using hyperbaric prilocaine Fentanyl twenty-five µg with prilocaine fifty milligrams & G***roup PN:*** using hyperbaric prilocaine 50mg and 800 µg nalbuphine.

Results: In terms of age, body mass index [BMI], ASA status, sex, & operation time or type, the research found no statistically significant difference between all three groups. In comparison to groups P & PF, group PN had a substantially longer time to request the first analgesic. In addition, during four hours & twenty-four hours after surgery, group PN patients reported much less pain on the Visual Analogue Scale [VAS] than groups P & PF. The length of time that sensory and motor blocks lasted also varied significantly across groups.

Conclusion: Adjuvants to two percent hyperbaric prilocaine in a subarachnoid block, such as intrathecal nalbuphine eight hundred µg or fentanyl twenty-five µg, are effective. When compared to fentanyl, intrathecal nalbuphine prolongs sensory block, motor block, & effective analgesia while reducing the occurrence of adverse actions and complications in patients undergoing lower limb surgery under spinal anesthesia.

Keywords: Hyperbaric Prilocaine; Spinal Nalbuphine; Lower Limb Surgeries; Fentanyl.

INTRODUCTION

One typical method of sedation for outpatient procedures involving the lower extremities is spinal anaesthesia. Quick sensory and motor block, predictable regression, & minimal side effects would characterize the perfect outpatient spinal aesthetic [1,2]. Research has shown that compared to hyperbaric bupivacaine ten milligrams, spinal anesthesia with fifty milligrams of hyperbaric prilocaine improves hemodynamic stability and speeds up the resolution of motor blocks, all while providing the same benefits of surgical anesthetic & patient satisfaction [3].

For lower limb & lower abdomen procedures that are up to 90 minutes long, dose-finding studies have shown that prilocaine dosages from forty to sixty milligrams are suitable [4]. When compared to 0.2 milligrams of morphine, eight hundred micrograms of nalbuphine administered intrathecally provided better intraoperative & postoperative analgesia with fewer side effects. When compared to other centrally acting opioids, nalbuphine has a far lower risk of respiratory depression & misuse [5]. As an alternative to nalbuphine, fentanyl is frequently administered as a spinal adjuvant. Administering ten to thirty micrograms of intrathecal fentanyl is risk-free & improves sensory block quality without extending motor block duration [6].

The purpose of this research was to examine the differences in the time it took for motor as well as sensory block to begin, the length of time it lasted, & the time it took to request analgesics after spinal anesthetic with hyperbaric prilocaine alone vs with nalbuphine or fentanyl for lower limb procedures. The duration of analgesia achieved by each drug combination is measured by the first analgesic request. Additionally, the VAS pain score is used to determine the intensity of pain. Secondary outcomes will include patient satisfaction, the time it takes for motor block to set in, the onset of sensory block, & the presence or absence of problems.

PATIENTS AND METHODS

The scientific and ethics research committee authorized this double-blind clinical trial of ninety individuals having lower limb procedures done under spinal anesthesia at Cairo's Al-Azhar University Hospitals. Patients were divided into three groups: Group P: Using hyperbaric prilocaine only [Takipril® Prilocaine 20mg/ml; Sunny Medical Group]: 30 patients underwent spinal anesthesia using 50 mg prilocaine alone, Group PF: Using hyperbaric prilocaine with fentanyl: 30 patients underwent spinal anesthesia using 50 mg prilocaine and 25 micrograms of fentanyl and Group PN: Using hyperbaric prilocaine with nalbuphine: 30 cases underwent spinal anesthesia using 50mg prilocaine and 800 micrograms of nalbuphine.

In order to participate in this trial, patients had to meet certain requirements: patients accepting to join the study, age: between 21-45years, Individuals with a Body Mass Index below thirty kilograms per square meter & ASA physical status I & II and expected surgery duration of 1-1.5 hours. Exclusion Criteria were patient individuals suffering from coagulation issues, injection-site infections,' sensitivity to used drugs, emergency operations and patients with history of analgesics dependence.

Sampling: Using G power program 3.1.9.4, the necessary sample size was determined. For the duration [mean ± standard deviation in the prilocaine plus adding nalbuphine group is 8 ± 4 & in the prilocaine plus adding fentanyl group is 12 ± 6], the minimum sample size for each group, according to previous research on the effects of prilocaine added to nalbuphine or fentanyl, is twenty-seven patients. The alpha level is 0.05 [two-tailed], and the effect size is 0.78. Thirty people were included in each group, an increase of ten percent above the original calculation to account for dropouts.

Methods

A thorough history, physical examination, & battery of tests were administered to each patient prior to anesthesia. All patients were then premedicated with 0.01 milligrams/kg atropine, then intravenously given ten milligrams of metoclopramide and twenty milligrams of famotidine before to the procedure. The patient was preloaded with twenty milliliters per kilogram of Ringer's lactate solution & left to infuse for fifteen minutes. Throughout the trial, baseline measurements of heart rate [HR], oxygen saturation [SpO2], & mean arterial blood pressure [MAP] were obtained & meticulously maintained .Just like the previous study groups, this one also used a 25-gauge pencil-point needle to provide spinal anesthesia at the L3–L4 level while the patient sat in a chair. Once the CSF flow was clear, each patient was given a specific volume of spinal solution over the course of thirty seconds. Immediately following the block, patients were positioned on their backs. The patient's weight, vital signs, & intraoperative losses were the determinants of fluid management during the procedure.

Testing for sensory & motor blockage was used to evaluate the quality of the anesthetic. The sensory blockage was checked with a blunted needle & a cold sensation test. The Modified Bromage Scale [0-Full flexion of the knees & feet; 1-Just able to flex knees, full flexion of the feet; 2-Unable to flex knees, flexion of the feet; 3-Unable to move legs or feet, full motor block] was used to measure motor block .The patient underwent sensory and motor testing at 0 minutes [shortly after spinal] & then every five minutes until the block was deemed sufficient to begin the surgical procedure. Fentanyl 0.1 milligrams was injected intravenously if the intraoperative analgesia was determined to be inadequate; in the event that this didn't successfully eliminate all pain sensations, general anesthesia was established, which was regarded as a block failure. Regular 30-minute post-op monitoring was necessary to ensure a full recovery of motor & sensory function. Postoperative pain was assessed by the visual analog scale pain score [0–10; 0, no pain; 10, worst pain] at 2, 3, 6, 12, 24 hours. postoperatively. All patients will receive IV paracetamol 1gm infusion, every 6 hours. Any patient had a VAS above 4 will receive a rescue analgesic dose of 1 mg IV morphine. Reassessment was done every 20 minutes after the morphine rescue analgesia.

The postoperative care unit recorded the patient's mean arterial blood pressure, heart rate, & oxygen saturation at time 0, upon arrival, 30, 60, & 90 minutes after the procedure, as well as 2, 4, 6, 8, 12, and 24 hours after the operation. These measurements were taken intraoperatively every five minutes. An intravenous injection of five milligrams of ephedrine was administered if the systolic blood pressure dropped to 20% below the baseline or below 90 mmHg. In addition, 0.5 milligrams of atropine would be administered intravenously if the heart rate dropped to fifty bpm or below. The duration that the analgesia will last, calculated as the time it takes to go from administering spinal anesthetic to the initial request for it. A four-point scale [1: Excellent, 2: Good, 3: Fair, & 4: Poor] was used to evaluate patient satisfaction. Lastly, we made note of any problems or negative impacts.

Statistical Analysis: The data will be analyzed using the Statistical Package for the Social Sciences, version 22.0, which is located in Chicago, USA. Mean ± standard deviation is used to summarize continuous variables, while numbers & percentages are used for categorical variables. The Shapiro-Wilk test was used to check if the quantitative variables were normal. An analysis of variance [ANOVA] will be used to compare the measured quantitative parameters, & then a post hoc Tukey test will be performed. The Chi-Square test will be used to compare the categorical data. Significant results were defined as a P value below 0.05.

RESULTS

There were no statistically significant differences between the three groups in terms of age, body mass index, sex, comorbidities, ASA physical status, operation timing or type, or any of the other variables examined in this study of ninety patients conducted between February & August of 2023 [Table 1]. Throughout the course of the research, all patients maintained consistently normal heart rates & blood pressure. All MAP measurements were statistically comparable in all studied time intervals. [Table 2] Table 2 shows that intraoperative mean arterial blood pressure decreased significantly within the same group when compared with baseline within each group. [$P< 0.05$]. Furthermore, there are no significant difference between the three studied groups regarding HR at all studied time intervals as revealed in Figure [1]. As regard SpO_2, no significant difference was observed among the three groups of patients analyzed at various time points in this investigation [Figure 2]. No group showed signs of oxygen desaturation.

From four hours after surgery to twenty-four hours after surgery, measurement of VAS postoperative pain scores was substantially lower in group PN compared to groups P and PF [Table 3].

The PN group had noticeably longer sensory and motor block durations than groups P & PF. On the other hand, whether it comes to the start of sensory, motor, or block symptoms, there isn't a substantial difference [Table 4]. Time to request of 1st analgesia was significantly higher among group PN compared to group P & PF. All other characteristics of postoperative analgesia are shown in [Table 5]. Concerning complications during and after surgery, as well as their management, the two groups were similar. No transverse nerve stimuli [TNS] were detected in any of the spinal anesthesia groups that reported buttocks pain, dysesthesia, or both [Table 6]. Finally, four-point scale was conducted to evaluate the degree of patient satisfaction. Higher clinical satisfaction score was more prevalent among patients of the PN group, compared to other groups, but the results was not statistically significant [Table 7]. None of the patients received intrathecal nalbuphine adjuvant reported to be unsatisfied.

Table [1]: Patient characteristics of the three studied groups.

Parameter		Group P [N=30]	Group PF [N=30]	Group PN [N=30]	χ^2/ F Value	P Value
Age [years]		35.57 ± 4.28	34.62 ± 5.47	32.48 ± 6.37	1.37	0.08
BMI [kg/m^2]		26.31 ± 2.27	26.54 ± 2.49	26.71 ± 2.83	0.18	0.82
Sex	Female	20 [66.6%]	19 [63.3%]	17 [56.7%]	0.66	0.71
	Male	10 [33.3%]	11 [36.7%]	13 [43.3%]		
Comorbid Diseases	Hypertension	7 [23.3%]	6 [20%]	5 [16.7%]	0.41	0.81
	DM	6 [20%]	5 [16.7%]	4 [13.3%]	0.48	0.78
	Cardiac Diseases	2 [6.7%]	1 [3.3%]	2 [6.7%]	0.42	0.80
Smoking		8 [26.6%]	10 [33.3%]	11 [36.7%]	0.72	0.70
ASA	I	15 [50%]	18 [60%]	19 [63.3%]	1.148	0.55
	II	15 [50%]	12 [40%]	11 [36.7%]		
Operative Time [min]		73.63 ± 13.22	74.83 ± 12.52	76.65 ± 11.28	0.45	0.63
Surgery Type	Orthopedic Surgery	7 [23.3%]	6 [20%]	5 [16.7%]	0.42	0.81
	General Surgery	10 [33.3%]	11 [36.7%]	13 [43.3%]	0.66	0.72
	Vascular Surgery	13 [43.3%]	15 [50%]	12 [40%]	0.63	0.73

Data are represented as Mean±SD or number [Percentage], BMI: Body mass index, ASA: American society of anesthesiologists. χ2/ Chi Square test, F Value: ANOVA test

Table [2]: Mean arterial blood pressure changes of the three studied groups.

Parameter	Group P	Group PF	Group PN	F Value	P Value
Baseline	82.65 ± 3.85	83.35 ± 4.85	84.72 ± 3.75	1.22	0.226
5 min Intraop.	81.95 ± 5.38	81.45 ± 4.38	82.71 ± 5.83	0.946	0.348
10 min Intraop.	81.21 ± 5.31	80.94 ± 5.11	82.27 ± 5.53	0.967	0.337
15 min Intraop.	80.75 ± 5.87	81.35 ± 5.87	82.77 ± 4.21	0.579	0.565
20 min Intraop.	79.89 ± 4.43	79.59 ± 3.43	81.32 ± 4.23	1.69	0.096
25 min Intraop.	80.82 ± 3.38	80.39 ± 3.74	80.68 ± 5.62	0.268	0.790
30min Intraop.	82.21 ± 4.31	81.44 ± 4.21	82.23 ± 3.34	0.805	0.424
60min Intraop.	80.46 ± 3.28	80.71 ± 3.59	81.45 ± 5.34	0.630	0.531
90min Intraop.	79.29 ± 3.77	78.19 ± 3.17	79.32 ± 4.16	1.18	0.242
2 hr Postop.	78.82 ± 3.11	78.12 ± 3.31	79.58 ± 3.25	1.72	0.091
4 hr Postop.	78.16 ± 3.7	77.36 ± 3.65	78.66 ± 3.64	1.38	0.173
6 hr Postop.	76.27 ± 4.23	76.27 ± 4.23	77.93 ± 3.43	1.67	0.101
8 hr Postop.	75.85 ± 4.91	74.8 ± 4.71	75.3 ± 5.38	0.383	0.703
12 hr Postop.	73.98 ± 3.52	72.78 ± 3.52	74.15 ± 3.91	1.43	0.159
24 hr Postop.	72.85 ± 3.97	71.65 ± 3.67	72.47 ± 4.35	0.789	0.433

Data are represented as mean ±SD, Intraop. Intraoperative, Postop. Postoperative.

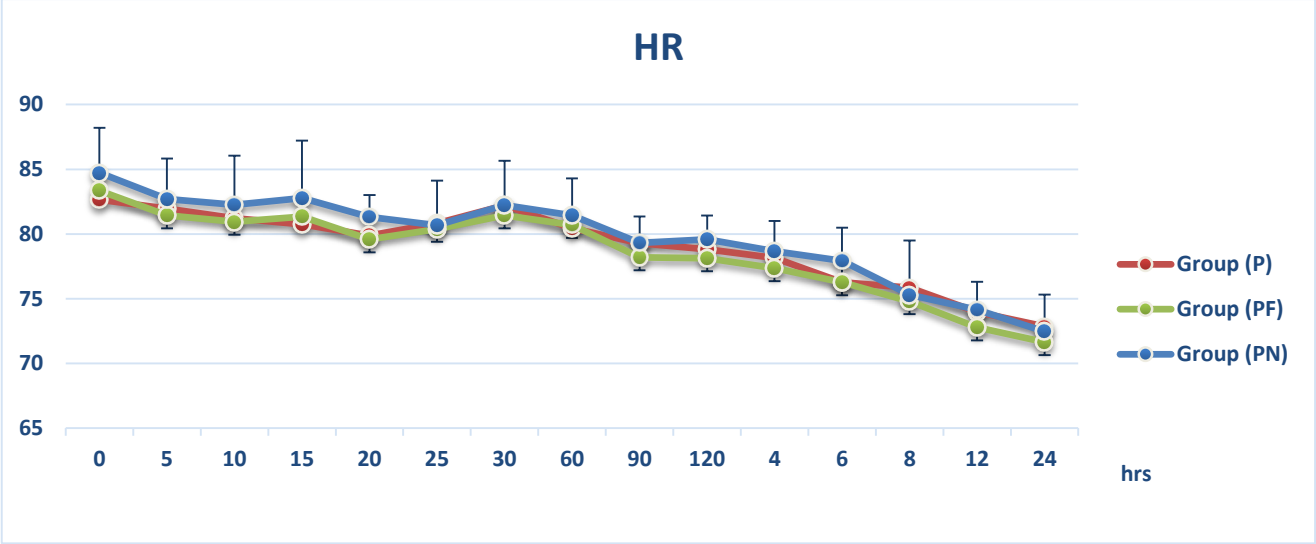

Figure [1]: Heart rate changes of the three studied groups.

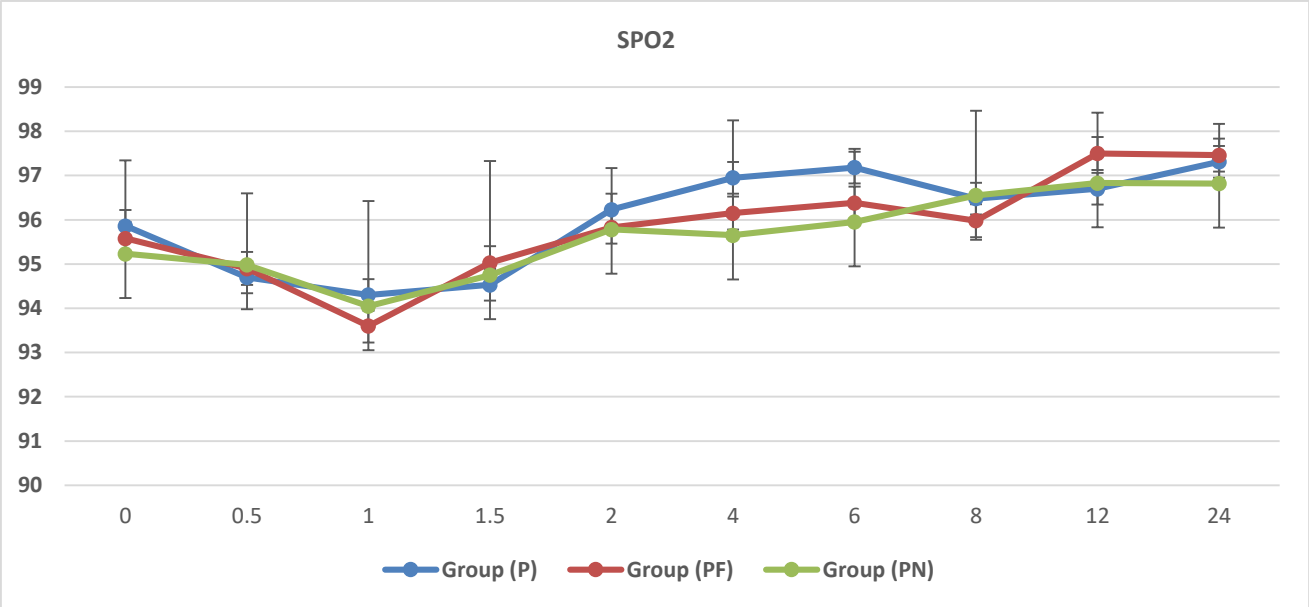

Figure [2]: SpO_2 Saturation of the three studied groups.

Table [3]: Postoperative VAS pain scores among the three studied groups.

Time	Group P	Group PF	Group PN	F Value	P Value
Baseline	1.31 ± 0.547	1.24 ± 0.589	1.19 ± 0.571	0.334	0.740
2 hr Postoperative	1.59 ± 0.578	1.61 ± 0.578	1.44 ± 0.511	1.21	0.232
4 hr	2.41 ± 0.712	2.11 ± 0.702	1.68 ± 0.632	2.49	0.016
6 hr	2.51 ± 0.715	2.32 ± 0.755	1.89 ± 0.783	2.17	0.034
8 hr	2.98 ± 0.931	2.94 ± 0.915	2.38 ± 0.724	2.63	0.011
12 hr	3.51 ± 0.925	3.15 ± 0.975	2.46 ± 0.936	2.8	0.007
18 hr	2.75 ± 0.911	2.84 ± 0.931	2.16 ± 0.922	2.85	0.006
24 hr	3.29 ± 1.32	3.18 ± 1.12	1.87 ± 0.971	4.84	<0.001

Data are represented as mean ±SD, Intraop. Intraoperative, Postop. Postoperative.

Table [4]: Sensory and motor block characteristics of the three studied groups.

Parameter	Group P	Group PF	Group PN	F Value	P Value
Start of the most severe sensory impairment [Sec]	33.63± 11.27	31.17 ± 10.67	35.41 ± 12.89	1.39	0.17
Onset of motor block [Sec]	54.57 ± 14.33	52.32± 12.63	57.93 ± 18.60	1.37	0.17
Sensory block duration [hrs]	1.5 ± 0.27	1.66 ± 0.22	2 ± 0.49	16.39	<0.01
Motor block duration [hrs]	1.25 ± 0.46	1.4 ± 0.47	1.75 ± 0.42	9.7	0.002

Data are represented as mean ±SD

Table [5]: Postoperative analgesia characteristics among the three studied groups.

Parameter	Group P	Group PF	Group PN	χ^2/ F Value	P Value
First analgesic request [hr]	2.95 ± 0.80	4.5 ± 0.71	6.00 ± 1.41	30.26	<0.0001
Total analgesic consumption [mg]	4.24 ± 1.73	2.5 ± 0.84	1.66 ±0.52	10.25	0.0003
Number of rescue analgesics	21 [70%]	10 [33.3%]	6 [20%]	7.25	0.026

In data representation, the mean ± standard deviation or the number [percentage] is used.

Table [6]: Complication distribution among the three studied groups.

Parameter	Group P **No. [%]**	Group PF **No. [%]**	Group PN **No. [%]**	χ^2 Value	P Value
PONV	1 [3.3%]	1 [3.3%]	0 [0%]	1.02	0.59
Shivering	2 [6.7%]	5 [16.7%]	1 [3.3%]	3.56	0.17
Pruritus	1 [3.3%]	3 [10%]	2 [6.7%]	1.07	0.58
Bradycardia	2 [6.7%]	4 [13.3%]	3 [10%]	0.74	0.69
Hypotension	4 [13.3%]	6 [20%]	5 [16.6%]	0.48	0.78

Data are represented number [Percentage], PONV. Postoperative Nausea and Vomiting

Table [7]: Patient Satisfaction distribution among the studied groups.

Parameter	Group P **No. [%]**	Group PF **No. [%]**	Group PN **No. [%]**	χ^2	**P**
Excellent	11 [36.7%]	18 [60%]	21 [70%]	13.19	0.04
Good	6 [20%]	6 [20%]	7 [23.3%]		
Fair	7 [23.3%]	4 [13.3%]	2 [6.7%]		
Poor	6 [20%]	2 [6.7%]	0 [0%]		

Data are represented as number [Percentage]

DISCUSSION

The results of this research show that intrathecal two percent hyperbaric prilocaine fifty milligrams for spinal anesthesia induces a significantly and clinically relevant short motor block onset time and low motor block duration, faster time to reach the maximum sensory block, and readiness for surgery, with a lower incidence of hypotension and adverse events making this choice is advantageous in Enhanced Recovery After Surgery protocol. Moreover, as compared to hyperbaric prilocaine with 0.8 milligram nalbuphine, the group that received twenty-five µg of fentanyl had a greatly reduced duration of sensory & motor blocks. In contrast to the hyperbaric prilocaine fentanyl group, the one that received nalbuphine had a much longer duration of analgesia.

When it comes to age, sex, BMI, ASA classification, kind, & duration of surgery, all three groups of patients are similar [P value > 0.05]. The present investigation results could be supported by several previous researches regarding intrathecal fentanyl, however the is no one previous research that studied the effect of intrathecal nalbuphine addition to hyperbaric prilocaine in our knowledge. Whichever the technique chosen [bilateral *vs.* unilateral spinal anesthesia], a dose of 50 mg hyperbaric 2% prilocaine induced an adequate sensory block level for inguinal hernia repair lasting up to 60 minutes with faster motor, sensory and bladder recovery [7].

This study found that hyperbaric prilocaine had an ED50 of 28.9 mg, which means that a dose of forty milligrams is sufficient to give spinal anesthetic for outpatient knee arthroscopy. Additionally, the second portion of the trial found that a dose of 40 milligrams was associated with a 92 percent success rate, lending credence to the estimated ED90 of 38.5 milligrams [8].

The opioid nalbuphine is a strong substitute for fentanyl; it has fewer side effects, less respiratory depression, and both adjuvants kept hemodynamic stability [9].

Short gynecologic procedures under spinal anesthesia were planned for 90 patients with American Society of Anesthesiologists physical status I or II. For brief surgical procedures, prilocaine may be better than lidocaine due to its shorter onset of effect & reduced prevalence of transient neuropathy symptoms [10]. Nalbuphine at 0.8 milligram was just as effective as the higher doses in delivering intraoperative anesthetic & hemodynamic stability, but it came with less unwanted side effects. When it came to giving pain relief after surgery, it wasn't as effective as twenty-five µg of fentanyl [11].

While intrathecal opioids have improved hemodynamic stability and allowed for longer periods of analgesia under neuraxial anesthesia, they are not without their drawbacks, including the following: respiratory depression, pruritis, nausea, & vomiting. Opioids with partial agonist-antagonist action have been the subject of substantial research into potential solutions to these side effects. Nalbuphine is an opioid that is both a kappa receptor agonist & a µ receptor antagonist [12,13].

When administered intrathecally, the narcotic analgesic fentanyl has an effect that is at least Eighty times faster than morphine. No hemodynamic instability is caused by fentanyl's extensive blocking, which provides total analgesia both during and after surgery [9,14].

Multiple studies in the literature have provided support for the dosages used in this study for both drugs. Research on the optimal dosage of prilocaine has shown that for procedures involving the lower limbs or the abdomen that last up to ninety minutes, doses of forty to sixty milligrams are suitable. We found that nalbuphine considerably lengthens the regression duration of sensory and motor block when compared to fentanyl, which suggests that nalbuphine is an effective alternative to fentanyl and can prolong surgeries, when used as an adjuvant to intrathecal bupivacaine [0.8 milligrams vs. twenty-five µg fentanyl]. Both groups had comparable rates of side effects [15].

Due to the addition of fentanyl or nalbuphine, all patients in the study groups had good postoperative analgesia with few requests for further analgesics. Consistent with earlier research, prilocaine also greatly accelerated the regression of motor & sensory blocks.

Culebras X *et al.* determined that nalbuphine intrathecally administered at doses ranging from 0.8 milligrams to 1.6 milligrams effectively provided adequate intraoperative analgesia, with a higher risk of side effects associated with the 1.6 milligrams dose [5].

Naaz *et al.* also found that fentanyl and nalbuphine hydrochloride [0.8 milligrams & 1.6 milligrams] both offer long-lasting analgesia after lower-limb orthopedic procedures, as well as sensory blockage. Intrathecal fentanyl or 1.6 milligrams of nalbuphine has no discernible benefit over the lower dose of 0.8 milligrams of nalbuphine [16].

In the same way, twenty-five µg of fentanyl was found to be more effective than eight hundred µg of nalbuphine in boosting the onset of sensory and motor block when used as an adjuvant to hyperbaric bupivacaine in spinal block for elective cesarean section. Both nalbuphine & fentanyl had comparable effects on the neonatal APGAR & neurologic & adaptive capacity scores, although nalbuphine lasts longer after surgery & reduces pruritus & shivering more effectively [17].

Also, along these lines, **Gomaa H. *et al.*** discovered that intrathecal fentanyl produced full motor block much sooner than nalbuphine. There is no clinical significance in the discrepancy between the times of sensory & motor blockage, even if it is large [18]. In the duration of analgesia is significantly longer at both 0.4 & 0.8 milligrams, according to another study; however, the adverse effects are more pronounced at the 0.8 milligram level [19].

Previous research found that, controversially, all study groups exhibited the highest results when given intrathecally a dose of 1.6 milligrams of nalbuphine.

In **Fareed *et al.*** [20], Nalbuphine at a dose of 0.8 milligrams was just as effective as the higher doses in delivering intraoperative anesthetic & hemodynamic stability, but it came with less unwanted side effects. When it came to giving pain relief after surgery, it was not as effective as twenty-five µg of fentanyl [21].

All three groups showed similar hemodynamics, including heart rate & blood pressure. SpO_2 was also maintained stable different time intervals.

In line with the current study *Suganya* [22] aimed to compare postoperative analgesia after intrathecal levobupivacaine with nalbuphine or fentanyl after gynecological surgery. The study reported that the MAP changes between both the groups was not statistically significant. Fentanyl caused decrease in MAP more than nalbuphine produces with no statistical significance. There was no statistically significant difference in the HR changes between the fentanyl and nalbuphine groups. Additionally, when it came to the perioperative oxygen saturation, there was no statistically significant difference between the two groups.

There was a statistically significant difference in the duration of sensory blocks in group PN compared to the other two groups, & in the duration of motor blocks within group PN compared to the other two groups as well. These differences were present across all three groups. In comparison to the other two groups, group PN had a substantially longer time to request first analgesia.

Farahat found no difference between the fentanyl & nalbuphine groups with regard to the quality of anesthesia or the length of time a motor block lasted, which is in line with the results of the present investigation. The nalbuphine group had considerably longer periods of effective postoperative analgesia compared to the fentanyl group. The fentanyl group outperformed the nalbuphine group in terms of times to two-segment sensory regression, maximum height of sensory block, initiation of sensory &maximal motor block, as well as time to regression. The fentanyl group had a substantially higher maximum dermatomal block level compared to the nalbuphine group [17].

I agree with the study by **Mohamed *et al.*** that compared nalbuphine with midazolam to see which one was better at preventing shivering after spinal anesthesia-induced lower limb surgeries. In the nalbuphine group, 18 patients' sixty percent had hypotension, 3 [ten percent] reported sedation, and 2 [6.6 percent] complained pruritus [23]. Within five to ten minutes of injecting the spinal anesthetic, the block takes effect, allowing surgery to begin. Important aims in day-surgery are the comfort & contentment of patients as well as their rapid return to normal daily activities & work.

Mukherjee A. *et al.* study, demonstrated a longer sensory block in the control group compared to the groups given 0.2, 0.4, & 0.8 milligrams of nalbuphine. There may be little clinical relevance preoperatively for the mean time difference of approximately four minutes [19].

Similar to our results, **Mukherjee A. *et al.*,** and **Gomaa H. *et al.*** found no difference in motor block length between patients who received intrathecal nalbuphine and those who did not. Given the potential for early ambulation in the postoperative phase, a short duration of motor block could be clinically significant [18,19].

There was no significant difference in the occurrence of nausea, vomiting, hypotension, bradycardia, or pruritus between the three groups in this investigation. Every single patient was alert & willing to participate. Consistent with recent research indicating the safety of both local anesthetics for same-day spinal anesthesia, neither group experienced temporary neurological complaints. The current findings corroborate those of earlier researchers who found that nalbuphine significantly extended the duration of spinal analgesia [24].

Conclusion: Preservative-free 800 µg nalbuphine and 25 µg fentanyl both are good adjuvants to 50 mg intrathecal hyperbaric prilocaine anesthesia. Fentanyl provides faster sensorimotor onset than nalbuphine. With both adjuvants, nalbuphine keeps hemodynamic stability while providing long-lasting postoperative analgesia free of unwanted side effects.

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