

ORIGINAL RESEARCH

A Comparative Study of Haemodynamic Stability between Transverse Abdominis Block and Ilioinguinal Nerve Block in Adult Inguinal Hernia Surgeries

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ABSTRACT

Introduction: Inguinal hernia surgery is a common procedure often associated with significant postoperative pain and discomfort. Local anesthetic infiltration has been identified as beneficial in managing postoperative pain by reducing discomfort, nausea, vomiting, respiratory issues, and the need for opioid medications. This study aimed to compare the efficacy, duration, and adverse effects of transversus abdominis block and ilioinguinal nerve block for postoperative analgesia in inguinal hernia surgery. **Methods:** This observational study enrolled patients aged 20 to 50 years who were randomly assigned to two groups, each comprising 30 individuals: Group T received a Transverse Abdominis Block, and Group I received an Ilioinguinal Nerve Block. The study protocol included preoperative assessments, standard diagnostic procedures, and anesthesia administration based on the assigned group. Continuous monitoring of heart rate, blood pressure and SPO2 was conducted. Statistical analysis utilized MS Excel and SPSS version 22, employing appropriate tests and graphical representation, with significance set at $p < 0.05$. **Results:** The study revealed no significant differences in Mean Age, Sex Distribution, Mean Weight, mean HR at all follow-up intervals, mean SBP at all follow-up intervals, mean DBP at all follow-up intervals, or Mean SPO2 between the two groups. **Conclusion:** The investigation focused on hemodynamic parameters associated with transverse abdominis plane block (TAP block) and ilioinguinal nerve block (IINB) during inguinal hernia surgeries. The results suggest comparable hemodynamic stability between both techniques, indicating the potential efficacy of both TAP block and IINB in improving postoperative analgesia outcomes for patients undergoing inguinal hernia surgeries..

Keywords: Anaesthesia, Transversus Abdominis, Ilioinguinal Nerve, Inguinal Hernia, Blood Pressure.

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INTRODUCTION

Inguinal hernia surgery is a frequently performed procedure that often leads to significant postoperative discomfort, affecting millions of patients globally each year. Studies suggest that around 37% of individuals experience postoperative pain following this surgery. Regional anesthesia is utilized in a minority of cases (5–15%), while central neuraxial blockade is used in a slightly higher percentage (10–

20%), with general anesthesia being the most common choice (60–70%) for hernia surgeries [1-3].

The use of local anesthetic drugs for blocks or infiltration offers several benefits, including delaying the need for breakthrough analgesia, reducing hospital recovery times, lowering morbidity rates, and cutting overall healthcare costs. Local anesthetic infiltration also enhances postoperative pain management, reduces discomfort, mitigates common side effects

like nausea, vomiting, and respiratory depression, and decreases the reliance on opioid medications [1].

Peripheral nerve blocks such as the Transversus Abdominis Plane (TAP) block and Ilioinguinal (IIN) nerve block have emerged as effective strategies for mitigating pain arising from abdominal wall incisions. TAP block is particularly valuable in multimodal postoperative analgesia plans following abdominal surgeries like inguinal hernia repair. This technique involves injecting a local anesthetic into the space between specific abdominal muscles, targeting the transversus abdominis and internal oblique muscles. Conversely, IIN blocks are commonly used for procedures below the umbilicus, including inguinal hernia repair, targeting the ilioinguinal and iliohypogastric nerves [4,5].

Recent trends indicate a growing preference for TAP and IIN blocks in managing postoperative pain after inguinal hernia surgery [5]. While TAP block impacts the transversus abdominis and internal oblique muscles directly, IIN block targets the ilioinguinal and iliohypogastric nerves, indicating a similarity between them [5]. This study aims to evaluate and compare the haemodynamic parameters of transversus abdominis block and ilioinguinal nerve block in managing inguinal hernia surgery.

MATERIAL AND METHODS

The study was designed as an observational investigation conducted at a tertiary care public hospital over a period of 1.5 years. Following

approval from the Institutional Ethics Committee, patients were fully briefed on the study procedures, and written informed consent was obtained from each participant.

Patients aged between 20 and 50 years were randomly assigned to two groups of 30 individuals each: Group T, which received a Transverse Abdominis Block, and Group I, which received an Ilioinguinal Nerve Block. Inclusion criteria encompassed patients scheduled for elective primary open inguinal hernia surgeries, with ASA grades I and II, willing to participate. Exclusion criteria were applied for patients with certain medical conditions, age above 50 years, inability to understand the Visual Analog Scale (VAS), and known allergies to specific medications used in the study.

Group T: Received Transverse Abdominis Block with 20 ml of 0.25% ropivacaine.

Group I: Received Ilioinguinal Nerve Block with 10 ml of 0.25% ropivacaine and local infiltration of 10 ml of 0.25% ropivacaine along the wound line. Patients fasted for 6 hours before surgery.

All patients were monitored using electrocardiography, pulse oximetry, and blood pressure. Baseline parameters such as heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP), and oxygen saturation (SpO2) were recorded.

Statistical analysis was performed using MS Excel and SPSS version 22, employing appropriate tests for significance and graphical representation of data. A significance level of $p < 0.05$ was considered statistically significant.

RESULTS

Table 1: Baseline demographic and clinical variables of study participants

Variable	IIN	TAP	p Value
Age in Years; Mean ± SD	38.77 ± 8.69	38.47 ± 9.82	0.901
Male; n (%)	30 (100)	1 (3.33)	0.313
Female; n (%)	0 (0)	29 (96.67)	
Weight in KG; Mean ± SD	74.47 ± 4.38	73.57 ± 5.04	0.463
ASA I; n (%)	0 (0)	0 (0)	-
ASA II; n (%)	30 (100)	30 (100)	

Table 2: Mean Heart Rate comparison between two groups at different intervals of time

Group	IIN (Mean)	IIN (SD)	TAP (Mean)	TAP (SD)	p value
Baseline	80.67	5.95	79.93	4.97	0.606
After premedication	80.67	5.88	81	5.03	0.814
After Spinal Anesthesia	71.33	2.04	71.7	2.05	0.491
At the time of surgery	78	5.41	78.27	4.98	0.843
At the end of surgery	80.53	4.03	80.53	4.03	1
At the time of block	82.17	3.38	82.47	3.27	0.728
10 Mins	83.3	3.64	83.67	3.26	0.683
30 Mins	83.5	3.29	83.8	2.99	0.713
1 hour	83.93	3.38	84.2	3.12	0.752
2 hours	83.93	3.38	84.2	3.29	0.758
4 hours	84.13	3.44	84.4	3.17	0.756
6 hours	84.53	3.82	84.8	3.55	0.78
8 hours	85.8	4.41	85.8	4.41	1
12 hours	87.47	4.61	87.73	4.6	0.823

16 hours	87.67	4.67	87.87	4.67	0.869
18 hours	89.13	4.26	89.33	4.01	0.852
24 hours	90	4.61	90.2	4.34	0.863

Table 3: Mean Systolic Blood Pressure comparison between two groups at different intervals of time

Group	IIN (Mean)	IIN (SD)	TAP (Mean)	TAP (SD)	p value
Baseline	130.2	1.21	129.8	1.69	0.297
After premedication	131.8	1.52	131	1.8	0.068
After Spinal Anesthesia	98.73	4.53	98.6	4.34	0.908
At the time of surgery	118.13	10.61	117.6	10.32	0.844
At the end of surgery	118.93	9.84	118.6	9.49	0.894
At the time of block	119.67	9.28	119.33	8.93	0.888
10 Mins	120.07	8.78	119.73	8.42	0.881
30 Mins	120.93	8	120.6	7.63	0.869
1 hour	121.8	8.14	121.47	7.75	0.872
2 hours	123.13	7.18	122.67	6.67	0.795
4 hours	123.93	7.15	123.67	6.87	0.883
6 hours	125.67	5.12	125.47	4.93	0.878
8 hours	126.07	4.62	125.73	4.39	0.776
12 hours	127.67	4.3	127.33	4.18	0.762
16 hours	127.8	4.11	127.47	4	0.751
18 hours	128.6	2.58	128.4	2.54	0.763
24 hours	130	0	129.8	0.61	0.078

Table 4: Mean Diastolic Blood Pressure comparison between two groups at different intervals of time

Group	IIN (Mean)	IIN (SD)	TAP (Mean)	TAP (SD)	p value
Baseline	90.13	1.17	89.73	1.46	0.246
After premedication	99.2	1.35	98.8	1.45	0.273
After Spinal Anesthesia	70.8	1.45	71.07	1.46	0.48
At the time of surgery	78.33	3.6	77.93	3.5	0.665
At the end of surgery	80.13	3.44	79.47	3.56	0.464
At the time of block	82.4	2.54	81.73	2.72	0.33
10 Mins	82.87	1.72	82.47	1.94	0.402
30 Mins	82.87	1.72	82.47	1.87	0.392
1 hour	83.07	1.72	82.73	1.86	0.474
2 hours	83.07	1.72	82.53	1.81	0.248
4 hours	86.13	3.44	85.73	3.47	0.656
6 hours	87.47	4.23	86.93	4.16	0.624
8 hours	87.47	4.23	86.93	4.16	0.624
12 hours	88.27	3.39	87.8	3.46	0.6
16 hours	88.27	3.39	87.73	3.23	0.535
18 hours	89.33	0.96	88.8	1.13	0.053
24 hours	89.8	0.61	89.47	1.17	0.171

Table 5: Mean SPO2 comparison between two groups at different intervals of time

Group	IIN (Mean)	IIN (SD)	TAP (Mean)	TAP (SD)	p value
Baseline	99	0	99	0	1
After premedication	99	0	99	0	1
After Spinal Anesthesia	99	0	99	0	1
At the time of surgery	99	0	98.97	0.18	0.321
At the end of surgery	98.97	0.18	99	0	0.321
At the time of block	99	0	99	0	1
10 Mins	99	0	99	0	1
30 Mins	99	0	99	0	1
1 hour	99	0	99	0	1
2 hours	99	0	99	0	1
4 hours	99	0	99	0	1
6 hours	99	0	99	0	1

8 hours	99	0	99	0	1
12 hours	99	0	98.97	0.18	0.321
16 hours	99	0	99	0	1
18 hours	99	0	98.93	0.25	0.155
24 hours	99	0	99	0	1

DISCUSSION

The advantages of successful postoperative analgesia are manifold, including reductions in the postoperative stress response and morbidity, enhancements in patient satisfaction, and improved overall outcomes. Ilioinguinal nerve block is recognized for its efficacy in providing postoperative analgesia following inguinal hernia surgery. Conversely, the TAP block serves as an alternative, readily performed, and effective peripheral abdominal field block that specifically targets the ilioinguinal, hypogastric, and lower intercostal (T7–T11) nerves [6].

In our study, all patients maintained stable oxygen saturation throughout the procedure, with intraoperative and postoperative heart rates remaining stable and comparable between the two groups. Additionally, there were no significant differences in follow-up intervals ($P > 0.05$) [1]. Similar findings were reported by Sujata et al. in 2017 [1], where systolic and diastolic blood pressure remained stable intraoperatively and postoperatively, with no significant differences between groups during follow-up intervals.

Zhou et al. [5], in their 2019 study comparing inguinal nerve block versus transversus abdominis plane block for postoperative analgesia following inguinal hernia repair surgery, also noted no significant fall in blood pressure or incidence of bradycardia after the procedures, consistent with our study. Rao et al. [7] similarly found no significant differences between groups in terms of heart rate and blood pressure postoperatively, aligning with our study's results.

One of the objectives of our study was to assess adverse effects following block procedures, including nausea, vomiting, hypotension, bradycardia, urinary retention, and respiratory depression. Zhou et al. [5] also reported no significant adverse effects in their study, mirroring our findings. Additionally, Elenbaas et al. [8] observed no adverse effects like nausea, vomiting, hypotension, bradycardia, respiratory depression, or urinary retention in their study on TAP block in hernia surgeries, similar to our study's observations.

Venkatraman et al. [9] also noted the safety of PNS-guided ilioinguinal nerve block in the TAP plane for postoperative analgesia in adult inguinal hernia surgery, without significant adverse effects, consistent with our study's findings.

In contrast, Sujata et al. [1] reported a higher incidence (35%) of postoperative nausea and vomiting in their study, which they attributed to the use of fentanyl as rescue analgesia, considering its emetogenic properties. However, they also

emphasized the overall safety of TAP and ilioinguinal nerve blocks with minimal side effects for hernia procedures.

CONCLUSION

The current investigation examined the hemodynamic metrics associated with transversus abdominis plane block and ilioinguinal nerve block during inguinal hernia surgeries. The results of the study indicate comparable hemodynamic stability between both approaches. These findings highlight the potential efficacy of both TAP block and IINB as feasible strategies for enhancing postoperative analgesia outcomes in individuals undergoing inguinal hernia surgeries.

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