

Ilioinguinal, Iliohypogastric and Genitofemoral Nerve Block for Elderly Patients Undergoing Inguinal Hernia Surgery in a Tertiary Care Center

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ABSTRACT

Introduction: Inguinal hernia is one of the common surgical procedures performed. The choice of anaesthesia may vary from general, spinal, and local infiltration to ultrasound-guided regional anaesthesia. Ultrasound-guided ilioinguinal/iliohypogastric nerve and genital branch of the genitofemoral nerve can be blocked precisely providing adequate surgical anesthesia and little variation in hemodynamics in elderly patients. This study aims to study the intraoperative hemodynamic changes in elderly patients who had comorbid conditions and were undergoing inguinal hernia repair under ilioinguinal, iliohypogastric and genitofemoral nerve block.

Methods: A retrospective chart review was conducted to see changes in intraoperative hemodynamics in 88 elderly patients with one or more comorbidities in comparison to the baseline hemodynamics. Systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate were recorded every 5 minutes intraoperatively and compared to the baseline values. Students paired t-tests were used to compare systolic, diastolic, mean arterial pressure and heart rate at fixed interval records during the surgery.

Results: The mean age of patients in our study was 70.34 ± 9.33 years. There were no significant changes (p-value less than 0.05) in the systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate taken at different time intervals compared to the baseline value.

Conclusions: Ultrasound-guided ilioinguinal/iliohypogastric nerve and genital branch of the genitofemoral nerve can be blocked providing adequate surgical anaesthesia and minimal variation in hemodynamics in elderly patients.

Keywords: *iliohypogastric nerve, ilioinguinal nerve, inguinal hernia, nerve block, ultrasound.*

INTRODUCTION

Inguinal hernia repair is a common surgical procedure.¹ General anaesthesia (GA), spinal anaesthesia (SA), surgical site infiltration, and ilioinguinal and iliohypogastric (IG-IH) nerve block are common anaesthetic choices.¹

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Elderly patients usually have comorbidities involving one or multiple systems. GA have a significant effect on psychomotor skills, attention and memory postoperatively, SA alters the hemodynamics which elderly patients may not tolerate well.^{2,3} IG-IH blocks combined with the genital branch of the genitofemoral nerve (GFN) result in adequate surgical anaesthesia, reduced opioid use, minimal hemodynamic changes, better postoperative pain control, shorter recovery period and reduced cost.^{2,4} The IG-IH nerve lies between the internal oblique muscle and transverse abdominal muscle near the anterior part of the iliac crest and provides a cutaneous sensation of the skin over the inguinal and superomedial aspects of the thigh, genital branch of the GFN enters the inguinal canal via the deep inguinal ring and lies near the spermatic cord.⁵⁻⁷

This study aims to study the intraoperative hemodynamic changes in elderly patients who had comorbid conditions and were undergoing inguinal hernia repair under ilioinguinal, iliohypogastric and genitofemoral nerve block.

METHODS

This is a retrospective chart review of patients who had undergone inguinal hernia repair under ultrasound-guided IG/IH and genital branch of GFN nerve block from May 2016 to April 2018. The inclusion criteria were age greater than 60 years, elective one-sided inguinal hernia repair and one or more comorbidities. Patients with recurrent hernia, patients refusal to undergo a block of IG-IH and genital branch of GFN, those allergic to anaesthetic agents, bleeding dyscrasias and bilateral inguinal hernia repair were excluded. Convenience sampling method was used.

Retrospective analysis for demographic data and hemodynamic changes was done. During the procedure, the past procedure was explained during the pre-anaesthetic checkup visit prior to surgery and informed consent was taken. Standard anaesthetic monitoring was attached. Injection Midazolam 0.03 mg/kg and Fentanyl 1 mcg/kg were given to ease the block procedure. With the use of a linear probe of 8-12 Hz IG and IH nerves were identified and 12-15 ml of 1.5% Lignocaine with Adrenaline were deposited and used the same for the genital branch of GFN and blocked by depositing 5 ml of 1.5% Lidocaine with Adrenaline. Perioperative hemodynamics were charted and analyzed. The adequacy of anaesthesia was checked by pinprick test. Once adequate anaesthesia was achieved, surgery was started.

The IBM SPSS Statistics version 26.0 was used for statistical analysis. The measurement data are expressed as mean ± standard deviation (mean ± SD). Students paired t-test was used for comparison of baseline systolic, diastolic, mean arterial pressure and heart rate with the same variables recorded at every five-minute interval during the surgery. The p value <0.05 was considered statistically significant.

RESULTS

The mean age was 70.34 ± 9.33 years. There were no significant changes (p-value less than 0.05) in the systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and

heart rate (HR) taken in 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85 and 90 minutes in comparison to the baseline SBP, DBP, MAP and HR.

In our study the baseline and 90 minutes heart rate were found to be 81.47±8.06 and 80.55±8.23 respectively (Table 1).

Table 1. Comparison of baseline values with intraoperative interval values using students t-test (paired)		
Time	Heart rate (HR) Mean ± SD	p values student's t-test paired.
Baseline	81.47±8.06	
5 minutes	81.40±8.52	0.943
10 minutes	80.87±8.13	0.579
15 minutes	81.78±7.77	0.779
20 minutes	81.01±8.07	0.660
25 minutes	81.76±8.07	0.773
30 minutes	80.97±8.03	0.626
35 minutes	80.65±7.97	0.439
40 minutes	80.99±8.59	0.644
45 minutes	81.35±7.93	0.901
50 minutes	79.97±7.99	0.131
55 minutes	81.13±8.04	0.799
60 minutes	81.94±7.99	0.776
65 minutes	80.39±7.83	0.135
70 minutes	80.38±7.72	0.877
75 minutes	82.75±7.98	0.642
80 minutes	82.34±7.83	0.841
85 minutes	81.49±7.11	0.715
90 minutes	80.55±8.23	0.704

The systolic blood pressure, diastolic blood pressure, and mean arterial pressure were found to be 136.56 ±3.6, 85.84±7.86, 102.75±5.89 at baseline and 134.13±4.06, 85.58±5.31, and 101.76±3.77 at 90 minutes respectively (Table 2).

Table 2. Comparison of baseline values with intraoperative interval values using student's t-test (paired)

Time	Systolic blood pressure (SBP) Mean $\pm$ SD	p value (SBP)	Diastolic blood pressure (DBP) Mean $\pm$ SD	p value (DBP)	Mean arterial pressure (MAP) Mean $\pm$ SD	p value (MAP)
Baseline	136.56 $\pm$ 3.6		85.84 $\pm$ 7.86		102.75 $\pm$ 5.89	
5 minutes	135.98 $\pm$ 4.19	0.228	84.97 $\pm$ 7.10	0.224	101.97 $\pm$ 5.36	0.103
10 minutes	135.64 $\pm$ 3.77	0.965	86.26 $\pm$ 7.34	0.113	102.72 $\pm$ 5.23	0.967
15 minutes	136.27 $\pm$ 3.88	0.537	83.99 $\pm$ 6.38	0.584	101.42 $\pm$ 4.85	0.419
20 minutes	135.49 $\pm$ 3.78	0.537	85.60 $\pm$ 6.91	0.447	102.23 $\pm$ 5.08	0.512
25 minutes	135.81 $\pm$ 3.66	0.241	84.08 $\pm$ 5.91	0.238	101.32 $\pm$ 4.49	0.285
30 minutes	136.24 $\pm$ 3.70	0.483	85 $\pm$ 6.78	0.634	102.08 $\pm$ 4.94	0.724
35 minutes	135.72 $\pm$ 4.08	0.076	84.46 $\pm$ 6.81	0.654	101.55 $\pm$ 4.90	0.087
40 minutes	136.26 $\pm$ 3.72	0.522	85.56 $\pm$ 7	0.052	102.46 $\pm$ 5.11	0.082
45 minutes	136.24 $\pm$ 3.67	0.513	84 $\pm$ 6.4	0.740	101.41 $\pm$ 4.53	0.285
50 minutes	136.31 $\pm$ 3.68	0.806	84.4 $\pm$ 7.04	0.055	101.71 $\pm$ 5.02	0.114
55 minutes	135.38 $\pm$ 3.66	0.983	85.15 $\pm$ 7.55	0.197	101.89 $\pm$ 5.3	0.168
60 minutes	135.76 $\pm$ 3.43	0.179	84 $\pm$ 6.41	0.073	101.36 $\pm$ 4.61	0.074
65 minutes	136.53 $\pm$ 3.56	0.930	84.29 $\pm$ 7.1	0.720	100.44 $\pm$ 12.54	0.082
70 minutes	136.31 $\pm$ 3.76	0.720	85.06 $\pm$ 7.01	0.372	102.14 $\pm$ 5.06	0.067
75 minutes	135.27 $\pm$ 3.84	0.934	86.98 $\pm$ 6.9	0.544	103.08 $\pm$ 4.8	0.235
80 minutes	135.24 $\pm$ 3.72	0.56	87.36 $\pm$ 5.84	0.655	103.32 $\pm$ 4.37	0.958
85 minutes	135.53 $\pm$ 4.06	0.179	88.27 $\pm$ 5.81	0.399	103.57 $\pm$ 4.1	0.567
90 minutes	134.13 $\pm$ 4.06	0.930	85.58 $\pm$ 5.31	0.613	101.76 $\pm$ 3.77	0.427

DISCUSSION

In this study, intraoperative hemodynamic changes in elderly patients who had comorbid conditions and were undergoing inguinal hernia repair under ilioinguinal, iliohypogastric and genitofemoral nerve block were studied. There were no statistical changes in the hemodynamic parameters observed at different times as compared to the baseline values. Anaesthesia was adequate for surgical procedures as suggested by the hemodynamic parameter.

The choice of anaesthesia method can vary from general anaesthesia, spinal anaesthesia, selective ilioinguinal, and iliohypogastric nerve block often combined with genitofemoral nerve for proper surgical anaesthesia.⁸ Changes in cardiovascular physiology associated with ageing and disease reduce cardiovascular reserve and may predispose elderly patients to hemodynamic instability. Both general and regional anaesthesia are

associated with respective side effects in elderly patients. General anaesthesia often results in rapid hemodynamic changes during the induction of anaesthesia and also in postoperative confusion and memory impairment in the elderly. Spinal anaesthesia causes hypotension because of sympathetic blockade with vasodilatation and redistribution of central blood volume to lower extremities and splanchnic beds.⁹

Even though regional anaesthesia has benefits over general anaesthesia, hemodynamic instability due to spinal or epidural can lead to cardiac events. Hypotension is more common, and also more hazardous, in elderly patients, as they may have decreased physiological reserve and compromised blood supply to various vital organs. Various techniques, such as rapid intravenous (IV) crystalloid and vasopressor administration, are in use to attenuate this complication. However, rapid IV fluid infusion of large amounts may be detrimental to elderly patients

with cardiac and respiratory dysfunction.¹⁰ Moreover, ephedrine and vasopressors can lead to serious cardiac side effects like excessive hypertension or tachycardia.¹¹ Sympathetic nervous system activity increases in elderly patients and in those with congestive heart failure. Thus, such patients are at risk of cardiac events if there are larger decrease in systemic vascular resistance, myocardial contractility, and arterial blood pressure compared with young subjects.¹² To avoid the side effects of general and spinal/epidural anaesthesia in elderly patients with comorbid conditions, selective block of ilioinguinal, iliohypogastric nerve in combination with genitofemoral block has become better alternative.

The iliohypogastric nerve, from T12 and L1, provides sensory innervation to the suprapubic and anterior hip region. The ilioinguinal nerve is derived from L1 and follows the inguinal canal. It innervates the inguinal hernia sac, the medial aspect of the thigh and the anterior scrotum or labia.¹³ Ilioinguinal and iliohypogastric nerve block when combined with genitofemoral nerve provides better surgical anaesthesia for inguinal hernia repair.

The use of ultrasonographic guidance in the regional blocks has evolved over time. It results in more frequent successful blocks, shorter onset times, lower volume of local anaesthetics and longer duration of action with fewer side effects when compared with landmark guided block or surgical site local infiltration.

Besides surgical anaesthesia, regional nerve block also offers good postoperative pain relief, early ambulation and discharge. A higher success rate can be achieved by using ultrasound due to accurate placement, and reduced volumes of local anaesthetic agents closer to the nerves.¹⁴⁻¹⁶

The anatomical landmark technique may cause complications even in the experienced hands. Intestinal damage, colon damage and development of subserosal hematoma, temporary femoral nerve paralysis, pelvic hematoma, and quadriceps muscle paresis have been described.¹⁷⁻²² Yilmazar et. al used ilioinguinal, iliohypogastric nerve block for patients undergoing her-

niorrhaphy resulted in a shorter time-to-home readiness, quicker oral intake post-surgery, and no need for recovery room care when compared with the use of spinal anaesthesia.²³ Wilschke in 2006 used ultrasound for ilioinguinal/iliohypogastric nerve blocks in children and had a 100% success rate. This study supports the use of ultrasonography for regional anaesthesia.¹⁴ Yang et al in 2015 also showed that ilioinguinal iliohypogastric nerve block when combined with local infiltration had effectively reduced the pain of patients when pulling the hernia sac reduced the use of additional local anaesthetic drugs, and had higher safety.²⁴ Demicri et al sowed the combination of ultrasound-guided genitofemoral nerve block and ilioinguinal/iliohypogastric nerve block showed better intraoperative comfort and lower consumption of local administered by surgeons, lower postoperative Visual Analogue Scale scores.¹⁵

In this study, we also achieved sufficient surgical anaesthesia with the block and reduced significant changes in the hemodynamics of vulnerable elderly patients. The study provides a glimpse of the anaesthetic use of IG-IH block in our patient population done at our centre. The results can be reciprocated in another centre. However, it requires a detailed multicentric study. There is a possibility that variation in population dynamics in the ageing population and the co-morbid status can show fluctuation in the hemodynamic parameters. Similarly, complication level can be varied as the technique is more operated dependent with variable outcome rates.

CONCLUSIONS

The ultrasound-guided ilioinguinal/iliohypogastric nerve block in combination with the genitofemoral nerve block for inguinal hernia repair minimally alters the hemodynamics of elderly patients and decreases morbidity and mortality related to general or spinal anesthesia-induced drastic changes in hemodynamics.

Conflict of Interest: None

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