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Functional Outcome of Open Inguinal Hernia Repair: Nerve Block Versus Spinal

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Abstract

Background and Objectives: Inguinal hernia repair done under peripheral nerve block provides many advantages compared to spinal or general anaesthesia. The aim of this study is to compare the functional outcome of Ultrasound guided ilioinguinal and iliohypogastric nerve block with spinal anaesthesia using 0.5% bupivacaine in terms of duration of post-operative analgesia, hemodynamic stability, time for ambulation, hospital stay and side effects.

Methods: Forty adult patients aged 30 – 70 years with BMI 18 – 29.9 kg/m2 belonging to ASA physical status I & II undergoing elective open inguinal hernia repair were divided randomly into two groups of 20 to receive either Ultrasound guided ilioinguinal and iliohypogastric nerve block (Group U) using 0.5% bupivacaine 0.3 ml/kg or spinal anaesthesia (Group S) using 0.5% hyperbaric bupivacaine 3 ml (15 mg). Intra operative HR, SBP, DBP, MAP, SpO2 were recorded. Post-operatively patients were monitored for VAS score, ambulation time, time for first rescue analgesia, duration of hospital stay and side effects. Recorded data was compared between two groups using SPSS software. Qualitative data and quantitative data were compared using Chi-square test and independent't' test respectively. A p value of less than 0.05 was taken as significant.

Results and Discussion: The time for onset of sensory block was longer in Group U than for Group S. Mean VAS scores were less and duration of analgesia was longer in Group U than Group S. There was significant fall in SBP, DBP and MAP in Group S during the intraoperative period compared to Group U. The ambulation time and duration of hospital stay in Group S were much longer than Group U.

Conclusion: Ultrasound guided Ilioinguinal & Iliohypogastric nerve block can be a safe alternative to spinal anaesthesia for elective unilateral inguinal hernia repair.

Keywords: Iliohypogastric; Ilioinguinal; Spinal anesthesia; Ultrasound.

Introduction

Inguinal hernia repair is one of the most commonly performed surgeries. The repair of groin hernias with local anaesthesia has gained popularity. Still, there is no consensus regarding the optimum anaesthesia technique for this surgery.[1] Ideal anaesthetic technique is identified as acceptable for the patient, suitable for surgery, simple and safe with low risk of morbidity and low cost.[2] General anaesthesia, central neuraxial blockade and regional anaesthesia with sedation are the commonly employed techniques.[3] General anaesthesia carries risks of possible airway complications, post-operative deterioration of cognitive function, sore

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throat, nausea, vomiting and prolonged period of immobilisation with associated risk of deep vein thrombosis and longer hospital stay.[4] Spinal anaesthesia, although effective, is not without risk in patients with decompensated heart disease, recent head injury, convulsions and coagulopathies. Also, spinal and epidural anaesthesia have been associated with haemodynamic instability, vomiting, urinary retention, post dural puncture headache and backache and lesser patient acceptance.[5]

Since inguinal hernia is rarely associated with serious complications, it is an ideal surgical procedure for ambulatory settings. Ilioinguinal and iliohypogastric nerve block (IHNB) is the most frequently performed regional block for these surgical procedures. It has been reported that inguinal nerve block can have 10 to 30% failure rate when a blind technique is used[6] and ultrasound guidance can provide up to 100% success rate.[7,8,9]

Inadequate treatment of post-operative pain continues to be an important clinical problem. Persistent postsurgical pain that lasts beyond the typical healing period of 1 to 2 months has become increasingly recognised as a significant issue after surgery. Early ambulation in the post-operative period leads to decreased incidence of deep vein thrombosis, muscle atrophy, shorter length of stay and lower cost of care. Hence we decided to find out if there is any difference in the functional outcome of ultrasound guided ilioinguinal and iliohypogasgtric nerve block versus spinal anaesthesia for adult open inguinal hernia surgeries.

Despite being a simple operation with a very infrequent overall morbidity only few centres practice peripheral nerve block for hernia repair surgeries. So, we did this study to popularise USG guided IHNB as a successful alternative for spinal anaesthesia and general anaesthesia. Our study focused on emphasising its advantages like early ambulation, lesser hemodynamic variations and prolonged post-operative analgesia. Diseases like chronic obstructive emphysema, heart disease and renal failure can easily be handled with IHNB without increasing the risk to the patient there by leading to a better surgical outcome.

Methodology

Study Design: Longitudinal observational study.

Study Setting: Patients undergoing unilateral elective open inguinal hernia repair surgery in the age group 30 to 70 were assessed and included in the study after obtaining written informed consent. Patients with recurrent hernia, obesity and multiple co-morbidities (ASA 3 and above) were not included in the study.

Sample size calculation: From previous literature it was found that the standard deviation of the time for ambulation in hours after ultrasound guided IHNB and spinal anesthesia was 2.45 and 2.12 respectively.[9] The mean difference between the two groups was found to be 2.5 hours. Considering 5% level of significance with 90% power the estimated sample size for our study was 18 patients in each group. Thus the total sample size would be 35.

Sample size was calculated using the formula

$(Z\alpha/2+Z1-\beta)^2\ [2(\sigma1^2 + \sigma2^2)/2]\div(\mu1 - \mu2)^2$

$Z_{\alpha/2}$ = represent the desired level of statistical significance (1.96)

$Z_{1-\beta}$ = represent the desired level of power [typically 1.282 for 90% power].

σ1 = standard deviation of ultrasound guided IHNB.

σ2 = standard deviation of spinal anaestheia Group

μ1 = mean of post-operative ambulation in hours in ultrasound guided IHNB. μ2=mean of post-operative ambulation in hours in spinal anaestheia Group.

Materials and Methods

The study was conducted on 40 patients undergoing elective open inguinal hernia repair surgeries after getting approval from the Institutional Research Committee (IRC) and Institutional Ethical Committee (IEC). Study was conducted after getting informed consent from all patients satisfying the inclusion criteria. Half of the Patients were allocated to USG guided IHNB (Group U) and other half subarachnoid block (Group S) by the table of random numbers. Pre-operatively all patients were instructed regarding how to read the Visual Analogue Scale (VAS) that will be used for assessing pain in the post-operative period. Premedication was given with oral Ranitidine 150 mg previous day night and in the morning and oral Metoclopromide 10mg in the morning and glycopyrrolate 0.2 mg 6 hours before surgery and inj. Midazolam 0.03 mg/kg at the beginning of procedure intravenously. Nerve block in Group U was performed with 0.5% bupivacaine, 0.3 ml/kg or a maximum dose of 150 mg. The time of onset of sensory block was assessed in the related nerve

innervation area with the ''pinprick test'' (analgesia test with needle). When patients complained of pain during pulling of cords, cord structures were infiltrated with 0.25% 5 to 7 ml bupivacaine by operating surgeon.

In Group S, the patients were positioned in lateral decubitus position and dural puncture was performed at L_3–L_4 interspace through midline approach with 25 G Quincke needle. 15 mg (3 ml) of 0.5% Hyperbaric Bupivacaine was injected intrathecally. Patients were immediately positioned supine for the surgery. Any block failure or failed spinal cases were converted to general anaesthesia. Such cases were excluded from the study. Motor block was assessed by Modified Bromage scale every 2 minutes for first 10 minutes. Duration of motor block was considered as time for return to Modified Bromage scale.[1]

Modified Bromage scale 0– no paralysis.

Modified Bromage scale 1– unable to raise extended leg.

Modified Bromage scale 2– unable to flex knee.

Modified Bromage scale 3– unable to flex ankle.

Baseline mean arterial pressure (MAP), pulse rate, respiratory rate and oxygen saturation were recorded before surgery. Standard ASA monitoring was done with continuous ECG, intermittent non-invasive blood pressure and continuous oxygen saturation till the end of surgery. Vitals signs were maintained stable throughout intraoperative period.

Outcome variables

Post operative analgesia

The visual analogue scale (VAS) scores at rest and on movement/cough were recorded hourly in the post operative period for first 8 hours. Time for first dose of rescue analgesia was noted. The duration of analgesia was taken as the time at which patient complained of pain or the VAS was ≥3 on assessment at serial intervals. Patient at VAS score 3 got intramuscular injection of pentazocin 30 mg as rescue analgesia.

Haemodynamic parameters

The patients were considered haemodynamically stable if the mean arterial pressure and pulse rate remained within 20 % of baseline values. Hypotension after spinal anaesthesia was treated with a bolus administration of 250 ml RL over ten minutes and incremental doses of Inj. Ephedrine if necessary.

Time for ambulation

Duration of ambulation was the time interval from the end of surgery till the patient could start walking without support. The suitable criteria for ambulation after spinal anaesthesia include normal perianal (S4-S5) pinprick sensation, ability to plantar flex the foot and proprioception of the big toe. This suggests a complete regression of sensory block. There should also be no residual motor blockade. The residual sympathetic block can lead to dizziness on standing which should also be regressed.[11]

In our study, time for ambulation was recorded after surgery (in minutes) when all of the following parameters were present.

The patient was fully conscious and oriented to time, place and person.

There was complete regain of motor power (grade 5 power in lower limbs).

There was complete regain of all modalities of sensation, including proprioception of the great toe.

No dizziness on standing and walking.

Post-operatively the patients were monitored in the post operative ICU for occurrence of any complications like haematoma, bleeding, urinary retention, nausea and vomiting. Time of hospital stay was also noted from the discharge notes.

Data analysis

Statistical analysis of the data was done using Statistical Package for the Social Sciences (SPSS) software version 25 (Armonk, NY, IBM Corp). Qualitative data like sex, ASA physical status and adverse effects were compared using Chi- square test. Quantitative data like age, height, weight, BMI, visual analogue scale, time for first analgesic dose were compared using independent 't' test. A p value of less than 0.05 was taken as statistically significant. The data was expressed in number, percentage, mean and standard deviation.

Results

The two Groups were comparable with respect to their age, weight, sex, and ASA physical status. There is no statistically significant difference among two Groups in demographic profile. (Table 1-4)

Table 1: Sex Distribution.

Gender	Group U (n=20)		Group S (n=20)		Total		Chi-sq	p value
	N	%	N	%	N	%		
Females	1	5	2	10	4	7.5		
Males	19	95	18	90	36	92.5	0.3604	0.548
Total	20	100	20	100	40	100		

Table 2: Age distribution.

Category	Age in Years		t	p
	Mean	SD		
Group U (n=20)	53.60	11.071	0.740	0.464
Group S (n=20)	51.10	10.295		

Table 3: Comparison of height weight and BMI.

	Group U (n=20)	Group S (n=20)	t	p
Height	165.95±6.100	166.90±5.647	0.511	0.612
Weight	60.50±5.482	68.45±5.326	1.141	0.261
BMI	24.190±2.2176	24.810±2.5429	0.822	0.416

Table 4: ASA Grade.

ASA Grade	Group U (n=20)		Group S (n=20)		Total		Chi-sq	p value
	N	%	N	%	N	%		
1	8	40	11	55	19	47.5		
2	12	60	9	45	21	52.5	0.902	0.342
Total	20	100	20	100	40	100		

Table 5: Onset of Sensory Block.

	Mean (min)	SD	P value
Group U (n=20)	12.05	0.887	0.00
Group S (n=20)	5.75	0.967	

There was significant difference among two Groups in the time for onset of sensory block (p<0.05).

Table 6: Duration of Surgery.

	Mean (min)	SD	P value
Group U(n=20)	55.75	8.926	0.111
Group S (n=20)	59.75	6.382	

The data suggest that duration of surgery was comparable in both Groups. (p>0.05).

Table 7: Duration of hospital stay.

Category	Mean (hours)	SD	t	P
Group U (n=20)	56.95	2.164	24.3111	0.00*
Group S (n=20)	85.55	4.796		

The mean duration of hospital stay was significantly higher in Group S (p<0.001).
VAS score was recorded hourly for first 8 hours in the post-operative period

Table 8: Visual Analogue Scale (VAS) Score.

VAS	Group U (n=20)	Group S (n=20)	P value
2nd hour	0.00±0.00	0.05±0.224	0.324
3rd hour	0.00 ±0.00	0.65±0.587	0.00
4th hour	0.05±0.224	1.80±0.696	0.00
5th hour	0.55±0.510	2.65±1.812	0.00
6th hour	1.60±0.503	0.90± 0.553	0.00
7th hour	2.70±0.657	1.10±0.308	0.00
8th hour	1.85±1.040	1.60±0.681	0.374

Mean VAS score from 3rd to 7th hours were statistically significant (p < 0.001) between Group U and Group S. Highest VAS recorded in Group S was at 4th hour 1.80±0.696 (17 patients) and in Group U was at 7th hour 2.70±0.657 (12 patients) in the post-operative period indicating post operative analgesia was significantly better in Group U (p<0.001).

Table 9: Duration of analgesia.

Category	Mean (Min)	SD	P-value
Group U (n=20)	406.75	29.704	0.000
Group S (n=20)	254.00	30.677	

Duration of post operative analgesia is significantly longer in Group U.

Table 10: Pre-operative Hemodynamic Parameters.

Baseline	Group U (n=20)		Group S(n=20)		t	P
	Mean	SD	Mean	SD		
HR	73.50	6.134	68.90	2.713	0.554	0.583
SBP (mmHg)	127.40	8.055	128.1	8.979	0.260	0.797
DBP (mmHg)	77.45	5.104	72.20	4.980	1.446	0.156
MAP (mmHg)	94.10	4.930	90.85	5.441	0.815	0.420

Group U and Group S were comparable in terms of baseline hemodynamic parameters like heart rate, systolic BP, diastolic BP and Mean Arterial Pressure. (Table 10).

Intraoperative Hemodynamic Parameters

The heart rate was recorded at 5 minutes interval till the end of surgery. Heart rate in the two groups were comparable (p>0.05).

Table 11: Comparison of Heart rate between groups..

Heart Rate	Group U (n=20)		Group S (n=20)		t	p
	Mean	SD	Mean	SD		
0 min	73.50	6.134	74.65	6.961	0.554	0.583
5 min	74.05	6.134	69.6	7.486	2.035	0.05
10 min	74	7.108	74.55	5.596	0.275	0.785
15 min	73.2	7.179	74.45	5.596	0.614	0.543
20 min	71.2	6.346	72.60	4.650	0.796	0.431
25 min	70.85	5.613	73.10	4.229	1.432	0.160
30 min	70.6	5.915	73.00	3.825	1.524	0.136
35 min	70.65	6.675	72.45	4.359	1.010	0.319
40 min	69.6	6.5	71.90	3.291	1.412	0.166
45 min	71.65	5.860	70.90	2.900	0.513	0.611
50 min	70.25	2.9	72.25	4.077	1.160	0.253
55 min	70.50	6.637	71.10	3.878	0.349	0.729
60 min	70.45	6.194	70.95	2.819	0.329	0.744
65 min	70.05	5.844	69.95	2.282	0.071	0.944
70 min	69.2	6.338	68.90	2.713	0.195	0.847

Systolic, diastolic and mean blood pressures were recorded at 5 minutes interval till the end of surgery. There was statistically significant drop in all blood pressures in Group S compared to Group U ($p<0.05$).

Table 12: Comparison of SBP and DBP between groups.

Time	Group (n=20)	SBP (mmHg)				DBP (mmHg)			
		Mean	SD	t	p	Mean	SD	t	P
0 min	U	127.40	8.055	2.60	0.797	77.45	5.104	1.446	0.156
	S	128.10	8.979			75.00	5.601		
5 min	U	126.50	8.205	2.552	0.015	76.90	4.599	5.411	0.00
	S	118.80	10.710			67.20	6.566		
10 min	U	126.25	8.522	2.399	0.450	76.35	4.511	5.085	0.00
	S	119.80	8.483			68.50	5.226		
15 min	U	125.65	8.561	2.229	0.032	75.65	4.749	4.739	0.00
	S	119.70	8.317			68.40	4.925		
20 min	U	125.95	8.709	2.547	0.015	74.75	4.983	4.107	0.00
	S	119.20	8.037			68.40	4.795		
25 min	U	125.90	8.849	2.544	0.015	74.05	4.796	3.619	0.001
	S	119.20	7.770			68.60	4.728		
30 min	U	125.20	9.041	2.437	0.020	74.15	4.891	3.501	0.001
	S	118.80	7.495			68.70	4.953		
35 min	U	124.40	8.695	2.487	0.017	73.70	4.964	2.558	0.015
	S	118	7.539			69.80	4.675		
40 min	U	124.20	8.965	2.498	0.017	73.60	5.394	2.264	0.029
	S	117.80	7.135			70	4.634		
45 min	U	123.65	9.218	2.344	0.024	73.55	5.472	2.389	0.022
	S	117.60	6.946			69.70	4.692		
50 min	U	123.45	9.478	2.461	0.019	73.05	5.808	1.871	0.069
	S	116.80	7.495			69.90	4.789		
55 min	U	123.10	9.170	2.238	0.031	72.80	5.126	1.292	0.204
	S	117.20	7.410			70.80	4.652		
60 min	U	122.95	9.512	2.099	0.042	72.60	4.978	0.538	0.247
	S	117.40	7.022			70.80	4.697		
65 min	U	122.55	10.071	1.681	0.101	72.20	5.105	0.763	0.450
	S	118	6.712			71	4.834		
70 min	U	122.45	10.190	1.669	0.103	72.15	5.060	0.663	0.512
	S	117.90	6.696			71.10	4.962		

Table 13: Comparison of MAP between groups.

MAP	Group U (n=20)		Group S (n=20)		t	p
	Mean	SD	Mean	SD		
0 min	94.10	4.930	92.6715	6.09487	0.815	0.420
5 min	93.5	4.815	84.5	7.266	4.541	0.000
10 min	92.90	4.800	85.65	5.393	4.491	0.000
15 min	92.30	5.038	85.65	4.923	4.222	0.00
20 min	91.80	5.074	85.45	4.904	4.024	0.00
25 min	91.35	5.081	85.45	4.839	3.760	0.001
30 min	91.00	5.301	85.40	4.967	3.447	0.001
35 min	90.45	5.286	85.90	4.756	2.862	0.007
40 min	90.65	5.163	85.95	4.740	2.999	0.005
45 min	90.25	5.457	85.70	4.646	2.839	0.007
50 min	89.85	5.603	85.40	4.871	2.680	0.011
55 min	89.60	5.394	86.30	4.624	2.077	0.045
60 min	89.25	5.210	86.25	4.678	1.916	0.063
65 min	89.00	5.516	86.80	4.618	1.368	0.179
70 min	88.95	5.472	86.90	4.756	1.264	0.214

Table 14: Comparison of time for Ambulation between groups

Ambulation Time	Group U(n=20)		Group S(n=20)		Chi-sq	P
	N	%	N	%		
4th hour	15	75	1	5	24	0.000
5th hour	5	25	2	10	36.19	0.000
6th hour	0	0	3	15	29.565	0.000
7th hour	0	0	14	70	21.538	0.000
Total	20	100	20	100		

None of the patients were able to ambulate in the initial three hours in both the groups (Table 14). By 8th hour all patients in both groups ambulated. In Group U 15 patients (75%) were able to ambulate by 4th hour after surgery ($p<0.05$). In Group S 14 patients (70%) were able to ambulate only by 7th hour ($p<0.05$). The data suggests that post-operative ambulation is significantly earlier in Group U compared to Group S.

Table 15: Comparison of Mean time for ambulation between groups.

	mean±std (min)	p value
Group U (n=20)	210±29.29	0.000
Group S (n=20)	412.25±47.94	

Mean ambulation time in Group S was 412.25±47.94 and in Group U was 210±29.29 (Table 15). Patients in Group U ambulated early compared to Group S.

Table 16: Side effects between groups.

	Post-operative urinary retention		Post-operative nausea and vomiting		Chi-sq	p
	N	%	N	%		
Group U(n=20)	0	0	0	0	4.444	0.035
Group S(n=20)	4	20	3	15	3.243	0.072

In Group U none of the patients had side effects like urinary retention or nausea and vomiting. In Group S, 4 patients (20%) complained of urinary retention ($p= 0.036$) and 3 patients (15%) complained of nausea and vomiting ($p=0.075$). No other side effects like arrhythmias, seizure and vertigo were reported in both Groups (Table 16).

Discussion

Ilioinguinal and Iliohypogastric nerve block is a well known peripheral nerve blockade used for intra operative and post operative analgesia in inguinal herniorrhaphy, orchipexy, hydrocoele repair, cord cyst[12] excision for both adult and pediatric population.

To obtain post -operative analgesia in surgeries using Pfannenstiel incision like caesarean section[13] and abdominal hysterectomy.[14]

To diagnose chronic nerve entrapment pain after hernia repair surgeries.

For inguinal surgeries in patients with compromised cardio-respiratory functions.

It is proven that peripheral nerve blockade with long acting local anaesthetic agents not only provide extended analgesia but also early ambulation and better hemodynamic stability. Spinal anaesthesia (SAB) provides excellent intra -operative conditions but with associated change in normal physiology. Hypotension, urinary retention and post dural puncture head ache (PDPH) are well known complications after SAB. Lack of effective postoperative pain control will not only result in adverse physiological effects but also can end in chronic pain.[15] Callesen et al[16] found out moderate or severe pain scores in 60% of cases in the first day of herniorrhaphy and in 33% of cases in the 6th day of surgery. Conventional fascial click method for IHNB is associated with high block failure rate, erratic needle placement and other side effects. Ultrasound guidance had revolutionised the practice of regional anaesthesia. Thus, we decided to compare efficacy of ultrasound guided IHNB with SAB using 0.5% bupivacaine.

In our study 20 patients received USG guided IHNB (Group U) and 20 (Group S) received SAB. There were no failures reported in both Groups. Both groups were comparable in terms of age distribution, sex, ASA grading, height, weight and BMI.

Onset of sensory block

In our study, the mean time for onset of sensory block was 12.05±0.887 min in Group U and 5.75±0.967 min in Group S. There was significant difference among two Groups in the time for onset of sensory block ($p<0.05$). Our results were comparable with previous studies (Table 5).

Gurkan et al[9] in their study in 50 patients divided into 2 groups showed mean sensory block rise time as 25.2±5.1 min (IHNB) vs 6.9±3.4 min (SAB). In our study faster onset of sensory block in Group U can be attributed to the use of USG which allows accurate placement of drug. Dorreya M. Fekrya et al[17] showed onset of sensory block is faster in SAB (9.19±2.54 min in USG-IHNB versus 3.10±0.70 min in SAB).

In contrast to our study Swati Chhatrapati et al.[18] in their study in 60 patients, showed onset of block in 6.567±0.4037 min in IHNB Group and 6.224± 1.0487 min in SAB Group. The faster onset in IHNB Group may be due to drug characteristics. They used 50% of their drug volume as lignocaine with epinephrine. Lignocaine has a faster onset compared to bupivacaine but with lesser duration of analgesia. Another factor is higher drug volume they used which was 40–60ml. Higher volume of drug is associated with local anesthetic toxicity and TFNP (Transient Femoral Nerve Palsy).

Duration of surgery

Our study has shown that mean duration of surgery in both groups were comparable (55.75±8.926 min in Group U and 59.75±6.382 min in Group S) (Table 6). Duration of surgery mainly depends upon the surgeon's expertise. In our study three patients in group U complained of pain when traction was applied to the cord structures. This was managed by infiltrating 0.25% bupivacaine 5–7 ml to cord structures by surgeon. Study by Shiv Kumar Singh et al[19] and Reynolds L et al[20] showed blocking genitofemoral nerve along with IHNB increases the quality of block especially when novice surgeons are doing the repair.

Duration of hospital stay

In our study the mean duration of hospital stay in Group U was 56.95 ± 2.164 hours whereas in Group S was 85.55 ± 4.796 hours. Our study has shown that patients who received (Table 7) USG -IHNB can be discharged early compared to patients who received SAB for hernia repair. Our results were comparable with previous studies.

In a study by Yilmazral et al8 the time to home readiness was 14.1±0.1hours in IHNB group and 42.8±5.3 hours in SA group. Early home readiness in Group U is attributed to the technique of peripheral nerve blockade.

Post-operative analgesia

Present study has shown that mean VAS Score was high in the post operative period in patients who received SAB for inguinal hernia repair. Due to extended analgesia of USG guided IHNB (Table 8) the mean VAS Score was less in the post operative period. Dorreya M. Fekrya et al[17] showed the VAS in group SAB was significantly higher at the fourth hour (P=0.002) and at the 16th hour (P=0.002) postoperatively when compared with VAS in group IHNB. Pradeep Goyal et al[21] states that the mean pain was statistically significantly less in IHNB group as compared to SAB ($p<0.05$).

In our study mean duration of analgesia in Group U was 406.75 ± 29.704 minutes and in Group S it was 254 ± 30.677 minutes (Table 9). Uma Shrivastava et al[22] found postoperative analgesia after IHNB to be 10.18±1.12 hrs and in SAB group it was 4.34± 2.16 hrs. Same observation was made by Natasha Shafique et al.[23] They found that time for rescue analgesia was 4.5 hours in IHNB and 3.9 hours for SAB group. The results may vary according to the VAS score at which first dose of rescue analgesia was given. In present study rescue analgesia was given at VAS score 3. Literature suggests that total analgesic consumption was also higher in SAB group. Pradeep Goyal et al[21] found mean analgesic dose received was statistically significantly less in IHNB group patients as compared to SAB Group patients ($p<0.05$).

Hemodynamic stability

Our study has shown that hemodynamic parameters were close to baseline values in USG guided IHNB Group. SAB resulted in significant drop in SBP, DBP, MAP during the intra operative period (Table 11-13). Our results were consistent with previous studies. Drop in mean arterial pressure was measured in percentage. One patient who received SAB developed 21.3% drop in MAP and was managed by fluid bolus and graded dose of vasopressors. There was no post operative hypotension reported in patients who received SAB or USG guided IHNB.

Dongare et al[24] in their study showed 25 (30) patients in SAB group and 28(30) patients in IHNB group had MAP within 10 % of baseline. 5 in SAB group and 1 patient in IHNB group had decreases in MAP from 10–20%. Swati Chhatrapati et al[19] in their study showed statistically significant reduction in systolic and mean blood pressure in first 40 minutes with higher intraoperative fluid requirement in SAB Group patients. Neuraxial anaesthesia produces sympathetic (vasomotor) and somatic (sensory and motor) nervous system blockade along with unopposed parasympathetic activity and compensatory reflexes. The decrease in stroke volume and cardiac output is due to peripheral (T1–L2) and cardiac (T1–T4) sympathetic fibre blockade. Adrenal medullary secretion also gets blocked. Inguinal hernia repair need a

sensory level up to T6 because of involvement of peritoneum. This in turn produces hypotension. Hypotension in patients with compensated cardio-respiratory diseases will be detrimental and difficult to manage. Peripheral nerve blockade is free of all the above said physiological changes.

Time for ambulation

Our study has shown that USG guided IHNB allows patients to ambulate and return to normal activities much earlier than patients who received SAB. During the first 3 hours of post operative period no patients were able to ambulate. In patients who received SAB for hernia repair it may be due to residual motor block. Anxiety and surgical stress may be the reason in patients who received USG guided IHNB. By 8th hour all patients in both Groups were ambulated (Table 14). Mean ambulation time in Group S was 412.25±47.94 and in Group U was 210±29.29 (Table 15). USG guided IHNB was found to provide analgesia at rest as well as on ambulation.

Our study was comparable with the study by Dongare et al.[24] They have shown that the mean duration of postoperative ambulation was 298.6 ±27.9 minutes in SAB group and 120.1±15.8 minutes in IHNB group. Similar results were obtained in a study by Gurkan et al.[11] Mean time to first mobilization was 307.1±146.9 min in IHNB group and 456.9±131.7 min SAB group. Early mobilsation helps in accommodating more patients and surgeries without compromising care leading to reduced cost of hospital stay.

Side effects

In our study, few patients who received spinal anesthesia had side effects like urinary retention, nausea and vomiting. Urinary retention was managed by bladder catheterisation (Table 16).

Nausea and vomiting was managed by intravenous ondansetron 0.1 mg/kg. There was no incidence of PDPH, hematoma formation, bowel injuries etc. Our results were comparable with study conducted by Dajun song et al[7] who found urinary retention in 20% patients receiving spinal anesthesia and none in general anesthesia or IHNB group . Dongare et al[24] reported Nausea and vomiting in 3.3% patients in IHNB and 3.4% in SAB group and urinary retention 10% in SAB and zero in IHNB group. Natasha Shafique et al[23] showed 20% of SAB group patients had PONV and 8% in IHNB group. Urinary retention was 9.7% in SAB group and zero in IHNB group.

Our study had multiple limitations. Though subjects were allocated to Group U and S randomly, blinding was not done for both observation and analysis. So there was an element of bias. Monitoring the plasma level of bupivacaine will help to reduce local anaesthetic toxicity if it occurs and will also help to calculate the minimum effective volume of drugs for IHNB block, which is not clearly mentioned anywhere. Overall patient satisfaction scale assessment was not done even though it is the ultimate aim of all postoperative analgesic techniques. Further studies are required to show the analgesic efficacy of USG guided IHNB in various other abdominal surgeries using different local anaesthetics and continuous catheter techniques.

Conclusion

Ultra-sound guided ilioinguinal and iliohypogastric nerve block is a safer alternative to spinal anesthesia or general anesthesia for adult open unilateral inguinal hernia repair.

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