Comparison of ilio-inguinal ilio-hypogastric nerve block versus spinal anesthesia for hernia repair as day care surgery

Dongare Dhanashree H[1], Dongare Harshad C[1]

[1]Assistant professor, Department of Anesthesia, Smt. Kashibai Navale Medical College and General Hospital, Pune, India.

Address for correspondence: Dr. Dhanashree Dongare, Flat Number, 402, A-2, Shashitara Vihar Appartment, Anandnagar, Hingane Khurd, Pune, India 411051

Email: dhanashreedongare@gmail.com

ABSTRACT

Background: The interest in ilio-inguinal ilio-hypogastric nerve block (IHNB) has increased now a day due to good intraoperative surgical conditions, the minimum change in patient's physiology, fewer complications, early ambulation and excellent postoperative analgesia.

Aim: To find out the optimal anesthetic technique for inguinal herniorrhaphy as day care surgery.

Materials and Methods: This study compared various parameters of spinal anesthesia and IHNB. Patients with unilateral (direct and indirect) reducible hernias were included in the study. They were randomly allocated into two groups, each group comprising of 30 patients. Group 1 [SA], received spinal anesthesia and group 2 [IHNB] received Ilioinguinal iliohypogastric nerve block. SA group received spinal anesthesia with 3.5 ml of 0.5 % heavy bupivacaine. IHNB group received Ilioinguinal iliohypogastric block with 35 ml local anesthetic solution.

Results: Patients receiving IHNB had better hemodynamic stability and postoperative analgesia as compared to SA group. The post operative ambulation was significantly early in IHNB group and no post operative urinary retention as compared to SA group.

Conclusion: We found that IHNB with sedation is better alternative to spinal anesthesia for inguinal herniorrhaphy specially when carried out in ambulatory set up.

Key Words: Day care surgery, Ilioinguinal iliohypogastric nerve block, Spinal anesthesia

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INTRODUCTION

The popularity of day care surgery is increasing day by day. There are several advantages that contribute to the popularity of day surgery. There is a greater degree of patient comfort and convenience. [1, 2, 3] Patients and their relatives experience less disruption to their personal lives and a more rapid return to their daily activities. It also leads to a reduction in the strain on hospital resources. Day care surgeries are also suitable for regional centers with minimal facilities. Anesthesia for day surgery should ensure a rapid recovery with a swift return to 'street fitness'. At the same time, we should be responsible and aware of the possible problems like pain, nausea, headache, dizziness, urinary retention, etc., which the patient may have after discharge at home. The interest in IHNB has increased now-a-days. Spinal anesthesia is a tried and tested anesthetic technique which also offers good intraoperative surgical conditions, however the post operative ambulation is often delayed. This varies with the type and dose of the local anesthetic used. We decided to compare the various parameters of these two techniques of anesthesia for day care herniorrhaphy surgery. The present study was aimed to compare ilioinguinal iliohypogastric nerve block and spinal anesthesia for herniorrhaphy in adults as a day care procedure. The specific objectives for the study were to compare the two anesthetic techniques in the context of postoperative analgesia, post operative time for ambulation, Intraoperative and

postoperative hemodynamic stability and complications if any.

MATERIALS AND METHODS

The present study was conducted after approval from the institutional ethical committee. Total 60 cases among the age group of 20-60 years were studied. All were male patients. They were randomly divided into two groups: Group 1 constitutes (SA) spinal anesthesia group and group 2 constitutes IHNB group. Both groups contained 30 patients each. Male patients with reducible unilateral inguinal hernia (direct or indirect inguinal hernia), American Society of Anesthesiologists (ASA) physical status I and II, having age between 20 to 60 years were included in the study. Patients refusing to participate in the study, patients having bilateral, recurrent, obstructed irreducible or strangulated hernias, patient with ASA grade III, IV and V those with associated major systemic disorders, particularly liver and kidney diseases were excluded from the study. Similarly psychologically unstable patients, overweight and obese patients (BMI>28) and patients with known hypersensitivity to local anesthetics were also excluded from the study. All patients were posted for herniorrhaphy with mesh repair. A local examination of the spine and inguinal region was done. Investigation were done including Hemoglobin estimation, complete blood count (CBC), urine, routine and microscopy, liver function test (LFT), kidney function test (KFT), blood sugar estimation, electrocardiography and chest x-ray PA view. Written, valid and informed consent was taken from the patients. During the study intervention, NBM status and consent was checked, all the equipment and drugs necessary for resuscitation and general anesthesia were kept ready. Noninvasive BP monitor, pulse oximeter and continuous ECG monitor was applied. After securing IV line, all patients were given sedation with injection midazolam 1 mg IV and injection pentazocine 20 mg IV.

Patients were induced with either spinal anesthesia or an inguinal block. Thirty patients were given spinal anesthesia with 3.5 ml of 0.5 % heavy Bupivacaine and 30 patients were given an inguinal block (Ilioinguinal iliohypogastric nerve block) with 35 ml of local anesthetic solution. The solution contained 2 mg/kg of 0.5 % bupivacaine and 3mg/kg of 2% lignocaine with adrenaline (1:200000) diluted with distilled water to 35 ml.

For any discomfort during surgery (like during hernia sac dissection), supplementation was given with bolus propofol up to1 mg/kg. If patient's discomfort and vital parameters did not settle after proposal, then it was considered a failure of block and general anesthesia was to be instituted. Hypotension was treated with intravenous fluids and injection mefentermine 6mg bolus as required.

Postoperatively the patients were monitored in the recovery room for the following parameters: Heart rate, blood pressure, oxygen saturation and respiratory rate. The time after surgery when the patient first complained of pain or requested analgesia was recorded in minutes as the time of postoperative analgesia. At this time injection diclofenac 75mg IM was given as rescue analgesic. Time after surgery for ambulation was recorded (in minutes) when all of the following parameters were present.

1) The patient was fully conscious and oriented to time, place and person.
2) There was complete regain of motor power (grade 5 power in lower limbs)
3) There was complete regain of all modalities of sensation, including proprioception of the great toe.
4) No dizziness on standing and walking.

Any other complication like nausea, vomiting, hypotension, urinary retention, transient femoral nerve palsy, transient radicular irritation etc. were noted. The patient was seen on the second postoperative day again for noting any voiding problem and headache. Statistical analysis was done by using student's t test and chi square test with appropriate correction wherever required. One patient in IHNB group required conversion to general anesthesia and was excluded from this observation.

RESULTS

The two groups were comparable in terms of demographic data baseline pulse and mean arterial pressure (MAP), and duration of surgery (Table 1).

Table 1: Demographics, baseline parameters and duration of surgery

Parameters	Group 1(SA)	Group 2 (IHNB)	P value
Age (years)	46.63±8.2	46.93±7.7	P=0.05
Weight (kgs)	61.96±4.9	60.66±5.4	p>0.05
Body mass index	22.31±1.21	22.7±1.07	p>0.05
Baseline pulse rate	82.3±9.4	80.5±11.05	P=0.501
Baseline MAP	94.8±8.5	94.5±7.5	P=0.87
Duration of surgery	77.16±8.06	77.24±9.6	P=0.97

The post operative pulse rate was noted every hour after completion of surgery for 6 hours. The variation in pulse rate from baseline was calculated in percentages. The patient was considered hemodynamicaly stable if the pulse rate and MAP remained within 20 % of baseline. 26 patients in SA group and 27 patients in IHNB group had a pulse rate within 10 % of the baseline value. No patient had variation in pulse rate by more than 20 % of the baseline value. There was no significant difference in variation in pulse rate from base line between the two groups (p>0.05).

Table 2: Postoperative pulse rate

Variation in PR From base line (%)	Group 1 SA (30 patients)	Group 2 IHNB (29 patients)
Decrease by more than 20%	0	0
Decrease by 10-20 %	4	2
Within 10 % of baseline	26	27
Increase by 10-20%	0	0
Increase by more than 20 %	0	0

Postoperatively the MAP was noted every hour for the first 6 hours. The variation in MAP from baseline value was calculated in percentages. The patient was considered hemodynamicaly stable if the MAP and pulse rate were within 20 % of the baseline value. Twenty Five patients in SA group and 28 patients in IHNB group had MAP within 10 % of baseline. Five patients in SA group and 1 patient in IHNB group had decreases in MAP from 10-20 %. However, no patient from any group had variation in MAP by more than 20 % of baseline. The p value after applying chi square test with appropriate correction was 0.211 which is statistically insignificant. Thus the two groups were comparable in terms of postoperative variation in MAP.

Table 3: Postoperative MAP

Variation in MAP From base line	Group 1 SA (30 patients)	Group 2 IHNB (29 patients)
Decrease by more than 20%	0	0
Decrease by 10-20 %	5	1
Within 10 % of baseline	25	28
Increase by 10-20%	0	0
Increase by More than 20 %	0	0

There was a significant difference in duration of postoperative analgesia and time for post operative ambulation between the two groups (Table 4 and 5). It has been observed that the mean analgesia duration was 188.5 ±24.6 minutes in group 1 whereas 361.5±74.4 minutes in group 2. Similarly the mean duration of postoperative ambulation was 298.6 ±27.9 minutes in group 1 and 120.1 ±15.8 minutes in group 2.

Table 4: Postoperative analgesia

Analgesia (Duration in Minutes)	Group 1 SA (30 patients)	Group 2 IHNB (29 patients)
150-199	19	1
200-249	11	2
250-299	-	3
300-349	-	6
350-399	-	9
400-449	-	4
450-499	-	4
Mean (SD)	188.5 ±24.6	361.5±74.4

Table 5: Postoperative Ambulation

(Duration in Minutes)	Group 1 SA (30 patients)	Group 2 IHNB (29 patients)
51-100	-	3101-150-25
151-200	-	1
201-250	3	-
251-300	14	-
301-350	13	-
MEAN ±SD	298.6 ±27.9	120.1 ±15.8

The incidence of post operative complication is shown in table 6. The most common complication was urinary retention observed in 4 cases in SA Group whereas nausea and vomiting was reported by 1 patient each in both the groups.

Table 6: Postoperative complications

Complications	Group 1 SA (30 patients)	Group 2 IHNB (29 patients)
Nausea /vomiting	1 (3.3%)	1(3.4%)
Urinary retention	4 (10%)	0
Headache	1(3.3%)	0
Hypotension	0	0
TFN	0	0

DISCUSSION

Patient satisfaction is improved in ambulatory settings if the anesthetic technique provides early ambulation, good postoperative analgesia and a small incidence of postoperative side effects. Investigators found that the operation and anesthetic time are a strong predictor of postoperative complications (e.g. pain, emesis) and delayed discharge as well as unanticipated admission to hospital after ambulatory surgery.[2]

Yilmazar et al [4] compared various parameters of spinal anesthesia and IHNB in inguinal hernia surgery. They found a significant decrease in pulse rate and mean arterial pressure after induction in SA group when compared with their preoperative values. In addition, these parameters were significantly reduced perioperatively in the spinal anesthesia group as compared with the IHNB group. No significant variation in pulse rate and MAP was seen in IHNB group. In our study 3 patients in IHNB group had increased in pulse rate by > 20% of baseline. All these 3 patients had discomfort during hernial sac dissection. Their pulse rate and mean arterial pressure settled after supplementation with proposal by giving boluses up to 1 mg/kg. There was no significant difference between the two groups in terms of variation of pulse rate from baseline. ($p>0.05$) The variation in mean arterial pressure from baseline in SA group was statistically significant ($p<0.05$) as compared to IHNB group. Our findings were similar to those obtained by Yilmazlar et al.

Marshall et al[1] discussed the discharge criteria and complications after spinal anesthesia. Patient's vital signs, including blood pressure, heart rate,

respiratory rate and temperature should be within 20 % of baseline value at the time of discharge in the ambulatory setting according to modified post anesthesia discharge scoring system [PADS] for home readiness.[2]

In our study, postoperatively, all patients from both groups had a pulse rate within 20% of baseline value and statistically there was no significant difference in variation from baseline among the 2 groups.

The mean arterial pressure in postoperative period also remained within 20% of baseline in all patients from both groups. There was no significant difference between the two groups in terms of postoperative variation in pulse rate.

IHNB does not provide visceral anesthesia. Hence the hernia sac (containing peritoneum) must be infiltrated with local anesthetic solution[5] or supplementation with IV sedation may be required.

In our study, we used IHNB with genitofemoral nerve block with skin infiltration. The Genitofemoral nerve block is recommended by some authors to improve intraoperative analgesia in inguinal herniorrhaphy. [6,7]

The only time when some patients had discomfort was during dissection of the sac. Three patients required additional sedation with propofol boluses up to 1mg/kg during sac dissection. They did not have any discomfort once the sac handling was over. All these 3 patients were conscious and oriented to time, place and person at the end of surgery. In 1 patient of IHNB group general anesthesia was instituted at the beginning of the procedure due to failure of the block. No patient in the SA group had intraoperative discomfort at the operative site.

Post herniorrhaphy pain is "moderate to severe" and often poorly controlled with opioids as a single mode of therapy 6. IHNB has been shown to significantly reduce pain associated with herniorrhaphy regardless of whether the blocks are used as primary anesthetic or pain control after general anesthesia or spinal anesthesia.[5]

In our study, we noted the time when the patient demanded first rescue analgesic postoperatively. It was less in the SA group compared with IHNB group and this difference between the two groups was statistically significant.

In study by Yilmazlar et al [4] the first rescue analgesic time postoperatively was 3.30±0.2 hrs. in SA group and 2.7±0.13 hrs in IHNB group. Similar results were seen by C.A. Harrison ET al[8] who found that combination of IHNB and wound infiltration led to less morphine consumption in first 6 hrs after operations as compared to wound infiltration alone however there was no difference in analgesic consumptions beyond 6 hrs.

Uma Shrivastava et al [9] found postoperative analgesia after IHNB to be 10.18± 1.12 hrs and in SA group it was 4.34± 2.16 hrs.

The suitable criteria for ambulation after spinal anesthesia 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.[1,2,10]

Transient femoral nerve palsy is a recognized complication after IHNB. It will cause knee weakness and hence inability to ambulate, the reported time of onset of TFNP following surgery varies from 2-6 hrs. It usually resolves within 24-36 hrs.[6,11,12]

In study by Dajun Song et al patients with IHNB-MAC technique were awake and oriented by the end of surgery. They were "home ready" by 133±68 min. In contrast, patients with SA were "home ready "by 280±80 min. Knee weakness was seen in 3 patients in IHNB-MAC group.[13]

In study by Yilmazral et al 4 the time to home readiness was 14.1±0.1hrs. in IHNB group and 42.8±5.3 hrs. in SA group. In study by Uma Shivastava et al 10 83% patients could ambulate by 6 hrs. Postoperatively in both IHNB and SA group. The time spent on recovery was 0-2.1 hrs. for IHNB-MAC group and 2.32±0.88 hrs. for SA group. In our study, SA group, 14 patients could ambulate by 251-300 minutes and 13 patients could ambulate by 301 to 350 minutes. whereas in IHNB group, 28patients were able to ambulate within 150 minutes.

The mean time required to ambulate in SA group was 298 with SD of 27.9 as against a mean of 120 minutes with SD of 15.8 in IHNB group. The p value after applying t test is less than 0.05. The observed difference is thus clinically as well as statistically significant.

It is important to note that at the time of ambulation most of the patients in IHNB group had no incisional site pain. IHNB was found to provide analgesia at rest as well as on ambulation.

The patients with SA had already received analgesic injection diclofenac 75mg IM, on demand by the time they could ambulate. They had discomfort and pain at the incision site on ambulation. Pain is an important factor that hinders early ambulation

Dajun song et al[13] found urinary retention in 5 (20%) patients receiving spinal anesthesia and none in general anesthesia or IHNB MAC group.

Uma Shrivastava et al [9] found urinary retention catheterization in 7 patients of spinal anesthesia group. In our study 4 out of 30 patients (13/3%) were not able to void even at 8 hrs. Postoperatively. However, all could void urine by 12 hrs and none required catheterization.

Transient femoral nerve palsy [TFNP] has been implicated not only after IHNB, but also after subcutaneous injections and in local infiltration at the internal inguinal ring. [12] Ghani et al reported no difference in incidence of TFNP when the block was given blindly by anesthetist or under direct vision by surgeon injecting local anesthetic solution within or inferior to inguinal ligament increase the risk of lateral femoral cutaneous or femoral nerve block.[11] In our study, however, we did not have any patient of IHNB group having postoperative knee or leg weakness. In our technique we did not hit the iliac bone. We deposited LA solution at the loss of resistance that is below the external oblique muscle and not deeper. Postdural puncture headache is a recognized complication of SA. In our study postoperative nausea was seen in 1 patient in SA group and 1 patient of IHNB group.

CONCLUSION

IHNB with sedation offers better intraoperative hemodynamic stability, better postoperative analgesia and early postoperative ambulation. Also, we observed that IHNB was associated with a very less incidence of postoperative complications. Considering all these advantages of IHNB, it is a better alternative to spinal anesthesia particularly for ambulatory setup.

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