Original Research Article

A study of post-operative analgesia, ambulation and discharge in patient of inguinal hernia repair by tap block versus splash block

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Abstract

Background: Innervation of the anterolateral abdominal wall arises from the anterior rami of spinal nerves T7 to L1. The anterior divisions of T7-T11 continue from the intercostal space to enter the abdominal wall between the internal oblique and transversus abdominis muscles untilthey reach the rectus abdominis, which they perforate and supply ending as anterior cutaneous branches supplying the skin of the frontof the abdomen. **Aim:** In this study, we evaluated the analgesic efficacy of TAP block andSplash block for the first 24 post-operative hours in patients undergoinginguinal hernia surgeries. **Result:** Patient's characteristics were comparable among the two groups (table 1). Diclofenac consumption was almost reduced by approximately 40% in TAP block group compared to SPLASH block group which was statistically significant (p<.000). Time for first request for analgesia was statistically prolonged in TAP block group in comparison to Splash block group (table 2).Pain scores at rest and movement were 0 in PACU and at 2nd hour in both the groups. Statistically significant reduced pain scores were seen in TAP block group as compared to Splash block group from 4th to 24th hour (Table 3, 4). Diclofenac requirement was almost negligible during first 4th hours postoperatively. During 4th to 12th hours, Diclofenac consumption was significantly low in TAP block group as compared to Splash block group. After 12 hours both groups are comparable.(table 5). Reduced post-operative nausea and vomiting was noticed in TAP block group as compared to Splash block group during 8th hour and 24th hour postoperatively. At other points of time, both the groups were comparable to each other and statistically significant difference was not found.(table 6,7). Antiemetic requirement was almost negligible in both the group during first 8th hours. Statistically significantly reduced requirement was observed during 8th – 24th hours in TAP block group as compared to Splash block group(p<.0001). (table 8). Overall 75% of the patients were satisfied with their analgesic regimen among TAP block group as compared to 50% among Splash block group.(table 9) **Conclusion:** Hence we conclude TAP block constitutes an effective analgesia after inguinal hernia surgeries as compared to Splash block. The ease with which it can be performed, an excellent safety profile, and outstanding clinical utility, will no doubt lead to increasing popularity and use of TAP block.

Key Words: hernia.

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INTRODUCTION

A substantial component of the pain experienced by patients after inguinal hernia surgery is derived from the abdominal wall incision[1]. The abdominal wall consists of three muscle layers, the external oblique, internal oblique and the transversus abdominis and their associated fascial sheaths. The muscular wall is innervated by nerve afferents that course through the transversus abdominisneurofascial plane[2]. A promising approach to the provision of postoperative analgesia after abdominal

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incision is to block the sensory nerve supply to the anterior abdominal wall[3,4]. However, the clinical utility of current approaches to the blockade of these nerve afferents, such as abdominal field blocks, is limited and the degree of block achieved can be unpredictable. A major reason for the relative lack of efficacy of these blocks is the lack of clearly define danatomic landmarks, leading to uncertainty regarding the exact needle positioning, and the lack of a clear indication that the total anaesthetic is being deposited in the correct anatomic plane. A new alternative and reliable approach to the blockade of the neural afferents to the anterior abdominal wall is transversus abdominisplane block. These neural afferents course through the neurofascialplane between the internal oblique and the transverse abdominismuscles[2]. On the basis of anatomic studies, lumbar triangle of Petit has been identified as a potential access for is transversusabdominis plane block, which is bounded by the latissimus dorsimuscle posteriorly and the external oblique muscle anteriorly, with theiliac crest forming the base of the triangle[2]. The transverses abdominis plane is the fascial layer between the internal oblique and the transversus abdominis muscle. It exists as a continuous planelocated at any point on the abdomen where the two innermost musclelayers, internal oblique and transversus abdominis, exist. By introducing local anaesthetics into the transversus abdominis plane viathe triangle of Petit, it is possible to block the sensory nerves of theanterior abdominal wall before they pierce the musculature to innervatethe abdomen. In this study we utilized the extra peritonealapproach to give transversus abdominis plane block. On the other hand Splash block, which is an altered form of the illioinguinal - illiohypogastric nerve block is a simple analgesic method with no side effects. The hernial sacs are ligated when performing herniorrhapies and local anaesthetics are instilled into the incision site. Before closing it so that the local anaesthetics are absorbed into themuscular coat and the exposed nerves. Preliminary cadaveric studies, followed by volunteer studies, have demonstrated the potential for transversus abdominis plane block to produce a dermatomal sensory block of the lower six thoracic and upper lumbar abdominal afferents[5]. The intercostal, subcostal, iliohypogastric and ilioinguinal nervescourse through the lateral abdominal wall within the TAP before they pierce the musculature to innervate the abdomen[5]. In addition, we have demonstrated the analgesic potential of the. TAP block in a series of patients undergoing radical prostatectomy. Inthis study, weevaluated the analgesic efficacy of TAP block and Splash block for the first 24 post-operative hours in patients undergoing inguinal hernia surgeries.

AIM AND OBJECTIVES

The aim of this prospective controlled study was to compare the effect of TAP block and Splash block in terms of:

1. Postoperative analgesic efficacy.
2. Time of ambulation.
3. Time of discharge from the hospital.
4. Adverse effect if any.

MATERIAL AND METHODS

Place and Duration: After approval from institutional ethical committee this prospective randomized study was carried out in the department of Surgery, S.N. Medical College Agra over a period of 12 months, from November 2015 to November 2016. Approval of Institutional Ethical Committee was 98+*-/-0 “taken to conduct the study. All the patients of ASA grade I and II, between age 18 to 70 years undergoing inguinal hernia surgery were included in 00the study.

Exclusion Criteria

1. Patients with previous abdominal surgeries.
2. Patients with history of relevant drug allergy.
3. Patients receiving medical therapies considered to result intolerance to opioids.

Patients were randomly allocated to one of the following groups on the basis of Computer Generated Random Number Table. Group T- In these patients, TAP block was given at the end of surgery using 20ml of 0.5% bupivacaine into the transverses abdominisplane. Group S-In these patients Splash block was given at incision site using 20 ml of 0.5% bupivacaine. As a part of routine pre-operative preparation, all patients had received Metoclopramide 10 mg and Ranitidine 50 mg, 30 minute before shifting to OT. Standard monitoring including Electrocardiograph, Arterial blood pressure, Arterial oxygen saturation and Pulse rate. Monitoring were attached to the patient. Surgery was commenced after giving Spinal anaesthesia as required for surgery. At the end of surgery, patient received either Transversus abdominis plane block or Splash block.

Techniques Technique of TAP block

TAP block was given utilizing transcutaneous approach. Performed intraoperatively, the technique requires a blind puncture at apoint close to the anterior superior iliac spine (ASIS) and a localanaesthetic agent injection into the planes between the external and internal oblique muscles and internal and transverse muscles plane to block the nerve before entering the inguinal region by appreciable lossof resistance (double pop sensation)[6,7]. After careful aspiration, to ensure no vascular injury has occurred,20 ml of 0.5% bupivacaine (group A) was injected slowly between external oblique and internal oblique (10 ml of 0.5% bupivacaine) andinto the fascial plane between the

internal oblique and transversusabdominis (10 ml of 0.5% bupivacaine) which contains the nerves fromT7 to L1.

Technique of SPLASH block: For the Splash block, 20 ml of 0.5% bupivacaine was prepared. Before closing the incision site 10 m of 0.5% bupivacaine was instilled. The muscular coat was sutured and at the end 10 ml of 0.5% bupivacaine was instilled before suturing the subcutaneous tissue. The instilled state was maintained for a minimum of 1 minute each time. Gauze cleaning was skipped so that the local anaesthetic could adequately be absorbed. After completion of the surgical procedure, patients were transferred to the post anaesthesia care unit (PACU).

Following observation were made in first 24 hours

1. Heart rate/blood pressure was recorded every 30 minute in post-operative period. Intensity of pain was assessed at the arrival in the PACU and at 2hour, 4 hour, 8 hour, 12 hour, 24 hour using verbal analogue pain score of 0-100(0-no pain. 100- most severe pain). Each time painscore was noticed at rest and on movement.
2. Patient was asked to stand up and take a few step 6 hr. aftersurgery and severity of pain was assessed.
3. Nausea and Vomiting were assessed on a three point score. (1-No Nausea, 2-Nausea, 3-Vomiting) Nausea lasting >10 minutes, i.v. Ondansetron 4 mg stat
4. The patient was offered additional analgesics, if demanded, in theform of injection Tramadol 100mg in infusion.
5. Satisfaction level of the patient was assessed.
6. Requirement of antiemetic postoperatively.
7. Night sleep to be assessed on first post-operative day.
8. Any other complication like retention of urine, any complicationrelated to block.
9. Time of discharge from PACU and hospital.

The assessments were performed in PACU and at 2, 4, 8, 12, 24 hrs.postoperatively.

RESULT

Patient's characteristics were comparable among the two groups (table 1). Diclofenac consumption was almost reduced by approximately 40% in TAP block group compared to SPLASH block group which was statistically significant (p<.000). Time for first request for analgesia was statistically prolonged in TAP block group in comparison to Splash block group (table 2).Pain scores at rest and movement were 0 in PACU and at 2ndhour in both the groups. Statistically significant reduced pain scores were seen in TAP block group as compared to Splash block group from 4thto24th hour. (Table 3, 4). Diclofenac requirement was almost negligible during first 4th hours postoperatively. During 4th to 12th hours, Diclofenac consumption was significantly low in TAP block group as compared to Splash block group. After 12 hours both groups are comparable. (Table 5). Reduced post-operative nausea and vomiting was noticed in TAP block group as compared to Splash block group during 8th hour and 24th hour postoperatively. At other points of time, both the groups were comparable to each other and statistically significant difference was not found. (Table 6, 7). Antiemetic requirement was almost negligible in both the group during first 8th hours. Statistically significantly reduced requirement was observed during 8th – 24th hours in TAP block group as compared to Splash block group(p<.0001)(table 8). Overall 75% of the patients were satisfied with their analgesic regimen among TAP block group as compared to 50% among Splash block group (Table 9).

Table 1: Demographicdata

Demographicfeatures	TAPBlock		SPLASH Block		t- value	p-value
	Mean	SD	Mean	SD		
Age(yrs.)	31.23	3.51	26.57	3.15	-5.412	<0.0001
Weight(kg)	56.41	3.73	59.49	4.56	2.864	0.0058
Duration(min.)	60.24	9.164	55.23	8.96	-2.141	0.0365

Table 2: Total consumption of diclofenac in mg in 24 hours duration after surgery and first requirement of analgesic

	TAPBlock		SPLASH Block		t-value	p-value
	Mean	SD	Mean	SD		
Consumption in mg in 24hours Duration after surgery	106	25.64	180	28.64	10.544	<0.0001
Analgesic requirement for the first time in minutes	720.00	326.20	280.00	94.42	7.8580	<0.0001

Table 3: Pain score at rest

Interval	TAPBlock 0Mean	SPLASH Block Mean	t-value	p-value
PACU	0±0	0±0	0	0
2ndhour	0±0	0±0	0	0
4thhour	0±0	10±3.54	15.472	<0.0001
8thhour	8±8.37	19±4.18	6.440	<0.0001
12thhour	22±6.37	28±3.28	4.587	<0.0001
24thhour	17± 5.48	18±4.47	5.422	<0.0001

Table 4: Pain score at movement

Interval	TAP Block Mean	SPLASH Block Mean	t-value	p-value
PACU	0±0	0±0	0	0
2ndhour	0±0	0±0	0	0
4thhour	0±0	16±5.47	16.021	<0.0001
8thhour	20±8	27±4.47	3.500	<0.0001
12thhour	31±6.41	33±6.58	1.033	<0.0001
24thhour	14±7.16	18±7.61	1.868	<0.0001

Table 5: Stratifiedanalgesic requirement

Interval	TAP Block		SPLASH Block		t-value	p-value
	Mean	SD	Mean	SD		
1-4hour	0.432	0	0.821	4.55		
4-8hour	15.10	13.20	24.76	14.91	-5.0443	<0.0001
8-12hour	27.20	20.35	37.20	12.99	-5.0206	<0.0001
12-24hour	37.50	19.56	45.60	18.60	-4.0467	0.0003

Table 6: Post-operativescorefornausea

Interval	TAP Block		SPLASH Block		t-value	p-value
	Mean	SD	Mean	SD		
PACU	1		1			
2ndhour	1.33	0.20	1.43	0.19	-1.0476	0.1131
4thhour	1.63	0.38	1.76	0.29	1.5055	0.2378
8thhour	1.06	0.36	1.36	0.59	-2.8911	<0.0001
12thhour	1.09	0.42	1.53	0.63	-2.688	<0.0001
24thhour	1.10	0.38	1.48	0.68	-2.1126	<0.0001

Table 7: Post-operatives core for vomiting

Interval	TAP Block		SPLASH Block		t-value	p-value
	Mean	SD	Mean	SD		
PACU	0		0			
2ndhour	1.12	0.14	1.13	0.44	-1.3299	0.0245
4thhour	1.38	0.23	1.19	0.27	1.2626	0.2625
8thhour	1.02	0.43	1.32	0.55	-1.9659	<0.0001
12thhour	1.18	0.29	1.70	0.77	-2.2689	<0.0001
24thhour	1.06	0.74	1.42	0.57	-1.5261	<0.0001

Table 8: Antiemetic requirement

Interval	TAP Block		SPLASH Block		t-value	p-value
	Mean	SD	Mean	SD		
1-4hour	1		1			
4-8hour	1.10	0.56	1.05	1.07	1.0980	0.0786
8-12hour	0.50	1.42	1.90	2.14	-1.3484	<0.0001
12-24hour	0.40	0.54	1.80	0.66	-3.7675	<0.0001

Table 9: Patient's satisfaction

	TAP Block	SPLASH Block
Extremely satisfied	40.00	11.42
Satisfied	35.00	38.58
Not Satisfied	25.00	50.00

DISCUSSION

Post-operative pain management is one of the most important aspects of patient management after surgery. Poorly controlled pain after inguinal hernia surgery is associated with a variety of unwanted postoperative consequences, including patient suffering, distress, confusion, Chest and heart problems and prolonged hospital stay. Traditionally, pain relief was provided by medications injected into a vein using a drip such as morphine or paracetamol, administering local anaesthetic into the skin around surgical wound, or by providing epidural pain relief where localanaesthetic and other pain relieving medications are injected through a fine plastic tube into the epidural space of lower back-numbing the nerves that supply abdomen. Following surgery, Transversus Abdominis Planeblock is a relatively new way of anaesthetising nerves which numb the abdomen after surgery in order to help improve patient comfort after their surgery. The analgesic regimen of the patient after surgery should provide safe, effective analgesia with minimal side effects to the patients. Amultimodal analgesic regimen is most likely to achieve these goals. However, optimal components of this regimen continue to evolve. Although single shot neuraxial analgesic technique using long acting opioids or patient controlled epidural opioid administration produce effective analgesia, they are associated with frequent incidence of side effects, particularly nausea, vomiting and pruritus which reduce overall patient satisfaction[8]. Transverse abdominis plane block is a regional analgesic technique which blocks T6 – L1 nerve branches and has an evolving role inpostoperative analgesia for lower abdominal surgeries[9]. The block has also been found effective after various other abdominal surgeries like abdominalhysterectomy[10],open prostatectomy[11], and appendicectomy[9]. The aim of our study was to determine the efficacy of TAP block and Splash block following inguinal hernia surgeries, their side effects if any and patient satisfaction regarding analgesia. We postulated that the TAP block and Splash block would result in decreased analgesic Requirement in first 24 hours after surgery. This study aimed to examine our postulation and observe any side effects. We recruited the patients and grouped them by computer generated random number table to receive TAP block and Splash block with 20ml of 0.5% bupivacaine in a double blind randomized manner. Our study demonstrated that supplementing a standard analgesicregimen with TAP block and Splash block with bupivacaine resulted in reduced 24 hours Diclofenac requirement and pain scores as well asdelayed request for supplemental analgesia. *Nanze Yu et al (2014)* compared analgesic efficacy of Transversus Abdominis Plane block and local anaesthetic infiltration into surgical wound. They found that both methods provided comparable short termpostoperative analgesia but TAP block has better long lasting effect[12].Along with reduced analgesic consumption we also observed that the patients in TAP block group took a longer time to request for the firstrescue analgesic as compared to Splash block group. The mean time for first analgesic requirement in group A was 720min,as compared to Group B where it was 280 min in group P($p<0.001$). Our findings are inaccordance with those observed by *McDonell et al (2008), Mishriky et al (2012)* and *Vijaylakshmi et al (2013)*[10, 13, 14].The reason for prolonged duration of analgesic effect is that TAP is poorly vascularized and therefore drug clearance may be slowed. Therefore drug remained in the plane for longer period[10]. Our study demonstrates that postoperative pain scores both at rest and at movement were also reduced in TAP block group and Splash block group. Pain scores were zero at rest till 2nd hour in both the groups which might be due to residual effect of spinal anaesthesia. After 2 hours pain scores were significantly lower in TAP block group in comparison to Splash block group. Lower pain scores were observed following abdominal surgeries employing TAP block like colorectal surgeries[15]and following caesarean section[16]. Incidence of nausea and vomiting was also lower in TAP block group. Reduced scores were found during 8th to 24th hour in comparison to Splash block group. This could be due to lower tramadol consumptionin TAP block group. Similar results were observed by *Gucev et al (2008)* who showed absence of nausea and vomiting following continuous infusion of 0.2% ropivacaine at 4ml / hr via TAP catheter for 72hoursfollowing caesarean section[17].*Baaj et al (2010)* and *Costello et al (2009)* also got the same findings[18,19]. As the incidence of postoperative nausea and vomiting was reduced, marked reduction inantiemetic requirement was seen in 24 hours duration. One of the overwhelming findings of our study was that patients receiving TAP block were able to ambulate early during the post operative period due to low pain scores at rest and at movement as compared to patients who receive Splash block. They also had sound sleep during night reason being the same as above.. When we enquired

about patient satisfaction, overall 75% of the patients in TAP block group were satisfied with pain relief as compared to 50% in Splash block group. *Baaj et al (2010)* also reported increased patient satisfaction during their studies over TAP block[18].

CONCLUSION

Hence we conclude that although TAP block and Splash Block were easy to perform and provided effective analgesia without any complications but TAP block is more promising in providing effective analgesia with reduced demand of rescue analgesic and antiemetic's along with more patient satisfaction in TAP Block.

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