

Comparison of Epidural Analgesia vs Continuous Transversus Abdominis Plane Analgesia for Post-Operative Pain Relief in Patients Undergoing Lower Abdominal Surgery

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ABSTRACT

BACKGROUND

Regional Anaesthesia for post-operative analgesia has become an important tool in the anaesthetist's arsenal. Epidural analgesia has become a standard of care for abdominal surgeries; however, it has its own complications. Further, many patients cannot benefit from it when contraindicated. Transversus Abdominis Plane (TAP) block is a relatively new technique of regional anaesthesia which has the potential to be an alternative to Epidural analgesia for abdominal surgeries. However, it remains a yet poorly explored technique. This is more so in the case of continuous TAP Blocks by means of a catheter. Few studies have been done comparing it with epidural analgesia.

METHODS

72 patients undergoing lower abdominal surgery under spinal anaesthesia were randomized to receive epidural anaesthesia with 10 ml 0.125% Bupivacaine 8th hourly or TAP Block with 20 ml 0.125% Bupivacaine on each side 8th hourly. VAS scores at rest and on coughing, consumption of Paracetamol (first rescue analgesic) and consumption of Tramadol (second rescue analgesic) were recorded along with heart rate, blood pressure and respiratory rate.

RESULTS

VAS scores at rest were comparable between the groups in the first 16 hours. However, at 24 and 48 hours, the TAP Block group had significantly higher VAS scores at rest. Similar results were seen for the VAS score on coughing. The first 8 hours were comparable between the groups, beyond which, VAS scores were significantly higher in the TAP Block Group. Analgesic consumption reflected the same with paracetamol (first analgesic) consumption being comparable throughout the study, however, the consumption of tramadol (second rescue analgesic) was significantly higher in the TAP block group at the end of 24 as well as 48 hours.

CONCLUSIONS

The findings suggest that Analgesia with Epidural as well as with continuous TAP Block at 8th hourly bolus dosing of 0.125% Bupivacaine in patients undergoing lower abdominal surgeries is comparable in the first 8 to 16 hours. However, the quality of analgesia provided by the TAP Block catheter is inferior to that provided by epidural catheters beyond 24 hours post-operative period.

KEY WORDS

Regional Anaesthesia, Post-Operative Analgesia, Transversus Abdominis Plane Block, Epidural Analgesia, Bupivacaine, Catheter-Based Techniques

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DOI: 10.14260/jemds/2020/139

*Financial or Other Competing Interests:
None.*

How to Cite This Article:

Kumar RK. Comparison of epidural analgesia vs continuous transversus abdominis plane analgesia for post-operative pain relief in patients undergoing lower abdominal surgery. J. Evolution Med. Dent. Sci. 2020;9(09):634-640, DOI: 10.14260/jemds/2020/139

Submission 05-08-2019,

Peer Review 02-02-2020,

Acceptance 11-02-2020,

Published 02-03-2020.



BACKGROUND

Control of post-operative pain is imperative for patient comfort, early mobilization and faster recovery.⁽¹⁾ Specifically, good post-operative pain management has been shown to be effective in reducing peri-operative morbidity associated with acute coronary events and thrombotic events in high risk patients.⁽²⁾ At the same time, it has been an endeavour to reduce peri-operative opioid consumption and its associated complications. In this respect, an effective multimodal strategy which affords best control of post-operative pain is very important. Increasingly, Regional Techniques are gaining popularity as a part of multimodal post-operative analgesic regimen. Regional Anaesthesia has been shown to reduce the incidence of post-operative nausea and vomiting while also providing benefits that go even beyond patient comfort. Epidural Analgesia is a time tested technique for post-operative analgesia. It has proven efficacy and use of epidural catheters for post-operative analgesia is a norm at many centres. However, the epidural technique comes with its own risk of complications. Also, there are many situations where it would be contraindicated to use the epidural technique. Thus, an equally effective alternative regional anaesthetic technique would be useful in such situations.

The Transversus Abdominis Plane (TAP) Block and TAP catheter based continuous blocks are relatively new techniques whose efficacy has been well documented in the scientific literature^{(3), (4), (5), (6)} They are regional anaesthesia techniques which provide analgesia to the skin and muscles of the anterior abdominal wall.⁽⁷⁾ It was first described just about a decade ago and has undergone several modifications which in turn have expanded its scope of application for an increasing range of surgical procedures.⁽⁸⁾ Their advantage over epidural technique lies in the fact that it does not cause hemodynamic instability. Another advantage is that they can be used in patients with mild platelet or coagulation abnormalities where neuraxial techniques would be contraindicated. Despite a low risk of complications and a high success rate, it is an underutilized technique.⁽⁹⁾

METHODS

After obtaining ethical clearance certificate from the institution's ethics committee, a prospective randomized comparative study was conducted among 72 patients, who were to undergo elective lower abdominal surgeries, admitted to Sri Devaraj Urs Medical College Hospital from September 2012 to Aug 2013.

Sample Size

In a previous study by Vandriessche et al A VAS score of 4.8 cm (SD: 1.8 cm) for TAP block group and VAS score of 3.2 cm (SD: 2.1 cm) for epidural group was observed. Assuming similar results, it was calculated that to obtain a power of 80% within a confidence interval of 95%, a minimum of 30 patients were required in each of the two groups. Thus, a total of 60 patients were required at the least. An additional

5% (6 in each group) were taken to account for drop-outs from the study.

Inclusion Criteria

1. Lower Abdominal Surgeries under Spinal Anesthesia.
2. American Society of Anesthesiologists (ASA) Physical Status (PS) I and II.
3. 18 – 75 years age.

Exclusion Criteria

1. Patient refusal for epidural or TAP catheter placement.
2. BMI > 30.
3. Coagulation disorders.
4. Infection at the site of injection and insertion of needle.
5. Use of Opioids or Alpha-2 agonists for sedation, premedication or post-operative analgesia (except for Tramadol)
6. Catheter dislodgement at any time before the end of the 48 hours post-operative.

Written informed consent was taken. A computer generated random number table was used to randomize the patients in two groups. In both groups, patients were Pre-medicated with per oral tablet Ranitidine 150 mg and tablet Ondansetron 8 mg. All the patients underwent lower abdominal surgery under spinal anaesthesia with 2 -3 ml 0.5% Bupivacaine and 60 – 90 micrograms of Buprenorphine – as per the attending anaesthetist's discretion. Intra-operative sedation, if required, was provided with injection Midazolam IV, titrated to effect.

Patients in Group 'E' had a lumbar epidural catheter (22G, Multi-orifice) placed at L1 – L2 or L2 – L3 (best available) intervertebral space. The catheter was placed with the patient seated, before giving the spinal anaesthetic. "Loss of Resistance to Air" technique with 18G Tuohy needle (Perifix™, B. Braun Melsungen) was used and 5 cm of the catheter was left in-situ. A test dose of 3 ml solution of 2% Lidocaine with 5 mcg/ml adrenaline was given to rule out intra-thecal and intra-vascular placement of the catheter. However, the epidural catheter was not activated till at the end of the surgery.

Patients in Group 'T' received bilateral TAP block at the end of the surgery. The Block was given using O'Donnell's "Two 'pop' technique" with a 16G IV cannula (Venflon™, Becton and Dickinson) whose stylet had been blunted at the tip by striking it over a sterile surface. After injecting the local anaesthetic solution, the stylet was removed and the 16G cannula was left in situ. The cannula was secured in place using waterproof "Duropore™" plaster (3M Healthcare). In case the patient experienced pain during the surgery, they were considered to have been dropped out of the study as an alternative technique to spinal anaesthesia would have to be used. Patients in group "E" had the epidural activated with 0.25% Bupivacaine while patients in Group "T" were induced to general anaesthesia.

At the end of the surgery, Group E received 10 ml of 0.125% Bupivacaine (0.5% Anawin™, Neon Laboratories diluted with Normal Saline) in the epidural catheter while group T received 20 ml of 0.125% Bupivacaine on each side (during placement of the block). Subsequent top-ups of the same dosage were given at eighth hourly intervals. IV

Paracetamol 1 gram and IV Tramadol 50 mg were prescribed as the first and second rescue analgesics, respectively. Patients were assessed for pain at 8, 16, 24- and 48-hours post-operative.

Assessment of pain was done using-

1. VAS score for pain at rest.
2. VAS score for pain on coughing.
3. Consumption of rescue analgesic.

Additionally, blood pressure, heart rate and respiratory rate were also recorded when top-ups were given, as a part of institutional protocol.

Statistical Methods

Owing to the discrete nature of the measured data along with divisibility into a small number of categories made it appropriate to use non-parametric analysis. Thus the Chi-square test was used to obtain the results. In doing so, it was imperative that each category should not have less than 20% of the total number. Wherever this was violated that category was clubbed with the next higher or next lower category, as appropriate.

For ease of calculation, VAS scores of the patient were grouped into 4 categories-

1. Nil = VAS score 0
2. Mild = VAS score >0 - 3
3. Moderate = VAS score >3 - 6
4. Severe = VAS score >6 - 10

The descriptive statistics for the continuous independent variables of patient data was analysed using ‘T’ test.

Assumptions made on data-

1. The variables are normally distributed.
2. Samples drawn from the population are random.
3. The samples taken are unrelated.

The statistical software used was Statistical Package for Social Sciences (SPSS) version 20, 2011 (IBM).

RESULTS

Out of the 72 patients selected, 69 completed the trial, 36 in the epidural group and 33 in the TAP block group. In two of the patients in the TAP block group, the case had to be converted to General Anaesthesia as the anaesthesia was inadequate while in one of the patients, the catheter became dislodged after the patient had been shifted back to the ward. Data was compared for demographics, VAS score at 8, 16, 24 and 48 hours. Consumption of Paracetamol in the first 24 hours and total Paracetamol consumption were also compared. A similar comparison was made for Tramadol consumption in the first 24 hours as well as total consumption.

Demographic Data

No statistically significant difference was found in the age, sex, ASA Physical Status, weight, height and BMI of the patients. Also, the baseline pulse rate, respiratory rate and

mean arterial pressure were no different between the two groups.

		Gender		Total
		Male	Female	
Epidural	Count	7	29	36
	%	19.4%	80.6%	100.0%
TAP	Count	3	30	33
	%	9.1%	90.9%	100.0%
Total	Count	10	59	69
	%	14.5%	85.5%	100.0%

Table 1. Sex Distribution in Both the Groups

Degrees of freedom: 1, 'p' value: 0.222.

		N	Mean	Std. Deviation	Std. Error Mean
Age	Epidural	36	46.03	11.958	1.993
	TAP	33	40.52	11.732	2.042
Weight	Epidural	36	63.50	6.575	1.096
	TAP	33	62.03	6.536	1.138
Height	Epidural	36	162.11	5.075	.846
	TAP	33	160.30	3.610	.628
Heart rate baseline	Epidural	36	80.94	7.950	1.325
	TAP	33	80.48	6.462	1.125
Respiratory Rate Baseline	Epidural	36	16.72	2.711	.452
	TAP	33	16.48	3.163	.551
systolic BP Baseline	Epidural	36	127.22	11.276	1.879
	TAP	33	123.15	11.281	1.964
Diastolic BP Baseline	Epidural	36	80.61	6.741	1.124
	TAP	33	78.36	6.717	1.169

Table 2. Comparison of Age, Height, Weight, Baseline Pulse Rate, Baseline Blood Pressure, Baseline Respiratory Rate in Both the Groups

Comparison of BMI between the Two Groups			
		Mean	Std. Deviation
BMI	Epidural	24.1320	1.93492
	TAP	24.1189	2.22066

Degrees of freedom: 63.79 P value: 0.979

Comparison of ASA Physical Status between the Groups				
		ASA_PS		Total
		ASA PS 1	ASA PS 2	
Epidural	Count	23	13	36
	%	63.9%	36.1%	100.0%
Total	Count	43	26	69
	%	62.3%	37.7%	100.0%

Degrees of freedom: 1 P value: 0.779

Table 3. Comparisons of BMI and ASA Physical Status between the Groups

Duration	Procedure	VAS Score			Total	
		Nil	Mild	Moderate		
8 hours	Epidural	Count	29	6	1	36
		%	80.6%	16.7%	2.8%	100.0%
	TAP	Count	23	7	3	33
		%	69.7%	21.2%	9.1%	100.0%
	Total	Count	52	13	4	69
		%	75.4%	18.8%	5.8%	100.0%
16 hours	Epidural	Count	30	5	1	36
		%	83.3%	13.9%	2.8%	100.0%
	TAP	Count	24	8	1	33
		%	72.7%	24.2%	3.0%	100.0%
	Total	Count	54	13	2	69
		%	78.3%	18.8%	2.9%	100.0%
24 hours	Epidural	Count	33	2	1	36
		%	91.7%	5.6%	2.8%	100.0%
	TAP	Count	17	16	0	33
		%	51.5%	48.5%	0.0%	100.0%
	Total	Count	50	18	1	69
		%	72.5%	26.1%	1.4%	100.0%
48 hours	Epidural	Count	31	-	5	36
		%	86.1%	-	13.9%	100.0%
	TAP	Count	18	-	15	33
		%	54.5%	-	45.5%	100.0%
	Total	Count	49	-	20	69
		%	71.0%	-	29.0%	100.0%

Table 4. Comparison of VAS Score at Rest at 8 Hours, 16 Hours, 24 Hours, and 48 Hours

The distribution of VAS pain scores at rest was comparable in both the groups at the end of 8 hours post-operative. The distribution of VAS pain scores at rest was comparable in both the groups at the end of 16 hours post-operative. At the end of the first 24 hours, the epidural group was found to have better pain scores at rest with a significantly more percentage of the patients reporting a nil pain and a small percentage reporting mild to moderate pain. On the other hand, the TAP block group showed a smaller percentage of patients with nil pain and a significantly higher proportion of patients reporting mild pain. At the end of 48 hours, the epidural group still has a significantly better outcome with a higher proportion of patients reporting nil pain at rest and a lower proportion reporting mild pain at rest.

Duration	Procedure	VAS Score on Coughing					Total
		Nil	Mild	Moderate	Severe		
8 hours	Epidural	Count	24	10	2	0	36
		%	66.7%	27.8%	5.6%	0.0%	100.0%
	TAP	Count	11	11	10	1	33
		%	33.3%	33.3%	30.3%	3.0%	100.0%
	Total	Count	35	21	12	1	69
		%	50.7%	30.4%	17.4%	1.4%	100.0%
16 hours	Epidural	Count	20	13	2	1	36
		%	55.6%	36.1%	5.6%	2.8%	100.0%
	TAP	Count	8	23	2	0	33
		%	24.2%	69.7%	6.1%	0.0%	100.0%
	Total	Count	28	36	4	1	69
		%	40.6%	52.2%	5.8%	1.4%	100.0%
24 hours	Epidural	Count	18	17	0	1	36
		%	50.0%	47.2%	0.0%	2.8%	100.0%
	TAP	Count	4	22	7	0	33
		%	12.1%	66.7%	21.2%	0.0%	100.0%
	Total	Count	22	39	7	1	69
		%	31.9%	56.5%	10.1%	1.4%	100.0%
48 hours	Epidural	Count	26	9	1	-	36
		%	72.2%	25.0%	2.8%	-	100.0%
	TAP	Count	10	18	5	-	33
		%	30.3%	54.5%	15.2%	-	100.0%
	Total	Count	36	27	6	-	69
		%	52.2%	39.1%	8.7%	-	100.0%

Table 5. Comparison of VAS Score on Coughing at 8 Hours, 16 hours, 24 hours, and 48 hours

A statistically significant difference was noted between the two groups in the distribution of pain scores in the first 8 hours post-operatively. The epidural group had a higher proportion of patients with no pain on coughing and a smaller proportion with mild to severe pain on coughing as compared to the TAP block group. At 16 hours post-operative, the pain scores on coughing were significantly different. While the epidural group reported a higher proportion of patients with nil pain, the TAP block group had a higher proportion of patients reporting a mild pain. The incidence of moderate pain was comparable. At 24 hours post-operative, the results were similar to those at 16 hours post-operative. There was a slight variation with a rise in the patients reporting mild pain on coughing in the epidural group but no patient reporting moderate pain. On the other hand, there was an increase in the TAP block group patients reporting moderate pain. Overall, the epidural group patients did significantly better. On the second post-operative day, at 48 hours the epidural group was still found to be doing significantly better with a higher proportion of patients reporting no pain on coughing with a small minority complaining of mild pain while a negligible fraction of patients complaining of moderate pain. In the TAP block group, majority of the patients complained of mild pain and a sizeable number of patients even reported moderate pain.

At the end of 24 hours Consumption of Paracetamol was no different between the two groups studied. A majority of the patients were noted to have required 1–2 gm of Paracetamol for the additional analgesia. At the end of 48 hours, there was no significant difference in the Paracetamol requirements between the groups. However, all patients eventually required Paracetamol in the TAP group while some patients in the epidural group found analgesia sufficient without additional requirements.

Duration	Procedure	Paracetamol Consumption (gm)					
		0	1	2	3	4	
24 hours	Epidural	Count	5	16	14	1	-
		%	13.9%	44.4%	38.9%	2.8%	-
	TAP	Count	3	15	11	4	-
		%	9.1%	45.5%	33.3%	12.1%	-
	Total	Count	8	31	25	5	-
		%	11.6%	44.9%	36.2%	7.2%	-
48 hours	Epidural	Count	5	14	14	3	0
		%	13.9%	38.9%	38.9%	8.3%	0.0%
	TAP	Count	0	13	12	6	2
		%	0.0%	39.4%	36.4%	18.2%	6.1%
	Total	Count	5	27	26	9	2
		%	7.2%	39.1%	37.7%	13.0%	2.9%

Table 6. Comparison of Paracetamol Consumption in 24 hours and 48 hours

DISCUSSION

As our understanding of pain and the pathophysiology of the post-operative period has improved, the importance of adequate management of post-operative pain is increasingly being appreciated. As has been discussed, inadequate analgesia has implications which range from patient discomfort and dependence to cardiovascular and respiratory complications. In this setting, regional anaesthetic techniques have assumed great importance.

For open abdominal surgeries, epidural anaesthesia has been established to provide excellent analgesia combined with attenuation in the stress response to surgery as well as in the neurogenic contribution to inflammation. However, epidural analgesia comes with its own set of complications. By blocking thoraco-lumbar sympathetic outflow, epidural anaesthesia causes hypotension and bradycardia. Additionally, patients with mild to moderate derangements in coagulation profile or platelets are unable to reap the benefits of analgesia provided by neuraxial techniques owing to the risk of epidural haematoma. Thus it becomes necessary to explore alternative approaches to post-operative analgesia.

Since its introduction, several studies have been done on the efficacy of TAP block. Carney John, McDonnell, John G (5) et al compared single shot pre-incisional TAP block using Ropivacaine against placebo in patients undergoing abdominal hysterectomy under general anaesthesia. They found a significant reduction in post-operative VAS scores in the TAP block group vs. placebo. The 48 hour IV PCA morphine consumption was also found to be significantly lower in the TAP Block group (27±20 mg) vs. that in the placebo group (55±17 mg, P<0.001).

Tan, Terry T.; Teoh, Wendy H.L.; Woo, David CM et al(10) performed a similar study comparing efficacy of bilateral TAP block with Levobupivacaine against no block in women

undergoing caesarean delivery under general anaesthesia. Though the pain scores were comparable between the groups, 24 hour morphine consumption was noted to be significantly lower (12.3 ± 2.6 mg vs. 31.4 ± 3.1 mg, $p < 0.001$). Patient satisfaction was also much better with TAP Block (80% vs. 25% , $p = 0.012$).

On the other hand, Kanazi, Ghassan E; Aouad, Marie T; Abdallah, Faraj W. et al⁽¹¹⁾ compared subarachnoid morphine with TAP block in post caesarean section pain. They primarily evaluated the time to first request for analgesia while secondarily they looked at consumption of Tramadol (rescue analgesic) in first 12 hours. The results favoured intrathecal morphine wherein median (range) time to first request for analgesic was 8 (2–36) hours compared to 4 (0.5–29) hours in the TAP group ($p = 0.005$). Even the Tramadol consumption was shown to be significantly lower in the Subarachnoid morphine group (0-1 vs. 0-2, $p = 0.03$)

However, in all these studies, the efficacy of “single shot” TAP Block was investigated. In the “single shot” TAP block, the duration of analgesia is limited by the duration of action of the drug injected and lasts for only a few hours. However, the analgesic requirements in the post-operative period can range from several hours to a few days. This problem can be circumvented, by placing catheters in the TAP space. Catheters enable to prolong the duration of analgesia either by using repeated intermittent boluses or by using continuous infusions of the drug.

L. Bollag, P. Richebe, C. Ortner and R. Landau⁽¹²⁾ published a series of 5 cases where they placed bilateral ultrasound guided TAP block catheters in patients who had undergone caesarean section. They concluded that repeated local anaesthetic dosing through the TAP block catheters maybe a viable alternative or a valuable adjunct to Morphine for post-operative analgesia.

A similar case series was published by Jankovic, Zorica B; Pollard, Stephen G. and Nachiappan, Meyyappan M.⁽¹³⁾ wherein 7 patients were provided post-operative analgesia after renal transplant surgery using continuous local anaesthetic infusion through surgically placed TAP block catheters. The data from these patients was retrospectively compared with previous cases who had received IV PCA Morphine only. They reported 80% reduction in 24 hour morphine consumption and early cessation of IV PCA in the patients who had received TAP block.

Rao V Kadam and J B Field⁽¹⁴⁾ compared continuous local anaesthetic infusion through TAP catheters against PCA Fentanyl in patients undergoing abdominal surgery. Post-operative median pain score was significantly lower in the TAP block group in the first 24 hours (2 vs. 6) as well as in the next 24 hours (2 vs. 7) with P values 0.02 and 0.01 respectively. Fentanyl consumption was also lower: 78mcg vs. 203 mcg on the first day and 664 mcg vs. 1237 mcg on the second day ($p = 0.03$ and 0.01 , respectively).

In a second study, Rao V Kadam, Van Wijek RM, Moran JI and Miller D⁽¹⁵⁾ compared bilateral TAP Block local anaesthetic infusion via catheters against continuous local anaesthetic infusion via epidural in patients undergoing abdominal surgery. The authors found the post-operative VAS scores, Paracetamol and Fentanyl consumption were comparable between the two groups.

A study performed by H. Vandendriessche, Y Hoydonckx, A. Pexters and M. Van de Velde⁽¹⁶⁾ compared bilateral transverses abdominis catheter infusion of Levobupivacaine against epidural infusion with Levobupivacaine with Sufentanil. On the basis of VAS scores at rest and on coughing, they concluded that the quality of analgesia was comparable in the two groups with VAS score at rest 15 ± 12 in the TAP block vs. 4 ± 8 in the epidural group while the VAS scores on coughing were 48 ± 18 and 32 ± 21 , respectively.

In our study, we have compared the efficacy of bilateral TAP block catheters against epidural analgesia over 48 hours in patients undergoing lower abdominal surgery. Unlike in other studies, we have used intermittent boluses of local anaesthetic instead of continuous infusions.

Lower abdominal surgeries were chosen because the TAP block is known to anaesthetize 9th to 12th thoracic nerves along their course in the anterior abdominal wall. This would be adequate for infra-umbilical abdominal surgeries. To avoid the confounding effect of bilateral effect of epidural analgesia, surgeries with bilateral incisions, midline incisions or incisions crossing the midline were chosen and bilateral TAP block was used in the comparison.

Bupivacaine is a popular choice of local anaesthetic for post-operative analgesia and as such is the most common choice in our institution. Owing to its ease of availability, familiarity of use at our institution and low cost, it was used in the study. Intravenous Paracetamol and Tramadol are also commonly used analgesics at our institution in the post-operative period.

Most of the lower abdominal surgeries at our institution are performed under spinal anaesthesia. The drug used is 0.5% (heavy) Bupivacaine with Buprenorphine. Thus, the same technique was utilized for anaesthesia in the present study. To avoid the confounding effect of the profile of post-operative analgesia with General Anaesthesia and Spinal Anaesthesia, cases done under general anaesthesia were excluded from the study.

The decision to give intermittent boluses of local anaesthetic over continuous infusions was taken due to the issue of cost constraints raised by the ethics committee. Based on the same concerns of cost, commercially available regional anaesthesia catheters were eschewed in favour of 16G cannulas. At our institution, we routinely use IV cannulas to perform regional blocks using fascial “pop” techniques with satisfactory results.

The epidural catheter was placed at the time of administering the spinal anaesthetic for convenience. The TAP block cannulas were placed after the surgery to avoid them from posing a hindrance in the operative field. To compensate for the discrepancy in the timing of administration of the actual drug, the epidural administration of the drug was also done in the post-operative period.

The concentration of Bupivacaine injected was the same at 0.125% while the volume was 10 ml in the epidural group and 20 ml on each side i.e. 40 ml in the TAP block group. The volume was meant to allow adequate spread of the local anaesthetic to cover roughly equivalent dermatomes.

On analysis, both the groups were found to be comparable in their composition in terms of age, sex, height, weight, ASA Physical status, baseline heart rate, blood pressures and respiratory rate. In the first 8 and 16 hours, the VAS pain scores at rest and on coughing were comparable between the two groups.

However, the patients in the epidural group had better VAS scores at 24 and 48 hours with 91.7% and 86.1% of the patients in the epidural group pain free at 24 hours and 48 hours, respectively. In the TAP block group, the corresponding percentage of the patients being 51.5% and 45.5%, respectively. The P values for this comparison were <0.001 and 0.004, respectively.

The consumption of Paracetamol (first rescue analgesic) at 24 and 48 hours was comparable between the groups. However, the consumption of Tramadol (second rescue analgesic) was significantly higher in the TAP block group at the end of 24 hours as well as at the end of 48 hours. In the epidural group, 94.4% of the patients did not require Tramadol at the end of 24 hours as well as at the end of 48 hours. In comparison, only 63.6% and 60.6% of the patients in the TAP Block group did not require a second rescue analgesic at the end of 24 and 48 hours, respectively. Further, in the TAP Block group 33.3% and 36.4% of the patients required 50 mg Tramadol at the end of 24 and 48 hours, respectively. 3% of the patients required 100 mg Tramadol at the end of 24 hours as well as 48 hours. In comparison, none of the patients in the Epidural group required 2 doses of Tramadol over the entire 48 hour period. This indicates that the Epidural group patients experienced better analgesia.

None of the patients in either group had any complications arising from the regional technique. Both groups of patients were haemodynamically stable during the 48 hours of follow-up.

CONCLUSIONS

Analgesia with epidural as well as with continuous TAP Block at 8th hourly bolus dosing of 0.125% Bupivacaine in patients undergoing lower abdominal surgeries is comparable in the first 8 to 16 hours. However, the quality of analgesia provided by the TAP Block catheter is inferior to that provided by epidural catheters beyond 24 hours post-operative period.

ACKNOWLEDGEMENT

I am thankful to the Institution, the Department of Anaesthesiology, the patients who participated in the study, and the staff of operating theatres.

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