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Postoperative analgesia after major abdominal gynaecological surgery using surgical transversus abdominis plane block

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Abstract
Background: Gynecological surgeries are often associated with severe pain requiring a well-planned analgesia regimen to ensure adequate patient-comfort, satisfaction, early mobilization, and to decrease the hospital/post-anesthesia care unit (PACU) stay. Transversus abdominis plane (TAP) block is the technique to block the sensory nerves of the anterior abdominal wall and the TAP block has been used to control the pain after abdominal surgery in many cases. By incorporating TAP block in post-operative management, it may be possible to decrease narcotic use while also avoiding some of the potential side effects of neuraxial anesthesia such as respiratory depression and risk of spinal hematoma.
Methods: In the present study, sixty patients undergoing major gynaecological surgeries were included. The study participants were divided into 2 groups of 30 each. One group received TAP block.
Results: Among 60 patients, the mean age of the study participants was found to be 48.53±8.97 years. Only 22% of the study participants had the history of previous surgery. 80 % of the study participants underwent Total Abdominal Hystrectomy (TAH). In the present study, the overall mean hourly VAS score among Group 2 (No TAP block) was found to be lower than Group 1 (TAP block) at all hours. The mean time of rescue analgesia in Group 1 was found to be 12.30±6.87 hours. The mean time of rescue analgesia in Group 2 was found to be 2.8±1.49 hours.
Conclusions: Surgical TAP block has been proved to cater significant analgesic effect especially below T10 up to L1 level; hence, it is perfectly suited for use after lower abdominal and gynecological surgeries. Prolonged analgesic effect can be achieved by continuous blockade using catheter for drug delivery, but it is technically more demanding. This study reinforces the recommendation for TAP as a part of multimodal post-operative analgesic regimen.

Keywords: Surgical TAP block, total abdominal hystrectomy, post-operative analgesic, rescue analgesia, VAS score

Introduction
Gynecological surgeries are often associated with severe pain requiring a well-planned analgesia regimen to ensure adequate patient-comfort, satisfaction, early mobilization, and to decrease the hospital/post-anesthesia care unit (PACU) stay [1]. These patients require a multimodal postoperative pain treatment regimen that provides high quality analgesia with minimal side effects. The usual trend is to prescribe an opioid or a NSAID for postoperative analgesia. Opioids, such as morphine, delivered using a patient-controlled analgesia (PCA) device, remain the mainstay of postoperative analgesic regimens for patients post-major abdominal gynaecological surgeries. However, the use of opioids can result in significant adverse effects, including sedation, nausea, and vomiting [2, 3]. NSAIDs can cause renal dysfunction, alteration in haemostasis, gastrointestinal haemorrhage, etc.
Transversus abdominis plane (TAP) block is the technique to block the sensory nerves of the anterior abdominal wall and the TAP block has been used to control the pain after abdominal surgery in many cases [4-8]. It was introduced by Rafi [9] and involves injection of local anesthetics into the lumbar triangle of Petit. TAP block may be an effective component of a multimodal approach to pain management in the postoperative period in patients undergoing open gynecologic surgery. By incorporating TAP block in post-operative management, it may be possible to decrease narcotic use while also avoiding some of the potential side effects of neuraxial anesthesia such as respiratory depression and risk of spinal hematoma [10].

In this study, we evaluated the degree of pain and additional analgesic requirements when the ultrasound-guided transversus abdominis plane block (US-TAP block), as part of a multimodal analgesic regimen, was performed in patients undergoing gynecological surgery through a transverse lower abdominal skin incision. This was compared to standard care including patient-controlled analgesia with nonsteroidal anti-inflammatory drugs and opioids.

Objective of the study

1. To study the Visual Analogue Score (VAS) for pain relief following surgical TAP block.
2. To study the need for rescue analgesia following surgical technique for TAP block in first twenty-four hours following major gynaecological surgery.

Methodology

- **Study Design:** Randomized control trial study
- **Study Duration:** 24 months (September 2020 -August 2022)
- **Study Area:** MVJ Medical College and Research Hospital, Bangalore.
- **Study Participants:** Women undergoing major abdominal gynaecological surgery in MVJ Medical College and Research Hospital, Bangalore.

Inclusion Criteria

1. Women undergoing major abdominal gynaecological surgery in MVJ Medical College and Research Hospital, Bangalore.

Exclusion Criteria

1. History of allergy to the study drug (Bupivacain)
2. Surgery done under combined spinal and epidural anesthesia

Estimation of sample size

On the basis of statistics obtained from Department of Obstretics & Gynaecology, M.V.J. Medical College and Research Hospital, an average of 3 cases per month fitting the criteria of the study with study duration of 24 months, we can expect to have N=72. Based on this population size, using YAMANE equation, for a known population size, sample size (n) equal to

n =N/1+Ne2

n=sample size

N=population size

e= margin of error (for 95% of confidence level, margin error = 0.05)

n=72/1+72*0.05*0.05 = 72/1.18 = 60.12

Therefore after approximating, the sample size of the study participants was fixed at 60. The patients were divided into 2 groups of 30 participants each with Group 1 including participants receiving surgical TAP block and group 2 including participants serving as control group.

Results

Table 1: Distribution of the study participants according to their age group

Age	Frequency N	Percentage %
31- 40 years	12	20
41 - 50 years	25	42
51 - 60 years	16	27
> 60 years	7	11
Mean ± S.D	48.53±8.97	

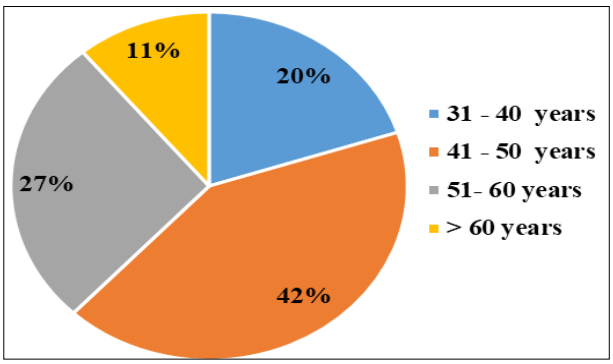

Fig 1: Distribution of the study participants according to their age group

Majority of the study participants belonged to the age group between 41-50 years (42%) of age. The mean age of the study participants was found to be 48.53±8.97 years.

Table 2: Distribution of the study participants according to their BMI

BMI	Frequency N	Percentage %
18 - 24.9 kg/m^2	2	3
25.0 - 29.9 kg/m^2	14	23
$\geq$ 30.0 kg/m^2	44	74
MEAN±S.D	31.98±4.05	

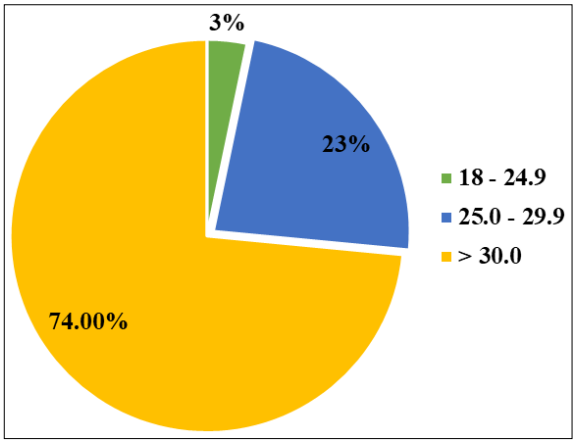

Fig 2: Distribution of the study participants according to their BMI

As seen from the above figure 13, Majority of the study participants had BMI ≥ 30 kg/m^2 (74%). 23% of study participants had BMI in the range of 25.0 - 29.9 kg/m^2. The mean BMI among the study participants was found to be 31.98±4.05 kg/m^2.

Table 3: Distribution of the study participants according to their parity

Parity	Frequency N	Percentage %
1	3	5
2	39	65
3	15	25
4	3	5
Mean ± S.D	2.30±0.64	

65% of the study participants had 2 children and 25% of the study participants had 3 children. The mean parity among the study participants was found to be 2.30±0.64

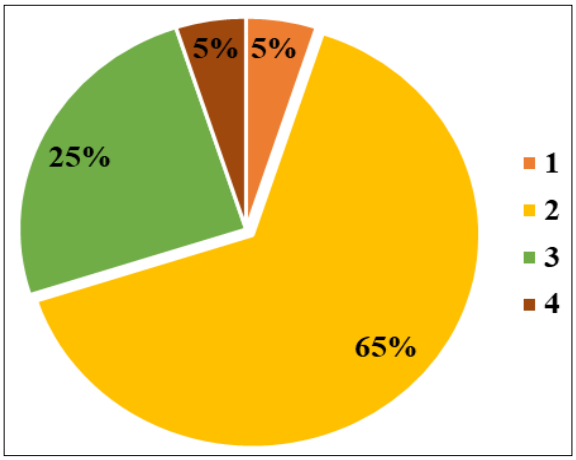

Fig 3: Distribution of the study participants according to their parity

Table 4: Distribution of the study participants according to their history of previous surgery

Previous surgery	Frequency N	Percentage %
Yes	13	22
No	47	78

Majority of the study participants did not have history of previous surgery (78%). Only 22% of the study participants had the history of previous surgery.

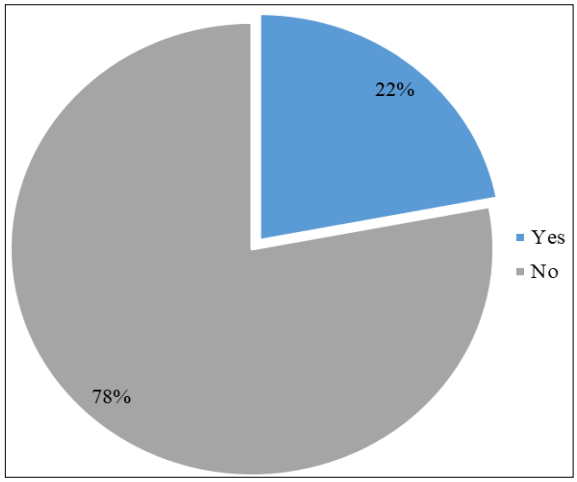

Fig 4: Distribution of the study participants according to their history of previous surgery:

Table 5: Distribution of the study participants according to the type of gynaecological surgery performed

Type of gynaecological surgery	Frequency N	Percentage %
Tah	48	80
Cystectomy	12	20

80 % of the study participants underwent Total Abdominal Hystrectomy (TAH). Only 20% of study participants underwent Cystecomy.

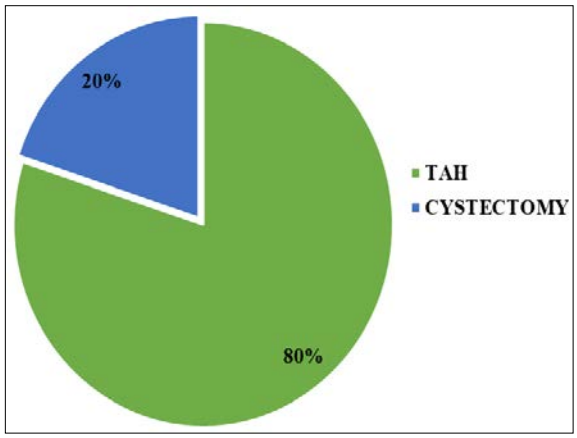

Fig 5: Distribution of the study participants according to type of gynaecological surgery performed

Table 6: VAS score among the study population

VAS Score	Group 1		Group 2		P Value
	Mean	Std. Deviation	Mean	Std. Deviation	
VAS at 1 HR	1.43	0.80	2.7	1.1	0.000
VAS at 2 HR	1.63	0.70	3	0.85	0.000
VAS at 4 HR	1.86	0.76	2.93	0.85	0.000
VAS at 6 HR	2.5	0.80	2.63	0.70	0.415
VAS at 12 HR	2.43	0.66	3	0.89	0.024
VAS at 24 HR	2	0.52	2.16	0.37	0.083

The above table 9 depicts postoperative visual analog scale at various hours among the two groups. Maximum VAS score in group 1 was recorded at 6th hour with the mean VAS score of 2.5±0.80. Maximum VAS score in group 2 was recorded at 12th hour with the mean VAS score of 3±0.89. The difference in VAS scores at 1, 2, 4 and 12th hours between the 2 groups was found to be statistically significant.

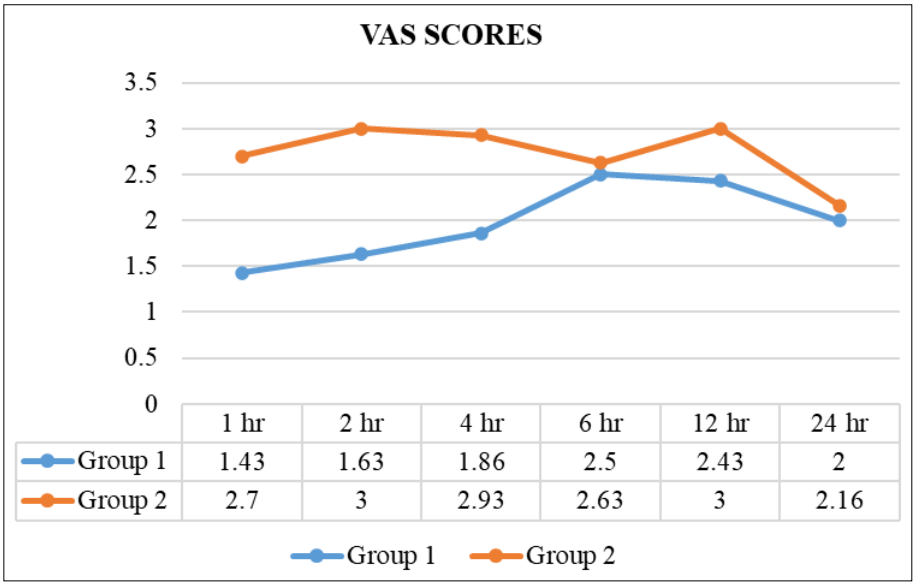

Fig 6: Line diagram depicting the mean hourly VAS scores among the study participants

The above figure depicts the hourly mean VAS scores among the study participants in the 2 groups. In the present study, the overall mean hourly VAS score among Group 2 (No TAP block) was found to be lower than Group 1 (TAP block) at all hours.

Table 7: Distribution of the study participants according to the time of Recue analgesia

Time of rescue analgesia	Group 1	Group 2	P value
	Frequency N	Frequency N	
< 6 hours	3	29	0.000
6-11 hours	13	1	
12-17 hours	7	0	
18-24 hours	7	0	
TOTAL	30	30	
MEAN ± S.D	12.30±6.87	2.8±1.49	

Most of the study participants in Group 1 had their rescue analgesia between 6-11 hours (n=13). Majority of the study participants in Group 2 had their rescue analgesia within less than 6 hours (n=29). The mean time of rescue analgesia in Group 1 was found to be 12.30±6.87 hours. The mean time of rescue analgesia in Group 2 was found to be 2.8±1.49 hours. The difference in the time of rescue analgesia between the two groups is found to be statistically significant.

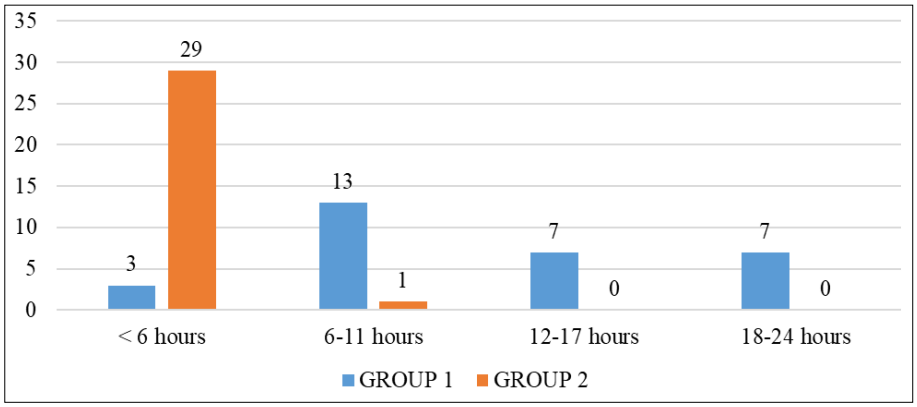

Fig 7: Distribution of the study participants according to the time of Recue analgesia

Discussion

This study included 60 study participants, undergoing major abdominal gynaecological surgery in MVJ Medical College and Research Hospital, Bangalore to study the Visual Analogue Score (VAS) for pain relief following surgical TAP block and also the need for rescue analgesia following surgical technique for TAP block in first twenty-four hours following major gynaecological surgery. 30 patients receiving TAP block were categorised as group I and the other 30 patients receiving standard analgesia protocol were categorised as group II.

Age of the study participants

In the present study, Majority of the study participants belonged to the age group between 41-50 years (42%) of age. The mean age of the study participants was found to be 48.53±8.97 years. Based on a study done by Randombagea P *et al*., the mean age of the study participants was found to be 51.98±8.36 years which is almost similar to the findings of the present study.

BMI of the study participants

In the present study, Majority of the study participants had BMI ≥ 30 kg/m^2 (74%). 23% of study participants had BMI in the range of 25.0 - 29.9 kg/m^2. The mean BMI among the study participants was found to be 31.98±4.05 kg/m^2. In a study done by Mowafi MM *et al*., the mean BMI among the study participants was found to be 44.8±1.3, which is higher than the findings of the current study. This could be attributed to the different study settings and that the latter study was predominantly on morbid obese individuals. In a study done by Dai C *et al*., the mean BMI among the study participants was found to be 31.20±6.09, which is similar to the findings of the present study. The problem of obesity can make an additional burden on anaesthesiologists and surgeons to search for the best modalities in order to achieve a safe perioperative care and enhanced recovery. In obese patients, the performance of TAP block can be challenging due to excessive subcutaneous fat and increased depth of TAP. It is recommended that USG-TAP block is performed under real-time ultrasound guidance in obese patients. [Toshniwal G].

Parity of the study participants

In the present study, 65% of the study participants had 2 children and 25% of the study participants had 3 children. The mean parity among the study participants was found to be 2.30±0.64. In a study done by Calle GA *et al*., the mean parity among the study participants was found to be 2.04±1.01, which is similar to the present study.

History of previous surgery among the study participants

In the present study, Majority of the study participants did not have history of previous surgery (78%). Only 22% of the study participants had the history of previous surgery. In a study done by Chang H *et al*., 53.4% of the study participants had history of history of previous abdominal surgery.

The type of gynaecological surgery performed on the study participants

In the present study, 80 % of the study participants underwent Total Abdominal Hystrectomy (TAH). Only 20% of study participants underwent Cystecomy. In a study done by Ranjit S *et al*., majority of the study participants underwent total abdominal hysterectomy. Hysterectomy is one of the most frequently performed surgical procedures during reproductive ages in many countries worldwide after caesarean section. The high prevalence of hysterectomy in many parts of the country suggested conducting in-depth studies, considering the life cycle approach and providing counselling and education to women about their reproductive rights and informed choice.

Vas scores among the study participants

In the present study**,** Maximum VAS score in group 1 was recorded at 6th hour with the mean VAS score of 2.5±0.80. Maximum VAS score in group 2 was recorded at 12th hour with the mean VAS score of 3±0.89. The overall mean hourly VAS score among Group 2 (No TAP block) was found to be lower than Group 1 (TAP block) at all hours. [Figure] In a study done by Dai C *et al*., the overall mean hourly VAS score among Group 2 (No TAP block) was found to be lower than Group 1 (TAP block) at all hours except at the 24th hour where the Pain experienced by Group receiving TAP block was higher than the group which dint receive TAP block. In the present study**,** the difference in VAS scores at 1, 2, 4 and 12th hours between the 2 groups was found to be statistically significant. In a study done by Dai C *et al*., it was concluded that TAP block did not provide superior analgesic efficacy, which is in contrast with the findings of the present study. A study done by Randombagea P clearly identified the potentiality of reducing the post-operative analgesic requirement by administrating TAP blocks, which is similar to the findings of the present study. A study done by Sivapurapu V concluded that Transversus abdominis plane block proved to be an effective means of analgesia for lower abdominal surgeries with minimal side-effects, which is consistent with the findings of the present study.

Time required for rescue analgesia among the study participants of 2 groups

In the present study, most of the study participants in Group 1 had their rescue analgesia between 6-11 hours (n=13). Majority of the study participants in Group 2 had their rescue analgesia within less than 6 hours (n=29). The mean time of rescue analgesia in Group 1 was found to be 12.30±6.87 hours. The mean time of rescue analgesia in Group 2 was found to be 2.8±1.49 hours. The difference in the time of rescue analgesia between the two groups is found to be statistically significant. In the study done by Owen D *et al.*, the time requirement of rescue analgesia was significantly higher in the group which received TAP block, which is consistent with the findings of the present study. In a study done by Suner Z *et al.*, the need for additional analgesic and VAS values were lower in TAP block group, which is similar to the findings of the present study. In a study done by Saxena A *et al.*, The TAP block reduced postoperative pain scores and postoperative opioid requirements, which is consistent with the findings of the present study.

Conclusion

Regional anaesthesia has become an important tool in our armamentarium for tackling post-operative pain. Newer techniques like TAP block and its variations including continuous or catheter-based approaches need to be evaluated in order to provide us a range of options to suit the variety of patients we care for. Our study demonstrates that as a part of multimodal analgesia, intermittent boluses of Bupivacaine administered through TAP Block catheters do provide satisfactory pain relief to patients after lower abdominal gynaecological surgery, especially in the first 24 hours of the post-operative period.

Conflict of Interest

Not available

Financial Support

Not available

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