Section: Anesthesia

Original Research Article

EVALUATING PAIN MANAGEMENT STRATEGIES AFTER TOTAL ABDOMINAL HYSTERECTOMY: A RANDOMIZED CONTROLLED TRIAL OF TRANSVERSUS ABDOMINIS PLANE BLOCK AND LOCAL ANAESTHETIC WOUND INFILTRATION

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Abstract

Background: Postoperative pain management is crucial for successful recovery from surgery. TAP block and LWI are two regional anesthesia techniques used as adjuncts to multimodal postoperative analgesia for lower abdominal surgeries. The objective is to compare the effectiveness of TAP block and LWI in managing postoperative pain in women undergoing TAH. **Materials and Methods:** This single-center, prospective, double-blinded, randomized controlled trial was conducted at Lautoka Hospital from February 1st, 2021, to July 31st, 2021. Thirty women booked for elective TAH were recruited and randomly assigned to parallel groups, either TAP block or LWI group. **Results:** The results showed that TAP block significantly reduced pain scores at rest at 1-hour postoperative period compared to LWI group. Additionally, TAP block resulted in significantly lower pain scores on movements including coughing, and hip flexion at various time intervals postoperatively. The results also showed that women in the TAP group had statistically significant reduction in the time to mobilize out of bed compared to women in LWI group. **Conclusion:** TAP block is more effective than LWI in managing postoperative pain in women undergoing TAH. This study supports the use of TAP block as a part of multimodal analgesic technique for postoperative pain management in women undergoing TAH.

INTRODUCTION

Hysterectomy is a common major gynecological surgery globally and Fiji is no exception.[1] Common ways in which hysterectomies are done include TAH, vaginal hysterectomy and laparoscopic hysterectomy. Postoperative pain in TAH with or without bilateral salpingo-oophorectomy (TAH +/- BSO) is often reported as a significant clinical problem with moderate to severe intensity.[2,3] Postoperative TAH pain can be divided into two components; visceral and somatic. The intensity, character and duration of postoperative TAH pain is influenced by both surgical and patient factors. The incidence of moderate or severe postoperative pain has been shown to be high (41% - 61%) in developed countries.[4] A meta-analysis of 165 studies (20000 patients) revealed that 30% and 11% of patients suffered moderate to severe and severe postoperative pain respectively.[5] A study done in South Africa showed even higher incidence of postoperative pain in a developing country setting with 62% of patients experiencing either moderate or severe pain during their first postoperative day.[4]

Adequate management of postoperative pain is essential for successful recovery from surgery. Adequate analgesia relieves suffering, promotes early mobilization and recovery, reduces postoperative complications, reduces length of hospital stay and improves patient satisfaction.[6] Inadequately treated pain can cause physiological, psychological, economic and adverse social effects.[6] Multimodal analgesia is a component of a multidisciplinary approach to pain management recommended by Enhanced Recovery After Surgery (ERAS) protocols.[7,8] The categories of multimodal analgesia include non-pharmacological methods, paracetamol, non-steroidal anti-inflammatories (NSAIDS), neuropathic agents, opioids and regional anaesthesia. Multimodal analgesia aims to maximize the positive aspects of treatment in relieving pain while reducing associated side effects.[7,8] TAP block

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is a regional anaesthesia technique used as an adjunct to multimodal postoperative analgesia for lower abdominal surgeries. It was first described by Rafi in 2001.[19] In this regional anaesthesia technique, local anaesthesia is deposited in the intermuscular fascial plane superficial to the transversus abdominis muscle. Initially, this block was performed with a blind landmark technique with identification of 'lumbar triangle of Petit' with variable results described in the literature.[10]

The extent of postoperative pain at Lautoka hospital was formerly an unknown entity as documentation of pain has traditionally been poor. In 2016, Dr. Onisimo, identified that postoperative TAH pain management is an ongoing major issue at Lautoka Hospital and needs improvement.[11] In this retrospective study, Dr. Onisimo looked at folders for postoperative pain documentation for patients who underwent elective intra-abdominal surgeries and found that there was no record of postoperative pain documentation in 71.6 % of surgical patient folders. The most common procedure in her study was TAH (55%) from which 32% of the cases had recorded pain.

The current practice at Lautoka hospital for the management of postoperative TAH pain is not standardized and thus some patients receive TAP blocks while others receive LWI as a part of multimodal postoperative analgesia. However, with some controversy in the literature, there is no available data locally to suggest which technique is superior in our population. Hence, this study is aimed to compare TAP block with LWI for postoperative pain management in women undergoing TAH at Lautoka Hospital.

The primary objective of this study is to assess pain levels at rest and with movement at specified time intervals, utilizing the numerical rating scale, to evaluate the efficacy of pain management strategies. Pain scores are recorded at 1 hour, 6 hours, 12 hours, 18 hours, and 24 hours post-intervention. The secondary objectives of this study are to investigate additional outcomes, including the time taken for patients to mobilize out of bed, as a measure of recovery and functional status. The length of stay in the post-anesthesia recovery unit (PARU) and postoperative hospital stay to assess the impact of pain management on patient outcomes and resource utilization.

MATERIALS AND METHODS

This study was a single-center, prospective, double-blinded, randomized controlled trial conducted at Lautoka Hospital, involving the Department of Anaesthesia, Critical Care and Pain Management Services and Department of Obstetrics & Gynecology. Lautoka Hospital is the only referral hospital in the Western division of Fiji and is managed by Health Care (Fiji) Pte Ltd, trading as Aspen Medical after the Fijian Government made a commitment to their people to modernize the local healthcare system in 2018/19 through a public private partnership.

The study took place from February 1st, 2021, to July 31st, 2021, and included women booked for elective total abdominal hysterectomy during this period. Participants were recruited from the Women Surgical Ward (WSW), where informed voluntary written consent was obtained before inclusion in the study. The intervention was performed in the Operation Theatre, and outcomes were measured in the Post-Anaesthesia Recovery Unit (PARU) and followed up in WSW until discharge from the hospital.

Ethics approval was obtained from the Fiji National University (FNU) - Centre for Health, Human Research Ethics Committee (CHHREC) and facility approval was granted from the medical superintendent of Lautoka Hospital before the study was commenced.

The sampling process involved targeting women undergoing total abdominal hysterectomy (TAH) at Lautoka Hospital between February 1st and July 31st, 2021. Inclusion criteria as shown in Table 1 were then applied to identify eligible participants, who were subsequently approached and recruited for the study. To determine the required sample size, a formula provided by the FNU Research Unit was used, taking into account the average of 2-3 TAH surgeries performed per week, equivalent to 10-12 surgeries per month. With a study duration of six months, the potential participant pool was estimated to be around 60-70 women. However, the calculated sample size revealed that a minimum of 28 participants would be sufficient to power the study adequately.

A total of 36 participants were assessed for eligibility to be enrolled. Three participants were excluded based on an ASA score of III. Hence, 33 participants were approached to participate. The TAP group had 17 participants and the LWI had 16 participants. A single participant was later excluded due to surgical complications in the TAP group. Both the groups had 1 participant each who had been lost to follow up due to missing information in the data collection sheet. Therefore, the results from 15 participants in each group were analyzed. The study began following full ethics approval. A summary of the recruitment process is summarized in Table 2.

Firstly, the women booked for elective TAH at Lautoka Hospital for the study timeframe as stated earlier were approached to voluntarily participate in this study. First contact was made with the participants once they were already admitted to Women Surgical Ward a day before their surgery by the researcher himself (or the facility supervisor in case the researcher was unable to meet the participants (few cases). The women were assessed for eligibility to participate in the study using the inclusion and exclusion criteria. The eligible women were informed about the study including the risks and the benefits, questions were answered, and their understanding was checked. Voluntary written consent was then sought. Women were also informed

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that they could withdraw from the study at any time. In the same meeting, the participants were informed that they would be randomized into one of the two parallel groups, and they would not be aware of their groups themselves as the study is double blinded. Education was provided on the pain assessment (use of Numerical Rating Scale) and management protocols including the multimodal analgesia approach and drugs used for the pain management. Any allergies to included drugs was checked as well. The participants of this study were randomized into two parallel groups, namely Group 1, also called TAP Group or Group 2 also called LWI Group. Participants in TAP Group received bilateral ultrasound guided TAP blocks while those in LWI Group received local anaesthetic wound infiltration (LWI). The process of randomization was carried out using computer generated randomization. The participants were assigned a unique code number for de-identification. The intervention allocation was concealed using identical opaque concealed envelopes. These envelopes were personally handed over to the anesthetist involved in the case on the day of surgery with specific instructions to maintain confidentiality and safe keeping of these envelopes throughout the day. These envelopes were personally collected at the end of the list for that day from the same Anesthetist. The envelopes were opened by the anesthetist once the patient was under general anaesthesia as the patients were blinded in the study. The content of the envelope included the treatment group allocation for the participant, instructions for the anesthetist, participant unique code number and the data collection sheet.

The outcome assessors were also blinded as it was not documented in the patients notes whether patient had received TAP block or LWI specifically, however, it was documented that patient had received "40 ml of 0.25% bupivacaine given as a regional anaesthesia as per study protocol" in the regional section of the anaesthetic chart. The handover to the PARU staff, ward staff and the pain team included that patient has received "regional anaesthesia as per study protocol". The documentation for records purpose, separate paper was used for documenting what method patient had received including the description of the technique which was kept in the same envelope as per intervention allocation and these was later translated into the patients notes upon discharge of patient from the hospital.

For both groups of patients, on the day of surgery, participants had undergone general anaesthesia for TAH. General anaesthesia was conducted by the rostered anesthetist in the operating room and was standardized to all patients. General anaesthesia was induced after preoxygenation with 100% Oxygen for 3 – 5 minutes. Induction was done using with Fentanyl 1-2mcg/kg, Propofol 2-3mg/kg and Atracurium 0.5 mg/kg or Vecuronium 0.1mg/kg. The trachea was intubated with a size 7.0 – 7.5mm endotracheal tube and secured. General anaesthesia was maintained with Isoflurane at Minimum Alveolar Concentration of 1.0. Patients were mechanically ventilated with oxygen: air at 1:1 ratio and tidal volume of 6-8ml/kg. Once patients were hemodynamically stable, Morphine at 0.1mg/kg was administered to all patients for intraoperative analgesia. Dexamethasone 4mg single bolus dose was also given intraoperatively post induction as a prophylactic antiemetic medication. For all patients, Diclofenac 100mg was given per rectally at the end of surgery before extubation and charted every 12 hourly after that.

Apart from the standard general anaesthesia as explained above, participants in TAP group received bilateral ultrasound guided Transversus abdominis plane (TAP) blocks with 20mls of 0.25% Bupivacaine on each side at the end of the surgery. The TAP block was performed by the theatre Anesthetist under direct supervision by a Consultant Anesthetist. The ultrasound scan machine available in the operation theatre at Lautoka Hospital was used for this procedure. The linear probe of the ultrasound scan was placed transversely between the iliac crest and the costal margin in the mid-axillary line at the same level of the umbilicus and important structures including the external oblique, internal oblique and transversus abdominis muscles was visualized. The 18-gauge cannula needle was introduced from the medial side of the ultrasound scan probe (anterior of the abdomen) in an in-plane view to deposit the local anaesthetic under direct visualization in the intermuscular plane between the transversus abdominis muscle and the internal oblique muscle. Sterility was maintained during the procedure to avoid any infection.

Participants in LWI group had also undergone TAH under standard general anaesthesia as for TAP Group. LWI group patients also received local anaesthetic wound infiltration (LWI) at the end of surgery. The Surgeon was provided with a sterile solution of 40 mL of 0.25% Bupivacaine to inject at both wound edges. LWI was performed by the same Surgeon doing the surgery. At the end of surgery, neuromuscular reversal was administered (neostigmine 2.5 mg and atropine 1.2mg). Patients emerged from general anaesthesia and were extubated prior to transfer to the recovery unit (PARU).

In PARU, standard postoperative care was provided by trained PARU nurses and participants were monitored closely until they were ready to be discharged back to the Women's Surgical Ward. Outcome assessment commenced from PARU. For primary outcome, pain severity scores were taken from participants using the Numerical Rating scale and documented by the PARU staff at an hour of patients' completion of surgery. Pain scores were taken on rest and upon movement. For movement, two separate actions were asked for participants to perform including coughing and flexing the hip. Rescue analgesics mainly fentanyl (only in PARU) and morphine were charted for patients and given if the pain score was 4 or more. The data collection

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sheet was used to record pain scores. The length of PARU stay was documented.

For postoperative pain management in the ward, multimodal analgesia was prescribed by the Anaesthesia team. The analgesia prescription included: Paracetamol 1g per oral every six hourly, Diclofenac 100mg per rectal twice a day and Morphine 2.5mg – 5mg intravenously or subcutaneously as required (prn) were charted for patients for further pain relief. Patients were followed up in the ward to assess further pain scores on rest and movement at 6 hours, 12 hours, 18 hours and 24 hours postoperatively with the help of ward nurses. For secondary outcomes, participants' length of PARU stay, time taken to mobilize out of bed and length of postoperative hospital stay was compared between the groups.

RESULTS

Description of Demographic Variables

The demographic characteristics of participants are summarised in Table 3. It is interesting to note the BMI of the whole study population. The only statistically significant differences were noted in the age groups as described below:

Age

Upon comparing the age between the two groups, the results showed that there was a statistically significant difference in the median age between the TAP group and LWI group. The median age (IQR) in TAP group was 49 (23) years as compared to 45 (11) years in the LWI group (P=0.002).

Body Mass Index (BMI), height and weight

There were no statistically significant differences observed between the 2 groups in these variables. The median BMI in TAP group was 27.4kg/m² whereas the median BMI in LWI group was 26.7kg/m² (P= 0.624). This suggests that the majority of the women in the study were overweight.

Ethnicity

There were no statistically significant differences observed in the ethnicity of participants between the 2 groups. However, of interest, majority of the participants were of Fijian of Indian Descent (FID) in both the groups (67% in TAP group vs 73% in LWI group).

Indications of TAH

Amongst the women that underwent TAH, there were no statistically significant differences observed in the indications of surgery between the TAP and LWI groups. Of interest, the 2 most common indications of TAH noted in both the groups were similar and included Uterine fibroid (47% in TAP group vs 27% in LWI group) and Endometrial cancer (40% in TAP group vs 13% in LWI group).

Concomitant Comorbidities

There were no statistically significant differences observed in the underlying comorbidities amongst the participants in both the groups. Of interest, the common comorbidities that were similar in both groups included Diabetes (27% in TAP group vs 47% in LWI group), Hypertension (40% in TAP group vs 20% in LWI group) and Obesity (27% in TAP group vs 27% in LWI group).

ASA Classification

There was no statistically significant difference between the ASA scores of participants between the groups. However, majority of the participants were of ASA II in both the groups (80% in TAP group vs 73% in LWI group).

Type of Incision

There was no statistically significant difference amongst the participants between the 2 groups on the type of incision done. Of interest, majority of the participants had midline incision below the umbilicus in both the groups (80% in TAP group vs 93% in LWI group).

Operative Duration

There was no statistically significant difference in the operative duration amongst the women who underwent TAH under general anaesthesia between TAP and LWI groups. The results showed that the median operative duration in TAP group was 2hours compared to 2hours and 10minutes in LWI group (P = 0.389).

Intraoperative Analgesia

There was no statistically significant difference in the intraoperative analgesia dosages amongst the women who underwent TAH under general anaesthesia between TAP and LWI groups. There was no difference in the median intraoperative fentanyl doses between the groups. The median intraoperative morphine dose in TAP group was 6mg compared to 5mg in LWI group (P = 1.0)

Primary Outcomes

The pain scores at rest were obtained at time intervals of 1hr, 6hr, 12hr, 18hr and 24hr using the numerical rating scale and has been presented in Table 3 and Figure 1. The results showed that there was a statistically significant difference in the median pain score at rest at 1-hour postoperative period with lower pain scores in TAP group compared to LWI group. The median pain score at rest at 1hr post operation was 1 in TAP group compared to 3 in LWI group (P = 0.037). However, there were no statistically significant differences noted in the pain scores at rest at 6 hours, 12 hours, 18 hours and 24 hours' post-operation.

Figure 1 demonstrates the box plots for pain scores at rest comparing TAP group with LWI with a significantly lower median pain score at 1 hour post operation. The Pain scores on movement is presented on Table 4 and Figure 2. Since movement is not a specific variable on its own, for the study purpose, it is a combination of two actions calculated as a mean which included pain scores on Coughing and Hip flexion. The time intervals for pain scores on movement also included 1hour in PARU, 6 Hours, 12 hours, 18 hours and 24 hours in the ward postoperatively. The result shows that pain scores on movement were statistically significantly lower in TAP block than LWI at 1hr, 6hr, 12hr, 18hr and 24 hours postoperatively.

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Table 5 demonstrates the pain scores on coughing between the 2 groups. Among women undergoing TAH under general anesthesia getting TAP block compared to LWI, there was no statistically significant differences in the pain scores upon coughing at 1-hour post- operation.

Participants in the TAP group had statistically significant lower pain scores on coughing at 6hr, 12hr, 18hr and 24 hours postoperatively.

Table 6 demonstrates the pain scores on Hip Flexion of participants between the 2 groups. Among women undergoing TAH under general anesthesia getting TAP block compared to LWI, there was statistically significant differences in the pain scores upon hip flexion at 1hour, 6hours, 12hours, 18hours and 24 hours post-operatively all favoring TAP group.

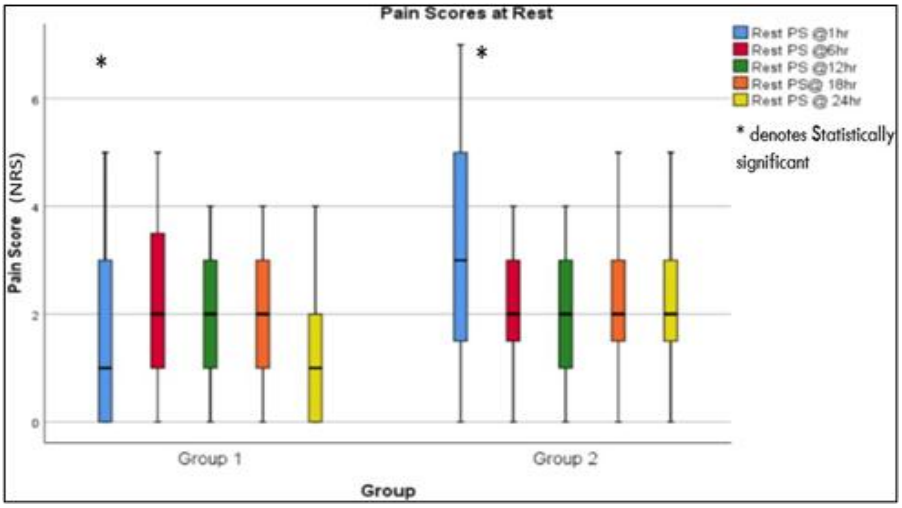

Figure 1: Box Plots for Pain Scores at Rest

(NB: Group 1 is same as TAP group and Group 2 is same as LWI group)

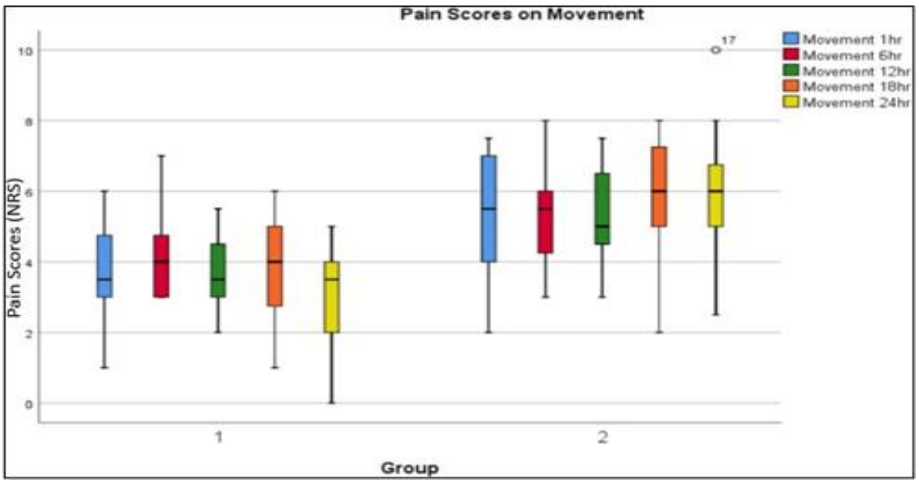

Figure 2: Box Plots for Pain Scores on Movement

(NB: Group 1 is same as TAP group and Group 2 is same as LWI group)

Secondary Outcomes

The secondary outcomes of this study included the following:

1. Length of PARU stay post TAH.
2. Time for first mobilization out of bed postoperatively.
3. Length of postoperative hospital stay.

The secondary outcome results of this study are presented in the Table 7.

Length of PARU Stay

Among women undergoing TAH under general anesthesia receiving TAP block compared to LWI, there was no statistically significant differences in the length of PARU stay between the groups. The median length of PARU stay in TAP group was 1hour and 20 minutes compared to 1hour and 30 minutes in LWI group (P = 0.233).

Time to Mobilize Out of Bed

The results showed that women in the TAP group had statistically significant reduction in the time to get out of bed compared to women in LWI group. The median time taken to mobilize out of bed in TAP group was 18hours compared to 22hours in LWI group (P = 0.01).

Length of Postoperative Hospital Stay

Among women undergoing TAH under general anesthesia receiving TAP block compared to LWI, there was no statistically significant differences in the

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length of postoperative hospital stay between the groups. The median length of postoperative hospital stay in TAP group was 2days compared to 3days in LWI group (P = 0.267). The results show a median difference of one-day favoring TAP block, but this is not statistically significant.

Table 1: Inclusion and Exclusion Criteria.

Inclusion Eligibility Criteria	Exclusion Eligibility Criteria
All Women scheduled to undergo elective TAH under general anaesthesia at Lautoka Hospital: • From 1st February 2021 to 31st July 2021. • With American Society of Anaesthesiologists Score (ASA) of I to II. • Who give voluntary written consent.	Women were excluded from the study if they met the following criteria: • Lack of consent for the study. • Known allergy to opioids or any analgesics used in this study. • ASA score of more than II. • Weight less than 50kg. • Included in the study but did not have the surgery or ended up with intraoperative or postoperative complication requiring additional procedures or ICU care. • Included in the study but were lost to follow up due to missing information in the data collection sheet. • Known psychiatric illness, dementia or intellectual impairment. • Already on regular opioid therapy before surgery

Table 2: Detailed process of present study

Process	Setting	Description
Enrollment	Women Surgical Ward (WSW) (1 day before surgery)	• Assessed for eligibility • Voluntary informed consent obtained • Education – Pain Assessment, Management & Blinding process
Randomization	Operation Theatre (OT)	Computer generated randomization • 2 groups: TAP vs LWI
Intervention Allocation	Operation Theatre	Identical Opaque Concealed Envelope: • Handed directly to Anesthetist involved on the day • Opened once patient under general anaesthesia • Content – participant code, instructions for Anesthetist, data collection sheet
Blinding	OT, PARU, WSW	Participants - intervention under GA Outcome Assessors – Documentation and handing over ('Regional Anaesthesia as per study protocol")

Table 3: Comparison of Demographic Characteristics

Variable	TAP Group (n = 15) Median (IQR)	LWI Group (n = 15) Median (IQR)	P value
Age (years)	49 (23)	45 (11)	0.002*†
	(40 - 79)	(32 - 60)	
BMI (kg/m2)	27.39 (5.09)	26.72 (14.98)	0.624†
	(18.38 – 41.27)	(20.40 – 48.27)	
Weight (kg)	68.00 (25)	75 (45)	0.436†
	(55 - 111)	(50 - 130)	
Height (cm)	161 (11)	163 (10)	0.305†
	(151 - 177)	(140 - 178)	
Ethnicity	No. (%)	No. (%)	
FID	10 (67%)	11 (73%)	1.000
I-taukei	5 (33 %)	4 (27%)	1.000
Indications of TAH			
Endometrial Ca	6 (40%)	2 (13.33%)	0.215
Ovarian Ca	0	1 (6.67%)	1.000
DUB	1(6.67%)	1 (6.67%)	1.000
Ovarian mass	0	4 (26.67%)	0.100
Uterine mass	0	1 (6.67%)	1.000
Uterine Fibroid	7 (46.67%)	4 (26.67%)	0.450
GTD	0	1 (6.67%)	1.000
Pelvic Mass	0	1 (6.67%)	1.000
Cervical Fibroid	1 (6.67%)	0	1.000
Concomitant comorbidity			
Nil	3 (20%)	4 (26.67%)	1.000
Diabetes	4 (26.67%	7 (46.67%)	0.450
Hypertension	6 (40%)	3 (20%)	0.427
Ischemic Heart Disease	1 (6.67%)	0	1.000
Obesity	4 (26.67%)	4 (26.67%)	1.000
Anemia	2 (13.33%)	3 (20%)	1.000
Valvular Heart Disease	1 (6.67%)	1 (6.67%)	1.000
Hypothyroid	0	1 (6.67%)	0.483
Chronic Pain	2 (13.33%)	2 (13.33%)	1.000
ASA Classification			

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ASA I	3 (20%)	4 (27%)	1.000
ASA II	12 (80%)	11(73%)	1.000
Type of Incision			
Midline	12 (80%)	14(93%)	0.598
Pfannenstiel	3 (20%)	1 (7%)	0.598
Operative Duration (minutes)	120 (60) (80 - 200)	130 (75) (75 - 190)	0.389†
Intraoperative Analgesia			
Fentanyl (mics)	200 (100) (100 – 200)	200 (100) (100 – 200)	0.775†
Morphine (mg)	6 (2) (3 – 10)	5 (1) (4 – 10)	1.000†

NB: * denotes statistically significant, † denotes Mann Whitney U test used; ASA = American Society of Anaesthesiologists Score, Fisher's Exact test used for categorical data analysis,

Table 4: Pain Scores at Rest

	TAP Group Median (IQR) (Range)	LWI Group Median (IQR) (Range)	Median difference	95% Confidence Interval	P Value
1 hour (PARU)	1 (3) (0 - 5)	3 (4) (0 - 7)	2	1.6758 – 3.1909	0.037*
6 HOURS (ward)	2 (3) (0 – 5)	2 (2) (0 – 4)	0	1.6077 – 2.6590	0.713
12 HOURS (ward)	2 (2) (0 – 4)	2 (2) (3 – 8)	0	1.4811 – 2.5189	1.000
18 HOURS (ward)	2 (2) (0 – 4)	2 (2) (0 – 5)	0	1.6263 – 2.6404	0.345
24 HOURS (ward)	1 (2) (0 – 4)	2 (2) (0 – 5)	1	1.2593 – 2.3407	0.074

NB: Mann Whitney U test used to analyze data, * denotes statistically significant, IQR= Interquartile range

Table 5: Pain Scores on Coughing

	TAP Group (n = 15) Median (IQR) (Range)	LWI Group (n = 15) Median (IQR) (Range)	Median difference	95% Confidence Interval	P Value
1 HOUR	4 (2) (1 - 7)	5 (3) (3 - 8)	1	4.3455 –5.5212	0.137
6 HOURS	4 (2) (3 – 7)	5 (2) (3 – 8)	1	4.3320 – 5.4014	0.041*
12 HOURS	4 (1) (2 – 5)	5 (3) (3 – 8)	1	4.0439 – 5.2894	0.001*
18 HOURS	4 (2) (1 – 7)	6 (2) (2 – 8)	2	4.4079 – 5.8588	0.003*
24 HOURS	3 (3) (1 – 5)	6 (2) (3 – 10)	3	3.6465 – 5.3535	0.0001*

NB: Mann Whitney U test used to analyze data. *Denotes statistically significant data

Table 6: Pain Scores on Hip Flexion

	TAP Group (n = 15) Median (IQR) (Range)	LWI Group (n = 15) Median (IQR) (Range)	Median difference	95% Confidence Interval	P Value
1 HOUR	3 (3) (1 - 6)	6 (3) (1 - 8)	3	3.5529 – 5.1137	0.007*
6 HOURS	4 (3) (2 - 8)	5 (3) (3 – 8)	1	4.0064 – 5.3269	0.050*
12 HOURS	4 (1) (2 - 6)	5 (3) (3 – 8)	1	3.7908 – 4.9425	0.019*
18 HOURS	4 (2) (1 – 6)	6 (4) (2 – 8)	2	3.8925 – 5.4409	0.009*
24 HOURS	3 (2) (0 – 5)	6 (3) (2 – 10)	3	3.2938 – 5.1062	0.001*

NB: Mann Whitney U test used to analyze data. *Denotes statistically significant data

Table 7: Secondary Outcomes

	TAP Group (n = 15) Median (IQR) (Range)	LWI Group (n = 15) Median (IQR) (Range)	Median difference	95% Confidence Interval	P Value
Length of PARU stay (mins)	80 (30) (65 - 126)	90 (50) (60 - 140)	10	79.7569 –97.5764	0.233
Time to get out of bed (hours)	18 (7) (13 – 26)	22 (10) (18 - 36)	4	19.0493 –23.1507	0.010*
Length of post-op hospital stay (days)	2 (1) (2 – 4)	3 (3) (2 - 5)	1	2.4799 –3.3201	0.267

NB: Mann Whitney U test used to analyze data. *Denotes statistically significant data

DISCUSSION

In this study, it was hypothesized that bilateral ultrasound guided TAP block provides superior postoperative analgesia compared to LWI for women undergoing TAH. The primary and secondary objectives have been fulfilled answering the research question. The findings of this study support the hypothesis.

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The findings of this study are in line with the majority of the RCTs that compare TAP blocks to LWI for TAH.

In this study, the TAP group had lower pain scores at rest at 1hr post operation. This is consistent with previous RCTs noting reduced pain scores at 6hr (Atim et al.) 8hr (Ranjit et al., Sherbeny et al.) and 24hr (Atim et al., Ranjit et al.).[11-13]

However, Atim et al. did not show any difference at 1hr post operation. In this study, the sample size is small and the overall pain scores are low in both groups. These factors may underlie a lack of difference at 1hr post operation. Pain scores at rest may also be considered only one component of pain assessment since pain on movement is more likely to provoke discomfort and could be considered a more sensitive measure of pain.

Pain scores on movement were significantly reduced up to 24 hours in the TAP group in this study. This is consistent with previous RCTs that showed lower pain scores in the TAP group on movement at 6hours (Atim et al., Ranjit et al.), 8hours (Ranjit et al.), 12hours (Sherbeny et el.), 24hours (Ranjit et el.).[11,13,14] Prolonged analgesia on movement has been shown in this study. This could be attributed to wind up theory whereby early good postoperative pain management results in better pain control in the later period due to less peripheral and central sensitization of pain.

However, it is interesting that a more rigorous test of pain (movement including coughing and hip flexion) compared to at rest supports the efficacy of TAP blocks compared to LWI.

The findings of this study is contradicting few studies present in the literature including Ismail et al., Dai et al., Chang et al. and Gasanova et al.[15-18] Ismail et al. could not demonstrate any statistically significant differences in the pain scores while comparing TAP block with placebo for TAH.[15] Dai et al. in a retrospective review, found no difference in the pain scores up to 24 hours and no reduction in narcotic consumption beyond PARU.[16] Chang et al. found no difference in pain scores in the first 24 hours post operation.[17] Gasanova et al. found LWI was superior compared to TAP blocks for TAH with significantly lower pain scores in LWI group.[18]

The explanation why these studies have not found to be effective is because two of these studies are retrospective reviews,[16,17] one study has used a longer acting local anaesthetic in the LWI group hence a prolonged analgesic effect in the LWI group.[18] Ismail et al. in a RCT compared TAP to placebo and primarily assessed stress response and did not find TAP superior.[15] Hence for study by Ismail et al., a different outcome is considered and that could explain why the results did not favor TAP blocks. Therefore, this study contradicts the literature that concluded that LWI is superior to TAP block for TAH.

The ultrasound guided TAP block is not a difficult procedure to perform but certain key concepts are important to consider when choosing to use this technique. A clear understanding of the relevant anatomy is important and to identify the TAP on the ultrasound scan and be able to see the spread of local anaesthetic in the correct plane is paramount. Deciding on the approach relevant to the surgery will also make a big difference. In this study, TAP block has shown to be effective as the procedure was done with the presence of an experienced anaesthetist equivalent to a consultant level. In practice, inexperienced personnel performing the procedure may produce variable results.

Comparing the present study with the study by Dr. Narayan, in 2021 audited post caesarean section (CS) pain management at Labasa Hospital and found that 70.8% of mothers had moderate or severe pain at 24 hours post CS.[19] The incidence of moderate or severe pain in study by Narayan is much higher compared to this study. This study demonstrated that women in both groups had better pain relief with moderate or severe pain in 16% at rest and 40% at movement at 24 hours post TAH. The improved analgesia could be a result of a more structured multimodal analgesia including TAP blocks or LWI. Hence, we should consider doing TAP blocks for our caesarean sections done under general anaesthesia.

Strengths of this study includes a prospective, double blinded, and randomized controlled trial which is considered the gold standard in the hierarchy of evidence. Selection bias was avoided by using computer generated randomization and concealed allocation. Performance bias was avoided as participants were blinded and the rest of the perioperative care was standardized. Detection bias was avoided by blinding the outcome assessors. The Anaesthetist and Surgeon performing the interventions could not be blinded for practical and ethical reasons. The real-world impact of this study is that it addresses a major and common problem at our hospital and offers a simple, safe and practical solution.

During the course of this study, several challenges were encountered. One of the primary obstacles was the small study population, with only 100-140 women undergoing Total Abdominal Hysterectomy (TAH) at Lautoka Hospital per year. This limited population size made estimating the sample size for the study a significant challenge, particularly when trying to estimate for half the year. To address this, a sample size formula was utilized with the assistance of the FNU research team. However, the small population size resulted in a smaller sample size, limiting the generalizability of the study. Additionally, the study was limited to a single center due to human resource and financial constraints, making a multicenter trial unfeasible. The COVID-19 pandemic also posed a significant obstacle, with a 21-day lockdown at Lautoka Hospital during the study period, further restricting the sample size. Finally, the lack of purpose-designed ultrasound block needles necessitated the use of an 18-gauge cannula needle as an alternative, which was thinner and sharper, making it more difficult to visualize on

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ultrasound imaging, although no complications were reported.

The participants in the TAP block group mobilized out of bed earlier in this study. This finding is also consistent with findings from Sherbeny et al.[14]

The data contributes to a clearer understanding of the role TAP block plays in postoperative TAH pain management showing superiority over LWI. Thus, these results build on the existing evidence of the usefulness of TAP blocks in lower abdominal surgeries.

CONCLUSION

Bilateral ultrasound guided TAP block is superior to LWI for postoperative analgesia in TAH and is associated with reduced pain scores on rest and movement up to 24 hours post-surgery and promotes earlier mobilization.

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