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A Retrospective Study on Transversus Abdominis Plane Block and Local Infiltration for Post Operative Analgesia in Patients Undergoing Laparoscopic Cholecystectomy at a Tertiary Hospital

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ABSTRACT
Despite being classified as a minimally invasive procedure, laparoscopic cholecystectomy is nonetheless linked to significant pain, particularly within the initial 24 hours following surgery. Empirical evidence suggests that laparoscopic surgery may be linked to heightened levels of early postoperative discomfort, contrary to initial expectations. Given that laparoscopic surgery is known to offer the benefit of reduced pain, it is imperative to address the matter of acute postoperative discomfort.

INTRODUCTION

Despite being classified as a minimally invasive procedure, laparoscopic cholecystectomy nonetheless causes significant discomfort, particularly within the initial 24 hrs following surgery[1]. Nerve blocks have been recommended as a component of a multimodal analgesia regimen to decrease the use of pain relievers and improve pain management, hence promoting faster recovery following surgery[2]. The incisions made in the front abdominal wall are what primarily cause the pain that follows a laparoscopic cholecystectomy. Gallstone disease continues to be a significant contributor to abdominal morbidity and mortality worldwide[3]. Currently, gallbladder illness is a common issue in developed nations, posing a significant health concern[4]. The occurrence of cholelithiasis is higher in females than males in India. It is more prevalent among Northern Indians compared to Southern Indians, with Maharashtra's coastline region being particularly affected[5-7]. Empirical evidence suggests that laparoscopic surgery may be linked to higher levels of acute postoperative pain than initially anticipated.

Given that laparoscopic surgery is known for its reduced pain levels, we believe it is crucial to address the matter of early postoperative pain. If sufficient pain relief is attained the need for additional systemic opioid analgesics can also be diminished. In the absence of blocks or local infiltration the utilization of opioid analgesics for pain management will be elevated. The administration of blocks or local infiltration can effectively reduce the required amount of supplementary opioids. The purpose of this study is to gain a deeper understanding of the effectiveness, patient friendliness, cost-effectiveness and reduction in the usage of additional pain relievers associated with various forms of analgesia, such as blocks or local infiltrations, which are commonly used.

Aims and objectives: To compare Transversus abdominis plane block and Local infiltration for post operative analgesia in patients undergoing laparoscopic cholecystectomy.

MATERIALS AND METHODS

Study design: Retrospective.

Study setting: Yenepoya Medical College Hospital(YMCH) is a 900 bedded tertiary care teaching hospital situated in Deralakatte, a suburban locality of Mangaluru, Dakshina Karnataka. It provides general and specialist healthcare to the coastal and central parts of Karnataka and northern part of Kerala.

Study population: Patients diagnosed with gallstones and underwent laparoscopic cholecystectomy.

Study period: This shall be conducted between September 2022 and February 2023.

Sampling method: Convenient sampling.

Sample allocation: Single blinded (participant blinded).

Prior to conducting the study, the institutional ethics committee's approval was obtained. The study was done in compliance with the ethical standards outlined in the Declaration of Helsinki. The information collected was kept strictly secret. A password-protected personal laptop contained all of the data. The data was exclusively accessible to researchers and guides. The necessity of obtaining informed consent from patients was exempted. Upon obtaining the requisite authorizations from the medical superintendent and MRD officer, The study included the medical records of 62 patients who underwent laparoscopic cholecystectomy. Intraoperative analgesia was administered in the form of local infiltration and laparoscopic-guided TAP block, with 31 patients receiving each method.

The study involved accessing nursing records to quantify the level of analgesia during the postoperative period using the visual analogue scale (VAS) at three specific time points immediately within the first 0-4 hrs, at 24 hrs and at 48 hrs. The use of additional opioid analgesics and whether their usage remained consistent, decreased, or grew were also examined using the same records.

The visual analog scale (VAS) is a pain rating scale that was initially employed by Hayes and Patterson in 1921. The scores are derived from self-reported measures of symptoms, which are indicated by a single handwritten mark placed at a specific point along a 10-cm line. This line represents a continuum between the two extremes of the pain scale "no pain" on the left end (0 cm) and "worst pain" on the right end (10 cm). An analysis comparing two groups will provide an inference regarding which group experienced superior pain relief. The gathered data was maintained and distributed for educational purposes while ensuring the subject's confidentiality.

Method of collection of data:

- According to the past study on "Comparison of laparoscopy guided with ultrasound guided subcostal TAP block in laparoscopic cholecystectomy" by Rajagoplan Venkatraman 11
- The post operative analgesia for patients with ultrasound guided is 867.24+/-135.83 and laparoscopy is 751.21+/-311.22. From the available information the computed effect size is equal to 0.482

- The sample size determination is done using G* power software considering 15% level of significance and 80% the minimum subject required for the present study to test the above computed effect size is equal to 62. Divided equally in two groups i.e., 31 and 31.

$$n = \frac{(Z_{1-\infty\square} + Z_b)^2 \sigma_p{}^2}{2} \over (\mu_1 - \mu_2)^2$$

N = 62

Inclusion criteria:

- All patients who underwent laparoscopic cholecystectomy at YMCH of age 18-70 years

Exclusion criteria:

- Patients with known cardiac, liver, or renal diseases, pregnant patients and patients with coagulation abnormalities will be excluded from the study
- **Contraindications to local anaesthetics:** Epilepsy, severe cardiac conduction block (2nd and 3rd degree AVB), allergy
- Medical records with incomplete Visual Analogue scale
- Patients given other classes of additional analgesics such as NSAID's

Details of clinical examination: Nil.

Validity of study tool: Nil.

Statistical analysis:

- Simple descriptive and summary measure is used to describe the data. Two samples independent t-test is used to the difference in the parameter score

Diagnosis:
Visual analogue scale: Based on the pain level.
Use of supplemental analgesics: Same Reduced increased.

RESULTS

Pain assessment:

- The difference was p = 0.049 statistically significant the indication that at the TAP block is more effective than local infiltration in providing post operative analgesia
- 9.68% had no pain in the first 12 hours following surgery in the TAP block group

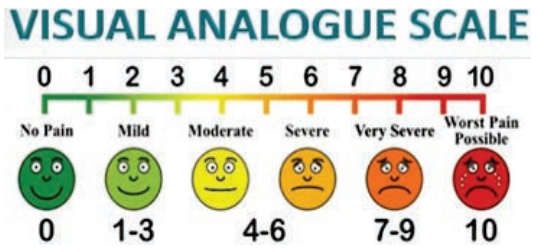

Fig.1: Pain assessment

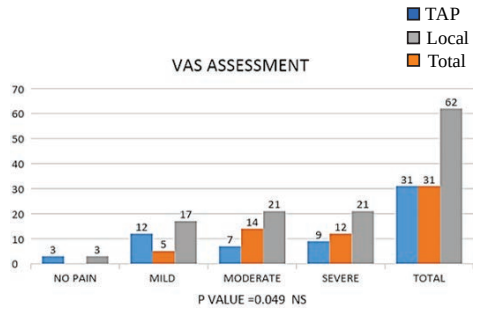

Fig. 2: VAS Assessment

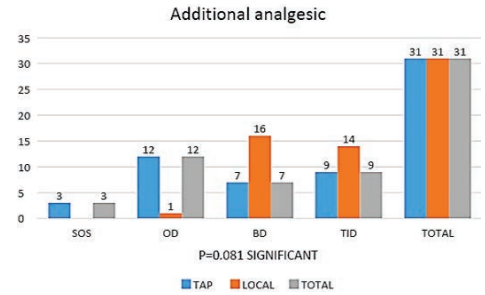

Fig. 3: Additional Analgesic

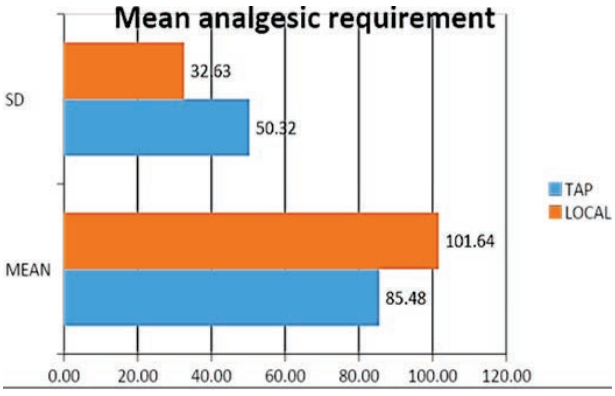

Fig. 4: Mean Analgesic requirement

Additional analgesic:

- 38.71% in the TAP block group and 3.23% in the local infiltration block required once a day analgesia with 50 mg tramadol per dose
- 22.58% in the TAP block group and 51.61% in the local infiltration block required twice a day analgesia with 50 mg tramadol per dose
- 29.03% in the TAP block group and 45.16% in the local infiltration block required thrice a day analgesia with 50 mg tramadol per dose

Mean analgesic requirement:

- The mean analgesic requirement in the TAP group was 85.48 M SD+50.32 mg of tramadol years and the mean age in the local infiltration group was 101.64 SD+32.63 mg of tramadol
- The difference was p = 0.104 statistically not significant hence the groups are comparable

DISCUSSIONS

Rajagopalan Venkatraman and others conducted a study. A prospective, randomized study titled "Comparing laparoscopy-guided with ultrasound-guided subcostal transversus abdominis plane block in laparoscopic cholecystectomy" was published in the Indian Journal of Anaesthesia in December 2020 (Volume 64, Issue 12, Pages 1012-1017). The study aimed to assess the efficacy of ultrasonography and laparoscopic techniques in performing subcostal TAP blocks. The secondary aims were to evaluate the length of time for postoperative pain relief and the amount of morphine used throughout the 24-hrs postoperative period. A total of 82 patients who were undergoing laparoscopic cholecystectomy were randomly assigned to two groups. One group had an ultrasound-guided subcostal TAP block, while the other group received a laparoscopy-guided subcostal TAP block after the conclusion of the surgery. Morphine was given to alleviate enduring discomfort. The aggregate morphine usage was documented. The statistical analysis was conducted using the student t-test and the chi-square test. The study determined that laparoscopy-guided subcostal TAP block is a viable substitute for ultrasound-guided block and can be employed in settings lacking access to an ultrasound machine[6]. In a study published in the Journal of Anaesthesiology Clinical Pharmacology in July 2012, Tolchard, Davies, and Martindale examined the effectiveness of subcostal transversus abdominis plane block in laparoscopic cholecystectomy compared to standard port-site infiltration. This study examined the potential superiority of subcostal transversus abdominis (STA) block over standard port-site infiltration of local anesthetic in terms of lowering postoperative pain, narcotic usage and recovery time. Forty-three patients undergoing day-case laparoscopic cholecystectomy were randomly assigned to receive either an ultrasound-guided supraclavicular transversus abdominis (STA) block or a local anesthetic injection at the port-site. Pain severity was assessed by using visual analogue pain scores at 1 and 4 hrs after the operation. Opioid demand was recorded during recovery and up to 8 hrs after the operation. The duration of discharge from recuperation was also documented. The study determined that the STA block offers more effective pain relief after laparoscopic cholecystectomy and decreases the need for opioids. Additionally, it has the potential to enhance theatrical efficiency by decreasing the duration of discharge from the recovery unit. Jean-François Brichant *et al*.[8] conducted a clinical investigation on the analgesic effect of TAP block after laparoscopic cholecystectomy. The trial was documented on Clinical Trials gov, a database maintained by the US National Library of Medicine, in July 2018 (reference number 17/0339153). The study aimed to assess the pain-relieving effectiveness of TAP subcostal block following laparoscopic cholecystectomy. The efficacy of the TAP block will validate the significance of the parietal pain component following this surgery. Less pain and opioid use after surgery may be linked to fewer morphine side effects like nausea, vomiting, drowsiness and tiredness. This could help the progress of outpatient laparoscopic cholecystectomy. The study is a randomized, double-blind placebo-controlled trial including two groups of 20 patients. In one group the TAP block will be conducted using a local anesthetic solution, while in the other group, saline will be used. The study aims to determine the effectiveness of the TAP block in reducing postoperative pain. Perla Ekstein did a study on laparoscopic surgery and its correlation with intense pain and increased analgesic needs during the immediate postoperative period. The study was published in the Annals of Surgery in January 2006, volume 243, issue 1, pages 41-6. The aim of the study was to evaluate the intensity of pain experienced by patients immediately after laparoscopy and laparotomy, within the first 0-4 hrs after surgery and to determine their need for analgesics in the Post-Anesthesia Care Unit. This study examined the 24-hrs pain intensity and analgesia needs of 145 patients who had undergone abdominal surgery using either laparoscopy or laparotomy with standardized general anesthesia. These patients had pain in the post-anesthesia care unit (PACU) that did not respond to 120 microg kg^{-1} intravenous morphine. It was determined that a considerable number of patients

who undergo abdominal surgery experience severe, immediate postoperative pain. Among these patients, those who undergo laparoscopic surgery have a higher intensity of pain and require a greater amount of analgesics compared to those who undergo laparotomy[9].

CONCLUSION

- Laparoscopy guided TAP block is comparatively more effective, less time consuming than Local infiltration
- Post operative need for additional opioid analgesics were lesser
- Can be routinely performed by the surgeons
- Ultrasound guided TAP blocks done by Anaesthetists can be time consuming thereby increasing overall OT time, cost and need for General Anaesthesia

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