

REVIEW ON REGIONAL BLOCK TECHNIQUES FOR NEPHRECTOMY SURGERIES IN HOSPITAL KUALA LUMPUR; 2018 IN RETROSPECT.

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ABSTRACT:

Background and Objectives: Adequate post-operative analgesia is widely accepted as one of the most important cause in prevention of chronic post-surgical pain and post-operative pulmonary complications. This review looked into the use of various inter-fascial plane blocks administered in comparison to morphine usage and compares the dynamic pain scores.

Methods: This was a retrospective review involving 82 post nephrectomy patients with data extracted from Acute Pain Services (APS) and regional block procedural forms. Patients were subjected to either open or laparoscopic nephrectomy and divided to three groups; patients receiving post-operative Patient Controlled Analgesia (PCA) morphine only, patients receiving PCA morphine along with perioperative single bolus regional technique and those receiving regional block single bolus with subsequent continuous LA infusion. Data on morphine requirements and dynamic pain scores at 24 hours were analysed using R version 3.5.3.

Results: Patients who received PCA morphine in combination with single LA bolus had apparent reduction in opioid consumption at 24 hours compared to PCA morphine alone in both open and laparoscopic nephrectomy groups. With regards to dynamic pain scores at 24 hours, patients with PCA morphine alone fared better in open nephrectomy group while those with PCA morphine in conjunction with regional block single bolus technique fared better in the laparoscopic nephrectomy group. However, all differences were not found to be statistically significant.

Conclusion: Regional techniques did offer benefits in terms of reduction in opioid consumption in both groups but yielded equivocal results in dynamic pain score assessment with no significant difference. Further randomized controlled trials with larger sample size is required for comparison.

BACKGROUND:

Post-operative analgesia is known to be a challenging field in view of the adverse outcomes secondary to pain leading to physiological derangements and risk of chronic post-surgical pain. Upper abdominal surgery in general, has been shown to be associated with significant degree of acute pain¹⁻³ and among such surgeries, nephrectomies have been associated with potential progression to chronic post-surgical pain.¹ With recent growing trends in the use regional anaesthesia, many patients have the option of utilizing regional blocks as an adjunct analgesic tool to combat pain. Besides central neuraxial techniques, there is a growing body of evidence showing benefits of utilizing inter-fascial plane (IFP) blocks in optimizing pain relief and reducing side effects. Inter-fascial Plane block techniques from Transversus Abdominis Plane (TAP), to Quadratus Lumborum Block (QLB) and recently described Erector Spinae Plane Block (ESP) have been shown to improve outcomes.⁴⁻⁸

Minimally invasive procedures such as laparoscopic and hand-assisted nephrectomies of various surgical approaches are increasingly being performed in most centres. These advancements in surgical techniques, although require training to acquire desired competency and skills level, offer better pain relief as the incision made is much smaller, hence better tolerated with less physiological derangements and complications.⁹ There is a close association between effective management of post-operative pain and patients' satisfaction, leading to shortened length of hospital stay and decreased in cost. Minimally invasive surgeries have also been extensively promoted as part of Enhanced Recovery After Surgery (ERAS) and has been proven to be beneficial with good outcomes.¹⁰

This review evaluates efficacy parameters of various regional block approaches, in comparison with conventional opioid based techniques for nephrectomy surgeries over one year in Hospital Kuala Lumpur.

METHODOLOGY:

This was a retrospective review involving post-nephrectomy patients in Hospital Kuala Lumpur over a one year period from January 2018 to December 2018. Patients were subjected to either open or laparoscopic nephrectomy as decided by the operating surgeon. All nephrectomy cases were performed under general anaesthesia as per conventional institutional protocol. Type of analgesic modality administered was at the discretion of the attending anaesthesiologist. Post-operatively, all patients were provided with standard oral analgesics and supplemented with either Patient Controlled Analgesia (PCA) or, for patients whom block catheter were inserted, local anaesthetic infusion were administered. All patients were reviewed post-operatively by Acute Pain Services (APS) team from day of op (day 0) up to day of discharge.

Study data were extracted from APS and regional block procedural forms in terms of opioid consumption, resting & dynamic pain scores at post-operative Day 1 (POD1) and accumulated volume of LA usage. Patients' data were subsequently categorized into three groups; Group A were patients who received post-operative supplementary PCA morphine; Group B were patients who received post-operative PCA morphine with peri-operative single bolus regional technique; Group C were patients who received regional block single bolus with subsequent continuous LA infusion.

Data were analysed and statistical tests were performed using R version 3.5.3 with validated packages using Chi Square test, T-test and Mann-Whitney test.

RESULTS:

Data was procured from source documents of 82 post-operative nephrectomy patients between January 2018 to December 2018. Laparoscopic Nephrectomy (LN) was the preferred technique comprising 45 patients (54.9%) while Open Nephrectomy (ON) involved 37 patients (45.1%). As for analgesic modality, PCA morphine was the most commonly administered, with 28 patients in LN group and 24 in the ON group. Amongst those who received blocks, 18 patients received single bolus LA (SB) with post-operative PCA while 12 patients acquired bolus of LA with subsequent post-operative LA infusion via an indwelling block catheter. Data were summarized using frequency and proportion in percentage and are presented in Table 1. Various types of inter-fascial plane blocks were done and amongst them, Quadratus Lumborum block is most commonly done followed by Serratus Anterior and TAP block (Table 2).

Table 1: Number of patients according to procedure and analgesia modality offered

Group	Analgesia used	Procedures		p-value
		Open Nephrectomy	Laparoscopic Nephrectomy	
Group A	PCA morphine	24 (64.9)	28 (62.2)	0.391 ^a
Group B	PCA morphine & RA (bolus)	6 (16.2)	12 (26.7)	
Group C	RA (catheter)	7 (18.9)	5 (11.1)	
Total number of patients		37	45	

a There was no significant association between analgesia used and type of procedure (Chi-square, $p = 0.391$).

Table 2: Types of regional block administered in both groups

Type of Block	Open	Laparoscopic
Serratus Anterior Block	4	1
Paravertebral Block	2	1
Erector Spinae Block	1	1
Transversus Abdominis Plane	1	3
Quadratus Lumborum Block	3	11
Rectus Sheath Block	1	-
Thoracic Epidural	1	-

Comparison between morphine requirements and dynamic pain scores at POD1 among the 3 groups, between open and laparoscopic procedures are as shown in Tables 3 and 4.

Table 3: Comparison of morphine usage

Procedures	Group	Morphine usage	
		Mean (sd)	t-test, p-value
Open nephrectomy	PCA morphine	21.73 (22.03)	0.6341s
	PCA morphine & RA (bolus)	17.25 (9.87)	
Laparoscopic nephrectomy	PCA morphine	28.34 (29.55)	0.1113
	PCA morphine & RA (bolus)	14.7 (7.04)	

Table 4: Comparison of movement / dynamic pain scores on Day 1

Procedures	Group	Day 1 movement pain scores	
		Mean (sd)	t-test, p-value
Open nephrectomy	PCA morphine	2.04 (1.08)	0.184
	PCA morphine & RA (bolus)	2.67 (0.52)	
Laparoscopic nephrectomy	PCA morphine	2.43 (1.53)	0.602
	PCA morphine & RA (bolus)	2.25 (0.62)	

DISCUSSION:

In our study, PCA morphine alone was the most commonly used modality (64.9% vs 62.2% respectively) in both the 'Open' (ON) and "Laparoscopic' (LN) groups, while 'regional anaesthesia-only' technique with catheter in situ was the least common (18.9% vs 11.1%). This is probably due to PCA morphine being conveniently administered via intravenous access and easily titratable based on patient's demands, whereas institution of regional anaesthetic blocks requires various levels of competency training before being able to be successfully administered. Previously described blocks for nephrectomy varies in terms of technical difficulty and block selection of choice may be influenced by familiarity. Various Inter-fascial Plane (IFP) blocks have now been shown to be as comparable in efficacy as central neuraxial techniques, without its associated inherent risks while being technically less challenging. As for the choice of IFP block in our centre, Quadratus lumborum block (QLB) was the most common IFP block (Table 2) performed due to its potentially extensive dermatomal coverage as evidenced by current literature.¹¹

In comparing morphine usage in both nephrectomy groups, patients who received PCA morphine in combination with single LA bolus (SB) had reduced opioid consumption at 24 hours post-operatively compared with PCA morphine alone, with mean morphine consumptions of 17.25mg vs 21.73mg and 14.7mg vs 28.34mg in open and laparoscopic nephrectomy groups respectively (Table 3). Although the comparable reduction in usage may clinically indicate better pain control, statistical analysis did not yield a significant result.

With regards to dynamic pain scores at 24 hours (Table 4), there were no statistical significant difference in the analysis comparing patients who received PCA morphine in combination with single LA bolus (SB) compared to PCA morphine alone in both open vs laparoscopic groups. PCA morphine only group appears to fare better in terms of mean pain scores in the open nephrectomy group (mean score 2.04 vs 2.67) while PCA morphine in conjunction with single LA bolus (SB) showed better pain relief in the laparoscopic group (2.25 vs 2.43). Dynamic pain scores were selected as study parameter instead of resting pain as it reflects maximum inducible pain which should be the focus objective in terms of efficacy of targeted therapy. Improvement in dynamic scores may improve post-operative respiratory function, post-operative pulmonary complications (PPC) and hence hasten recovery.

Contrary to multiple prior studies which had shown significant differences in terms of improved pain scores and reduction of opioid consumption with supplementation of a block, our study did not yield any significant difference. That being the case, we found that patients in whom regional block techniques were administered (for both ON and LN groups), managed to achieve similar favourable pain scores at 24 hours, with an apparent reduction in morphine consumption compared to patients who were on PCA morphine alone. There were multiple factors in this study that could have potentially impacted on the results and contributed to the insignificant statistical analysis. This was a study of a retrospective observational design, involving small number of patients with data extracted from secondary sources with potential multiple source of bias. The regional block techniques, performed by multiple operators with different levels of expertise, were also from a heterogenous group of block approaches, with differing characteristics in terms of mechanisms of spread, technical difficulty, dermatomal coverage and were administered under general anaesthesia peri-operatively which precluded testing to establish block efficacy.

Limitation of this study were mostly due to its prospective observational extraction of retrospective data from secondary sources which makes for a pragmatic methodological design with lack of statistic power. In addition, the total number of samples involved were small and of unequal distribution, with

further dilution in the group receiving regional block due to the heterogenous nature of the blocks which were performed by multiple operators with differing levels of expertise. Data from patients with post-operative catheter technique LA infusion were collected for descriptive analysis only and not included in the analysis of post-operative analgesic requirement as we did not have a common surrogate indicator for comparison. Dynamic pain scores from these patients were also not incorporated in the pain score analysis due to the small number of patients.

CONCLUSION:

Results from our retrospective study showed that there were no statistically significant difference found in terms of dynamic pain scores among patients with and without regional block techniques in open and laparoscopic nephrectomies. However, regional techniques did offer benefit in terms of reduction in opioid requirements for both groups, but to a degree that did not show any statistical significance. Further randomized controlled trials with a larger sample size are required to compare analgesic efficacy of various available block techniques with conventional opioid based analgesic therapy.

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