Original Article

Evaluation of continuous wound infusion with local analgesics in postoperative renal transplantation patients: A retrospective study

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Abstract

Objectives: The objective is to evaluate the efficacy of the continuous wound infusion (CWI) with Ropivacaine (naropeine 2 mg/ml) on postoperative pain, analgesics consumption, and bowel function in renal transplantation patients.

Materials and Methods: A retrospective study trial including 79 patients who underwent renal transplantation. Patients were separated into two groups (catheter or without catheter). We identified 52 (65.8%) patients who received catheter wound infusion during the first 48 h postoperatively. On the other hand, 27 (34.1%) patients received standard without catheter anesthetic technique. Catheter wound infusion was achieved through a 12 cm catheter, inserted subcutaneously after abdominal closure. The catheter was placed above the external oblique aponeurosis. All postoperative data were examined to evaluate the first postoperative 48 h. This study aims to assess three variables: postoperative pain analysis through a visual analog scale, analgesics consumption, and bowel function.

Results: The overall score of the three variables was studied. Regarding pain assessment, we have determined that the group of patients with catheter scored better than patients without catheter with borderline significance (66.3 vs. 61.2 consecutively; $P = 0.0843$). An early bowel function was noted in patients with catheters on the 2nd postoperative day ($P = 0.0209$). Moreover, patients without catheter consumed more painkillers with nonsignificant difference ($P = 0.2499$).

Conclusion: Patients with catheter showed earlier bowel function than the noncatheter group on the 2nd postoperative day. The catheter group had better pain evaluation.

Keywords: Continuous wound infusion, local anesthetics, postoperative analgesia, postoperative pain management, renal transplantation

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INTRODUCTION

Postoperative pain has been considered an important concern after operation. It might be severe and impeding early mobilization and recovery. However, adequate pain relief and patient satisfaction are still deficient in most cases.[1] Optimal postoperative analgesia is essential after renal transplantation, as insufficient pain control can lead to cognitive impairment, hypertension, tachycardia, and an increased risk of pulmonary complications.[2] Nonetheless, many applicable options for postoperative renal transplantation analgesia have remained limited due to the recipients' comorbidities and wide drug pharmacokinetic variations in these patients.[3]

The wound application of local anesthetic (LA) agents has been widely used for several wound types and is deemed generally effective.[4] Continuous wound infusion (CWI) has been identified as an efficient, proven, and safe analgesic method that is simple to perform compared to other analgesic techniques, such as peripheral nerve blocks or epidural analgesia.[5] Technically, LA infusion is delivered into the wound through a catheter placed directly by the surgeon at the end of the procedure.[6] Currently, many LA techniques are available through single or continuous fashion. Any major interventions like renal transplantation need long-lasting LA such as CWI and epidural anesthesia, while a single dose of peripheral block or neuraxial block has a limited role.[7] The aim of this retrospective study was to evaluate the postoperative pain, analgesics consumption, and bowel function along with ropivacaine (naropeine2 mg/ml) CWI infiltration in kidney transplanted patients during the first 2 postoperative days.

MATERIALS AND METHODS

A retrospective single-center study was conducted after approval from the Ethics Committee (approval number: MZN2019-15). This study included 79 patients aged between 19 and 76 years old who underwent renal transplantation. Patients' data were examined to determine if they received or did not receive LA with an infusion catheter during the first 48 h postoperatively.

The principal inclusion criteria were that transplanted patients received either catheter or no catheter standard analgesia during the first 48 h postoperatively. All patients with spinal analgesia were excluded from the study.

All patients' demographic information, as well as information on early bowel functions (bowel movement restoration by passing stool or flatus), pain assessment with a Visual Analog Scale, and analgesics consumption (painkiller demand), were collected. All patients received during the first 48 h identical postoperative rescue analgesics prescriptions (Acupan and Topalgic) to be administered as needed for moderate or severe pain. The pain evaluation was completed once daily at the same fixed time.

The CWI was done using a 12-cm wound catheter inserted subcutaneously during the abdominal wall closure above the external oblique aponeurosis.

Statistical analysis

Data were entered into the computer using the "Microsoft Office Excel Software" program (2016) for Windows. Data were then transferred to the Statistical Package for the Social Sciences software program, version 23 (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY, USA: IBM Corp.), for statistical analysis. Data were presented using the range, mean, and standard deviation for quantitative variables and frequency and percentage for qualitative ones. The comparison between groups was made using an independent sample *t*-test and one-way analysis of variance for quantitative variables and Chi-square or Fisher's exact test for qualitative ones. Paired measurements were examined through a paired *t*-test. Multivariate regression models (linear and logistic) were then designed to explore the predictors of each variable of the dependent list. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 79 transplanted patients were recruited, about two-thirds of them ($n = 54$; 65.8%) received ropivacaine using the wound catheter, while the other control group of patients ($n = 27$; 34.2%) did not receive any catheter analgesics. More than half of the patients were males ($n = 44$; 55.7%) and 35 females (44.3%). The mean age was 51.8 ± 16.3 years. Regarding the restoration of bowel function, approximately all of our patients 74 (93.7%) did not restore bowel function at day zero, while 5 patients (6.3%) passed only flatus. On day 1, 60 patients (75.9%) did not restore bowel function while 19 (24.1%) restored their flatus. On the postoperative day 2, 48 (60.8%) patients did not restore bowel function, while 27 (34.2%) restored their flatus and only 4 patients (5.1%) started to normally pass stool.

By comparing the results of both groups, we found that the group of patients with the catheter had earlier bowel function than the other group on the 2nd postoperative day (50% vs. 18.5% $P = 0.0209$). On the other hand, we

observed that there was no significant difference between both groups on postoperative day zero and day 1 [Table 1].

The average pain scale was higher during the 3 postoperative days in the group without a catheter ($P = 0.505$). Moreover, patients without catheter consumed more painkillers without a significant difference between both groups ($P = 0.2499$) [Table 1].

The overall score of the three variables was then calculated (0 represents the worst outcome with no bowel function and intense pain leading to high analgesic consumption; a score of 100 represents the best results with early bowel function, no pain, and lower analgesic consumption). We have found that the group of patients with the catheter had a higher overall score compared to patients without the catheter with borderline significance (66.3 vs. 61.2 consecutively; $P = 0.0843$) [Table 1].

DISCUSSION

The use of CWI with LA has been proven effective for postoperative pain relief with low toxicity and failure rate in various fields of surgery. LA prevents and alleviates postoperative pain by reversibly blocking the conduction of nociceptive nerve impulses responsible for pain sensation.[8] Our study was dedicated to evaluate the postoperative pain, analgesics consumption, and bowel function with CWI using ropivacaine (naropeine 2 mg/ml) in renal transplantation patients during the early postoperative 72 h. We concluded that CWI with local ropivacaine (naropeine 2 mg/ml) helped in restoring the bowel function and reducing postoperative pain. To the best of our knowledge, this is the first study to assess the effectiveness of CWI with LAs in patients undergoing renal transplantation.

Postoperative recovery of bowel function continues to be an important concern after open abdominal surgery. In our study, we finally reported that the group of patients with the catheter had earlier bowel function, flatus, and first stool compared to the no-catheter group on the 2nd postoperative day. These results matched the findings of Bertoglio *et al*., who reported increased bowel activity in the CWI group.[8]

This study showed that CWI with ropivacaine had borderline statistical significance in decreasing the postoperative overall pain score. Likewise, Lee *et al*. reported a decrease in postoperative pain score and the consumption of rescue analgesics among CWI with ropivacaine patients.[9]

Our study has several limitations. First, this study was not blinded. As the study design was a comparison between two groups that had different types of anesthesia. Second, the pain was evaluated once daily at the same hour for all patients; moreover, the patients in both studied groups were subjected to the same postoperative prescription, so the results were not expressive. Third, the only experimental

Table 1: Comparison between patients with infusion catheter and those without catheter

	Total (*n*=79)		With catheter (*n*=52; 65.8%)		Without catheter (*n*=27; 34.2%)		*P**
	n	Percentage/average±SD*	*n*	Percentage/average±SD*	*n*	Percentage/average±SD	
Sex							
Male	44	55.7	28	53.8	16	59.3	0.6460
Female	35	44.3	24	46.2	11	40.7	
Age	78	51.8±16.3	51	49.9±16.7	27	55.2±15.1	0.1767
Restoration of bowel function day 0							
No bowel function	74	93.7	50	96.2	24	88.9	0.3315
Flatus	5	6.3	2	3.8	3	11.1	
Restoration of bowel function day 1							
No bowel function	60	75.9	38	73.1	22	81.5	0.4071
Flatus	19	24.1	14	26.9	5	18.5	
Restoration of bowel function day 2							
No bowel function	48	60.8	26	50	22	81.5	0.0209*
Flatus	27	34.2	22	42.3	5	81.5	
Stool	4	5.1	4	7.7	0	0	
Evaluation pain day 0	79	2.3±2.4	52	2.2±2.5	27	2.4±2.3	0.6852
Evaluation pain day 1	79	1.8±2.4	52	1.6±2.5	27	2.2±2.1	0.2795
Evaluation pain day 2	79	1.1±1.7	52	1.0±1.7	27	1.3±1.9	0.5054
Number of injection of topalgic day 0	79	0.5±0.9	52	0.5±1.0	27	0.4±0.6	0.7337
Number of injection of acupan day 0	79	4.1±2.0	52	4.1±2.1	27	4.3±1.9	0.6798
Number of injection of topalgic day 1	79	0.5±0.8	52	0.4±0.8	27	0.5±0.6	0.6097
Number of injection of acupan day 1	79	4.2±1.7	52	4.1±1.7	27	4.5±1.5	0.2426
Number of injection of topalgic day 2	79	0.4±0.6	52	0.4±0.6	27	0.3±0.5	0.5383
Number of injection of acupan day 2	79	3.0±2.2	52	2.8±2.3	27	3.5±2.2	0.1602
Total consumption	79	12.7±4.9	52	12.2±5.1	27	13.6±4.4	0.2499
Score	79	64.6±12.6	52	66.3±10.3	27	61.2±10.3	0.0843

*Significant *P*-value. SD: Standard deviation

drug used in this study was ropivacaine. Further studies using other LAs such as bupivacaine or anesthetics mixed with titrated epinephrine are therefore recommended to confirm the results of our trial. Fourth, this present study did not perform the cost-effectiveness analysis associated with the use of CWI. Finally, the rescue analgesics used in this study cannot be applicable to all and may be unfamiliar to some providers in other countries.

CONCLUSION

We finally concluded that the group of patients with the catheter had earlier bowel function than the other group on the 2nd postoperative day. CWI with ropivacaine decreased the postoperative pain score.

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Conflicts of interest
There are no conflicts of interest.

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