Efficacy and Safety of Temperature-responsive Gel Mixed with Ropivacaine as a Wound Infiltration in Minimally Invasive Colorectal Surgery

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Introduction

Wound infiltration is effective for postoperative pain management, but the optimal delivery method remains unclear. Continuous infusion via catheter provides extended analgesia but has limitations in convenience and catheter-related complications. This study evaluates a novel temperature-responsive gel mixed with ropivacaine for prolonged wound infiltration analgesia

Methods and procedures

This study included all patients who underwent minimally invasive colorectal surgery at a single institution from March to August 2024. Following fascial closure, a mixture of 25 mg ropivacaine in 6 mL of temperature-responsive supramolecular gel was infiltrated into the wound between the fascia and subcutaneous fat layer. The drug mixture was infiltrated into mini-laparotomy and all trocar sites of 10mm or greater in length. The primary outcome measure was the requirement for additional opioid analgesics postoperatively.

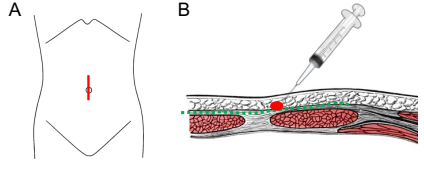


Figure 1. Application of wound infiltration into the fascia layer of mini-laparotomy wound

Results

Of 49 patients, 41 (83.7%) had malignancies, 8 (16.3%) had benign diseases; 39 (79.6%) were elective, 10 (20.4%) were emergent. Median incision length was 7cm. Only 2 patients (4.1%) required additional opioids, and 1 (2.0%) had a wound infection. No allergic reactions occurred.

Table 1. Baseline characteristics

	N =49
Sex, n(%)	
Male	27 (55.1)
Female	22 (44.9)
Age, median (range)	68 (34 – 88)
Diagnosis, n(%)	
Colorectal cancer	41 (83.7)
Diverticular disease	8 (16.3)
Name of surgery, n(%)	
Rt hemicolectomy	20 (40.8)
Anterior resection	18 (36.7)
Low anterior resection	2 (4.1)
Hartmann's operation	9 (18.4)
Type of surgery, n(%)	
Elective	39 (79.6)
Emergency	10 (20.4)
Operation time, min, median (range)	182 (120 – 281)
Length of mini-laparotomy incision, cm, median (range)	7 (5 – 10)

Table 2. Postoperative complications

	N =49
Length of stay, day, median (range)	6 (5 – 12)
Ileus, n(%)	3 (6.1)
Wound complications, n(%)	3 (6.1)
Seroma	2 (4.1)
Infection	1 (2.0)
Dehiscence	0
Urinary retention, n(%)	2 (4.1)
Anastomotic leakage, n(%)	0
Anastomotic bleeding, n(%)	0
Surgical site infection (organ/space), n(%)	1 (2.0)
Pneumonia, n(%)	1 (2.0)
Overall morbidity, n(%)	10 (20.4)
Mortality	0

Conclusions

In conclusion, we confirmed that the temperature-responsive gel mixed with ropivacaine is a safe and effective method for wound infiltration in minimally invasive colorectal surgery.