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W T C C World Journal of Clinical Cases

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### **ABOUT COVER**

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CASE REPORT

# Enhancing postoperative pain control by surgically-initiated rectus sheath block in abdominal aortic aneurysm open repair: A case report

Kuan-Hua Chen, Ming-Yuan Kang, Yi-Ting Chang, Sheng-Yang Huang, Yung-Szu Wu

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<b>Provenance and peer review:</b> Unsolicited article; Externally peer	Yi-Ting Chang, Department of Anesthesiology, Taichung Veterans General Hospital, Taichung 407219, Taiwan	
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	<b>BACKGROUND</b> Abdominal aortic aneurysm (AAA) repair often involves significant postoperative pain, traditionally managed with systemic opioids, which can cause undesirable side effects. This case report explores the novel use of a surgically-initiated rectus	
	sheath block with a catheter-over-needle assembly for pain management in AAA repair.	

### CASE SUMMARY

A 67-year-old female with hypertension and previous aortic dissection underwent elective open repair of an infrarenal AAA, which had grown from 3.4 cm to 4.3 cm over 14 months. A rectus sheath block was initiated surgically for postoperative pain control. The patient reported low pain scores and did not require systemic intravenous opioids, enabling early ambulation and discharge on postoperative day seven without complications. By preventing complications of systemic opi-



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oids, the method indicating a promising direction for postoperative pain management in major vascular surgeries.

### CONCLUSION

Surgically-initiated rectus sheath block as a valuable tool for managing postoperative pain in AAA repair.

Key Words: Abdominal aortic aneurysm; Postoperative pain management; Rectus sheath block; Surgical anesthesia; Opioid-sparing techniques; Case report

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**Core Tip:** This case report highlights the successful use of a surgically-initiated rectus sheath block for postoperative pain management in a patient undergoing elective abdominal aortic aneurysm repair. The technique provided effective analgesia without the need for systemic opioids, enabling early ambulation and discharge on postoperative day seven. The rectus sheath block offers a promising alternative for pain control in abdominal surgeries, minimizing opioid-related side effects. Further research is needed to validate its safety and efficacy in larger patient cohorts.

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### INTRODUCTION

Abdominal aortic aneurysm (AAA) open repair is known to cause significant postoperative pain, which can lead to delayed recovery and increased morbidity. Postoperative pain restricts the depth of breathing, resulting in a higher incidence of postoperative pulmonary complications. These complications contribute to elevated morbidity and mortality rates, underscoring the critical importance of effective pain management following AAA repair surgery[1].

Instead of relying on systemic opioid analgesics, regional anesthetic techniques such as epidural or spinal anesthesia and peripheral nerve blocks can be utilized to avoid adverse effects like nausea, vomiting, hypotension, respiratory depression, and delayed recovery associated with systemic opioid use. However, the use of spinal opioids is contraindicated in aortic aneurysm surgery due to the common peri- and postoperative use of Heparin, which poses a risk[2].

An alternative option for pain management is rectus sheath catheter analgesia, which does not have the limitation of heparin use. This technique has shown promising results, with significantly lower resting pain scores at 72 hours post-operatively, decreased opiate consumption, and reduced occurrences of hypotension and vasopressor dependency when compared to epidural analgesia[3,4].

This case report highlights the successful utilization of surgically-initiated rectus sheath block for postoperative pain control in a 67-year-old female patient undergoing AAA repair surgery. Based on our findings, we recommend using this method for pain management in AAA repair surgery, as it offers excellent patient satisfaction and favorable outcomes.

### **CASE PRESENTATION**

### **Chief complaints**

Painless abdominal aorta mass with progressing size by images.

### History of present illness

We report the case of a 67-year-old female patient who underwent elective open repair of an infrarenal AAA that had increased in size from 3.4 cm to 4.3 cm over 14 months, as shown in Figure 1A.

### History of past illness

The patient had a history of hypertension and an acute type A aortic dissection with hemopericardium, for which she underwent emergent surgery 16 months earlier, illustrated as Figure 2. The previous procedures included ascending aorta and total arch replacement with a 28 mm 4-branch Gelsoft<sup>™</sup> graft and a frozen elephant trunk technique (Thoracic endovascular aortic repair, thoracic endovascular aortic repair, zone 1 landing: GORE C-TAG TGU313110 + TGU2626-110). Additional interventions were in-situ fenestration of the left subclavian artery with a VIABAHN 10 mm × 5 cm graft (W. L. Gore and Associates, Inc, Flagstaff, AZ, United States), aortic valve resuspension, and percutaneous transluminal angioplasty for a focal dissection of the left subclavian artery.



Figure 1 Progression of infra-renal abdominal aortic aneurysm: Sequential computed tomography imaging demonstrates the progression of an infra-renal abdominal aortic aneurysm, which increased in size by over 1 cm within approximately a year. A: Pre-operative status; B: Post-operative status 2 months later; C: A follow-up 1 year and 4 months post-operation, respectively.



Figure 2 Emergent total arch replacement and thoracic endovascular aortic repair procedure: Involving a total arch replacement using a 28 mm 4-branch Gelsoft<sup>™</sup> graft for reconstruction of the ascending aorta and innominate and left carotid arteries. The procedure included a thoracic endovascular aortic repair with a zone 1 landing using GORE C-TAG devices, fenestration of the left subclavian artery with a VIABAHN stent, and resuspension of the aortic valve. An aortic aneurysm measuring approximately 3.3 cm was noted in the abdominal aorta at the time of operation.

### Physical examination

On examination, she was stable with normal vital signs. On palpation, she had no abdominal mass. She had no signs of deep venous thrombosis in her legs. She also had no signs of heart failure or lower limb vascular obstruction.

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Figure 3 Second operation utilizing Gelsoft<sup>™</sup> vascular prosthesis: Surgical intervention involved the use of a Gelsoft<sup>™</sup> vascular prosthesis (Y graft, 22 mm-11 mm), ligation of the inferior mesenteric artery, and placement of a surgically-initiated rectus sheath catheter for post-operative pain control. A: The surgical plans; B: A peri-operative photo showing the Y graft; C: A post-operative photo illustrating the effective placement of the rectus sheath block and a patient-controlled analgesia device (arrows).

### Imaging examinations

Progression of infra-renal AAA was noted by sequential computed tomography (CT) imaging. The lesion size grew over 1 cm within approximately a year.

### **FINAL DIAGNOSIS**

Two months after the initial surgery, a CT angiography (CTA) showed an infrarenal AAA measuring 3.4 cm, as shown in Figure 1B. This aneurysm further expanded to 4.3 cm by 16 months post-surgery, as Figure 1C.

### TREATMENT

We performed an open surgical reconstruction of the infrarenal abdominal aorta to the bilateral common iliac arteries using a Gelsoft<sup>TM</sup> Vascular Prosthesis (Y graft, 22-11 mm), as Figure 3A and B; the inferior mesenteric artery was also ligated. The catheter was secured with a subcutaneous tunnel and suture, and connected to a patient-controlled analgesia pump delivering a continuous infusion of ropivacaine for three days postoperatively, as Figure 3C. Intraoperatively, we placed a rectus sheath catheter through the rectus muscle using a catheter-over-needle assembly for postoperative pain control, illustrated in Figure 4.

### OUTCOME AND FOLLOW-UP

The patient's postoperative pain was well-controlled, necessitating only oral analgesics. She was able to ambulate and participate in physical therapy shortly after being transferred to the general ward. The catheter was removed on the third postoperative day, and the patient was discharged on the seventh postoperative day.

Nine months after surgery, a follow-up CTA scan indicated a stable condition of the dissecting flap from the descending aorta to the proximal abdominal aorta. The scan also showed partial thrombosis of the false lumen, with no evidence of endoleak following the infrarenal abdominal aorta to bilateral common iliac artery reconstruction, as Figure 5.

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Figure 4 Rectus sheath block technique: A detailed cross-sectional diagram of the abdominal wall illustrating the technique for rectus sheath block. A: The needle target; B: The transverse section of the anterior abdominal wall depicting needle position and local anesthetic injection; C: The placement of the rectus sheath catheter; D: The catheter-over-needle assembly being inserted in a cephalad-to-caudad direction, with intra-abdominal hand placement to feel for needle advancement.



Figure 5 Follow-up computed tomography scans showing stable condition. This image confirms the absence of progression or complications related to the previously observed abdominal aortic aneurysm and surgical interventions.

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### DISCUSSION

Despite advancements in pain management, postoperative pain remains a significant challenge in this patient demographic. If left untreated, it may lead to acute hypertension, which can subsequently cause bleeding or cerebrovascular accidents<sup>[5]</sup>. This case report illustrates the feasibility and efficacy of the surgically initiated rectus sheath block, employing a catheter-over-needle assembly, for managing postoperative pain following AAA repair. The rectus sheath block has long been used as an effective technique for postoperative analgesia after the operations carried out on the abdomen, which effectiveness was confirmed by multiple trials showing that the application of this method helps to minimize the use of opioids and enhances patient satisfaction[6-9]. Conventional in the course of the abdominal surgery this regional anesthesia method is based on the infiltration of local anesthetics between the rectus abdominis muscle and its posterior sheath as well as sparing the lower thoracic intercostal nerves along their anterior branches. Many cardiovascular operations require the administration of anticoagulants, especially during and after surgery with agents like heparin. This demand for anticoagulation creates a major concern with respect to conventional epidural analgesia because epidural hematoma formation. The novelty of the current report is that rectus sheath block preventing risk of spinal hematoma with adequate analgesics for the patient post major cardiovascular surgery.

Furthermore, the rectus sheath block is recognized as a safe and effective technique for managing postoperative pain across a spectrum of surgical procedures, including abdominal surgeries like genitourinary and aortic surgeries, which are often associated with substantial pain and discomfort. Postsurgical pain was reported by 97.1% of patients undergoing abdominal surgery, with 34.9% reporting moderate pain<sup>[10]</sup>.

Compared to systemic opioids, the advantages of the rectus sheath block include effective and targeted pain relief without the need for external catheterization, which can lead to side effects such as nausea, vomiting, sedation, and respiratory depression[11]. This approach ultimately enhances patient comfort, accelerates recovery, and reduces hospitalization durations[12].

Moreover, in aortic surgery, the administration of heparin is indispensable for preventing thrombotic complications. However, this necessitates careful consideration of pain management strategies, as heparin is a well-known contraindication for spinal anesthesia<sup>[2]</sup>. Unlike spinal anesthesia, which has clear contraindications in the presence of heparin due to associated coagulation risks, rectus sheath block emerges as a promising alternative for postoperative pain control in aortic surgery patients. Its few absolute contraindications include patient refusal and allergy to local anesthesia[4].

Rectus sheath block has been employed in various abdominal surgeries and pediatric cardiac surgeries. Typically, anesthetists have applied this technique under the guidance of ultrasonography. In contrast, surgeons find it straightforward to perform this procedure independently, relying on anatomical landmarks, such as laparoscopic guidance, as Figure 4. Consequently, we foresee the potential for the widespread utilization of this technique in open aortic surgery, which could provide more clinical data in the near future.

### CONCLUSION

Surgically-initiated rectus sheath block, employing a catheter-over-needle assembly, represents a promising approach for managing postoperative pain following AAA repair. This method provides efficient and precise pain relief without relying on systemic opioids or external catheterization, ultimately leading to enhanced patient outcomes. In the case described, the patient reported notably low postoperative pain scores, and there was no documented need for systemic intravenous opioids, resulting in satisfactory pain control. However, it is important to emphasize that this technique has not yet been standardized in our patient care protocols. More comprehensive studies are required to validate its safety and efficacy across a broader patient population.

### FOOTNOTES

Author contributions: Chen KH contributed to writing original draft, review and editing, conceptualization, methodology, formal analysis; Kang MY and Chang YT contributed to conceptualization, methodology; Wu YS contributed to writing, review and editing, conceptualization, methodology; Huang SY contributed to writing, review and editing, conceptualization, methodology, funding acquisition, project administration; All authors have read and approved the final manuscript.

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