



Contents lists available at ScienceDirect

## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Vacuum-assisted closure for open perineal wound after abdominoperineal resection



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### ARTICLE INFO

#### Article history:

Received 11 February 2015  
Received in revised form 24 April 2015  
Accepted 26 April 2015  
Available online 29 April 2015

#### Keywords:

VAC  
APR  
SSI  
Vacuum assisted closure  
Perineal wound  
Abdominoperineal resection

### ABSTRACT

**INTRODUCTION:** In colorectal cancer surgery, surgical site infection (SSI) is a common complication, and especially, perineal wound complications after abdominoperineal resection (APR) remain to be serious clinical problems. Vacuum-assisted closure (VAC) therapy was first reported in another surgical field in 1997, and it is useful for treating complex wounds because it promotes granulation. VAC therapy has been recently used for open abdominal wounds. We introduced VAC for treating open perineal wound of APR and report the usefulness of it.

**PRESENTATION OF CASE:** We treated four patients. Firstly, in cases 1 and 2, we introduced VAC therapy to the management of SSI of the perineal wound after APR, and it was useful to control postoperative perineal wound infection. And also, in cases 3 and 4, we introduced VAC therapy to prevent perineal wound infection. Perineal wound infection did not happen.

**DISCUSSION:** A vertical rectus abdominis myocutaneous flap has been reported to decrease perineal wound complications including pelvic abscess and open perineal wound; however it results in significant operative blood loss, increased operative time, and additional surgical complications. In our cases, there were no complications relating to VAC therapy and it promoted rapid wound healing. Our results suggested that it is an effective treatment for APR in a high-risk case of an open perineal wound.

**CONCLUSION:** VAC therapy is a less invasive method and a useful treatment for open perineal wound of APR.

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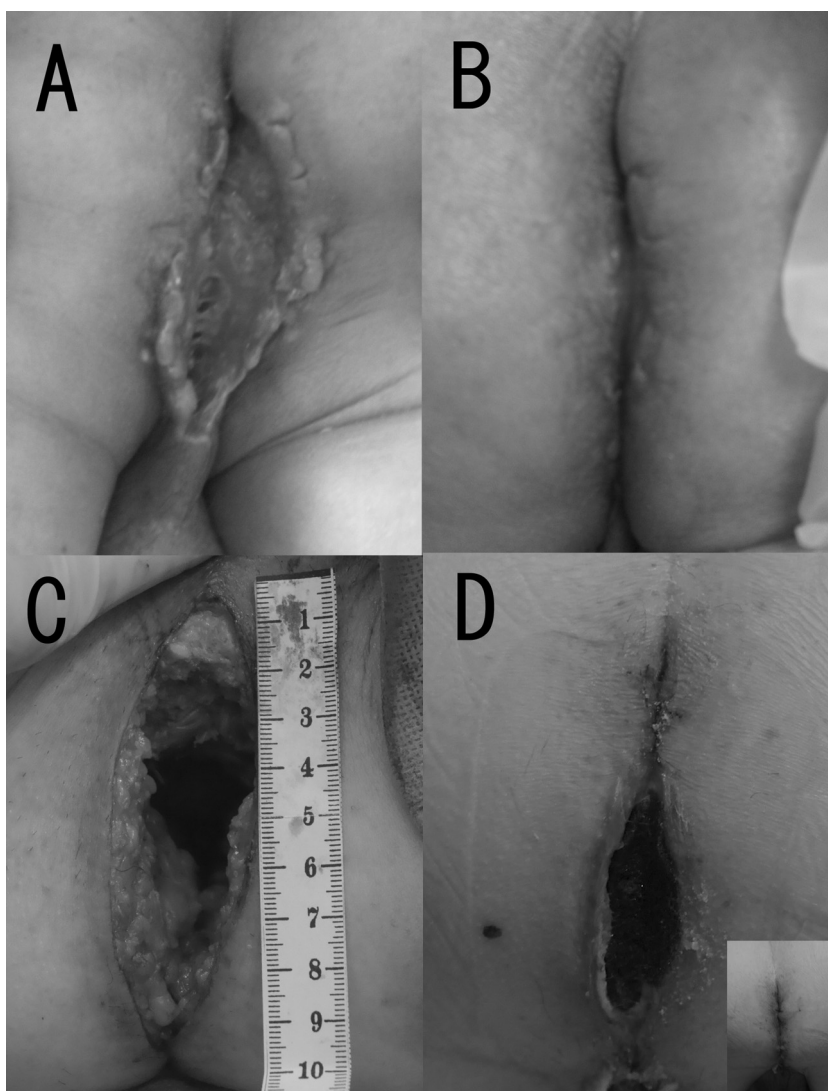
### 1. Introduction

In colorectal cancer surgery, surgical site infection (SSI) is a common complication, and various procedures have been attempted to decrease its incidence. Especially, perineal wound complications, including pelvic abscesses and open perineal wound infections, after abdominoperineal resection (APR) remain to be serious clinical problems; SSIs occur in more than 40% of the cases according to several reports [1,2]. We retrospectively studied the details of eighty-three patients who underwent APR at Osaka Medical Center for Cancer and Cardiovascular Diseases (OMCCD) from 2003 to 2013; pelvic abscess occurred in 23 patients (28%) and open perineal wound infection occurred in 39 patients (47%). SSIs are associated with a long hospital stay, decreasing the quality of life of the patient. A vertical rectus abdominis myocutaneous flap has been reported to decrease perineal wound complications [2]. Although this flap is very useful for the reconstruction of the pelvic defect resulting from APR, it results in significant operative

blood loss, increased operative time, and additional surgical complications arising from the use of the normal tissue used for the reconstruction.

Vacuum-assisted closure (VAC) was first reported in another surgical field in 1997 [3]. It has become a common modality for treating complex wounds, assisting secondary wound healing. The mechanism for assisting wound healing is as follows: an open-cell foam placed in the wound cavity with a controlled negative pressure is able to decrease bacterial colonization, tissue edema, and wound tension, while increasing blood flow. It leads to the promotion of better tissue granulation. Recently, VAC has been used for the treatment of open abdominal wounds, and shown to decrease the operative time for abdominal wall reconstruction [4]. We introduced VAC for treating open perineal wounds after APR. Here, we report four cases in which VAC therapy (VAC; KCI International, San Antonio, TX, USA) was successful for treating the perineal wound after APR. There are few reports of VAC therapy for treating open perineal wounds after APR, so that we mention the usefulness of it.

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**Fig. 1.** The perineal wound pictures of cases 1 and 3. In case 1, the open perineal wound was observed and VAC therapy was started on POD 30 (A); the wound was cured on POD 39 (B). In case 3, the perineal defect after APR was observed (C) and VAC therapy was started on POD 0. The wound became smaller and was sutured on POD 6 (D).

**2. Presentation of case**

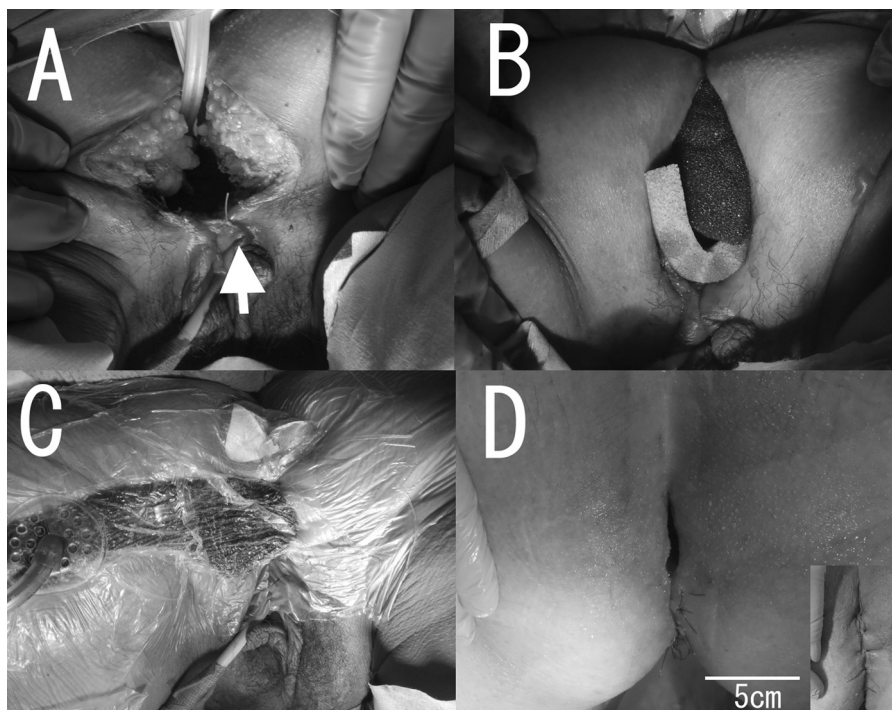
From June 2013 to December 2014, four patients underwent APR and VAC therapy at OMCCD and the clinical information was summarized in Table 1. In cases 1 and 3, traditional APR was performed. In cases 2 and 4, the operation for recurrence was performed. In all cases, open surgery was performed, and the pelvic cavity could not be filled with the greater omentum.

In case 1, APR with urinary tract impairment was performed and an open abdominal wound was observed around 3 weeks after the operation (Fig. 1A). No organs were exposed through the open perineal wound. Although the wound was washed with water every day, it was hard to control infection. Then, VAC therapy, in which an open-cell foam (GranuFoam; KCI International, San Antonio, TX) was placed in the open wound, was introduced on postoperative day (POD) 30. On POD 39, the wound infection was well

**Table 1**  
Clinical characteristics and perioperative factors of all 4 patients.

Case No.	Sex	Age	Rectal tumor status	Preoperative chemotherapy/radiotherapy	Other organs resected with tumor	Open perineal wound size (cm <sup>3</sup> )	Organ exposed to wound cavity	VAC treatment period (POD <sup>a</sup> )	Postoperative hospital stay (POD <sup>a</sup> )
1	Male	74	Primary rectal cancer	No/No	None	15 × 4 × 3 cm <sup>3</sup>	None	30–39	59
2	Female	53	Re-recurrence of rectal cancer (invasion to vagina and right gluteus muscle)	Yes/No	Vagina right gluteus muscle	10 × 10 × 10 cm <sup>3</sup>	Bladder	30–55	57
3	Male	73	Primary anorectal melanoma	No/No	None	10 × 8 × 3 cm <sup>3</sup>	None	0–6	29
4	Female	34	Recurrence of rectal cancer (invasion to vagina)	Yes/No	Vagina	20 × 20 × 10 cm <sup>3</sup>	Vagina	0–27	36

<sup>a</sup> POD, postoperative day.



**Fig. 2.** The perineal wound pictures of case 4.

(A) The vagina was sutured (arrow) and a large defect remained. (B) A WhiteFoam (KCI International) was placed on the sutured vagina and a GranuFoam (KCI international) was placed on it. (C) The long GranuFoam was extended to the right side of the patient to avoid clogging of the drainage tube. The wound was covered with a film and a controlled negative pressure was applied. (D) The size of the perineal wound became smaller and was sutured on POD 27.

controlled and no other treatments were necessary for the wound (Fig. 1B). In case 2, APR with resection of a vagina and right gluteus muscle was performed, and open abdominal wound was observed around 3 weeks after the operation. An open perineal wound with exposure of the bladder wall was observed. An atraumatic contact layer (Mepitel One; Mölnlycke Health Care, Norcross, GA, USA), was placed between the bladder wall and the GranuFoam (KCI International) because direct organ contact with GranuFoam has been reported to result in bleeding and perforation [5]. VAC therapy was successful and the wound size decreased on POD 55.

We intraoperatively introduced VAC to prevent perineal wound infection in case 3. The surgical defect after APR is shown in Fig. 1C. VAC therapy was initiated at the end of the operation. On POD 6, the wound size became smaller and the wound was sutured (Fig. 1D). The patient was discharged on POD 27 without any complications. Case 4 was a high-risk case for open perineal wound infection, because it involved preoperative chemoradiotherapy, repeat surgery for tumor recurrence, and a large defect size predicted after the APR was combined with vaginal resection for the tumor (Fig. 2A). A vertical rectus abdominis myocutaneous flap was an alternative for treating the surgical defect, but we introduced VAC therapy. It was started on the day of the operation without the placement of primary sutures. A GranuFoam dressing was placed in the surgically resected perineal wound, and WhiteFoam (KCI International) which is a less-traumatic contact foam, was placed on the vaginal wall (Fig. 2B and C). It promoted good granulation and the foam was replaced once a week. The perineal wound size became smaller, and the wound was closed by secondary suturing on POD 27 (Fig. 2D). The patient was discharged on POD 36 without any complications.

### 3. Discussion

VAC therapy was reported in the treatment for open abdomen [4,6], and it promotes rapid wound healing and helps manage costs

[7]. There are few reports of VAC therapy for treating open perineal wounds after APR, and we experienced four successful cases with VAC therapy. In cases 1 and 2, it was useful to treat postoperative open perineal wound. And we introduced VAC therapy starting on the operation day in cases 3 and 4 in order to prevent perineal wound infection. There were no complications in relation to the VAC therapy, and the treatment resulted in reducing the hospital stay.

A vertical rectus abdominis myocutaneous flap is useful for the pelvic reconstruction after APR with large pelvic defect. However, our results suggested that, it is an effective treatment for APR in a high-risk case of an open perineal wound. This suggests that VAC therapy is a less-invasive alternative.

### 4. Conclusion

VAC is a useful treatment for open perineal wounds and is a less invasive method for APR.

### Conflict of interest

We have no conflicts of interest to declare.

### Funding

We have no funding sources to declare.

### Ethical approval

This study was approved by Osaka Medical Center for Cancer and Cardiovascular Diseases ethical committee (ref No. 1408185104).

## Consents

Written informed consents were obtained from all patients for publication of this case report and accompanying images.

## Author contribution

SF and NM designed the report. SF, NM, MO and SN were attending doctors for the patient. NM, MO, YF, MY, HM and SM organized the report and SF wrote the paper. All authors read and approved the final manuscript.

## Guarantor

The guarantor of this manuscript is Norikatsu Miyoshi, corresponding author.

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