



Novel Blake Drain with Negative Pressure in Pediatric Laparoscopic Surgeries

Shaodong Gu*, Hong Luo, Yingxun Wang

Department of Pediatric Surgery, Kangda College of Nanjing Medical University, Nanjing, China

ABSTRACT

Background: A drainage tube is generally retained after an abdominal surgery, especially in cases of postoperative bleeding or exudation. In recent years, negative pressure drainage or Vacuum Sealing Drainage (VSD) has been extensively applied. However, the use of VSD in laparoscopic surgery is still challenging and has been rarely reported. Purpose: To introduce a novel Blake drain applied with negative pressure in laparoscopic surgeries.

Materials/methods: Two bar-shaped cuts were made at the end of the drainage tube, with one deeper than the other, and there were no other side holes retained. Thirty patients aged 4-8 years in Novel Drainage Tube (NDT) group received the novel VSD after laparoscopic appendectomy or laparoscopic pyeloplasty, while those in the control Traditional Drainage Tube (TDT) group received traditional drainage using the tube bearing side holes. This study was approved by the Ethics Committee of The First People's Hospital of Lianyungang.

Results: Tissue plugging and other complications were not observed in patients of NDT group. Significant differences were found in volume of drainage and cases of tissue plugging between NDT and TDT groups ($P < 0.05$).

Conclusion: The novel technique is simple, safe and effective for VSD following laparoscopic surgery. It can prevent plugging of soft tissues into the tube and improve drainage effect.

Keywords: Abdominal surgery; Negative pressure; Drainage tube; Plugging prevent; Surgery

Abbreviations: VSD: Vacuum Sealing Drainage; NDT: Novel Drainage Tube; TDT: Traditional Drainage Tube

INTRODUCTION

A drainage tube is necessary to be retained for monitoring postoperative bleeding or exudation. In recent years, negative pressure drainage or Vacuum Sealing Drainage (VSD) has been widely used in wound treatment [1]. However, VSD following a laparoscopic surgery requires to be cautiously applied. A traditional drainage tube has several side holes. Conventional operation may result in plugging of soft tissues into the side holes, thus greatly troubling extubation. The counteraction of careful site diseases has gotten little consideration in pediatric medical procedure. Negative pressing factor wound treatment is utilized to treat complex injuries. We estimated that this standard could diminish wound contamination rates following laparoscopic medical procedure. We tried this in a randomized controlled preliminary. A medical caretaker dazed for the therapy assessed the umbilical injury between postoperative days 7-10 for disease. Information examination was performed utilizing a Fisher precise test with $p < 0.05$ characterized as critical. The break examination showed an illogical number of

patients would be needed to accomplish adequate force. We didn't track down a critical distinction between the control and vacuum dressings in lessening post-usable injury contaminations.

CASE PRESENTATION

A total of 9-271 ml (59.15 ± 61.14 ml) of pus was drained out after laparoscopic appendectomy, and 25-58 ml (31.30 ± 9.96 ml) of fluid was drained out after laparoscopic pyeloplasty. Extubation was performed at postoperative 48-72 h. Tissue plugging and other complications were not found in NDT group. There were significant differences in volume of drainage, and cases of plugging between NDT and TDT group ($P < 0.05$) (Tables 1 and 2).

We prospectively collected the data after examining sixty five parturient patients of ASA grade I and II posted for elective caesarean section (Table 1).

Correspondence to: Dr. Shaodong Gu, Department of Pediatric Surgery, Kangda College of Nanjing Medical University, Nanjing, China, E-mail: gushaodong369@outlook.com

Received date: August 02, 2021; **Accepted date:** August 17, 2021; **Published date:** August 24, 2021

Citation: Gu S, Luo H, Wang Y (2021) Novel Blake Drain with Negative Pressure in Pediatric Laparoscopic Surgeries. J Anesth Clin Res. 12:1021.

Copyright: © 2021 Gu S, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Table 1: Postoperative outcomes of NDT and TDT group following laparoscopic appendectomy.

	NDT	TDT	p value
Cases (N)	20	20	
Age (Y)	5.80 ± 1.54	5.50 ± 1.19	0.522*
Volume of drainage (milliliters, mean ± std dev)	59.15 ± 61.14	28.45 ± 23.55	0.043*
Cases of plugging (N)	0	6	0.008 ‡

p value<0.05:Considered as statistically significant; *:Independent t test was performed; ‡:Fisher's exact test was performed.

Table 2: Postoperative outcomes between NDT and TDT groups following laparoscopic pyeloplasty.

	NDT	TDT	p value
Cases (N)	10	10	
Age (Y)	6.30 ± 1.57	5.60 ± 1.26	0.354*
Volume of drainage (milliliters, mean ± std dev)	31.30 ± 9.96	20.50 ± 8.50	0.018*
Cases of plugging (N)	0	8	0.002 ‡

p value<0.05:Considered as statistically significant; *:Independent t test was performed; ‡:Fisher's exact test was performed.

RESULTS AND DISCUSSION

Redon first proposed VSD that increased drainage efficacy and wound healing rate [2]. Qiu applied abdominal VSD for the first time in China [3]. Later, many studies have shown that VSD is effective in controlling abdominal infection, clearing abscess and shortening healing time [4-6]. In conventional VSD after abdominal surgery, however, foam materials should be placed between the abdominal soft tissues and the side hole of VSD tube. Otherwise, the soft tissues may be exposed to the side hole, triggering focal necrosis of the intestinal wall. Besides, granulated tissues may also grow into the foam material [7]. However, in laparoscope-guided open surgery, it is unfeasible to put the foam material into or out of the abdomen. In 1983, an original patent was issued, which described a novel drainage method named Blake drain. The inventor's name is Larry W Blake. The Blake drain's design has 4 open fluted channels to prevent the plugging of draining perforations. The drain today continues to be a popular drain of choice for surgeons in all subspecialties [8].

We herein report a novel Blake drain method by transforming the end of drainage tube. We made two bar-shaped cuts at the end of drainage tube, 4-5 cm long and 2-3 cm long. In this way, the side hole of the tube was transformed into two cuts to prevent the omentum or other soft tissues being incarcerated. The pressure could also be dispersed through both relatively long cuts. Even if the tissues were suctioned, extubation could be quickly and easily performed. The outside of the drain tube was connected with a negative ball. With this technique, foam or other materials were unneeded, which significantly simplified the procedures of VSD. Therefore, this technique is especially suitable for laparoscopic surgeries.

Perforated appendicitis is common in children. Their omentum has not yet fully developed, and the appendix tissue is much thinner than that of adults. As a result, abdominal contamination becomes much more severe in children with perforated appendicitis, making postoperative drainage always necessary [9].

CONCLUSION

VSD has been extensively in clinical application, but its use in laparoscopic surgeries is rarely reported. In the present study, we

treated 20 cases of laparoscopic appendectomy with this novel Blake drain. To convenience the drainage, the end of the drainage tube is inserted into the Douglas pouch, a site far below the omentum. Early off-bed activities can also promote apocenos through the tube. After that, we tried this technique in laparoscopic pyeloplasty that is always challenged by the lodged tube. In a case prior to this study, for example, we used ureteroscope to remove the drainage tube that had suctioned the omentum tissues into its side holes. Notably, in pyeoplasty treated with this novel Blake drain, the end of tube was still fixed near the renal pelvis stoma, and tissue plugging and other complications were not found, highly suggestive of its effectiveness and safety. The novel technique is simple, safe and effective for VSD following laparoscopic surgery. It can prevent plugging of soft tissues into the tube.

DECLARATIONS

Ethics approval and consent to participate

All authors declare their participation and they meet the current ICMJE criteria for authorship.

The author confirms

- That the work described has not been published before;
- That it is not under consideration for publication elsewhere;
- That its publication has been approved by all co-authors, if any;
- That its publication has been approved (tacitly or explicitly) by the responsible authorities at the institution where the work is carried out.
- The author agrees to publish in the Journal indicated below and also in English by BMC surgery journal.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available in the Shaodong Gu repository. The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

CONFLICT OF INTEREST

The authors certify that there is no conflict of interest with any individual/organization for the present work.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

ACKNOWLEDGEMENT

The authors gratefully acknowledge the trust and support given by the patient's parents.

REFERENCES

1. Umezawa H, Matsutani T, Yokoshima K, Nakamizo M, Ogawa R. A novel tube-drainage technique of negative pressure wound therapy for fistulae after reconstructive surgery. *Plastic and Reconstructive Surgery Global Open*. 2018;6(8):1880-1885.
2. Redon H. Closure under reduced atmospheric pressure of extensive wounds. *Memoires. Academie de chirurgie (France)*. 1954;80(14):394-396.
3. Li Y, Li PY, Sun SJ, Yao YZ, Li ZF, Liu T, et al. Chinese Trauma Surgeon Association for management guidelines of vacuum sealing drainage application in abdominal surgeries—Update and systematic review. *Chinese Journal of Traumatology*. 2019;22(1):1-10.

4. Giudicelli G, Rossetti A, Scarpa C, Buchs NC, Hompes R, Guy RJ, et al. Prognostic factors for enteroatmospheric fistula in open abdomen treated with negative pressure wound therapy: a multicentre experience. *Journal of Gastrointestinal Surgery*. 2017;21(8):1328-1334.
5. Franchin M, Tozzi M, Soldini G, Piffaretti G. A case of continuous negative pressure wound therapy for abdominal infected lymphocele after kidney transplantation. *Case reports in transplantation*. 2014 ;8(5):121-132.
6. Durai R, Ng PC. Perirectal abscess following procedure for prolapsed haemorrhoids successfully managed with a combination of VAC sponge and Redivac systems. *Techniques in coloproctology*. 2009;13(4):307-309.
7. Zhang LY. Application of vacuum sealing drainage in abdominal surgery: status and prospects. *J Trauma Surg*. 2016;18(8):490-491.
8. Meyerson JM. A brief history of two common surgical drains. *Annals of Plastic Surgery*. 2016;77(1):4-5.
9. Almaramhy HH. Acute appendicitis in young children less than 5 years. *Italian Journal of Pediatrics*. 2017;43(1):1-9.