



## Letters to the Editor

**Re: Chronic pain and risk for reoperation for recurrence after inguinal hernia repair using self-gripping mesh**


To the Editors:

We read with interest the report by Axman et al<sup>1</sup> entitled “Chronic pain and risk for reoperation for recurrence after inguinal hernia using self-gripping mesh.” We found this subject relevant because chronic pain after inguinal hernia repair remains one of the main postoperative complications than can cause chronic distress to patients. The authors reported a rate of 15% of patients with chronic pain after inguinal hernia repair, and although in their methods section they reported to have recorded how the surgeon handled the nerves, these data were not published. Studying the correlation between nerve treatment and inguinodynia would be very interesting because currently there is no consensus on how to manage these nerves. Inguinodynia has been classified as neuropathic or nonneuropathic. Neuropathic genesis has been attributed to the ilioinguinal, iliohypogastric, and the genital branch of the genitofemoral nerve related to trauma during dissection and nerve entrapment by the mesh through an inflammatory or fibrotic mechanism. Non-neuropathic etiology is related to excessive scar formation, the periosteal reaction from sutures inserted into the pubic tubercle, or misplacement with bulkiness of the mesh leading to mechanical pressure on the inguinal region.<sup>2,3</sup> The Hernia Surge Group and the European Hernia Society strongly recommend an only-nerve-recognizing/nerve-preservation approach, even though it has a low level of medical evidence; these societies justify this approach, because it appears to be associated with less chronic pain.<sup>4,5</sup> A study comparing the benefits between self-gripping mesh and lightweight polypropylene mesh reported a greater visual analog scale score of pain when the iliohypogastric nerve was preserved compared to nerve resection.<sup>6</sup> Wijsmuller et al, in their systematic review, found little difference between section or preservation of the ilioinguinal nerve in terms of chronic inguinal pain.<sup>7</sup> With these reports in the literature, we think that including these data and presenting their results in a 3-year follow-up period could add precious information to our knowledge on the subject.

**Funding/Support**

This study was supported by the Research Funds of Azienda Unità Sanitaria Locale-IRCCS di Reggio Emilia.

**Conflict of interest/Disclosure**

The authors have no related conflicts of interest to declare.

**References**

1. Axman E, Holmberg H, Nordin P, Nilsson H. Chronic pain and risk for reoperation for recurrence after inguinal hernia repair using self-gripping mesh. *Surgery*. 2020;167(3):609–613.
2. Hakeem A, Shanmugam V. Inguinodynia following Lichtenstein tension-free hernia repair: A review. *World J Gastroenterol*. 2011;17(14):1791–1796.

3. Hu QL, Chen DC. Approach to the Patient with Chronic Groin Pain. *Surg Clin North Am*. 2018;98(3):651–665.
4. Simons MP, Aufenacker T, Bay-Nielsen M, et al. *European Hernia Society Guidelines on the Treatment of Inguinal Hernia in Adult Patients*. Vol 13.; 2009. <https://doi.org/10.1007/s10029-009-0529-7>
5. Simons MP, Smietanski M, Bonjer HJ, et al. International guidelines for groin hernia management. *Hernia*. 2018;22(1):1–165.
6. Smeds S, Nienhuijs S, Kullman E, et al. Identification and management of the ilioinguinal and ilio-hypogastric nerves in open inguinal hernia repair: benefits of self-gripping mesh. *Hernia*. 2016;20(1):33–41.
7. Wijsmuller AR, Van Veen RN, Bosch JL, et al. Nerve management during open hernia repair. *Br J Surg*. 2007;94(1):17–22. <https://doi.org/10.1002/bjs.5651>.

Carolina Castro Ruiz, MD\*

Department of General Surgery, Chirurgia Area Nord. Azienda Unità Sanitaria Locale-IRCCS di Reggio Emilia, Italy

Clinical and Experimental Medicine Ph.D. Program, University of Modena and Reggio Emilia, Italy

Erica Pavesi, MD, Lara Ugoletti, MD

Department of General Surgery, Chirurgia Area Nord. Azienda Unità Sanitaria Locale-IRCCS di Reggio Emilia, Italy

Maurizio Zizzo, MD

Clinical and Experimental Medicine Ph.D. Program, University of Modena and Reggio Emilia, Italy

Surgical Oncology Unit, Azienda Unità Sanitaria Locale-IRCCS di Reggio Emilia, Italy

Valerio Annessi, MD

Surgical Oncology Unit. Azienda Unità Sanitaria Locale-IRCCS di Reggio Emilia, Italy

\* Corresponding author.

E-mail address: [carolina.castroruiz85@gmail.com](mailto:carolina.castroruiz85@gmail.com) (C. Castro Ruiz).

Accepted 31 March 2020

<https://doi.org/10.1016/j.surg.2020.03.036>  
0039-6060/© 2020 Elsevier Inc. All rights reserved.

**The impact of negative pressure wound therapy for closed surgical incisions on surgical site infection: A systematic review and meta-analysis**


To the Editors:

We read the interesting report on the efficacy of incisional negative pressure wound therapy (NPWT) for the prevention of postoperative wound complication such as surgical site infections (SSIs).<sup>1</sup> NPWT is effective in promoting wound healing and in removing wound exudate, irrigation fluids, bodily fluids, or infectious materials.<sup>2–6</sup> The procedure may be indicated for use on chronic, acute, traumatic, subacute, and dehisced wounds; diabetic ulcers; pressure ulcers; skin flaps; and grafts. Also, indications for the use of incisional NPWT include prophylaxis of SSI.<sup>1,7,8</sup>

In agreement with the authors,<sup>1</sup> we believe that postoperative wound complications increase morbidity and mortality. However, assessments of cost-effectiveness of incisional NPWT demonstrated different results according to indications. We believe that the higher price of the device compared with the standard dressing is balanced by the low rate of complications and early discharge of the patient.<sup>4</sup>

The present analysis of randomized and observational studies compared incisional NPWT with control dressing—regarding SSI, wound dehiscence, skin necrosis, seroma/hematoma, length of stay, readmission, and reoperation—as outcomes, for several types of surgery.

We have used incisional NPWT in more than 40 patients who underwent the repair of an abdominal wall defect with associated bowel resection in an emergency setting. After resection of the ischemic/necrotic bowel segment, we performed intestinal anastomosis and corrected the parietal defect with the use of biosynthetic mesh. At the end of the procedure, we applied incisional NPWT in continuous mode at suction pressures of 75–125 mmHg. In this patient population we have observed a lower incidence of seroma and a lower incidence of wound dehiscence and reoperation compared with a similar population of patients treated with standard dressings. Meta-analysis did not show a reduction of reoperation among randomized controlled trials (RCTs) nor among observational studies. In patients where mesh is used, we believe that a certain percentage of reoperations related to bacterial colonization of the mesh or the formation of seroma and wound dehiscence can be avoided with the use of incisional NPWT. We agree with the authors that anatomic location of SSI seems a relevant outcome, and, as reported in the literature, deep SSI needs surgical debridement.

Moreover, we treated some cases of elective complex abdominal wall reconstruction with mesh (biosynthetic, biologic, or synthetic), primary wound closure, skin approximation through distant stitches, no surgical drain, and prolonged (a minimum of 10 days) incisional NPWT. As Chiarello and Cariati<sup>4</sup> maintained, the results were promising in high-risk patients (such as patients who were severely obese and had chronic obstructive pulmonary disease), where the wound tension tends to be high in the postoperative period, owing to hypoperfusion, abdominal fat, abdominal breathing, or cough. The dressing was changed every 4 days, the device was well tolerated, and the patients were encouraged to early mobilization and discharged home with the functioning device.<sup>4</sup>

In some studies, incisional NPWT, which is applied after primary wound closure, was able to decrease wound complications such as dehiscence, and unpredictably it resulted in decreased hernia recurrence. It is not readily apparent how hernia recurrence is affected. Studies that reported reduced hernia recurrence with the use of incisional NPWT did not propose potential mechanisms, nor did they analyze the factors that led to hernia recurrence. We agree on the hypothesis that reduced hernia recurrence may be a secondary benefit of less wound complications. Patients experiencing SSI or wound dehiscence after abdominal wall repair often require mesh removal, which may result in relapse of their original hernia.<sup>5,9</sup> Many other studies reported wound dehiscence. The present meta-analysis demonstrated that incisional NPWT significantly reduces wound dehiscence. This result is concordant with the largest trial of Galiano et al.,<sup>10</sup> who found a significant decrease of wound dehiscence after breast surgery.

We believe that the patients treated prophylactically with incisional NPWT and experiencing primary wound closure of their surgical incision after surgery most likely experience fewer SSIs than patients treated with standard dressings. The conclusion of the analysis by Shiroky et al.<sup>1</sup> supports our position. The authors demonstrated that incisional NPWT reduces the risk of SSI. We

have also noted a lower incidence of seroma, as confirmed in the results of the meta-analysis.

We have observed a low incidence of superficial SSI in our incisional patients treated with NPWT. The results are credibly evident that incisional NPWT results in fewer SSI than standard dressings after surgery. The present meta-analysis demonstrated that the reduction of SSI remained significant among RCTs that described potentially contaminated procedures or RCTs that included clean and contaminated procedures.

In accord with Shiroky et al's<sup>1</sup> meta-analysis, we believe that incisional NPWT is an effective procedure for the prevention of SSI in selected surgical settings.

#### Funding/Support

The authors have nothing to disclose regarding the sources of support in the form of grants, equipment, and/or pharmaceuticals.

#### Conflict of interest/Disclosure

The authors declare that they have no conflict of interest.

#### References

- Shiroky J, Lillie E, Muaddi H, Sevigny M, Choi WJ, Karanicolas PJ. The impact of negative pressure wound therapy for closed surgical incisions on surgical site infection: A systematic review and meta-analysis. *Surgery*. 2021;169(5):1257–1265.
- Bakaeen FG, Haddad O, Ibrahim M, et al. Advances in managing the noninfected open chest after cardiac surgery: Negative-pressure wound therapy. *J Thorac Cardiovasc Surg*. 2019;157:1891–1903.e9.
- Cuomo R, Grimaldi L, Nisi G, Zerini I, Giardino FR, Brandi C. Ultraportable devices for negative pressure wound therapy: First comparative analysis. *J Invest Surg*. 2019;27:1–9.
- Chiarello MM, Cariati M. Perioperative complications of complex abdominal wall reconstruction with biologic mesh: A pooled retrospective cohort analysis of cohort of 220 patients from two academic centers: A commentary. *Int J Surg*. 2020;76:14–15.
- Swanson EW, Cheng HT, Susarla SM, Lough DM, Kumar AR. Does negative pressure wound therapy applied to closed incisions following ventral hernia repair prevent wound complications and hernia recurrence? A systematic review and meta-analysis. *Plast Surg (Oakv)*. 2016;24:113–118.
- Latifi R, Samson DJ, Gogna S, Joseph BA. Perioperative complications of complex abdominal wall reconstruction with biologic mesh: A pooled retrospective cohort analysis of 220 patients from two academic centers. *Int J Surg*. 2020;74:94–99.
- Abadia P, Ocana J, Ramos D, et al. Prophylactic use of negative pressure wound therapy reduces surgical site infections in elective colorectal surgery: A prospective cohort study [E-pub ahead of print] *Surg Infect (Larchmt)*. 2020. <https://doi.org/10.1089/sur.2019.309>. Accessed June 10, 2020.
- Chambers LM, Morton M, Lampert E, et al. Use of prophylactic closed incision negative pressure therapy is associated with reduced surgical site infections in gynecologic oncology patients undergoing laparotomy [E-pub ahead of print] *Am J Obstet Gynecol*. 2020. <https://doi.org/10.1016/j.ajog.2020.05.011>. Accessed May 14, 2020.
- Gassman A, Mehta A, Buchholdt E, et al. Positive outcomes with negative pressure therapy over primarily closed large abdominal wall reconstruction reduces surgical site infection rates. *Hernia*. 2015;19:273–278.
- Galiano RD, Hudson D, Shin J, et al. Incisional negative pressure wound therapy for prevention of wound healing complications following reduction mammoplasty. *Plast Reconstr Surg Glob Open*. 2018;6:e1560.

Giuseppe Brisinda, MD\*

Department of Surgery, Catholic University of Rome  
Fondazione Policlinico Universitario Agostino Gemelli – IRCCS  
Rome, Italy

Maria Michela Chiarello, MD

Department of Surgery, General Surgery Operative Unit  
“San Giovanni di Dio” Hospital  
Crotona, Italy

\* Corresponding author.  
E-mail address: [gbrisin@tin.it](mailto:gbrisin@tin.it) (G. Brisinda).

Accepted 6 July 2020

<https://doi.org/10.1016/j.surg.2020.07.039>  
0039-6060/© 2020 Elsevier Inc. All rights reserved.

### Response to Letter to the Editor: The impact of negative pressure wound therapy (NPWT) for closed surgical incision on surgical site infection: A systematic review and meta-analysis



We would like to thank Drs Brisinda and Chiarello for their interest in our systematic review and meta-analysis of randomized controlled trials. We are pleased to hear that our study appears to parallel the authors' own approach and findings at their home institutions when applying incisional negative pressure wound therapy (NPWT) to elective and emergency repair of complex abdominal wall hernias. We would certainly agree that the use of incisional NPWT may have additional benefit in this population, particularly given the significant morbidity that can result from a surgical site infection in the presence of implanted permanent mesh. While we did not identify any randomized controlled trials that specifically examined ventral hernia patients, we feel that our findings are generalizable to this population.

The application of incisional NPWT appears to be a safe and effective intervention that can be used to minimize perioperative morbidity. Future research should include cost utility analyses as well as identifying the subgroups who would benefit most from this novel intervention. Indeed, this may include patients undergoing complex abdominal wall reconstruction and abdominal closures involving permanent mesh.

Jonah Shiroky, MD, MSc, FRCSC  
Division of General Surgery  
Sunnybrook Health Sciences Centre  
Toronto, Canada

Erin Lillie, MSc  
Sunnybrook Research Institute  
Sunnybrook Health Sciences Centre  
Toronto, Canada

Hala Muaddi, MD, MSc, Marika Sevigny, MD, Woo Jin Choi, MD  
Division of General Surgery  
Department of Surgery  
University of Toronto  
Canada

Paul J. Karanicolas, MD, PhD, FRCSC\*  
Division of General Surgery  
Sunnybrook Health Sciences Centre  
Toronto, Canada

Sunnybrook Research Institute  
Sunnybrook Health Sciences Centre  
Toronto, Canada

Division of General Surgery  
Department of Surgery  
University of Toronto  
Canada

Institute of Health Policy  
Management and Evaluation  
University of Toronto  
Canada

\* Corresponding author.  
E-mail address: [paul.karanicolas@sunnybrook.ca](mailto:paul.karanicolas@sunnybrook.ca) (P.J. Karanicolas).

Accepted 5 October 2020

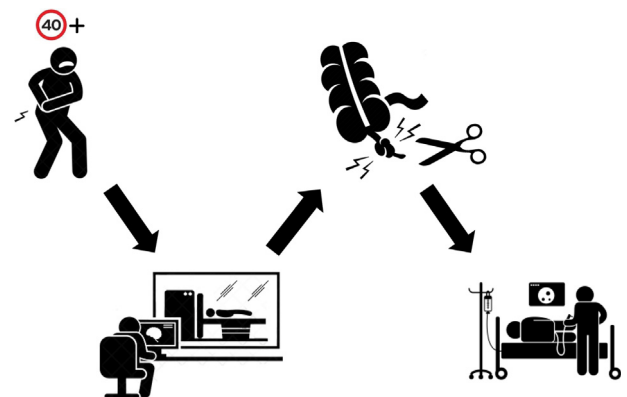
<https://doi.org/10.1016/j.surg.2020.10.005>  
0039-6060/© 2020 Elsevier Inc. All rights reserved.

### The challenge is now to incorporate preoperative computed tomography scan and postoperative colonoscopy into routine practice for patients aged over 40 years presenting with acute appendicitis



We read with interest the article by Naar et al<sup>1</sup> published online on 29 July 2020 in *Surgery*. The authors present results of a post hoc analysis of data from the Eastern Association for the Surgery of Trauma Multicenter Study of the Treatment of Appendicitis in America, which highlighted an increased risk of malignancy for patients older than 40 years with appendicitis and with an appendix wider than 10 mm on computed tomography (CT) scan.

The findings by Naar et al<sup>1</sup> are immensely important, highlighting the need for routine preoperative CT scan and postoperative colonoscopy in patients aged over 40 years presenting with acute appendicitis. We recently performed a meta-analysis of 4,328 patients from 8 studies, which showed that the risk of right-sided colon cancer in patients aged over 40 years with acute appendicitis is 10 times higher than the risk in the general population.<sup>2</sup> The pooled incidence of right-sided colon cancer was 1.043% (95% CI 0.762–1.367), which was significantly higher than the risk in general population (standardized risk ratio: 10.65, 95% CI 3.83–29.66,  $P < .0001$ ). The number needed to treat was calculated as 112 patients (95% CI 83–171). Therefore, the risk of coexisting malignancy in patients aged over 40 years with acute appendicitis is too high to be ignored. The results from our study<sup>2</sup> and the study by Naar et al<sup>1</sup> warrant the need for routine use of CT scan to diagnose appendicitis and the need for direct visualization by colonoscopy after recovery from operatively or conservatively treated appendicitis (Fig 1).



**Figure 1.** A proposed visual computed tomography and colonoscopy based protocol for assessment of patients aged over 40 presenting with acute appendicitis