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A novel technique: hemostatic agents for port-site closure post robotic-assisted urological surgeries. a pilot study

Abstract

Background: Many techniques and devices are used to close the surgical ports post minimally invasive procedures. However, they have limitations and may entail complications such as hernia, infection and dehiscence. This paper proposes novel plugging technique for port-site closure using a hemostatic agent to overcome these limitations and lower the complication rate.

Objective: To assess the safety and efficacy of a novel Surgicel® plug technique for port-site closure post minimally invasive urological surgeries.

Methods: A retrospective study conducted at King Fahad Medical City/Riyadh/Saudi Arabia with 114 sample size. Patients included are those who underwent robotic assisted urological surgery (from January 2010 to December 2013) in which their port-sites were closed by the novel Surgicel® plug technique with a minimum of 5-years follow-up period. All data were statistically analyzed using SPSS (version 23). Descriptive variables were presented as numbers and percentages.

Patient demographics, type of surgery, and follow-up results.

Results: A total of 114 patients were collected. 50 were males with a mean age of 41.9 (SD=18.2) and 64 were females with a mean age of 39.2 (SD=18.3). The male-female ratio is 1:1.2. In total, two cases (1.7%) developed port-site non-infectious discharge during radical nephrectomy and pyeloplasty, and one case (0.8%) developed port-site hernia during ureteric reimplantation. 111 cases (97.3%) had no port-site complications.

Conclusion: This study showed that the novel plugging technique of port-site closure post minimally invasive urological procedures using a hemostatic agent (Surgicel®) is feasible, safe, easy, and effective in the group of patients studiedand could be considered as a newapproachfor trocar sites closure.

Keywords: minimally invasive, port site, closure technique, hemostatic agent, urological surgeries

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Introduction

Minimally invasive surgeries (MIS) are safe and applicable. Nonetheless, complications at the port-site are evident. Current techniques for port-site closure after MIS may entail complications such as bleeding, infection, emphysema, visceral injury, hernia, and hypertrophic scarring.[1] As a result, several studies have developed new techniques to reduce the rate of complications, particularly hernia.[1] The port-site closure techniques currently in frequent use have some difficulties and limitations including being time-intensive, requiring special instruments, needing an additional port for assistance and viewing, and being considerably more difficult to apply to obese patients. Furthermore, the current port entry devices have sharp tips, which risk bowel injury or injury to abdominal wall vessels.[2–5] The absorbable hemostatic agent Surgicel® is a regenerated oxidized cellulose commonly used to stop bleeding via artificial clotting (due to its robust affinity to hemoglobin) and vasoconstriction (due to the acidity effect after its conversion into cellulosic acid).[6] Recently, some port-site closure techniques adopted complete plugging of the port-site orifices using a hemostatic device or Surgicel® to guard against bowel herniation. Port-site plugging by a hemostatic agent may help lower the rate of hernia because it closes the port-site completely.[7,8] A comparative study has shown the superiority of a Surgicel® plug over a Vicryl® suture in terms of decreasing the overall cost, operative time, and iatrogenic bowel injuries caused by a closure device.[7] Herein, we propose a preliminary results of a novel plugging technique using a hemostatic agent (Surgicel®) for port-site closure post robotic-assisted urological procedures with a long follow-up.

Patients and methods

A retrospective study conducted at a tertiary center. Patients included are those who underwent robotic assisted urological surgery with the novel hemostatic agent (Surgicel®) plug technique within a period of 4 years (January 2010 - December 2013) with at least 5years of follow-up. Patients' demographics, type of surgery, and follow-up results were collected after obtaining the institutional review board approval. Patients' data were statistically analyzed using SPSS (version 23). All cases have been performed by a single surgeon.

Surgical technique

Patients were on a flat position with the peritoneum deflated. This technique was used for trocar sizes 8 and above. Under scope guidance, the hemostatic agent (Surgicel®) was inserted through the

trocar opening. It was fed through until half of the hemostatic agent was visible beyond the abdominal wall (Figure 1). Then the trocar was removed from the port and the hemostatic agent left as it was (Figure 2). After that, the exposed skin side of hemostatic agent was trimmed and the remains dipped just under the level of skin in the subcutaneous tissue (Figure 3). The hemostatic agent would be reabsorbed by the body later on. The remaining trocars were completed with the same process. However, for the last one (the scope trocar) the hemostatic agent was placed blindly, then the skin side cut and the restdipped, like the others. At the end, the skin was closed with a stapler or with 4.0 monocryl suture in a subcuticular manner (Figure 4). The VIDEO shows clearly how the steps in the technique are performed.

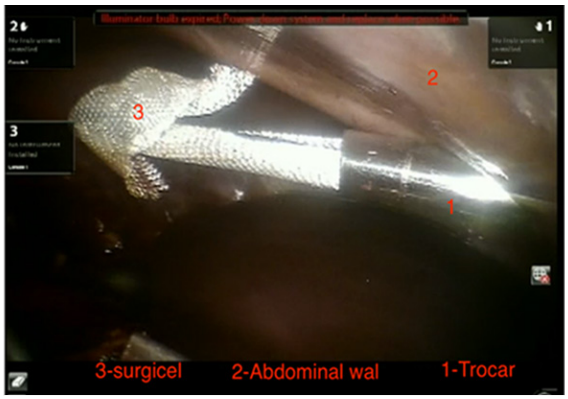

Figure 1 Inside view after hemostatic agent insertion through the trocar.

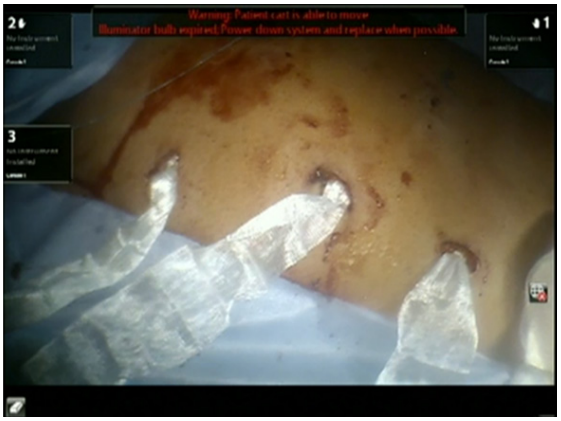

Figure 2 Outside view after insertion of the hemostatic agent and removal of the trocar.

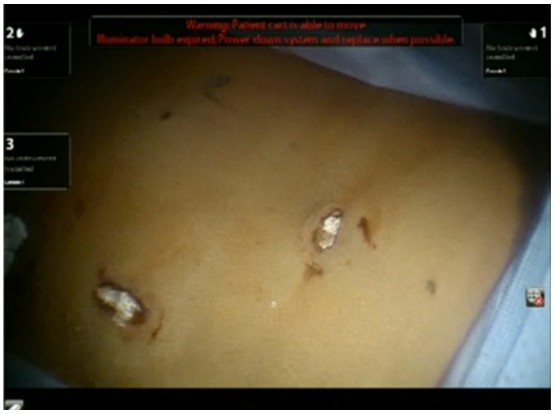

Figure 3 After cutting the skin half of surgicel and dipping the rest of it under the subcutaneous tissue level.

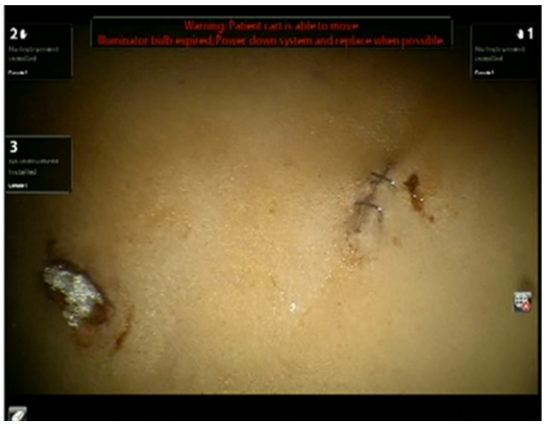

Figure 4 Skin closure with clips.

Results

As Table 1 shows, a total of 114 patients were collected. 50were males with a mean age of 41.9 (SD=18.2) and 64were females with a mean age of 39.2 (SD=18.3). The male-female ratio is 1:1.2. In total, two cases (1.7%) developed port-site discharge during radical nephrectomy and pyeloplasty, and one case (0.8%) developed port-site hernia during ureteric reimplantation. 111 cases (97.3%) had no port-site complications.

Table 1 Surgeries and related complications

Type of surgery	Follow up results			
	No complications	Hernia	Discharge	Total
Robotic nephrectomy	64	0	1	63
Robotic ranal cyst deroofing	4	0	0	4
Robotic pyeloplasty	26	0	1	27
Fistula repair	3	0	0	3
Robotic pyelolithotomy	2	0	0	2
Robotic nephroureterectomy	5	0	0	5
Ureteric reimplant	3	1	0	5
Hysterectomy	2	0	0	2
Orchidectomy	1	0	0	1
Adrenalectomy	1	0	0	1
Total	111	1	2	114

Discussion

Recent decades have witnessed remarkable advances in minimally invasive urological procedures. Nevertheless, some complications still notably arise at the portsite.[1] Therefore, several studies have suggested the development of new techniques to lower this specific complication rate.[2–5] Among these suggestions is the plugging of the port-sites by absorbable hemostatic agents to prevent port-site hernia.[8,9] One study described the use of a bio absorbable plug device to close the port-site in 17 patients.(9) The other described the use

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of Surgicel® for port-site closure by a roll-up and plug technique on 500 patients.[8] Both studies resulted in a 0% rate of port-site related complications.[8,9] Furthermore, in a retrospective comparative study which compared Vicryl sutures and Surgicel® plugs, the authors stated that the Surgicel® plug technique may offer some advantages over the Vicryl suture in terms of decreasing the overall cost, operative time, and iatrogenic bowel injuries caused by a closure device.[7] The novel technique that this paper proposes to introduce was conducted on 114 patients. The results were fairly similar to others who used different plugging techniques. Only one case (0.8%) out of 114 patients developed a port-site hernia. In this sole case, the Surgicel® was reported to have been unintentionally dropped inside the abdominal cavity instead of being placed at the port-site, so, the port-site had not, in fact, been plugged and/or closed. Zero percent rate of hernia resulted in patients whom the Surgicel® was placed correctly.

None of the published data of a plugging technique reported any case of postoperative port-site discharge. In our study, 2 cases had a non-infectious discharge (1.7%). This was probably due to the cutting of the Surgicel® without dipping it; therefore, the Surgicel® was left above the level of subcutaneous tissue. By the nature of osmosis, Surgicel® transported the intra-abdominal fluid outside and was initially thought to be an infectious discharge as reported by a family physician. However, investigations that was carried out later showed negative for any infection. No adhesion, dehiscence or any other port-site complications were reported in any case. In comparison with currently used port-site closure techniques, this novel plugging technique seems to be easier to perform and has technical advantages: no direct visualization is needed; therefore, no additional opening is required to assist. Moreover, there is no need to purchase any special devices, which are required with the other techniques, thus reducing cost. In terms of safety, unlike other techniques, it uses no sharp needles, and there is no need for additional abdominal wall penetration. Therefore, there is less risk of visceral injury and injury to abdominal wall vessels.[1–5,7] In contrast to other techniques, the described novel technique may work more easily and effectively in morbidly obese patients because no limited-length devices or curved needles are needed. In comparison to the roll-up and plug technique which is similar to this technique, the novel hemostatic agent plug technique with the use of a 35cm Surgicel® may offer less risk of Surgicel® migration as it fills and covers the whole port-site length even in morbidly obese patients; therefore, less tendency of bowel herniation.[8]

Conclusion

This study showed that the novel plugging technique for port-site closure post minimally invasive procedures using a hemostatic agent (Surgicel®) is feasible, safe, easy, and effective in the group of patients studied and could be a new technical approach for trocar sites closure. Prospective comparative studies with large group of patients are recommended.

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Conflicts of interest

The author declares there is no conflict of interest.

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