

## CASE REPORT

# Novel Technique in Laparoscopic Staple-line Reinforcement

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## ABSTRACT

Bleeding prevention and control can be very challenging in laparoscopic surgery. The author describes a new and less expensive technique to lower the incidence of staple-line bleeding in laparoscopic surgery.

**Keywords:** Laparoscopic, Laparoscopic hemostasis, Laparoscopic staple line, Laparoscopic staple-line reinforcement.

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## INTRODUCTION

Minimally invasive surgery offers a variety of advantages over the open approach; these include, but are not limited to, less postoperative pain, faster physiological function, shorter length of stay and better cosmesis. However, a continuous challenge for the laparoscopic surgeon and the most common cause of conversion to open surgery is to keep the surgical field almost free of bleeding. Moreover, blood absorbs light causing darkness and suboptimal intra-abdominal working field, and it is difficult to control bleeding by laparoscopic means as compared with the open technique. Subsequently, massive bleeding allows no opportunity for the efficient application of the open approach maneuver, as an example direct compression or tying. A number of commercial buttressing materials have been described to give more hemostasis to the staple line whether it is used for bowel resection, organ resection or vascular control. The buttressing material also had questionable leak prevention advantage. Unfortunately, these materials are expensive, with limited shelf life and the need for training to apply them.<sup>1</sup>

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## DESCRIPTION OF THE TECHNIQUE

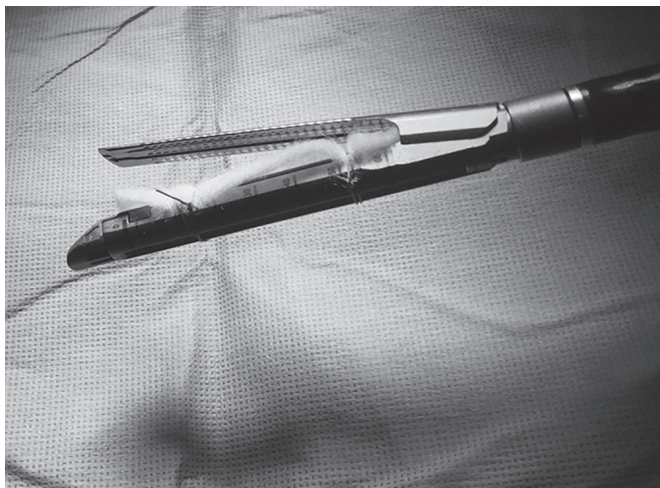
In laparoscopic surgery (mostly sleeve gastrectomy), the staple line is reinforced with hemostatic material using one piece of SURGICEL SNoW® (4 × 4 inches) or large SURGICEL® Original absorbable Hemostat folded once, and cut in the exact size of the stapler cartridges (usually one piece cut for five to six loads of cartridges). After loading the cartridges (any cartridge thickness depending on the indication) onto the stapler handle (Echelon® or Endo GIA™), the piece of hemostatic material is tied twice with 3-0 or 2-0 absorbable suture (VICRYL® Ethicon). The tie could be one or two loops (Fig. 1). The distal tie has to be at least 10 mm before the last staple to guarantee complete cut; likewise, the proximal tie has to be applied 10 mm after the blade site to allow free initial movement of the blade (Fig. 2). The stapler with enforced hemostatic material is applied to the tissue (stomach) or vascular pedicle, e.g. splenic pedicle, then after waiting for 15 to 20 seconds as the stapler manufacturer recommendations, the stapler is fired and removed. The two crossing threads are cut with a scissor (Fig. 3). If it is sleeve gastrectomy, the whole process is repeated until the last load. To save time, a trained nurse or an assistant surgeon can do the hemostatic material application.

## DISCUSSION

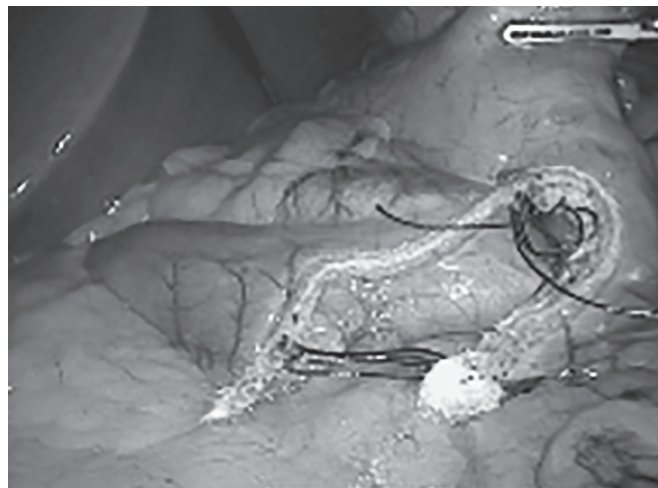
Bleeding has been reported to be a major complication of laparoscopic surgery. This has become more worrisome



**Fig. 1:** Powered-Echelon® and fixing the SURGICEL® SNoW® to it by 2-0 VICRYL® Ethicon suture



**Fig. 2:** Final fixation of the hemostatic material to the stapler load with two ties



**Fig. 3:** Sleeve gastrectomy using the new technique of SNoW<sup>®</sup> reinforce stapler

in the era of increasing demand on bariatric surgery due to the increasing epidemic of obesity worldwide.

Three different techniques have mainly been proposed in the literature to prevent staple-line bleeding including oversuturing, buttressing material and application of tissue glue or sealant agent. Dapri et al<sup>2</sup> have published the only randomized clinical trial comparing the outcome of three different reinforcements: No enforcement, Gore Seamguard<sup>®</sup> and staple-line oversewing with polydioxanone; the study demonstrated significantly lower blood loss in the buttressing group with Gore Seamguard<sup>®</sup> but with longer operative time and higher cost (640–890 euros). Other studies in the literature are low in power and do not address cost *per se*.<sup>3</sup> Buttressing material is becoming widely used as a means of lowering intraoperative as well as postoperative complications<sup>4,5</sup>; moreover, it is associated with lower complication in early surgeon experience.<sup>6</sup> A number of staple-line buttressing reinforcements described in the literature include bioabsorbable polyglycolic acid and trimethylene carbonate (Gore Seamguard<sup>®</sup>), nonabsorbable bovine pericardium (Peri-Strips Dry<sup>®</sup>) and small bowel submucosa (Surgisis<sup>®</sup>).

Gagner and Buchwald<sup>7</sup> reported Gore Seamguard<sup>®</sup> to be the best hemostatic material with possible added benefit of decreasing staple-line leaks to 1.1% in a study of 8,900 sleeve gastrectomy as compared with 2% in oversuture, 2.2% in nonreinforcement and 3.3% in Peri-Strips group.

Unfortunately, these materials are expensive, costing US\$280 in the author's country for each load with approximate total cost in laparoscopic sleeve gastrectomy equal to US\$1,500 for one operation, while the net cost of the used Surgicel<sup>®</sup> and the ties is around US\$200.

The buttressing material needs to be preloaded onto the stapler handle and become incorporated into

the staple line on firing. Features of ideal buttressing material should include enhancement of the strength of the staple line during healing process and the material should also be flexible and thin enough for easy cutting by the stapler blade.

A similar technique has been described in the literature by using Surgicel<sup>®</sup> Nu-knit<sup>®</sup> (considered to be too thick for white load) reinforcement with glue fixation (usually difficult to find) and has been done in Roux-en-Y gastric bypass, but there is no study in sleeve gastrectomy or other applications.<sup>8</sup>

## CONCLUSION

Stapler-line reinforcement with SURGICEL SNoW<sup>®</sup> or SURGICEL<sup>®</sup> Original fixed with suture in this novel technique is safe, practical, convenient and affordable.

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