

# Technical Modifications in Laparoscopic Appendectomy

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## ABSTRACT

The technique of laparoscopic appendectomy has been modified several times in the past 20 years. In this report, we have described our modifications regarding the position of ports placement and closure of the base of appendix. Three surgeons successfully performed laparoscopic appendectomy in 108 cases with these modifications during the 3-year period. The first 10 mm port is placed in the periumbilical region. The second 10 mm and third 5 mm ports are inserted in the left and right side of abdomen below the pubic hairline respectively. Then the telescope is transferred from the periumbilical to the left suprapubic port. This mode of access leads to optimal ergonomics and cosmesis. For securing the base of appendix, only one Hem-o-lok clip (nonabsorbable polymer clip) is applied on each side. The use of Hem-o-lok clip is simple, safe and decreases the time and cost of laparoscopic appendectomy.

**Keywords:** Appendicitis, Laparoscopic appendectomy, Hem-o-lok clip, Polymer clip.

## INTRODUCTION

Since the first introduction of laparoscopic appendectomy by Semm in 1987, this procedure has been modified several times.<sup>1,2</sup> Two important issues in this procedure are mode of port placement and control of appendiceal stump.

Laparoscopic appendectomy is usually done through three ports. In some circumstances, one or two puncture techniques have been performed, and occasionally the fourth port became necessary. In standard technique, the telescope is inserted through periumbilical port. Then a 10 mm port is placed in left lower quadrant and a 5 mm port is placed in right lower quadrant. This configuration of port insertion has two drawbacks with respect to cosmesis and ergonomics. First, the cosmetic result is not ideal. The other disadvantage is that it requires the operating surgeon to stand in an ergonomically unfavorable position with one arm crossed over the patient's body.<sup>3,4</sup>

The standard technique for securing the base of the appendix is by double endoloop ligatures. However, application of endoloop requires dexterity and training. Another technique is application of endoscopic staplers. But this is a more expensive method for closure of the stump of the appendix, which is particularly important in developing countries.<sup>5,6</sup>

In this report, we described our technique regarding configuration of ports and control of base of appendix during laparoscopic appendectomy.

## OPERATIVE TECHNIQUE

We have modified the position of ports placement and closure of base of appendix. Three surgeons performed laparoscopic appendectomy in 108 cases with these modifications during the past 3 years.

The first 10 mm port is placed in periumbilical region. Introducing telescope and careful transillumination of skin enables to find a suitable position of two other ports. The second 10 mm and third 5 mm ports are inserted in the left and right side of abdomen below the pubic hairline respectively (Fig. 1). Then we transfer the telescope from the periumbilical to the left suprapubic port. Ergonomically, this technique with the optical axis lying between the two working axes with wide manipulation angle is optimal for laparoscopic surgery (Fig. 2). Additionally, the elevation angle of the working instrument traversing the umbilical region (which is at a higher level than the suprapubic region in an inflated abdomen) is suitable (see Fig. 1).<sup>4</sup>

For securing the base of appendix and ligation of mesoappendix, Hem-o-lok clip (Weck Closure Systems, Research Triangle Park, NC, USA) is applied (Figs 3A to E).



**Fig. 1:** Ports position for laparoscopic appendectomy: Two ports in suprapubic region and reinsertion of laparoscope through left suprapubic port

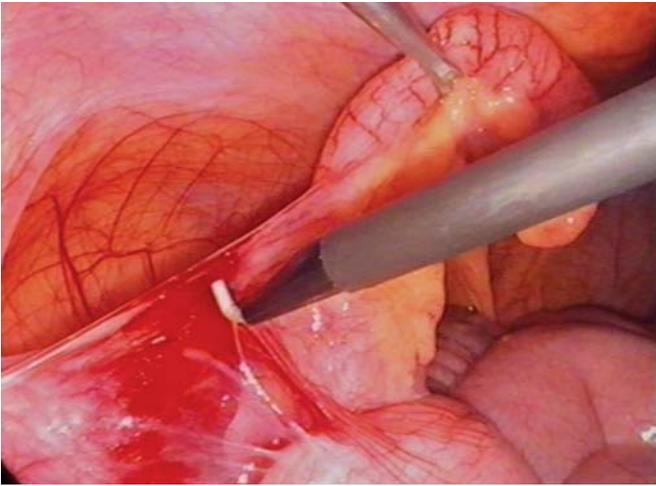
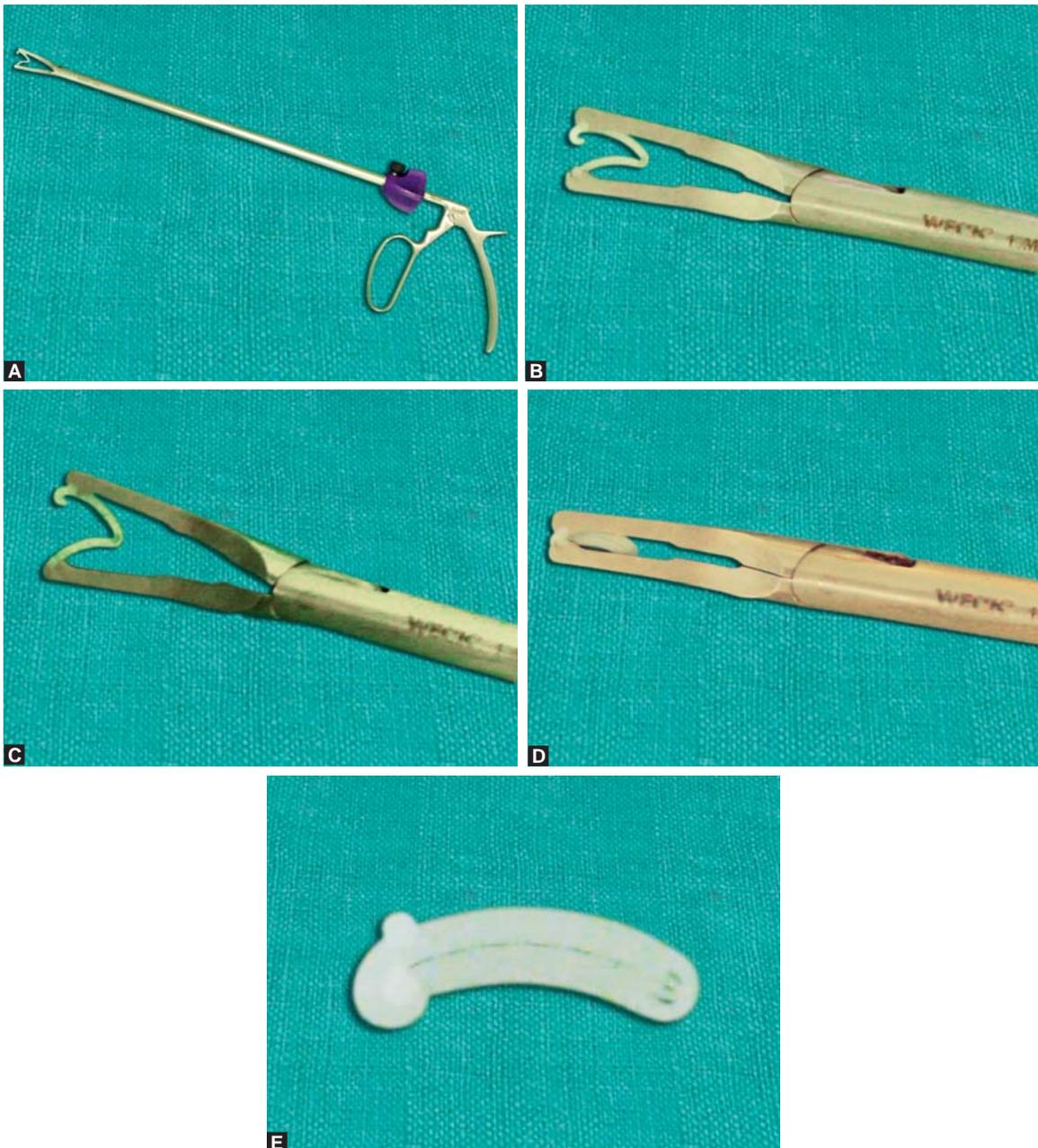


Fig. 2: Optimal working space: Optical axis lying between the two working instruments with wide manipulation angel

Application of the clips at the base of appendix is done by a special applicator for the Hem-o-lok clip (Fig. 3A). Only one Hem-o-lok clip, size L or XL is placed at 90° to the base of the appendix on the proximal part and one on the distal part which would be removed (Figs 4A to F). We did not encounter any complications related to the use of Hem-o-lok clips, such as bleeding or leakage from appendiceal stump.

### DISCUSSION

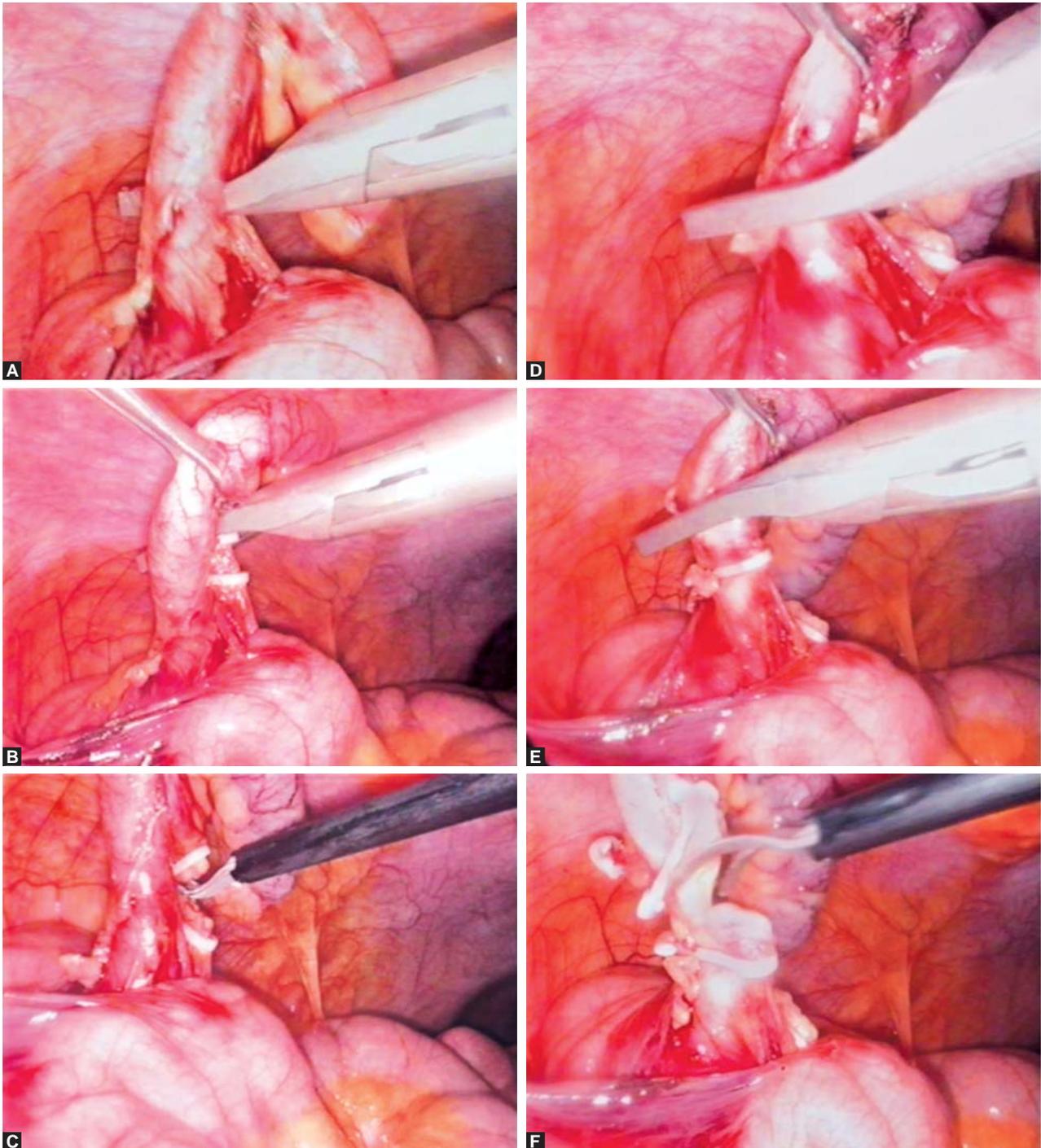
In practice, this mode of port placement offers several benefits. Two ports can be inserted below the pubic hairline with no visible scars. This modification not only improves the cosmetic result but also provides optimal ergonomics. First, the telescope, pointing upward and to the right, affords much better visualization of the base of appendix (see Fig. 2).



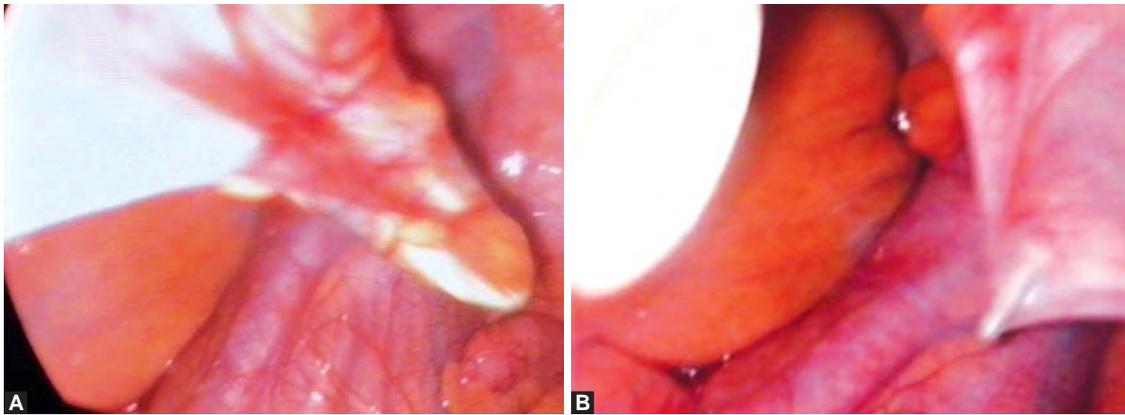
Figs 3A to E: Hem-o-lok clips and applicator

In comparison, the visibility of a periumbilical telescope is less desirable as it might be impaired by a distended cecum. Second, with the tip of appendix retracted upward by the left hand grasper, the mesoappendix would assume a favorable position for dissection by a dissector inserted through the periumbilical port (see Fig. 2). Third, an instrument in this position carries less risk of electrocoagulation injury to the sigmoid loop compared to when it is inserted through the left lower quadrant port. Therefore, this configuration provides good and safe surgical

exposure for laparoscopic appendectomy.<sup>4</sup> However, there are some important technical points during trocar insertion in the suprapubic region. Selection of suitable position with careful transillumination is necessary to prevent bleeding from abdominal wall vessels. Insertion of trocars in this place can be slightly difficult because the suprapubic peritoneum is flexible and typically results in tenting of the peritoneum before the trocar tip penetrates into the abdominal cavity (Figs 5A and B). Routine use of Foley catheter prevents urinary bladder injury.<sup>3</sup>



**Figs 4A to F:** Closure of the mesoappendix (A-C) and base of appendix (D-F) with one hem-o-lok clip on patient side and one on specimen side



**Figs 5A and B:** Tenting of peritoneum during insertion of left 10 mm (A) and right 5 mm (B) suprapubic ports (A: Inflamed appendix in right inferior corner)

We have good experience with application of Hem-o-lok clip for securing the stump of appendix. The successful uses of Hem-o-lok clips, which are nonabsorbable polymer clips, have been shown in different procedures.<sup>5-7</sup> Design of its applier markedly decreases the chance of possible fall out of the clip (Fig. 3), and operative time is shorter in relation to application of the endoloop. The cost of Hem-o-lok clips is lower than endoscopic staplers and endoloop ligatures.<sup>5</sup> Moreover, its application is easy. Some technical points must be considered during the application of Hem-o-lok clip. Because of the locking mechanism, it is very important that the clip fits tightly around the base of the appendix prior to closure of the locking mechanism, as slipping off the base of the appendix may result in incomplete security. Every Hem-o-lok clip must be applied at 90° to the base of the appendix, which was shown to be important during the application of this clip on the vessel.<sup>5,7</sup>

## CONCLUSION

According to our experiences and previous reports,<sup>3-6</sup> the better ergonomics and cosmetic results are advantages of placement of two ports in suprapubic area and transferring the laparoscope to the left suprapubic port in comparison to standard port position. The feasibility of application, shorter time of operation and lower cost of Hem-o-lok clips are advantages of this technique for ligation of appendiceal stump in comparison to the standard endoloop ligature.

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