



Laparoscopic Appendicectomy Various Modification in Techniques

KEYWORDS

Appendicitis, Laparoscopic Appendicectomy , Ligasure*, Endoloop, Roeder's knot.

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ABSTRACT

There are several modifications existing in the technique of Laparoscopic appendicectomy. In this report we have mentioned our modifications regarding the position of port placement and closure of the base of appendix. Three Surgeons successfully performed laparoscopic appendicectomy in 120 cases with these modifications during last 4 years. The first 10mm port is placed in the periumbilical site. The second port 10mm placed suprapubically at hairline level and Third 5mm port placed midway of the left spino-umbilical line. Then telescope was transferred from the periumbilical to suprapubic port, this modification leads to optimal ergonomics and cosmesis. For securing the base, ligasure* or endoloop* or roeder's knot loop using catgut/ vicryl used. Although ligasure is easy to use, The use of handmade Roeder's knot loop is simple, safe and cost effective.

INTRODUCTION:

Laparoscopic appendicectomy first introduced by SEMN in 1987. The procedures was modified several times.^[1,2]

Two important issues in this procedure are:

- (1) Placement of ports
- (2) Control of appendicular stump

Laparoscopic appendicectomy is usually done through three ports, occasionally fourth port becomes necessary. In standard technique the Telescope is inserted through periumbilical port, then a 10mm port is placed in left lower quadrant lateral to Rectus muscle, taking care of inferior epigastric vessels 5mm port is placed in right lower quadrant. This configuration of port insertion has two drawbacks with respect to cosmesis and ergonomics. Operating Surgeon has to stand in an unfavorable position with one arm crossed over the patient's body.^[3, 4] The standard technique for securing the base of appendix is by double endoloop ligature. Its application requires dexterity and training. Another technique is application of endoscopic staplers, handmade roeder's knot and ligasure. Apart from handmade Roeder's knot/loop, rest of all are more expensive method for closure of the stump of appendix which is particularly important in developing countries. In this study we described our technique regarding configuration of ports and control of base of appendix during Laparoscopic appendicectomy.

METHOD:

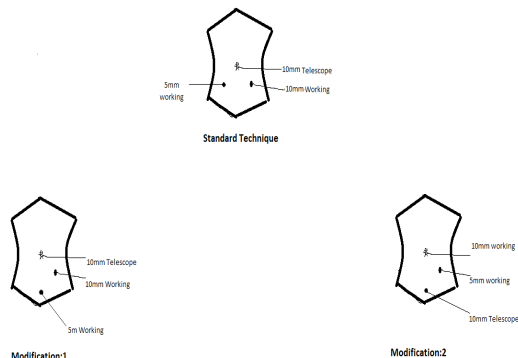


Figure 1: Various Port Positions

OPERATIVE TECHNIQUE:

We have modified the position of ports placement and closure of base of appendix. Three Surgeons performed Laproscopic appendicectomy in total 120 cases within last 4 years.

In standard method by careful insertion of veres needle/ Hassan's canula pneumo peritoneum created safely, 10mm port is placed in periumbilical region either by supra or infra umbilical smiling incisions. Telescope introduced and careful transillumination of skin enables to find a suitable position of two other ports. The second 10mm and third 5mm ports are inserted in left and right side of abdomen respectively (fig.1).

In modification 1 after inserting 10mm port in periumbilical region, second 10mm is inserted at midpoint of left spino-umbilical line and third 5mm is inserted at suprapubically in midline (at pubic hairline). Telescope remains at umbilical port, second (10mm) and third (5mm) ports functions as working ports.

In modification 2, after inserting 10mm port in periumbilical region second 5mm port is inserted at midpoint of left spino-umbilical line taking care of vessels and third 10mm port is inserted at pubic hairline in midline under vision. Then telescope is transferred to port 3 and umbilical port and 5mm ports function as working ports.

After placement of ports we proceed for procedure, meso appendix was separated from appendix by cautery dissection and base was isolated.

In standard technique we ligate base by two endoloop* and then appendix was cut and removed. Another method of securing base of appendix is by application of ligasure/ CO-VIDIEN*, electric energy generated tissue sealer and cutter. The third method of securing base is application of handmade Roeder's knot from chromic 1-0 catgut ligature which is passed via ligature carrier and then tied to base doubly and appendix is cut and removed.

Preliminary emptying of bladder or foley's catheterization was done in every case. In case of complicated appendicitis we proceeded with laparoscopic method unless they are converted into open procedure which we had not included in study.

DISCUSSION:

Table 1: Comparison of various port positioning in different techniques.

No	Ergonomica- tion	Standard Technique	Modification 1	Modification 2
1	Working axis with wide manipulation angle	Ok	Optimal	Optimal (better visualization of base of appendix)
2	Elevation of angle of the working instrument (In inflated abdomen)	Less	Less	Highest
3	Crossing of arms resulting in tired some of procedure	Yes	No	No
4	Visualization of base of appendix	Good	Good	Better
5	Electro coagulation injury to sigmoid loop	Yes	Yes	Very less
6	Cosmetic scar	Ok	Better	Best
7	Routine use of Foley's catheter	Op- tional	Optional	Routine

TABLE 2: Methods of Base Ligation.

Sr No	Features	Endoloop	Ligasure	Roeder's Knot
1	Cost	Costly	Very costly	Cheaper
2	Wider stump (thick appendix)	Can be done	Up to 7-8 mm easy	Can be done
3	Application conveniency	Requires time and dexterity	Less time	Requires time and dexterity

In practice, compared to standard technique regarding placement of ports, modified ways offer several benefits. Ergonomically modification 1 or 2 provides optimal working axis with wide angle for manipulation inside abdominal cavity. This helps in better movement inside abdominal cavity and in difficult cases it is useful. The clustering of instruments is avoided.

Third advantage is elevation of angle of the working instrument in inflated abdomen which is highest in case of modification 2 where periumbilical ports acts as working port, as it assumes highest position in inflated abdomen.^[4] An instrument in this position carries less risk of electro coagulation

injury to the sigmoid loop compared to when it is inserted through the left lower quadrant port. Therefore this configuration provides (modification 2) the good and safe surgical exposure for laparoscopic appendicectomy.^[4]

In standard technique there is crossing of arms resulting into tiresome procedure particularly when it is prolonged in difficult cases or when surgeon is doing multiple procedures in same session. This type of crossing doesn't occur in modification 1 and 2. Level of comfort in position of surgeons and camera assistant is good in modification 1 and 2 as compared to standard technique.

Fourth, in modified technique the telescope points upward and to the right affords much better visualization of the base of appendix. In comparison the visibility of a periumbilical telescope is less desirable as it might be impaired by a distended caecum. More, the tip of appendix is easily retracted upward by a left hand grasper, and the mesoappendix would assume a favourable position for dissection by a dissector inserted through the periumbilical port. Apart from this, the movement of grasped appendix on left side is easy as there is room in peritoneal cavity compared to right side as there is lateral abdominal wall.

Therefore, this configuration of working periumbilical port provides good and safe surgical exposure for laparoscopic appendicectomy. In last the best advantage is cosmetic result. This is one of the biggest advantages of any laparoscopic procedure. In standard technique apart from periumbilical scar (10mm). There are two more scar (10mm and 5mm) visible on abdomen. While in modification type-1 10mm port on left side is more visible and the second 5mm port is at the pubic hairline level which is less marked. While in modification type-2 the cosmetic result is the best compared to standard technique and modified technique-1. There is only 5mm port scar visible over abdomen. This scar is almost negligible. Both 10mm scars one in pubic hairline and second in umbilical curvature are also negligible.

However, there are some important technical points during 10mm trochar insertion in the suprapubic region hence selection of suitable position with careful transillumination is necessary to prevent bleeding from abdominal wall vessels. Insertion of trochar in this place can be slightly difficult because the suprapubic peritoneum is flexible and typically results in tenting of the peritoneum before the trochar tip penetrates into abdominal cavity. Injury to urinary bladder is at the greatest risk in suprapubic insertion of trochar. We routinely insert foley's urinary catheter in modification type 2. While in standard and modification type 1 it is optional. Just asking the patient to pass urine before procedures to empty urinary bladder was sufficient. Chances of injury to left inferior epigastric artery is less in technique 2 as only 5mm port is inserted. It was prevented by careful light illumination through peritoneal scope.

There are various methods for securing the base (stump) of appendix use of endoloop*ligature (JandJ USA), Hem-o-lok* clips (Weck closure systems, NC USA), endoscopic staplers*(JandJ, ethicon USA), Ligasure*/COVIDIEN* (Mars field, MA USA)

LIGASURE TM (Tissue response electrosurgical generator): It has unique vessel sealing ability upto 7mm. Its effects are precisely confined to the target tissue only without charring and minimal thermal spread. It senses body's collagen automatically and obliterates the vessels and tissue.

In our study we included use of endoloop* ligatures, COVIDIEN* (ligasure) energy generated tissue sealant and cutter and simple handmade Roeder's knot type ligature made from chromic catgut. Comparing the cost effectiveness one endoloop costs Rs. 600 at least two endoloop is applied at the base while for ligasure*/COVIDIEN* we have to purchase

special type of instrument which is very costly and after some procedures we have to ask for new probe of application. The use of chromic catgut made Roeder's knot type ligature (same as endoloop knot) and applying by applicator which is available in market and reusable is most cost effective in all types. The correct market price of chromic catgut no 1-0 is Rs. 130 and only one suture is needed. Comparing the cost effectiveness of three methods for securing the stump of appendix application of handmade Roeder's knot type of ligature with chromic catgut is very cheaper than both.

However operative conveniency is better with ligasure* usage which also requires less time. Rest of both methods require comparatively more time and dexterity. In case of wide appendicular stump more than 7-8mm application of endoloop is much convenient than others. In our study none of complication like leak had occurred with any method.

CONCLUSION:

According to our experience and previous reports the better ergonomics and cosmetic results are advantages of placement of two ports in left iliac fossa(5mm) and suprapubic area (10mm) (Modification type 2) and transferring the laproscope to suprapubic port in comparison to other standard port position. Although the feasibility of application is little bit easy with ligasure* usage, the most effective method is usage of handmade Roeder's knot type of ligature from chromic catgut.

However study regarding usage of Hem-o-lok clips (nonabsorbable, polymer clip weck closure system NC USA) is also recommended same reports shows advantages of this technique for ligation of appendiceal stump in comparison to the standard endoloop ligation.^[11]

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