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Case Report

A Novel Approach to the Laparoscopic Appendectomy

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Abstract

The laparoscopic appendectomy has been around for more than 20 years and is still one of the most common procedures in general surgery. We present a novel approach to trocar placement that can potentially reduce operating time compared to the traditional technique. 12 patients were operated with appendicitis with this technique here. Average operating time was 17 minutes. No adverse events were recorded.

Keywords: Appendicitis; Case Series; Laparoscopic Appendectomy

Introduction

Appendicitis is one of the most common surgical emergencies in the world. In western Europe, the incidence rate is approximately 150 per 100 000 annually, making it one of the most prevalent surgical emergencies in this part of the world [1]. Diagnosis is usually by ultrasound or computed tomography (CT), with the latter having a higher sensitivity in most studies due to the operator-dependent results by ultrasound.

Kurt Semm performed the first fully laparoscopic appendectomy in 1980, and it has been the gold standard for the treatment of appendicitis for the last 15-20 years in most countries [2]. The equipment has changed since then, but the three-trocar setup with the first trocar placed in or right under the umbilicus is the same. Numerous studies have documented the single-port approach, which places only one trocar in or under the umbilicus. This technique has obvious cosmetic benefits but, in most studies, it increases the operating time substantially [6].

There are numerous studies comparing open versus laparoscopic appendectomy [3] and the benefits of the laparoscopic approach are considered to be well known now. Shorter hospital stays and an overall reduction in postoperative pain are well documented. This is true not only for laparoscopic appendectomy but is also one of the general advantages of minimally invasive procedures. In Norway, as in most countries, laparoscopic appendectomy is considered one the first operations surgical residents are expected to learn. In many cases, a junior resident is supervised by a senior resident in the first few cases. Depending on progress, a resident is expected to master, without supervision, a simple appendectomy in their second or third year of residency. This underlines the importance of having safe and time-effiecient technique.

The technique for the standard laparoscopic appendectomy includes placing the first trocar either transumbilical (intraumbilical) or infraumbilical. This is usual a 12-mm trocar to accommodate a normal 10-mm camera. Some will select a 5-mm camera for pediatric patients. The second trocar is usually 5 mm and is placed in the lower left quadrant, and the third is 12 mm that is placed above the symphysis.

The aim of this case series was to demonstrate that a feasible alternative approach to trocar placement in laparoscopic appendectomies is both safe and time effective. In my novel technique I started placing the first trocar optically in the lower left quadrant

and the second supraumbilical in the upper left quadrant. Placing the second trocar in this supraumbilical position provides a much better angle of attack using the endoGIA when dealing with an appendix in a normal anterocecal position. The third 5mm trocar was placed above the symphysis. The work has been reported in line with the SCARE and PROCESS criteria.

Presentation of Cases

All patients were operated laparoscopically using the Olympus EVIS III video laparoscope. In step one, all skin incisions were made at once. In step two, pneumoperitoneum was achieved with a 12-mm. Endopath XCEL trocar (Johnsona and Johnson, New Jersey, US) placed optically in the lower left quadrant. In step three, the other 12-mm trocar was placed in the upper left quadrant, 3-4 cm above the umbilicus, and the 5-mm trocar was placed 2 cm above the symphysis in the midline. In step four, the camera was placed in the lower left quadrant, and a monopolar hook and grasp was used to identify the appendix. The hook was then used for electrocoagulation in the mesoappendix down to the desired level for stapling. In step five, the endoGIA purple cartridge (45 or 60 mm) was used for the actual appendectomy. In step six, the appendix was removed. This was achieved by slowly pulling the appendix out of the 12-mm trocar. The use of an Endobag (Golden mean med, Shandong, China) for retrieval was only necessary in cases where the appendix was too big for the trocar. In step six, the trocars were removed. If there was visible contamination this step would include a lavage. In step seven, the skin was closed. Skin closure was done intracutaneously in all but one patient, where a skin stapler was used since the suture material for intracutaneous closure was temporarily unavailable. Patients received antibiotics perioperatively; metronidazole (1,5g i.e.,) and doxycycline (400 mg i.e.,) at a one-time dose. All but two patients were discharged the following day. The last two patients had to stay another day as they lived far from the hospital and travel arrangements had to be made.

A total of 12 patients (8 male, 4 female) were operated using the new technique. The only inclusion criteria were no previous abdominal surgery, pregnancy, or previous appendicitis treated with antibiotics only. The mean age was 30.3 years. The mean operating time was 17.9 minutes (9-23 minutes). The diagnosis was confirmed by CT in all but two cases, where only clinical evaluation was done before surgery. There were no complications recorded. The diagnosis of acute appendicitis was confirmed histologically in all cases. All patients were discharged the following day except for two, who had to stay an extra day to make travel arrangements home.

Patient	Diagnosis	Operating time (min)	Appendectomy	Complications	Postoperative stay in days	Endobag	Skin closure
1	CT	17	endoGIA	No	1	No	Intracutaneous
2	CT	22	endoGIA	No	1	No	Intracutaneous
3	CT	18	endoGIA	No	2	Yes	Intracutaneous
4	Clinical	16	endoGIA	No	1	No	Intracutaneous
5	CT	14	endoGIA	No	1	Yes	Intracutaneous
6	CT	23	endoGIA	No	1	No	Intracutaneous
7	CT	21	endoGIA	No	1	No	Intracutaneous
8	CT	11	endoGIA	No	2	No	Intracutaneous
9	Clinical	23	endoGIA	No	1	Yes	Intracutaneous
10	CT	20	endoGIA	No	1	No	Intracutaneous
11	CT	21	endoGIA	No	1	No	Intracutaneous
12	CT	9	endoGIA	No	1	Yes	Skin stapler.

Table 1: Summary of case presentation. CT, computed tomography.

Discussion

This technique is a time-effective method compared with the traditional approach; with the added benefit of more optimized trocar placement for using an endoGIA. In young adolescent patients, the infraumbilical access is impractical due to the close angle to the appendix that makes the procedure more difficult. In a metareview [4], the mean operating time for conventional laparoscopic appendectomy was between 38 and 63 minutes in six studies. The supra technique has the potential to reduce the operating time substantially as most studies reported operating times in the ± 40-minute range [4]. According the World society for emergency surgery 2020 consensus on the diagnosis and treatment of acute appendicitis, there are approximately 300 000 appendectomies annually in the US alone. Thus, reducing the operating time is of crucial importance to increase the overall capacity in the public health sector. The single-port approach might have cosmetic benefits, but it is difficult to justify a significant increase in the operating time [5].

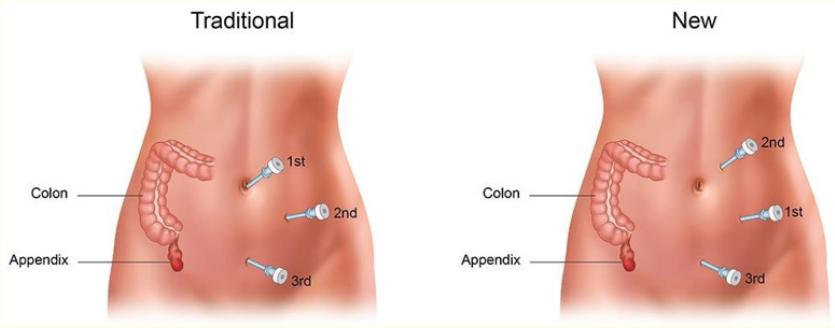

Figure 1: Traditional trocar placement where first (1) trocar is placed in the infraumbilical, then the second (2) in the lower left quadrant, while the third (3) is placed right below the umbilicus. In the new approach, the first trocar (1) is placed in the lower left quadrant optically. The second trocar is then placed 3-4 cm from the umbilicus in the upper left quadrant. The third trocar remains in the same position above the symphysis.

Figure 2: CT verified acute appendicitis.

Conclusion

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