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Review Article

**MANAGING BENIGN GI DISEASES WITH LAPAROSCOPIC
COLON RESECTION**¹Abdulaziz ahmed H alsahli, ²Abdulaziz Ali Salem Alqurshie, ³Abdullah Ali Eid alharbi**Abstract:**

Laparoscopic colon surgical procedure as a minimally invasive surgical procedure is currently expanding in therapy of malignancies after verifying his place in the treatment of benign disorders. In this review we will discuss the cases it can be used in GI disease and also techniques. PubMed, Embase, and Google scholar databases were searched up to end of 2018 for published studies with English language and human subject management of benign GI diseases with laparoscopic colon resection. Laparoscopic colon surgery has actually been performed for some years and is commonly accepted in the medical area as an alternative for procedures entailing benign disease. Temporary advantages consist of much less postoperative pain, faster return of bowel function, and a shorter length of stay. As technology remains to improve and doctors come to be a lot more comfortable and accomplished with minimally invasive strategies, these methods may be supplied to patients with more complicated problems. With even more experience, operative times decline and much shorter size of keeps result in reduce total expenses.

Corresponding author:

Abdulaziz ahmed H alsahli.

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INTRODUCTION:

Since the introduction of laparoscopic surgery in the early 1990s, several multicenter randomized clinical trials (RCTs) have developed that laparoscopy is a safe and possible strategy in colorectal surgery. These researches have actually focused on benign diseases such as diverticulitis and ulcerative colitis (UC), pre-malignant ailments like familial adenomatous polyposis (FAP), and deadly ailments, mainly colorectal carcinoma [1], [2]. Benefits of laparoscopic surgery include shorter postoperative health center stay, much less perioperative blood loss, much less postoperative pain and cosmetic advantages. Long-term follow-up will certainly most likely reveal less incisional hernias and bonds. However, no sufficient data are readily available yet. Morbidity and oncologic follow-up have been reported to be similar for open and laparoscopic colorectal surgical treatment [3]. Drawbacks are the extended operating time, the higher expenses and the requirement for an experienced cosmetic surgeon, because it takes a minimum of 20 procedures to find with the finding out curve [4]. After colorectal surgical procedure for malignancy, several patients experience a combination of physical and psychological issues for an extended period of time. Signs and symptoms such as fatigue, pain and disrupted bowel function, in addition to troubles in social and function functioning, unavoidably influence the patients' well-being. Assessment of self-reported quality of life is therefore significantly vital in medical tests, and also when taking into consideration the higher expenses for laparoscopy and its cost-effectiveness. Additionally, in cancer trials, it has been shown that analyzing quality of life might add to better therapy [5].

Today there is a growing number of minimally invasive surgical techniques for different disorders. Laparoscopic colon surgical procedure as a minimally invasive surgical procedure is currently expanding in therapy of malignancies after verifying his place in the treatment of benign disorders. In this review we will discuss the cases it can be used in GI disease and also techniques.

METHODOLOGY:

PubMed, Embase, and Google scholar databases were searched up to end of 2018 for published studies with English language and human subject management of benign GI diseases with laparoscopic colon resection. Moreover, we included reviews and randomized control studies, we excluded all case reports, in our search strategy we scanned the references list of our included studies for more relevant articles.

DISCUSSION:

• Laparoscopic surgery for benign disease Inflammatory bowel disease

It is identified that patients suffering from inflammatory bowel diseases (IBD) have a high life time probability of calling for surgical treatment. Particularly, patients who have Crohn's disease (CD) have an 80% total chance, whereas patients experiencing ulcerative colitis (UC) have a 30% to 40% probability of needing a colectomy [6]. Provided their proportionally younger age and the danger of requiring numerous procedures, patients are progressively seeking care from specialized colorectal centers using laparoscopic treatment of IBD. Several temporary advantages comparable to those explained in colon cancer have been related to laparoscopic surgical procedure for IBD. In addition, academic lasting benefits consist of fewer adhesions formation, reduced rates of bowel blockage, decreased the possibility of chronic pain, and decreased incidence of infertility or injury hernias [6], [7].

In Crohn's disorder involving the colon, the visibility of inflammatory changes, enlarged mesentery, avoid lesions, and fistulas and abscesses makes the laparoscopic strategy to surgical treatment especially difficult. Nevertheless, the indications for surgical procedure stay the like with open strategies. According to one testimonial [7], as much as 3 various minimally invasive procedures can be executed, including diagnostic laparoscopy, diversion procedures, and bowel resections, which can be approached utilizing pure laparoscopic techniques or hand-assisted methods. 2 randomized regulated trials have actually been released to date with numerous small comparative instance series, making it extremely difficult to analyze the superiority of laparoscopic techniques when compared to standard open outcomes (Table 1) [8-10]. In the very first research, Milsom and colleagues randomized 60 patients to elective laparoscopic-assisted (n =31) or open (n =29) ileocolic resection for CD [8]. They reported a lowered incidence of minor issues preferring the laparoscopic group (4 versus 8, $P < 0.05$), with a substantially quicker return to preoperative pulmonary function within this same group (2.5 versus 3.5 days, $P = 0.03$). Surprisingly, total morphine demands and recovery of bowel function were not dramatically different between both groups, whereas operative time was considerably much shorter within the open group (140 ± 45 versus 85 ± 21 mins, $P < 0.0001$). As anticipated, incision size was considerably much

shorter within the laparoscopic group (5.3 ± 1.6 versus 12.7 ± 5.5 centimeters, $P < 0.0001$). Lately, a second trial by Maartense and coworkers [9]. made use of a similar relative method with 60 patients who had CD. They reported much shorter hospital stays (5 versus 7 days, $P = 0.008$), reduced 30-day postoperative morbidity rates (10% versus 30%, $P = 0.028$), and reduced overall prices over 3 months (€6412 versus €8196, $P = 0.042$) within the laparoscopic resection group. Remarkably, no considerable quality of life difference was found between both groups making use of the SF-36 Health Survey and the Gastro-Intestinal Quality of Life Index. Based on the information gotten from these 2 randomized regulated tests, it shows up that laparoscopic ileocolic resection for CD is beneficial over open methods, along with giving an obvious cosmetic advantage [11]. It should be noted that the short-term advantages of laparoscopic surgical procedure for CD have additionally been sustained by a recent meta-analysis on the topic [12]. Finally, long-lasting outcomes adhering to laparoscopic ileocolic resection for CD have simply not been resolved in possible trials. Because of this, suggested long-term advantages connected with the laparoscopic technique stay theoretical, and should not form the basis for selecting this technique over a traditional open strategy.

The surgical management of UC by minimally invasive techniques is intricate, and has thus far been restricted to extremely experienced laparoscopic surgeons working in specialized centers. The 3 procedures presently executed are laparoscopic subtotal colectomy, overall proctocolectomy, and restorative proctocolectomy [13]. As is the case in open surgical procedure, these procedures call for the mobilization of the whole colon, in addition to the taking of a number of essential vascular pedicles. This location of laparoscopic colon surgical procedure has paralleled the advancement of operative experience within specialized colorectal centers, and has been facilitated by the development of laparoscopic modern technologies. Many very early publications on the subject explained dramatically worse postoperative end results amongst UC patients dealt with laparoscopically compared with those obtaining traditional open treatments, along with longer operative times of approximately 8 hrs [14], [15]. Much more lately, nevertheless, information from case-controlled studies have shown that patients undertaking laparoscopic surgical treatment for UC had no worse outcomes than those obtaining open procedures, despite operative times that have actually continued to be considerably much longer in many series (see Table 1) [16]. Actually,

lots of groups have actually recorded shorter postoperative stays in health center by roughly 1 day within their laparoscopic groups, along with superior body image information, and equivalent practical results [17-19]. Larson and colleagues have recently reported equivalent functional outcomes at a median follow-up of 13 months, amongst patients that had undergone laparoscopic ($n = 33$) and open ($n = 33$) ileal pouch-anal anastomosis for UC or familial adenomatous polyposis [19]. Despite numerous reports highlighting the safety and usefulness of laparoscopic surgical procedure for UC amongst professional hands, no comparative randomized trial with open surgical treatment has actually yet been finished. The current level of evidence in the literary works is therefore not enough to conclude the superiority of one method over an additional. Nevertheless, it is most likely that the minimally invasive approach will remain to get in popularity among experienced laparoscopists, provided its clear cosmetic advantages and potentially improved temporary results.

Diverticular disease

In recent years, laparoscopic resection methods have been successfully applied to diverticulitis of the sigmoid colon [20]. Good data exist from a variety of nonrandomized research studies highlighting the benefits of laparoscopic sigmoid resection in uncomplicated diverticular ailment (see Table 1). These benefits consist of a lot of the helpful short-term end results related to laparoscopic colon surgery, and additionally include reduced postoperative wound and pulmonary difficulties, in addition to reduced straight costs [21-23]. Lately, Alves and colleagues published the outcomes of a prospective national study including 332 successive patients going through laparoscopic ($n = 163$) or open ($n = 169$) optional sigmoid resection for diverticular illness [24]. They reported dramatically greater total morbidity rates within the open group (16.0% versus 31.4%, $P < 0.001$), including higher wound issues, abscesses, and fistulas, along with substantially longer lengths of stay in healthcare facility within this very same group. Although this study experienced a significant patient option bias associated with its absence of randomization, the research authors did figure out that open colectomy was an independent threat variable for morbidity, utilizing a multiple logistic regression analysis design. As a result, regardless of the absence of large randomized tests comparing open and laparoscopic sigmoid colectomy for diverticulitis, good proof exists supporting making use of laparoscopy for elective resections, based on developed short-term end results [20]. One must remember, nevertheless,

that this conclusion does not necessarily apply for complicated diverticular illness. Some groups have actually shown considerable boosts in morbidity and conversion rates related to laparoscopic resection of complicated diverticulitis [25]. It is recommended that such resections be done by knowledgeable laparoscopists.

Clostridium Difficile Associated Colitis

In 2011, *Clostridium difficile* was in charge of an estimated 453,000 infections and was associated with roughly 29,000 fatalities [26]. This rise in occurrence is multifactorial and has actually been attributed to an increase in antibiotic resistance needing more comprehensive antibiotic coverage, a raised understanding of treating clinicians, and an improvement in the sensitivity of available screening. Most of patients with *C. difficile* associated colitis (CDAC) will certainly reply to traditional therapy, however 3 to 10% of patients' progression to fulminant colitis with resultant multisystem organ failing and systemic indications of extreme sepsis [27], [28]. The definitive therapy of fulminant CDAC has actually traditionally been complete abdominal colectomy with end ileostomy. Subtotal colectomy permits control of sepsis with hostile resource control complied with by ongoing resuscitation with the prospective to establish gastrointestinal connection at a later date. While this approach is the supported medical therapy and has been revealed to boost the survival in serious fulminant CDAC, the death has been reported as high as 80% [29].

Initiatives have actually been made to apply minimally intrusive medical methods in attempt to minimize the morbidity and mortality seen after

surgical intervention. In 2011, Neal et al reported the use of laparoscopic diverting loop ileostomy with antegrade colonic lavage as an option to subtotal colectomy with end ileostomy in patients with fulminant CDAC [30]. The research study consisted of 42 patients in the treatment arm of which 90% required ICU care, 64% called for mechanical ventilation, and 74% called for vasopressor assistance. Laparoscopic diversion was successful in 83% of patients, with the rest calling for an open strategy. The patients underwent intraoperative colonic lavage though the ileostomy with warmed polyethylene glycol 3350/electrolyte solution and postoperative vancomycin colonic flushes every 8 hours for 10 days together with intravenous metronidazole. All patients in the test that went through diversion and lavage had resolution of CDAC. Three patients needed postoperative complete abdominal colectomy, two for abdominal area disorder and one for recurring vasopressor requirement. Eight patients (19%) died in the perioperative period and one patient had CDAC reappearance. At the time of publication, almost 80% of patients had their ileostomies turned around. The authors compared these end results with the previous 42 patients treated in their institution who went through overall abdominal colectomy and end ileostomy as primary therapy for CDAC. The patients had a similar preoperative APACHE-II score, yet they experienced 50% mortality in the perioperative period and just 19% underwent ileostomy reversal. While really minimal proof exists to sustain this method, these results should motivate more investigation right into this technique to treatment in this very risky patient populace.

Table 1. Major studies of laparoscopic colon resection for benign disease

Authors	Year	Study type	No. patients (lap/open)	Disease site	Conversion rate	Comparative outcomes*
Inflammatory bowel disease						
Maartense et al [9]	2006	RCT	30/30	IC	10%	↑ OR time, ↓ hospital stay, ↓ morbidity, ↓ costs
Huilgol et al [32]	2004	CC	21/19	IC	5%	↓ time PO intake, ↓ bowel time, ↓ hospital stay
Msika et al [31]	2001	PNS	20/26	SB, IC, C	0%	↑ OR time, ↓ bowel time, ↓ hospital stay, ↓ complications, ↓ costs
Milsom et al [8]	2001	RCT	31/29	IC	6%	↑ OR time, ↓ pulmonary recovery time, ↓ complications
Ulcerative colitis						
Larson et al [19]	2005	CC	33/33	C	-	No difference in morbidity or functional outcomes
Dunker et al [18]	2001	CC	16/19	C	0%	↑ OR time, ↓ hospital stay, ↓ bowel time, [body image
Hashimoto et al [17]	2001	RCS	11/13	C	0%	↑ OR time, ↓ blood loss, ↓ pain, ↓ hospital stay, [cosmesis
Araki et al [33]	2001	RCS	21/11	C	-	↓ time PO intake, ↓ bowel time, [cosmesis
Marcello et al [16]	2000	CC	20/20	C	0%	↑ OR time, ↓ bowel time, ↓ hospital stay
Diverticular disease						
Alves et al [24]	2005	PNS	163/169	S	15%	↑ OR time, ↓ blood loss, ↓ hospital say, ↓ morbidity
Lawrence et al [23]	2003	RCS	56/215	S	7%	↑ OR time, ↓ hospital stay, ↓ complications, ↓ costs
Dwivedi et al [22]	2002	RCS	66/88	S	20%	↑ OR time, ↓ blood loss, ↓ hospital stay, ↓ time PO intake, ↓ costs
Senagore et al [21]	2002	PNS	61/71	S	7%	↓ hospital stay, ↓ complications, ↓ costs

Abbreviations: CC, case controlled study; IC, ileocolic; OR, operating room; PNS, prospective non-randomized study; RCS; retrospective case series; RCT, randomized controlled trial; SB, small bowel; ↑, increased; ↓, decreased. * Outcome results are pertaining to the laparoscopic group, relative to the comparison group; non-statistically significant results are omitted.

• Techniques

Laparoscopic-assisted techniques

A lot of surgeons would consider a laparoscopic colorectal resection to suggest intracorporeal division and control of the significant vascular pedicle entailed, with bowel re-anastomosis being done either intra- or extracorporeally using a tiny extraction site made in the abdominal wall. It is important to keep in mind that there is no generally accepted interpretation of what really constitutes "laparoscopic assistance"

and even "conversion" from a laparoscopic to an open treatment, resulting in considerable differences in reporting of the rates that they take place and are contrasted [34]. Different levels of "laparoscopic assistance" can be used either due to issue or expediency, such as laparoscopic mobilisation of the left colon and division of the substandard mesenteric pedicle for anterior resection, with subsequent anal dissection being done open through a low midline or pfannenstiell incision, avoiding a high midline injury which would possibly be a lot more painful and lower

cosmesis.

Hand-assisted techniques

A hybrid method, which attempts to provide the advantages of laparoscopic surgery while minimizing the technical difficulty and raised operative time, is the hand-assisted technique. The authors believe that this method can be particularly useful for surgeons that are reasonably new to laparoscopic surgery as a helpful adjunct to coming to be skillful in completely laparoscopic colorectal surgery. This method includes the insertion of a bespoke port into the abdominal wall that enables the surgeons' hand to enter the abdominal cavity to aid in the procedure while keeping a pneumoperitoneum and therefore proceeded visualisation of the abdominal contents with the laparoscope. Although information comparing hand assisted and laparoscopic colorectal surgical treatment is limited in contrast to that comparing laparoscopic and open treatments, a Cochrane review of randomised regulated tests concluded that there was a considerable reduction in conversion rates in the hand assisted group, although there was no difference in problems or operating times [35].

Robotic colorectal surgery

Using robotic systems for doing minimally invasive colectomy was first reported in 2002 by Weber et al, complying with earlier work in the fields of urological and cardiac surgery. Without a doubt, over 50000 robotic prostatectomies were performed in the United States in 2007 [36], [37]. There is no doubt that these robotic systems are substantially more costly than traditional laparoscopic or undoubtedly open intestines procedures, so it is essential that the evidence base for these treatments is reinforced in the future. To date, just one randomised research from South Korea comparing robotic with conventional laparoscopic surgery has actually been published, which focused on complete mesorectal excision for rectal cancers cells and included only 18 patients in each group [38]. This restricted research did suggest that short-term end results for robotic surgical treatment were at the very least equal, with appropriate specimen quality on pathological analysis for oncological standing.

Single incision laparoscopic colorectal surgery

Single-incision laparoscopic surgery (SILS) was first defined in colorectal surgery in 2008. Various platforms, tools, and cameras exist, which come in variable lengths and levels of angulation and articulation, allowing the surgeon to stay clear of operating in a single axis. The SILS port site can additionally be made use of as the removal excision or stoma site, allowing scarless operations such as

overall abdominal colectomy and end ileostomy. Several researches have reviewed the safety and security and efficacy of SILS for the treatment of benign colon pathology, consisting of diverticulitis, IBD, and slow transit constipation. SILS has demonstrated similar outcomes of standard multiport laparoscopy, including morbidity, conversion rate, and readmission rates [39], [40].

CONCLUSION:

Laparoscopic colon surgery has actually been performed for some years and is commonly accepted in the medical area as an alternative for procedures entailing benign disease. Temporary advantages consist of much less postoperative pain, faster return of bowel function, and a shorter length of stay. As technology remains to improve and doctors come to be a lot more comfortable and accomplished with minimally invasive strategies, these methods may be supplied to patients with more complicated problems. With even more experience, operative times decline and much shorter size of keeps result in reduce total expenses.

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