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Masters Laparoscopic Left Colon – Tips and Tricks You Cannot Find in the Textbook

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Backgrounds

In recent years colorectal cancer incidence in Slovenia is slowly decreasing. Approximately two-thirds of all cancers are left sided, majority located at the level of sigmoid colon where the laparoscopic approach should be the easiest. Most of the randomized controled studies about laparoscopic approach to colon cancer concentrated on sigmoid resections and right hemicolectomies, and trials about left hemicolectomies involving freeing of splenic flexure and tension-free anastomosis have been rare. Laparoscopic left hemicolectomy has been more challenging than other laparoscopic colon procedures.

Methods

We searched different internet databases (Cochrane library, Medical Literature Analysis and Retrieval System Online (MEDLINE), and PubMed Health) from 2000 to 2018 about recommendations for laparoscopic left hemicolectomy. We performed a search for following keywords in various combination: “laparoscopy”, “laparoscopic colectomy”, “laparoscopic left hemicolectomy”, “tips and tricks”, and “technical tips”.

Results

We found more than 700 results in a form of classical articles, clinical trials, reviews and systematic reviews. Afterwards, we studied the most exact contributions. They all stress the importance of proper oncological principles (tying of the left branch of middle colic artery) and tension free anastomosis by proposing different methods for freeing of the splenic flexure.

Conclusions

Laparoscopic left hemicolectomy is not a simple procedure. It inevitably demands downtaking of left flexure and tying the left branch of medial colic artery to satisfy the oncological principles and achieve a tension-free anastomosis.

Key words

laparoscopic left hemicolectomy, technical tips

Importance of Vascular Anatomical Variations in Laparoscopic Right Hemicolectomy

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Laparoscopic complete mesocolic excision is gradually becoming the standard surgical approach in colon cancer surgery, the core element of which is central vascular ligation. Complete mesocolic excision reduces the risk of local recurrence and improves long-term patient survival. It is based on accurate Toldt's space dissection, central vascular ligation, and complete lymph node dissection. However, this increases the difficulty for surgeons, particularly in the context of right hemicolectomy, which encounters complex vascular anatomy. Understanding the anatomy of lymphadenectomy through variations in the right colon vascular anatomy is crucial during surgical resection. The studies showed that the ileocolic artery and ileocolic vein are consistently present and are thus important landmarks during these procedures. The ileocolic artery passes the superior mesenteric vein anteriorly or posteriorly, while the right colic artery passes the superior mesenteric vein anteriorly in most patients. The gastrocolic trunk of Henle is relatively constant. Detailed information on the vascular anatomical variations occurring on the right-side of the colon is crucial for protection of the right gastroepiploic and colic veins and anterior superior pancreaticoduodenal vein during surgery and to help minimize the risk of bleeding and adjacent organ injury. Failure to identify variations during surgical procedures can result in unwanted bleeding.

KEY WORDS

laparoscopy, complete mesocolic excision, vascular variations

Comparison of Histopathological Specimens of Open and Laparoscopic Colon Resections

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Backgrounds

Histopathological specimens play a central and critical role regarding future therapies and clinical results after colon resection. In fact, it combines preoperative diagnostics, treatment and performed surgical procedure with the work of pathologist and is the basis for adjuvant treatment. At the end, it is the milestone for the best patient outcome. Each new surgical technique requires quality control with indicators. Big randomized trials show complete comparability of open and laparoscopic colon resection, therefore, from broader perspective, a removed specimen can be understood as a quality indicator.

Methods

A retrospective analysis of colon resections at our institution was performed. Histopathologic reports from laparoscopic and open resections were compared.

Results

We retrospectively analysed 30 histopathologic reports of laparoscopic colon cancer resections which were performed in the previous year. These were compared with the reports of resections done in 2010, when we did not perform laparoscopic colon resections. To exclude biases, we compared the same TNM stage defined by the same pathologist. We found no important differences in histopathologic differentiation of adenocarcinoma, weight of specimens (laparoscopic 533 g vs. open 555 g) and length of specimens (laparoscopic 26.6 cm vs. open 28.1 cm). All specimens in laparoscopic and open group had lymphocytic infiltration, vascular invasion was present in 10% (3/30) in both groups, while perineural invasion was more frequent in the open group 16.7% (5/30) when compared to the laparoscopic group 16.7% (5/30). Intestinal margins were almost the same in both groups (laparoscopic 93.6 mm vs. open group 98.9 mm). Radial margin was wider in the open group (21.5 mm) than in the laparoscopic group (17.4 mm). The average number of resected and defined lymph nodes was slightly higher in the open group (24.4) than in the laparoscopic (20.3). The difference in average number of positive lymph node is small (laparoscopic 1.46 vs. open 1.76). Five years ago, we implemented quality assessment for mesocolic resections as well. The average grade of laparoscopic resection specimens was 2.9, but we had no such grading in 2010.

Conclusions

Undoubtedly laparoscopic resections for colon cancer are here to stay. Today there is no question of feasibility of laparoscopic resections, but strong demand for quality indicators.

Key words

laparoscopic colorectal surgery, histopathologic specimens, oncologic outcomes

Robotic and Laparoscopic Approach in the Surgical Field of Colorectal Cancer

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Backgrounds

The incorporation of robotics into a minimally invasive surgery platform is the newest advancement and has the potential to change medical field even more drastically with minimization and possibly elimination of human error. In the last few years, robotic surgery changed the surgical field of minimally invasive surgical technique for colorectal cancer treatment, despite the advantages of laparoscopic procedures. The purpose of this study is to analyse the differences between laparoscopic and robotic techniques for the treatment of colorectal cancer in terms of oncological and clinical outcomes.

Methods

Clinico-pathological data of 158 patients surgically treated for colorectal disease during the period 2010–2018 with laparoscopy and robotic assistance were analysed. Right colonic, left colonic and rectal resections were performed. A comparison between laparoscopic and robotic resections was made. In our department, the first robot-assisted resection of rectal cancer with hybrid technique was performed in 2010. In May 2014, we started again, and the first total robot-assisted resections of colon and rectal cancer were performed (single docking system). During the period 2014–2018, 61 patients were operated with robotic assistance (48% female, 52% male), the average age was 64.5 years, 62% were ASA II. Colorectal carcinoma was present in 76% of patients, 62% of patients had carcinoma of rectum or rectosigmoid, while others had diverticulosis and benign diseases. Besides, we retrospectively analysed laparoscopic operations during the period 2010–2018. We operated on 97 patients (63% male, 37% female), the average age was 66.5 years, 40% of the patients were ASA III. Colonic adenocarcinoma was present in 80% of patients, while others had diverticulosis and benign diseases. The most common localisation of cancer was rectum (25%) and rectosigmoid (41%) in robotic resections and coecum and ascending colon in laparoscopic operations.

Results

In all patients, radical resection has been achieved. The average number of isolated lymph nodes was 18.5 and 16.5 for robotic and laparoscopic procedures, respectively. The duration of hospital stay was shorter for patients operated with robot-assistance (average 7.5 days), but with longer operative time when compared to laparoscopic procedures. Also, robotic procedure was associated with lower intraoperative blood loss (50–150 ml vs. 100–300 ml) and lower rate of conversion to open surgery (4.5% vs. 7%). Increased complication rate was observed in the laparoscopic group (9 patients, 10.3%) when compared to robotic group (4 patients, 9%). During the eight-year follow-up, nine patients that underwent laparoscopic resection died (10.3%) – five due to cardiovascular disease and four due to progression of disease. On the other hand, three patients operated with robot-assistance died (6%) – one due to progression of disease, the others due to cardiovascular disease. The most common operation was right hemicolectomy (46%) in the laparoscopic group and anterior resection of rectum (54%) in the robot group.

Clonclusions

Laparoscopic and robot-assisted surgery are safe and feasible techniques for the treatment of practically all colorectal conditions requiring surgical intervention. Because of its dexterity and three-dimensional view, the Da Vinci system was particularly useful in specific stages of the procedure, e.g. takedown of the splenic flexure, dissection of a narrow pelvis, identification of nervous plexus, and handsewn anastomosis. The cost-effectiveness of the procedure still needs to be evaluated. To determine suitable minimally invasive surgical approach, it is important to recognise both laparoscopic and robotic procedures, present benefits and limitations when compared with each other. Hence, the ideal approach should ultimately result in the use of technique that is most appropriate for the specific surgical indication.

Key words

colorectal surgery, robotic surgery, laparoscopic surgery

Benefits of Intracorporeal Anastomosis in Laparoscopic Colorectal Surgery

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Minimally invasive surgery should be regarded as a safe alternative to a conventional approach for the same procedure and should be associated with lower postoperative patient morbidity. Intracorporeal anastomosis was one of the last challenges in completely laparoscopic colorectal surgery. Intracorporeal approach was found to be safe and feasible with similar operative times and complication rates as extracorporeal. Besides that, it offers some other benefits to a patient and a surgeon. It allows us to remove the specimen through any type of incision, therefore, reducing the incidence of incisional hernias. We usually chose mini Pfannenstiel incision which is known for excellent cosmetic results and low incisional hernia rates. We avoid traction injuries to the bowel and the mesentery, have better control over the aligement of the mesentery and closing the defect in it. We reduce the likelihood of intestinal twist. We mobilize less bowel and so reduce the extent of unnecessary tissue injury. We avoid difficulties in exteriorisation of heavy mesentery and large specimens through a small incision in a thick abdominal wall in obese patients. In hands of an experienced laparoscopic colorectal surgeon, intracorporeal anstomosis is superior to extracorporeal one. Laparoscopic surgeons should be focused on upgrading their minimally invasive surgery techniques with creation of intracorporeal anastomosis.

KEY WORDS

minimally invasive colorectal surgery, intracorporeal anastomosis

Total Intracorporeal Anastomosis in Right Hemicolectomy – a Literature Overview and Our Experience

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Backgrounds

The laparoscopic approach in colon surgery is increasingly becoming the standard of care for both benign and malignant disease. In a laparoscopic right hemicolectomy the anastomsis is most commonly still performed extracorporeally in most centres, as the intracorporeal approach is often accepted as technically more challenging. There is however increasing evidence showing that an intracorporeal anastomosis may be significantly more beneficial for patient outcome.

Methods

An overview of the available studies has shown superiority of the intracorporeal anastomosis in regards to the extracorporeal anastomosis in terms of duration of surgery, postoperative ileus, conversion rate of laparoscopic to open approach, length of hospital stay and postoperative complications.

Results

We performed a retrospective analysis of the demographic data, intraoperative and postoperative course of patients who underwent a laparoscopic right hemicolectomy at Izola General Hospital in the 5-year period 2014–2018. The results will be presented at the 14th Endoscopic Surgical Conference of Slovenia.

Conclusions

Having assessed the available surgical literature, we can conclude that an intracorporeal anastomosis formation has numerous advantages over an extracorporeal one in a right hemicolectomy. Our 5-year patient data overview supports that.

KEY WORDS

laparoscopic right hemicolectomy, intracorporeal anastomosis, extracorporeal anastomosis

Laparoscopic Colorectal Surgery – Our Experience

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Backgrounds

Laparoscopic colon resection is becoming a standard of care throughout the world. In General Hospital Slovenj Gradec, the number of these procedures is increasing since 2010. To determine if our outcomes are similar to those published in the literature, we looked at the outcomes of this procedure at General Hospital Slovenj Gradec.

Methods

A retrospective analysis was conducted on data from laparoscopic colon resections performed in years 2013, 2015, 2017 and 2018. We looked for location and stage of the tumour, number of lymph nodes harvested, postoperative morbidity and mortality and postoperative hospital stay.

Results

In four years, 74 laparoscopic colon resections were done. In 35 cases the tumour was located in the right colon, two in the left colon, 23 in the sigmoid colon and 13 in the rectum. Most of the tumours were T2 (24%) and T3 (40%). Average number of lymph nodes was 17. In 44% of cases one or more lymph nodes were positive. In one case surgical margins were positive. The overall 30-day postoperative morbidity was 10.9%. Two patients died, one with complicated pneumonia and one with acute myocardial infarction. Average hospital stay for patients without complication was seven days.

Conclusions

The results are similar to those published in the literature. Postoperative morbidity and mortality are slightly greater due to nonsurgical complication in old, polimorbid patients.

KEY WORDS

laparoscopic colorectal surgery

Laparoscopic Ventral Rectopexy for Treatment of Rectal Prolapse

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Backgrounds

Pelvic floor disorders (PFD) are a common name of different types of pelvic organ disfunction and different degree of pelvic organ prolapse. Clinical presentation of PFD has many faces and often present as a disfunction of defecation, urination and genital organ prolapse. Pelvic pain and sexual disfunction is often present. Obstructed defecation is a leading symptom in patients in day practice in proctology. Pain syndromes and disfunctions can lead to seriously disturbed psycho-social behaviour of patients. PFD can affect up to 60% of female population after 50 years. Vaginal delivery is a major risk factor, but young nulliparous females and male patients can develop PFD as well. Diagnostic procedure of PFD is a complex process. Careful anamnesis is crucial. Clinical examination should consist of digital rectal examination, vaginal inspection, recto- and proctoscopy. Pelvic floor asymmetry, scars, hypermobility, external prolapse can be seen. Different calculating systems are used to define severity of symptoms. Dynamic perineal and 3D-endoanal ultrasound, conventional and MR defecography, anal manometry and EMG or other special investigations are used to precisely define correct diagnosis and to measure a degree of PFD. Current treatment is primarily conservative and very effective in more than 80% of cases. Conservative treatment consists of life style changes, dietary consultation and physical rehabilitation by a specialist pelvic floor physiotherapists and nurses. Different modalities of electrostimulation and biofeedback are used as well. Surgical therapy is indicated in up to 10% of patients. Major indications for surgery are open prolapse, failure of conservative measures and very much disturbed psycho-social life. The aim of surgery is to correct disturbed functional anatomy of the pelvis. Surgery, a rectopexy or resection can be performed perinealy or transabdominally.

Methods

Obstipation and rectal prolapse are leading symptoms of PFD in patients seen in MC Iatros. We see up to 800 patients per year with one or both diagnoses. During the work out, current international guidelines are followed. Disease related history, number of vaginal deliveries, defecation habits and symptoms of possible obstructed defecation syndrome are investigated. Directed questions about incomplete defecation, bowel prolapse, time and frequency of defecation are addressed to the patient. Careful clinical examination includes inspection and digital rectal examination, recto- and proctoscopy, looking for signs of full thickness or mucosal prolapse. When clinical suspicion of rectal prolapse, internal working protocol is followed. All the patients are sent to ultrasound of pelvic floor (endoanal, endovaginal and perineal), conventional or MR defecography, some do transit time investigation. Colonoscopy is performed in selected cases. Other procedures and clinical examinations (gynaecological, urological) are sometimes indicated. After clinical workout patients are sent to conservative treatment, which constitutes of dietary consultation, physical rehabilitation and some life style support. Conservative measures help patients to re-educate pelvic floor muscles, redefine defecation habits and induce some life style changes. Majority can improve and reduce their symptoms so that further therapy is not needed. Patients with ongoing symptoms are

selected for surgical treatment. Both perineal and transabdominal procedures are offered. Detailed discussion of possible results and complications is in place, since the surgery is a functional one. Perineal procedures, such as Delorme, are performed as a day surgery cases in Iatros MC. Transabdominal surgeries are done in Izola General Hospital in collaboration with the surgical team.

Results

From October 2016 to April 2019 23 patients were operated for rectal prolapse, 22 were female and 1 man, mean age was 65.5 years (43–94 years). Indication for surgery was open rectal prolapse in four patients, 19 patients had internal rectal prolapse with different degree of uterovaginal prolapse, rectocele, enterocele and pelvic floor descent. Twenty-one laparoscopic mesh anterior recto(colpo)pexy were performed and two Altemeier resections for open prolapse, one in paraplegic patient, concomitant segmental colonic resection was performed in one. Mesh rectopexy is performed following descriptions in the literature. Polypropylene mesh is placed deep into rectovaginal septum, fixated with non-resorbable suture as well as on promontory. Mobilization of the rectum is limited to the right lateral plane to avoid nerve damage. Careful peritonealisation is performed at the end. One bladder perforation was noticed during surgery and treated by direct suture with no consequences, one revision of bleeding from the port side was needed. Average hospitalization was five days. No mesh related complication was noticed. Functional results were 100% in four patients with open prolapse. Fifteen patients in laparoscopic group are satisfied with the result. Main objective improvement is ease and shortened time of defecation. Four (17%) patients described no improvement. There is no faecal incontinence in follow up.

Conclusions

Pelvic floor disorders, rectal prolapse being one of the most embarrassing, are complex. Surgical correction of the rectal prolapse is the last choice in treatment. In our institution all possible treatment modalities are offered, including mesh rectopexy in collaboration with surgical department of Izola General Hospital. Surgical results are promising and improving with careful selection of the right patient for the right procedure.

KEY WORDS

pelvic floor disorder, rectal prolapse, obstructed defecation syndrome, laparoscopic rectopexy

Lessons Learned Since the Introduction of TaTME in Slovenia

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Laparoscopic surgery due to pathology of the middle and lower third of the rectum is very demanding. To overcome the problems of transabdominal laparoscopic approach, the transanal total mesorectal excision (TaTME) has been introduced to clinical practice about ten years ago. The technique has been adopted in many surgical centers during the recent years; we have introduced it in Slovenia in 2017. Since its introduction, the suggested best indications for TaTME are tumors of the middle and lower third of the rectum, especially in male patients. The expected benefits of the technique are the direct visualization of the tumor and therefore better control of the distal resection margin as compared to purely transabdominal approach. Another good indication for TaTME turned out to be proctitis due to inflammatory bowel disease, especially ulcerative colitis. Due to incomplete mesorectal dissection in the latter case, the technique differs slightly from the technique used in cases of rectal cancer, therefore the term TaTME might not fully apply for these cases. The surgical technique of TaTME is considered technically demanding with steep learning curve. Due to possible serious complications as suggested by some of the available clinical data, it should be performed after appropriate training of the performing surgical team. The two team approach is generally recommended, one performing the tarnsabdominal part, the other the transanal part. To facilitate the best possible results of surgery the appropriate equipment is also necessary. In contrast to conventional laparoscopic surgery, a special transanal port is needed and a special insufflator is crucial for the transanal part of the surgery to achieve stable working conditions. Special instruments on the other hand do not seem to be necessary. Technically, the transabdominal part does not differ much from the laparoscopic rectal resection. The splenic flexure mobilization however is recommended in most of the cases. Concerning the trasanal part, the special care must be given to the formation of the purse string suture. During the dissection phase the identification of the correct planes is very important. By achieving that, the injury to other anatomical structures can be avoided. The dissection of mesorectum can be completely performed from the transanal side, however it might also be partially done from the abdominal side. The most important step for the postoperative course of the patient is the formation of anastomosis. It can be performed in different ways, either in end to end or side to end fashion, stapled or hand sewn. The type of the anastomosis must be chosen individually and tailored to the local conditions. The ileostomy formation might be omitted in many cases, however the close clinical postoperative follow-up of these patients is necessary with possible re-laparoscopy if anastomotic leak is suspected. In conclusion, TaTME is a technically demanding surgical procedure that should only be performed by appropriately trained teams in dedicated centers, possibly within clinical trials. For the time being it seems to be a very promising surgical technique for specific indications with good short-term results and comparable outcome to other surgical techniques, while the results of ongoing trials aiming to assess its long-term results are still awaited.

KEY WORDS

transanal total mesorectal excision, rectal cancer, learning curve

Early Functional Results after TaTME for Rectal Cancer

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Backgrounds

The main focus of rectal cancer treatment is curing the disease. However, the cure of the disease is only one of the aspects of successful treatment. Treatment of rectal cancer can leave behind functional disturbances that may significantly impair the quality of patients' lives. As such, more and more emphasis is placed on preserving the function of pelvic organs. The aim of our study was to examine the extent of bowel dysfunction and impact on health-related quality of life after transanal total mesorectal excision (TaTME).

Methods

The Slovenian version of Low Anterior Resection Syndrome (LARS) questionnaire was completed by rectal cancer patients who underwent transanal TaTME in the period from January 1, 2017 to January 31, 2019 at the University Medical Centre Ljubljana. LARS questionnaire is a simple, easy-to-use tool with five questions regarding anorectal function. The questionnaire was sent to the patients and then returned via mail.

Results

Out of 11 patients who were contacted for participation, 10 (90.9%) were included in the final analysis. A total of four patients reported major LARS, four patients reported minor LARS and two patients reported no LARS. The mean LARS score was 28.2.

Conclusions

Although the number of included patients is small, the early results are comparable to the results of the LARS score analysis performed on the patients that underwent anterior rectal resection from 2006 to 2010 at our centre. TaTME seems to have acceptable impairment of anorectal function but further studies are needed to confirm this.

KEY WORDS

transanal total mesorectal excision, low anterior resection syndrome, rectal cancer, quality of life

TaTME – Our Experience and Complication Management

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Backgrounds

Transanal total mesorectal excision (TaTME) is the latest minimally invasive transanal technique pioneered to facilitate difficult pelvic dissections. The surgical dissection in deep pelvis is facilitated by a »down to up« approach, thus possibly improving oncological an functional outcomes for patients with mid- and low rectal cancer, overcoming the limitations of dissection of the angulated rectum deep within the pelvis. Patients who most benefit from TaTME approach are: men, low tumor, high body mass index and bulky or anteriorly situated tumours. In these cases laparoscopic total mesorectal excision (LaTME) with deep mesorectal dissection, safe resection margins (both distal and circumferential) and safe stapled transection, without the need for multiple firings, may not be achieved, requiring conversion to open surgery. TaTME may overcome these challenges by improved visualization and ergonomics. By enabling a more precise distal dissection in the embryological planes, the autonomic nerves can be preserved possibly leading to improved functional outcomes. As with any new technique new complications do arise. This is also true with TaTME as a number of specific complications were recognized during and after the procedure. For example, local collection or abscess secondary to bacterial contamination can occur due to transection of the rectum at the start of the procedure. TaTME was found to be associated with positive cultures in more than one third of patients, with development of presacral abscess in 17% of patients. Secondly, the injury of the urethra, urethral sphincter and bladder can occur in up to 10% of patients. This is a unique complication of TaTME compared to the abdominal approaches for rectal cancer. Furthermore, incorrect dissection plane with injuring of the venous plexus and autonomic nerves is possible since CO_2 insufflation used to aid dissection might expose planes beyond the scope of dissection, particularly during lateral and posterior dissection of the mid-rectum which can lead to extending the dissection too deep into the pre-sacral space. Finally, CO_2 embolism rarely may occur during TaTME in the setting of venous bleeding during pneumopelvis, causing sudden, transient cardiovascular instability.

Methods

We retrospectively analysed our group of 12 patients treated with TaTME technique. We analized demographics, oncological parameters, operative procedure parameters with special emphasis put on procedure-related complications.

Results

In our series of 12 patients we encountered the following procedure-related complications: illiac vein lesion due to incorrect plane dissection and pelvic abscess formation. Regarding late postoperative complications we had a case of colovaginal fistula formation.

Conclusions

TaTME appears to be oncologically safe and effective technique for distal mesorectal dissection with acceptable short-term patient outcomes and good specimen quality. Some specific, procedure-related complications can be expected due to a new surgical dissection perspective and new technology employment. Ongoing structured training and upcoming randomized controlled trials are needed to asses the technique further.

KEY WORDS

transanal total mesorectal excision, rectal cancer, pneumorectum, CO_2 embolism

Laparoscopy Training of Surgical Residents

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Backgrounds

Laparoscopic procedures require certain level of psychomotor skills to ensure patient safety. Learning curve is steep and there is ethical concern on when to start operating on live patients. At the moment, there is neither a minimum standard for psychomotor skills nor the test for checking them during most surgical residency curricula in our country. In fact, national surgical curricula are very scarce with endoscopic techniques learning. Simulators proved to be useful in teaching those skills outside the operating room. The aim of this review is to enlighten the situation and the need for the development of basic level of laparoscopy training during surgical residency curricula in our country.

Methods

A comprehensive review of the literature was made.

Results

At the time of writing, there is no obligatory curriculum for surgical residents. There is a decent pool of studies, which show that simulation is an effective method of laparoscopy training and that acquired skills are shown to be beneficial when evaluating procedures in the operating room. The evidence suggests that virtual reality trainers ensure more effective training than observation alone. Laparoscopic simulated training program increases the number and complexity of the procedures during residency. Furthermore, simulators can be used as an assessment tool for technical proficiency in trainees. Participation in a comprehensive ex vivo training curriculum for laparoscopic colorectal surgery results in improved technical knowledge and improved performance in the operating room compared with conventional residency training.

Conclusions

There is a need for standardized curriculum of laparoscopy training during residency as well as all endoscopic procedures. Presented paper is a plea for upgrading the surgical curricula. In addition, the question arises what the role of different institutions from surgical societies to medical chamber is in developing minimum requirements in sense of psychomotor skills for laparoscopy on live patients. More studies regarding the field of ethics and cost-effectiveness are needed.

KEY WORDS

laparoscopy, abdominal surgery, residency training, psychomotor skills, standardized curriculum

Laparoscopy Training of General Surgery Residents in General Hospital Slovenj Gradec

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Laparoscopic surgery has a long and rich tradition in General Hospital Slovenj Gradec, where laparoscopic cholecystectomies first started in 1990 at the Department of Urology and a year later at the Department of General and Abdominal Surgery. Now we perform laparoscopic surgery in over 94% of patients with acute and chronic symptomatic cholecystolithiasis, laparoscopic appendectomies, diagnostic laparoscopies, benign and malignant colon disease, ileus, laparoscopic splenectomy, laparoscopic hernia repair and bariatric gastric surgery. Since the beginning of laparoscopic procedures in our hospital, the crucial importance of early and consistent resident training in laparoscopy was soon recognized. Our faculty is dedicated to increase the advancement of training in laparoscopic surgery to ensure safe performance of basic and later on advanced laparoscopic procedures. Starting with the introduction to instruments and basic principles, residents are immediately involved in the operations as camera holders and first assistants. General surgery, urology and gynecology residents altogether have access to a simulator – a training box, where they can practice different drills to develop visual motor processing capabilities, bimanual coordination and train intracorporal suturing. Soon after, residents start to perform basic laparoscopic procedures such as diagnostic laparoscopies, laparoscopic appendectomies and cholecystectomies under close supervision of the faculty in order to become proficient in laparoscopic techniques quickly and safely. Some of the residents also start to learn and perform advanced procedures during residency being laparoscopic gastric ulcer repair, laparoscopic hernia repair and bariatric gastric surgery. All residents are encouraged to attended laparoscopy courses and workshops in Slovenia and abroad. From March 2011 to May 2019 eight residents successfully finished general surgery residency in General Hospital Slovenj Gradec. Five are currently working at the Department of General and Abdominal Surgery and three at the Department of Trauma Surgery. During their residency in our hospital they performed 108 laparoscopic appendectomies (14 in average) and 366 laparoscopic cholecystectomies (46 in average). Minimal number of performed procedures was seven for appendectomies and 19 for cholecystectomies, while maximal number was 27 and 75, respectively. During the residency some surgeons also started to perform advanced laparoscopic procedures, namely three gastric ulcer repairs, five hernia repairs and 247 bariatric gastric surgery procedures. All five former residents who currently work at the Department of General and Abdominal Surgery are continuing to do the basic and advanced laparoscopic procedures and have upgraded their skills and experience. Moreover, they all have started to teach basic laparoscopic principles to current residents. In conclusion, laparoscopic techniques have become an integral part of the operative management. Our Department of General and Abdominal Surgery is trying to promote safe practice of laparoscopic surgery, early training of basic laparoscopic skills and integration of advanced laparoscopic skills during general surgery residency.

Key words

laparoscopy, training, laparoscopic psychomotor skills, bimanual coordination, laparoscopic intracorporal suturing, basic and advanced laparoscopic procedures

Tips and Tricks in Management of Acute Intestinal Obstruction

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Backgrounds

With increased useage of laparoscopic approach in the treatment of acute intestinal obstruction we reviewed the literature searching for effects and consequences of such treatment.

Methods

A systemic search was conducted in MEDLINE and PubMed.

Results

The majority of literature was in agreament that laparoscopic treatment of acute small bowel obstruction was beneficial but far less certain for the positive effects of such treatment for colon obstruction.

Conclusions

The laparoscopic approach in small bowel obstruction can improve postoperative outcomes and shorten hospitalisation period, but we cannot say the same for using it in the treatment of acute colon obstruction for now.

KEY WORDS

acute intestinal obstruction, laparoscopy

Minimally Invasive Surgery for Complicated Left Sided Colonic Diverticulitis

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Backgrounds

Acute left sided colonic diverticulitis (ALCD) is one of the most common emergency surgical conditions in developed countries. The lifetime risk for diverticulitis in a person with diverticulosis was reported from 10% to 25%. Current estimations based on colonoscopy and CT show that < 5% of people with diverticulosis develop diverticulitis. The incidence has increased over time and with patients' age. However, the highest relative increase in incidence is observed in young individuals. Due to better understanding of pathophysiology and availability of radiological imaging in recent years, the treatment of ALCD has changed drastically. An accurate assessment of patient using clinical signs, laboratory inflammation markers and radiological findings to individually tailor the best treatment for each patient is recommended. CT scan of the abdomen and pelvis is indicated for all patients with suspected ALCD. Ultrasound may be alternatively used when CT is not available.

Methods

A retrospective cohort study for acute diverticulitis was performed at our institution. All patients who were treated for acute diverticulitis from 2012 to 2017 were included. The type of treatment (operative vs. conservative), surgical approach (resection with terminal stoma vs. resection with anastomosis) and surgical technique (laparoscopic vs. open) were assessed.

Results

Ninety-two patients were included in the study, 40 had complicated diverticulitis (Hinchey IIb, III and IV) and were treated surgically. Three (7.5%) had percutaneous drainage, 27 (67.5%) Hartmann,s operation, six (15%) laparoscopic lavage and drainage, one (2.5%) open lavage and drainage and six (7.5%) resection with primary anastomosis. Among patients with terminal stoma after emergency surgery, 58% had a two-stage Hartmann,s procedure with anastomosis.

Conclusions

The most commonly used classification of diverticulitis is modified Hinchey classification. The stage is significant predictive factor for patient,s mortality. However, due to wide use of CT, the CT-guided classification which divides acute diverticulitis into two groups (uncomplicated and complicated) and may guide the clinicians in the management of acute diverticulitis, is becoming universally accepted for everyday practice. Patients with localized complicated diverticulitis (pericolic air or small fluid collection on CT) should be treated by antimicrobial therapy only. Treatment of diverticular abscesses > 4 cm is by percutaneous drainage combined with antibiotics. Treatment of diffuse peritonitis is always surgical, and it has a significant mortality. In patients who are hemodynamically unstable with sever sepsis and/or peritonitis, Hartmann's resection is advised. However, in clinically stable patients

with no comorbidities, primary resection with anastomosis with or without diverting stoma may be performed laparoscopically or open. Laparoscopic peritoneal lavage and drainage is not recommended in patients with diffuse peritonitis (as indicated in trials SCANDIV, LADIES-LOLA, DILALA) given its association with persistent and recurrent abdominal sepsis. Damage control surgery with lavage, limited bowel resection, laparostomy and scheduled second-look operation is suggested for clinically unstable patients to enhance sepsis control and improve rate of anastomosis. Patient-related factors and not a number of previous episodes of diverticulitis should be considered when planning resection after conservative treatment. Elective sigmoid resection is indicated for stenosis, fistulas, recurrent diverticular bleeding and in high-risk patients (immunocompromised) after conservatively treated ALCD. In conclusion, advanced radiological imaging and the availability of non-surgical options has dramatically changed management of ALCD toward less aggressive treatment. However, well supported consensus guidelines do not exist due to low quality evidence-based data and treatment algorithms are still manly based on clinical dogma and expert opinion. Laparoscopic emergency resection is safe and preferable in experienced hands.

KEY WORDS

diverticulitis, surgery, laparoscopy, anastomosis, diverticular disease

Laparoscopic Rectal Resections for Rectal Cancer – Our 5-year Experience

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Backgrounds

Despite the current multidisciplinary modern management, rectal cancer remains a formidable challenge for the surgeon. Surgical therapy for rectal cancer has evolved since Miles described the abdominoperineal resection in 1908. Technical advancement came to light in 1982, when Heald described the total mesorectal excision (TME) technique that involves nervesparing dissection in the avascular plane between the mesorectum and surrounding structures circumferentially and he called it the "Holly plane". Despite initial concerns about oncological safety of laparoscopy, laparoscopic surgery was gradually introduced in the early 1990's. Two big trials (COST, COLOR II) demonstrated safety, oncologic equivalency with rates of locoregional recurrence and disease-free and overall survival similar to those of open surgery indicating clinical benefits over open surgery. Technical limitations exist with the laparoscopic approach, especially during the distal transection of the rectum, due to limited visualization and restrictions working in the confined, narrow bony pelvis. New techniques are developing to overcome technical issues and improve oncological outcomes (TaTME, TAMIS, robotic TME).

Methods

We retrospectively analysed data of patients who were treated radically for rectal cancer in our institution from January 1, 2014 to December 31, 2018. We analysed: patients' demographics, pre- and postoperative diagnostics and postoperative complications. Special emphasis was put on patients who were treated laparoscopically (laparoscopic TME, TaTME, laparoscopic PME, laparoscopic APE).

Results

During the 5-year period, 140 patients with rectal cancer were treated surgically. During the analysis we recognised two distinct periods. In the first three years (2014–2016) only a small number (about 15%) of patients were treated laparoscopically. In the second period (2017–2018) the ratio of patients treated laparoscopically reached 65%. The details of the analysis will be presented during the meeting.

Conclusions

Laparoscopic surgery is the current way to go in rectal cancer treatment. It is proven to result in faster postoperative recovery, fewer complications and better cosmetic results with equal oncologic results. In our institution we follow the current trends in rectal cancer surgery especially involving also the transanal approach (TaTME) in patients with rectal cancer located in the lower third of the rectum. We are constantly re-evaluating and trying to improve oncological parameters and rates of complications.

KEY WORDS

rectal cancer, laparoscopic total mesorectal excision, laparoscopic surgery

Laparoscopy for On-Call Surgical Emergencies

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Backgrounds

The number of personnel on duty after regular working hours is small. This is even more true for little regional hospitals. They have a demanding task to establish the diagnosis and deliver treatment in all surgical emergencies. The treatment must be delivered according to modern guidelines. The patient must receive the same treatment regardless the time of the day or the day of the week.

Methods

A retrospective review of all on-call emergency operations performed by general surgeons at the Department of General and Abdominal Surgery at General Hospital Slovenj Gradec was performed. We looked for the type of surgery (minimally invasive or not) and the cases where the preoperative diagnosis was not completely accurate and conclusive and was established during laparoscopy.

Results

In 2018, 195 on-call emergency operations were performed. There were 26 amputations, necrectomies and deep tissue abscess drainage, 12 procedures on peripheral vascular system and 157 abdominal procedures. In 113 patients a laparoscopy was performed. Among them, 105 procedures were therapeutic while eight were only diagnostic thus a laparotomy was performed thereafter. In 31 cases preoperative diagnosis was not conclusive and the decision regarding the type of surgical procedure needed was made after laparoscopy.

Conclusions

Most of the on-call emergency procedures in general surgery are done for abdominal diseases. During the last decades, laparoscopic approach became the standard treatment for most of them (appendicitis, cholecystitis, bowel obstruction, ulcer perforation, etc.) Well trained and experienced surgeon together with a dedicated team is a necessary prerequisite for laparoscopy – both diagnostic and therapeutic.

KEY WORDS

on-call surgical emergencies, laparoscopic emergency surgery

Emergency Laparoscopic Surgery in General Hospital Celje

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Backgrounds

During the last years, the role of laparoscopy in the acute care surgery has significantly increased. A lot of abdominal emergencies have been managed successfully by laparoscopy such as acute appendicitis, acute cholecystitis and perforated peptic ulcer. Laparoscopic technique has also become important as a diagnostic tool when all the other imaging techniques such as ultrasound, computed tomography and X-ray do not give us definitive answer. We would like to present our results of laparoscopic approach in emergency duty, especially for acute cholecystitis and acute appendicitis.

Methods

We reviewed the use of laparoscopic surgery in emergency setting between 2010–2018 at our institution.

Results

In the period from 2010 to 2018, we performed 3906 cholecystectomies, 2093 appendectomies and 13 diagnostic laparoscopies. Regarding the cholecystectomies, 675 (21.8%) were performed due to acute gallbladder inflammation. There were 53.1% of men and 46.9% of women, the average age was 64.2 years. The most common pathological diagnosis was acute gangrenous inflammation of the gallbladder. In 59.1% of patients who underwent laparoscopic cholecystectomy, acute gangrenous cholecystitis was found without perforation, while 31.4% had an initial inflammation. The average hospital stay for open gallbladder surgery was 7.9 days and shorter hospital stay was recorded after a laparoscopic procedure (5.4 days). After acute laparoscopic removal of the gallbladder, 2.3% of patients developed postoperative complications. In 0.5% diffuse peritonitis and haematoma were found that required laparotomy. There were also two iatrogenic damage of common bile duct (0.5%). A higher complication rate (10%) was observed after open gallbladder surgery. Regarding the appendectomies, there were 424 (20.3%) laparoscopic procedures in adults and 43 (2.1%) in children. A slightly higher proportion of men was observed (53.2%; 46.8% were women). The average age of the patients was 26.4 years. The most common pathological diagnosis was gangrenous inflammation of the appendix. Postoperative complications after laparoscopic appendectomy occurred in 1.9% (0.9% postoperative wound infections, 0.5% intra-abdominal abscesses and postoperative ileus). After open approach, postoperative complication rate was 3.3% (wound infection). The average hospital stay was shorter after laparoscopic surgery (4.3 days) when compared to open procedure (5.6 days).

Conclusion

Laparoscopic surgery helps us make further decisions and provide definite care for the acute abdomen. In the retrospective analysis laparoscopic approach was associated with shorter duration of hospital stay. The frequency of complications was

comparable to those published in the literature. We observed reduced rate of postoperative wound infection after laparoscopic procedure when compared to an open one, but the number of intraabdominal abscesses and postoperative ileus was similar in both groups. Some limitations need to be taken into account when performing a laparoscopic procedure, such as general condition of the patient, prior operative interventions in the abdominal cavity, age of children, etc.

KEY WORDS

laparoscopic emergency surgery, abdominal surgery, acute cholecystitis, acute appendicitis

Hot Topics in Treatment of Acute Appendicitis

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Ever since McBurney performed the first recorded surgical removal of the appendix for acute appendicitis in 1864, appendectomy has been considered the standard of care. With development of minimally invasive surgical techniques, the open procedure was replaced with laparoscopic appendectomy. Advantages of the latter are well established, and recommendations clearly favour the laparoscopic approach. Nowadays, it is among the most frequently performed procedures in abdominal surgery, which is one of the reasons for constant debate and research in the field. The diagnosis of acute appendicitis is based on history taking, clinical examination and laboratory blood tests followed by radiology imaging. Ultrasound is usually the imaging modality of choice as it is widely accessible and inexpensive. Its sensitivity is 58–76%, with 95% specificity and in Europe, it is the most utilised imaging technique prior to surgery. In the USA, however, CT scans are routinely performed at suspicion of acute appendicitis. This is, unfortunately, mostly due to logistics and legal concerns. Nonetheless, CT should be performed only if ultrasound is not diagnostic and when cancer or appendicular masses/abscesses are suspected. Although in the setting of acute appendicitis, appendectomies are usually still performed, conservative treatment approach has been gaining on popularity in the recent years. Appendectomy, with its low morbidity and mortality rates, is indeed the most efficient treatment option for acute appendicitis. It is successful in more than 95% of patients. However, surgical approach is much more invasive, what should be carefully considered in high risk patients and small children. Non-operative management is based on antibiotic treatment alone. By recommendations, 1–3 days of intravenous application is usually followed by seven days of oral antibiotics. According to some studies, 90% of conservatively treated patients may avoid surgery during the primary admission. This is especially true for uncomplicated, mild forms of appendicitis. Nonetheless, 10% of patients still require surgical intervention during the primary admission and recurrence rates of conservatively treated appendicitis vary from 14–38%. When solely antibiotic treatment approach is considered, patients should be carefully selected. Advantages and risks of the conservative management vs. an appendectomy should be evaluated. Peritoneal irrigation has been traditionally used during laparoscopic appendectomy. During surgery, thorough removal of any infective material from the abdominal cavity should always be the goal. However, data of some recent trials have failed to demonstrate the benefit of irrigation during laparoscopic appendectomy for perforated appendicitis. The rates of postoperative intraabdominal abscess formations and wound infections were in some cases even higher after irrigation. In these studies, intraoperative suction of infective material was shown to be enough. Nonetheless, some other trials proved the other to be true and have encouraged using peritoneal irrigation in order to lower the risk of postoperative septic complications. Similar debate has been going on about intraabdominal drain placement. Evidence for routine usage of drains is scarce and most surgeons rely on their personal experience and opinion. For perforated appendicitis drains have often been used with the aim of lowering the rates of postoperative abscess formation. Some of the recent data were comparable with these findings, demonstrating reduction in overall complication, re-intervention and re-admission rates. Most studies, however, discourage routinely using intraabdominal drains. While financial costs were higher and hospital stay was longer, drainage did

not lower the incidence of postoperative intraabdominal abscess formation regardless of the severity of the appendicitis. In conclusion, being the most common abdominal surgical emergency, acute appendicitis will continue to be in focus of many clinical trials and debates. Natural history of acute appendicitis is still debated; complicated and uncomplicated acute appendicitis are likely to be two different entities. Optimal treatment approach thus needs to be established, yet it should always be tailored with regard to clinical and radiological findings. Further studies will provide new information and hopefully help develop a clear clinical treatment protocol.

KEY WORDS

laparoscopic appendectomy, conservative treatment, antibiotic therapy, drainage, peritoneal irrigation

Risk Factors for Conversion in Laparoscopic Appendectomy

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Backgrounds

Acute appendicitis is the most common abdominal surgical emergency and can occur at any age. It can be uncomplicated or complicated (gangrenous, perforation, abscess, diffuse peritonitis). Several demographic and clinical risk factors for complicated appendicitis were identified such as female sex, obesity, age over 50 years, start of the symptoms over two days or, high Alvorado score. Today almost all appendectomies are done laparoscopically, but there is a place for open surgery also.

Methods

We reviewed our results from the last two years and tried to find the rate of complicated appendectomies which require open procedure.

Results

In the last two years (2017 and 2018), 417 appendectomies were performed in General Hospital Jesenice. There were 390 (93.5%) laparoscopic procedures, 17 (4.1%) open and 10 conversions from laparoscopic to open procedure, therefore our conversion rate being 2.6%. All of the conversions were due to complicated appendicitis, particularly perforation, abscess, peritonitis. Primary open appendectomy was done in small children in 11/17 cases (64.7%) and due to complicated appendicitis in 6/17 cases (35.3%). If we exclude small children and include conversions to open procedure, there were 23 (5.5%) open appendectomies for complicated appendicitis. Patients in whom conversion to open operation was needed lost the advantages of laparoscopic approach. They had higher likelihood of infectious/inflammatory (wound infection, sepsis, pneumonia, peritoneal abscess, adhesive bowel obstruction), hematologic (transfusion, postoperative hemorrhage) and renal (acute renal failure) complications compared to patients that had primary open operation. There are some scoring systems as predictors to avoid conversions. Age over 40 years, male sex, diabetes, obesity and preoperative diagnosis of complicated appendicitis can be included as independent risk factors for conversion. If we score each variable, we can compute the risk of conversion and higher score means higher conversion rate. Independently, the main risk factors are local inflammation, diffuse peritonitis and obesity. In could be argued that major morbidity can still be greater in the primary open operation than in laparoscopically operated patients or patients after conversion. There can also be shorter length of hospital stay and shorter length of postoperative antibiotic course. In the absence of peritonitis and systemic illness necessitating urgent laparotomy, laparoscopic appendectomy should be offered to patients. Similarly, results from large series of appendectomies show lower mortality, reduced overall morbidity, lower readmission rate, fewer admissions to intensive care units, shorter length of hospital stay and reduced hospital costs in patients with complicated appendicitis operated laparoscopically. So laparoscopic appendectomy can be superior or comparable to open appendectomy in terms of several surgical outcome measures for both uncomplicated and complicated appendicitis, across most illness severity groups.

Conclusions

Regarding our experience and the literature, many complicated appendicitis can be successfully managed laparoscopically. Laparoscopic appendectomy is a preferred method of choice for treatment of all kind of appendicitis if we decide that operation is needed. Predictors can sometimes help us to make decision easier when to make a primary open operation anyway and is still the best option in some cases. It can reduce operating time and the price of operation and regarding to the American retrospective cohort analysis it can also reduce the rate of morbidity. More studies should be done to develop better criteria for selection of patients which are primary open candidates.

KEY WORDS

laparoscopic appendectomy, conversion rate, risk factors

Laparoscopic Appendectomies in University Medical Centre Ljubljana

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Backgrounds

Acute appendicitis is the most common indication for emergency abdominal surgery. Laparoscopic appendectomy is the standard of care for the treatment of acute appendicitis.

Methods

We performed a retrospective study of 1153 patients with acute appendicitis who were admitted to the Department of Abdominal Surgery, University Medical Centre Ljubljana from January 1, 2017 to December 31, 2018. Demographics, diagnostic history, additional intraoperative findings, duration of operation, operative outcomes and postoperative complications were recorded.

Results

During the observed period, 1153 patients were included. There were 627 men (54.4%) and 526 (45.6%) women. The average age of patients was 39.11 years. The average operative time was 39 minutes. Abdominal ultrasound was the most commonly used diagnostic procedure before surgery. In 1079 (93.6%) patients ultrasound was positive. In 51 (4.4%) patients acute appendicitis was diagnosed with abdominal CT. During operation, acute appendicitis without perforation was found in 897 (77.8%) patients. In 291 (18.9%) patients the appendices were perforated. Perityphlitic abscesses was found in 31 (2.6%) patients. In 1111 (96.4%) patients the laparoscopic appendectomy was performed. In 25 (2.2%) patients the laparoscopic appendectomy was converted to classic appendectomy and in six patients (0.5%) the classic open procedure was perforemed. In 11 (0.9%) patients the appendectomy was performed during the explorative laparotomy. The mean length of hospital stay was 4.91 days.

Conclusions

Laparoscopic appendectomy is a safe and effective method of treating acute appendicitis. The advantages of a laparoscopic approach were shorter hospital stay and lower number of complications.

KEY WORDS

laparoscopic appendectomy, diagnostics, intraoperative findings

Cost Comparison of Laparoscopic versus Open Appendectomy

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Backgrounds

Laparoscopic appendectomy, like laparoscopic cholecystectomy, has gained wide acceptance between surgeons despite the lag of big trials confirming its superiority. Influence of costs in these types of procedures were studied very rarely. Procedures are in fact not comparable in medical terms and are indicated for different stages of acute appendicitis. The aim of the study is to collect and compare the cost of open and laparoscopic appendectomy.

Methods

The cost of open and laparoscopic appendectomy was compared in our setting due to our reimbursement system with diagnosis-related groups.

Results

The reimbursement paid by the Health Insurance Institute of Slovenia after the appendectomy in diagnosis-related group system for General Hospital Jesenice is 1588.32 €. The financial means are the same, regardless of how the procedure is performed (open or laparoscopically). With the development of endoscopic techniques in recent years, over 90% of appendectomies have been performed laparoscopically. Open surgical technique is performed only in case of inflammatory infiltrates around ileocecal region, diffuse peritonitis or in other complicated cases. Comparing the cost of both procedures show that the cost of classic appendectomy was only 61% of the cost of laparoscopic surgery. Higher costs for laparoscopic procedure are due to instrumentation, single used materials and consumable material that is needed during the operation. Depreciation of all equipment was also included. Hospital length of stay after open appendectomy is longer, almost twice the one after laparoscopic appendectomy (7.5 vs. 3.4 days) and the need for medication treatment (analgesics, antibiotics) is higher and longer in open procedures. Preoperative radiologic investigations were not included in the analysis. Comparison of costs for the same procedure between countries is almost impossible due to different paying systems, organizational issues, labour costs, surgical equipment and material prices. Despite the fact that the analysis did not cover all material costs, costs of sterilization, depreciation of all equipment and facilities, and maintenance costs, the financial means payed by the Health Insurance Institute is likely to be covered.

Conclusions

Laparoscopic appendectomy is less painful for patient and cheaper for employer and the state, since the patient's recovery is shorter. However, this is a loss for the contractor, because the funds for the development of profession, financial means for maintaining the equipment and preservation of the working space are lacking.

Key words

laparoscopic appendectomy, open appendectomy, cost comparison

Intestinal Failure – Nutrition Therapy

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According to definition accepted by European Society for Clinical Nutrition and Metabolism (ESPEN), intestinal failure (IF) is defined as "the reduction of gut function below the minimum necessary for the absorption of macronutrients and/or water and electrolytes, such that intravenous supplementation is required to maintain health and/or growth". Clinically it can be divided into main 3 types. Type 1 is temporary and will resolve spontaneously along with resolution of any external factor(s). The intestine is generally not functioning because of non-gastrointestinal factors such as drugs, anaesthesia, or acute illness, but this type of intestinal failure is also associated with prolonged postoperative gastrointestinal stasis or ileus. The gut is not otherwise diseased. Type 2 is most commonly seen after major gastrointestinal surgery where the gut anatomy is altered, e.g. high output entero-cutaneous fistula. There are often other factors involved such as sepsis, short bowel, or severe malnutrition. These patients require a combined multi-disciplinary approach involving intensive and specialist medical, nursing, dietetic and nutritional care. Many of these patients will require further gastrointestinal surgery and around half will go on to require home parenteral nutrition (HPN). The condition can be temporary if underlying cause is treated but it can also transform in type 3 IF. Type 3 occurs in patients who have chronic intestinal failure and is permanent. Their condition is however relatively stable, and it is now usual for them to be managed at home with HPN. Intestinal failure usually follows major resection, but also occurs when the intact intestine is unable to function because of severe inflammation or disorders of motility. In many such patients (eg. Mb. Crohn) both causes coexist. Severe intestinal failure is rare in most Western nations. It is best managed when anticipated. The patient with surgical loss is protected from long-term intestinal failure by the process of adaptation, which occurs mostly in the first six months after injury but can take up to two years. This process encompasses hyperplasia and hypertrophy at the cellular level within the intestine. Additionally, there is adaptive hyperphagia and changes in dietary choices, which will augment recovery. Intestinal failure should be anticipated in the patient with an ileostomy and < 200 cm small bowel, in the patient with < 100cm with intact colon in continuity, and in the patient with a stoma or fistula output > 1.5 L/day. Not all such patients will require parenteral nutrition, but all will need some degree of nutritional support and monitoring. The need for intravenous nutrition and/or intravenous fluid support is governed largely by the combination of the anatomy and its pathophysiological consequences. If there is a high output (meaning > 1.5 L) from stoma or fistula, then major electrolyte loss is almost certain and the need for daily intravenous fluids is highly likely. Regarding the patient assessment, body weight monitoring in the early stages of intestinal failure and in its on-going management is essential. Rapid changes in weight can be a consequence of changes in fluid balance rather than reflections of nutritional status due to fluid losses. Examination for postural change in the blood pressure can also provide evidence of inadequate circulatory volume before conventional blood tests become abnormal. Additionally, careful monitoring of dietary input in terms of energy and nutrients is crucial for diagnosis of malabsorption or maldigestion as symptoms of IF. Information about stool frequency, consistence and timing have to be obtained. Careful fluid balance records will provide important information especially in hospital settings. Laboratory parameters in terms of malnutrition can be checked if we suspect IF as a result of findings in anamnesis and status. We can monitor haemoglobin levels, lymphocytes count, CRP level, electrolyte balance (Na, K, Cl, Mg, P), urea, creatinine, albumin, triiodothyronine (T3), testosterone. The most helpful laboratory parameter in diagnosis of IF is usually the urine sodium concentration. Random samples are sufficient and there is normally no need for prolonged urine collections. As there are substantial losses of magnesium in diarrhoea and

high-volume stoma or fistula output, its blood levels should always be sought. Body composition assessment and regular monitoring is very helpful in diagnosis of IF and regular follow-up of nutritional interventions and fluid replacement strategies. In therapy of IF, the aims are to reduce gastrointestinal secretions due to short bowel syndrome, to slow the speed of transit, to reverse or prevent malnutrition, and to prevent deficiencies of specific nutrients. The most urgent component however is to identify and to treat elements of dehydration to avoid renal impairment. It is also important to avoid precipitating refeeding syndrome in the patient who has been deprived of appropriate nutrition for one week or more. Once these early targets have been achieved evolution to a stable longer-term nutritional regimen is then required. It is important to understand that it is beneficial to employ enteral feeing in patients with IF. The amount of residual functioning small bowel will determine the quantity (and frequency) of parenteral nutrition needed to complete patients' nutrient requirements. While enteral nutrition may be insufficient to provide all nutritional needs, this does not negate the considerable gains to be accrued from at least a percentage of their nutrition being accessed by the normal route. Patients with IF are advised to eat normal food, avoid excessive fibre, divide fluids from solids and ingest them separately. The food strategy should be "little and often". Formula feeds and prepared supplements may be helpful in short bowel because of their energy density and convenience but are certainly not mandatory if food is preferred by the patient. Elemental feeds should be avoided because the combination of high osmolality, low energy density, high volume and relatively poor palatability provides an increase in fluid losses with relatively poor nutrient advantages. Regular (1 kcal/ml) or higher energy (1.3–1.5kcal/ml) feeds can therefore be employed as determined by the patient's needs and tolerance of osmolality. In terms of fluid ingestion an oral rehydration solution-based strategy will naturally and necessarily include a limitation on the intake of free fluids (those with no or little sodium). The aim is not only to reduce the oral intake of free fluid but also to increase sodium intake in general. Pharmacological treatment of IF includes acid suppression by proton pump inhibitors (PPIs), drugs to delay transit, somatostatin and analogues, colestyramine, GLP-2, teduglutide and other. PPIs have an important role in the management of IF by reducing the total volume of gastric secretion, since most of this volume is from the secretion of acid. In patients with an ultra-short bowel and end jejunostomy (< 50 cm) oral PPIs may not be absorbed. They will require permanent intravenous application. Opioid drugs have minimal antisecretory effect but are nonetheless valuable in reducing the speed of intestinal transit. Loperamide is preferred over opioids. A combination of low dose opioids and high dose loperamide may be required for optimal control. In those with severe short bowel syndrome and also in those with functional intestinal failure in whom all approaches to enteral nutrition have failed it will be necessary to use intravenous nutrition. The amount of energy to be delivered is best determined by calorimetry, but when this is unavailable it is reasonable to follow the simple approach adopted in ESPEN's advice on nutrition in critical care and to give 25 kcal/kg body weight. In the already malnourished or especially catabolic patient this may be increased to 30 kcal/kg. The amino acid content should be set initially at 1.5 g/kg with the expectation that this is reduced to ~1g/kg as the patient moves into controlled steady-state type 3 intestinal failure. Once the patient is stable and securely established on intravenous nutrition it will usually be appropriate for discharge from hospital on HPN. In conclusion, chronic type 3 intestinal failure and its clinical manifestation as short bowel syndrome are not common, but they pose substantial management problems, which can be overwhelming to medical staff who are unprepared. The tendency for patients with short bowel syndrome to be net secretors, in whom drinking free fluids increases gastrointestinal losses, is particularly challenging. The use of oral rehydration solutions and of restricting free fluids is sometimes sufficient. This will be combined with encouraging solid food to ensure positive nutritional balance. Pharmacological antisecretory approaches should be attempted and along with judicious fluid and enteral food approaches are often successful. The more severely affected patient will generally need long-term intravenous nutrition. Long-term parenteral nutrition should not be exclusive anyway since physical and psychological gain come from eating. New therapeutic options to augment the adaptive process offer the possibility that some of these patients will in future be weaned from long-term parenteral nutrition and that others may never need it. For now, however, HPN or intestinal transplantation in a few highly selected patients, remain the norm for severe short bowel syndrome.

Key words

intestinal failure, short bowel syndrome, high output fistula, enteral nutrition, home parenteral nutrition

Advantages of Enhanced Recovery after Surgery Implementations for Laparoscopic Colon Resections

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Backgrounds

The Enhanced Recovery After Surgery (ERAS) care concept was initiated by Kehlet in the 1990s. It includes evidence-based items designed to reduce perioperative stress, maintain postoperative physiological function and accelerate recovery after surgery. In 2018, the fourth updated guidelines were presented. The guidelines provided graded recommendations for each ERAS item within the protocol.

Methods

We started with laparoscopic colon resection for colon carcinoma in 2015. We already had an established clinical pathway which included most of the ERAS protocol. We aimed to compare open vs. laparoscopic colon resection using ERAS protocol. We performed a retrospective analysis of patients operated for colon carcinoma in our hospital from 2015 to 2018. Only patients scheduled for elective surgery were included.

Results

Outcome measures, length of hospital stay, postoperative surgical stress response (C-reactive protein levels) and postoperative complications were compared between the two groups. The length of hospital stay was 9.29 days and 7.11 days in open and laparoscopic colon surgery, respectively. Mean C-reactive protein level two days after the surgery was 155 after open procedure and 97.4 after laparoscopic one. We recorded higher postoperative complication rate in open resection group, mainly due to paralytic ileus after the surgery.

Conclusions

Our study revealed an advantage in favour of laparoscopic when compared to the open resection for colon carcinoma. An advantage in favour of laparoscopic surgery was recorded in regard to the length of stay, postoperative stress and complication rate. We feel that laparoscopic or minimally invasive surgery for colon cancer is an important item in the ERAS protocol. We know that retrospective study is inferior to randomized clinical trial and could lead to too optimistic conclusions (the cancer stage in the open surgery group was higher, these were the learning years in our laparoscopic surgery).

Key words

laparoscopic colon resection, enhanced recovery after surgery protocol, patient outcomes

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East Meets West – Feasibility of Laparoscopy for Locally Advanced Gastric Cancer in Slovene Patients

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Backgrounds

Inspired by Asiatic gastric cancer surgeons, we have refined the lymphadenectomy technique making the results of our D2 lymphadenectomy rivaling open surgery. In the West there is a great void when it comes to significant single center studies evaluating the results of laparoscopic gastric resections. We therefore compared the results of laparoscopically operated patients to their propensity score matched open surgery counterparts.

Methods

We compared the results of 48 propensity score matched patients operated with laparoscopic resection and open surgery. The final outcomes were short-term functional results, perioperative morbidity and mortality, and the comparison of long-term results.

Results

Laparoscopically operated patients were significantly older (68.4 vs. 62.1; p=0.032), predominately female (p=0.046), and in similar general condition than patients in open surgery. Both groups were comparable according to clinicopathological characteristics. The number of extracted lymph nodes was similar in both groups (20 ± 11 lymph nodes in laparoscopically operated patients vs. 21 ± 13 lymph nodes in open surgery; p=0.732). No significant difference was observed in the perioperative morbidity and mortality between both groups. Laparoscopically operated patients required significantly less intravenous analgesics (p=0.002) and usually passed stool one day earlier than patients with open surgery, but this difference did not reach the level of significance. Although laparoscopically operated patients left hospital four days earlier, this difference did not reach the level of significance. There was no significant difference in the two-year survivals between groups (88.9% vs. 72.7% for laparoscopic and open operations, respectively; p=0.473).

Conclusions

Our results confirmed that laparoscopy is equivalent to open surgery in oncological aspects. The most important postoperative benefit of laparoscopic operations was the significantly lesser postoperative pain that resulted in a faster recovery although the patients in the laparoscopic group were almost six years older than the patients in the open surgical group. Although our results could not confirm a faster recovery of bowel function, our study suggests that laparoscopy has significant perioperative advantages which offer a great basis for implementation of enhanced recovery after surgery protocols in selected patients with comparable long-term results to open surgery.

KEY WORDS

minimally invasive gastric resection, D2 lymphadenectomy

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Minimally Invasive Esophagectomy: Moving Forward in Radical Surgical Treatment of Esophageal Cancer

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Backgrounds

Esophagectomy is the cornerstone of radical esophageal cancer treatment. Despite scientific and technical advances it remains a complex procedure with many complications. Perioperative mortality can reach 1% in large series in selected centers of excellence, but multicentre studies revealed a more realistic rate of 5–10%. Minimally invasive techniques of performing the standard Ivor Lewis and McKeown esophagectomies have developed in the last two decades and are being introduced into standard practice. Studies comparing minimally invasive esophagectomies (MIE) to open procedures have shown equal oncological outcomes and equal long-term survival. MIE is however associated with fewer pulmonary complications, less intraoperative blood loss, a shorter hospital stay and superior patient tolerance. Lower in hospital mortality, fewer cardiovascular and total complications and superior long-term results remain to be consistently shown. Data is building up with time, however, and a recent meta-analysis has shown superiority of MIE in all mentioned outcomes, but also longer operative times, higher surgeon stress levels and more reoperations in the MIE group. While open esophagectomies were done routinely, we performed the first MIE at our department in February 2015 and have introduced it in our standard clinical practice. Our aim was to review and report our experiences and results.

Methods

We reviewed all patients treated with radical esophagectomy with curative intent from 2009 to 2018 at our department. Data collected in a prospective clinical database on preoperative patient characteristics, neoadjuvant therapy, procedures performed, complications and survival are reported. Survival is compared between open and minimally invasive procedures with Cox Mantel log rank test and shown as a Kaplan Meier survival curve. Incidence of perioperative mortality, all complications, conduit complications and respiratory failure is compared between open and minimally invasive groups with the Chi square test.

Results

We performed 176 esophagectomies in 148 (84.1%) men and 28 (15.9%) women. Mean age was 64.7±9.4 (range 31–83). The first minimally invasive esophagectomy was performed in February 2015. Since then, 58 hybrid or total MIE were performed (33.0% of all between 2009–2018). Since the introduction, 76.3% were performed minimally invasively. Ivor Lewis resection with an intrathoracic anastomosis was the most common type of resection (139 cases (79.0%)) followed by McKeown three-field esophagectomy with a cervical anastomosis in 28 (15.9%) cases. Four transhiatal esophagectomies with a cervical anastomosis (2.3%) and five esophagogastrec-

tomies with colon interposition were also performed (2.8%). There were 94 patients with adenocarcinoma (54.0%), 78 planocellular carcinoma (44.8%) and two patients with GIST (1.15%). Resections were radical (R0) in 92.5%, macroscopically radical (R1) in 4.0% and macroscopically non-radical (R2) in 3.5%. Mean number of lymph nodes harvested was 22.6±11.8 and in 77.6% cases 15 or more lymph nodes were resected. There was 24.3% of patients in stage I, 30.6% in stage II, 38.8% in stage III and 5.4% in stage IV. One-, 3- and 5-year survivals were 72.9%, 44.9% and 40.3%, respectively. Survival did not differ between the open and minimally invasive groups (log rank p=0.499). In hospital mortality was 15/176 (8.52%). At least one complication of Dindo-Clavien grade 2 or more was experienced in 44.8% of patients with 15.8% of patients suffering a complication affecting the conduit (fistula or gastric necrosis) and 26.6% suffering pleuropulmonary complications. No statistically significant differences in perioperative mortality (OR 0.457, CI 0.09–2.29, p=0.330), any complication (OR 1.557, CI 0.79–3.15, p=0.196), conduit complications (OR 1.308, CI 0.51–3.36, p=0.576) or pleuropulmonary complications (OR 1.397, CI 0.65–3.00, p=0.392) could be established.

Conclusions

Minimally invasive esophagectomy is becoming a reliable method of performing a radical resection for esophageal cancer. Its safety, oncological adequacy and long-term results are equal or superior to those in open techniques while allowing for better patient tolerance of this major procedure. Studies have consistently shown decreased pain, accelerated rehabilitation and superior cosmetic results. There are reports of decreased incidences of pulmonary complications and less blood loss in MIE but positive effects on perioperative mortality, other complications and overall survival remain to be consistently shown. We have introduced MIE in our clinical practice over four years ago and have done 76.3% of all esophagectomies minimally invasively since. Our results have proven to be equal to previous open procedures in clinical and oncological outcome measures. We have not sistematically followed pain and rehabilitation parameters but their superiority was obvious to all personnel involved in the care of these patients which enhanced the acceptance rate of this complex (and especially in the first cases quite stressful) new approach in all members of the team.

Key words

esophageal cancer, esophagectomy, minimally invasive surgery, VATS, laparoscopy

Gastric Surgery Symposium Ljubljana Revisited

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The two main topics have been discussed in the past Gastric Surgery Symposium, i.e. gastric cancer and obesity. Evidence is growing up about the strong correlation of obesity with increased risk for different cancers; a statistically significant positive dose-response relationship between BMI and risk in esophageal cancer with the relative risk of 4.6 for those with BMI > 40 kg/m^2 and calculated relative risk per 5 kg/m^2 is 1.48. The overal risk for the gastric cardia carcinoma in obese population is found to be 1.8 and for overweight 1.2. The relationship between BMI at the time of cancer diagnosis and cancer-related mortality is well established. Complex mechanisms responsible for obesity-related cancer risk include systemic alterations in sex hormones, the direct and indirect effects of changes in metabolic, immune-mediated markers, the insulin-glucose pathway, and inflammatory markers with the impact to carcinogenic pathways. Five years ago, the estimated number of obesity-related cancers globally was 481 000. The age-standardised incidence rate of gastric cancer in Slovenia is decreased (2% annually) and 5-year survival rate is on average 29% which is statistically slightly above the European average. Firstly, surgery is currently considered to be the only radical treatment and improvement in the surgical techniques and multimodal approach importantly improved 5-year survival and quality of life. Secondly, low rate of early diagnosis misses the best surgical window and the main treatment of gastric cancer remains the combination of neoadjuvant chemotherapy, molecular-target therapy and immunotherapy. Long-term survival is importantly improved in personalised and comprehensive treatment plan. Obesity is related to a wide range of metabolic complications that are successfully treated with bariatric and metabolic surgery interventions. Adoption of comprehensive lifestyle changes is mandatory for short- and long-term success determined with excessive weight loss (EWL%) and resolution of comorbidities. Individualisation of patient care is necessary to avoid surgical complications and might be reached by respecting algorithms in surgical technique selection, risk factors stratification and care and all over supporting patient care. Bariatric surgery is associated with a 42% reduction of the cardiovascular risk and 30% reduction of all-cause mortality. Surgery for cancer has the comprehensive complication index (CCI) of 17.5% and for obese patients the operative risk and mortality remain low (modified classification system for bariatric mortality risk). The risk of bariatric surgery-related long-term adverse outcome is related to modifications to the gastrointestinal anatomy and physiology, which could impact macro- and micronutrient absorption. Besides, in comparison to the non-surgical management of obesity, bariatric surgery represents a minimally increased risk for complications, as well as importantly reduced risks of obesity-related comorbidities. The risk of complications should be considered in the decision-making process. In gastric cancer, identification of prognostic factors and reported prognostic index is crucial in clinical decision-making, patient stratification, and planning of the interventions. Clinical factors, summarised in the Table 1, affect short- and long-term survival in patients with gastric cancer.

It is important to asses novel tissue-based prognostic biomarkers (prognostic index identified) being implemented in clinicopathological parameters for survival in patients with disease progression, during or after chemotherapy for the

Peritoneal metastases (yes vs. no)
ECOG PS (1 vs. 0)
No. of metastatic sites (≥3 vs. 0 to 2)
Weight loss within 3 mo (≥10% vs. <10%)
Time since diagnosis (<9 mo vs. ≥9 mo)
Presence of a primary tumor (yes vs. no)
Time to progression since prior therapy (<6 mo vs. ≥6 mo)
Tumor differentiation (poor/unknown vs. well/moderate)
Body weight (<60 kg vs. ≥60 kg)
Histologic subtype (diffuse vs. intestinal)
Histologic subtype (other* vs. intestinal)
Age group (<65 yr vs. ≥65 yr)
Liver metastases (yes vs. no)
Disease progression (during first-line therapy vs. within 4 mo after the last dose of first-line therapy)
Sex (female vs. male)
Ethnicity (Hispanic or Latino vs. not Hispanic or Latino)
Race (other† vs. Caucasian)
Race (Asian vs. Caucasian)
Measureable disease (no vs. yes)
Primary tumor location (GEJ vs. gastric junction)

Table 1. Prognostic factors affecting short- and long-term survival in gastric cancer patients.

treatment of advanced gastric cancer. Nutritional surveillance is an essential component of bariatric patients management; the next key points supporting are: (1) facilitation of the detection of possible nutritional deficiencies that could develop despite medical therapy; (2) contribution to maintaining a good quality of life; (3) increaseed patients' adherence to healthy dietary habits and appropriate supplementation regime; and (4) prevention of the risk of weight regain.

Key words

gastric cancer, obesity surgery, multimodal treatment approach, progress in treatment, comprehensive treatment plan

Minimally Invasive Surgery for Gastrointestinal Stromal Tumours of Stomach

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Backgrounds

Gastrointestinal stromal tumours (GISTs) are the commonest subepithelial lesions of the gastrointestinal tract with an incidence around 1/100 000/year. Standard therapy of localized GISTs is a surgical resection with tumour free margins and intact tumour capsule.

Methods

All patients with stomach GISTs who underwent surgical treatment in our institution between the years 2007 and 2019 were identified from a database and retrospectively analysed regarding clinicopathological features.

Results

The pathohistological and immunohistochemical diagnosis of stomach GIST was found in 32 patients. The tumour size varied from 1.3 cm to up to 25 cm in its largest diameter (average 6.9 cm), most commonly seen histological subtype was spindle tumour (40.6%). Low mitotic count (≤ 5 mitoses per 50 high power fields) was present in more than half of the patients (21 patients; 65.6%) and T2 tumour (> 5 mitoses, ≤ 10 cm) was found in 13 (40.6%) patients.

Conclusions

Due to the rare incidence of stomach GISTs, the treatment should be performed in selected medical centres to pop-up the volume of patients, to increase the laparoscopic skills and oncologic principles to favour the outcome of the patients.

KEY WORDS

gastrointestinal stromal tumour (GIST), stomach, surgery

Laparoscopic Gastrectomy for Early Gastric Cancer – Our Experience

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Backgrounds

Gastric cancer in Slovenia is the 6th most frequent cancer in men and 9th in women. The incidence is about 4%. Although chemotherapy can improve patients' survival, radical resection with lymphadenectomy is the only curative treatment. Prof Kitano was the first who described a laparoscopic distal gastrectomy in 1994 for the treatment of early distal gastric cancer. Laparoscopic gastrectomy is still not completely accepted for the treatment of locally advanced gastric cancer, where D2 lymphadenectomy is mandatory.

Methods

We performed a retrospective analysis of patients operated laparoscopically for early gastric cancer at our institution in the following period: October 1, 2017 – March 30, 2019.

Results

In 10 patients the procedure was started laparoscopically. In nine patients a subtotal laparoscopic gastrectomy was performed with D1+ lymphadenectomy. In one patient, a conversion to an open procedure was made early due to local peritoneal carcinosis. In all patients treated laparoscopically R0 resection was achieved. One patient had a minor postoperative biliary leak that healed spontaneously. We had a case of late postoperative death due to right colon necrosis, probably unrelated to the gastric procedure. None of the above patients died because of carcinoma recurrence.

Conclusions

Most publications describing laparoscopic gastrectomy for early gastric cancer originate in Asia. All of them report similar complication rates, oncological non-inferiority and no difference in survival rates between open and laparoscopic gastrectomy. Based on our modest series of laparoscopically treated patients, we can conclude that the procedure is technically feasible and safe.

KEY WORDS

gastric cancer, laparoscopic subtotal gastrectomy, laparoscopic lymphadenectomy

Laparoscopic Proximal Selective Vagotomy and Gastroenterostomy in the Treatment of Peptic Duodenal Stenosis – a Review of the Surgical Technique and a Video

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Proximal selective vagotomy includes removal of a section of vagal braches for the fundus and the gastric corpus. Denervation of acidosecretory part of the stomach was a method of choice in the treatment of peptic ulcer disease in the 60s, 70s and 80s of the last century. The aim of this paper is to present an overview of the surgical technique, including a short video presentation. The operation begins with the identification of the branches of Latrajet's nerve for the antrum and the pylorus, which must be preserved. Dissection of vagal branches for the corpus and the gastric fundus is performed along the lesser curvature of the gastric wall. After identifying and separating the left vagal nerve, dissection continues along the distal esophagus in the length of about 5 cm. By preparation between the right pillar of the diaphragm and the distal esophagus, the right vagal nerve should be identified. This is followed by the cutting of the Grassi's nerve, since its high separation from the right vagal nerve can be the cause of unsuccessful proximal selective vagotomy. Dissection continues along the mid and last plan of the small curvature of the stomach, until the opening of the lesser sac, after which we are sure that the vagotomy is complete. Gastro-entero anastomosis is created with a proximal jejunum in retro-colic, infra-mesocolic fashion. With the use of proton pump inhibitors (1989) and the wide application of eradication therapy for Helicobacter Pylori, in the era of minimally invasive surgery, a paradigm in the treatment of this disease changed. Today, only rare cases of resistance to drug therapy presents an indication for surgical treatment. Due to the small number of patients, the training of specialists for performing this surgical procedure becomes problematic.

Key words

proximal selective vagotomy, peptic ulcer disease

The Role of Minimally Invasive Pancreatic Surgery

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Laparoscopic pancreatic resections have been shown to be feasible and safe, with rising numbers being reported during the last decade. While laparoscopic distal pancreatectomy has been widely adopted, laparoscopic pancreatoduodenectomy gained slower acceptance due to the complexity of the procedure. Comparisons with open surgery have shown shorter hospital stay, reduced intraoperative blood loss as well as similar results in terms of oncological adequacy. Due to improved postoperative recovery after minimally invasive resections, shorter median time to adjuvant chemotherapy and equal or even longer overall survival when compared to open resection was reported in some studies. However, this data often represents single centre or even single surgeon's experience and may not be generally applicable. Moreover, several studies indicated that low patient volume leads to longer hospital stay, higher costs and can negatively impact outcome. The expertise gained in laparoscopic and robotic procedures applied in other gastrointestinal areas does not necessarily provide guarantee of good outcomes for pancreatic resections. The learning curve is steep in pancreatic surgery in general, let alone in minimally invasive procedures. Experience in robot-assisted pancreatic surgery is increasing and is expected to improve surgical safety but reports are small in numbers, lacking randomization and mostly limited to dedicated centres. Still, minimally invasive pancreatic surgery has to be provided with an advanced degree of expertise and should be performed in referral centres able to guarantee key services.

KEY WORDS

laparoscopic pancreatic surgery, robot-assisted minimally invasive pancreatic surgery, learning curve

Spleen-Preserving Distal Pancreatectomy

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Backgrounds

Spleen preserving distal pancreatectomy (SpDP) is a preferred method for removing benign lesions and lesions with low malignant potential in the pancreatic tail and body, sometimes also for trauma of the pancreatic tail or chronic pancreatitis. Retrospective studies show no differences in early postoperative morbidity between SpDP and distal pancreatectomy with splenectomy, whereas long-term outcomes demonstrate clear advantage in the cohorts with spleen preservation. Overwhelming postsplenectomy infection is a serious risk in 1–5% of patients after spleen removal and is associated with a mortality of 50–70%. There are various methods for spleen preservation. The most common among them is the splenic vessel preservation technique, most commonly achieved with Kimura's procedure (median approach for the splenic vein and distal approach for splenic artery). The Warshaw's approach is an alternative and has been first described in 1988. In this technique, the splenic perfusion, after resecting the splenic artery and vein, is enabled through short gastric vessels. A modified approach of splenic vessel preservation has been described recently, where embryonal planes serve as entering point for retroperitoneal preparation of distal pancreas. This technique, according to authors, enables approach even in cases of strong adhesions in the lesser sac.

Methods

A review of abstracts from medical literature (PubMed, Cochrane) on the topic of laparoscopic and open SpDP has been performed and techniques compared. Small studies were excluded. The articles were reviewed according to design of the study, surgical procedure, results and complications. The results were compared with the data of our hospital in last three years (2016–2018), where we perform laparoscopic and open splenic vessel preservation technique in indications for SpDP.

Results

Among articles included in the final analysis (20), most of them consisted from large case series. None of them was randomized or controlled. In the Pancreatic Centre of Hospital of St. John of God in St. Veit/Glan, Austria, between 2016–2018, 98 patients were operated on due to pancreatic pathology. The average age of patients in a three-year period with all pancreatic resections was 65.2; 54% were female, 46% male. Whipple-Kausch operation (partial pancreatoduodenectomy) was performed in 52% of patients, distal pancreatic resection in 43% (27% open, 13% laparoscopic and 3% SpDP), pancreatectomy in 4% and open benign tumour enucleation in 1%. In the group of laparoscopic distal pancreatectomies with splenectomy, pathologic specimens always showed benign features: cystadenoma in 31%, benign neuroendocrine tumour in 25%, pancreatitis in 13%, intraductal papillary mucinous neoplasm in 19%, mucinous cystic pancreatic neoplasm in 6% and pancreatic intraepithelial neoplasia in 6%. Three cases of SpDP were one cystadenoma and two neuroendocrine tumours (insulinoma and non-active neuroendocrine tumour). All patients received triple vaccine prior surgery of distal pancreas, disregarded of intention for spleen preservation. Conversion from laparoscopy to open sur-

gery was performed in 25% of cases (mainly due to obesity and worsened overview). In the group of distal pancreatectomies, three patients developed pancreatic fistula, two patients had major postoperative bleeding.

Conclusions

Spleen preserving distal pancreatectomy should be on the repertoire of every pancreatic centre. Although triple vaccine prior to splenectomy minimizes the risk for overwhelming postsplenectomy infection, SpDP can be safely performed with low morbidity and should be considered as a treatment of choice in benign (inflammatory or tumorous) lesions of distal pancreas.

KEY WORDS

spleen-preserving, splenectomy, pancreas surgery, complications

Laparoscopic Liver Resection: How to Avoid Complications?

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Backgrounds

Laparoscopic liver resection (LLR) has been accepted as an attractive alternative to open liver resection. In determining the appropriateness of minimally invasive approach, the primary consideration is patient safety. The aim of this study was to analyse the complications related to LLR.

Methods

A prospectively maintained database of all consecutive LLRs in a tertiary referral centre specialized in hepato-pancreato-biliary surgery was retrospectively reviewed. The first 128 patients undergoing pure LLRs between April 2008 and February 2019 were analysed. Intraoperative complications were defined as major blood loss, unintentional damage to surrounding structures and conversion to open approach. Postoperative complications were defined and graded according to the Clavien-Dindo classification.

Results

Some 23 of the 128 LLR procedures (17.9%) were associated with intraoperative complications. Median estimated blood loss was 110 ml (range: 0–2200). Seventeen (13.2%) patients received perioperative blood transfusion. Blood loss of > 775 ml occurred in eight (6.2%) patients (conversion to laparotomy was required in three of them). No unintentional damage to surrounding structures occurred in any of the patients. Conversion to laparotomy was required in 18 (14.0%) patients. The overall incidence of postoperative complications was 38 (29.7%). The incidence of postoperative major morbidity and mortality were 9.3% (12/128) and 0.8% (1/128), respectively. Four patients (3.1%) required reoperations. Three patients (2.3%) were readmitted after discharge from the hospital.

Conclusions

Only the subset of surgeons who are dually trained in hepatobiliary surgery and minimally invasive surgery are adequately equipped to safely perform LLR. Surgeons should recognize the increased risk they assume by taking on more complex procedures.

KEY WORDS

liver resection, laparoscopic, morbidity, mortality

Predicting Intraoperative Complications during Laparoscopic Liver Resection – Preliminary Results

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Backgrounds

Laparoscopic liver resection (LLR) was firstly described in 1991. Afterwards, laparoscopic feasibility of all liver resections including the most demanding has been demonstrated. The use of minimally invasive liver surgery has been supported by consensus conferences in 2008 and 2014. Recently, the number of LLRs performed worldwide has increased exponentially. LLR is still limited to few specialists in tertiary liver centres because a technical complexity of the procedures varies from peripheral wedge resections to major hepatectomies and a considerable learning curve must be overcome in a stepwise fashion to reduce morbidity. Therefore, a preoperative assessment of LLR difficulty aids to patient selection according to surgeon's skills and experience at each stage of the learning curve. Predictive tools for the difficulty of LLR can improve the uptake of LLR. Surgical scores have been proposed to rate the difficulty of LLR and to improve the patients' safety. In 2018, Halls et al. used a large multicentre European database to develop and internally validate a new difficulty scoring system. In comparison to earlier scores which address only tumour factors, this scoring system includes patient (neoadjuvant chemotherapy), surgical (previous open liver resection, classification of resection) and tumour (lesion type and size) factors. On the base of this scoring, there are four difficulty levels which predict the likelihood of intraoperative complications: low (< 10%), moderate (10–20%), high (20–50%) and extremely high (> 50%). The need for validations of existing tools before a clinical application has been emphasized. The aim of this study is to externally validate the recently proposed model of a difficulty score to predict intraoperative complications (IOC) during LLR.

Methods

A prospectively maintained database of all consecutive LLRs in a tertiary referral centre specialized in hepato-pancreato-biliary surgery was retrospectively reviewed. The first 128 patients undergoing pure LLRs between April 2008 and February 2019 were analysed. The LLR difficulty score by Halls et al. was used and externally validated. Its various parameters (neoadjuvant chemotherapy, previous open liver resection, benign or malignant lesion, lesion size and classification of resection) were captured from the institution database. Factors predicting IOC were defined, assigned points, calculated, and grouped as in the original model. Each LLR was retrospectively scored from minimally 0 to maximally 15 points. It was then classified to low (0–2 points), moderate (3–5 points), high (6–9 points) and extremely high (10–15 points) difficulty levels. As suggested in the model proposed by Halls et al., the marker of a complex operation was an IOC, described as excessive blood loss (> 775 mL), unintentional damage to surrounding structures and conversion to open approach. Postoperative morbidity was based on the

most severe complication and graded according to Clavien-Dindo classification. IBM SPSS for Windows Version 21.0 (IBM Corp., Armonk, NY, USA) was used for statistical computations. Univariable analysis for binary data was performed using the Chi-squared test for categorical variables (Pearson's or Fisher's exact test when appropriate, two-tailed in all instances). Continuous variables were analysed using the Student's t-test for independent samples or the Mann-Whitney U-test if the criteria for parametric testing were not met. The analysis of variance (ANOVA) was used to determine statistically significant differences between the means of three or more independent groups. All percentages are listed to one decimal place and a difference with a p value of < 0.05 was considered statistically significant.

Results

Factors predicting IOC are shown in Table 1. Grouping of points into risk groups (difficulty level) based on Hall's score and the outcome measures are shown in Table 2. We grouped 128 patients into four risk groups as follows: 36 (28.1%) patients in low, 63 (49.2%) in moderate, 27 (21.1%) in high and 2 (1.6%) patients in extremely high risk group.

Intraoperative complication was present in 23 (17.9%) patients. Median estimated blood loss was 110 ml (range: 0–2200). Seventeen (13.2%) patients received perioperative blood transfusion. Blood loss of > 775 ml occurred in eight (6.2%) patients (conversion to laparotomy was required in three of them). There has been no unintentional damage to surrounding structures in any of the patients. Conversion to laparotomy was required in 18 (14.0%) patients. The need for conversion included unfavourable intra-operative findings (inability to proceed) or events (oncological concern during resection or bleeding). Reasons for inability to proceed were as follows: poor access due to dense adhesions (n=2), difficult exposure of large, fatty liver (n=2), inability to locate the tumour (n=1), and slow progression of liver transection (n=2). Unfavourable intra-operative events were as follows: oncological concern due to uncertain localization of tumour margins (n=9), the need for diaphragm resection to assure radical resection (n=1), and diffuse parenchymal bleeding (n=1). In none of these cases was the decision

Table 1. Points assigned to the five risk factors used in the predictive model to estimate the risk of intraoperative complications during laparoscopic liver resections.

Risk factor	Patients (n=128) n (%)	Risk factor category	Points assigned
Neoadjuvant chemotherapy	22 (17.2%)	No	0
		Yes	1
Previous open liver resection	2 (1.6%)	No	0
		Yes	5
Lesion type	89 (69.5%)	Benign	0
		Malignant	2
Lesion size (cm)	48 (37.5%)	< 3	0
	44 (34.4%)	3–5	2
	36 (28.1%)	> 5	3
Classification of resection	93 (72.6%)	Minor	0
	18 (14.1%)	Technically major*	2
	17 (13.3%)	Anatomically major	4

* Technically major resections are those that would be considered minor resections anatomically (involving only one or two segments) but are located in areas of the liver that are difficult to access laparoscopically (segments 1, 4a, 7 and 8).

Table 2. Grouping of points into risk groups based on risk of intraoperative complications predicted by the model. Difficulty levels vs. other outcome measures.

	Overall	Low (0–2)	Moderate (3–5)	High (6–9)	Extremely high (10–15)	P-value (χ2 test except[2])
Number of patients	128	36 (28.1%)	63 (49.2%)	27 (21.1%)	2 (1.6%)	/
Intraoperative complication[1]	23 (17.9%)	0 (0%)	6 (9.5%)	15 (55.5%)	2 (100%)	< 0.001
Transfusion required	17 (13.2%)	1 (2.7%)	11 (17.5%)	4 (14.8%)	1 (50.0%)	0.042
Operative time (min)[2]	155 (25–360)	120 (45–240)	150 (25–360)	210 (120–350)	310 (260–360)	< 0.001
Pedicle clamping	30 (23.4%)	2 (5.6%)	19 (30.2%)	9 (33.3%)	0 (0.0%)	0.009
Total pedicle clamping time (min)[2]	30 (10–75)	37.5 (35–40)	30 (10–75)	40 (10–60)	0 (0–0)	0.033
Postoperative morbidity (CD 1–5)[3]	38 (29.7%)	9 (25.0%)	18 (28.6%)	10 (37.0%)	1 (50.0%)	0.154
Postoperative major morbidity (CD ≥3)	12 (9.3%)	1 (2.7%)	4 (6.3%)	6 (22.2%)	1 (50.0%)	0.028
Postoperative mortality	1 (0.8%)	0	1	0	0	/
Hospital stay (days)[2]	6.0 (2–79)	6.5 (2–13)	5 (2–42)	7 (3–79)	24 (6–42)	0.107
Readmission rate	3 (2.3%)	0	2	1	0	/

[1] Intraoperative complication, defined as blood loss > 775 mL, unintentional damage to surrounding structures and conversion to open approach.
[2] Continuous variables are reported as median (range); ANOVA test without considering the extremely high risk group.
[3] Postoperative morbidity was based on the most severe complication and graded according to the Clavien–Dindo classification.

to proceed to conversion taken in urgent situation caused by severe, life-threatening bleeding. Postoperative major morbidity occurred in 12 (9.3%) patients. One patient died postoperatively, counting for 0.8% mortality rate. The rates of IOC (0%, 9.5%, 55.5% and 100%) increased gradually with statistically significant values among difficulty levels ($p < 0.001$). The rate of complications in high risk group (55.5% vs. 20–50%) slightly exceeded the proposed value.

Conclusions

This external validation proved that this complex difficulty score is an objective predictor of IOC during LLR. Our results show a systematic approach through the learning curve since the complication rates in groups with low and moderate risk are lower than expected. A surgeon should be aware of an increased risk of IOC before starting with more complex procedures.

Key words

liver resection, laparoscopy, scoring systems, complications

Minimally Invasive Surgery for Necrotizing Pancreatitis

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Necrotizing pancreatitis is severe, life threatening condition and multimodality aproach is necessary for its treatment. Throughout the decades surgical treatment has shifted from classical aproach, with total midline incision and necresectomy to minimally invasive surgery for selected group of patients. Nowadays we are aware that sterile pancreatic necrosis without organ failure should be treated conservatively, while surgical debridement is reserved for the patients with infected pancreatic necrosis. As mentioned, classical approach consists of surgical intervention with laparotomy and necrosectomy, which can be associated with high morbidity and mortality rates. Therefore, the interventions for necrotizing pancreatitis have shifted away from open surgical necrosectomy towards minimally invasive techniques, knowing that the open approach is still the "gold standard" treatment of symptomatic pancreatic necrosis, despite its postoperative mortality rate of 20–40% and morbidity reaching as much as 78%. That was the reason for developing a number of minimally invasive techniques, including radiological drainage and a minimal access retroperitoneal approach. In that group, video-assisted retroperitoneal debridement (VARD) and minimal access retroperitoneal pancreatic necrosectomy (MARPN) are most popular. VARD is a hybrid technique combining open lumbotomy with a laparoscopic technique, introduced by Gambiez et al., who originally removed the necrotic debris visualized by means of a mediastinoscope through a small lumbotomy. MARPN was first introduced by Carter et al. In this technique, a nephroscope was originally used through a tract formed along a drain that was inserted during previous open necrosectomy. The visualization of the necrosis was aided by instillation of saline, and the necrotic debris was removed through the working channel of the nephroscope.

Key words

necrotising pancreatitis, video-assisted retroperitoneal debridement, minimal access retroperitoneal pancreatic necrosectomy

Safe Cholecystectomy – Prevention of the Bile Duct Injury: Where Are We and How To Proceed?

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Laparoscopic cholecystectomy is the treatment of choice for patients with symptomatic calculus gallbladder disease. It is a safe and efficient procedure in elective patients, as well as in the case of complications (acute cholecystitis, hydrops, empyema, gallbladder perforation). Main advantages of laparoscopic cholecystectomy in comparison with open procedure are less postoperative pain, early mobilization, better respiratory function, lower rate of infections of the operative wound and shorter hospitalization. Despite numerous advantages, laparoscopic cholecystectomy is also associated with perioperative complications. Bile duct injury, with or without hepatic vascular injury, is considered as one of the most feared complication. The first publications showed a higher degree of bile injuries in laparoscopic cholecystectomy compared with the open method (0.85% vs. 0.3%). This can be attributed to the lack of experience at the beginning of laparoscopic era. Nowadays, incidence of bile duct injuries is lower and comparable with the open procedure (0.3–0.6%). The most commonly used classifications of bile duct injuries are Bismuth and Strasberg classification. Despite the advances in technique and experience, the incidence of bile duct injury remains constant and represent the Achilles tendon of laparoscopic cholecystectomy. Bile duct injury, with or without vascular injury, is associated with high morbidity and long-term lower quality of life of the patient. A number of factors and measures are important in the pursuit of preventing and reducing the incidence of bile duct injury. Anatomy of the biliary tract and hepatic vascular system play an important role. Intrahepatic bile ducts are in most cases merged in left and right hepatic duct, which at confluence create a common hepatic duct (in approximately 60%). The latter then joins the cystic duct to form the common bile duct, that ends within the pancreas in papilla Vateri. Many anatomical variants of the extrahepatic bile ducts are possible. During embryonic development, left hepatic artery is arising from left gastric artery, middle hepatic artery from celiac trunk and right hepatic artery from upper mesenteric artery. In most cases (about 60%), the left and right arteries are obliterated during development. The surgeon must be aware of and recognize the anatomical variations of the hepatic bile and vascular systems, thereby reducing the possibility of errors and damage to bile ducts or arteries. Other risk factors for bile duct injury were indicated. Most studies list male sex, age above 70 years, acute cholecystitis, intraoperative bleeding, stone impaction in Hartmann's pouch, previous surgery in the upper abdomen, cirrhosis and anatomic variants as factors that make laparoscopic cholecystectomy technically more demanding. However, it is not entirely clear whether the aforementioned factors actually contribute to a higher degree of damage to the bile ducts. The main cause of injuries is incorrect identification or non-recognition of the elements of hepatocholedochus. Lack of experience is associated with a higher degree of complications, but injury can also happen to experienced hepatobiliary surgeons. In case of ambiguity, consultation with an experienced surgeon is advised. A safety method was proposed in order to reduce the injury to the surrounding structures. The incision of visceral peritoneum and blunt dissection in the Calot's triangle is followed by separation of the gallbladder neck from the liver bed. Thus, we can safely visualize the cystic duct and the cystic artery. This reduces the possibility of

incorrect identification and consequent damage to bile ducts or arteries. In some centres, such an approach is a part of the routine and is recorded with photo documentation. In the case of difficult laparoscopic cholecystectomy, some authors describe the use of an infudibular approach in which the dissection is carried out right along the wall of the gallbladder. Antegrade dissection is also possible, in which cholecystectomy is performed from the direction of the fundus towards the Calot's triangle. If the situation does not allow safe cholecystectomy, subtotal or partial cholecystectomy is possible, leaving the posterior wall of the gallbladder attached to the liver and closing the cystic duct at its origin from within the gallbladder. Most authors agree that, in case of uncertainty or complications, a conversion to an open method and a safe visualization of the Calot's triangle structures is mandatory. Some anatomic landmarks may aid in avoiding injury to surrounding structures. Rouviere's sulcus as the level of dissection of the Calot's triangle is supposed to ensure safe clipping of cystic duct and artery in most patients. Another anatomic landmark to guide gallbladder dissection is represented by the "cystic lymph node" or Mascagni's node, which always lies lateral to the biliary tree and should form the medial end point of dissection. Some authors proposed a mnemonic "B-SAFE method" by using five anatomic landmarks (B, bile duct; S, sulcus of Rouvière; A, hepatic artery; F, umbilical fissure; E, enteric/duodenum) to correctly place their cognitive map during dissection. The metaanalysis showed that the different methods of cystic duct closure are comparable to each other. Nevertheless, the advantages of locking clips and ligatures are demonstrated over other techniques. Special attention is needed in closure of inflamed or ischemic cystic duct. The literature recommends the selective use of intra-operative cholangiography in cases where an injury is suspected or there is no clear anatomy. It is important to know the anatomical variants of the biliary tree and to correctly and accurately evaluate the images. Routine cholangiography is not recommended. The use of indocyanine green to show the biliary tree is comparable to intra-operative cholangiography. Studies show that laparoscopic cholecystectomy using indocyanine green is an effective and safe method of visualization of the biliary tract anatomy and can help reduce the incidence of bile duct injuries. Nonetheless, prospective studies are needed to put the method into clinical practice. In conclusion, despite the aforementioned recommendations, damage to the bile ducts can still occur. In the case of intraoperatively recognized bile duct injury, it is necessary to ensure haemostasis, insert the drainage and refer the patient to a tertiary centre. If the injury is identified after an operation, diagnostic measures (ERCP, CT, MRCP) should be carried out and in the event of proven bile duct injury the patient should also be referred to a tertiary centre.

KEY WORDS

indocyanine green, laparoscopic cholecystectomy, bile duct injury

Can Neutrophil to Lymphocyte Ratio and HOMA-IR Be a Predictor of Severe Cholecystitis?

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Backgrounds

Acute cholecystitis is one of the most common gastrointestinal diseases which require hospitalisation and surgical treatment. Inflammatory response during the operation leads to impaired insulin sensitivity. Insulin sensitivity can be measured by hyperinsulinemic euglycemic clamp. This method is highly specific and sensitive for insulin sensitivity, but at the same time, it is an expensive diagnostic procedure. On the other hand, measurement of insulin resistance, using homeostatic model assessment-insulin resistance (HOMA-IR) has the same diagnostic value, and it is much simpler and cheaper. The predictive value of preoperative neutrophil-to-lymphocyte ratio (NLR) in patients with cholecystitis has not been established. The aim of this study was to investigate preoperative NLR in patients with cholecystitis and to identify a relevant NLR value that discriminates between simple and severe cholecystitis.

Methods

This study consisted of 136 patients who underwent laparoscopic cholecystectomy due to cholecystitis. The Receiver Operating Characteristic (ROC) analysis was performed to identify the most useful NLR cut-off value in relation to the severity of cholecystitis. The patients were divided into two groups according to the cut-off NLR value: high NLR group (≥ 4.18, n=23) and low NLR group (< 4.18, n=113). Severe cholecystitis was defined as a state which includes inflammation, empyema, gangrene, perforation of gallbladder, adhesions or difficulty in dissecting Calot's triangle.

Results

A total of 136 patients with symptomatic cholecystitis who underwent laparoscopic cholecystectomy during the study period were included in the study. The median age was 53.41±14.14 years, 57 were women (41.9%) and 79 were men (58.1%). Physical examination and intraoperative findings confirmed simple cholecystitis in 113 patients (83.1%) and severe cholecystitis in 23 patients (16.9%). In order to determine the cut-off value for NLR to discriminate simple from severe cholecystitis receiver operating curve (ROC) curve was established. The area under the curve was 0.801 (95% CI 0.717–0.886, p < 0.0001). With NLR value of 4.18, the sensitivity was 78.3% and specificity 74.3%, respectively. Therefore, we defined 4.18 as the cut off value and divided the patients in two groups: the group with preoperative NLR < 4.18 (n=113) and the group with preoperative NLR ≥ 4.18 (n=23). There was no significant difference in age (p=0.417), BMI (p=0.093), and sex (p=0.912).

Statistically significant difference ($p < 0.0001$) in severity of illness between the groups was found. Also, there was a significant difference in the baseline CRP ($p < 0.0001$), white blood cell count ($p < 0.0001$), and neutrophil level ($p < 0.0001$). Lymphocytes were significantly higher in lower NLR group ($p < 0.0001$) then in higher NLR group. There were no significant differences in the baseline value of glucose ($p=0.802$), insulin ($p=0.782$) and HOMA-IR value ($p=0.634$) between high and low NLR group. CRP on the first postoperative day was significantly higher in higher NLR compared with lower NLR group (22.30 (9.29–50.45) mg/L vs. 62.9 (33.8– 127.4) mg/L ($P < 0.001$)). The same trend was noticed for HOMA-IR but the difference was borderline significant ($p=0.05$). HOMA-IR on the first postoperative day in higher NLR group was 3.64 (2.20–6.92) and in lower NLR group 2.40 (1.30–4.10). Spearman's correlation revealed significant association between the preoperative NLR and HOMA- IR on postoperative day 1 ($r=0.254$, $p=0.030$), and between preoperative NLR and CRP on postoperative day 1 ($r=0.355$; $p < 0.0001$). There was also a correlation between preoperative NLR and severity of acute cholecystitis on postoperative day 1 ($r=0.991$; $p < 0.0001$).

Conclusion

This study demonstrated that NLR ≥ 4.18 was significantly associated with severe cholecystitis. The preoperative NLR in patients undergoing cholecystectomy due to cholecystitis could be a useful surrogate marker of severe cholecystitis. The association between preoperative NLR and HOMA-IR and CRP on postoperative day 1 may be helpful in prediction of impaired insulin sensitivity with higher possibility of perioperative complications.

Key words

NLR, HOMA-IR, acute cholecystitis, laparoscopic cholecystectomy, severe cholecystitis

Sacral Neuromodulation for Faecal Incontinence

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Backgrounds

Faecal incontinence (FI) is frequently under-reported. It has major impact on the patient's quality of life and may result in significant secondary morbidity, disability, and costs. The estimated prevalence ranges from 0.4% to 18%. Treatment for FI is demanding and needs to be patient tailored. Sacral neuromodulation (SNM) is the surgical modality that has transformed the management of FI in the last two decades. SNM has become the first line surgical treatment for FI in people failing conservative therapies. The exact mechanism of this technique is not yet completely understood. SNM re-stimulates a dysfunctional pelvic floor and receptor pathway. In addition, the cortico-anal pathways, brainstem, and specific parts of the spinal cord are involved. SNM shows remarkable short- and long-term improvements regardless of whether a sphincter defect is present or not.

Methods

This minimally invasive, completely reversible technique of SNM involves two short procedures under anaesthesia. During the first, X-ray controlled placement of a 4-point electrode at the sacral root S3 is carried out and linked to a temporary external stimulation device. If the patient shows a good response within the subsequent two- to three-week trial period, a definitive implantation of the pacemaker-like stimulator device is performed; otherwise the electrode is removed.

Results

Two thirds of the patients report improvement greater than 50% in the trial period and about 40% of the patients achieve perfect continence control.

Conclusions

SNM improves continence in a proportion of patients with FI. This treatment has recently been introduced into clinical practice at the University Medical Centre Ljubljana.

Key words

faecal incontinence, sacral neuromodulation

Preventive Salpingectomy During Elective Non-Gynaecological Procedures

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The purpose of the following paper is to present the topic of ovarian carcinoma and preventive salpingectomy to surgeons who operate in the abdominal cavity and open a discussion to a possible collaboration between different fields in prevention of ovarian carcinoma. Ovarian carcinoma is the leading cause of death from gynaecologic malignancy. Raw incidence of the disease is calculated to around 11.2 cases per 100.000 people, with the highest incidence in Central and Eastern Europe. Disease carries a high mortality rate, with only 29% 5-year survival rate. In Slovenia ovarian carcinoma is the tenth most common malignancy, with 42% 5-year survival rate, with about 150 new cases each year. More than 75% of all cases are discovered in advanced stages, FIGO IIIA. Different serum cancer antigens and pelvic ultrasound have been evaluated for early detection, however no effective screening test has been established. Risk factors for development of ovarian carcinoma are age, menopausal status, reproductive history and family history. Majority of hereditary breast and ovarian carcinoma include a mutation in BRCA1 or BRCA2 genes and carry a 40% lifetime risk of developing epithelial ovarian carcinoma. Women with confirmed hereditary disease are recommended to have the ovaries and fallopian tubes removed before the age of 40. Thus, the operation leads to surgical menopause, which has a significant impact on quality of life, with a decrease in cardiovascular health and osteoporotic health. There are five main histological subtypes of ovarian carcinoma: high-grade serous carcinoma, low-grade serous carcinoma, endometrioid carcinoma, clear cell carcinoma, and mucinous carcinomas. High-grade serous carcinoma is the most common type, accounting for approximately 70% of invasive ovarian carcinomas with an early peritoneal spread. Research in the last two decades has strongly suggested that the origin of high-grade serous carcinoma lies in an interaction between the ovaries and fallopian tube. In 2001, Piek et al. presented the model in which he connected dysplastic changes in fimbriae of fallopian tubes to development of high-grade serous carcinoma in patients with a BRCA mutation. Dysplastic changes were named serous tubal intraepithelial carcinomas (STICs), a precursor in hereditary and a majority of non-hereditary serous ovarian and pelvic carcinomas. The role of the ovaries in the pathologic pathway is not completely understood. As mentioned above, preventive bilateral salpingo-oophorectomy in women with confirmed hereditary disease or in the high-risk population carries a decreased quality of life, due to absent ovaries. Strong correlation to the origin of high-grade serous carcinoma in the fallopian tubes led to hypothesis that preventive removal of fallopian tubes should reduce the incidence in the low-risk population of women. Studies in the last decade showed no effect on ovarian hormonal function after preventive bilateral salpingectomy. Both Morelli et al. and Song et al. showed no difference in levels of anti-Müllerian hormone in groups after hysterectomy with or without salpingectomy. A large population-based cohort study preformed by Falconer et al. including more than 5 million women in Sweden, showed that bilateral salpingectomy was associated with a lower risk of ovarian carcinoma (hazard ratio 0.65; 95% confidence interval 0.52-0.81) compared with unexposed population. Both safety and costs of the operation were evaluated. Population-based cohort study Ovarian Cancer Research Program of British Columbia (OVCARE) evaluated perioperative outcomes in almost 50.000 women with or without bilateral salpingectomy during hysterectomy. Study showed a minimal increase in

time, of approximately 16 minutes in the group that included salpingectomy. No differences in postoperative complications were noted. Kwon et al. studied cost effects of the procedure and showed that procedure preformed before age of 50 are cost effective. All data supports preventive salpingectomy as safe and without additional risk during benign gynaecological procedures. Society of Obstetricians and Gynaecologists of Canada, the Royal Australian, New Zealand College of Obstetricians and Gynaecologists, the American College of Obstetricians and Gynecologists and the Society of Gynecologic Oncology recommend that salpingectomy be considered at the time of surgical sterilization or hysterectomy for benign disease. There is also a consensus at the Department of Gynaecology, University Medical Centre Ljubljana, to preform preventive salpingectomy at the time of benign gynaecological procedures. Since the effects of ovarian carcinoma are severe, idea of preventive salpingectomy during elective non-gynaecological procedures arose. Tomasch et al. from Medical University of Graz conducted a pilot study, asking women scheduled for elective laparoscopic cholecystectomy if they would consider preventive salpingectomy during the procedure. Twenty women participated in the study, 19 were open to the idea and 12 would agree to preventive salpingectomy straight away. Study gave a clear answer that women would consider the procedure during laparoscopic cholecystectomy. However organisational and other challenges would need to be addressed. The same research group is conducting an ongoing trail studying acceptance, technical feasibility, time requirements, and complications. In conclusion, ovarian carcinoma is the leading cause of morbidity and mortality from gynaecological malignancy. Preventive salpingectomy decreases the risk in low risk women. The procedure is safe and does not increase costs. Currently the procedure is only preformed during gynaecological procedures, however a possibility to expand it to non-gynaecological procedure is worth exploring.

KEY WORDS

ovarian carcinoma, high- grade serous carcinoma, preventive salpingectomy, bilateral salpingo-oophorectomy

Laparoscopic Approach for Inguinal Hernia Repair – Tips and Tricks

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Laparoscopic hernia repair has been introduced into clinical practice in the 1990s. Due to technical issues and higher cost of the procedure as compared with the classical open Lichtenstein procedure, it took quite a long time before laparoscopic hernia repair has become more widespread. Nevertheless, even now there are still some open questions regarding the use of laparoscopic techniques in clinical practice. Although the best indications for the laparoscopic approach seem to be the cases of recurrent inguinal hernia (after open approach) or bilateral inguinal hernia, there are some other cases, where laparoscopic approach offers some advantages over an open approach. It is straightforward that patients with symptomatic gallstones and inguinal hernia represent a good case for a laparoscopic approach. The other good indication is a suspected inguinal hernia in female patients. Due to a high percentage of femoral hernias in the latter situation, the laparoscopic approach with its advantage over an open approach regarding the possibility of visualization of the exact internal hernia opening seems to be reasonable. For the same reason some favor the laparoscopic approach also in the case of unilateral inguinal hernia in men, since it is known that occult contralateral hernia might be present. This possibility must be addressed with patients before surgery in order to be able to perform bilateral repair in such cases. The indications for laparoscopic hernia repair in cases of inguinal pain without clinically apparent hernia (so called sportsman's hernia) are still controversial. In-depth knowledge of the anatomy of the groin is indispensable for a safe and successful laparoscopic hernia repair. Regarding the surgical technique, one has a choice between transabdominal and preperitoneal approach (TAPP vs. TEP). TAPP is preferred by many surgeons due to better visualization of both internal inguinal openings and because it is also considered slightly less demanding than TEP, however it might be associated with more postoperative adhesion formation. Hernia sack dissection in TAPP is most difficult in cases of large indirect inguinal hernias. In such cases, the hernia sack might be transected with distal end left in situ in order to avoid the damage to the spermatic cord structures. In women, the peritoneal dissection from the round ligament might be difficult, therefore the transection of the ligament is often necessary. Sufficient dissection of the preperitoneal space with clear visualization of all landmarks (epigastric vessels, bladder, symphysis, spermatic cord structures, internal hernia opening) is the essential part of the laparoscopic approach in order to enable the positioning of an adequately sized mesh, with at least 3 cm overlap of the internal hernia opening in all sides. There is no clear evidence to support one mesh type over another, however the mesh fixation method seems to be important. Mesh fixation with the use of tackers my lead to postoperative pain if not used cautiously. The use of self-gripping mesh, glue fixation or no mesh fixation can avoid such complications with no adverse effects in a form of higher incidence of hernia recurrence in almost all cases. Peritoneal closure must be done meticulously, preferably by running sutures. In conclusion, the laparoscopic hernia repair has become an important surgical option in the management of patients with inguinal hernia. In experienced hands it offers some advantages over the standard open technique in selected patients groups. However, it might also be used even in the most frequent scenario of unilateral inguinal hernia in male patients, although in such cases it apparently offers no clear clinical benefit over the Lichtenstein hernia repair.

Key words

laparoscopic hernia repair, laparoscopic transabdominal preperitoneal hernia repair, Lichtenstein technique, recurrent inguinal hernia

Laparoscopic Component Separation Procedures in Abdominal Wall Reconstruction

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Retro-muscular mesh placement in ventral hernias is associated with best results and lowest number of complications. In large hernia defects open component separation technique is today the gold standard for management of such complex ventral hernias. However it is associated with significant wound complications. Anterior component separation technique should be done with mesh and perforator sparing method, where endoscopic approach can be used. Posterior component separation or transversus abdominis release (TAR) is an extension of the original retrorectus Rives-Stoppa operation. This procedure avoids large flaps and allows large mesh in sublay position. Minimally invasive or laparoscopic procedures with less pain, better cosmetic results and especially with fewer wound complications are trying to copy open procedures with placement of mesh in sublay position and avoiding intraperitoneal onlay composite mesh (IPOM) as it was performed in laparoscopic IPOM. New laparoscopic modifications are technically very demanding and time consuming. Robotic-assisted TAR seems to be technically less demanding, but it is not cost beneficial yet.

KEY WORDS

component separation technique, transversus abdominis release, laparoscopy

Adhesive Technique of Mesh and Peritoneum Fixation in Laparoscopic Inguinal Hernia Repair

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Backgrounds

Inguinal hernia surgery is the most commonly performed operation in Europe and USA. Standard methods of operation are open or laparoscopic techniques involving fixation of the mesh with tissue-perforating methods, fixation of mesh with adhesive method and, finally, non-fixation method. Non-fixation mesh methods are simple, with less postoperative pain, but are associated with complications such as large mesh mobility, lower tensile strength and higher rate of hernia recurrence. In meta-analysis, there was no statistically significant difference in the percentage of hernia recurrence after laparoscopic fixation methods when compared to non-fixation methods. The current guidelines of the International Endohernia Society (IEHS) recommend that the use of non-fixation techniques in TAPP repair should be considered in L I, L II, M I and M II type inguinal hernias according to EHS classification. We have three categories of adhesives for fixation: synthetic adhesives, biological adhesives and genetically engineered polymeric adhesives. The use of adhesive for fixation of the mesh decreases postoperative complications compared to fixation methods. EHS guidelines say that the use of glue adhesives for fixation of mesh and peritoneal closure reduces acute and chronic postoperative pain compared to the fixation of the mesh with tissue-perforating methods.

Methods

Between January 1, 2018 and August 31, 2018 we prospectively monitored 20 patients divided into two groups: group I (GI) with patients undergoing TAPP procedure with mesh and peritoneum closure with the tacks and group II (GII) with patients undergoing TAPP procedure by mesh and peritoneum closure by glue. There were 10 patients in each group. Inclusion criteria were: male, adult, ASA I–III. Patients with direct, indirect or bilateral inguinal hernia of L I–III or M I–III according to the EHS classification have been enrolled. Exclusion criteria were: female, large inguinoscrotal hernia, severe comorbidity, anticoagulant, corticosteroid, immunosuppressive or psychiatric therapy. In GI, the fixation of the mesh and peritoneum was performed by tacks (Ethicon SecureStrap®, Absorbable Strap Fixation Device, Johnson§Johnson). In GII, mesh and peritoneum were fixed with a laparoscopic instrument using adhesive n-butyl-2-cyanoacrylate (NBCA) (LiquiBand Fix8®, Advanced Medical Solution). In both groups, we used light polypropylene titanium mesh, size 10x15 cm (TiLENE® Blue, pfm medical, Germany). All patients were operated by the same surgeon. In GI group we fixed the mesh with an average of 5–7 tacks, the peritoneum was fixed with an average of 7–8 tacks. In GII, fixation with adhesive was done in approximately the same number of focal points as in GI. In GII, after the fixation of the gland, the intra-abdominal pressure was dropped from 14 mmHg to 6–8 mmHg and afterwards the peritoneum was fixed with glue. After that, we released the gas from the abdomen and after 5 minutes we again made pneumoperitoneum at 8 mmHg and

performed the inspection of the success of fixation of the peritoneum. Analgesic therapy after surgery was the same for all patients: paracetamol 1 gram intravenously 4 times/day on the first day, and paracetamol 500 mg orally 3 times/day for another three days. Patients were discharged on the first postoperative day. We recorded the performance of mesh and peritoneum fixation, the postoperative pain measured by Visual Analog Scale (VAS). We also followed early postoperative complications: haematomas, wound infections and recurrent hernias. Controls were performed on the 1, 6 and 30 postoperativaly. In the statistical analysis we used standard descriptive statistics, one and two-factor analysis of variance, multiple ranking test, median Mod test and Turey test.

Results

The average age of patients was 53.7 years without significant differences in the group. There were four patients with bilateral inguinal hernia, nine with right-sided and seven with left-sided inguinal hernias. There was no difference in the distribution of hernia between the groups. The distribution of hernia size in both groups was similar; 50% of cases were L II or M II, 30% L I or M I, and 20% L III or M III according to the EHS classification. During 30-day follow-up, there were no recurrent hernias, wound infections, and haematomas in both groups. Compared to the parameters tested, the groups were similar (Table 1). Average time of the procedure was 45 minutes in GI and 51 minutes in GII.

In GI, VAS score was 2.1, 1.3 and 0.8 on postoperative day 1, 6 and 30, respectively. In comparison, we recorded lower VAS scores in GII being 2, 0.8 and 0.4 on the postoperative day 1, 6 and 30, respectively (Table 2).

A two-factor analysis of variance showed that there is no statistically significant difference between the two groups. However, the difference between samples in groups, or the time of pain assessment, is statistically significant at $p < 0.0001$ (Table 3). Multiple range test (LSD) and Tukey test confirm that there is no statistically significant difference between the two groups.

A single-factor analysis of variance showed that the difference between the three samples in the first group is not statistically significant. Multiple range test (LSD) showed that only the difference between the first and the third sample in GI is statistically significant. The Mood median test also shows that the difference between all three samples is not statistically significant. However, in this case, there is only about 8% probability that the difference could be random ($p=0.0785011$). A single-factor analysis of variance for GII showed that the difference between the three samples in the second group is statistically significant ($p < 0.0001$, F-ratio 15.6). The difference between the

Table 1. Patients' characteristics by group.

	Group I		Group II	
	n	%	n	%
Hernia inguinalis bilateralis	2	20	2	20
Hernia inguinalis dextra	4	40	5	50
Hernia inguinalis sinistra	4	40	3	30
L I, M I (< 1.5cm)	3	30	3	30
L II, M II (1.5–3cm)	5	50	5	50
L III, M III (> 3 cm)	2	20	2	20
haemathoma	0	0	0	0
wound infection	0	0	0	0
recurrence	0	0	0	0
mesh fixation	10	100	10	100
peritoneum closure	10	100	10	100

Table 2. Postoperative pain measured by visual analogue scale (VAS) – distribution by group and time.

Patient number	GI			GII		
	Day 1	Day 6	Day 30	Day 1	Day 6	Day 30
1	3	2	1	2	1	0
2	2	0	0	2	0	0
3	1	0	0	2	1	1
4	0	0	0	2	0	0
5	0	0	0	2	1	0
6	4	1	1	3	2	1
7	3	2	2	3	1	1
8	3	3	2	2	1	0
9	2	2	1	2	1	1
10	3	3	1	0	0	0
average	2.1	1.3	0.8	2	0.8	0.4

Table 3. Two-factor analysis of variance for both groups.

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:group	1.66667	1	1.66667	1.90	0.1732
B:days	22.0333	2	11.0167	12.58	0.0000
RESIDUAL	49.0333	56	0.875595		
TOTAL (CORRECTED)	72.7333	59			

first and the second sample, and between the first and the third sample in the second group is statistically significant. The difference between the second and the third sample is not statistically significant. The Mood Median test shows that the difference between all three samples in the second group is statistically significant ($p < 0.0001$). The variance analysis shows that the difference between all six samples from both groups of observations together is statistically significant ($p < 0.0001$). Multiple range tests show that out of the fifteen possible comparisons, the difference is statistically significant between seven sample comparisons and is not significant in nine comparisons. The test also shows that the pain in the VAS scale is the same in patients who are in GI at 30 days as in GII at 6 days. We recorded less pain when using adhesive, therefore patients with adhesive technique are recovering much faster (Table 4, Figure 1).

Conclusions

The NBCA adhesive is a perfect method for fixing the mesh and peritoneum in TAPP reparation. The method is simple, safe and feasible. Adhesive techniques are better than penetrant fixation techniques for the prevention and reduction of postoperative chronic pain after TAPP repair.

Key words

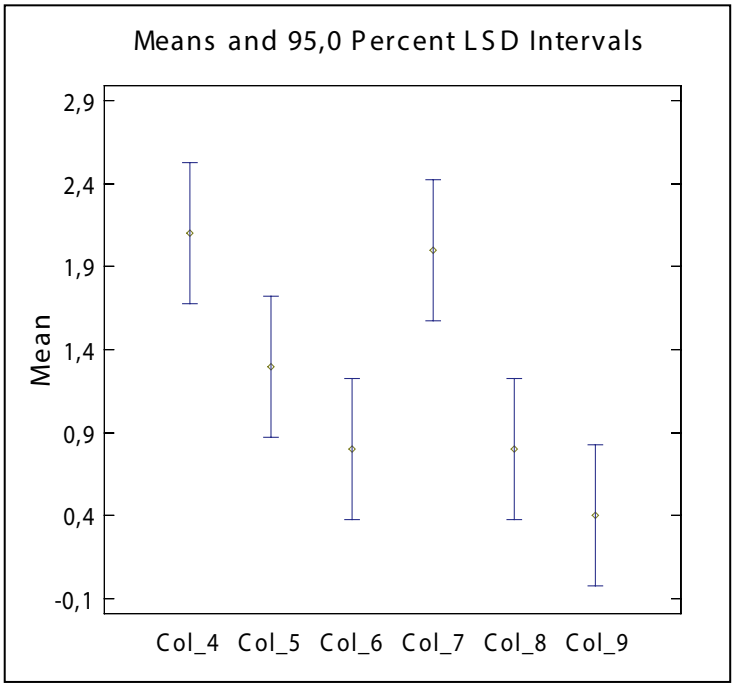
TAPP, mesh fixation, adhesive technique, cyanoacrylate, peritoneal closure, pain

Table 4. Multiple Range test for six samples at the same time.

	Count	Mean	Homogeneous Groups
GII 30 day	10	0.4	X
GI 30 day	10	0.8	XX
GII 6 day	10	0.8	XX
GI 6 day	10	1.3	XX
GII 1 day	10	2.0	X
GI 1 day	10	2.1	X

Contrast	Sig.	Difference	+/- Limits
GI 1day-GI 6 day		0.8	0.8506
GI 1 day – GI 30 day	*	1.3	0.8506
GI 1 day – GII 1day		0.1	0.8506
GI 1 day – GII 6 day	*	1.3	0.8506
GI 1 day – GII 30day	*	1.7	0.8506
GI 6 day – GI 6 day		0.5	0.8506
GI 6day- GII 1day		-0.7	0.8506
GI 6day- GII 6 day		0.5	0.8506
GI 6 day- GII 30day	*	0.9	0.8506
GI 30day – GII 1 day	*	-1.2	0.8506
GI 30 day- GII 6day		0	0.8506
GI 30day- GII 30day		0.4	0.8506
GII 1 day – GII 6day	*	1.2	0.8506
GII 1day- GII 30 day	*	1.6	0.8506
GII 6day - GII 30day		0.4	0.8506

Figure 1. LSD multiple ra1nge test.



TAPP Approach for a Recurrent Inguinal Hernia

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Backgrounds

International guidelines for groin hernia management state that for recurrent inguinal hernias a laparo-endoscopic repair is strongly recommended after a failed anterior tissue or Lichtenstein repair; that an anterior repair is recommended after a failed posterior repair; and that an expert surgeon should repair a recurrent groin hernia after a failed posterior and anterior repair, technique selection depending on patient and surgeon specific factors.

Methods

We performed a retrospective analysis of surgical techniques used at our surgical department in the 5-year period 2014–2018. In the analysis we only included patients whose data we could retrieve at six months or more after surgery. We evaluated the demographic properties, recurrence rate, chronic pain and postoperative complications in this patient group. Follow-up period was six months or more.

Results

In the 5-year period we operated 136 patients with recurrent inguinal hernias with either open or TAPP approach, TEP was not performed. We found that through these years an increasing portion of recurrent groin hernias were approached with TAPP with good results. All surgeons at our department are technically capable of performing an endoscopic repair. Detailed results shall be presented at the 14th Endoscopic Surgical Conference of Slovenia.

Conclusions

We found that in cases of recurrent inguinal hernia after a failed open approach, a TAPP approach is most suitable when patient is fit for the laparo-endoscopic approach. In rare cases of a recurrent inguinal hernia after a laparoscopic approach, we found that an open technique was appropriate.

KEY WORDS

recurrent inguinal hernia, TAPP approach, open approach, recurrence, chronic pain

Laparoscopic Inguinal Hernioplasty (TAPP) in General and Teaching Hospital Izola – Our 5-Years Analysis

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Backgrounds

Laparoscopic hernia repair is gaining its popularity among surgeons all over the world. The results found in the literature regarding superiority of laparoscopic technique compared to Lichtenstein technique are controversial. Although Lichtenstein repair still remains the "gold standard" for unilateral primary groin hernia, we use laparoscopic technique for all types of groin hernias. The relative simplicity and efficiency of the laparoscopic TAPP technique lead us to use it whenever it is presumed the results of the latter technique would bring better results. The first laparoscopic inguinal hernioplasty at our institution was performed in 1994, but the technique was reserved for selected patients only. In the next years, the trends all over the world were leaning towards Lichtenstein repair and so was at our institution. However, in the period of 1994–2002, 201 hernias were treated laparoscopically. The trend changed in the last few years and more and more hernias are operated laparoscopically. We present the analysis of our last 5-years of laparoscopic TAPP inguinal hernioplasty.

Methods

Our retrospective analysis included 318 patients that were operated using laparoscopic TAPP technique in the period of 2014–2018. We wanted to find out the actual share of the technique compared to Lichtenstein repair (the last three years). To all of our patients (except obese) both of the techniques for inguinal hernia repair were offered, many of them still decided for Lichtenstein repair especially under local anaesthesia. Most of the bilateral hernias, recurrent hernias (after open repair), primary hernias in non-obese were then operated using laparoscopic technique.

Results

As seen from the Table 1 and Figure 1, absolute number and relative share (Figure 2) of the laparoscopic TAPP at our institution is rising but may be slowly approaching plateau. The reasons for that are the fact that not every patient is suitable for laparoscopic hernia repair – in very obese patients not only the surgery is more difficult but the proper positioning of the mesh to cover all of the critical points in order to reduce displacement is sometimes impossible. Besides, there are also other factors – some patients prefer local anaesthesia, some are refused from the general anaesthesia due to severe chronic illness, the waiting list for the laparoscopic repair is a little longer and there are strangulated hernias, who are still mostly treated with open repair.

Conclusions

Our analysis showed that the share of the laparoscopic TAPP hernioplasty is rising. The reasons for that are less postoperative pain and faster recovery. Also, the simplicity of the technique, short operating time, similar recurrence rate, low incidence of life threating complications and better cosmetic results. Careful patient selection for the best results is crucial.

Table 1. Hernia repairs through the observing period.

	2014	2015	2016	2017	2018
Lap. TAPP	8	24	69	114	172
Lichtenstein			238	221	208
% laparoscopic			22.5	34	45.3

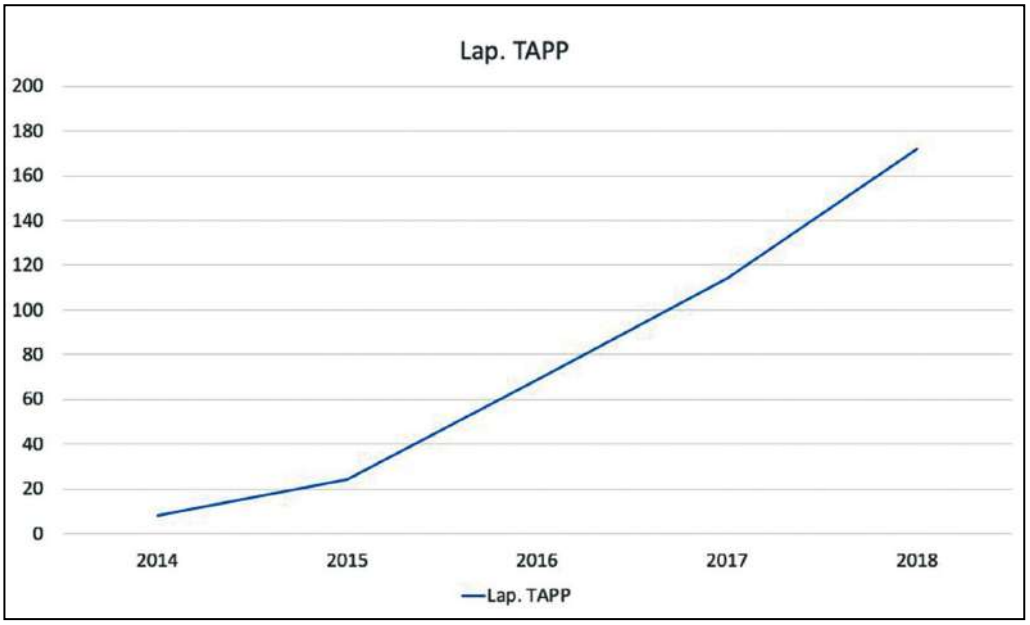

Figure 1. Absolute number of laparoscopic TAPP repairs.

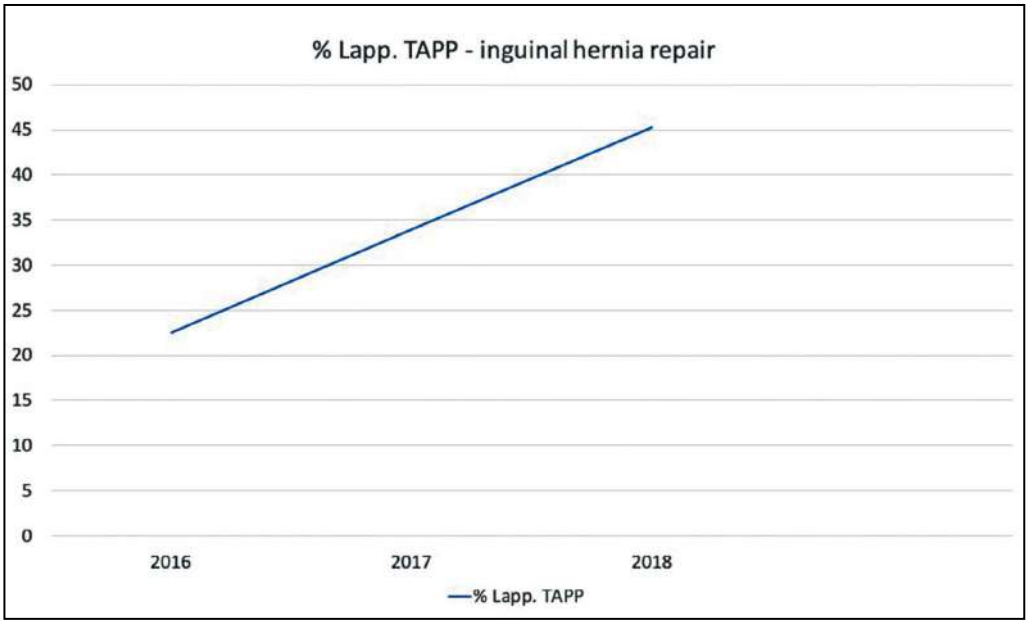

Figure 2. Percentage of laparoscopically treated inguinal hernias.

Key words

inguinal hernia repair, TAPP

Treatment of Inguinal Hernia – Laparoscopic Method and Tension-Free Hernioplasty at General Hospital Celje

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Backgrounds

Years have passed since laparoscopic methods for inguanal hernia repair (TEP, TAPP) were introduced and first used in Slovenia. Still, in the years that followed, interest in laparoscopic method gradually declined and it was recommended primarily for the repair of recurrent and bilateral hernias. Tension-free hernioplasty (Trabucco and Lichtenstein) became the treatment of choice. Nonetheless, a number of reports can be found in the literature about the successful use of these methods, despite the widely accepted view that for most of the inguinal hernias tension-free hernioplasty is the most appropriate technique.

Methods

In the years from 2010 to 2018, 2912 patients were treated in our facility using classical methods. In addition to the open tension-free hernioplasties, we started operating with laparoscopic technique years ago. Initially, we used the TEP method by which 48 patients were treated. From 2012 we started using the TAPP method and 112 patients were treated using that tehnique by the end of 2018. During the same period, 2335 tension-free operations were performed (Trabucco 1204 patients, Lichtenstein 1130 patients). Of the 112 patients that underwent TAPP surgery, 99 patients had unilateral hernia and 13 had bilateral hernias, among them 22 patients presented with recurrent hernia. The average age of patients was 48.8 years, 7% were women and 93% were men. We did not have major complications during and after the surgery (one fistula, three haematomas, 2.6% laparoscopic recurrence)

Results

Intraoperative complications included one bleeding, which needed to be stopped by open technique. After surgery, swelling and hematoma in the area of the operative wound were observed, and recurrance after the laparoscopic method was observed in three cases, representing 2.6%. Patients operated laparoscopically were on average hospitalized for 2.6 days.

Conclusions

The treatment of inguinal hernia is everyday work of the surgeon and one of the most common operations in general hospitals. Despite being a relatively routine and regular operation, we occasionally encounter serious complications. Laparoscopic surgery, regardless of technique (TEP or TAPP), is a technically demanding method that has its own learning curve and requires time. The lack of free space in the operating room, the cost-effectiveness, and the lack of surgeons in our institution are the reasons why we mostly operate using open, tension-free tehniques.

KEY WORDS

laparoscopic tension-free hernioplasty, TEPP, TAPP, procedure

Laparoscopic Groin Hernia Repair in General Hospital Ptuj

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Backgrounds

In General Hospital Ptuj, approximately 400 patients undergo groin hernia repair annually. We started laparoscopic TAPP technique in 2013. The choice of the surgical procedure depends whether the hernia is primary or recurrent, unilateral or bilateral and also upon patients age, symptoms, hernia size and patient's wishes. The aim of this analysis was to collect data and to present laparoscopic treatment of groin hernia in General Hospital Ptuj.

Methods

A retrospective analysis of all patients who underwent laparoscopic groin hernia repair up to date was conducted. Data about hernia type and postoperative complications were collected.

Results

Between May 2013 and December 2018, TAPP procedure was performed in 210 patients. These included 141 unilateral hernias (67%), 39 bilateral hernias (19%), 28 recurrent unilateral hernias (13%) and one recurrent bilateral hernia (0.5%). Postoperative pain up to one month after surgery was recorded in 24 patients (11.4%), among which eight patients (3.8%) still suffered from groin pain after three months. In nine patients a small haematoma after the surgery was observed, which was treated conservatively. In one patient haematoma evacuation was performed. Hernia recurrence was observed in one patient, while three patients underwent US examination which was suggestive for recurrent hernia, but clinical examination of the groin was negative, therefore we decided for watchful waiting. In nine patients (4.3%) we observed incongruence between clinical examination, US and intraoperative findings.

Conclusions

Our results indicate that laparoscopic technique for groin hernia repair is safe. The most common complication was postoperative pain, but the incidence was lower when compared to average.

KEY WORDS

inguinal hernia, laparoscopic surgery, TAPP

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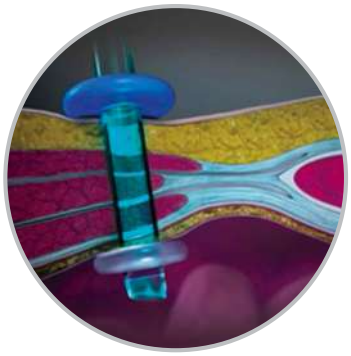

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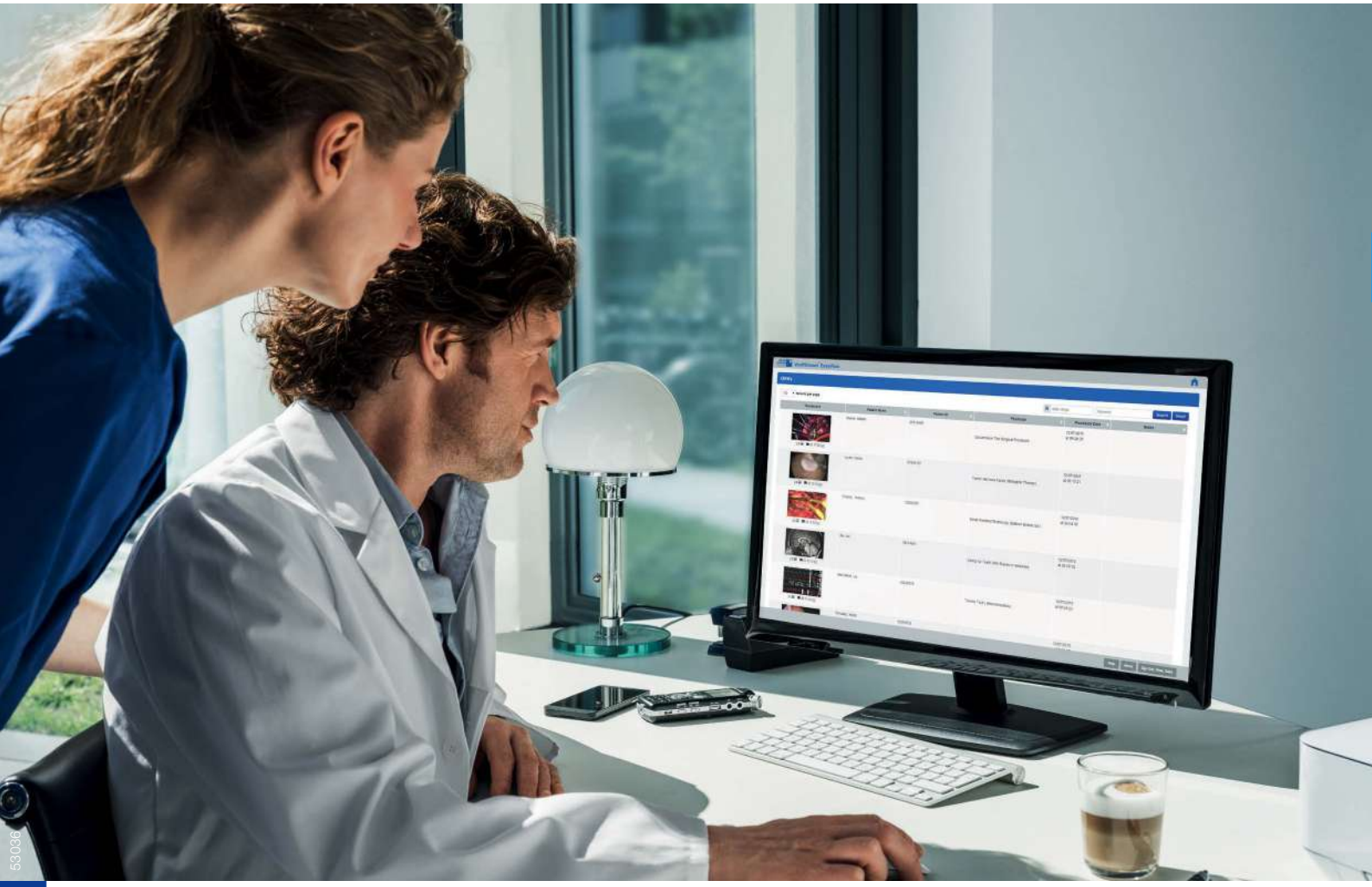

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Medical Content Management

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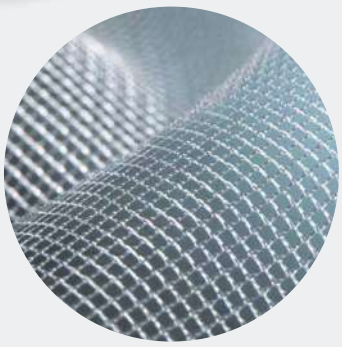

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