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South-East European Endo-Surgery (SEEES) is a surgical journal of Bosnia and Herzegovina, founded in 2022. The intention and goal of this journal is for new ideas, knowledge and techniques from the field of endoscopic surgery and related disciplines to be available to surgeons in Bosnia and Herzegovina, but also throughout South East Europe. The journal publishes reviewed articles in the following surgical fields: abdominal, thoracic and cardio- surgery, plastic and reconstructive surgery, pediatric surgery and neurosurgery, urology and anesthesiology. However, SEEES will also publish articles on open surgery in order to promote medical research and writing in South East Europe, as well as more advanced surgical techniques and technologies.

In addition, SEEES publishes letters to the editor, reviews of surgical books, comments on published articles, calendars of surgical congresses and meetings, and other information from the field of surgery and related disciplines.

EDITORIAL CONTACT INFORMATION

South-East European Endo-Surgery,
Department of Surgery, University Clinic Center Tuzla, Trnovac bb, 75000 Tuzla,
Bosnia and Herzegovina.
Contact person: Samir Delibegović
Tel: + 387 35 303 279 ; Email: delibegovic.samir@gmail.com

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EDITORIAL

The Potentially predatory function of multicentre studies – HYPPO study.

Samir Delibegovic[1,2]

Received: 7 May; Accepted: 11 June 2025.

ABSTRACT

Over the last two decades multicentre trials have been becoming increasingly common in medical research due to their many advantages. However, the successful conduct of multicentre, prospective studies requires careful organization, coordination, motivated staff in the centres taking part, and an experienced centre. Publication of the results of studies is the most important and most complex product of multicentre studies. Collaborators must be aware from the outset of the principles that are applied in determining authorship. If authorship is not regulated, then multicentre studies may have a predatory function.

Keywords: multicentric study, authorship, coordination.

Introduction

Over the last two decades multicentre trials have been becoming increasingly common in medical research due to their many advantages. However, they are much more complex to conduct than individual studies[1]. The reason for their increasing use is the possibility of accelerating the process of data collection and covering a wider population[2].

Other major advantages of multicentre trials include the fact that they are highly generalizable, less prone to confounding or bias related to idiosyncratic local practices, and capable of recruiting participants quickly and a potentially larger sample size.[3]

However, the successful conduct of multicentre, prospective studies requires careful organization, coordination, motivated staff in the centres taking part, and an experienced centre[4].

[1] Clinic for Surgery, Tuzla University Clinical Center, Tuzla, Bosnia and Herzegovina
[2] Faculty of Medicine, University of Tuzla, Tuzla, Bosnia and Herzegovina

Samir Delibegović
E-mail: delibegovic.samir@gmail.com
ORCID 0000-0003-0525-3288

Management of multicentre studies

Multicentre studies demand close collaboration between the components of the multicentre study, field sites, a coordination centre, resource centres and study committees. With the introduction of various internet platforms, software and applications, such as Zoom conferences, this process has become easier.

Coordinating centres are often based at universities or government agencies, or they are run by commercial organizations for clinical research[5].

The most common types of multicentre studies are: a single study of a single disease, multiple studies of a single disease, and multiple studies of multiple diseases.

Publication of multicentre studies and authorship

Publication of the results of studies is the most important and most complex product of multicentre studies[6], where the question of authorship also arises. The practical and ethical issues related to multicentre studies are also very significant[7]. The International Committee of Medical Journal Editors (ICMJE) requires all authors, including all members of the group of authors, to be active contributors to the study, included in the development of the manuscript, to approve the final content, and accept responsibility for its publication.

In order to ensure transparency and fairness, studies with a large number of associates must have authorship guidelines that are explicit from the outset of the trial[6]. Therefore, it is very useful to draw up an authorship agreement between the participants in a multicentre study.

There are various models for determining group authorship: the DI Giusto points system, The Center for Healthy Communities authorship scale, the National Psychosis Research Framework guidelines, Ranking method by Bhopal et al., Authorship guidelines by Erlen et al., Rennnie-Yank Emanuel descriptive system, Canchild author guidelines, Heart Failure: A controlled trial investigating Outcomes of Exercise Training (HF-Action) scoring system. These different models demonstrate the complexity of determining authorship.

The corporate model of authorship is one in which an organization or group is responsible for authorship rather than an individual. Therefore, no authors are mentioned apart from the organization or corporation. This model is not good because it conceals the true contribution of each individual, who will not receive true credit for their work. It is an unfair model, especially when the collaborators are not members of the corporation, because in that case there is no stimulation for collaborators in the trial, who only collect data for the corporation or organization. Collaborators may contribute only once before they see the predatory characteristics of the project.

Collaborators must be aware from the outset of the principles that are applied in determining authorship. However, if none of these models are used, and authorship is not regulated, then multicentre studies may have a predatory function, consuming their collaborators, who merely collect data for the coordinating centre, as in the corporate model.

The HIPPO Project

An example of this predatory behaviour is a project by the University of Birmingham, Global Health. Although the corporate model of authorship was mentioned, even participation in writing articles did not lead to recognition of authorship, but results and publications were blatantly appropriated. The project even stated: "All collaborators will be listed as PubMed-citable collaborators', this did not happen. However, members of the corporation are listed as authors, which in a true corporate model of authorship cannot be the case.

Why would individuals in developing countries work and send data to the University of Birmingham and participate in the HIPPO Project? This conduct is reminiscent of the neo-colonial approach, where none of the results from collaborators in developing countries have their authorship recognized. The responsible body is a corporation, a University in the United Kingdom,

or rather one of its institutes, hiding behind the hypocritical title Global Health, and the articles produced serve its PhD students to graduate, whilst surgeons from developing countries around the world collect data for them.

For this reason, surgeons from Bosnia and Herzegovina have decided to discontinue their collaboration in the Global Health project.

Disclosure statement

The authors report there are no competing interest to declare.

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REVIEW

The Modern approach to choledocholithiasis

Zlatan Mehmedovic[1]

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ABSTRACT

Choledocholithiasis, defined as the presence of calculi within the common bile duct, represents a frequent clinical challenge in surgical and endoscopic practice. Although gallstone disease is common, concomitant bile duct stones are detected in a clinically significant proportion of patients, particularly with advancing age. Clinical manifestations range from biliary colic to life-threatening complications, such as acute pancreatitis and cholangitis. This narrative review provides an expanded overview of contemporary diagnostic and therapeutic strategies, emphasizing individualized and multidisciplinary patient management.

Keywords: holedocholithiasis, common bile duct stones, ERCP, MRCP, endoscopic ultrasound.

Introduction

Choledocholithiasis refers to the presence of gallstones within the common bile duct and represents a clinically significant manifestation of gallstone disease. While most gallstones remain confined to the gallbladder, migration into the bile duct may occur spontaneously or during surgical manipulation. The prevalence of choledocholithiasis increases with age and is higher in patients with long-standing symptomatic cholelithiasis[1]. The clinical spectrum of choledocholithiasis is broad, ranging from transient biliary colic to severe and potentially life-threatening complications, such as acute pancreatitis and ascending cholangitis. In patients with suspected or confirmed bile duct stones, timely risk stratification is essential, as delayed biliary

[1] Clinic for Surgery, University Clinical Center Tuzla Bosnia and Herzegovina.

Zlatan Mehmedovic
Email: zmehmedovic@hotmail.com
ORCID: 0000-0001-6564-3793

decompression in severe cases may lead to significant morbidity, while selected patients may benefit from single-stage endoscopic or surgical management strategies[2,3]. Imaging plays a central role in diagnosis and therapeutic decision-making[4].

Pathophysiology and stone characteristics

Bile duct stones may be classified as primary or secondary according to their origin and underlying pathophysiological mechanisms. Primary stones develop de novo within the biliary tree and are typically associated with biliary stasis, chronic infection, or anatomical abnormalities of the bile ducts[1,4]. These stones are more frequently encountered in elderly patients and in populations with a higher prevalence of biliary tract infections. In contrast, secondary bile duct stones originate in the gallbladder and migrate into the common bile duct, accounting for the majority of cases in Western populations[5].

The stones' characteristics, such as size, number, and composition, have important clinical implications. Smaller stones may pass spontaneously, resulting in transient obstruction and fluctuating biochemical abnormalities, whereas larger or impacted stones are more likely to cause persistent obstruction, acute cholangitis, or pancreatitis[2,6]. Recognition of these differences is essential for selecting the appropriate diagnostic and therapeutic strategy.

Management of common bile duct stones

Management strategies should be guided by accurate risk stratification, integrating clinical, biochemical, and imaging findings. Patients with clear evidence of biliary obstruction and infection require urgent biliary decompression[2,4]. Endoscopic retrograde cholangiopancreatography (ERCP) remains the most commonly employed therapeutic modality, allowing both stone extraction and biliary drainage. However, given its invasive nature and potential complications, ERCP should be reserved primarily for patients with a high likelihood of bile duct stones or confirmed stones on non-invasive imaging[3,4]. In centers with appropriate expertise, laparoscopic common bile duct exploration offers an effective surgical alternative, enabling single-stage management in conjunction with cholecystectomy[3].

Diagnostic imaging in suspected choledocholithiasis

Non-invasive imaging modalities play a pivotal role in the evaluation of patients with an intermediate probability of choledocholithiasis. Magnetic resonance cholangiopancreatography (MRCP) allows detailed visualization of the biliary tree without exposure to ionizing radiation or iodinated contrast agents, making it particularly suitable for diagnostic purposes[4].

Endoscopic ultrasound provides even higher sensitivity for detection of small bile duct stones and biliary sludge, especially in cases where MRCP findings are inconclusive[4,5]. Although EUS is minimally invasive, it remains highly operator-dependent and may not be universally available. The selective use of MRCP or EUS enables accurate confirmation or exclusion of bile duct stones, thereby reducing unnecessary ERCP procedures and minimizing procedure-related morbidity[5].

Endoscopic versus surgical management

Endoscopic and surgical approaches to the management of bile duct stones should be viewed as complementary rather than competing strategies. Endoscopic retrograde cholangiopancreatography is widely available and familiar to most clinicians, allowing effective stone extraction and biliary drainage in a single session. However, ERCP is associated with procedure-related complications, including pancreatitis, bleeding, and perforation, which must be considered when selecting patients for intervention[3,4].

Surgical management, most commonly laparoscopic common bile duct exploration, offers the advantage of single-stage treatment when performed in conjunction with cholecystectomy. This approach may reduce hospital stay and avoid repeated anesthesia, but it requires advanced surgical expertise and appropriate equipment. Consequently, the optimal treatment strategy should be individualized, and based on the patient's characteristics, the stone burden, and institutional experience[3,7]. Intraoperative near-infrared fluorescence imaging using indocyanine green (ICG) has emerged as a useful adjunct in the assessment of biliary anatomy during minimally invasive surgery. ICG fluorescence enables real-time visualization of the extrahepatic bile ducts and may facilitate identification of critical biliary structures, thereby potentially reducing the risk of bile duct injury. Although ICG does not directly detect bile duct stones, it can support safer surgical decision-making during cholecystectomy and bile duct exploration, particularly in cases with complex or unclear anatomy[8].

The timing of interventions

The timing of diagnostic and therapeutic interventions is a critical determinant of outcome in patients with choledocholithiasis. In the presence of acute cholangitis, early biliary decompression is essential and should not be delayed for additional diagnostic testing, as delayed intervention is associated with worse clinical outcomes[2,4].

In clinically stable patients without signs of infection, a more measured approach may be appropriate. Delaying invasive intervention in favor of non-invasive imaging allows for confirmation of persistent obstruction and helps avoid unnecessary procedures. Nevertheless, prolonged delays in definitive management may increase the risk of recurrent symptoms or complications, underscoring the importance of close clinical monitoring and timely reassessment[4,5].

Multidisciplinary approach

The management of choledocholithiasis increasingly relies on close collaboration between surgeons, gastroenterologists, radiologists, and anesthesiologists. A multidisciplinary approach facilitates integration of clinical findings, imaging results, and procedural expertise, enabling selection of the most appropriate diagnostic and therapeutic pathway for each patient[3,4].

Such collaboration is particularly valuable in complex clinical scenarios, including patients with altered anatomy, severe pancreatitis, or significant comorbidities. Development of institution-specific protocols through multidisciplinary consensus may further enhance consistency of care and optimize patient outcomes[8,9].

Special clinical situations

Choledocholithiasis associated with acute pancreatitis

Gallstone-induced acute pancreatitis frequently involves transient bile duct obstruction. Patients with concomitant cholangitis require urgent endoscopic intervention[6,10]. In contrast, patients with improving clinical and biochemical parameters often experience spontaneous stone passage and may be managed conservatively, with MRCP or EUS guiding the need for delayed intervention[10].

Choledocholithiasis after cholecystectomy

Choledocholithiasis may occur after cholecystectomy due to retained stones, overlooked stones, or de novo formation within the bile duct. Diagnostic evaluation can be challenging, as physiological bile duct dilation is common following cholecystectomy, particularly in elderly patients. Advanced imaging modalities are therefore recommended to confirm the presence of bile duct stones before invasive treatment is undertaken[9,11].

Table 1. Clinical approach to suspected choledocholithiasis

Clinical scenario	Estimated likelihood of CBD stones	Preferred diagnostic or therapeutic approach
Clear biliary obstruction, cholangitis	High	Urgent biliary decompression, most commonly by ERCP
Persistent cholestasis without infection	High	Endoscopic or surgical bile duct exploration
Equivocal laboratory and imaging findings	Intermediate	MRCP or EUS
Normal liver tests and no duct dilation	Low	Proceed directly to cholecystectomy
Post-cholecystectomy biliary symptoms	Variable	MRCP or EUS

Conclusion

Choledocholithiasis represents a common yet complex clinical condition requiring nuanced and individualized management. Advances in diagnostic imaging and minimally invasive therapeutic techniques have increased the treatment options available, shifting emphasis toward patient-centered and expertise-driven decision-making. Accurate risk stratification, appropriate timing of intervention, and effective multidisciplinary collaboration remain central to achieving optimal outcomes[3,4,8].

Disclosure statement

The authors report there are no competing interest to declare.

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ORIGINAL ARTICLE

The advantages of the three-port combined technique for laparoscopically assisted extracorporeal base ligation in appendicitis in children

Kenan Karavdic[1], Asmir Jonuzi[1], Nadzida Dziho[1], Alena Firdus[1], Emir Milisic[1], Azra Karamustafic[1], Enis Goralija[1]

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ABSTRACT

Background: Laparoscopic appendectomy is the treatment of choice for acute appendicitis. The optimal technique of appendiceal stump closure is still under discussion because it is assumed to affect the occurrence of complications. The three-port combined technique with laparoscopically assisted extracorporeal base ligation (mesoappendix hemostasis performed intra-abdominally and the appendix ligated extra-abdominally) represents a novel technique with which to ligate the appendiceal stump following laparoscopic appendectomy. We compared this combined technique with the appendix stump treatment technique using an endoscopic loop, for complicated and uncomplicated appendicitis.

Material and methods: In the period from January 1, 2020 to December 31, 2024, 628 patients under the age of 18 were operated on for appendicitis at the Clinic for Pediatric Surgery of the Clinical Center of the University of Sarajevo, 430(68.5%) with open appendectomy and 198(31,5%) with laparoscopic appendectomy We divided all the patients into two groups, group A with 102 patients who underwent surgery with a combined laparoscopic method, and group B where the base of the appendix was closed with an endoscopic loop (95 patients).

Results: 198 patients underwent laparoscopic surgery, of which 123 (62%) were boys and 75 (38%) girls. Of these 198 patients who underwent laparoscopic surgery, 102 (52%) were treated using laparoscopically assisted extracorporeal ligation of the base of the appendix, 80 (40%) patients with one endoloop, 15 (8%) with 2 endoloops and only one patient with 1 (0.5%) hem-o-lok and an endoloop. Of the 198 patients who were operated laparoscopically, 108 (54%) had complicated appendicitis, 59 (30%) uncomplicated appendicitis and 31 (16%) chronic appendicitis. The average duration of surgery for patients treated with the combined method was 58.61 minutes and with endoscopic loops 69.41 minutes. The average length of hospitalization for patients treated with the combined method was 3.96 days and with endoscopic loops 4.59 days.

Conclusions: The three-port combined technique for laparoscopically assisted extracorporeal base ligation of the appendix is a safe, useful, and cost-effective alternative to endoscopic loops, with the advantages of less manipulation, fewer complications involving the appendix, and shorter operative times. This technique is particularly acceptable in resource-limited countries.

Keywords: laparoscopy, appendectomy, combined, stump.

[1] Clinic for Pediatric Surgery, Sarajevo University Clinical Center, Bosnia and Herzegovina

Kenan Karavdic
Email: kenan.kv@bih.net.ba
ORCID: 0000-0002-7361-5212

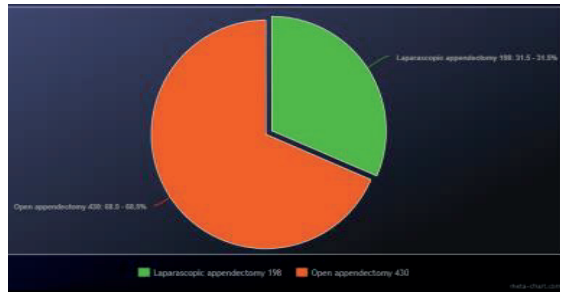
Introduction

Laparoscopic appendectomy is the treatment of choice for acute appendicitis[1,2]. Its advantages include a shorter hospital stay, earlier return to normal activity, and fewer wound infections. In traditional open appendectomy, the appendiceal stump is fixed and usually inverted into the cecum, but this is omitted in laparoscopic appendectomy, and the stump is closed according to the surgeon's preference. Ligation of the mesoappendix in open surgery has also been replaced by electrocautery in laparoscopic appendectomy. Stump closure can be achieved either through ligature techniques or mechanical devices, with mesoappendix division by simple electrocautery or mechanical devices. The optimal technique for appendiceal stump closure is still under discussion because it is assumed to affect the occurrence of intra-abdominal infection. Endoloops and endostaplers are the most commonly applied techniques for laparoscopic appendectomy[3]. We recently reported that closure of the appendiceal stump using a combined technique of laparoscopically assisted extracorporeal base ligation instead of endoloops reduces the rate of complications. There are a number of recognised methods for securing the base of appendix, and a 2017 Cochrane review of uncomplicated cases found insufficient evidence to draw any conclusions regarding any recommendation of one method over another.

Material and methods

In this retrospective cohort study, we compared the outcomes of patients treated using the combined technique of laparoscopically assisted extracorporeal base ligation versus endoscopic loops for appendicitis. In the period from January 1, 2020 to December 31, 2024, 628 patients under the age of 18 underwent surgery for appendicitis at the Clinic for Pediatric Surgery of the Clinical Center of the University of Sarajevo: 123 (62%) boys ,75 (38%) girls. Four hundred and thirty (68.5%) underwent open appendectomy and 198 (31.5%) laparoscopic appendectomy (Figure 1).

We divided all the patients into two groups, group A of 102 (52%) patients who underwent surgery using the combined laparoscopic method, and group B of 95 patients (48%) in whom the base of the appendix was closed with endoscopic loops (Figure 2).



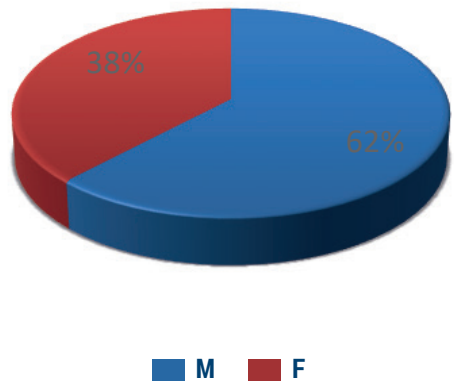


Figure 1. Presentation of open (68.5%) and laparoscopic appendectomies (31.5%).

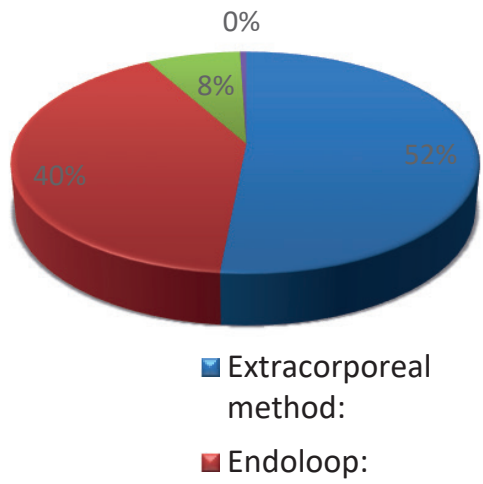


Figure 2. The relationship between the treatment of the appendix base with the combined technique (52% of patients) and the endoloop technique (48% of patients).

The patients were further subgrouped into those with complicated and uncomplicated appendicitis. Complicated appendicitis was defined as perforation or necrosis of the appendix, as well as inflammation at the base of the appendix or cecum. All consecutive patients treated with the combined technique of laparoscopically assisted extracorporeal base ligation, or with endoloops were included. Appendectomies were performed according to the surgeon's preference. If postoperative antibiotics were administered, a combination of either amoxicillin/clavulanic acid or ceftriaxone/metronidazole was given. The exclusion criterion was open appendectomy. The primary outcome was the incidence of postoperative intra-abdominal abscesses.

The secondary outcomes were the readmission rate, the reoperation rate, the length of hospital stay, operation costs, and operative time.The operation costs were calculated as follows: the price of an Ethicon ENDOLOOP® Ligature made with PDS® II was 40 EUR. Due to the retrospective nature of the study, written or verbal informed consent was not applicable or necessary.

The surgical procedure

Single-shot antibiotic prophylaxis was administered to all patients 30 to 60 minutes before surgery (amoxicillin/clavulanic acid at 2 g/200 mg for adults and 33 mg/3mg/kg for children <40 kg or ceftriaxone/metronidazole at 2 g/1 g for adults and 50 mg/7.5mg/kg for children <40 kg). An open technique (Hasson) was used to enter the abdomen under direct vision at the umbilicus. Three-port laparoscopic appendectomy was performed with a 10-mm camera (Olimpus) port at the umbilicus and one working port in the left lower quadrant (5mm) for stapled appendectomy and the second above the symphysis (5mm), respectively (Figure 3).

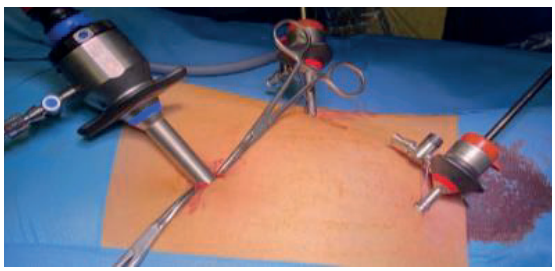


Figure 3. Trocar position (3 port technique).

The pneumoperitoneum was set at a pressure of 12 mmHg. The mesoappendix was divided using a LigaSure device (Covidien) (Figure 4).

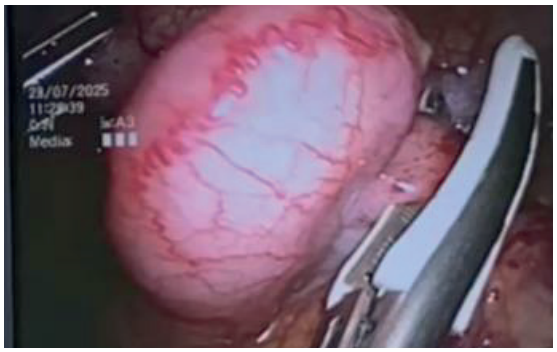
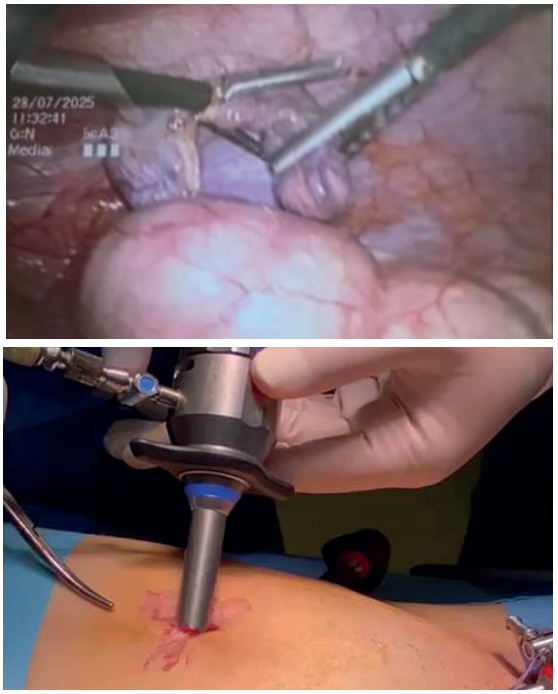


Figure 4. Treatment of the mesoappendix using the LigaSure device.

After that, in patients from group A, the camera (5mm) was moved from the umbilical port to the 5mm port in the left iliac region. Through the umbilical port, the appendix was grasped with a grasper and exteriorized outside the abdominal cavity through the 10mm umbilical port (Figures 5,6).



Figures 5 and 6. Grasping the appendix with a grasper and exteriorizing it from the abdominal cavity through the 10mm umbilical port.

The base of the appendix was extracorporeally ligated using two ligatures, and the appendix resected with the LigaSure device (Figure 7, 8).

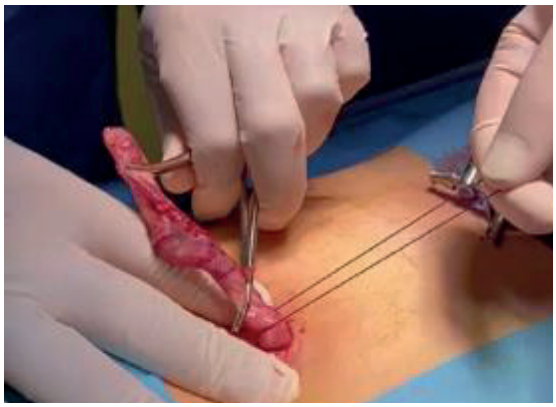


Figure 7. Extracorporeal ligation of the appendix.

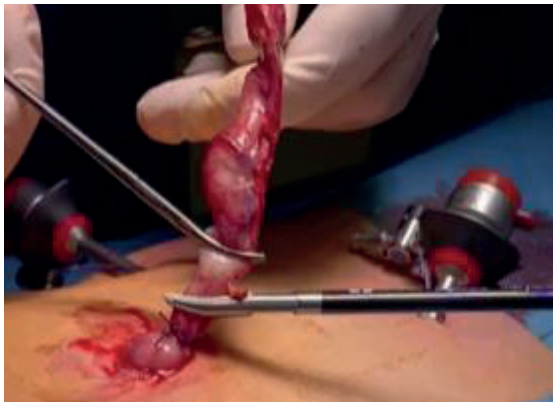


Figure 8. Resection of the appendix with a ligature device.

The base of the appendix and the cecum were placed back into the abdominal cavity. The intracorporeal appearance of the ligated base of the appendix was checked again with the camera, the 3 ports closed and the port entry sites sutured. In patients from group B, after the mesoappendix was divided using the LigaSure device (Covidien), an endoscopic loop was placed at the base of the appendix and the appendix was resected half a centimeter above that location and removed through the 10mm umbilical port (Figure 9).

Results

In total, 198 patients were included in this study. The appendiceal stump was secured using the combined

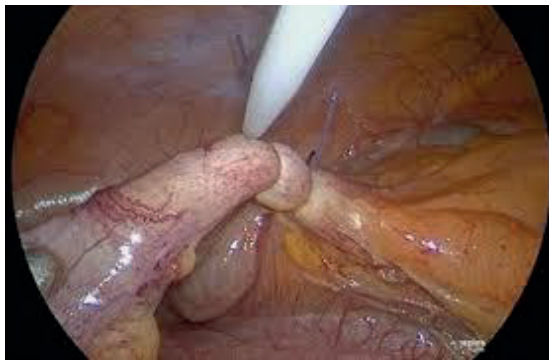


Figure 9. Endoloops in patients from group B.

technique of laparoscopically assisted extracorporeal base ligation in 102 (52%) patients and using endoscopic loops, in 80 (40%) patients with one endoloop, in 15 patients (8%) with two endoloops and in only one patient with (0.5%) a hem-o-lok and an endoloop. Of the 198 patients who underwent laparoscopic surgery, 108 (54%) had complicated appendicitis, 59 (30%) uncomplicated appendicitis and 31(16%) chronic appendicitis (Figure 10).

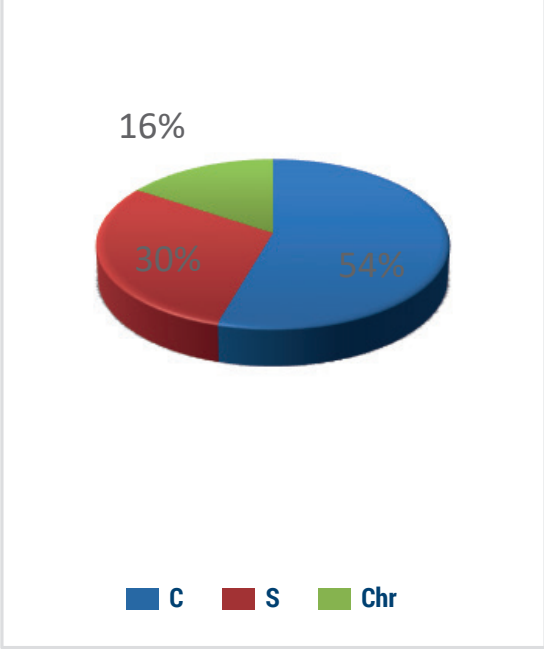
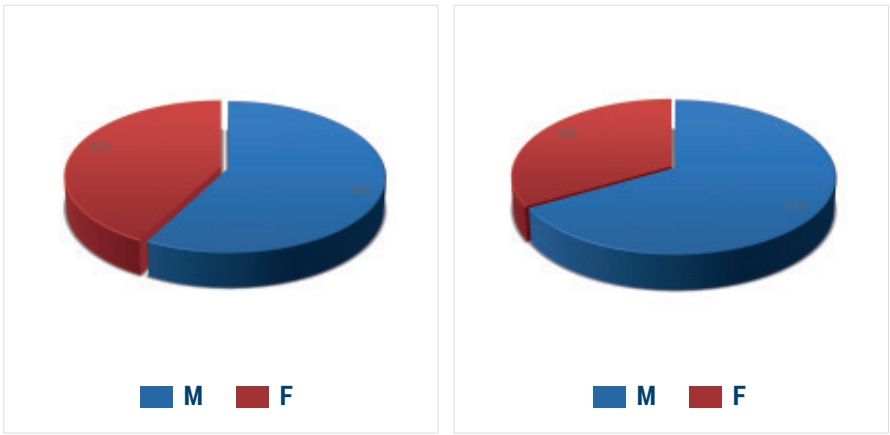


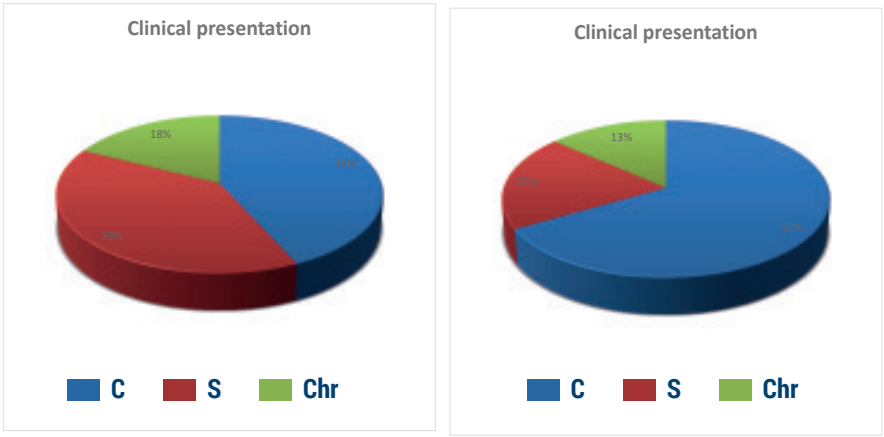
Figure 10. Clinical presentation of patients who underwent surgery for appendicitis.

We analyzed the gender distribution in the examined groups. In group A, 58% were boys and 42% were girls, and in group B, 67% were boys and 33% were girls (Figrues 11 and 12).



Figures 11 and 12. Gender distribution in the examined groups (blue male, red female).

We analyzed the clinical presentation of appendicitis. In group A, 43% had complicated appendicitis and in group B, 67% (Figures 13 and 14).



Figures13 and 14. Clinical presentations in the examined groups (blue complicated, red simple, and green chronic appendicitis).

The patients' characteristics were similar in the groups with the combined technique of laparoscopically assisted extracorporeal base ligation (group A) and those with endoscopic loops (group B) with regard to sex, the American Society of Anesthesiologists' grade, and preoperative white blood count. (Table 1)

Table 1. Patients' characteristics: group A (combined techniques of laparoscopically assisted extracorporeal base ligation) and group B (endoloop)

Patients	Group A n = 102	Group B n = 96	
Age, years	11 (4-18)	11,7 (5-18)	<0.001
Male/female	59/43 (58%/42%)	64/32 (67%/33%)	1.000
ASA grade I–II/III	425/10 (98%/2%)	230/8 (97%/3%)	0.457
WBC count ≥13 × 109/L	13 (10–16)	13 (11–16)	0.760
CRP ≥51 mg/L	14 (4–45)	48 (15–127)	<0.001
Postoperative antibiotic treatment	84 (82,35%)	83 (90,22%)	<0.001
Acute uncomplicatd appendicitis	40 (39%)	19 (20%)	<0.001
Complicated appendicitis	44 (43%)	64 (67%)	<0.001
Chronical appendicits	18 (18%)	13 (13%)	0.229

The patients treated with the combined technique were older than those treated with endoloops (p<0.001), and patients treated with the combined technique had higher preoperative C-reactive protein levels (p<0.001), they had perforated appendicitis more often (p<0.001), and had received postoperative antibiotics more often (p<0.001). Endoloops were used in the majority of patients with complicated appendicitis (endoloop group, nĽ64; combined technique group, nĽ44). The patients' demographics were similar in the two groups, except that perforations occurred more frequently in the endoloop group than in the combined technique group (67% vs. 43%, respectively; pĽ0.024).

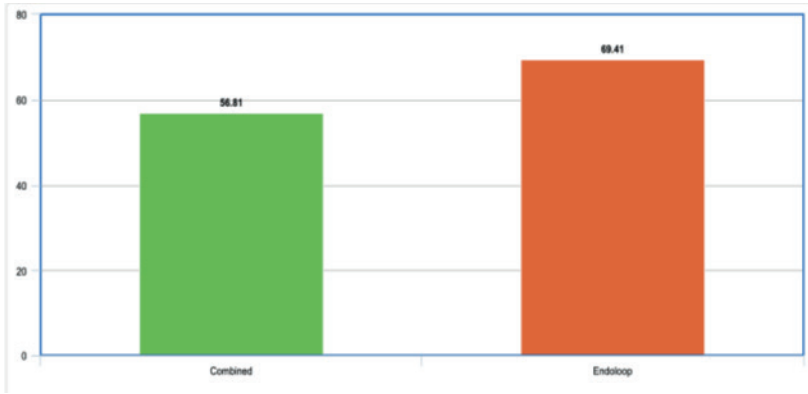


Figure 15. Clinical presentations in the examined groups (blue complicated, red simple, and green chronic appendicitis).

We analyzed the average length of hospitalization. The combined technique (group A) involved a significantly shorter average length of hospitalization of 3.96 days than the endoscopic loop technique (group B) where the average length of hospitalization was 4.59 days (Figures 16).

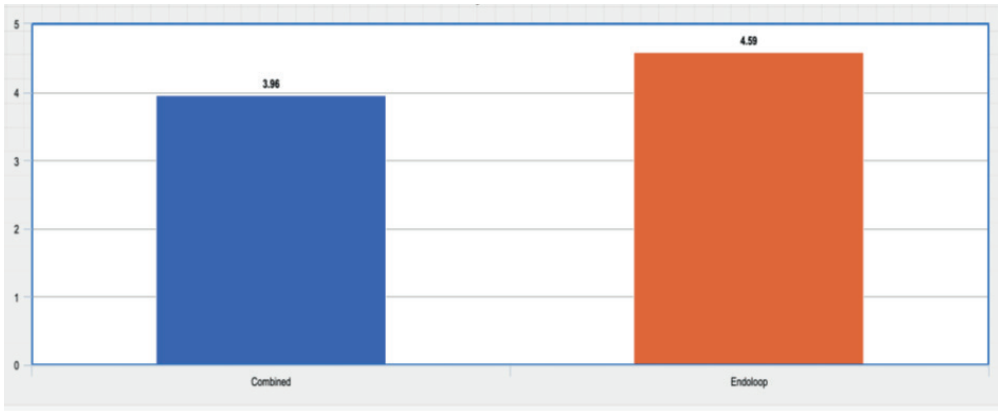


Figure 16. The average length of hospitalization.

Discussion

Different methods are used to close the appendiceal stump, including endoloops, staplers, polymeric clips, and intracorporeal knots. Among these, endoloops and staplers are the most commonly employed[4,5]. Polymeric clips have primarily been used for vessel and tissue ligation, and have been shown to be a safe alternative to endoloops in the treatment of uncomplicated appendicitis with a non-inflamed or only moderately inflamed appendix base measuring <10 mm[6-8]. The handling of polymeric clips is technically simple, resulting in a shallow learning curve and shorter operative time[9,10]. Unlike comparisons between polymeric clips and endoloops, studies assessing appendiceal stump closure with polymeric clips versus staplers are sparse in the literature[11,12].

Our data suggest that the three-port combined technique is not inferior to the endoscopic loop technique, and may also be used safely in patients with perforated appendicitis. The endoloop needs to be tightened for ligation, with the disadvantage that the surrounding tissue may be pinched during the tightening process. Endoscopic loops may be associated with more manipulation of the appendiceal stump, which may increase the possibility of iatrogenic perforation of the appendix and increases the operative time. In this study, we were unable to verify the superiority of the combined technique over the endoloop in laparoscopic appendectomy for uncomplicated appendicitis in terms of shortening the operative time[13]. Stapled appendectomy is expensive, fast and reliable even in cases of inflammation at the base of the appendix[14]. With the exception of an inflamed appendix base, staplers do not seem to be superior to endoloops or polymeric clips and are not recommended for use as standard treatment by many authors[15]. Non-absorbable polymeric clips were reported as a safe,useful and cost-effective method. The advantage of using polymeric clips is that they can be applied precisely to the desired area. The major limitation of the polymeric clip is that it can be difficult to apply to a thick appendiceal base or an appendiceal base with severe and friable inflammation, and the risk of slippage[16]. Closure of the stump of the appendix with a stapler is a simple but more expensive method. Appendectomy with a linear stapler requires a 12-mm trocar for its introduction into the abdominal cavity, which is very often inappropriate in younger children. Metal staples left on the appendiceal stump may cause adhesion-related small bowel obstruction[17].

In a single port approach, the operating telescope is introduced through the umbilical port, and the appendix is grasped through the operating channel of the telescope and brought out along with the port. This approach may be beneficial in early appendicitis, when the appendix and its mesentry is not thick, or in the pediatric age group where the distance

between the umbilicus and the appendicular base is small. This technique requires a surgeon experienced in laparoscopy and it is difficult to control bleeding, in obese patients, and to deal with other associated pathologies. Others have combined the advantages of the operating telescope using the umbilical port with a 5mm suprapubic port, but experience is limited[18].

Two- and three-port laparoscopic assisted open apendicectomy is simple, easy to learn and has the combined advantages of open appendicectomy and full laparoscopy of the abdomen. It can be converted to open appendicectomy very quickly when required, or to a total intracorporeal approach by inserting accessory ports. Compared to the single port approach, it does not require expertise with the operating telescope. The cost is minimized by using a non-disposable port. The overall morbidity is low. There were no specific complications related to this technique and the incidence of port site infection is similar to other approaches of laparoscopic appendicectomy[19].

The percentage of patients undergoing laparoscopic assisted appendicectomy has steadily increased and the conversion rate has decreased over the years. The disadvantages of the laparoscopic procedure are longer operating time and greater cost[20]. One technique that can reduce operating room time and cost is a combination of the laparoscopic and open technique known as the three-port combined techniques of laparoscopically assisted extracorporeal base ligation[21]. This technique allows surgeons to use the advantages of the laparoscopic method including visual diagnosis, less postoperative pain, and a quicker return to work. The laparoscopic-assisted appendectomy requires less operating room time and is less costly than the traditional intracorporeal laparoscopic treatment. In essence, it offers the advantages of both the laparoscopic and the open techniques[22]. Although the present study accurately reflects the daily practice of treating acute appendicitis in our clinic, the study design is a limitation, as this was a single-center, retrospective review in which the surgeon decided on the technique of appendiceal stump closure.

Conclusion

The three-port combined technique with extracorporeal ligation of the appendiceal base is technically relatively easy and quick, especially for pediatric surgeons who are less experienced with intracorporeal suturing.

The three-port combined technique avoids the need for expensive endoloops, staplers, clips or advanced intracorporeal knotting, and involves reduced operative time. It has a short learning curve for surgical trainees and lower costs.

Disclosure statement

The authors report there are no competing interest to declare.

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Author's Contribution

Kenan Karavdic; Data curation, Visualization, Investigation, Writing-Reviewing, Asmir Jonuzi: Data curation, Visualization, Investigation, Nejra Dziho; Conceptualization, Methodology, Emir Milisic; Data curation, Investigation, Azra Karamustafic; Conceptualization, Methodology, Alena Firdus; Data curation, Investigation Writing-Original draft, Enis Goralija: Data curation, Visualization, Investigation.

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PROFESSIONAL PAPER

Clinicopathological predictors of five-year mortality in colorectal cancer patients in the Zenica-Doboj Canton, Bosnia and Herzegovina

Nejla Huseinspahic[1], Savan Kuridza[1], Emir Begagic[2], Andrej Popov[1], Elvir Besic[1]

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ABSTRACT

Aim To identify the clinicopathological factors associated with five year mortality in patients with colorectal cancer (CRC) treated at Cantonal Hospital Zenica, Bosnia and Herzegovina.

Methods A retrospective cohort of 64 consecutively operated CRC patients (2019 2024) was analysed. The baseline variables included age, sex, tumor stage, histology, metastatic burden, local infiltration, and comorbidities. Five year cumulative mortality was the primary outcome. Risk ratios (RR) with 95 % confidence intervals (CI) were calculated by two by two contingency analysis.

Results The cohort comprised 26 women (40.6 %) and 38 men (59.4 %); their median age was 64 years (IQR 58.8–73.0). Eleven patients (17.2 %) died within five years. Mortality was strongly linked to tumor spread and cardiometabolic disease. Any distant metastasis conferred a fifteen fold increase in risk (9/15 vs 2/49; RR 14.7, 95 % CI 3.6–60.8, $p < 0.001$), and the involvement of two or more metastatic sites remained prognostic (RR 5.6, 95 % CI 1.9–16.9, $p = 0.014$). Infiltration of more than two adjacent organs quadrupled mortality (RR 4.4, 95 % CI 1.7–11.6, $p = 0.032$). Hypertension was present in 10 of the 11 deaths, yielding an RR of 12.1 (95 % CI 1.6–88.8, $p = 0.002$). Type 2 diabetes also increased risk (RR 3.5, 95 % CI 1.3–9.6, $p = 0.040$). Patients with three or more comorbid conditions had a nearly four times higher mortality (RR 3.9, 95 % CI 1.3–11.7, $p = 0.027$).

Conclusion The five year death rate in this Bosnian Herzegovinian CRC cohort was driven chiefly by distant metastasis, extensive local invasion, and cardiometabolic comorbidities—especially hypertension and type 2 diabetes. Early detection of metastatic spread and proactive management of vascular risk factors may improve survival in similar settings.

Keywords: colorectal cancer, predictors, mortality rate, comorbidities, recurrence.

[1] Department of Surgery, Cantonal Hospital Zenica, Bosnia and Herzegovina;
[2] Department of Neurosurgery, Cantonal Hospital Zenica, Bosnia and Herzegovina;

Nejla Huseinspahic
Email: nejla.huseinspahic1@gmail.com
ORCID: 0009-0005-0472-1950

Introduction

Colorectal cancer (CRC) is a malignant disease of the colon and rectum, which is a public health problem in terms of morbidity and mortality[1]. CRC is the third most commonly diagnosed cancer and the second leading cause of death in the world[2]. In Bosnia and Herzegovina, CRC is the second most common form of cancer in men and women, after lung and breast cancer, meaning that more than 1,800 people develop the disease each year[3]. The risk factors for the development of CRC can be divided into fixed and variable risk factors. Irreversible risk factors include: age, genetics (estimated to be non-hereditary in 70% of cases and hereditary in 20% of cases), a positive family history of hereditary syndromes, namely: FAP syndrome, Lynch syndrome, Peutz-Jeghers syndrome, Cowden's disease, juvenile polyposis syndrome, and Cronkhite-Canada syndrome, and a positive personal history of inflammatory bowel diseases such as Crohn's disease and ulcerative colitis (which have a 7-11 times higher risk of passing into cancer). Variable risk factors include: diet, obesity, physical inactivity, cigarettes, and alcohol[1]. CRC often leads to local infiltration of neighboring organs and distant metastasis, which is the leading cause of death. The organs where the metastases first appear are the liver, lungs, brain, bones, and peritoneum. The liver is the most common site of metastasis. The pathway for tumor cells to reach the liver is through the portal venous system[4]. Since CRC occurs at an older age, patients typically have a high comorbidity rate. The CRC uses comorbidity indices, namely the Charlson index and the Elixhauser index[5].

The overall five-year mortality was highest in patients who had metastatic changes (82%), and in patients who had other comorbidities in addition to CRC, such as hypertension (91%) and type 2 diabetes mellitus (36%). Patients who were in stage III-IV had a high mortality rate (73%) and patients who had local infiltration to adjacent organs (55%). Therefore, this study was conducted to determine clinically the pathological predictors of five-year mortality in patients with CRC, because in Bosnia and Herzegovina we do not have accurate data on the subject of this study.

The aim of this study was to analyze the clinicopathological predictors of patients with colorectal cancer admitted to the Department of Surgical Diseases at Cantonal Hospital Zenica over five years, from 2019 and 2024, to analyze the comorbidities in patients with CRC, and to show which predictors act directly on the patient's mortality outcome.

Material and methods

Patients and study design

This retrospective study, conducted between January 2019 and January 2024 at the Department of Surgical Diseases of Cantonal Hospital Zenica (Bosnia and Herzegovina), included 64 patients.

Inclusion criteria were: patients diagnosed with colorectal cancer by pathohistological analysis, and patients undergoing surgical treatment. Patients treated surgically in other institutions, without full diagnostic evaluation, with benign colorectal pathology, or with confirmed cancer but not treated surgically were excluded from the study. All patients provided informed consent after having the study's purpose explained. The study was approved by the Ethics Committee of Cantonal Hospital Zenica.

Methods

The clinical data were collected from electronic medical records and classical paper medical histories. The following variables were collected: sex, the pathohistological type of cancer, the stage of cancer, metastases, local infiltration of cancer, mortality, and comorbidities. All patients underwent colonoscopy, pathohistological analysis (biopsy), and magnetic resonance imaging (MRI, Magnetom Avanto 1.5 T, Siemens, Erlangen, Germany) or computed tomography (CT, Somatom Definition AS, Siemens, Erlangen, Germany). Each patient had a colonoscopy with a biopsy of the tumor tissue. Part of the tumor tissue was preserved and sent for pathohistological examination. For analysis, the sample was placed in a 4% formaldehyde solution with a pH of 7.4 for 12-16 hours. Slices 5 μm thick were prepared from formalin-fixed material, embedded in paraffin, placed on appropriate glass plates, and stained with haematoxylin and eosin (H&E), periodic acid-Schiff (PAS) haematoxylin, and by the

Goldner-Szekely (GS) trichrome method, to determine changes in the tumor tissue's morphology[6]. The stage of the cancer indicates how far the cancer has spread in the body. It is determined on the basis of the TNM classification defined by the American Joint Committee on Cancer (AJCC) as: stage 0 (Tis, N0, M0), stage I (T1/T2, N0, M0), stage IIA (T3, N0, M0), stage IIB (T4, N0, M0), stage IIIA (T1/T2, N1, M0), stage IIIB (T3/T4, N1, M0), stage IIIC (T1/T2/T3/T4, N2, M0) or stage IV (T1/T2/T3/T4, N1/N2, M1)7.

Statistical analysis

Descriptive statistical methods were employed. Data were presented as frequencies (N) and percentages (%) for categorical variables, while the median and interquartile range (IQR) were used for continuous variables. The normality of the distribution was tested using the Kolmogorov-Smirnov test. To determine the predictive factors for five-year survival, the risk ratio with a 95% confidence interval (95% CI) was applied. Statistical significance was set at 5% ($p \leq 0.05$).

Results

A total of 64 patients were enrolled. Of these, 26 (40.6%) were women and 38 (59.4%) were men, with a median age of 64 years (IQR: 58.75 - 73.00) (Table 1).

Adenocarcinoma was the predominant histological type, present in 59 (92.2%) patients, while mucinous carcinoma was found in 5 (7.8%). Stage III tumors were the most common, seen in 26 (40.6%), followed by stage I in 17 (26.6%), stage II A in 9 (14.1%), stage IV in 8 (12.5%) and stage II B in 4 (6.3%). Metastases were identified in 15 (23.4%) patients. Among these, 11 (17.2%) had one metastasis, 3 (4.7%) had two, and 1 (1.6%) had three. Metastatic sites included the liver in 11 (17.2%) patients, the lungs in 7 (10.9%) and other sites in 2 (3.1%) (Table 2).

Local infiltration was observed in 23 (35.9%) patients. One organ was infiltrated in 12 (18.8%) cases, two in 6 (9.4%), three in 4 (6.3%) and four in 1 (1.6%). The uterus was the most commonly infiltrated organ (6; 9.4%), followed by the small intestine (3; 4.7%),

Table 1. Baseline data

Variable		Total
		No (%)
Sex	Female	26 (40.6)
	Male	38 (59.4)
		Median (IQR)
Age (years)		64 (58.75 - 73.00)
Comorbidities		N (%)
DMT2		9 (14.1)
HTA		29 (45.3)
Other primary neoplasms		4 (6.3)
Without comorbidities		23 (35.9)
No. of comorbidities	1	7 (10.9)
	2	11 (17.2)
	3	6 (9.4)
	4	2 (3.1)
	5	12 (18.8)

IQR - interquartile range

Table 2. Histopathological and clinical data

Variable		No (%)
Histological type		
Adenocarcinoma		59 (92.2)
Mucinous		5 (7.8)
Stage		
	I	17 (26.6)
	II A	9 (14.1)
	II B	4 (6.3)
	III	26 (40.6)
	IV	8 (12.5)
Metastases	YES	15 (23.4)
	NO	49 (76.6)
No. of metastases	1	11 (17.2)
	2	3 (4.7)
	3	1 (1.6)
Site of metastasis		
Lungs		7 (10.9)
Liver		11 (17.2)
Other sites		2 (3.1)
Local infiltration	YES	23 (35.9)
	NO	41 (64.1)
No of infiltered organs	1	12 (18.8)
	2	6 (9.4)
	3	4 (6.3)
	4	1 (1.6)
Site of infiltration		
Uterus		6 (9.4)
Ovary		1 (1.6)
Small intestine		3 (4.7)
Vagina		2 (3.1)
Urinary bladder		2 (3.1)
Aorta and common iliac blood vessels		1 (1.6)
Other sites		5 (7.8)
Recurrence		2 (3.1)
5-year mortality		11 (17.2)

vagina and bladder (2 each; 3.1%), an ovary and major blood vessels (1 each; 1.6%), and other sites in 5 (7.8%). Recurrence occurred in 2 (3.1%) patients, while 11 (17.2%) died within five years. Comorbidities were present in 41 (64.1%) patients, most commonly hypertension (29; 45.3%), followed by type 2 diabetes mellitus (9; 14.1%), and other primary neoplasms (4; 6.3%). A total of 23 (35.9%) of the patients had no comorbidities. One comorbidity was reported in 7 (10.9%) patients, two in 11 (17.2%), three in 6 (9.4%), four in 2 (3.1%) and five in 12 (18.8%) (Table 1).

Five year mortality in this cohort was driven chiefly by tumor spread and the cardiometabolic burden. Patients with any metastasis experienced a 15 fold higher risk of death than those without metastasis (9/15 vs 2/49; RR = 14.7, 95 % CI 3.6–60.8, p < 0.001), and the risk was substantially elevated when two or more metastatic sites were present (RR = 5.6, 95 % CI 1.9–16.9, p = 0.014). Extensive local invasion also mattered: infiltration of more than two neighboring organs quadrupled mortality (RR = 4.4, 95 % CI 1.7–11.6, p = 0.032). Among the comorbidities, hypertension showed the strongest association, with 10 of 29 hypertensive patients dying, versus 1 of 35 normotensive patients (RR = 12.1, 95 % CI 1.6–88.8, p = 0.002), while type 2 diabetes nearly quadrupled the risk (RR = 3.5, 95 % CI 1.3–9.6, p = 0.040). Having three or more co existing diseases conferred a comparable increase (RR = 3.9, 95 % CI 1.3–11.7, p = 0.027). Stage III–IV tumors, male sex, and single organ infiltration showed elevated but statistically non significant risks (Table 3).

Discussion

This retrospective analysis provides the first country-specific insight into the clinicopathological determinants of CRC five-year mortality in Bosnia and Herzegovina. Three principal observations emerged. First, men were more frequently affected than women, echoing the male predominance reported by Araghi et al.8 . Second, conventional adenocarcinoma remained the dominant histological subtype (92.2 %), with mucinous variants comprising the remainder, a distribution consistent with data from Liu et al.8. Third, most tumors were diagnosed at an advanced stage: stage IIIB accounted

Table 3. Predictive factors for 5-year mortality

Variable	Five-year mortality No (%)	RR (95% CI)	p
Sex (Male)	8 (72.7)	1.82 (0.53 – 6.24)	0.502
Histological type (Mucinous)	2 (18.2)	2.62 (0.77 – 8.98)	0.201
Stage (III–IV)	8 (72.7)	14.70 (3.56 – 60.75)	<0.001
Metastasis (Yes)	9 (81.8)	5.63 (1.88 – 16.85)	0.014
No. of metastases (≥2)	3 (27.3)	2.14 (0.73 – 6.25)	0.182
Local infiltration (Yes)	6 (54.5)	4.42 (1.69 – 11.59)	0.032
No. of infiltrated organs (>2)	3 (27.3)	6.89 (3.77 – 12.60)	0.027
Recurrence	2 (18.2)	3.49 (1.28 – 9.55)	0.040
Neoadjuvant oncological treatment	5 (45.5)	12.07 (1.64 – 88.81)	0.002
DMT2	4 (36.4)	3.33 (1.06 – 10.53)	0.134
HTA	10 (90.9)	3.85 (1.28 – 11.67)	0.027
Other primary neoplasm	2 (18.2)	1.82 (0.53 – 6.24)	0.502
No. of comorbidities (≥3)	7 (63.6)	2.62 (0.77 – 8.98)	0.201

RR - risk ratio

for 40.6 % of cases, whereas Gunderson et al. noted stage IIA as the modal category in a Western cohort. The higher proportion of stage IIIB disease in our setting likely reflects delayed presentation and limited screening coverage.

Approximately one quarter of the patients harbored distant metastases, most commonly to the liver and lungs. This pattern is in accord with the hierarchical spread described by Qiu et al.11, reinforcing the liver as the first-line target organ for hematogenous dissemination from both colon and rectal primaries. Contiguous organ invasion was detected in more than one-third of tumours, predominantly affecting pelvic viscera such as the uterus and bladder, mirroring infiltration profiles observed in Japanese and Moldovan cohorts12,13 . This local extension complicates surgical resection and has been linked to inferior disease-specific survival.

The burden of comorbidity was substantial: nearly two-thirds of patients had at least one chronic condition, chiefly hypertension and type 2 diabetes. These findings match the multimorbidity spectrum reported by Pennisi et al.14, and highlight potential interaction between cardiovascular risk factors, treatment tolerance, and overall survival. Comprehensive management of co-existing illnesses should therefore form an integral component of CRC care pathways in the region.

The study's strengths include histologically confirmed diagnoses and systematic staging, enabling meaningful comparison with international datasets. Nevertheless, reliance on routine records revealed missing data, particularly in terminal cases managed partly outside our institution. Consequently, the prevalence of certain predictors—most notably comorbidity load and cause-specific mortality - may be underestimated. Prospective multicenter registries with uniform data capture would offer superior granularity and facilitate molecular-epidemiological correlations.

From a public-health perspective, the predominance of stage IIIB disease underscores the urgency of implementing nationwide screening programs capable of detecting lesions at a curable stage. Furthermore, recognition of liver-predominant metastasis supports early integration of hepatobiliary imaging and multidisciplinary evaluation. Future research should explore biomarker-driven risk stratification and evaluate the impact of comorbidity optimization on treatment outcomes.

The limitations of the present study stem primarily from its single center retrospective design and relatively small sample size. Nevertheless, the analysis of histologically confirmed and fully staged cases provides a reliable baseline for future prospective multicenter investigations that incorporate molecular profiling and extended follow up.

In conclusion, male sex, advanced stage at diagnosis, hepatic metastasis, and extensive local invasion emerged as the chief determinants of CRC mortality in Bosnia and Herzegovi-na. Targeted screening, timely staging, and integrated management of comorbid conditions represent actionable strategies for improving survival in this population.

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The authors report there are no competing interest to declare.

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Author's Contribution

Nejla Huseinspahic; Data curation, Visualization, Investigation, Writing-Reviewing, Savan Kuridza: Data curation, Visualization, Investigation, Emir Begagic; Data curation, Investigation, Andrej Popov; Conceptualization, Methodology, Elvir Besic; Data curation, Investigation Writing-Original draft.

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CASE REPORT

Surgical treatment of an incarcerated ventral hernia with massive jejunal diverticulosis

Ali Gavrankapatnovic[1], Edin Beciragic[1], Admir Bektesevic[1], Sanela Brzika[1], Nedim Hasic[1], Emina Letic[1], Samir Custovic[1], Ismar Rasic[1]

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ABSTRACT

Jejunal diverticulosis is a rare condition that often presents asymptomatically, but can occasionally lead to severe complications, such as obstruction, perforation or bleeding. We report a case of an incarcerated ventral hernia resulting from massive jejunal diverticulosis, an unusual cause of bowel obstruction. An 80-year-old female patient presented with acute abdominal pain, nausea and vomiting. Physical examination revealed a tender, irreducible mass in the epigastric region. Exploratory surgery was performed and confirmed the presence of multiple jejunal diverticula, with one segment incarcerated in the epigastric hernia. The patient underwent successful surgical repair, including liberation of the affected jejunal segment and hernia repair. This case highlights the importance of considering jejunal diverticulosis in the differential diagnosis of bowel obstruction, and emphasizes the need for prompt surgical intervention in cases of complicated diverticulosis. Early diagnosis and appropriate management are critical in preventing the severe morbidity and mortality associated with this condition.

Keywords: surgical treatment, jejunal diverticulosis, ventral hernia, hypertension, diabetes.

Introduction

Jejunal diverticulosis is a rare condition with a prevalence of about 0.2% to 1.3%. It is generally detected during autopsies or imaging studies as cases are asymptomatic[1,2]. This entity is usually found as an incidental discovery in the elderly population, and the majority are usually asymptomatic, but diverticulitis, hemorrhage, and small bowel obstruction may develop in about one-tenth of patients[2,3]. The symptoms of these complications can make the diagnosis difficult because the patient is

[1] General Hospital Prim. dr. Abdulah Nakas, Department of Surgery, Sarajevo, Bosnia and Herzegovina

Ali Gavrankapatnovic
Email: ali.gavrankapetanovic@gmail.com
ORCID: 0000-0001-9992-9036

usually only mildly symptomatic, which is sometimes only suggestive of other stomach malfunctions, such as Crohn's disease, appendicitis, and colonic diverticulosis[3,4]. Although hernias causing bowel obstruction caused by the imprisonment of parts of the small intestines are susceptible, jejunal diverticula leading to hernia incarceration are very rare[4,5].

In the present case, we report an 80-year-old female patient with an incarcerated ventral hernia arising from massive jejunal diverticulosis. She underwent surgery, which was successful. This case underlines the significance of obtaining more information on jejunal diverticulosis as a possible cause of bowel obstruction, especially if the patient has only mild and unspecific abdominal symptoms and a history of hernias.

Case Report

An 80-year-old woman was admitted to our hospital for urgent surgical treatment of incarcerated ventral hernia. Previously she had been diagnosed with hypertension and Type 2 Diabetes, which were both poorly managed. Due to the nature of her condition, it was necessary to perform surgery as soon as possible. First, we made an incision in the abdomen directly over the hernia. After cutting through the cutaneous and subcutaneous tissue, we visualized the fascia and the incarnated hernia. After liberating and opening the hernia sac, at the length of c. 30cm we found a jejunal loop with massive jejunal diverticula (Figure 1).

Since the wall of the jejunum was intact and there were no signs of bleeding or inflammation from the diverticula, we decided not to perform jejunal resection due to the patient's poor condition. We then performed ventral hernia repair using polypropylene mesh. After the surgery, the patient was successfully extubated. She was hospitalized for the following three days and discharged from the hospital with

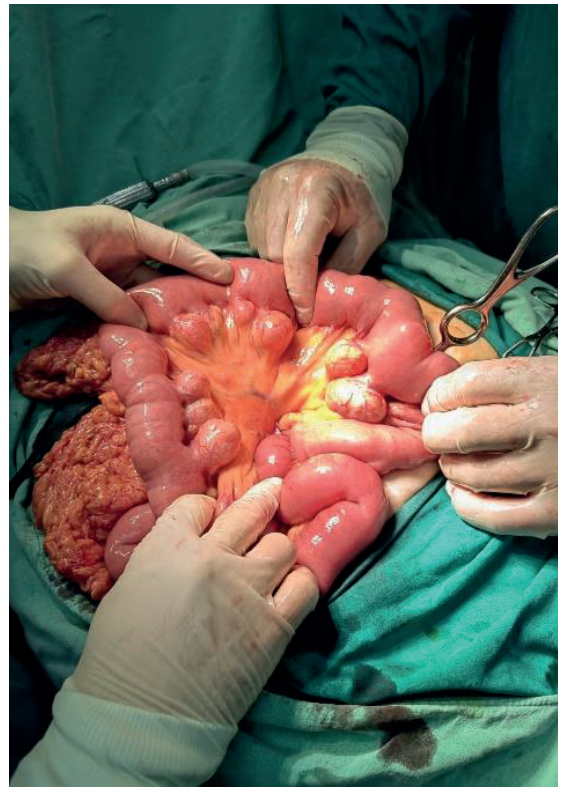

Figure 1. Intraoperative findings of massive jejunal diverticulosis.

full recovery from the abdominal symptoms. During the follow-up visits, she reported no symptoms of abdominal pain or gastrointestinal bleeding. A follow-up barium swallow test was conducted, which corroborated the patient's reported symptoms, and provided further confirmation of the clinical findings (Figure 2 and 3).

Discussion

This case report of an 80-year-old woman with an incarcerated ventral hernia, complicated by massive jejunal diverticulosis, provides excellent information to help surgeons deal with complex hernias in the presence of comorbidities. Jejunal diverticulosis is an uncommon condition, mostly seen in the older age group, and it is usually asymptomatic. Nonetheless, there are situations where it may lead to very serious

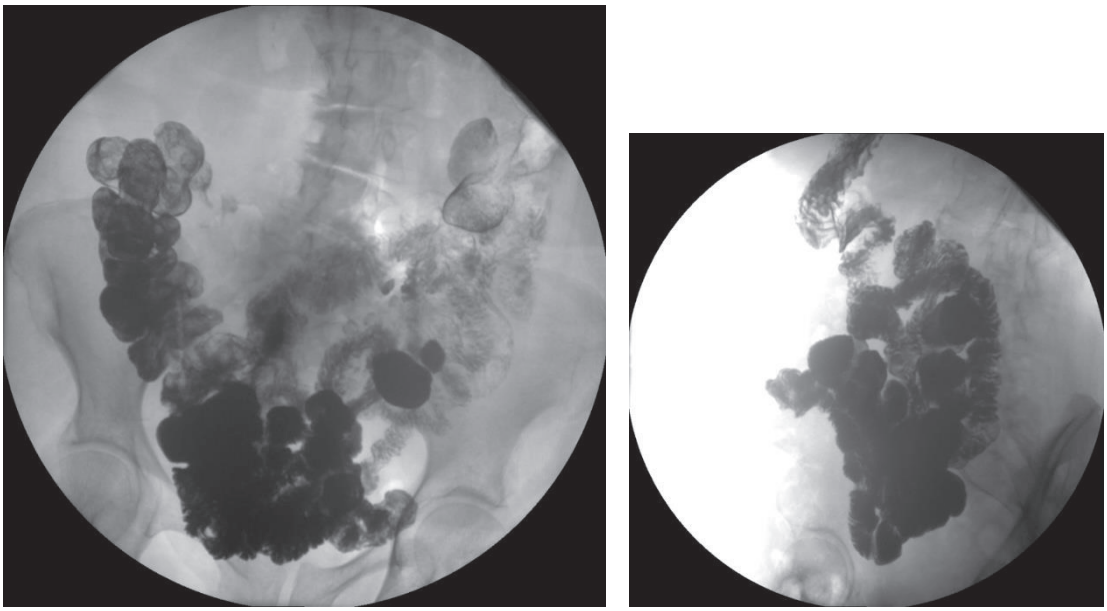

Figure 2 and 3. Follow up, barium swallow roentgen scan.

complications, for example, perforation, volvulus, or intestinal blockage, which can make the patient's condition worse[1,2]. Prompt identification of the incarcerated hernia and jejunal diverticulosis in this case led to the appropriate surgical procedure. As a result, severe outcomes were prevented, such as bowel ischemia or perforation[3].

The decision not to perform jejunal resection was justified by the absence of perforation, ischemia, and active inflammation in the diverticula, despite the fact that they were so large. The literature suggests that resection is usually performed in cases where there are complications such as bleeding or perforation[6]. This is particularly relevant in elderly patients with comorbidities such as poorly managed hypertension and diabetes, as they increase perioperative risks[6,7].

The use of a polypropylene mesh for hernia repair is in line with current surgical practice, which favors mesh repair for reducing the recurrence of hernias, especially in non-infected settings[8,9]. This method is associated with lower rates of recurrence compared to primary suture repair. In this patient, the absence of infection and contamination supported the use of mesh, contributing to a favorable outcome.

Jejunal diverticulosis is often underdiagnosed due to its asymptomatic nature, and is typically discovered incidentally during imaging or surgery, as in this case. The literature supports the hypothesis that diverticula form due to increased intraluminal pressure and motility disturbances, which can lead to complications such as bowel obstruction or volvulus, particularly in elderly individuals[6,8]. However, the management of uncomplicated jejunal diverticulosis, as seen here, often does not necessitate resection, especially in high-risk patients.

Postoperatively, the patient recovered well, with no recurrence of symptoms. Follow-up imaging, such as a CT scan and barium swallow, was performed in this case, and is essential to confirm the resolution of hernia-related symptoms and ensure no recurrence of complications from the diverticula[5,8]. This approach of vigilant postoperative monitoring is consistent with the best practices for managing patients with complex abdominal conditions.

In conclusion, this case highlights the importance of individualized management, especially in elderly patients with multiple comorbidities. Conservative management of jejunal diverticulosis, combined with mesh repair for hernia, can yield favorable outcomes when appropriately indicated. Future studies should focus on refining treatment protocols for patients with both a hernia and jejunal diverticulosis, to optimize outcomes in this high-risk group.

The perineal steps of the operation were as follows: the patient's position on the table was changed. The patient was placed in the Jackknife position. This was followed by a wide extralevator excision of the anorectum, completing the excision of the rectum. An elliptical incision was made around the anus in the skin and subcutaneous tissue (Figure 6). In the region of the tip of the coccygeal bone, a transverse incision was made along Waldayer's fascia and the anococcygeal ligament. After that, entry was made into the retrorectal space. The posterior wall of the rectum was dissected from the presacral fascia. The middle sacral artery and vein were ligated and severed. Bilateral incisions were made in the rectococcygeal muscles. Access was made to the ischiorectal space. The inferior hemorrhoidal artery and vein were ligated and severed. The lateral walls of the rectum were sharply dissected from the edges of the levator muscles on the left and right. The rectal stump was pulled out, and the rectum freed. The puborectal muscle was cut along the anterior wall of the rectum, and the rectum removed with the anus.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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Author's Contribution

Ali Gavrankapatnovic; Data curation, Visualization, Investigation, Writing-Reviewing, Edin Beciragic: Data curation, Visualization, Investigation, Admir Bektesevic; Conceptualization, Methodology, Sanela Brzika; Data curation, Investigation, Nedim Hasić1; Conceptualization, Methodology, Emina Letic; Data curation, Investigation Writing-Original draft, Samir Custovic: Data curation, Visualization, Investigation, Ismar Rasic; Methodology, Writing-Reviewing.

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CONGRESS PROCEEDINGS PAPER

Delaney C, Weese JL, Hyman NH for the Alvimopan Postoperative Ileus Study Group. Prospective, randomized, double-blind, multicenter, placebo-controlled study of alvimopan, a novel peripherally-acting new opiod antagonist, for postooperative ileus after major abdominal surgery (Study 14CL302). Abstract No. S41. Paper presented at the annual meeting of the American Society of Colon and Rectal Surgeons. 2004.

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