THE ASSOCIATION OF ENDOSCOPIC SURGEONS OF BOSNIA AND HERZEGOVINA

AESBH

South-East European Endo-Surgery / IMPRESSUM

ABOUT THE JOURNAL

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.

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SEEES journal

Dear Readers,

You have before you the first issue of the SEEES journal. This is the official journal of The Association of Endoscopic Surgeons of Bosnia and Herzegovina.

Why one more in the sea of surgery journals? Well, because a significant number of surgeons in South East Europe have not reached a level where they are able to publish in the more prestigious journals in the world.

There are many reasons for this: the inefficient health systems with poor databases, poor or inadequate academic backgrounds, the weak financial power of the hospital systems, and a lack of education and training. The reasons are many.

There is also a lack of a journal which will, together with reviewers, correct articles which would simply be rejected by more prestigious journals, because they require a great deal of correction for which the editors of major journals do not have the time. That is what SEEES is here for.

It is a journal that looks for good, current review articles, written by world experts, in order to inform and educate endoscopic and classical surgeons, to help young surgeons publish their first articles, which will contribute new information and insights which are important both for the local surgical community, but also on a wider level.

It will come out every two months, in print and electronic forms, and we hope that it will fulfil its goals.

We expect the support of our colleagues from the EAES. We have already received support from our esteemed colleagues from Albania, Bulgaria, Croatia, Montenegro, Serbia, Slovakia, Slovenia, Romania, and Turkey who comprise our Advisory Board.

You have before you the first issue of the SEEES journal. We are offering three review articles, two of which dedicated to right mesocolic excision, because we would like to emphasize the principles and renew knowledge of the anatomy of the right colon. There is also a review article on gynaecological endoscopy, because we would like to encourage the development of gynaecological endoscopy in this region, and especially in Bosnia and Herzegovina. Other original articles and case reports serve the purposes we have explained.

We hope that this journal will find its place in South East Europe, but that through its articles it will also attract a much wider reading audience.

Editor in Chief
Samir Delibegović

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REVIEW

Complete Mesocolic Excision with Central Vascular Ligation during Laparoscopic Right Hemicolectomy: Technical Notes

Maria Michela Di Nuzzo[1], Roberto Peltrini[1], Luigi Vanni[1], Michele D'Ambra[1], Umberto Bracale[1], Francesco Corcione[1]

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ABSTRACT

In this article we describe the surgical technique of the Complete Mesocolic Excision (CME) with Central Vascular Ligation (CVL) during laparoscopic right hemicolectomy (LRH) with intracorporeal anastomosis, as performed in our current surgical practice. The preparation of the patient, the operating room, the position of the surgeons, equipment and trocar placement are described in detail. The procedure is divided into well-defined steps, and each one is meticulously described.

Keywords: minimally invasive, laparoscopic right hemicolectomy, mesocolic excision, central vascular ligation

INTRODUCTION

Several approaches have been described for right hemicolectomy: hand-assisted, laparoscopic assisted with extracorporeal anastomosis, totally laparoscopic with intracorporeal anastomosis, robotically assisted, and a single-incision approach[1]. COST[2] and COLOR[3] trials have proven the safety and efficacy of laparoscopic colectomy for treatment of colorectal cancer. The accuracy of oncological resection has an impact on cancer recurrence and survival. Since first described by Hohenberger[4] right hemicolectomy (LRH) with total mesocolon excision (CME) has been related to high oncological effectiveness, and results in a higher number of resected lymph nodes with the corresponding reduction in recurrence rates[5]. This complex procedure requires the central ligation of the vessels and the wide removal of the entire mesocolic tissue that contains the reginal lymphatic drainage, preserving the embryologic fascial envelope. Its complexity is related to the identification of the right mesenteric planes[6] and to the variability of the vascular anatomy[7]. In this article we describe our technique for LRH with CME and CVL associated with an intracorporeal anastomosis, as performed in our current surgical practice. Each step of our standard surgical laparoscopic technique is described as performed over thirty years of experience, with the support of 3D vision for facilitation of intracorporeal sutures[8].

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SURGICAL TECHNIQUE

Patient preparation

Patient preparation follows the ERAS protocol[9]. A Foley urethral catheter and a gastric nose tube are applied and are removed on the first post-operative day and at the end of surgery respectively. Antibiotic prophylaxis is carried out half an hour before skin cutting.

Equipment

The equipment required for the laparoscopic right hemicolectomy with CME and CVL is shown in Table 1 with the respective quantities.

Patient position

The patient is positioned supine on the operating table with the lower limbs placed on special stirrups that allow constant adjustment during surgery. The upper left limb is placed alongside the body. The patient is secured to the table with straps, and two shoulder pads are placed a few centimetres medially to the clavicular humeral joints and down to the level of the pelvis. Particular attention must be paid to anti-decubitus devices, given the different positions taken by the patient during surgery to facilitate the exposure of the operating field. The operating table must have the possibility of tilting both horizontally by up to 30°- 35° and vertically in the anti-Trendelenburg and Trendelenburg positions.

Operating theatre set up

LHR requires a total of three surgeons: a first operator and two assistants, one scrub nurse and two operating room nurses. The operator and the first assistant (cameraman) take up positions to the left of the patient, the second assistant in the middle of the patient's spread legs, and the nurse on the right side of the patient in front of the surgeon operator. The laparoscopic tower with the monitor, the insufflator and the camera are placed at the level of the patient's head on the right, if there is a possibility of a second laparoscopic tower, this is placed at the level of the patient's feet, always to the right. The generator for the ultrasonic scalpel and bipolar cladding are located to the left of the team.

Location of trocars

A total of four trocars (T) are placed: T1(10-12 mm) in the periumbilical left region, usually 2 centimetres above and lateral to the navel; T2 (10-12 mm) in the left hypochondrium; T3 (5 mm) in the left lower quadrant; T4 (10-12 mm) in the left suprapubic region. T1 is used for optical access, T2 and T3 are the trocars for the operator surgeon, T4 is the assistant port. T1, T2 and T3 respect the concept of laparoscopy triangulation, T2-T3 are about 10 centimetres apart and about 8 centimetres from T1 (Figure 1).

Pneumoperitoneum

Pneumoperitoneum is achieved using the Open Verres Assisted technique in the left upper abdominal quadrant with insufflation of 12-15 mmHg.

Exploration

Once achieving the pneumoperitoneum, the first step consists of insertion of the T1 trocar, extracting the Verres needle and verifying the absence of iatrogenic lesions. Exploratory laparoscopy is the last diagnostic and the first operating stage. It is essentially undertaking an accurate exploration of the abdominal cavity for localization of the cancer and of any associated disease that can be treated during laparoscopy surgery.

Identification of the ileocolic pedicle

The patient is rotated 30° to the left side and placed in slight Trendelenburg. In this way the small bowel moves to the left and the operator raises the omentum in the subdiaphragmatic region above the

Table 1: Equipment for laparoscopic right hemicolectomy wit CME

Equipment	Diameter	Quantities n
Need of Verres		1
Hasson	10-12 mm	1
Trocar	10-12 mm	2
Trocar	5 mm	1
Johann	5 mm	2
Delaitre	10 mm	1
Grasper	5 mm	1
Angled 30°laparoscopic lighting and insufflation	10 mm	1
Bipolar electrosurgical device	10 mm	1
Laparoscopic dissector	10 mm	1
Laparoscopic needle holders	10 mm	1
Endo surgical clips	10 mm	>1
End bag	15 mm	1
Roticulating laparoscopic linear stapler 60mm lenght	10-12 mm	>1
Suture (V-lock, Vicryl, riassorbile monofillamente)		>1

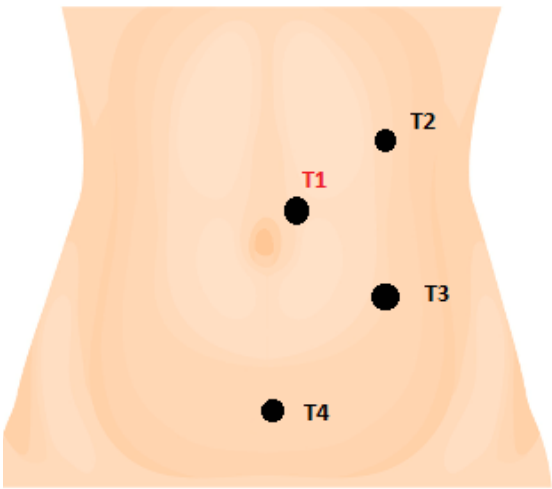

Figure 1: Trocars placement.
T1(10-12 mm) peraiombecal left region
T2 (10-12 mm) left hypochondrium
T3 (5 mm) left lower quadrant
T4 (10-12 mm) left suprapubic region.

stomach in order to obtain better exposure of the operating field.

The last ileal loop is identified, the assistant places the ileocolic pedicle under tension, facilitating its identification by tractioning the ileocecal junction in a lateral direction. The incision of the peritoneum starts along the lower edge of the ileocolic vessels. The origin of the ileocolic vein and the superior mesenteric vein are completely exposed in this step (Figure 2).

Vascular division and mesocolic dissection

The ileocolic vein and artery are dissected separately, ligated with surgical clips and divided by an energy device. The peritoneum is incised along the right edge of the upper mesenteric vein in a caudo-cranial direction so that the right colic vessels, if present, are ligated between clips and sectioned (Figure 3). The duodenum is identified and the medial to lateral approach allows the development of the 'mesocolic

window', the dissection is conducted along the embryological avascular plane between the Toldt's and the Gerota's fasciae with blunt maneuvers, so that the posterior mesocolic layer is separated by the retroperitoneal space (Figure 4). Continuing this dissection cranially, the lateral isolation of the duodenum is achieved, while medially the submesocolic area at the head of the pancreas is exposed. In a right hemicolectomy, the complexity of the anatomy is related to the mesenteric planes and to the anatomic variability of the tributary vein of the superior mesenteric vein[7]. At this level the correct identification is important of the right superior colic vein that can joins the right gastroepiploic vein and the anterior superior pancreaticoduodenal vein, thus forming the gastrocolic trunk (Figure 5). In the case of extending a right colectomy, the middle colic vein is sectioned at its origin. At each step, suspicious malignant central nodes are detected and removed to ensure oncological radicality.

Hepatic flexure and ascending colon mobilization

Cranially, coloepiploic detachment allows the separation of the omentum from the transverse mesocolon (Figure 6). The hepatic flexure is mobilized by sectioning the peritoneal attachments and the previous surgical plane is found. The mobilization of the ascending colon is completed along the right colon gutter. The colon is sectioned by a linear stapler, through the suprapubic trocar in order to join the section site of the transverse colon perpendicularly, while the ileum is dissected to 10-15 centimeters upstream of the ileocecal valves with a white charged suture through T2, and the specimen is placed in an endobag for extraction.

Intracorporeal anastomosis

The surgeon dissects the ileum with an Endo GIA white charge, and the colon with an Endo Gia blue charge. The surgical resection specimen is placed above the liver during intracorporeal anastomosis. The assistant lifts the extreme dissected colon and moves it to the right lateral abdominal wall while the operator moves the ileal stump to the transverse colon, evaluating the seat of the incisions for

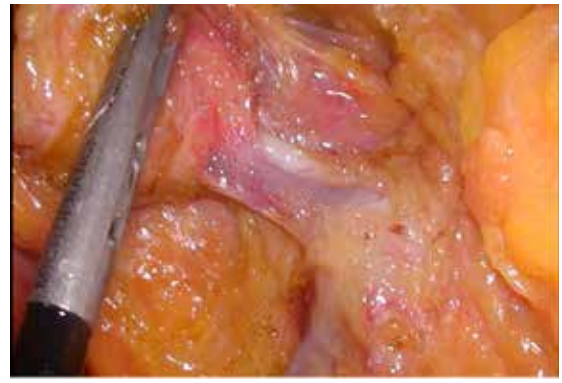

Figure 2. Ileocolic vessel identification.

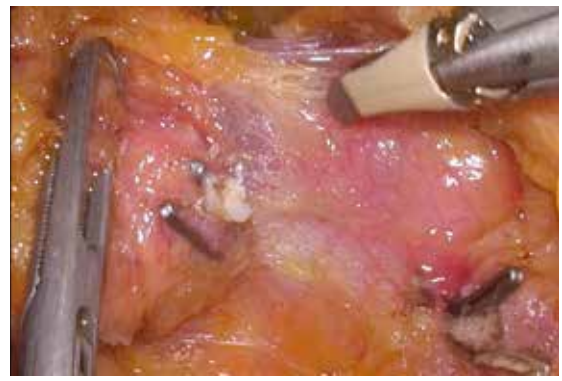

Figure 3. Ileocolic vessel section between clips.

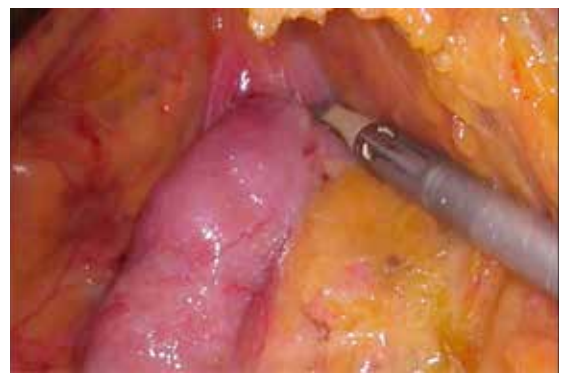

Figure 4. Toldt's and Gerota's fasciae dissection.

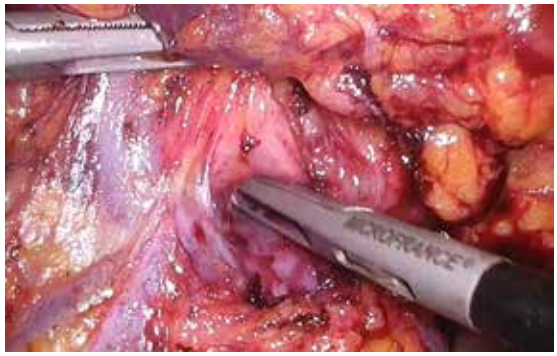

Figure 5: Henle trunk.

Figure 6. Coloepiploic medio-lateral detachement.

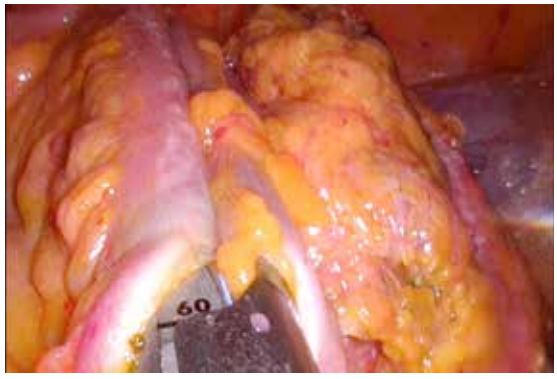

Figure 7. Intracorporeal anastomosis.

isoperistaltic side-to-side anastomosis. The surgeon performs enterotomy with the ultrasonic scalpel on the ileal wall, while at the colon level the incision is made at 6-7 centimetres from the stump. With the T2 trocar the operator introduces the 60 ENDO

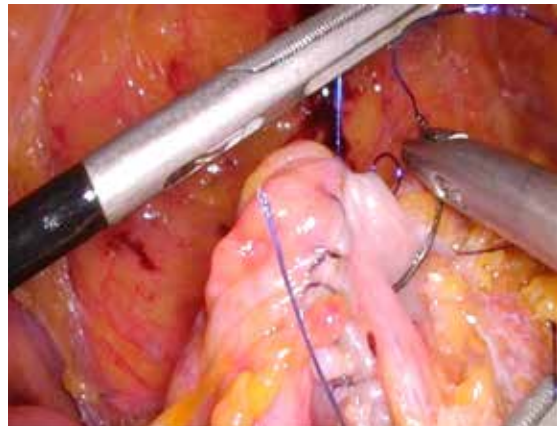

Figure 8. Double-Layer Closure technique.

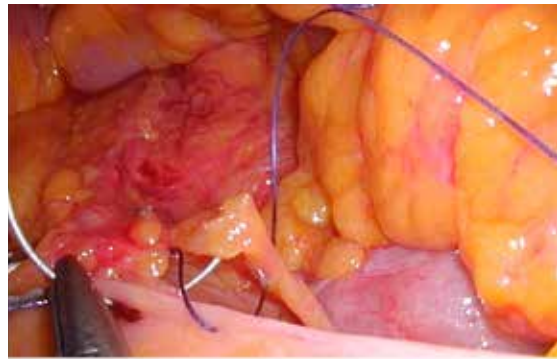

Figure 9. Intermesenteric suture.

GIA which is inserted into the enterotomy (Figure 7). Intracorporeal side-to-side isoperistaltic anastomosis is carried out, and the enterotomy is closed according to the Double-Layer Closure technique[10] (Figure 8). The intermesenteric space is sutured with stiches using Vicryl 3-0 to avoid internal hernias (Figure 9). The surgical resection specimen is extracted in an endo-bag by a Pfannestiel incision. No drainage is routinely placed, the nasogastric tube is removed at the end, and the urinary catheter on the first POD. A liquid diet begins the morning after the surgery. The patient is generally discharged on the fourth or fifth post-operative day.

Conflicts of interest

The authors have no conflict of interest.

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REVIEW

Laparoscopic Right Hemicolectomy - Anatomy and Critical Structures

Samir Delibegovic[1 2]

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ABSTRACT

Laparoscopic right hemicolectomy is a procedure that involves removing the cecum, the ascending colon, the hepatic flexure, the first third of the transverse colon, and part of the terminal ileum. Due to anatomic complexity, laparoscopic surgery for right colon cancer, especially hepatic flexure and transverse colon, is not an easy procedure. Some key steps are quite complicated procedures, so we would like to point out and explain the difficult sites of dissection during a right colectomy.

Keywords: laparoscopic, right hemicolectomy, mesenteric attachments

INTRODUCTION

Laparoscopic right hemicolectomy is a procedure that involves removing the cecum, the ascending colon, the hepatic flexure, the first third of the transverse colon, and part of the terminal ileum (Figure 1).

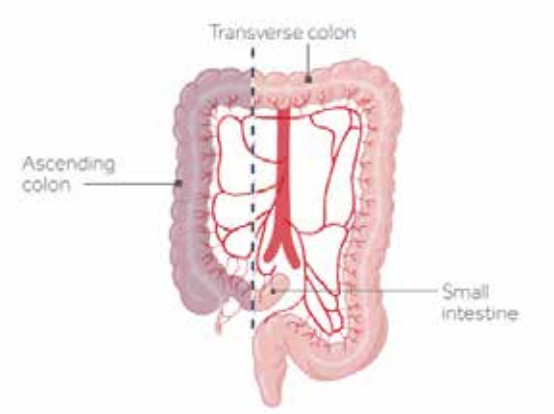

Figure 1. Anatomical presentation of right hemicolectomy.

Due to anatomic complexity, laparoscopic surgery for right colon cancer, especially hepatic flexure and transverse colon, is not an easy procedure, which is why we would like to emphasize the key steps:

The key steps:

- identification of the ileocolic pedicle and incision of the peritoneum along the superior mesenteric artery;

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- dissection of the duodenum, with preservation of the posterior mesocolic fascia; high division of the ileocolic artery at its origin;
- medial-to-lateral mobilization of the ascending colon,
- preserving the posterior mesocolon up to and above the head of the pancreas, and removing attachments to the uncinate process and duodenum;
- identification and division of the right branch of the middle colic artery at its origin, achieving complete mesocolic excision from the ileocolic to the right branch of the middle colic artery;
- division of the greater omentum, resected en bloc with the right colon and exposure of the lesser sac;
- completion of mobilization of the hepatic flexure;
- completion of mobilization of the lateral attachments of the ascending colon and inferior attachments of the cecum; and finally,
- completion of the mobilization of the retroperitoneal attachments of the small bowel mesentery up to the third part of the duodenum[1].

Some of these key steps are quite complex procedures, so we would like to explain these difficult dissection sites.

Mesenteric attachments, the ureter, blood supply to the right colon and variants

The mesentery associated with the small intestine and colon is now regarded as a contiguous and extraperitoneal organ[2] (Figure 2).

It emerges from the "root region" (as named by Treves), which corresponds to the attachment of the superior mesenteric artery to the aorta, and fans out to span the intestines from the duodenum to the rectum. However, its continuity can only be seen when the mesentery is exposed in a certain way[3].

Dividing the peritoneum provides access to the plane formed by the mesentery and the underlying fascia. When the mesentery is separated from the fascia, the mesentery emerges as a discrete entity (Figure 1).

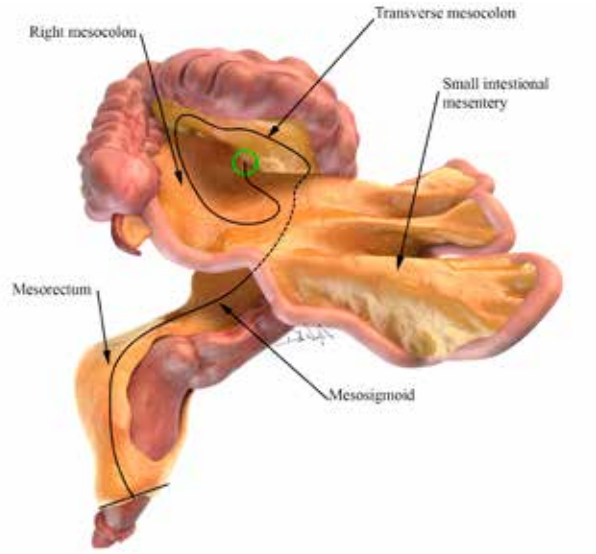

Figure 2. Digital representation of the small and large intestines and associated mesentery.
(with the permission of the publisher)

The small intestinal mesentery is mobile, whereas the right mesocolic region is flattened against the posterior abdominal wall[2]. It then changes its conformation to continue as the transverse mesocolon, with another change in conformation at the splenic flexure to continue distally as the left mesocolon (Figure 1).

The mesentery distal to the duodenojejunal flexure can be viewed as similar to a handheld fan, with the central pivot point corresponding to the origin of the middle colic artery from the superior mesenteric artery.

The right and left mesocolic regions and the medial mesosigmoid region curve onto and are flattened against the posterior abdominal wall. They are held attached in these regions by Toldt's fascia and the peritoneal reflection (Figure 3)[4,5].

Suspension and the mesenteric attachment prevent the intestine from collapsing into the pelvis.

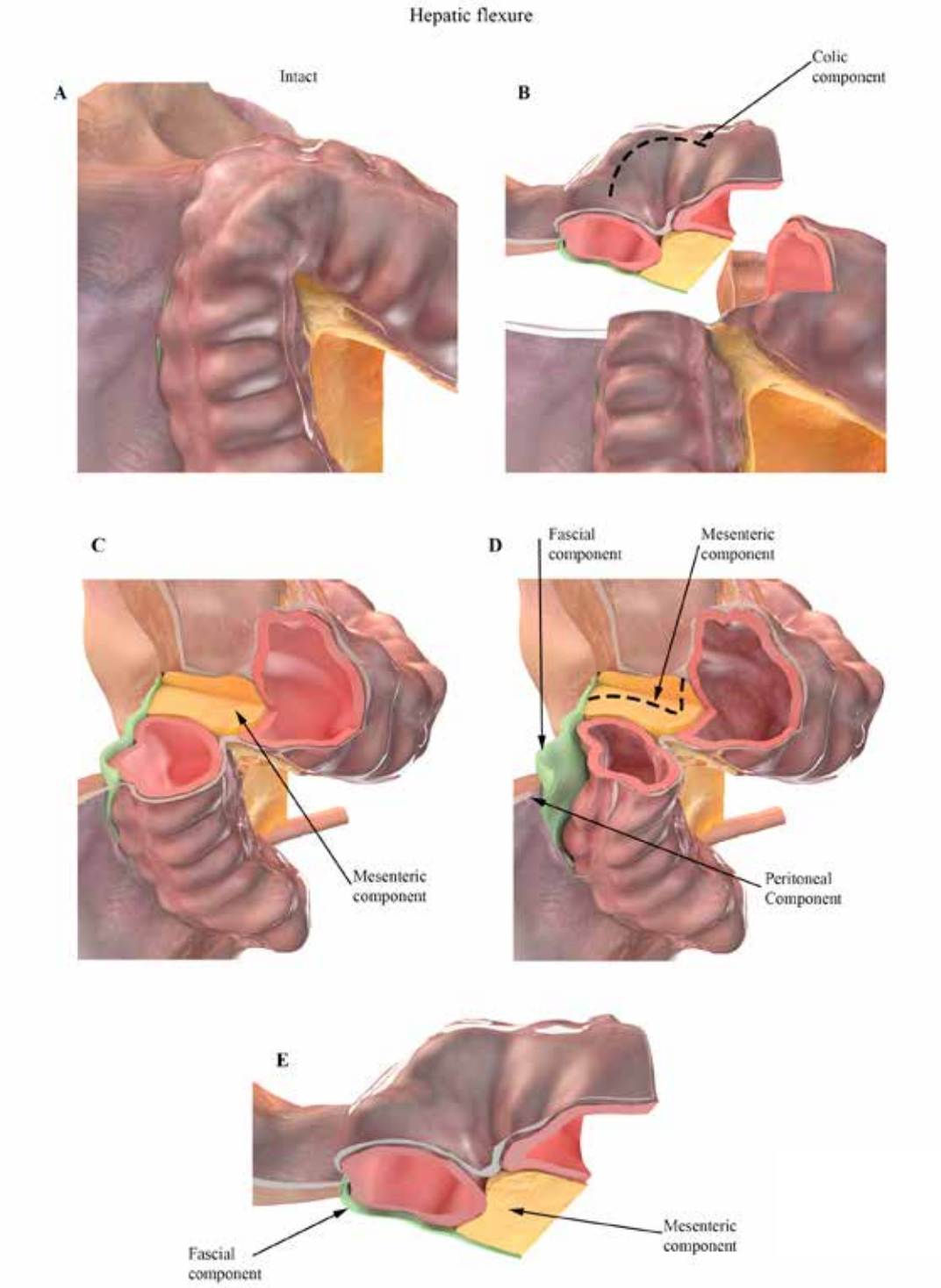

Figure 3. Anatomical components of the hepatic flexure.

Snapshots from a digital sculpture showing (A) the undisturbed hepatic flexure, (B) the flexure separated from contiguous structures, highlighting the colic component, (C) a view of the contiguous mesentery, (D) the divided peritoneal component of flexure, and (E) the fascial component of flexure. (with the permission of the publisher)

The transverse mesocolon consists of a confluence between the mesenteric components of the hepatic and splenic flexure and the middle colic adipovascular pedicle[4]. It forms a caudal limit to the lesser sac.

The greater omentum adheres to the cephalad surface of the transverse mesocolon and partially obliterates this space.

There are six flexures: duodenojejunal, ileocaecal, hepatic, splenic, and those between the descending colon and the sigmoid colon and rectum. All six have contiguous intestinal, mesenteric, peritoneal, and fascial components (Figure 3).

The right and left mesocolon and the medial mesosigmoid and mesorectum are apposed or attached to the subjacent abdominal wall or surrounding pelvis (Figure 3). If attachment does not occur, the intestine and mesentery are suspended on vascular pedicles alone and are thus prone to twisting with vascular occlusion.

Mesenteric attachment facilitates suspension of the colon, allowing it to adopt a spiral conformation.

The right mesocolon is the continuation of the small intestinal mesentery, and it is attached (or anchored) to the posterior abdominal wall throughout its length.

The right mesocolon continues as the transverse mesocolon at the hepatic flexure, and the latter continues as the left mesocolon at the splenic flexure.

At the hepatic flexure, the reflection curves around the colic component of the hepatic flexure, and continues along the lateral aspect of the right colon until it reaches the ileocaecal region. From here it curves around the ileocaecal region and extends along the base of the small intestinal mesentery.

The fascia is readily observed between the right mesocolon and nonmesenteric domain of the abdomen. Surgeons exploit this relationship to access the zone between the fascia and the mesocolon, in order to detach the mesentery from the fascia, and thereby separate the mesentery from the posterior abdominal wall.

The mesofascial plane is formed by the mesentery and the apposed fascia (Figure 3 D). The colo-fascial plane is formed by the colon and the underlying fascia. A colofascial plane occurs wherever the colon is opposed to the posterior abdominal wall (right and left colon and at the flexures)[6]. Division of the right lateral peritoneal reflection exposes the plane on the right.

Once the right lateral peritoneal reflection is divided, this interface is exposed. When the surgeon places it under stretch, by lifting it away from the retroperitoneum, the fascia can either be swept away from the colon, diathermy or sharply divided. By continuing this process,the colon is freed to the point where the mesofascial plane becomes apparent.

The mesenteric and fascial components of the mesofascial plane are contiguous and substantive entities. Upon entry into the abdomen, they are not immediately apparent. To demonstrate these, the overlying peritoneal reflection must be divided.

In general, the peritoneal reflections are identified by the White Line of Toldt, and it is recommended that one begins mobilization or dissection approximately 5 mm medial to the white line (Figure 4).

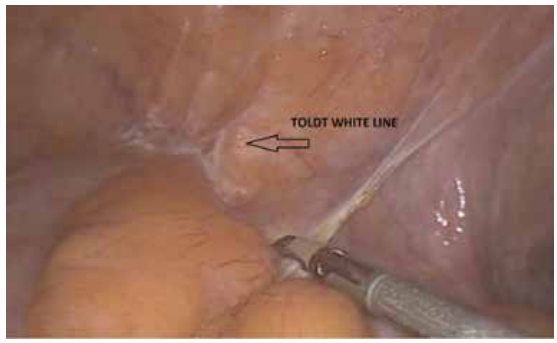

Figure 4. Dissection along the Toldt white line.

The right lateral peritoneal reflection continues around the hepatic flexure as the hepatic-colic peritoneal reflection. On the right side, division of the right lateral peritoneal reflection exposes the colo-fascial plane. Separation of colic and fascial components brings the surgeon to the mesofascial plane. Similarly, peritonotomy of the hepatic-colic

peritoneal reflection exposes the colo- and mesofascial plane at the hepatic flexure and is an early step in hepatic flexure mobilisation.

An unnamed peritoneal reflection also occurs between the greater omentum and underlying transverse colon. This is appreciated intraoperatively by placing the greater omentum under traction and the transverse colon under counter-traction. Division of this reflection exposes the interface formed by the greater omentum and underlying transverse mesocolon.

Ureter

The path of the ureter is along the anterior edge of the psoas muscle, which is the general area where the gonadal vessels cross anteriorly to the ureter, a third of the way to the bladder. The ureter crosses over the common iliac arteries, showing the anatomical landmark of the bifurcation of the common iliac vessels into the internal and externa iliac vessels.

The right ureter lies in close relationship to the ascending colon, cecum, and appendix (Figure 5).

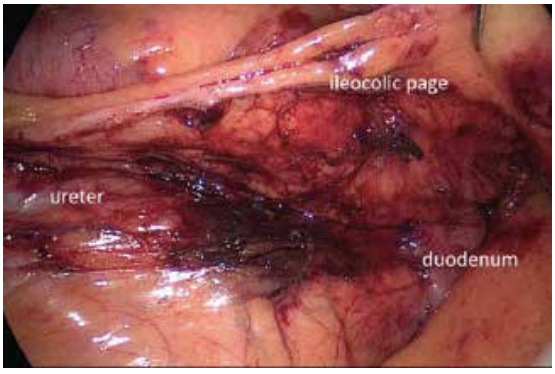

Figure 5. Position of the right ureter during dissection of the right colon.

To facilitate the surgical overview, the open book model of the fascial and vascular relations is recommended.[7]

Figure 6. Step 1: The correct dissection plane between the retroperito- neum and the ileocolic page can be ensured when the duodenum is viewed from a ventral angle and below (red arrow). The mesenteric root (dotted line) must consequently be located ventral to the viewersś eye.

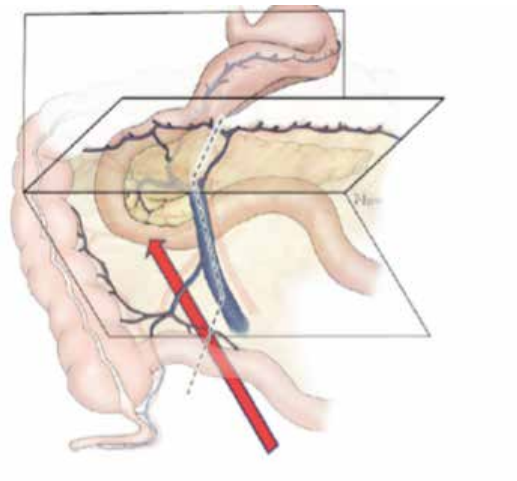

Figure 6. The open book model of the fascial and vascular relations.
Step 1: the correct dissection plane between the retroperitoneum and the ileocolic page can be ensured when the duodenum is viewed from ventral and below (red arrow). The mesenteric root (dotted line) must consequently be located ventral to the viewer´s eye.

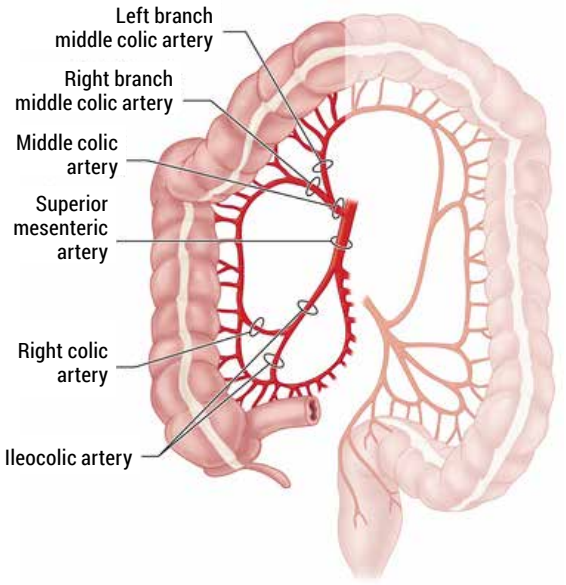

Figure 7. Blood supply of right colon.

Blood supply

The main arterial branches supplying the right colon are the ileocolic artery (ICA) and the middle colic artery (MCA), since both branches are present in all patients, (Figure 7) whereas the right colic artery (RCA) is found in 10%–60% of patients[8].

One of the most important clinical relationships is the crossing pattern of the ICA and the RCA related to the SMV, as demonstrated in Figure 8.

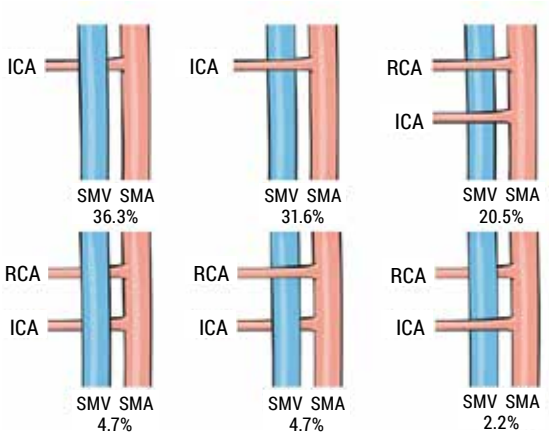

Figure 8. Crossing patterns of the ICA[8].

The crossing pattern is defined as the ICA and the RCA crossing the SMV, either posterior or anterior, when they arise from the SMA.

The relationships of the RCA and ICA to the SMV are mostly anterior and posterior, respectively, which should be considered during CVL to avoid injuries and for adequate lymphadenectomy. Regarding the MCA, all studies show only the anterior crossing of the SMV.

Initially, all the studies show that the ICA and ICV are present in 100% of all samples[8].

This finding will strongly support the ileocolic pedicle (ICA and ICV) as a landmark for starting the safe dissection of the mesocolon in the medial to lateral technique (Figure 9).

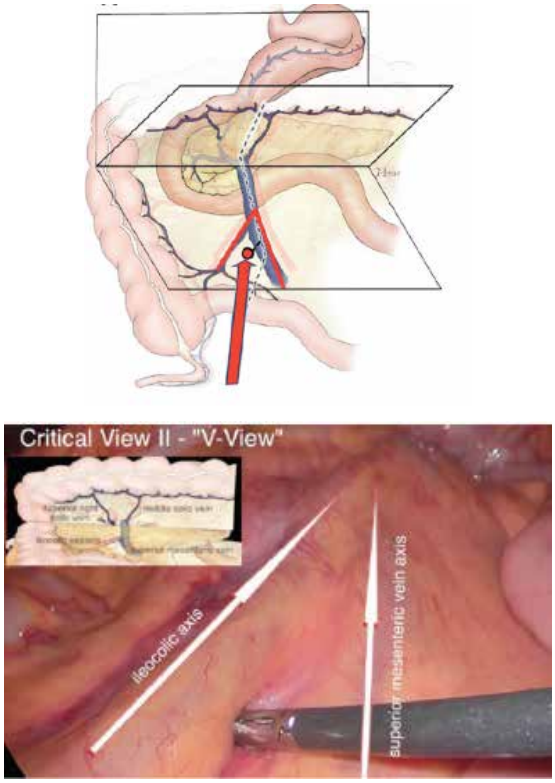

Figure 9. The ileocolic pedicle (ICA and ICV) is a landmark for starting the safe dissection of the mesocolon[7].

This is why it is important for the division of the ICA and the RCA to be on the left-hand side of the SMV and the MCA (high ligation), with additional removal of related main lymph nodes[9].

The ileocolic vein (ICV) is defined as the tributary from the ileocecal marginal veins; the right colic vein (RCV) and the middle colic vein (MCV) are defined as tributaries from the marginal veins of the ascending and transverse colon, respectively (Figure 10).

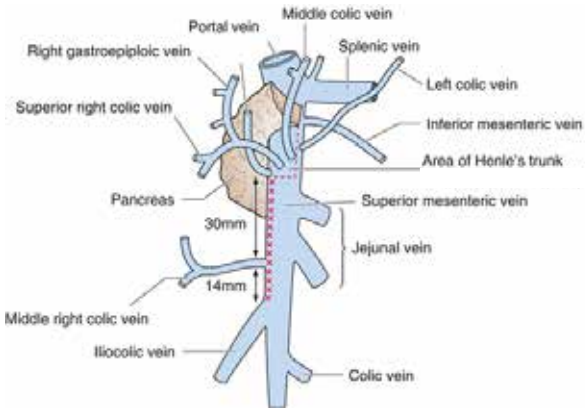

Figure 10. Distribution of veins of the right colon.

The ICV is always present and drains into the SMV, with the exception of one study showing that in 2% of cases, the ICV drained into the GTH and in 98% into the SMV.

MCV The location of the MCV on the pancreatic head was found highly variable among the veins of the right colon, with the main MCV draining directly into the SMV in 84.5% of cases[8].

The MCV was positioned cephalad to the middle colic artery (MCA) in all cases (100 %).

The main MCV flowed into the SMV in 55 patients (68 %), GCT in 16 patients (20 %), the jejunal vein in 5 patients (6 %), the inferior mesenteric vein (IMV) in 4 patients (5 %), and the splenic vein in 1 patient (1 %) (Figure 11).

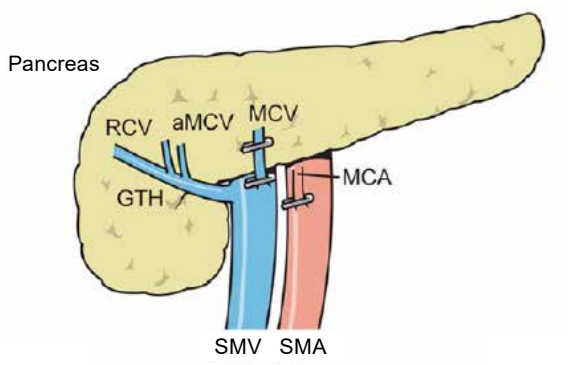

Figure 11. Position of MCA and GTH[7].

The superior right colic vein (SRCV) is defined as the tributary from the marginal veins of the hepatic flexure.

The gastrocolic trunk of Henle (GTH) is the confluence of the superior right colic vein and the right gastroepiploic vein (RGEV), which drain into the SMV at the inferior border of the neck of the pancreas.

Apparently, the GTH receives venous drainage from the ascending and transverse colon in most patients, mainly from the RCV and the MCV.

Right Colic Vein (RCV)

Generally, the RCV is depicted as joining the SMV directly[10], but actual anatomy has more variations. In one study, the main RCV flowed into the GCT in 68 patients (84 %) and the SMV in 8 patients (10 %)[11].

One of the main reasons for targeting the vein is that nodal metastases from the hepatic flexure and transverse colon cancer are sometimes found along the GCT, whereas the major lymphatic drainage follows the colic vessels to the root of the SMA.

The ileocolic and the right colic vessels (if present) are divided at their origin from the superior mesenteric vessel. Sharp dissection is then carried out centrally along the superior mesenteric artery, ensuring clearance of all associated lymph nodes.

Conclusion

The anatomy of the right colon is complex, but bearing in mind the key steps of right hemicolectomy, and taking note of the complex anatomic sites, right mesocolic excision becomes a standard laparoscopic procedure.

Conflicts of interest

The authors have no conflict of interest.

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REVIEW

Radiofrequency Ablation of Uterine Fibroids

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ABSTRACT

Uterine fibroids are a common occurrence in women. Treatment options range from medical management to surgeries, with hysterectomy providing the most effective treatment. Newer methodologies to treat fibroids continue to evolve, one being the use of radiofrequency ablation, which offers a minimally invasive and uterus-sparing technique to manage fibroids. This article provides a review of both laparoscopic and transvaginal approaches to radiofrequency ablation for the management of fibroids.

Keywords: radiofrequency, ablation, uterine, fibroids

INTRODUCTION

Uterine fibroids (also known as uterine leiomyomas) are a common gynecological condition affecting up to 80% of women during their reproductive years. Although often asymptomatic, fibroids can cause abnormal uterine bleeding, pelvic discomfort or bulk symptoms, urinary frequency, constipation, infertility, miscarriage, and other conditions prompting women to seek treatment. Treatment options include medical management with NSAIDS, combined hormonal contraceptives, progestins, antifibrinolytic agents such as tranexamic acid, GnRH analogues, or progesterone receptor modulators[1]. Traditionally, medications have targeted abnormal uterine bleeding while invasive treatments wholistically target a combination of bleeding, bulk, and/or fertility symptoms associated with uterine fibroids. Invasive treatments range from interventional radiological procedures, such as uterine artery (or fibroid) embolization (UAE), or magnetic resonance guided focused radiofrequency ablation (MRgFUS), to surgical intervention. For many years, surgical options have been either myomectomy or hysterectomy achieved through both minimally invasive (laparoscopic, robotic, or minilaparotomy) and open techniques. However, novel interventions combining surgical laparoscopy with radiological guidance are growing in popularity. The purpose of this article is to review one of these newer combined techniques: radiofrequency thermal ablation.

In contrast to more invasive surgeries, such as abdominal myomectomies or hysterectomies, radiof-

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requency ablation (RFA) provides a safe, effective, and minimally invasive treatment for uterine fibroids. RFA uses alternating current in the radiofrequency range to produce coagulative necrosis. The use of radiofrequency ablation for tumors was first described in liver tumors, but is now applied to various sites including the lungs, kidneys, breasts, bone, and uterus[2]. In 2012, the FDA approved the Acessa System as the first RFA treatment specifically for uterine fibroids. Multiple studies preceding and following FDA approval have demonstrated significant improvements in fibroid volume, menstrual blood loss, and patient satisfaction[2]. In a systematic review of non-resective treatments for fibroids, RFA demonstrated higher pooled fibroid volume reduction at six months (70%) than both uterine artery embolization (54%) and focused ultrasound (32%)[3]. Another systematic review and meta analysis of prospective studies on the clinical performance of RFA for fibroid treatment found that fibroid volume decreased by 66% at 12 months' follow up. The annual cumulative reintervention rate was 4.2%, 8.2% and 11.5% over 3 years[4].

Laparoscopic RFA

The Acessa RFA is a laparoscopic surgery coupled with pelvic ultrasound. Components include: a standard laparoscopic tower, a laparoscope, an RFA generator, a foot pedal, dispersive electrode pads, an RFA handpiece, and an ultrasound machine with a laparoscopic transducer. Two video monitors are required for proper visualization. Patients are positioned in the dorsal position with a tenaculum applied to the cervix for uterine manipulation. A 5-mm port is used for the laparoscope and a 10-12-mm port for the laparoscopic ultrasound transducer. The RFA electrode handpiece is introduced intra-abdominally through a 2-mm skin incision, and applied to the fibroid (Figure 1).

Appropriate placement of the handpiece to the fibroid is confirmed by ultrasound prior to activating ablation. The shaft of the RFA handpiece is insulated to allow for deep penetration into the uterus while limiting damage to surrounding myometrium and serosa[2]. Myomas larger than 4 cm often require overlapping ablations. RFA can achieve complete myoma resorption with small and medium-sized myomas[2]. In one study, the cumulative rate of surgical repeat intervention for myoma-related symptoms was 11%, far less than the estimated 25% reported in previous literature[5].

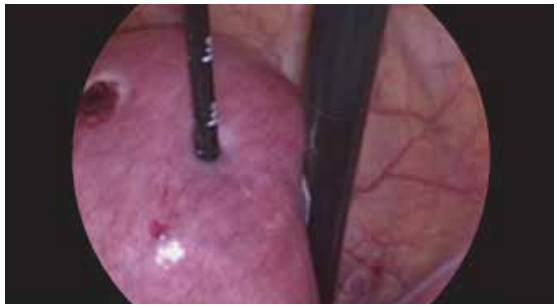

Figure 1. Laparoscopic RFA.

The American College of Obstetricians and Gynecologists recognizes laparoscopic radiofrequency ablation (Lap-RFA) as a clinically proven and safe option for fibroids, that should be offered to patients desiring symptomatic management of their fibroids[6]. Although hysterectomy remains the most definitive treatment for uterine fibroids, RFA is both effective and uterine-sparing. Lap-RFA is designed to spare non-fibroid tissue, and pregnancies have been documented in patients who have undergone Lap-RFA[2]. Nonetheless, pregnancy data are limited, and ongoing research is being conducted to evaluate further the obstetrical outcomes for such patients.

Transcervical RFA

Radiofrequency ablation can also be achieved transcervically, thus avoiding both abdominal incisions and general anesthesia. The Sonata System, previously known as VizAblate, is a form of RFA that utilizes a transcervical approach to introduce ra-

diofrequency ablation with intrauterine sonographic guidance. Unlike hysteroscopic methods, the Sonata System is not limited to submucosal fibroids, and unlike Lap-RFA, it does not penetrate the uterine serosa.

Components of the Sonata System include a reusable intrauterine ultrasound (IUUS) probe and a single-use disposable RFA handpiece that snap together into a single insertable device[7]. A small amount of hypotonic solution is inserted into the uterine cavity for acoustic coupling of the probe, which provides a 90-degree field of view and penetration over 9 cm (Figure 2).

Figure 2. Procedure of RFA.

The cervix is dilated, and the intrauterine ultrasound (IUUS) probe and RFA handpiece are inserted into the uterine cavity (Figure 3).

Figure 3. IUUS probe.

The Sonata Graphical Guidance Software, or SMART Guide™, is used to customize the ablation application. The Fibroid Ablation Study-EU trial (FAST-EU), a multicenter prospective trial of 50 patients (92 fibroids), demonstrated a median reduction of 76.9% in perfused fibroid volume and a 62.5% decrease in total fibroid volume in 3 months; this increased to 73.3% and 73.3% at 12 months, respectively (citation needed). A significant number of patients (89.8%) reported a reduction in menstrual bleeding[7]. Preliminary results from the TransScervical Radiofrequency Ablation Uterine Fibroids Global Registry (SAGE registry), which characterizes 5-year outcomes of transcervical radiofrequency ablation (TFA) for fibroid management, demonstrated statistically significant decreases in symptom severity, and increases in quality of life. The reintervention rate for heavy menstrual bleeding was 5.6% at 2 years[8]. As with the Acessa system, successful pregnancy following treatment has been documented, however additional research is needed to delineate any impact of such procedures on fecundity.

Conclusion

Radiofrequency ablation, whether applied laparoscopically or transcervically, provides a minimally invasive and safe option for fibroid management. RFA allows the surgeon to target intramural and subserosal fibroids. In the case of transcervical RFA, the surgeon can avoid abdominal and serosal penetration entirely. Procedures tend to be short, outpatient and sustainable, with low re-intervention rates. For patients desiring a minimally invasive surgical option, radiofrequency ablation should be considered and offered to patients desiring treatment that is both highly effective and uterine-sparing.

Conflicts of interest

The authors have no conflict of interest.

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ORIGINAL ARTICLE

E-TEP IN VENTRAL AND INCISIONAL HERNIA REPAIR - OUR EXPERIENCES

Bojan Radovanovic, Milan Mirkovic

Received: 15 May 2021; Accepted: 19 November 2021.

ABSTRACT

Background: Rives-Stoppa repair has become the standard for repairing ventral and incisional hernias. The endoscopic retromuscular approach has the same benefits and offers the advantages of minimal invasive surgery.
Method: The technique is based on the retromuscular approach to the linea semilunaris (longitudinal technique) or the linea semicircularis (transverse technique). The incision is made on the anterior rectus sheath, and the trocar is placed below the muscle. A retromuscular space is created and the neck of the hernia sac can be reached. Upon release of the hernia, the sheath of the opposite rectus muscle opens up entirely up to the semilunar line, allowing the creation of enough space for placing the mesh. The mesh can be fixed using transcutaneous sutures, glue or be non-fixed. It is not always necessary to close the defect.
Results: Between 2003 and 2017 we performed 108 operations. We had 35 umbilical, 17 epigastric, one Spigelian and 55 incisional hernias. There were no intraoperative complications with ventral hernias, and one bowel injury in the incisional hernia group. There were five conversions and four recurrences. All of them were caused by a small mesh, after insufficient dissection. There were no infections.
Conclusion: Unlike LVRH, e-TEP will probably achieve the results and benefits of the retromuscular open technique.

Keywords: ventral hernia, endoscopic retromuscular approach, laparoscopic ventral hernia repair

INTRODUCTION

Over the last twenty years Rives-Stoppa repair has become the standard for repairing big ventral and incisional hernias[1]. This approach allows good mesh position, easy and cheap fixation, and the possibility of implanting a broad spectrum of meshes.

IPOM, as a laparoscopic variant, presented as a replacement for the open technique, but failed to achieve the results of the Rives-Stoppa operation for several reasons. A mesh placed intraperitoneally caused adhesions as complications, and adequate mesh fixation was an issue. The mesh, in addition, has to be specially designed and is still extremely expensive for the vast majority of countries.

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E-TEP, the enhanced or extended view and totally extraperitoneal technique, an endoscopic retromuscular approach, has the same benefits as the previously mentioned technique and offers the advantages of minimal invasive surgery[2,3]. We started practicing this surgical technique as an alternative to open surgery in the early 2000's, and the underlying reason was economically difficult situation of the country that was emerging from the earlier war in Serbia in 1999, and a lack of funds for procurement of expensive materials. We based our operations on the work of M. Miserez[4] from 2002.

Surgical technique

The technique is based on the retromuscular approach to the linea semilunaris (longitudinal technique) or linea semicircularis (transverse technique) (Figure 1). Placement of the optical 12 mm trocar is at the level of the hernia (Figure 1), under direct control. The incision is made transversally to the anterior rectus muscle fascia, proximal to the linea semilunaris, so that the edge of the rectus muscle is displaced medially and the trocar is placed below the muscle. By insuflation and blunt dissection using optical instruments, a working space is created. Two operating 5mm trocars are set up to provide a good ergonomic position.

The longitudinal approach is optimal for middle-line hernias, while the transverse one is suitable for hernias in the substernal region. A 30˚ scope is necessary for the adequate positioning of operating ports. This position is good for hernias in the middle line and also to access lateral hernias on the opposite side. In the case of a Spigelian hernia, the trocars can be placed along the medial line, thus avoiding its opening. Immediately after creating the retromuscular space, we reach the medial edge of the posterior rectus fascia or the neck of the hernia sac[5]. This may be difficult to dissect, especially if any surgical procedure was performed earlier in this region. In the case of a major defect, the dissection is often made difficult by the proximity of the hernia sac. In this situation, it is preferable to open the medial edge of the rectus sheath above or below the defect, and thus open the retromuscular space from the opposite side (Figure 2). In this way, a significantly better working space is obtained and it is easier to approach the neck of the defect.

To ease the work and improve visualization, we modified the standard trocar (Figure 1) in order to obtain a visual space that is not covered by the rectus muscle placed above the top of the optical instruments. The dissection of the hernia sac is often related to the opening of the peritoneum attached to the fascia, especially in umbilical hernias. This allows intraabdominal inspection and adhesiolysis. Upon the release of the hernia, the sheath of the opposite rectus muscle opens up entirely, up to the linea semilunaris. This allows the creation of a large enough space for placing the mesh (Figure 3) . It is necessary to close the peritoneum to avoid contact of the mesh with the intestines. The mesh is positioned to fill the entire space between the rectus, while its proximal and distal size depends on the diameter of the defect.

Depending on the surgical technique, we can divide all the operations into three groups, and they are related to the professional experience acquired by the surgeon and the spread of indications to larger and more complicated hernias. In the first group, in all operations fixing the mesh using transcutaneous sutures, usually four were mandatory irrespective of the size of the defect. The second group were patients who were treated later, and in cases of a defect smaller than 5 cm, operations were performed without fixation or the occasional use of glue. In defects larger than 5 cm, in addition to the fixation mentioned above, we closed the defect using V-loc™ thread, where the thread is drawn to the skin, and tightened after the operation and exsufflation. The third group are patients with a major defect, where it is necessary to close the posterior rectus fascia, which is not easily done due to the tension and position of the trocars. In these cases, it is necessary to move the trocars to the transversal position and add the TAR to create flaps without tension[6]. The procedure is completed by closing the defect before placing the mesh.

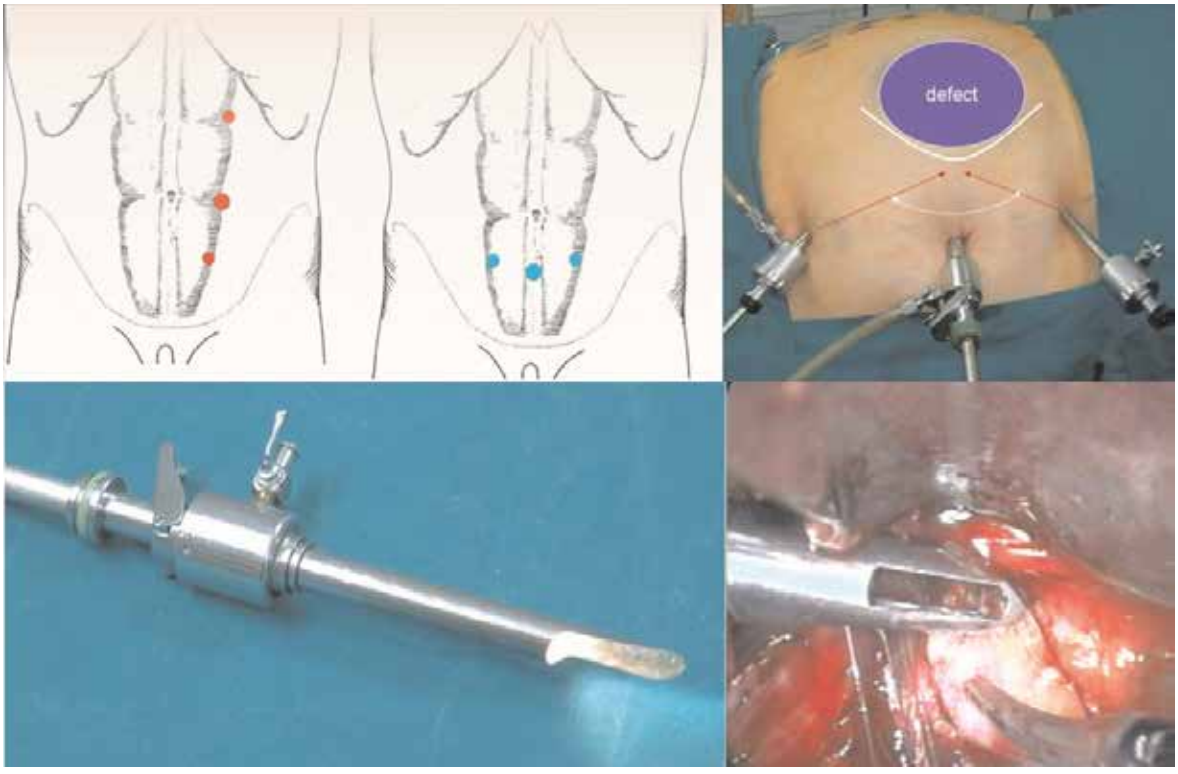

Figure 1. Placement of trocars and a modified standard trocar.

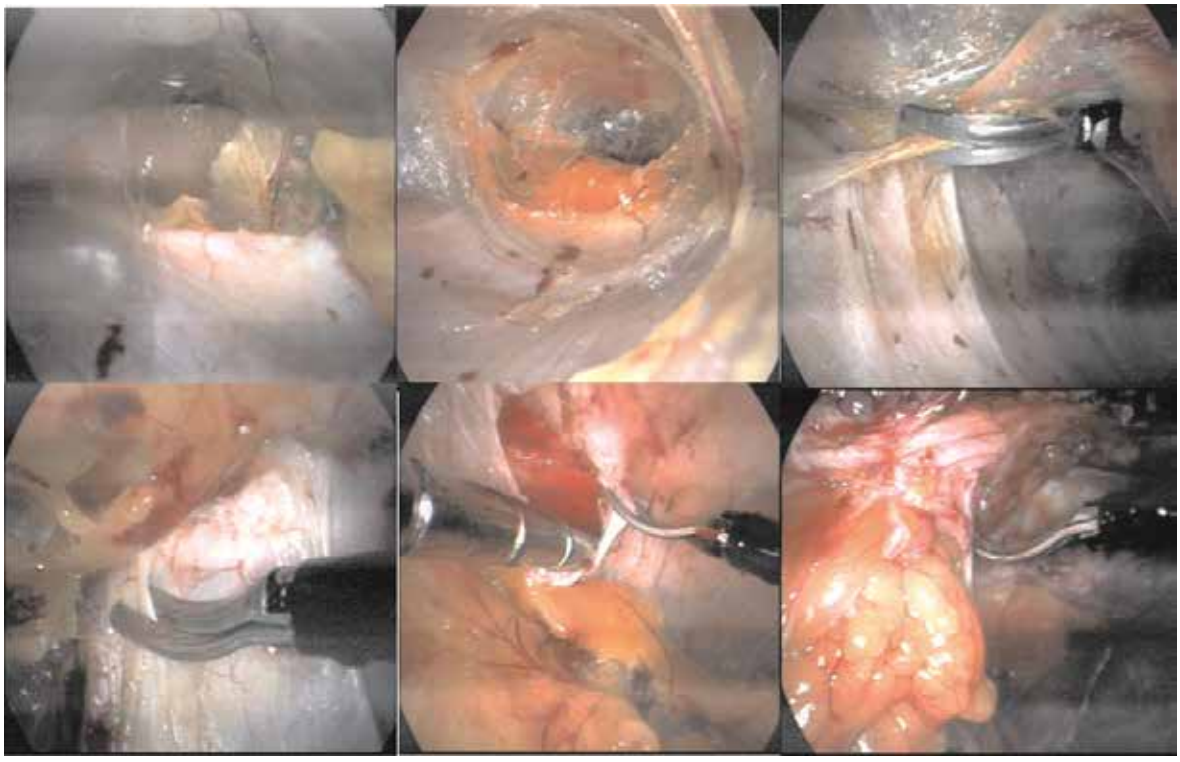

Figure 2. Dissection of the medial edge of the rectus sheath.

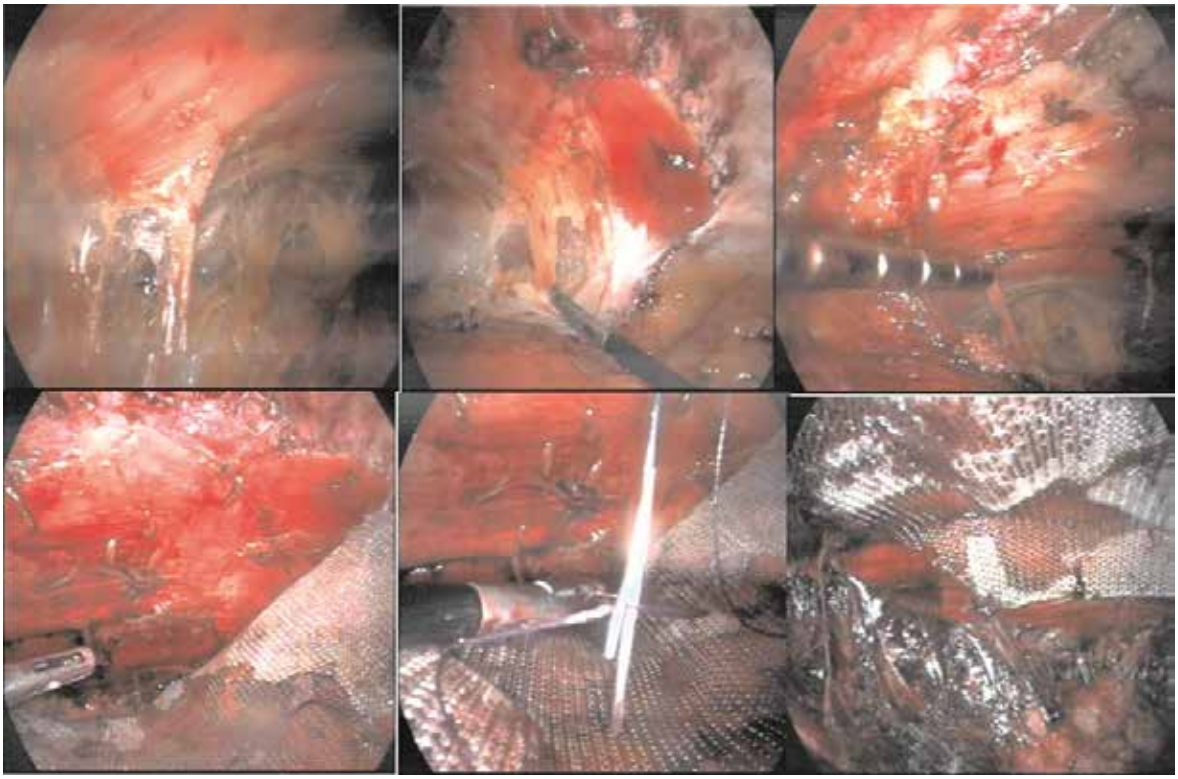

Figure 3. Creating a space to place a mesh, and placement of the mesh.

Figure 4. Immediate results at the end of the surgery.

Results

In the period between 2003 and 2018 we performed 108 operations in selected cases. Patients with symptoms of chronic and acute incarceration were excluded, but some of the patients that underwent surgery had irreducible hernias. The patients were between 42 and 78 years old. We had 35 umbilical, 17 epigastric, one Spigelian and 55 incisional hernias. The lateral approach was used in most cases. There were no intraoperative complications in ventral hernias, and one bowel injury occurred in the incisional hernia group. Five conversions to an open surgery technique were made. Four recurrences were noted, all of them caused by placing a small-dimension mesh, after insufficient dissection. There were no infections noted. Very low postoperative pain and discomfort were reported by a few patients.

Discussion

Regardless of all the benefits of laparoscopic ventral hernia repair, LVHR, it has not achieved the basic principles of retromuscular open technique that made the Rives Stoppa technique a standard in the treatment of incisional hernias[7]. The intraperitoneal positioning of the mesh requires a special type - a composite type mesh, larger meshes to provide better fixation, and various fixation methods, which increases the likelihood of visceral adhesions. All of this significantly increases the cost of surgery, reduces indications, and affects the percentage of complications and recurrence[8]. Placing the mesh in the preperitoneal area by the endoscopic technique complements the classic operation with the benefits of an endoscopic approach. The belated development of this surgery is related to the demanding operational technique and the necessary experience of the surgeon. The operation requires a good knowledge of the basic surgical technique, the anatomy of the abdominal wall, as well as mastering the laparoscopic technique[9]. Initial problems and the inexperience of surgeons determined that our selection of patients was narrowed down to smaller hernias set in the middle line. After doing almost twenty operations, we came to the conclusion that if a large enough dissection was made and the whole retromuscular space was covered by the mesh, then there was no possibility of the mesh moving, nor of the mesh protruding through the abdominal wall defect, if that defect did not exceed 5cm in the transverse diameter. We did not close the posterior rectus fascia in any of these cases.

The quality of the surgery was reflected in the minimal patient discomfort and in the patients' quick return to regular physical activity without any pain. The recurrences we had were related to the inexperience of surgeons, inadequate dissection in the sagittal diameter, and insufficient mesh size. The absence of defect closure in this group of patients was not of aesthetic significance given that the size of the defect was not great, which enabled the good remodeling of the skin (Figure 4). Closing of the defect is not always necessary, and it is complicated by an unfavorable angle in relation to the working trocars, as well as increased tension due to the pneumoperitoneum.

The transition to surgery on patients with a larger defect required closure which we resolved by using V loc™. The following group includes patients with a defect of a diameter greater than 10 cm. We performed 15 operations with the addition of TAR that allowed the closing of the posterior fascia of the rectus[10,11]. This is a more demanding technique, but it enables the completion of the indicated area in a significantly larger number of patients. We believe that in this case the fixation of the mesh does not matter if the hernia defect can be closed[11]. The mesh covers the complete retromuscular space transversally, and longitudinally we always set the whole length of the mesh of 30 cm. Drainage is occasionally used, and antibiotics only in patients with a risk of serious infections. The average time of the operation without TAR is 75 minutes, and the average hospitalization is 5 days.

Conclusion

E-TEP is an operation that successfully combines the benefits of the endoscopic approach and retromuscular mesh position, and provides satisfactory functional and aesthetic results with a decrease in the percentage of complications. The increasing use of this technique in the last few years will provide the necessary experience and ensure its further advancement. The results are directly dependent on the experience of surgeons, both in classical hernia surgery and in endoscopic surgery.

Conflicts of interest

The authors have no conflict of interest.

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PROFESSIONAL PAPER

ECTOPIC LIVER AND HEPATOCELLULAR CARCINOMA

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ABSTRACT

The most frequent anomalies of the liver are variations of the liver lobes and accessory bile ducts, and rare anomalies are related to the abnormal position of liver tissue. In this article, we present data about case reports of ectopic liver published from 2004 to 2020, about the connection between hepatocellular carcinoma and ectopic liver, its location, and the rea- son for a visit to a medical professional.

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Keywords: ectopic liver, hepatocellular carcinoma, hcc liver

INTRODUCTION

The most frequent anomalies of the liver are variations of the liver lobes and accessory bile ducts, and rare anomalies are related to the abnormal position of liver tissue[1]. Abnormal locations of liver tissue, or ectopic liver, was mentioned in an article for the first time in 1922[2], which described ectopic liver tissue in the inferior side of the gallbladder, 17x10x4mm in size, with its own vascular and bile ducts. The literature on the subject says that these anomalies are usually not symptomatic[1,3].

These anomalies can be classified in four types: (1) ectopic liver, arising outside the liver and without connection to the liver; (2) microscopic ectopic liver, which is found occasionally in the wall of the gallbladder; (3) a large accessory liver lobe attached to the liver by a stalk, (4) and a small accessory liver lobe attached to the liver[4].

According to available data, ectopic liver is found in 0.47% patients[5]. The usual incidence of ectopic liver and accessory liver lobes is from 0.56 to 0.70%[6]. These anomalies are hard to detect with standard imaging techniques[3]. Ectopic liver is usually found during abdominal surgery or autopsies[7].

Hepatocellular carcinoma is found in 30% of ectopic liver tissue discovered[8]. It is considered that ectopic liver tissue is functionally handicapped and more susceptible to hepatocarcinogenesis because of the lack of the complete vascular and ductal structure of normal liver[9].

Symptomatic cases can be found showing torsion, necrosis, rupture, pyloric obstruction and malignant

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transformation of this tissue[10]. The usual symptoms are pain, compression and bleeding[11,12].

Ectopic liver is usually found connected to the liver, close to the gallbladder, spleen, in the thoracic cavity and retroperitonaeal[6].

In this article, we present data about case reports of ectopic liver published from 2004 to 2020, about the connection between hepatocellular carcinoma and ectopic liver, its location, and the reason for a visit to a medical professional, as this clinical entity can be found during laparoscopic exploration.

Materials and methods

We searched PubMed for the term "ectopic liver". Since we did not find any review articles on this topic published after 2004[6], for this research we included articles presenting case reports of ectopic liver published from 2004 to the end of 2019.

We found 68 case reports in 64 articles, and from those we collected data about the location of ectopic liver tissue, pathology findings (hepatocellular carcinoma or other pathological findings), the diagnostic technique that revealed the tissue, if it was symptomatic, and data about the age and sex of the patients.

By statistical analysis using IBM SPSS version 21.0 for Windows, we tried to find statistically significant connections within the collected data and determine the frequency of hepatocellular carcinoma in ectopic liver, connections with location, sex, age, symptoms and whether ectopic liver is symptomatic or usually an accidental finding.

Results

All case reports, except one (1.5%), included the age of the patient at the time of finding the ectopic liver. The average age was 50.12 (±18.50) years, the youngest patient was 1, and the oldest was 91 years old (95% CI:45.61-54.63). Since we had continuous data, the Kolmorgorov-Smirnov test was performed, which showed even distribution (p=0.200), and allowed parametric statistics.

Table 1. Location of ectopic liver

	Location	Frequency	Percent	Reference
	Gallbladder	15	22.1	2, 5, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
	Spleen	9	13.2	8, 11, 25, 26, 27, 28, 29, 30, 31
	Stomach	2	2.9	32, 33,
	Thorax	10	14.7	4, 34, 35, 36, 37, 38, 39, 40, 41, 42
	Liver	6	8.8	43, 44, 28, 45, 46
	Right atrium, inferior vena cava	10	14.7	47, 48, 49, 50, 51, 52, 53, 54, 55, 56
	Pancreas	4	5.9	57, 58, 59, 60
	Peritoneum	4	5.9	7, 30, 61, 62
	Retroperitoneally	2	2.9	63, 64
	Esophagus	1	1.5	65
	Muscles	1	1.5	66
	Small intestine	1	1.5	67
	Bile duct	2	2.9	68, 69
	Skull	1	1.5	66
	Total	68	100.0	

In relation to sex, ectopic liver is more frequently found in women (61.8%) than in men (38.2%).

Ectopic liver in our data was found in 14 different locations. Most frequently this was the gallbladder (22.1%), thorax (14.7%), the right atrium and inferior vena cava (14.7%) and the spleen (13.2%). It was found in other locations in less than 10% of cases. All cases classified in terms of location are shown in Table 1.

Pathological analysis of 36 cases (52.9%) found normal liver tissue, hepatocellular carcinoma was discovered in 26 cases (38.2%), inflammation in three cases (4.4%), fibrosis in one (1.5%) and hemorrhage in two cases (2.9%) .

Table 2. Pathological findings

		Frequency	Percent
	Normal	36	52.9
	HCC	26	38.2
	Inflammation	3	4.4
	Fibrosis	1	1.5
	Hemorrhage	2	2.9
	Total	68	100.0

In 41 cases (60.3%), the patients had symptoms that indicated diagnostics which led to discovery of ectopic liver tissue, and for the rest of the cases the ectopic liver was found by accident.

In terms of location, the most frequently symptoms occurred if ectopic liver was located in the right atrium and the inferior vena cava (90%). Although the

Table 3.

		Location													Total
		Gallbladder	Spleen	Stomach	Thorax	Liver	Right atrium, inferior vena cava	Pancreas	Peritoneum	Retroperitoneally	Esophagus	Muscles	Small intestine	Bile duct	Skull	
Normal	Count	11	3	2	7	2	9	0	1	0	1	0	0	0	0	36
	% within Pathology	30.6%	8.3%	5.6%	19.4%	5.6%	25.0%	0.0%	2.8%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Location	73.3%	33.3%	100.0%	70.0%	33.3%	90.0%	0.0%	25.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	52.9%
HCC	Count	1	6	0	3	3	0	4	2	2	0	1	1	2	1	26
	% within Pathology	3.8%	23.1%	0.0%	11.5%	11.5%	0.0%	15.4%	7.7%	7.7%	0.0%	3.8%	3.8%	7.7%	3.8%	100.0%
	% within Location	6.7%	66.7%	0.0%	30.0%	50.0%	0.0%	100.0%	50.0%	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	38.2%
Inflammation	Count	1	0	0	0	1	1	0	0	0	0	0	0	0	0	3
	% within Pathology	33.3%	0.0%	0.0%	0.0%	33.3%	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Location	6.7%	0.0%	0.0%	0.0%	16.7%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.4%
Fibrosis	Count	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	% within Pathology	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Location	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%

► Table 3.

Hemorrhage	Count	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2
	% within Pathology	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Location	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%
Total	Count	15	9	2	10	6	10	4	4	2	1	1	1	2	1	68
	% within Pathology	22.1%	13.2%	2.9%	14.7%	8.8%	14.7%	5.9%	5.9%	2.9%	1.5%	1.5%	1.5%	2.9%	1.5%	100.0%
	% within Location	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

gallbladder is a frequent location for ectopic liver, in our data this location was rarest location for symptoms, occurring in 26.7% of cases.

Most cases were discovered by radiological techniques (49 or 72.1%), then during surgery (14 or 20.6%). In one case, diagnosis was set by a clinical exam, and in

Table 4.

			Path_HCC		Total
			Other	HCC	
Location	Gallbladder	Count	14	1	15
		% within Location	93.3%	6.7%	100.0%
		% within Path_HCC	33.3%	3.8%	22.1%
	Spleen	Count	3	6	9
		% within Location	33.3%	66.7%	100.0%
		% within Path_HCC	7.1%	23.1%	13.2%
	Stomach	Count	2	0	2
		% within Location	100.0%	0.0%	100.0%
		% within Path_HCC	4.8%	0.0%	2.9%
	Thorax	Count	7	3	10
		% within Location	70.0%	30.0%	100.0%
		% within Path_HCC	16.7%	11.5%	14.7%
	Liver	Count	3	3	6
		% within Location	50.0%	50.0%	100.0%
		% within Path_HCC	7.1%	11.5%	8.8%
	Right atrium, inferior vena cava	Count	10	0	10
		% within Location	100.0%	0.0%	100.0%
		% within Path_HCC	23.8%	0.0%	14.7%
	Pancreas	Count	0	4	4
		% within Location	0.0%	100.0%	100.0%
		% within Path_HCC	0.0%	15.4%	5.9%

►

► Table 4.

Location	Peritoneum	Count	2	2	4
		% within Location	50.0%	50.0%	100.0%
		% within Path_HCC	4.8%	7.7%	5.9%
	Retroperitoneally	Count	0	2	2
		% within Location	0.0%	100.0%	100.0%
		% within Path_HCC	0.0%	7.7%	2.9%
	Esophagus	Count	1	0	1
		% within Location	100.0%	0.0%	100.0%
		% within Path_HCC	2.4%	0.0%	1.5%
	Muscles	Count	0	1	1
		% within Location	0.0%	100.0%	100.0%
		% within Path_HCC	0.0%	3.8%	1.5%
	Small intestine	Count	0	1	1
		% within Location	0.0%	100.0%	100.0%
		% within Path_HCC	0.0%	3.8%	1.5%
	Bile duct	Count	0	2	2
		% within Location	0.0%	100.0%	100.0%
		% within Path_HCC	0.0%	7.7%	2.9%
	Skull	Count	0	1	1
		% within Location	0.0%	100.0%	100.0%
		% within Path_HCC	0.0%	3.8%	1.5%
Total		Count	42	26	68
		% within Location	61,8%	38.2%	100.0%
		% within Path_HCC	100,0%	100.0%	100.0%

two cases by pathological analysis. 85.71% of cases discovered by surgery were asymptomatic.

In Table 3 we show the connections between pathological findings and the locations of ectopic liver.

Since all pathological findings except hepatocellular carcinoma (HCC) were benign, we performed statistical analysis of the connection between HCC and location related to all the other findings, as shown in Table 4.

We found a statistically significant difference between the location of ectopic liver and the finding of HCC (chi-squared test: x^2=36,101, df=13, p=0.001). HCC was not found in the right atrium and inferior vena cava (0/10), it was found in only 1/15 of cases in the gallbladder (6.7%), in 30.0% in the thorax, in 66.7% in the spleen, and all four cases in the pancreas (100%) had HCC (significantly frequent in the spleen and pancreas, and rare in the right atrium and inferior vena cava and gallbladder).

Of all cases of hepatocellular carcinoma, 26 of them, or 80.7%, were symptomatic, and benign cases were symptomatic at the rate of 47.6%.

Discussion

The data about ectopic liver in the literature are usually in the form of case reports as this anomaly is rare. The results of our search of case reports in PubMed

published from 2004 to 2020 showed that ectopic liver can be found in all age groups, from a newborn to old age. Ectopic liver is more frequent in women (61.8%). We found a relatively high incidence of ectopic liver in the right atrium and inferior vena cava (14.7%) that was not mentioned in earlier research[6]. Other frequently mentioned locations: the liver, gallbladder, spleen and thorax, were also frequent in our results. Rare locations of ectopic liver are the small bowel, muscles and skull.

Although it is said that ectopic liver is usually asymptomatic[1,3], in our data 60.3% of patients had some complaints that led to diagnostics and the discovery of ectopic liver as the cause of their problems. It is obvious that this tissue can cause unexpected clinical issues[9].

Contrary to the data in the literature that ectopic liver is usually found during surgery, in our sample it was mostly found by radiology (72.1%), which can be connected the greater availability and quality of radiological diagnostics in recent years.

Hepatocellular carcinoma was found in 38.2% of our cases, which is not a significant deviation from the 30% mentioned in earlier research[8]. It is significant to mention that all cases of ectopic liver in the pancreas had hepatocellular carcinoma, and that the incidence of HCC is high in the spleen and thorax. Although ectopic liver can be frequently found in the gallbladder, where it was described for the first time, occurrence of hepatocellular carcinoma at that location is rare. Other locations of ectopic liver are rare and occurrence of hepatocellular carcinoma there is also rare.

Hepatocellular carcinoma in ectopic liver causes symptoms in 80.7% of cases, which is almost double in relation to benign cases.

Ectopic liver is usually asymptomatic if it is in the gallbladder, and asymptomatic tissue is usually found during surgery.

Conclusion

Ectopic liver is a rare phenomenon which requires surgical removal and pathological analysis because of potential malignant alterations and occurrence of hepatocellular carcinoma. We must take this rare clinical entity into consideration during laparoscopic exploration when it can be removed before it becomes symptomatic or malignant.

Conflicts of interest

The authors have no conflict of interest.

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PROFESSIONAL PAPER

EMERGENCY SURGERY IN A REGIONAL HOSPITAL BEFORE AND DURING THE COVID 19 PANDEMIC

Zoran Matković [1]

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ABSTRACT

Background

In extraordinary situations the volume of work of all hospital services changes. The impact of the global COVID 19 pandemic, is classified as an international emergency situation. But, we do not know How did one regional hospital in Bosnia and Herzegovina cope with the COVID-19 pandemic in line with its capacities in terms of emergency surgery.

Materials and Methods

We used data from our surgical protocols - emergency surgery performed in our department during July and August in 2019 and 2020. We used descriptive statistics.

Results: The total number of examinations in the emergency surgical clinic was almost the same. The number of admissions in the period in question in 2020 was 36% lower in relation to the control period. The total number of operations was 17% lower. The number of emergency operations was 39.3% lower.

Conclusion: it may be said that emergency surgery functioned on a satisfactory level in our regional hospital, and that the results do not deviate significantly from data from the literature, except regarding emergency amputations and emergency surgery for malignant colorectal stenosis.

Keywords: Covid 19, emergency, surgery

INTRODUCTION

In extraordinary situations the volume of work of all hospital services changes. The impact of the global COVID 19 pandemic, proclaimed by the WHO on 11th March 2020, is classified as an international emergency situation. The Covid-19 pandemic affected many economic activities, all aspects of life, everywhere and all social and business activities[1,2].

In terms of surgery, the previous activities of many surgical associations aimed at developing the concept of "patient safety" were given new importance. New safety protocols were created, with the relevant algorithms for protection of both patients and physicians,

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and staff, for the appropriate surgical and non-surgical procedures[1,2]. On the basis of experiences from Asia and Europe, the emphasis was placed on personal protective equipment, both during transport and hospitalization[1,2].

All surgical procedures undermine immunity. The current virus draws iron from haemoglobin and releases it into free circulation, whereby the level of toxic activity is increased[1]. Immunity is a priority for both surgery and invasive procedures. Testing sometimes gives false negative results, so re-testing is practised after 3 days, sometimes after 7 days (the rules changed), and certainly before surgery. There is no alternative to a good surgical decision. The operation must be performed urgently if delay would lead to a longer time in hospital, subsequent re-admission or in any way cause harm to the patient[5,6,7]. Often a consiliary decision is needed. Risk assessment must be undertaken on the basis of the clinical condition, and if the patient is Covid 19 positive or there is a strong suspicion that they are, non-surgical treatment should be considered[3,4]. Cooperation with the anaesthesia team is vital, and during intubation there should be an anaesthesiologist with two anaesthetists in the operating theatre, and then the surgical team should enter, with no superfluous staff in the room. Work over night should be avoided, when the surgical team is limited[4]. There is no evidence that laparoscopic surgery increases the risk (due to the exsufflation of CO_2 from the patient's abdomen) but the duration of the surgery should be kept short. Therefore, the surgery must be performed in good time for the patient to have a good chance for recovery, whilst still preserving the person's health[2-4].

Table 1. The number of examinations, admissions and surgical procedures

Period	Total number of surgical examinations	Total number of admissions	Number of surgical procedures	Number of emergency procedures
1.7.2019.-31.8.2019.	1181	814	282	120
1.7.2020.-31.8.2020.	1168	527	234	73

Table 2. Distribution by diagnoses

	2019	2020
Appendicitis	36(30%)	19(26.02%)
Cholecystitis	23(19.1%)	11(15.06%)
Ileus (adhesions)	13(10.8%)	9(12.32%)
Incarcerated hernia	8(6.66%)	7(9.58%)
Amputations	7(5.83%)	8(10.95%)
Polytrauma	8(6.66%)	5(6.84%)
Perforation of hollow viscus	5(4.16%)	3(4.11%)
Wound dehiscence	4(3.33%)	2(2.74%)
Abscess	7(5.85%)	4(5.48%)
Malignant colorectal stenosis	9(7.5%)	5(6.85%)
TOTAL	120(100%)	73(100%)

In the case of the current pandemic, in our surgical department the criteria for admission have been tightened, there are fewer diagnostic procedures, work is in shifts - teams are changed every fourth day, and patients visit their doctors more cautiously and somewhat later.

The question for patients and doctors is: What is truly necessary?

The Aim of the Study

To compare the number and type of emergency operations performed during two summer months (July and August) before and during the Covid 19 pandemic. Did patients report for surgery later? How did one regional hospital in Bosnia and Herzegovina cope with the COVID-19 pandemic in line with its capacities in terms of emergency surgery.

Materials and Methods

We used data from our surgical protocols - emergency surgery performed in our department during July and August in 2019 and 2020. We used descriptive statistics.

Results

The total number of examinations in the emergency surgical clinic was almost the same (Table 1). The number of admissions in the period in question in 2020 was 36% lower in relation to the control period. The total number of operations was 17% lower. The number of emergency operations was 39.3% lower (Table 2).

The greatest differences were in the number of appendectomies - 36:19 (mostly phlegmonous), and cholecystectomies 23:11 (in 2020 more than half were gangrenous gall bladders) (Table 3). In the earlier, control, period, in 2019, there were a few more surgeries for malignant colorectal stenosis in the colon and rectum, wound dehiscence, and incision of abscesses (in 2020, 3 out of 4 abscesses were enormous).

The percentage of surgeries for perforation of the hollow viscus was almost the same (4.16%:4.11%).

The percentage of surgeries for incarcerated hernia (more often intestinal resection due to gangrene) and particularly amputation (above the knee) was higher in the period in question in 2020.

2019>2020 – appendectomy, cholecystectomy, malignant colorectal stenosis, wound dehiscence, abscesses

2019=2020 – perforation of the hollow viscus

2019<2020 – incarcerated hernia, limb amputations

Appendectomies performed – Intraoperative findings

Gangrenous, phlegmonous, normal

In the case of appendectomy, it may be noticed that the greatest difference was in the category of phlegmonous appendicitis (19/21) while there were slightly more gangrenous cases in 2019. The larger number of phlegmonous appendicitis also indicates the custom of some surgeons to declare a normal appendix to be inflamed (known to pathologists).

Emergency cholecystectomies revealed a higher number of gangrenous gall bladders (in 2020 63.6%, whilst in 2019 the figure was 43.4%), which indicates that surgery was performed later.

Table 3. Cholecystectomies performed

2019	Total performed: 23(19.1%)	Gangrene: 10(43.4%)
2020	Total performed: 11(15.06%)	Gangrene: 7(63.6%)

Table 4. The number of emergency laparoscopic procedures

	2019	2020
Appendectomia lap.	15(12.5%)	9(12.32%)
Cholecystectomia lap.	17(14.16%)	7(9.58%)

The number of laparoscopic procedures was proportionately lower in the same period in 2020, but without any great significance (Table 4).

Complications in emergency procedures:

2019 – 11/120(9.16%)
2020 – 7/73(9.58%)

Discussion

The literature is quite scant in relation to emergency surgery during the Covid 19 pandemic. The period is too short for any more comprehensive, wider conclusions[2,4].

Emergency cases became more challenging due to difficult and postponed diagnostics[1,10]. Some hospitals of a similar size in the region were converted to Covid 19 hospitals, and there was no work done in operating theatres[2]. Shift work made a so-called "second opinion" possible relating to a patient admitted the previous night, who was taken over by the next team that had to decide about an emergency procedure.

Most available research dates from the months of April, May and June of this year. The data indicate the smaller volume of emergency surgical procedures both in absolute numbers and percentages, when compared with two periods before and during the pandemic[1, 2]. The number of cholecystectomies fell (from about 15% to 5%), and appendectomies (from 32% to 25%)[10,11] as was also shown by this research, although the differences are smaller: the number of cholecystectomies fell from 19.1% to 15.06%, while the number of appendectomies fell from 30% to 26.2%. More than half the emergency surgery departments recorded a fall in the overall number of emergency conditions[4,13], which was also the case in our research.

Most authors noticed postponement, that is, patients presenting later with emergency surgical issues. In some studies, as many as 40% of non-traumatic emergency abdominal conditions had "postponed" treatment[9,11,13]! This was also noted in our research. The explanation is found in the patients' own choice to stay at home until their symptoms became worse, avoiding being infected, so that there was a higher number of complicated cases of appendicitis and cholecystitis, above the knee amputations due to wet gangrene, and incarcerated hernias with gangrenous intestines. Examples of fever which was not the result of Covid 19 infection but of an intra-abdominal process were also frequent. Changes in life habits, a diet with lower fat, reduced the number of acute cholecystitis[10]. In some centres there was a preference for non-surgical treatment using antibiotics for non-complicated appendicitis[6-8], which we did not practice. The equal number of surgeries for perforated hollow viscus indicates that some patients in the time of the pandemic were treated using the so-called Taylor method, that is, conservatively. All of this may explain why the percentage of conditions for which there is no alternative approach increased during the pandemic, such as incarcerated hernia (an increase from 5.5% to 14%), and malignant colorectal stenosis (increasing from 8.7% to 14%)[10,11]. In our research the number of surgeries for incarcerated hernia was also higher (6.66%:9.58%) while the percentage of malignant colorectal stenosis was slightly lower (reduced from 7.5% to 6.85%) which is not in line with the data from the literature. We also noticed a rise in the number of amputations - a jump from 5.83% to 10.95%. We explain this by

the more difficult diagnostics and the reduced work of vascular surgeons (in line with the reduction in surgical treatment of perianal abscesses - according to the recommendations of the leading surgical associations, we resolved minor cases on an out-patient basis, without bringing the patient into the operating theatre[4]. We did not stop performing laparoscopic cholecystectomies and appendectomies, according to the SAGES and EAES recommendations. In the literature, the laparoscopic approach was used in up to 69.6% of cases. The dispersion of aerosol particles was noticed in the operating theatre in only 32.3% of cases, according to the majority of studies[3,4]. It is believed that the work of surgeons in emergency situations overall was reduced to about 1/3 in comparison with the period before the pandemic (a reduction of about 60%). [9-11] In our research, that ratio was not so drastic. We had about 73 emergency operations in comparison with 120 in the control period, so the reduction was about 39.17%. It could be said that the work of our emergency surgery department was reduced by 1/3, so much less than in the literature.

More difficult diagnostics and restriction of the elective programme led to more complicated cases.

In the sense of organization, nasal swabs are taken in almost all centres from only symptomatic patients and surgeons, only 1 of 10 to 1 of 6 centres take nasal swabs from all patients and surgeons before entering the operating theatre[2-4]. In our centre we were not able to do this, a swab was taken from every patient immediately before admission to the ward. In general, in our country testing has been less frequent than in the region. According to data from the literature, more than 70% of surgeons have performed emergency surgery during Covid 19[10]. In this country, 75% of surgeons have performed emergency surgery during the pandemic. The number of complications was no higher than usual. From centre to centre it ranged from 7% to 8% (septic and respiratory)[6,7,11]. In our material there were about 9.58% complications.

Conclusion: The results relating to the number of operations are expected regardless of the fact that the availability of resources was similar (surgical and anaesthesia teams, staff, operating theatres). This was also the result of: the lower population in the region (it is reckoned that only 20% of people working temporarily abroad came home to the Doboj region in July and August this year), triage, testing for Covid, less movement by the population due to the pandemic, and fewer diagnostic procedures (EGD, colonoscopy, CDS, NMR, CT, angiography). Patients themselves came to their doctor somewhat later with acute abdomen, pain under the right costal arch and ileocecal pain, obstructed colon and bleeding, as well as the occurrence of perianal abscesses and incarcerated hernias. Bearing in mind the scope of the pandemic, it may be said that emergency surgery functioned on a satisfactory level in our regional hospital, and that the results do not deviate significantly from data from the literature, except regarding emergency amputations and emergency surgery for malignant colorectal stenosis.

Conflicts of interest

The authors have no conflict of interest.

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CASE REPORT

VAGINAL INSERTION OF ECTOPIC URETER DIAGNOSED IN ADULTHOOD, THE FIRST CASE IN BOSNIA AND HERZEGOVINA

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ABSTRACT

An ectopic ureter is defined as a ureter that does not insert into the normal anatomical position.
The occurrence of ectopic ureters is 1/2,000 in newborns and 1/2,000–4,000 in the general population. In most cases the ectopic ureter is associated with a duplicated renal collecting system, while in 20% a single system is found. The majority of cases are diagnosed during childhood as a result of continuous urinary dribbling or recurrent urinary tract infections.
In ectopic ureteral openings, diagnosis is often delayed because of inadequate evaluation;
in addition, most diagnostic methods do not provide sufficient information about ectopic ureteral openings.
In this particular case, we report on a patient with urinary incontinence and frequent episodes of urinary infections. In her childhood, she exhibited enuresis and was examined by a psychiatrist, followed by a neurologist and a gynecologist. CT urography revealed mainly hydronephrosis of the upper pole of the right kidney and a duplicate ureter on the right side, but not duplicate ureter insertion. Percutaneous nephrostomy was performed, with insertion of methylene blue into the collecting system. After the clinical investigation of the vagina with a speculum, a was observed blue dot at the vaginal fornix. Right partial upper pole nephrectomy and ureterectomy were performed.
An ectopic ureter opening is a clinical entity, rarely observed in a small country such as Bosnia and Herzegovina, but should be kept in mind during clinical evaluation of patients with incontinence, irrespective of the patient's age.

Keywords: ectopical ureter, vaginal, urinary incontinence, urinary tract infection, methylene blue

INTRODUCTION

An ectopic ureter is defined as a ureter that does not insert into the normal anatomical position.

The occurrence of ectopic ureters is 1/2,000 in newborns and 1/2,000–4,000 in general population. The gender ratio is 2–6:1 in favor of females [1]. In most cases (80–85%) the ectopic ureter is associated with a duplicated renal collecting system, while in 20% a

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single system is found [2]. The majority of these cases are diagnosed during childhood, as a result of continuous urinary dribbling or recurrent urinary tract infections (UTIs)[3].

Clinically, it is seen 2–12 times more frequently in women, while in autopsy series the female/male ratio was found to be 2.9/1 [4]. A small percentage (7.5–17%) of ectopic ureter cases are bilateral[5]. In men, it is usually accompanied by a single renal collecting system[6].

In women, the urethra opens into the vestibulum and occasionally, but rarely, it can open into the vagina, cervix, uterus, Gartner's duct, urethral diverticle or rectum. Normal urination, together with continuous incontinence, are the pathognomic features of infrasphincteric ureteral openings [5].

In ectopic ureteral openings, diagnosis is often delayed because the majority of diagnostic methods do not provide sufficient information about ectopic ureteral openings, and there is no established protocol for this congenital anomaly [2].

CASE DESCRIPTION

A 36-year-old-female was referred to our hospital (University Clinical Center, Tuzla) for investigation of urinary incontinence. She had continuous low volume urine leakage requiring 5 to 6 pads per day. Complete blood count, biochemical tests and urine analysis were normal, and two consecutive urine culture tests were negative.

In her childhood, the patient exhibited enuresis and was examined by a psychiatrist, followed by a neurologist and a gynecologist. There were no specific findings/diagnosis made. She had frequent episodes of urinary tract infections (up to 6 per year).

At the age of 28, she underwent urodynamic analysis that revealed slight detrusor hyperactivity, without the signs of stress urinary incontinence or residual urine. Cystoscopic findings were within normal range and she was prescribed a combination of Amzyol 3x10 mg and Tonocardin 1x1 mg therapy for 3 months, but this treatment did not result in any significant changes to her urinary leakage.

Ultrasonography showed a cortical cyst in the upper pole of the right kidney. This resulted in CT urography scanning. The images revealed important data about the entire collecting system and ureters, mainly hydronephrosis of the upper pole of the right kidney, and a duplicate ureter on the right side, one from the renal pelvis and the other from the upper pole (Figures 1-3).

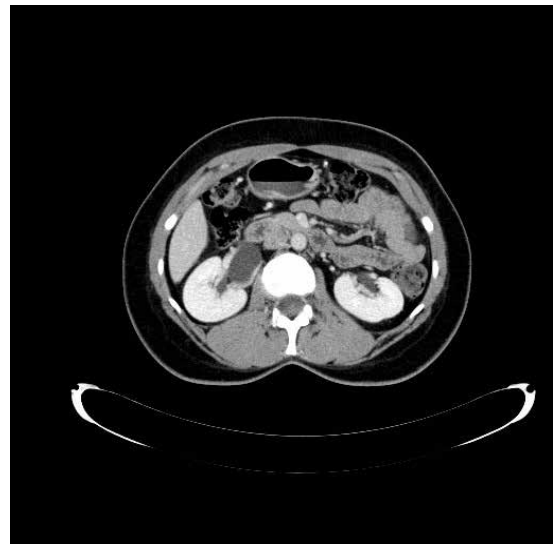

Figure 1. Double ureters emerging from the renal pelvis.

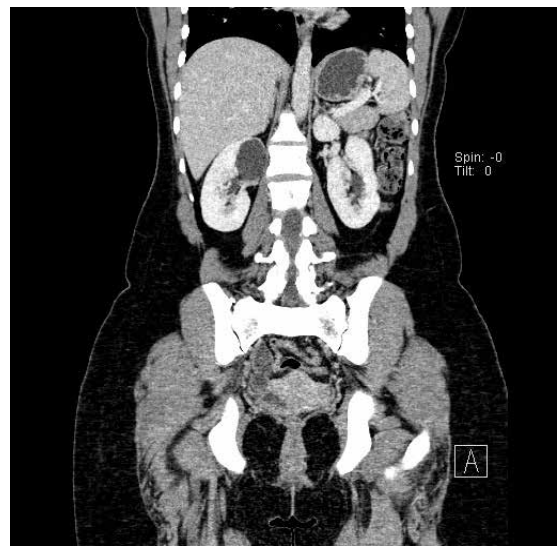

Figure 2. Hydronephrosis of the upper pole of the right kidney.

Figure 3. Infrasphinteric urinary leakage shown by contrast CT urography (arrow).

Figure 4. Urine leakage shown by contrast medium injection in the percutaneus nephrestomy system (arrow).

However, CT urography did not reveal duplicate ureter insertion. This prompted us to perform percutaneous nephrostomy and insert contrast medium into the percutaneous nephrostomy system. This revealed ureterohydronephrosis and contrast urine leakage (Figure 4). There were no obvious ectopic ureteral openings, which led us to insert 20.0 ml of methylene blue into the collecting system. Following the methylene blue, upon investigation of the vagina with a speculum a blue dot was observed at the vaginal fornix (Figure 5).

Surgery was performed next: partial nephrectomy and ureterectomy in the right upper pole. There were no postoperative complications detected. Following the surgical treatment urine leakage completely ceased almost immediately. Furthermore, one month postoperatively, ultrasonography revealed that the right kidney exhibited no signs of hydronephrosis (Figure 6).

Figure 5. Vaginal ectopic ureter opening detected using methylene blue (clinical vaginal examination).

Discussion

Even though ectopic ureter is a congenital anomaly, the diagnosis cannot generally be made before an advanced age because of inadequate anamnesis and assessments [7,8]. This was the case with our particular patient as well, as she was not diagnosed until the age of forty years.

The presenting symptoms in the patient depend on the insertion site of the ectopic ureter, and this

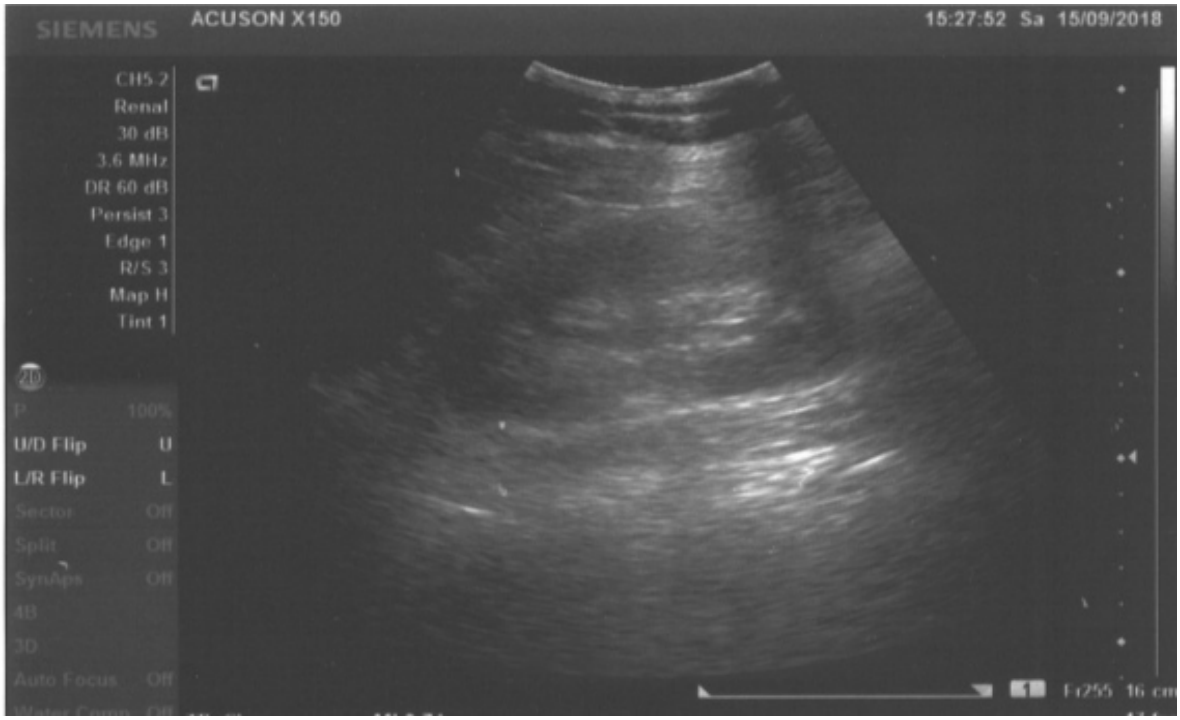

Figure 6. Control ultrasonography of the right kidney, with no sign of hydronephrosis.

differs between girls and boys[3]. Usually, males do not present urinary incontinence because of the ureter's insertion above the external urinary sphincter, but they may present with antenatal hydronephrosis or urinary tract infections.

Most girls present with urinary dribbling, as the insertion of the ectopic ureter bypasses the exterior urinary sphincter. Usually, affected girls have normal voiding patterns with small volume leakage or spotting incontinence. In females, the most frequent sites of ectopic ureter insertion are the bladder neck and upper urethra (33%), the vaginal vestibule between the urethra and the vaginal opening (33%), the vagina (25%), and, less commonly, the cervix or uterus (<5%)[3,9,10].

Only girls with a ureteral insertion at or above the bladder neck and upper urethra will be continent[1]. A single collecting system with an ectopic ureter is more frequently found in men, while in women the ectopic ureter is more commonly associated with a double collecting system[6].

As the patient ages, other causes of urinary incontinence are predominantly contemplated, and eventually the diagnosis of ectopic ureter is overlooked[11].

As in our patient, in the elderly, diagnosis of urge and/or stress type urinary incontinence was considered, and treatment planned accordingly. Many diagnostic tools were used for detection of urinary system anomalies.

According to Weigert-Meyer's law, ureter draining the lower pole should open more cranially, and become refluxive. However, in our patient the ureter draining the lower pole was in its normal position and non-refluxive. Regardless of all available diagnostic imaging, the value of methylen blue is significant and should not be underestimated as a diagnostic aid, especially in excretory type imaging studies. This method facilitates the confirmation of urinary tract junction obstructions, and visualization of hydronephrosis and hydroureter.

There is as yet no standardized protocol in place for diagnosing and treating these ectopic ureter

conditions. Our report suggests that in the diagnostic protocol, vaginal examination, followed by a cystoscopy and further imaging excretory type imaging studies with methylene blue instillation should be performed.

An ectopic ureter opening is a clinical entity, rarely seen in a small country such as Bosnia and Herzegovina, but should be kept in mind during clinical evaluation of patients with incontinence, irrespective of the patient's age.

Conflicts of interest

The authors have no conflict of interest.

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