

# Progress in gastrointestinal surgery: Track it, exhibit, and transmit to community benefit!

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## ÖZET

### Gastrointestinal cerrahide ilerleme: Takip et, uygula ve topluma yarar sağla!

Gastrointestinal ve minimal invaziv cerrahide son yirmi yılda meydana gelen gelişmeler, hem cerrahlar arasında hem toplumda ameliyat kavramına bakışı değiştirmiştir. Günümüzde hemen tüm abdominal ameliyatlarda laparoskopik /robotik yöntemlerle yapılabilir olarak kabul edilmektedir. Akademik tıp merkezlerinin vazgeçilmez bir görevi de, cerrahideki bu gelişmeleri takip etmek, güncel olarak uygulamak ve nihai hedef olarak toplum sağlığına katkı sağlayacak yenilerini geliştirmektir. Bu yazıda, Gülhane Askeri Tıp Akademisi Genel Cerrahi Anabilim Dalı'nda son yirmibeş ayda ilk kez gerçekleştirilen bazı ameliyatlara bu perspektiften ele alınmaktadır.

**Anahtar Kelimeler:** *gastrointestinal cerrahi, cerrahi ilerleme, güncel cerrahi pratik*

## SUMMARY

Advancements in gastrointestinal and minimally invasive surgery seen over the past twenty years have led both surgeons and the community to change the way they think about the term "surgical operation". Today, almost all abdominal surgical procedures are provisionally considered "doable" using laparoscopic / robotic techniques. A vital function of academic medical centers is to track these progresses, transfer them into their practice on time, and as ultimate goal, contribute to the community health by developing novel techniques. This paper discusses from the aforementioned standpoint some surgical procedures performed for the first time at Gulhane Military Medical Academy Department of General Surgery over the past twenty-five months.

**Key words:** *gastrointestinal surgery, surgical advancements, current surgical practice*

## Introduction

It is one of the natural purposes of academic medical institutions to track, adopt, and most importantly, contribute to advancements regarding novel diagnostic and therapeutic modalities. In the specific area of abdominal and gastrointestinal surgery, the past twenty years have witnessed significant achievements thanks to parallel development of new surgical instruments and minimally invasive techniques, among which are introduction of robotic and laparoscopic esophagectomies, gastrectomies, liver resections, pancreatectomies, colorectal resections and hernia repair.

With its history that goes back to the first half of the twentieth century, Gulhane Military Medical Academy Department of General Surgery in Ankara has been a part of or close follower to achievements that have been made by Turkish Surgical Community. Many important gastrointestinal surgical techniques, including Ivor-Lewis esophagectomy, transhiatal esophagectomy, conventional open radical gastrectomies, laparoscopic/robotic Nissen fundoplication, wedge resection of GIST situated in the stomach, obesity surgery, open liver and pancreas resections, completion pancreatectomy, liver transplantation, laparoscopic/robotic splenectomy, laparoscopic/robotic adrenalectomy, laparoscopic and open colorectal resections (right hemicolectomy, left hemicolectomy, anterior / low anterior resection, abdominoperineal resection, total proctocolectomy with ileal pouch anal anastomosis...etc) for colorectal cancer as well as for benign colorectal diseases, resections for sarcomas and other intraabdominal masses, cytoreductive surgery – HIPEC, proctologic interventions of several kind and hernia treatment have been in the armamentarium of our institute's surgical program for years.

The following tables provide a list of abdominal surgical procedures that were carried out for the first time in our department over a period of twenty-five months. The vast majority of the operations given below were performed by the same team consisting of the author accompanied by another staff surgeon or surgical fellow/resident, scrub nurse/technician and a circulating staff. The below tables thus may not include any other operations that were carried out by a different team within the same time interval. Table I provides name of each author who was the first to report on the corresponding operation in the literature (1-14). This is to reveal the time interval between the first operation performed in our department and the first description of that specific procedure. Table II provides information regarding critical aspect of each procedure that deserves attention and that has thus been mentioned here. Postoperative main

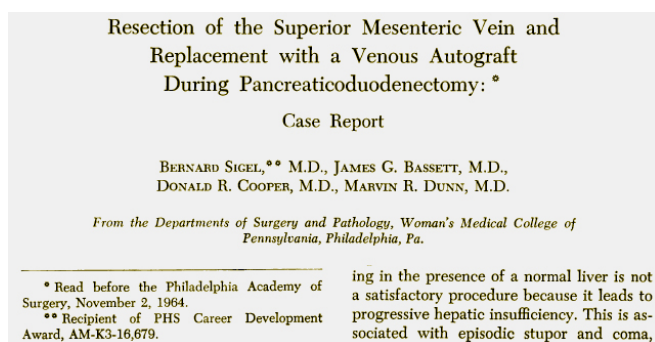
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complications and the way we managed that complication is also summarized in Table II. Table III gives detailed updated information of outcomes in patients with malignant conditions, including survival, and how every patient was doing at the time of drafting this manuscript.

In no part of the world significant surgical evolutions are free of obstacles. Similarly, our surgical program has encountered some difficulties throughout this period. Should multifaceted problems rise in particular, the situation may be difficult to overcome or even hinder the program to track current surgical progresses. These include, but are not limited to, institutional logistical problems, manpower insufficiencies, administrative rules, lack of trained surgeon who fixes know-how problems and navigates throughout preparation and operation phases of the procedure, physicians' reluctance or loss of motivation, low-volume hospital and restrictions in conducting clinical trials according to county laws and bylaws. Every factor stated above has the potential to interact with others which lies behind the multifaceted nature of the problem. As clearly demonstrated in the table, we seem to have been influenced by some of the aforementioned difficulties in tracking current advancements in a timely manner. Some procedures were performed at our institution with a two-decade delay; while some of those could be adopted relatively shorter period of time after it was originally described. Perineal rectosigmoidectomy for total rectal prolapse is a special occasion; we have tended not to adopt any surgical modality over laparoscopic rectopexy which have been performed successfully to treat rectal prolapse for years. I believe the overwhelming delay in adopting SMV/portal vein resection with venous autograft reconstruction during pancreaticoduodenectomy was mainly caused by low volume of this group of cases which in turn resulted in the limitation of criteria of resectability to tumors not invading SMV/portal vein. While partial SMV/portal vein resection and primary repair has long been in our practice; use of autologous veins for reconstruction of larger venous defects after pancreatic resections was just recently attempted, almost fifty years later Dr Sigel and colleagues described the procedure (**Figure 1**). The effect of factors that delay or prevent adoption of novel surgical techniques is also seen in the spectrum of complex upper gastrointestinal and other hepatopancreaticobiliary surgical procedures.



**Figure 1:** The original report by Bernard Sigel who was the first to describe venous autograft reconstruction after portal vein resection during the Whipple procedure in 1965.

Nevertheless, demonstrating efforts to track, adopt, and as ultimate goal, develop new surgical techniques should be an integral part of every surgeon's workload holding academic position at a faculty of medicine if that institute is to be one of

the best among other academic medical centers across the country. Today, this is a prominent reality showing itself more and more every day at a time when competition among tertiary care centers to offer better healthcare notably expands.

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**Table 1:** Procedures of gastrointestinal surgery performed for the first time at our institute over the past two years

Surgical Procedure	Date of operation at our institute	Author and date of first publication in relevant literature
<b>First Cases in Gastrointestinal Surgery - Malignant Conditions</b>		
• Laparoscopic Gastrectomy and D2 Lymph Node Dissection for Gastric Cancer	August 2013	Goh et al <sup>1</sup> , 1997*
• Laparoscopic Spleen Preserving Distal Subtotal Pancreatectomy and Lymph Node Dissection for Neuroendocrine Tumor of the Pancreas	June 2014	Gagner et al. <sup>2</sup> , 1996
• Spleen and Pylorus Preserving Total Pancreatectomy for Multifocal IPMN of the Pancreas	September 2014	Probably in the last two decades
• Whipple Procedure with SMV resection and Autologous Vein Graft Interposition for Locally Advanced Pancreatic Cancer	August 2013	Sigel et al. <sup>3</sup> , 1965
• Central hepatectomy for intrahepatic cholangiocarcinoma	January 2015	Wu et al. <sup>4</sup> , 1999
• ALPPS procedure for colorectal liver metastases**	February 2015	Schnitzbauer et al. <sup>5</sup> , 2012
• Single stage major hepatectomy and extralevator abdominoperineal resection for rectum cancer with multiple liver metastases	February 2015	Probably in the last two decades
• Laparoscopic Liver Left Lateral Sectorectomy for Liver Cancer	February 2013	Azagra et al. <sup>6</sup> , 1996
• Laparoscopic Isolated Anatomical Resection of Segment 2 for Rectal Cancer Liver Metastasis	April 2014	Probably in the last two decades
• Laparoscopic resection of large desmoid tumor adjacent to SMV and SMA	August 2014	-
• Laparoscopic Low Anterior Resection and Intersphincteric Dissection for Ultralow Rectal Cancer	August 2014	Watanabe et al. <sup>7</sup> , 2000
• Laparoscopic Panproctocolectomy with Permanent Ileostomy for FAP-associated Colorectal Cancer	October 2013	Wexner et al. <sup>8</sup> , 1993
<b>First Cases in Gastrointestinal Surgery - Benign Conditions</b>		
• Laparoscopic Bilateral Truncal Vagotomy and Gastroenterostomy for Pyloric Stenosis caused by Ulcer Disease	February 2014	Wyman et al. <sup>9</sup> , 1996
• Laparoscopic Liver Right Posterior Sectorectomy with Hilar Dissection for Large Hemangioma	October 2014	Cho et al. <sup>10</sup> , 2008***
• Laparoscopic Ventral Mesh Rectopexy for Rectal Prolapse in Young Male Patient	March 2014	D'Hoore et al. <sup>11</sup> , 2004
• Perineal Rectosigmoidectomy (Altemeier's Procedure) for Rectal Prolapse	May 2013	Altemeier et al. <sup>12</sup> , 1952
• Transvaginal NOTES Appendectomy for Acute Appendicitis	April 2014	Bernhardt et al. <sup>13</sup> , 2008
• Endoscopic Components Separation for Giant Loss of Domain Hernia	December 2012	Lowe <sup>14</sup> , 2000

\*The first laparoscopic assisted gastrectomy was reported by Kitano in 1994, however, Goh et al. were the first to report on gastrectomy with radical lymph node dissection for gastric cancer in 1997.

\*\* ALPPS: Associating liver partition and portal vein ligation for staged hepatectomy

\*\*\* Performed using extrahepatic Glissonian approach and epigastric specimen extraction. There is no article describing our technique of pure laparoscopic, gallbladder preserving hilar dissection with specimen retrieval through a pfannenstiel incision.

**Table II:** The critical aspect of the procedure, postoperative complications and management of complications for every corresponding operation.

Surgical Procedure	Critical aspect of the procedure	Postoperative complications	Management of complications
<b>First Cases in Gastrointestinal Surgery - Malignant Conditions</b>			
• Laparoscopic Gastrectomy and D2 Lymph Node Dissection for Gastric Cancer	Perivascular lymphatic dissection in oncological principles	Urinary tract infection	Antibiotherapy
• Laparoscopic Spleen Preserving Distal Subtotal Pancreatectomy and Lymph Node Dissection for Neuroendocrine Tumor of the Pancreas	Preservation of splenic vessels while performing curative pancreatic resection	Intraabdominal abscess	Percutaneous drainage + antibiotherapy
• Spleen and Pylorus Preserving Total Pancreatectomy for Multifocal IPMN of the Pancreas	Preservation of splenic vessels	None	NA
• Whipple Procedure with SMV resection and Autologous Vein Graft Interposition for Locally Advanced Pancreatic Cancer	Replacement of invaded vein with graft in very limited time to prevent bowel edema and liver ischemia	Delayed gastric emptying	Slow transition to solid foods
• Central hepatectomy for intrahepatic cholangiocarcinoma	Maintenance of blood supply to the right posterior and left lateral liver sections	None	NA
• ALPPS procedure for colorectal liver metastases**	Prevention of cut-surface complications and remnant liver failure	Biliary fistula	Prolonged drainage
• Single stage major hepatectomy and extralevator abdominoperineal resection for rectum cancer with multiple liver metastases	Completion of two long and complicated operation at one stage	Perineal fluid collection	Prolonged drainage
• Laparoscopic Liver Left Lateral Sectomy for Liver Cancer	Prototype operation for implementing routine laparoscopic liver surgery	None	NA
• Laparoscopic Isolated Anatomical Resection of Segment 2 for Rectal Cancer Liver Metastasis	Minor but anatomically difficult-to-perform operation due to access issues	None	NA
• Laparoscopic resection of large desmoid tumor adjacent to SMV and SMA	Very difficult operation due to 11 cm in size centrally located mass	Superficial wound infection	Drainage
• Laparoscopic Low Anterior Resection and Intersphincteric Dissection for Ultralow Rectal Cancer	Preservation of continence while achieving oncologically safe surgical margins	Incontinence to liquid stool	Biofeedback
• Laparoscopic Panproctocolectomy with Permanent Ileostomy for FAP-associated Colorectal Cancer	Long operation consisting of total colectomy and abdominoperineal resection	Superficial wound infection	Drainage
<b>First Cases in Gastrointestinal Surgery - Benign Conditions</b>			
• Laparoscopic Bilateral Truncal Vagotomy and Gastroenterostomy for Pyloric Stenosis caused by Ulcer Disease	Inadequacy in cutting true vagal fibers can result in late gastric perforation/bleeding	None	NA
• Laparoscopic Liver Right Posterior Sectomy with Hilar Dissection for Large Hemangioma	Highly complicated hilar dissection and longest transection line possible in liver resection	None	NA
• Laparoscopic Ventral Mesh Rectopexy for Rectal Prolapse in young male patient	Deep anterior dissection but sexual dysfunction should always be avoided as it is a benign condition	None	NA
• Perineal Rectosigmoidectomy (Altemeier's Procedure) for Rectal Prolapse	Both short and long segment resection can cause complications	None	
• Transvaginal NOTES Appendectomy for Acute Appendicitis	Offers quick recovery, vaginal access can be risky	None	NA
• Endoscopic Components Separation for Loss of Domain Ventral Hernia	Identification of the aponeurotic part of the external oblique muscle	Atelectasis	Breathing exercise

NA: Not applicable

\*\* ALPPS: Associating liver partition and portal vein ligation for staged hepatectomy

**Table III:** Oncological outcomes and the patient's current status for every corresponding operation.

Surgical Procedure	Oncological outcomes	Patient's current status
<b>First Cases in Gastrointestinal Surgery - Malignant Conditions</b>		
• Laparoscopic Gastrectomy and D2 Lymph Node Dissection for Gastric Cancer	Alive, free of recurrence	Doing well
• Laparoscopic Spleen Preserving Distal Subtotal Pancreatectomy and Lymph Node Dissection for Neuroendocrine Tumor of the Pancreas	Alive, free of recurrence	Doing well
• Spleen and Pylorus Preserving Total Pancreatectomy for Multifocal IPMN of the Pancreas	Alive, no proof of malignancy	On oral medications for type I diabetes
• Whipple Procedure with SMV resection and Autologous Vein Graft Interposition for Locally Advanced Pancreatic Cancer	Alive, free of recurrence	Doing well
• Central hepatectomy for intrahepatic cholangiocarcinoma	Alive	Doing well
• ALPPS procedure for colorectal liver metastases**	Alive	Have a drain in place for biliary fistula
• Single stage major hepatectomy and extralevator abdominoperineal resection for rectum cancer with multiple liver metastases	Alive	Have a drain in place for perineal collection
• Laparoscopic Liver Left Lateral Sectorectomy for Liver Cancer	Alive, free of recurrence	Doing well
• Laparoscopic Isolated Anatomical Resection of Segment 2 for Rectal Cancer Liver Metastasis	Alive, have recurrent liver metastases	Receiving chemotherapy
• Laparoscopic resection of large desmoid tumor adjacent to SMV and SMA	Alive, free of recurrence	Doing well
• Laparoscopic Low Anterior Resection and Intersphincteric Dissection for Ultralow Rectal Cancer	Alive, have unresectable liver metastases	Receiving chemotherapy
• Laparoscopic Panproctocolectomy with Permanent Ileostomy for FAP-associated Colorectal Cancer	Died of brain and lung metastases 12 months after surgery	Dead
<b>First Cases in Gastrointestinal Surgery - Benign Conditions</b>		
• Laparoscopic Bilateral Truncal Vagotomy and Gastroenterostomy for Pyloric Stenosis caused by Ulcer Disease	NA	Doing well
• Laparoscopic Liver Right Posterior Sectorectomy with Hilar Dissection for Large Hemangioma	NA	Doing well
• Laparoscopic Ventral Mesh Rectopexy for Rectal Prolapse in young male patient	NA	Doing well
• Perineal Rectosigmoidectomy (Altemeier's Procedure) for Rectal Prolapse	NA	Lost to follow-up
• Transvaginal NOTES Appendectomy for Acute Appendicitis	NA	Lost to follow-up
• Endoscopic Components Separation for Loss of Domain Ventral Hernia	NA	Doing well

NA: Not applicable

\*\* ALPPS: Associating liver partition and portal vein ligation for staged hepatectomy