SURGERY UPDATE
LEADING THE WAY
MEDICAL COLLEGE OF WISCONSIN **DEPARTMENT OF SURGERY**
SUMMER 2017 • VOLUME 8, NUMBER 2

We Wish Smooth Sailing to the Department of Surgery Graduating Chief Residents

Please join us for the Eberbach Lecture on June 16. This year's speaker will be Dr. Wayne Frederick, Surgical Oncologist and current President of Howard University. Dr. Frederick attended St. Mary's College in Port of Spain, Trinidad and Tobago before he entered Howard University at age 16 to pursue his dream of becoming a physician. He earned a dual B.S. / M.D. degree at 22 and began his surgical residency at Howard University Hospital. His mentor at Howard was one of the fathers of modern surgical oncology, Dr. LaSalle D. Leffall who coordinated a research fellowship for Dr. Frederick at the University of Texas M. D. Anderson Cancer Center. After completing his residency and research fellowship, Dr. Frederick returned to Anderson for a clinical fellowship in surgical oncology. Following a number of years on the faculty of the University of Connecticut, he returned to Howard University, and was appointed President on July 21, 2014.

2016–2017 Chief Residents: (From left to right) Drs. Elliot Asare, Anahita Dua, John Miura, Sarah Greenberg, Jason Glenn, Lisa McElroy, Munyaradzi Chimukangara, Rachel Morris and Hani Hasan. *Photographed in the Edwin H. Ellison Memorial Library.*

Chief Residents (and their future plans):

Elliot Asare, MD, MS
M. D. Anderson Cancer Center
Houston, Texas
Complex General Surgical Oncology

Munyaradzi Chimukangara, MD
The Ohio State University
Columbus, Ohio
Minimally Invasive and Bariatric Surgery

Anahita Dua, MD, MS, MBA
Stanford University
Palo Alto, California
Vascular Surgery

Jason Glenn, MD
University of Michigan
Ann Arbor, Michigan
Norman W. Thompson Fellowship in Endocrine Surgery

Sarah Greenberg, MD, MPH
University of Washington/Seattle Children's Hospital
Seattle, Washington
Pediatric Surgery

Hani Hasan, MD
Ascension Health
Private Practice

Lisa McElroy, MD, MS
University of Michigan
Ann Arbor, Michigan
Abdominal Transplant Surgery

John Miura, MD
Moffitt Cancer Center
Tampa, Florida
Complex General Surgical Oncology

Rachel Morris, MD
Medical College of Wisconsin
General Surgery

Fellows (and their staff positions in July):

Abdominal Organ Transplant Surgery Fellowship
Motaz Selim, MD, PhD
Medical College of Wisconsin
Transplant Surgery

Endocrine Surgery Fellowship
Emily EK Murphy, MD
Surgical Institute of South Dakota
Sioux Falls, South Dakota

Hepatopancreatobiliary Fellowship
Nikolaos Chatzizacharias, MD
Consultant Surgeon
HPB and Liver Transplant
University Hospital
Birmingham, UK

Minimally Invasive Surgery Fellowship
Kathleen Lak (Simon), MD
Medical College of Wisconsin
Assistant Professor of Surgery
Division of General Surgery

Pediatric Critical Care Fellowship
Ruchi Amin, MD
Medical College of Wisconsin
Milwaukee, Wisconsin

Pediatric Surgery Fellowship
Elizabeth Berdan, MD
Practice Plans In Process

Surgical Critical Care Fellowship
Nat Bonfanti, MD
Practice Plans In Process

James Cooros, MD
Acute Care Surgeon
Dartmouth-Hitchcock Medical Center
Dartmouth, New Hampshire

Vascular Surgery Fellowship
Brian Keyashian, MD
Bay Area Surgical Specialists
Walnut Creek, California

IN THIS ISSUE:

JAWS of Life: Career of a Trauma Surgeon

John A. Weigelt, MD, DVM

Dr. John A. Weigelt

On November 10, 2017, the Department of Surgery will honor Dr. John A. Weigelt with a Festschrift to celebrate his outstanding accomplishments and upcoming retirement from the Medical College of Wisconsin (MCW). Dr. Weigelt has been a faculty leader at MCW since 1999, when he was recruited to Milwaukee as the General Surgery Residency Program Director and Chief of the Division of Trauma, Critical Care and Acute Care Surgery. A Fellow of the American College of Surgeons (FACS) since 1982, Dr. Weigelt is the Milt & Lidy Lunda/Charles Aprahamian Professor of Surgery; Professor and Chief, Division of Trauma, Critical Care and Acute Care Surgery. He most recently completed 10 years of serving as both the Associate Dean for Quality at MCW and Medical Director of Quality at Froedtert Hospital (2005-2015). His leadership as the Trauma Program Director has established Froedtert and MCW as a national leader in the care of injured patients and the only Level One Trauma Center in Southeastern Wisconsin. For over 30 years, Dr. Weigelt has greatly impacted the quality of patient care and the education of faculty, residents, and students around the world.

SAVE THE DATE:

A Festschrift to Honor John A. Weigelt, MD, DVM

November 10, 2017.

Dr. Weigelt's involvement and leadership in local, regional, national, and international programs are numerous. He has been a member of and held leadership roles in a range of American College of Surgeons (ACS) programs and committees. He has been a member of the ACS Committee on Trauma (COT) since 1992 and, in that time, served as COT Chair (1994–1998) and COT Membership Committee Chair (1998–2004).

Dr. Weigelt has been deeply involved in many ACS educational programs. He began serving as an author of the Surgical Education and Self-Assessment Program (SESAP®) during SESAP VII, joined the Advisory Committee during SESAP IX, and has served as Medical Director of SESAP since 2001. He helped to start the General Surgery Review course at the Clinical Congress in 2007 and has functioned as Course Director of the Comprehensive General Surgery Review Course since its beginning in 2010.

Dr. Weigelt's involvement in local and national educational programs and committees is representative of his dedication to surgical education and practice. He has been a member of MCW's Residency Education and Evaluation Committee (1999–2010); Executive Committee (2001–present); Peer Review Committee (2004–present); and Society of Teaching Scholars (member, 2006–present and Chair in 2007), among many others. He has also chaired the Trauma Committee (1999–present) and the Joint Quality Committee (2004–2015). In 2012, he was awarded the Thomas L. Smallwood Award for Patient Care Excellence by the Board of Directors of Froedtert Hospital.

Dr. Weigelt has been recognized as a premier surgical educator. In his tenure as Professor at the University of Minnesota (1992–1999), he was twice awarded the Wangensteen Award for Excellence in Teaching (1993, 1999). Since joining MCW, he has twice been awarded the Teacher of the Year Award (2004, 2010). In 2013, he was honored by being elected one of the Giants of General Surgery by UT Southwestern and Parkland Foundation, recognizing his excellence and dedication to teaching. Dr. Weigelt also has mentored 88 medical students, residents, fellows, and faculty in his career, and served as Program Director for Surgical Critical Care at UT Southwestern and University of Minnesota and as General Surgery Residency Program Director at MCW.

Dr. Weigelt has presented more than 150 local, regional, and national lectures in his career, as well as 20 lectures on the international stage, in addition to serving as faculty for more than 130 postgraduate courses and symposia throughout the United States.

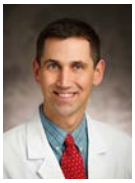
Dr. Weigelt has been the Editor-in-Chief of the *Journal of Surgical Education* (2006–2017) and of the audio *Practical Reviews in General Surgery*. He was the Editor of the *Journal of Surgical Outcomes* from 2002–2007. He was an Associate Editor with *Selected Readings in General Surgery (SRGS)* when it was published at UT Southwestern Medical Center (1989–1996) prior to the program's transfer to the ACS. Additionally, he has served on the editorial boards of the *Journal of Trauma*, the *Pan American Journal of Trauma*, the *Journal of Critical Care Medicine*, and *Advances in Therapy*. He is a reviewer for *Critical Care Medicine, Surgery*, and previously reviewed *Archives of Surgery*. As a contributor, he has published more than 150 medical journal articles, written more than 50 book chapters, and has been a contributing or associate editor of more than 60 entries in *SRGS*.

Dr. Weigelt graduated from Michigan State University, Lansing, with a bachelor of science degree, and earned his doctor of veterinary medicine degree from the same institution. He completed his medical degree at MCW, and his internship and residency at UT Southwestern. He completed his master's in hospital administration at the University of Wisconsin-Madison.

Dr. Weigelt received the 2015 Distinguished Service Award (DSA) of the American College of Surgeons during the College's 2015 Clinical Congress, one of the largest international meetings of surgeons in the world. The DSA is the highest honor bestowed by the ACS. In 2017, he will be honored with the Lifetime Achievement Award from Michigan State University. •

For more information on the November 10 Festschrift, please contact Heidi Brittnacher at hbrittna@mcw.edu or 414.805.9427.

Thoracic Outlet Syndrome



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Thoracic outlet syndrome (TOS) results in a range of upper extremity complaints, secondary to compression of neurovascular structures which traverse the thoracic outlet. The pertinent structures include the lower cord of the brachial plexus, the subclavian artery and the subclavian vein. These structures pass through three areas where compression can occur; the interscalene triangle, the costoclavicular space and the subpectoral space. TOS can be divided into three subtypes; neurogenic (approximately 95% of TOS), venous (4%) and arterial (1%).[1] The management and diagnostic algorithm for each subtype is unique and the approach to treatment is variable for each type. Treatment often involves a combination of physical therapy, medications, and possibly surgical decompression of the thoracic outlet. Surgical approaches to decompress the thoracic outlet can be through supraclavicular, infraclavicular, or transaxillary incisions, with the common goal of removal of the first rib, division/resection of anterior/middle scalene muscles, possible division of the subclavius muscle, and resection of aberrant anatomy with reconstruction as needed.

Patients presenting with neurogenic TOS (nTOS) typically describe a history of repetitive activities involving the upper extremity, usually related to recreational activities or employment. It is not uncommon to have a history of neck or upper extremity trauma, or to have an anatomic variant such as a cervical rib. Patients present with a wide variety of complaints. These include pain in the neck, shoulder or arm, weakness or muscle wasting in the involved extremity, paresthesia, and also headaches. The diagnosis is often difficult to make, and many confounding diagnoses should be excluded. No single study is uniformly successful in making the diagnosis of nTOS; though cervical MRI, nerve conduction studies, and scalene injections with local anesthetic or botulin toxin may aid in the diagnosis and occasionally the treatment. Initially, the treatment of nTOS centers on a conservative approach; physical therapy and limiting the inciting activity, augmented by medical management to alleviate inflammation and chronic discomfort. A success rate of 60–70% can be expected with non-operative management for nTOS if a routine is followed for at least eight weeks.[2]

A stepwise approach is preferred, first evaluating symptoms for other causes, followed by physical therapy (PT) with minimal pharmaceuticals. A CT scan is usually obtained to evaluate for compression of adjacent structures and to assess for altered anatomy. If the patient obtains a good result with PT, this can be continued as needed. If symptoms persist, then a referral for a scalene injection is made; relief of symptoms will support the fact that surgical resection may yield an acceptable result. Surgical decompression is accomplished through a transaxillary approach with resection of the first rib, accompanied by division of the anterior and middle scalene muscles. If altered anatomy is identified, then a supraclavicular approach would be considered.

Patients with venous TOS (vTOS) characteristically present with a heavy, tight, swollen and painful arm. There may be associated visible superficial veins present around the shoulder girdle, with symptoms typically exacerbated by strenuous activity. The diagnosis of vTOS is usually confirmed with a venous ultrasound that identifies extensive subclavian and axillary vein deep vein thrombosis (DVT), known as the Paget-Schroeder Syndrome. Other considered causes for axillary subclavian DVT are Pancoast tumors, central line-related thromboses, and hypercoagulable states.

With an acute presentation, lytic therapy with a tissue plasminogen activator may be instituted. The timing of post-lysis thoracic outlet decompression is still debated; until the thoracic outlet is decompressed, the patient is usually maintained on oral anticoagulation. In the case of a delayed presentation, the utility of lysis must be specific to the patient. With increasing delays, the likelihood of a good response to lysis is lessened. The patient is often offered transaxillary first rib resection with anterior scalenectomy and division of the subclavius muscle, which provides adequate decompression of the thoracic outlet. In some instances, the vein may be surgically repaired at the time of first rib resection. In the case of chronic venous occlusion, there also appears to be a benefit in first rib resection followed by prolonged anticoagulation, the subclavian vein reopens in many cases after the culprit anatomy is addressed.[3]

An acute upper extremity DVT associated with TOS is treated with lysis when possible, followed by a transaxillary first rib resection. Treatment of the associated DVT would need to continue for an appropriate time as well, usually three to six months total. Individuals with a delayed presentation are treated with first rib resection and a prolonged course of anticoagulation to give the vein a chance to reopen. Post-resection venography and angioplasty may be beneficial in those individuals with residual venous stenosis after a first rib resection.

The least common manifestation of TOS is the arterial type, aTOS. Patients present with symptoms of hand and/or arm ischemia, arm claudication, rest pain, pallor or tissue loss. Occasionally, a palpable aneurysm of the subclavian artery may be present. There is almost always a boney abnormality present with aTOS; abnormal first rib, cervical rib, abnormal fusion of first and second ribs, prior first rib fracture, or prior clavicle fracture. Imaging prior to intervention is often a CT scan and an angiogram. When significant arterial abnormalities exist, arterial repair or bypass is often required along with thoracic outlet decompression. Often a supraclavicular approach is required,

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7T MRI Staging of Rectal Cancer: Emerging

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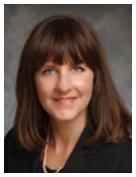

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The treatment of rectal cancer is complex, commonly involving multimodal therapy. The optimal treatment strategy for non-metastatic rectal cancer is primarily surgical, and is frequently preceded by neoadjuvant chemoradiation.[1] Although surgical intervention is the cornerstone of rectal cancer treatment, it comes at a cost. Surgical resection for rectal cancer can be complicated by dramatic, life-altering changes in bowel function, urinary and sexual dysfunction as well as the possibility of a permanent colostomy.[2] Interestingly, 10-30% of patients who have received neoadjuvant treatment have a complete clinical response to therapy, yielding no residual tumor nor malignant lymph nodes at the time of surgical resection.[3,4] Thus, two fundamental questions must be raised: Is it safe to manage these patients non-operatively? How can these patients be reliably identified?

There is emerging research focused on the possibility and safety of non-operative treatment. The "watch and wait" approach in rectal cancer has been studied in patients who have had a complete clinical response by physical, endoscopic, and radiologic exams after neoadjuvant treatment. Patients are monitored closely with digital rectal exams, proctoscopy, CEA level, and imaging.[4,5] Although these patients are monitored in a multimodal fashion, no single test has been identified that can accurately and reliably identify patients that have had a complete response. In fact, some patients who were thought to have a complete response do recur. Fortunately, surgical resection is almost always still feasible in these patients. The Division of Colorectal Surgery at the Medical College of Wisconsin is investigating if state of the art magnetic resonance imaging (MRI) can accurately identify the complete responder cohort.

MRI is the imaging study of choice in rectal cancer. Most clinical MRI scanners operate at 1.5-3 Tesla (T), a unit of magnetic strength. Resolution improves as magnetic strength increases. The MCW campus is fortunate to house one of only twenty 7T MRI scanners in the world capable of imaging the human pelvis. The Division of Colorectal Surgery is currently enrolling patients with rectal cancer to investigate the accuracy of the 7T MRI. Patients in the trial undergo neoadjuvant treatment prior to surgery. During surgery, the rectal specimen is excised and suspended in a normal saline-filled canister, which is then imaged in the 7T MRI. Multiple sequences are obtained, including T1-weighted 3D RF-spoiled gradient echo isotropic sequence and a T2-weighted 3D fast spin echo isotropic sequence (GE, Milwaukee, WI). MR imaging results are then compared with pathologic results.

The results thus far have been encouraging. In the initial cohort of rectal cancer patients, there was very strong correlation between the radiologic and pathologic interpretations regarding both tumor

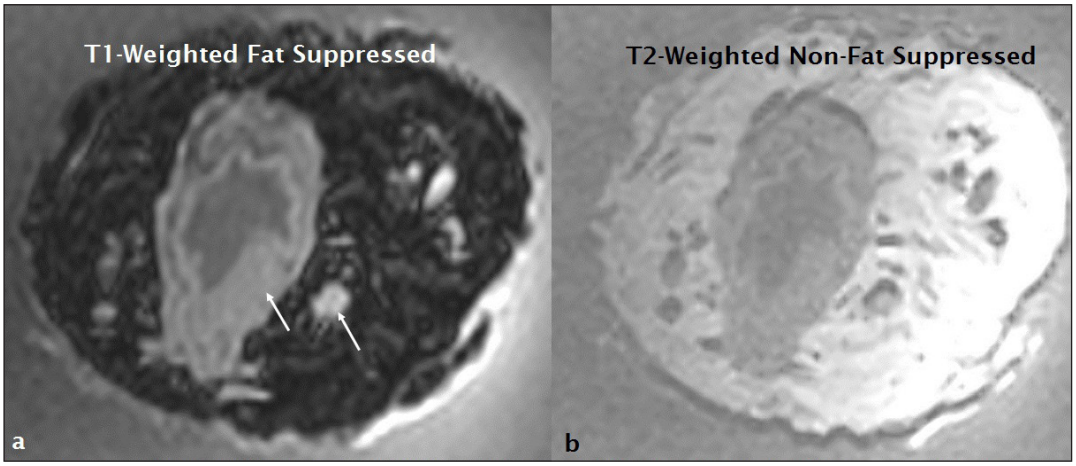

Figure 1: A comparison of the T1-weighted (a) and T2-weighted (b) 7T MR images of the human rectum. Note the layers of the rectal wall, which are obscured by a tumor at approximately 4 o'clock, as well as a lymph node with signal heterogeneity and spiculations, signifying malignancy (a). These details are not visible on the T2-weighted sequence (b).

Data from MCW

Figure 2. Sagittal view of 7T MR image of a full rectal specimen, with a tumor in the distal rectum (arrow) signifying malignancy.

depth (T-grade) and lymph node involvement (N-grade). One patient was staged as a T3 on pathologic review, but was staged as T2 on radiology. However, this tumor only extended 200 micrometers into the muscularis propria. The determination of lymph node status was identical for all patients on radiologic and pathologic review. On conventional MRI, lymph nodes less than 5mm in diameter cannot reliably be identified. However, at 7T, malignant lymph nodes as small as 2mm were correctly identified.

The correlation between the pathologic and radiologic exams has incredible potential. If tumor depth and lymph node involvement can be accurately predicted, so can the absence of tumor. In the next phase of the study, patients with rectal cancer will undergo 7T MRI of the rectum *in vivo* after neoadjuvant treatment. Patients will then proceed to surgery as planned, and pathologic data will again be compared to the 7T MR images. This research study has the potential to identify patients that may safely forgo surgical resection and its associated complications, recovery time, healthcare expense, and pain.

This exciting work is supported in part by funds raised during the annual *Get Your Rear in Gear,* Milwaukee 5K run/walk event. The Medical College of Wisconsin partners with the Colon Cancer Coalition for this event to raise research funds and to increase awareness of screening for colon and rectal cancer. All are welcome at the event, which is routinely attended by those whose lives have been touched by a diagnosis of colon or rectal cancer. **The next *Get Your Rear in Gear* event will be held on Saturday, October 14, 2017, at the Rotary Performance Pavilion, Wauwatosa, WI. For more information, please visit http://coloncancercoalition.org/ or contact Lynn Dickinson at 414-805-1690.** •

FOR ADDITIONAL INFORMATION on this topic, see references below, please visit mcw.edu/surgery, or contact Dr. Ridolfi, 414-805-1701, tridolfi@mcw.edu.

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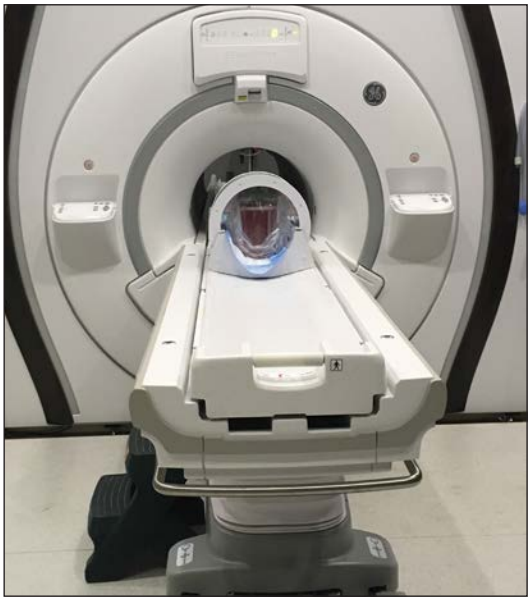

Figure 3. 7T MRI Scanner on the MCW campus actively imaging a rectal cancer specimen.

Loop Ileostomy Closure as an Overnight

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Following complex colorectal reconstructions, creation of a loop ileostomy allows for the diversion of fecal contents to protect healing distal anastomoses (Figure 1).[1] Despite the clinical benefit of reducing anastomotic leaks, even temporary ileostomies remain a large source of morbidity for patients, encouraging loop ileostomy closure/reversal as soon as feasible.[2,3] While data show that closure of temporary loop ileostomies result in a very low risk (~1%) of anastomotic leaks, postoperative management of loop ileostomy closure is not standardized due to concerns over prolonged ileus and high readmission rates.[4,5] However, enhanced recovery pathways for ileostomy closure could decrease length of stay, free inpatient beds, and prevent hospital-acquired conditions, all while maintaining low readmission rates.

Institutional protocol for discharge following loop ileostomy closure

In 2012, an enhanced recovery pathway (ERP) for loop ileostomy closure was implemented in the MCW Division of Colorectal Surgery. Prior to closure, the protocol is described to the patient, and all closures are performed through circumstomal technique with either hand-sewn or (more commonly) stapled anastomosis, followed by repair of the fascial defect. Patients are then admitted as inpatient status following closure of their loop ileostomy. Clear liquid diet is initiated immediately following surgery, and all patients are observed overnight and examined the following morning. Postoperative pain control is achieved with acetaminophen, ibuprofen, and narcotics if needed. Adjuncts such as gabapentin, nerve blocks, and alvimopan are not routinely used in our protocol.

The following morning, if patients are able to ambulate, pass urine and have no clinical signs of peritonitis or ileus, their diet is advanced to a full liquid diet. Patients who tolerate the full liquid diet and meet all other institutional discharge criteria are then discharged on postoperative day one and instructed to remain on a full liquid diet at home. A skilled outpatient advanced practice provider calls patients within 72 hours of discharge to appropriately direct return of the patient's normal preoperative diet. Patients return to clinic within one week of discharge following surgery to see an advanced practice provider, and again at four weeks following surgery to see the surgeon.

Examination of our institutional protocol

To determine if the MCW protocol for loop ileostomy closure is safe and effective, we performed a review of our institutional experience of adult patients undergoing loop ileostomy closure and compared it to similar patients from the National Surgical Quality Improvement Project (NSQIP) database. The hypothesis of the project was that patients can be safely discharged after loop ileostomy closure using an ERP, leading to clinically significant decreased length of stay without increased readmission or complication rates.

A total of 1,602 patients undergoing loop ileostomy closure were identified, 85 (5.3%) from MCW and 1,517 (94.7%) from the NSQIP set, with the remainder of those from our institution (5.3%, n=85). Length of stay was significantly shorter at our institution compared to the NSQIP cohort (2 vs. 4 hospital days, $p<0.001$), and median difference in length of stay was one hospital day (95% Mann-Whitney C.I.: 1-2 days). The overall estimated adjusted length of stay in a negative binomial regression model was 3.82 days, with our institution demonstrating a lower adjusted length of stay compared to the NSQIP set (2.93 vs. 5.58 days, $p<0.001$). Unanticipated readmission was not different between the cohorts, with 15.3% in the MCW cohort and 10.4% in the NSQIP cohort ($p=0.15$). Overall, 30-day morbidity and major morbidity were also not significantly different between the MCW and NSQIP cohorts. There was no association between cohorts and odds ratio for readmission ($p=0.22$).

Procedure

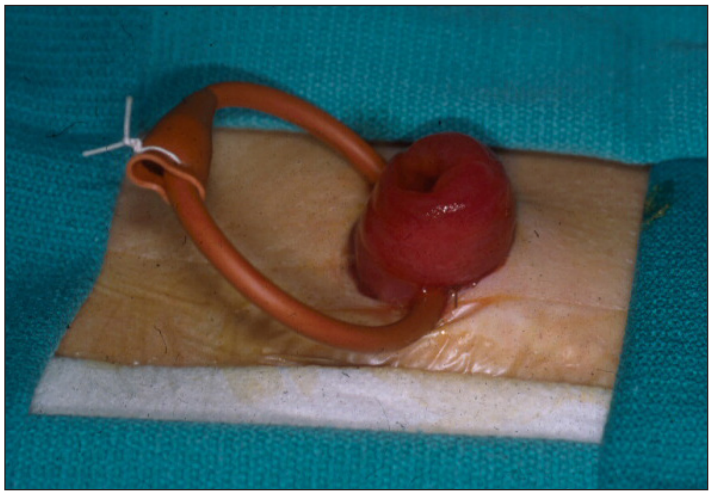

FIGURE 1: Picture of a newly created diverting loop ileostomy.

These results demonstrated a significant decrease in length of stay of a full hospital day at our institution compared to the national control. These results were accomplished without a significant increase in readmission rates or morbidity, concerns which have remained at the center of the controversy in the use of ERPs following loop ileostomy closure. Despite the 10-15% readmission rates in our review, this is within previously reported 10-20% readmission rates for enhanced recovery pathways in colon surgery.[6,7] As such, a paradigm shift in the way ileostomy closure is managed during the postoperative period has the potential to save valuable hospital and provider resources and improve patient satisfaction, with cost savings of up to $1,200 when ileostomy closure is treated as a day-surgery case.[8]

This is the first analysis to compare our institution's length of stay, readmission, and complication rates following loop ileostomy closure to a national control. Based on these results, enhanced recovery pathways can be successfully implemented following closure of loop ileostomy, with next-day discharge, protocoled diet advancement, and close telephone follow-up considered safe and acceptable afterwards. Patients can benefit from decreased length of hospital stay without increased rates of readmission or complications, and the MCW protocol has the potential to change the practice of postoperative management of loop ileostomy closure as well as decrease cost. For more information on this study and our protocol, please see forthcoming manuscript in *Diseases of the Colon and Rectum*. •

FOR ADDITIONAL INFORMATION on this topic see references, visit mcw.edu/surgery or contact Dr. Peterson, 414-805-5783, cypeterson@mcw.edu.

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Ex vivo Parathyroid Aspiration as a Valuable but the Intraoperative Confirmation of Parathyroid

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Accurate intraoperative identification of abnormal parathyroid tissue is necessary for successful parathyroidectomy. Visual confirmation of parathyroid tissue can be challenging; therefore, many surgeons obtain intraoperative confirmation that the resected specimen represents parathyroid tissue prior to completion of the operation.[1-5] Traditionally, confirmation of parathyroid tissue has been accomplished with intraoperative frozen section. However, frozen section can be time consuming and/or yield indeterminate results.[2, 6-8] These concerns with frozen and the routine availability of intraoperative parathyroid hormone (IOPTH) monitoring have made *ex vivo* parathyroid aspiration and analysis of the IOPTH level a valuable alternative to frozen section for the intraoperative confirmation of parathyroid tissue.

Ex vivo aspiration with analysis of IOPTH for parathyroid confirmation was first described in 2000 by Perrier et al. in a series of 41 patients, with a reported specificity and sensitivity of 100%.[4] Subsequently, other studies with small sample sizes have found similar diagnostic accuracy and have suggested that this technique may be associated with potential cost savings.[2-4, 9] Recently, at the Medical College of Wisconsin, we retrospectively reviewed a prospectively collected database of patients who underwent parathyroidectomy for primary hyperparathyroidism between January 2011 and August 2015. In these operations, the presumed parathyroid tissue was aspirated with multiple passes of a 3 mL syringe, prefilled with 1 mL of normal saline, using a 25-gauge needle (Figure 1). The sample was centrifuged and an aliquot was run concurrently with the serum IOPTH samples.

Ex vivo aspiration of suspected abnormal parathyroid tissue for IOPTH level (pg/mL) were obtained on 921 tissue aspirates. There were 847 (92%) samples confirmed as parathyroid on histopathology,

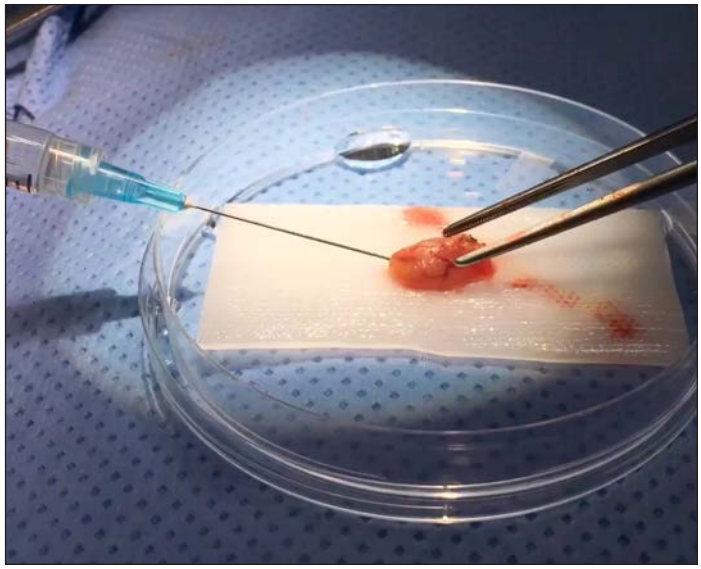

FIGURE 1: *Ex vivo* aspiration of a parathyroid gland.

with a mean ± SD aspirate IOPTH level of 3838 ± 1615 pg/mL. These 847 aspirates included 833 (98%) with aspirates IOPTH levels above the serum IOPTH and 14 (2%) with aspirate IOPTH levels below the serum IOPTH. A total of 74 (8%) aspirates were not parathyroid tissue, with a mean aspirate IOPTH level of 25 ± 12.7 pg/mL. Sensitivity and specificity analysis were performed for this data and an aspirate IOPTH ≥1.5x the serum IOPTH represented the optimal threshold for confirmation of parathyroid tissue.

Given our success with *ex vivo* aspiration, we decided to study the variability in intraoperative techniques for parathyroid identification/

Potentially Underutilized Technique for Tissue

confirmation among American Association of Endocrine Surgeons (AAES) members. The objective was to determine the preferred method of intraoperative identification of parathyroid tissue by AAES members, including reasons for its use and potential barriers to incorporation of other methods.

For this study, a de-identified 12-question electronic survey regarding techniques for intraoperative identification/confirmation of parathyroid tissue and the use of IOPTH monitoring was distributed to 608 members of the AAES. The survey addressed surgeon familiarity with techniques for parathyroid identification/confirmation, their primary and secondary techniques, advantages/disadvantages related to their primary technique, and how the surgeon became familiar with these techniques. Additional questions addressed surgeon use of IOPTH monitoring. Responses were collected between November 2015 and January 2016. AAES approval was obtained, prior to distribution.

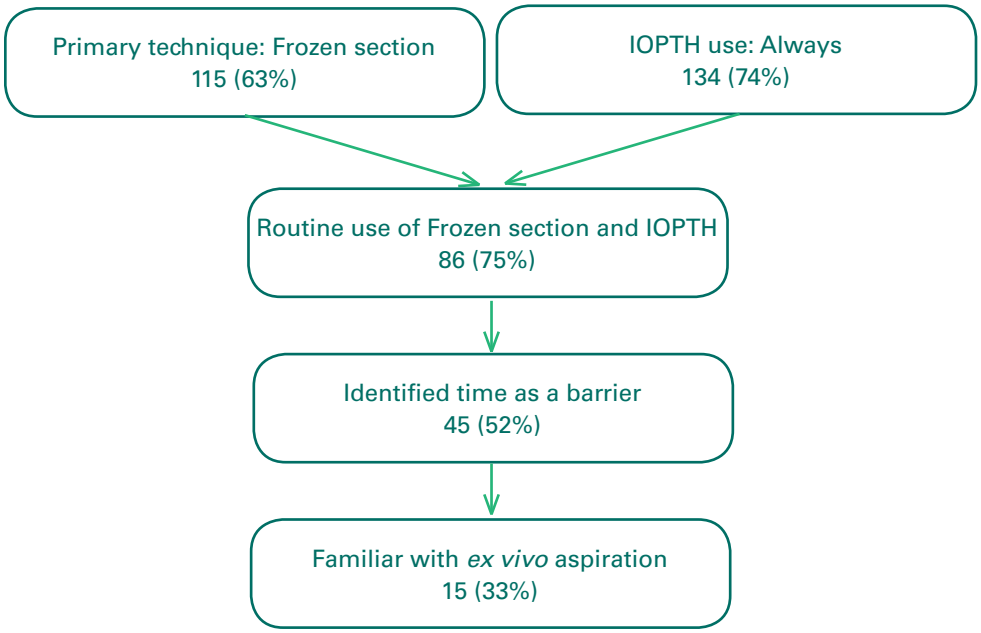

FIGURE 2: Respondent's familiarity with *ex vivo* aspiration who endorsed time as a barrier and routinely used frozen section and IOPTH.

A total of 608 AAES members were contacted to complete the survey, with 182 (30%) respondents. Intraoperative frozen section was utilized by 115 (63%) respondents as their primary method to confirm parathyroid tissue, but *ex vivo* aspiration was used by only 12 (7%) respondents. Familiarity with different techniques varied, but only 78 (42%) respondents were familiar with *ex vivo* aspiration. Respondents generally became familiar with their primary technique in residency and/or fellowship, very few cited a conference or journal article. Greater than half of respondents reported they preferred their primary technique because of availability, familiarity, ease of use, and rapid results; with rapid results being cited by 100% of respondents who used *ex vivo* aspiration. A barrier to respondent's primary technique was cited by 100 (55%) respondents; of these, the most common was time (71; 71%). Of those who reported time as a barrier, 63 (89%) respondents used frozen section as their primary technique. None of the respondents who utilized *ex vivo* aspiration cited time as a barrier.

Most respondents (134; 74%) always used serum IOPTH, and 75% had results in under 30 minutes. However, the majority (110; 62%) of respondents did not know how patients were charged for IOPTH. Of the 134 respondents who consistently used IOPTH, 86 (64%) respondents used frozen section as their primary technique for parathyroid identification/confirmation. Time was identified as a barrier in over half of respondents in this group, but only a third were aware of *ex vivo* aspiration as an alternative to frozen section (Figure 2).

Overall, this study demonstrated that most respondents used frozen section for confirmation of parathyroid tissue and also used IOPTH on all cases. Time was the most common barrier reported by those who used frozen section. Interestingly, *ex vivo* aspiration was associated with rapid results by 100% of respondents who utilized this technique, but it was not commonly used and was familiar to less than 50% of respondents. This may be partially because respondents are not aware of this technique, and less than 10% of respondents acknowledged a journal article and/or conference with how they became familiar with their primary technique. The majority of respondents attributed their familiarity to residency and/or fellowship. This limited familiarity from journal articles/

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conferences would suggest the need to look at other platforms, such as online media, to further distribute knowledge of new techniques.

Although *ex vivo* aspiration appears to be a viable method to confirm parathyroid tissue and is associated with rapid results, it was not commonly used by AAES members. It appears that many surgeons were not aware of this technique. This suggests the need for broader dissemination of novel techniques, potentially through non-traditional methods. •

FOR ADDITIONAL INFORMATION information on this topic, see references, please visit mcw.edu/surgery, or contact Dr. Wang, 414-805-5755, tswang@mcw.edu.

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TOS: continued from page 3

giving exposure to the proximal subclavian artery for control and repair. Occasionally, additional incisions allow for safe repair, or a bypass may be needed.

In summary, TOS is a complex diagnosis that affects primarily young patients with a variety of differing presentations, and has many treatment options. Appropriate management requires the coordinated efforts of many individuals, including physical therapists, pharmacists, interventional radiologists, anesthesiologists, and surgeons. These patients are often young and should be expected to have excellent outcomes when a dedicated team provides the care required for these difficult-to-manage conditions. •

FOR ADDITIONAL INFORMATION on this topic, please visit mcw.edu/surgery, or contact Dr. Lewis, 414-805-9160, blewis@mcw.edu.

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Minimally Invasive Colon Resection for Diverticular Disease: Challenges and New Techniques

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Diverticulitis imposes a huge clinical and economic burden to the United States health care system with over 300,000 admissions and 1.5 million days of inpatient care annually.[1] Simple or uncomplicated diverticulitis is limited to inflammation of the colonic wall and clinically presents with lower abdominal pain and/or tenderness on exam. Free perforation, abscesses, fistulae, strictures and/or obstruction all mark complicated disease. Elective resection is usually offered to patients after recurrent bouts of uncomplicated diverticulitis or after a complication of diverticulitis occurs. In the setting of repeated bouts of inflammation or in complicated disease, one can expect to find that inflammation distorts normal tissue planes and makes open and, even more so, laparoscopic dissection very challenging. The principle limitation of laparoscopic sigmoid colectomy for diverticular disease is lack of tactile feedback and inability to use digital dissection. For these reasons, laparoscopic sigmoid colectomy for diverticular disease has been associated with a high conversion rate of up to 23.5%,[2] with many patients, perhaps, not even offered a minimally invasive approach due to perceived complexity. An analysis of the nationwide inpatient sample between 1992 and 2001 showed that only 3.6% of patients requiring surgery for their diverticular disease underwent a laparoscopic resection.[3]

Hand-assisted laparoscopic surgery emerged in the 1990s as a technique to overcome the shortcomings of laparoscopic surgery while allowing patients to benefit from a minimally invasive approach. The use of hand-assisted laparoscopic techniques for colorectal surgery has expanded to be used for both malignant and benign colorectal conditions. We recently evaluated our institution's experience surrounding the outcomes, including complications and the conversion rate of elective hand-assisted laparoscopic sigmoid colectomy for patients with either simple or complicated diverticular disease.

Fifty-eight patients underwent elective sigmoid resection for diverticulitis from 2008-2012 at our institution, the Medical College of Wisconsin. All patients initially presented to the colorectal surgery clinic due to prior history of diverticulitis. Patients with active diverticulitis were excluded from the study. All patients were offered a hand-assisted laparoscopic approach regardless of patient or disease-related factors. All operations were performed by the same surgeon in the elective setting. There is no comparison group of patients undergoing open or straight laparoscopic resection as we do not typically manage this disease process at our institution via these approaches.

Twenty-five patients (43%) had complicated diverticulitis. We converted to open procedure in two patients (3%) due to dense adhesions and chronic inflammation. When patients in the complicated diverticulitis group were compared to patients in the simple diverticular disease group, the complicated disease group had a significantly longer operative time, more blood loss, and

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Table 1: Comparison of demographic, clinical and operative data between patients with simple and complicated diverticular disease.

	Simple Diverticular Disease N=33	Complicated Diverticular Disease N=25	P value
AGE [a]	55.2±1.95	58.9±2.7	0.25
SEX (% male)	39	48	N/A
BMI (Kg/m2)[a]	29.8±1.2	31.9±1.38	0.26
Number of Prior Abdominal Operations[a]	1.2±0.2	1.00±0.2	0.45
ASA score[a]	2.57±0.08	2.68±0.09	0.37
Operative Time (min)[a]	155.1±4.5	179.6±7.6	0.005*
Estimated Blood Loss (ml)[a]	68.2±9.2	164.3±5.7	0.0001*
Conversion to Open[b]	0	2 (8%)	0.18
Return of Bowel Function (days)[a]	2.63±0.1	3.1±0.3	0.12
Length of Hospital Stay (days)[a]	3.9±0.25	4.8±0.3	0.02*

Quantitative Data are expressed as the mean ±SEM
*Values are significantly different (P< 0.05)
[a]Student's T Test
[b]Fisher's Exact Test

Colon Resection, continued from page 11.

longer hospital stay (Table 1). The complication rate was 15.5% overall. All complications were due to ileus, urinary tract infections/urinary retention, wound complications and superficial surgical site infections (Table 2). There was no difference in rate of complications or readmissions between the simple and complicated diverticulitis groups. There were no anastomotic leaks in either group.

Our institutional experience provides evidence that elective hand-assisted laparoscopic sigmoid colectomy for diverticulitis is safe and effective in patients with complicated diverticular disease. There can be little doubt, based on a large base of evidence accumulated over the last two decades, that the use of laparoscopic techniques in colorectal surgery offers patients better short-term outcomes, which include decreased post-operative analgesia requirements, earlier return of bowel function, shorter hospital stay, and more rapid return to normal activities when compared to open procedures.[4] Specific to diverticular disease, laparoscopic sigmoid resection was associated with a 15.4% reduction in major post-operative complications, less pain and shorter hospital stay at the cost of longer operating time when compared with open resection.[5]

Repetitive bouts of inflammation and complicated disease result in dense pericolic and mesenteric adhesions and distortion of normal anatomic tissue planes, making surgical dissection difficult and potentially hazardous in these cases. The use of laparoscopic resections for patients with diverticular disease has been associated with conversion rates between 7 and 23%.[2,5-7] In a subset analysis of patients with complicated diverticular disease, the conversion rate to open operation goes up to 75%.[7] Studies have shown that hand-assisted laparoscopic colon resections provide the same benefits as standard laparoscopic techniques, with the added advantage of lower conversion rates, a slightly shorter operative time and a shorter learning curve.[8,9] In a retrospective review comparing outcomes of laparoscopic and hand-assisted laparoscopic sigmoidectomy for diverticular disease, Lee et al. found that hand-assisted laparoscopy was associated with a significantly lower conversion rate (4.8 vs. 14%).[7] Anderson et al. reported that surgeries started as straight laparoscopic sigmoid resections for diverticular disease were completed in that fashion only 59% of the time, with 23% being converted to open and 18% converted to hand-assisted laparoscopic resections.[2] However, patients in the hand-assisted laparoscopic group had a conversion rate of 6%.[2] Our data suggest an even lower conversion rate (3%) with our hand-assisted laparoscopic approach.

Our institutional experience shows that elective hand-assisted laparoscopic sigmoid colectomy for diverticulitis is associated with a low complication and low conversion rate, even in patients with complicated diverticular disease. A standardized elective hand-assisted laparoscopic sigmoid colectomy allows the maximum number of patients with diverticular disease to benefit from a minimally invasive approach. •

FOR ADDITIONAL INFORMATION on this topic, see references, please visit mcw.edu/surgery, or contact Dr. Ludwig, 414-805-1690, kludwig@mcw.edu.

TABLE 2. Morbidity and Mortality

	Simple Diverticular Disease N=33	Complicated Diverticular Disease N=25	P Value
All complications	3 (9%)	6 (24%)	0.15
Surgical site infections/ wound complications	1 (3%)	3 (12%)	0.31
Ileus	1 (3%)	1 (4%)	1.0
Urinary tract infections/Urinary retention	1 (3%)	2 (8%)	0.57
30 day mortality	0	0	N/A
30 day readmission	0	1 (4%)*	0.43

*One readmission for failure to thrive/volume depletion.

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Surgical Approach to Liver Resection

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Laparoscopic surgery has become the preferred approach for a variety of abdominal procedures over the past few decades. The first reported laparoscopic liver resection (LR) was in 1993,[1] but many did not recognize the feasibility until 2000 when Cherqui et al. detailed a cohort of 30 patients.[2] Now, as more centers report large laparoscopic series of major and minor hepatectomies, these techniques are increasingly common.[3] Such technical improvements in LR have allowed broadened indications to include patients with more extensive underlying liver disease.[4] Despite this potential increased risk of bleeding and/or liver failure, morbidity and mortality associated with LR has decreased with the concurrent increased use of laparoscopy.[5] General consensus in the academic community is that laparoscopic LR by experienced surgeons is a safe and effective technique for management of selective cases.[6] The topic of laparoscopic conversion to open hepatectomy is less frequently discussed.

Many studies have compared outcomes of laparoscopic to open LR, often showing laparoscopy to be either non-inferior or superior to an open approach. In patients with oncologic disease, margin status and disease are similar.[7] Laparoscopic LR consistently shows less blood loss and a shorter length of stay than open LR, but morbidity and mortality is either similar or favors laparoscopy.[7] The origin of this potential benefit for laparoscopic LR is thought to be the lack of a large incision.[8] Common logic would suggest that the advantage of a laparoscopic approach would be lost if the procedure undergoes conversion to an open hepatectomy. Appendectomy and cholecystectomy conversions to open have been associated with higher complication rates when compared to laparoscopic or planned open cases, while colectomy conversions to open have fewer blood transfusions, a shorter time to first bowel movement, and shorter length of stay than open colectomy.[9] Several small series have explored the effect of conversion to open on LR outcomes, but a large population has not been analyzed.

Blood loss is the most common reason for laparoscopic conversion to open LR, followed by failure to progress.[6] It is unclear whether blood loss is significantly higher in conversion to open than open LR, or if such a difference in blood loss is associated with worse postoperative outcomes. Such questions regarding conversion to open, blood loss, and postoperative outcomes have implications for intraoperative management of laparoscopic LR.[10] This study sought to analyze the impact of laparoscopic conversion to open LR on postoperative outcomes and the clinical and demographic factors associated with conversion to open. We hypothesize that conversion to open sacrifices the initial advantage of laparoscopy, but has similar outcomes to open LR.

Table 1: Logistic regression analysis of factors associated with minimally invasive surgery as an intended approach for liver resection.

	Univariate		Multivariate	
Pre-op characteristics, OR (95% CI)	**Odds Ratio**	***p value***	**Odds Ratio**	***p value***
Age, years, median (IQR)	1.00 (0.99-1.01)	0.855		
Age ≥ 65	1.03 (0.85-1.25)	0.745		
Gender				
Male	1.00		1.00	
Female	1.43 (1.19-1.73)	**<0.001**	1.25 (1.02-1.54)	**0.035**
Race	0.93 (0.86-1.00)	0.057		
White				
African American				
Asian				
Other/Unknown				
Hispanic	1.08 (0.70-1.65)	0.741		
BMI, median (IQR)	1.02 (1.00-1.03)	**0.011**	1.01 (0.99-1.02)	0.412
Current smoker	0.86 (0.66-1.13)	0.280		
Diabetes	0.97 (0.75-1.26)	0.828		
Ascites	0.94 (0.32-2.80)	0.918		
Viral Hepatitis (B and/or C)	1.22 (0.91-1.64)	0.187		
Pathology				
Benign	1.00		1.00	
Primary hepatobiliary cancer	0.42 (0.33-0.55)	**<0.001**	0.54 (0.41-0.71)	**<0.001**
Secondary (metastatic) cancer	0.44 (0.35-0.55)	**<0.001**	0.54 (0.41-0.71)	**<0.001**
Neoadjuvant therapy	0.62 (0.50-0.77)	**<0.001**	0.87 (0.67-1.13)	0.287
COPD	1.00 (0.60-1.66)	0.993		
Hypertension	0.93 (0.77-1.13)	0.474		
Steroid use for chronic condition	1.00 (0.61-1.64)	0.998		
Weight Loss	0.49 (0.27-0.88)	**0.017**	0.57 (0.31-1.07)	0.079
ASA	0.89 (0.76-1.03)	0.115		
1				
2				
3				
4				
5				
Type of Resection				
Partial lobectomy	1.00		1.00	
Total left lobectomy	0.50 (0.35-0.70)	**<0.001**	0.48 (0.33-0.68)	**<0.001**
Total right lobectomy	0.19 (0.14-0.27)	**<0.001**	0.21 (0.15-0.30)	**<0.001**
Trisegmentectomy	0.13 (0.07-0.24)	**<0.001**	0.13 (0.07-0.26)	**<0.001**

Patients undergoing LR between January 1, 2014 and December 31, 2014 at hospitals participating in the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Targeted Hepatectomy module were included in this study. Data for each case was collected for patient demographics, comorbidities, clinicopathologic characteristics and values, intraoperative details, and short-term postoperative outcomes. Patients were stratified by surgical approach into one of three groups: minimally invasive (MIS), conversion to open, or planned open. Univariate and multivariate analysis of independent factors contributing to intended approach, conversion to open, morbidity, readmission, and mortality was performed by logistic regression. Outcomes of interest were compared before and after propensity matching for the three surgical approach cohorts.

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Liver Resection, continued from page 13.

After surgical approach exclusion criteria were applied, 2,884 hepatectomy cases remained from the 3,064 available in the dataset. A planned open approach was chosen in 81.0% of patients (n=2,335). Of the remaining procedures, which were all intended as MIS, 20.9% resulted in conversion to open (n=115). Outcomes of the overall sample population within thirty days were as follows: 9.5% underwent an invasive postoperative intervention, 3.1% required reoperation, median length of stay (LOS) was six days (IQR: 4-7), 10.4% experienced a readmission, 35.3% had at least one morbidity-defining complication, and mortality was 1.6%.

Multivariate analysis revealed several factors as independent predictors of the intended surgical approach (Table 1). Planned open procedures were used as a reference to show odds ratios for MIS: female gender (OR 1.25; 95% CI 1.02-1.54), tumor malignancy (OR 0.54; 95% CI 0.41-0.71), left lobectomy (OR 0.48; 95% CI 0.33-0.68), right lobectomy (OR 0.21; 95% CI 0.15-0.30), and trisegmentectomy (OR 0.13; 95% CI 0.07-0.26).

For patients undergoing intended MIS, odds ratios for conversion to open were determined. On multivariate analysis, hypertension (OR 1.99; 95% CI 1.27-3.12), left lobectomy (OR 2.32; 95% CI 1.17-4.60), and right lobectomy (OR 2.31; 95% CI 1.12-4.79) were independent predictors of conversion to open.

Logistic regression for postoperative outcomes included preoperative characteristics used in addition to intraoperative details. Surgical approach was not an independent predictor of morbidity, readmission, or mortality.

Although conversion to open was not an independent predictor of bleeding requiring transfusion (p=0.069), the odds ratio trended toward significance (OR 1.92; 95% CI 0.95-3.88).

In the propensity-matched comparison of conversions to open versus MIS, conversions to open were associated with a higher chance of transfusion (25.9% vs. 9.0%, p<0.001), longer LOS (5 days vs. 3 days, p<0.001), and higher morbidity (38.4% vs. 17.6%, p<0.001). Conversions to open also had an over fourfold higher mortality, although the result did not reach statistical significance (3.6% vs. 0.8%, p=0.073). No significant differences existed between the propensity-matched conversion to open and planned open groups for any of the measured outcomes.

MIS is a safe and effective method for LR in select patients. Patients with hypertension and those undergoing left or right lobectomy may be identified for a higher risk of conversion to open. The technical challenges of a lobectomy may explain the increased likelihood for conversion to open, but further research is needed to explain hypertension as a risk factor. Conversion to open from MIS to open during LR results in higher morbidity, a longer LOS, and a trend toward higher mortality, when compared to procedures completed by MIS. These findings may explain a portion of the difference in morbidity seen in previous MIS versus open studies, but the benefit of MIS outweighs the risk of conversion to open in appropriately selected patients. Conversions to open show nearly identical outcomes to planned open cases, and should not be considered a failure of MIS. Rather, conversion to open is a necessary step in the management of some minimally invasive LRs that exhibit bleeding, failure to progress, or some other impediment to continuation.

The Division of Surgical Oncology conducts ongoing research utilizing nationally representative data in order to better serve a growing patient population. Knowledge of the risk factors and outcomes associated with differing surgical techniques allows us to more thoughtfully select candidates for LR from a diverse patient population, and to choose the optimal approach for those patients. •

FOR ADDITIONAL INFORMATION on this topic, see references, visit mcw.edu/surgery or contact Dr. Gamblin, 414-805-5020, tcgamblin@mcw.edu.

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Use of i2b2 Cohort Discovery Tool to Identify Potentially Unrecognized Primary Hyperparathyroidism

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Primary hyperparathyroidism (pHPT) is the third most common endocrine disorder and manifests with elevated serum calcium levels and inappropriately elevated parathyroid hormone (PTH) levels.[1] Symptoms of pHPT include nephrolithiasis, gastroesophageal reflux disease, and fragility fractures secondary to decreased bone mineral density, resulting in osteopenia or osteoporosis. Patients may also notice nonspecific neuropsychiatric symptoms such as fatigue, weakness, exhaustion, joint pain, depression, and changes in sleep quality.[2,3] Given the nonspecific nature, these symptoms have not traditionally been included in the symptoms of pHPT, and when present, many of these symptoms are often attributed to other causes, such as advanced age, stress, and/or menopause.[1,4] However, up to 80% of patients present with what is considered "asymptomatic primary hyperparathyroidism," and in a recent study, up to 40% of patients demonstrated improvement of these nonspecific symptoms after curative parathyroidectomy.[4,5]

Even after years of documented hypercalcemia, it is common for patients with pHPT to go undiagnosed and untreated, even though parathyroidectomy is the only cure for pHPT and is a procedure associated with low morbidity and mortality rates.[6] In a recent population-based analysis of 9 hospitals and 13 outpatient clinics within a single health care system that examined patients with hypercalcemia, of the 43% of patients with hypercalcemia who were thought likely to have pHPT, 19% never had PTH levels checked and only 1% were diagnosed with pHPT.[6] The hypothesis of the current study was that similar findings may be found within our health care system, and the purpose was to determine the prevalence of potentially undiagnosed pHPT within a tertiary care health care system.

We performed a retrospective review of de-identified patient data of all patients from Froedtert Health collected within the Informatics for Integrating Biology and the Bedside (i2b2) Cohort Discovery Tool between January 1, 2015 and September 30, 2015. For the purposes of this analysis, the study cohort was defined as any patient with at least one serum calcium level >10.2 mg/dL (normal, 8.6-10.2) and PTH level of >30 pg/mL (normal, 16-72) in the study period; labs were not necessarily drawn concurrently. All patients who met these initial criteria were then divided into four groups based on the presence or absence of an International Classification of Disease 9 (ICD9) diagnosis of HPT (pHPT, secondary/tertiary HPT, HPT not otherwise specified, and no diagnosis of HPT). The presence of symptoms of pHPT (nephrolithiasis, gastroesophageal reflux disease [GERD] and/or bone-related disease [osteopenia, osteoporosis, or compression fractures]), and referral to Endocrinology or Surgery within the study period were determined. These findings were then compared between two groups of patients: those PTH levels between 30-70 pg/mL and those with PTH levels >70 pg/mL.

The cohort included 941 patients. Of these, 446 (47%) patients had a maximum PTH of 30-70 pg/mL and 495 (53%) patients had a maximum PTH >70 pg/mL. Those patients with a maximum PTH >70 pg/mL were more likely to have a diagnosis of pHPT than those with PTH 30-70 pg/mL (Table 1). There were no differences between the two groups with respect to reported symptoms (Table 2). Overall, 462 (49%) were referred to endocrinology and/or surgery for additional evaluation (Table 3). There was a higher rate of referral for surgical consultation in patients with a PTH >70 pg/mL (154; 31%) than in patients with a PTH between 30-70 pg/mL (98; 22%).

Based on the findings of this study, patients with elevated serum calcium levels and maximum PTH levels 30-70 pg/mL appear to be less frequently referred for evaluation/treatment of potential pHPT

continued on page 16

and less frequently diagnosed with pHPT than patients with PTH levels >70 pg/mL. In addition, patients with PTH levels between 30-70 pg/mL were less likely to be referred for potentially curative parathyroidectomy, even though they presented with symptoms at a similar rate. Despite the limitations of the de-identified i2b2 database, this study suggests that pHPT may be underdiagnosed and undertreated within the health care system. Further examination of these data and broader dissemination of the diagnosis and symptoms of pHPT to primary care and other providers should be considered. •

Table 1: Rates of diagnosis of pHPT between patients with PTH 30-70 and >70.

	PTH 30-70 pg/mL N=446 (%)	PTH >70 pg/mL N=495 (%)	p-value
Diagnosis			<0.0001
pHPT	93 (21)	191 (39)	
Secondary/Tertiary HPT	13 (3)	108 (22)	
Unspecified HPT	54 (12)	94 (19)	
No HPT diagnosis	286 (64)	102 (21)	

Table 2: Rates of symptoms between patients with PTH 30-70 and >70 pg/mL.

	PTH 30-70 pg/mL N=446 (%)	PTH >70 pg/mL N=495 (%)	p-value
Symptoms			0.521
One Symptom	182 (41)	212 (43)	
Bone	83 (46)	78 (37)	
GI	78 (43)	111 (52)	
Renal	21 (12)	23 (11)	
Two symptoms	117 (26)	128 (26)	
GI/Bone	74 (63)	83 (65)	
Renal/Bone	25 (21)	20 (16)	
Renal/GI	18 (15)	25 (20)	
Three symptoms	17 (4)	21 (4)	
None	130 (29)	134 (27)	

Table 3: Rates of referrals between patients with PTH 30-70 and >70 pg/mL.

	Total cohort N=941 (%)	PTH 30-70 pg/mL N=446 (%)	PTH >70 pg/mL n=495 (%)	p-value
Referral				0.005
Endocrine	210 (22)	102 (23)	108 (22)	
Endocrine & Surgery or Only Surgery	252 (27)	98 (22)	154 (31)	
No referral	479 (51)	246 (55)	233 (47)	

FOR ADDITIONAL INFORMATION on this topic, see references, visit mcw.edu/surgery or contact Dr. Wang, 414-805-5755, tswang@mcw.edu.

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American College of Surgeons Clinical Congress
San Diego | October 23, 2017

Plan to join us on Monday, October 23, 2017 at the MCW Department of Surgery / Marquette Medical Alumni Association reception during the American College of Surgeons 103rd Annual Clinical Congress.

The reception will be held 6:00 to 8:00 p.m. at the University Club atop Symphony Towers, 750 B Street, in the Founder's Room on the 34th floor.

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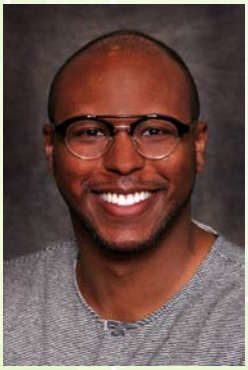

Chad Barnes, MD, PGY3 Surgery Resident, has been selected as the inaugural recipient of the SSAT/SBAS Resident/Fellow Research Award for his proposal, "Quantification of Mutant KRAS from Cell-free DNA from Patients with Pancreatic Cancer."

The award includes $25,000 to support his research.

The Society for Surgery of the Alimentary Tract (SSAT) is committed to advancing the science and practice of surgery in the treatment of digestive disease, and the Society of Black Academic Surgeons (SBAS) motivates, mentors and inspires young surgeons and medical students to pursue academic careers. This research fellowship award is provided to a resident or fellow member of the SBAS to support research being conducted in the in the laboratory of an SSAT member. Dr. Susan Tsai serves as Dr. Barnes' mentor for this research program.

MCW Department of Surgery is honored to host the annual meeting of the SBAS in 2020.

WE LOVE JULY!

The Department of Surgery welcomes the incoming 2017–2018 PGY1 General Surgery Residents:

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Washington University
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Pranav Dadhich
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The First Walk in Memory of Dr. Kenneth First

By: Meg M. Bilicki, Director of Development for the Department of Surgery

The First Walk is a family-friendly run/walk that takes place in Houston, Texas, at NASA Area Little League ballpark. Whether you are a runner, jogger, co-chair, volunteer, or cheering spectator – at the end of the day, you are a catalyst for change and a supporter of pancreatic cancer research.

The First Walk began in 2015 when Kenneth First, MD, was diagnosed with metastatic pancreatic cancer only a few weeks after his symptoms began. Ken resolved to heighten the awareness of pancreatic cancer prevention, diagnosis, and treatment for patients, their families, and friends. Proceeds from the event are directed to advancing pancreatic cancer research and clinical care far into the future.

Dr. First was a dedicated orthopedic surgeon and sports medicine physician. His interests were broad, but focused on the family that he loved so much. His greatest pride was to see his children carry his values forward in the classroom, on the athletic field, and in life itself. His passion for coaching and mentoring young athletes in a variety of sports was a staple as well. When not coaching, he loved playing sports throughout his life.

No one has impacted Houston's sports-medicine community more than Dr. Kenneth First, a Harvard-educated, former All-American lacrosse player. Ken's love of sports and radio broadcasting became the perfect mix for sports radio listeners and hosts. When on the air, he not only showed his expertise in explaining injuries in college and professional athletes, but he helped high schools improve their injury prevention strategies in areas such as concussion prevention and proper conditioning. He also was responsible for local schools acquiring automated external defibrillators.

Moved by his brief and brave battle, friends and family continue to honor Ken's life and the lives of all lost to pancreatic cancer. They are working together to advance research discovery and to provide hope to patients worldwide. Most importantly, Ken's family would like to support research aimed at detecting pancreatic cancer at earlier stages in order to give others a greater chance of survival.

Since 2015, the event has raised over $23,000 to support the We Care Fund in the Department of Surgery at the Medical College of Wisconsin. Pancreatic cancer is expected to become the third-leading cause of cancer death in the U.S. and has the highest mortality rate of all major cancers. It is estimated that 53,070 Americans will be diagnosed with pancreatic cancer and more than 41,780 will die from the disease annually.

"We are grateful to the many event participants and volunteers for making The First Walk possible. We are committed to fighting pancreatic cancer through raising funds for research, awareness, education, and prevention. Our goal is to improve overall survival rates and create a brighter future for those affected by pancreatic cancer," concurs Dr. Gina Rizzo, Ken's former wife and the mother of his children, and Julie Roven First, Ken's wife. •

To refer a patient or request a transfer/consultation, please use the references below:

ADULT PATIENTS

All non-cancer requests
Referrals: 800-272-3666
Transfers/Consultations:
877-804-4700
mcw.edu/surgery

Clinical Cancer Center
Referrals: 866-680-0505
Transfers/Consultations:
877-804-4700

PEDIATRIC PATIENTS

Referrals/Transfers/
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JUNE 28: **Michael La Quaglia, MD, FACS, FRCS, Glicklich Visiting Professor –** Medical College of Wisconsin

AUGUST 4: **2017 GI Symposium: Spotlight on Peritoneal Surface Malignancies and HIPEC –** The American Club, Kohler

SEPTEMBER 15: **Fall Research Symposium** – Medical College of Wisconsin

SEPTEMBER 29: **Wisconsin Surgical Site Infection Prevention Summit V –** Crowne Plaza, Madison

OCTOBER 13: **MCW Pancreatic Cancer Scientific and Translational Research Symposium –** University Club, Chicago, Illinois

OCTOBER 26: **Vascular Access Symposium –** Hampton Inn & Suites, Milwaukee

NOVEMBER 10: **Academic Festschrift in Honor of John A. Weigelt, MD, DVM –** Location TBD

DECEMBER 2: **Advances in Minimally Invasive General Surgery Symposium –** MCW-Green Bay

JANUARY 26, 2018: **Pancreatic Cancer Clinical Symposium –** Harley-Davidson Museum, Milwaukee

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