

Quick Shots

General Surgery Competition

General Surgery		
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[A Case of Chronic Small Bowel Obstruction Due to a Large Hamartomatous Polyp Displaying Features of Peutz-Jeghers](#)

Emery Edmondson DO, Georgios Mihalopoulos MD, Pei En Kwok MD, Audrey Dellert MS-3, Zhonqui Zhang MD-PhD
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Introduction: Peutz-Jeghers Syndrome (PJS) was first described by Peutz in 1921. It is an autosomal dominant polypoid syndrome that manifests as mucocutaneous pigmentation and gastrointestinal hamartomatous polyps. Diagnostic confirmation is based on clinical manifestations and histopathology. Solitary PJS type hamartomatous polyps are rare and were reported in 1989 by Kuwano et al. They are regarded as a variant of PJS and may even be considered as a different clinical entity. In general, hamartomatous polyps most commonly occur in the small bowel, colon, and stomach with 64% being found in the small intestine.

Method(s): We report a case of a 33-year-old male who presented to the emergency department with a three-day history of severe diffuse abdominal pain associated with anorexia, nausea, and vomiting. Computed Tomography (CT) imaging of the abdomen and pelvis revealed a long segment intussusception in the proximal jejunum and a round lesion along the intussusception with punctate hyperdensities. The patient underwent a diagnostic laparoscopy converted to open small bowel resection and end-to-end anastomosis that demonstrated a jejunal mass. The mass was removed and the pathology revealed a hamartomatous polyp with features of Peutz-Jeghers. The patient had no family history, previous endoscopic findings or physical exam findings such as mucocutaneous pigmentation that could be attributed to Peutz-Jeghers Syndrome.

Conclusion(s): Definitive diagnosis of solitary PJS type hamartomatous polyps depends on histopathological findings. There is also reported utility in the use of genetic analysis for mutation of the STK11/LB1 gene, the susceptible gene in PJS, and for the loss of heterozygosity of 19p 13.3 for the diagnosis of PJS. In patients with large pedunculated hamartomatous polyps, chronic intussusception can occur. If pathology reveals features of Peutz-Jeghers but the patient lacks the characteristic mucocutaneous pigmentation, family history of PJS or additional polyps within the GI tract, solitary PJS may be suspected.

[Adrenal Gland Collision Tumor – A Case Report](#)

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Introduction: A collision tumor is a neoplasm that is comprised of cell types from two distinct origins with distinct borders. They can consist of benign tumors, malignant, or mixed. They are rare, and are often documented in case reports when encountered to describe their origins, pathogenesis, and management. Here we describe a patient with a collision tumor comprised of pheochromocytoma and small cell neuroendocrine tumor. The tumor was resected via laparoscopic right adrenalectomy and the specimens were examined pathologically. She has since recovered from her surgery and is undergoing treatment for her metastatic small cell carcinoma.

Case Report: A 73-year-old woman with a history of chronic kidney disease stage 3 and liver steatosis was referred for evaluation of an incidental adrenal mass noted on chest CT scan during workup for chest pain. She was subsequently diagnosed with myocardial infarction and underwent coronary stenting with the placement of a drug-eluting stent. Dual antiplatelet therapy was initiated. In addition to poorly controlled hypertension, her symptoms included palpitations, anxiety, and restlessness. Personal and family history was negative for any endocrinopathy.

Biochemical workup demonstrated elevated plasma-free metanephrines and fractionated urine catecholamines with norepinephrine predominance. A review of thoracic imaging also demonstrated an enlarged right cervical lymph node and subcarinal adenopathy. Abdominal MRI demonstrated a 3.1 cm right adrenal mass with increased intensity on T2 weighted images and no retroperitoneal lymphadenopathy. The thoracic nodes demonstrated increased avidity on Ga-68 DOTATE PET SCAN, concerning for metastatic pheochromocytoma or multiple paragangliomas. Genetic testing was negative for MEN. Alpha- and beta-adrenergic blockade was initiated, and a thoracic surgery consultation was obtained. A joint decision was made to plan for endobronchial biopsy after the adrenalectomy to avoid a potential catecholamine crisis.

Laparoscopic right adrenalectomy was performed without complications. Surgical pathology reported a 5.8 cm composite mass of pheochromocytoma and small cell neuroendocrine carcinoma. Molecular tumor profiling confirmed the rare diagnosis of adrenal gland collision tumor. Postoperatively, the alpha and beta-blockade were maintained at a low dose with excellent blood pressure control. The patient recovered well and is starting systemic treatment for her metastatic small cell carcinoma.

Conclusion: Collision tumors are exceedingly rare and should be well recorded in surgical literature to document their origins, pathogenesis, management, and outcomes. Reports of these tumors, while rare, may lead to earlier diagnosis and better patient outcomes.

An Unlikely Duo: Jejunio-Ileal Diverticulitis in the Presence of a Mobile Cecum

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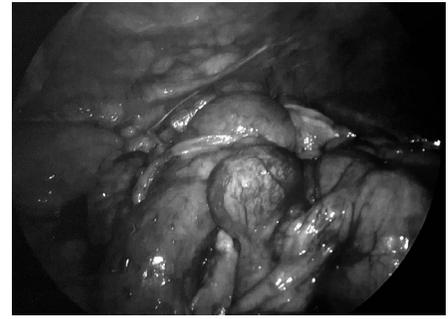
Waterbury Hospital Quinnipiac University Frank H Netter MD School of Medicine

Introduction: Jejunio-ileal diverticula is a rare clinical entity. The incidence ranges from 0.03 % to 8.0% on autopsy and between 0.02% and 7% on contrast imaging studies. It is estimated that only 10% will develop complications. While a mobile cecum is not an uncommon finding, it can result in atypical abdominal findings. We report herein a case of a 67 years old female who presented with a partial small bowel obstruction secondary to jejunio-ileal diverticulitis in the setting of a mobile cecum.

Case Description: A 67 years old female with a past medical history significant for hypertension, asthma, colonic diverticulosis and previous laparoscopic hysterectomy presented with a fourteen days history of abdominal pain. She reports diffuse abdominal pain, which was associated with nausea, vomiting and preserved bowel function. The patient's presentation was preceded by several months of chronic intermittent abdominal pain. On presentation her vitals were within normal limits and labs were unremarkable. A CT without contrast demonstrated loops of distended small bowel with a swirl sign at the root of the mesentery of a segment of small bowel localized in the pelvis, raising concerns for a partial small bowel obstruction. The patient was initially managed non-operatively with resolution of symptoms. However, the patient had a recurrence of symptoms two weeks after initial presentation and underwent a diagnostic laparoscopy.

Intraoperatively, the cecum was found to be folded on itself, displaced anteriorly and superiorly at the right upper quadrant due to adhesions between the distal ileum and jejunum with findings of jejunio-ileal diverticulitis. An ileocectomy with ileocolic-anastomosis and a jejunectomy with a side-to-side anastomosis was completed. Pathology demonstrated multiple diverticula on the jejunum and distal ileum with serosal adhesions. Transmural inflammation and necrosis with focal inflammatory exudate were found along the anterior surface on the wall of the distal ileum. This was consistent with a perforated ileal diverticulitis. The patient recovered without any complications.

Conclusion: Currently there is no comprehensive guideline in the management of jejuno-ileal diverticulitis. Rather, references are made to the management guidelines for colonic diverticulitis. This report aims to demonstrate that establishing the diagnosis of a mobile cecum requires a high index of suspicion. In our case, the diagnosis was not established until a diagnostic laparotomy demonstrated the caudal displacement of the cecum due to the adhesions and inflammation between the perforated diverticulitis at the distal ileum and the jejunum. It can be deduced that the recurrent symptoms that antedated her surgery were occasioned by transient displacement of the cecum causing a partial small bowel obstruction.



Case Report: Perforated Acute Appendicitis in the Setting of Appendiceal Amyloidosis: Rare but Real.

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Introduction: Acute appendicitis is a very common condition. About 7-8 % of the population in the United States is diagnosed with acute appendicitis over their lifetime. Delay in diagnosis or management might result in perforation and secondary complications namely peritonitis, abscess, sepsis, etc. Amyloidosis, on the other hand, is a systemic or localized disease characterized by pathological deposition of insoluble fibrillar proteins within various organs leading to structural and functional disruption. The gastrointestinal (GI) tract is rarely involved, but if involved, the small intestine is the most commonly affected site. GI amyloidosis usually presents with bleeding, dysmotility, and diarrhea. Even though uncommon, multiple cases of GI amyloidosis have been associated with perforation and malignancies. In this report we describe a case of acute perforated appendicitis due to amyloidosis of the appendix.

Case Description: We report the case of an 80-year-old male patient with atrial fibrillation, iliac artery aneurysm, and coronary artery disease, who presented to the emergency department in sepsis with two day history of acute onset abdominal pain. His abdomen was noted to be diffusely tender with peritoneal signs on exam. He had leukocytosis, mild acute kidney injury, and imaging findings consistent with an abnormal looking appendix, inflammatory changes in the right lower quadrant, and diffuse massive distention of the small bowel. On operative exploration, purulent peritonitis was encountered in the setting of perforated appendicitis. He underwent an appendectomy and abdominal washout. Post-operative course was complicated with rapid atrial fibrillation and delayed return in bowel function. With supportive therapy his sepsis resolved, he was stabilized, tolerated diet, and was subsequently discharged home eight days after surgery. Pathology revealed acute transmural appendicitis with perforation and amyloid deposits in the appendiceal vasculature. Patient was referred to Hematology/Oncology for further evaluation. Workup, including a serum protein electrophoresis (SPEP), was otherwise non-revealing. Due to lack of evidence of amyloid deposits in other organs or concern for underlying malignancy, decision was made not to pursue any further therapeutic measures at the time. Patient seen on subsequent office visit and has recovered uneventfully.

Discussion: Amyloidosis is an underdiagnosed progressive condition that affects multiple organ systems, and could be associated with significant morbidity and mortality. Amyloidosis is classified as primary, secondary, dialysis-related, senile, and hereditary. Our patient likely had senile amyloidosis with no significant personal or family history. The pathophysiology is poorly understood and therapeutic modalities are limited with no randomized controlled trials evaluating efficacy and treatment outcomes. Although it rarely involves the GI tract, amyloidosis can affect the appendix and present with acute perforated appendicitis like in this patient. GI amyloidosis has been reported to be associated with hematologic malignancies and hence, Hematology/Oncology referral and workup is warranted to evaluate for an occult hematologic malignancy or lymphoproliferative disorder that might necessitate further treatment.

Use of 0.05% Chlorhexidine in Orthopedic Open Fractures Compared to the Standard Treatment in Reducing the Incidence of Infection Compared to the Standard Treatment: A Historical Control Study

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Introduction: Open bone fractures pose an immediate and high risk of infection to patients who experience them. These infections often prove difficult to treat which increases patient mortality and morbidity. One way to reduce the incidence of infection is the use of irrigation solutions, such as saline, betadine, or antibiotics. The use of 0.05% chlorhexidine (CHG) poses as a strong substitute for irrigation of open fractures. Demonstrated here, is preliminary data that is focused on the use of CHG as an irrigation tool to decrease the incidence of infection in orthopedic open fracture cases.

Methods: A historical control, single center study of the use of CHG versus the standard treatment (betadine or saline/betadine and normal saline) was performed. The primary endpoint was presence of infection. Infection was determined to be any objective signs of site infection or cellulitis within 30 days of fracture occurrence. Cases were excluded if the patient had died from the acuity of the patients' condition regardless of open fracture status. If patients were transferred to another facility or loss to follow-up, they were also excluded from the study. The data was analyzed using a fisher's exact test.

Results: A total of 89 patients were included in the study. There was a total of 28 patients in the CHG group and 61 in the standard treatment group. The standard treatment group had 9 infections (17%) compared to the CHG group which had 3 infections (10%). A fisher exact analysis revealed a p value of 0.746.

Conclusion(s): The use of CHG in orthopedic open fracture cases compared to the standard irrigation, based off the data collected here, was shown to not be statistically significant. There may be other variables (type of fracture, time to antibiotic administration, etc.) that may play a factor in which patient ultimately gets an infection. Our study is ongoing. *(cont. next page...)*

	Infection	No infection	
Chlorhexidine	3	25	28
Standard Treatment	9	52	61
Total	12	77	89

Medical Student Research

Medical Student Research		
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Victoria Marks, BS	Yale School of Medicine	Role of Colectomy for Appendiceal Tumors
Amber Wilkes, BA	University of Connecticut School of Medicine	The Role of Implicit Bias as a Barrier to Gender Parity in Thoracic Surgery Career Selection During Medical School: A Pilot Study

Barriers to Gender Parity in Thoracic Surgery Career Selection During Medical School: A Pilot Study

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Introduction: Despite gender parity in medical schools, women remain underrepresented amongst thoracic surgery trainees. Our aim was to identify barriers to gender parity in selecting thoracic surgery career for medical students.

Method(s): A cross sectional survey was emailed to preclinical medical students (1st and 2nd year) at a single US institution to understand their perception of gender and a surgical career with regards to their medical education, mentorship, personal life, and career outlook. Data was analyzed via SAS utilizing the Fisher exact test and statistical significance was defined as p-value < 0.05.

Results: Survey response rate was 85/223 (38%) with 68% women (Group I) and 32% men (Group II). Table 1 lists the aggregate data. The majority (82%) of students were 22-26 years old and White (56%). Women were discouraged from medicine due to gender (40% vs. 4%, $p = 0.001$) and future parental status (45% vs. 7%, $p < 0.001$) more often than men. More than a third (38%) of those respondents who already selected a specialty said they would not choose the same residency if they were of a different gender. Gender played a role in residency selection for 27% of the cohort (32% vs. 11%, $p = 0.04$). Similarly future marital status was a factor for 28% of entire cohort as well as future parental status for 34%. Both genders felt that surgery is a "male-dominated" specialty (98% vs. 85%, $p = 0.03$).

Conclusion(s): This survey highlights the impact of gender and career counseling on specialty selection among medical students - discouragement due to gender and future parental status for women, gender specific attitudes towards a surgical career, and an overwhelming perception that surgery is a male-dominated field. Efforts are needed to acknowledge and mitigate these hurdles to remove real or perceived limitations for all genders to select a career in thoracic surgery.

Table 1 - Survey Results Based on Gender

	Women - 68% (n = 58)	Men - 32% (n = 27)	p-value
Gender Related Experiences			
Discouraged from pursuing medicine due to gender	40%	4%	0.001
Experienced sexual harassment/violence during medical education	3%	7%	0.6
Gender of primary role model (Female)	65%	33%	0.01
Surgical role model	31%	26%	0.8
Chosen residency	28%	19%	0.4
Surgical residency (n = 21)	31%	60%	0.3
Would NOT choose same residency if were a different gender (n = 21)	44%	20%	0.6
Gender Related Residency Choices			
Role of gender in residency selection (YES)	32%	11%	0.04
Role of marital status (YES)	32%	19%	0.2
Role of parental status (YES)	40%	19%	0.08
Perception of surgery as "male-dominated"	98%	85%	0.03
Most common barrier to surgical career (Lifestyle)	81%	81%	1
Gender SPECIFIC medical school residency advising/counseling process	12%	7%	0.7

P-values calculated using the Fisher exact test

Deep Learning Image Analysis Automatically Annotates H&E-Stained Histopathology Slides and Quantifies Tumor Immune Infiltrate

Hatim Amiji, BS, Todd Sheridan, MD, Jeff Chuang, PhD, Jill C. Rubinstein, MD, PhD
Frank H Netter MD School of Medicine

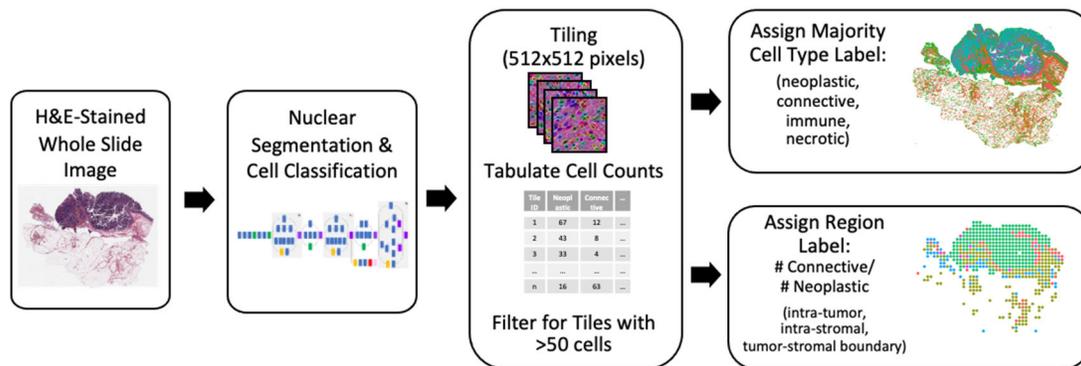
Introduction: Pathological assessment of hematoxylin & eosin (H&E)-stained images is the cornerstone of tumor diagnostics and prognostication. The level of tumor immune infiltrate captured in these images is an emerging biomarker in many cancer types, including colorectal adenocarcinoma. Colon tumors demonstrating microsatellite instability are noted to harbor increased immune infiltrate, which is in turn associated with improved prognosis and a greater likelihood of response to immunotherapy.

However, manual quantification of immune cells is time-intensive and error prone. Digitization of traditional glass histopathology slides allows for application of deep learning methods for image processing, enabling automated tumor annotation and detection of prognostic biomarkers.

Method(s): Digitized whole slide images (WSIs) from The Cancer Genome Atlas (TCGA) colorectal dataset are processed through a computational pipeline for automated tissue detection, nuclear segmentation, and cell type classification. The images are divided into 512 x 512-pixel tiles, cell counts tabulated, and tiles annotated based on the majority cell type (neoplastic, connective, immune, necrotic). Intra-tumoral, intra-stromal, and tumor-stromal boundary labels are further applied based upon each tile's ratio of neoplastic to connective cells (Figure 1). Immune infiltrate is tabulated, and levels compared in tumor vs. stromal compartments and in relation to clinical features (Wilcox signed rank test).

Results: After tiling, cell-type labelling, and filtering, the dataset consisted of 340,608 image tiles. Mean immune cell count for the pool of intra-stromal, intra-tumor, and tumor-stromal boundary tiles was 30.4, 5.4, and 17.7, respectively ($p < .0001$). Tumors with high microsatellite instability (MSI-H) had significantly greater immune infiltrate compared to those with MSI-Low/Microsatellite Stable (MSI-L/MSS) status ($p < .0001$). This trend persisted when testing the intra-stromal, intra-tumoral, and tumor-stromal boundary compartments individually ($p < .0001$ for all three). Finally, right-sided tumors showed significantly greater immune infiltrate than left-sided ($p < .0001$).

Conclusions: Deep learning imaging methods can be leveraged to provide automated annotation of tumor slides and detection of prognostic biomarkers in colorectal cancer. With further validation on independent data, the ability to quantify immune infiltrate in an automated fashion could have direct translational application, in both prognostication and prediction of response to immunotherapy. The ability to derive clinically relevant information from histology images already available in a standard clinical workflow could have significant impact on the ease and cost of assessing complex biomarkers, making precision oncology tools available to treating physicians regardless of their geographic location and institutional resources.



Emergent applications of machine learning for diagnosing and managing appendicitis: a state-of-the-art review

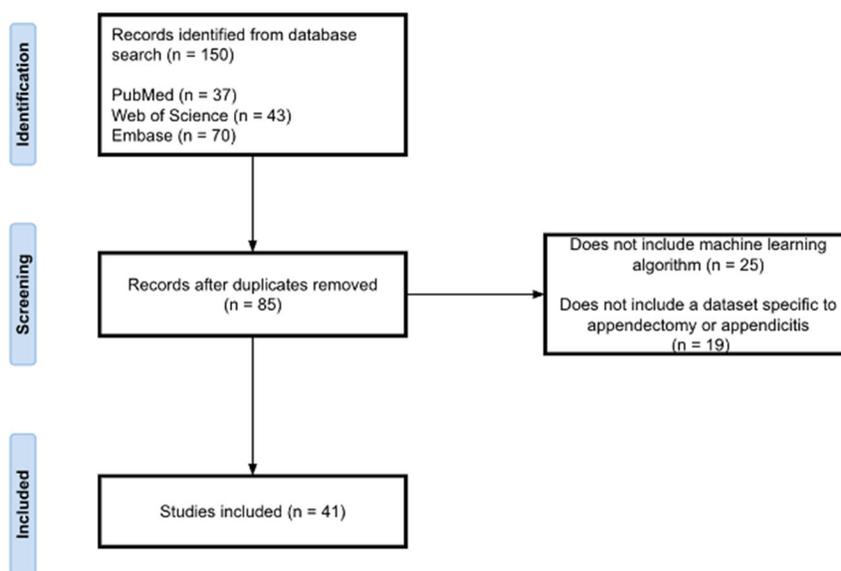
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Introduction: Clinical diagnosis of appendicitis currently relies on scoring systems like the Alvarado Score to stratify patients by risk of perforation. However, atypical presentations and poor predictive value of laboratory tests complicate diagnoses and decisions for surgical intervention. CT imaging improves sensitivity and specificity of diagnoses, yet this tool bears the drawbacks of high operator dependency and radiation exposure. The aim of this review is to describe reports on the use of novel machine learning algorithms in the context of appendicitis diagnosis and management.

Method(s): A state-of-the-art review was conducted based upon systematic assessment of relevant articles found in PubMed, Web of Science, and Embase published from January 1, 2012 to January 1, 2022. Search terms included the following: "Appendectomy" OR "Appendicitis" and "Machine Learning" OR "Artificial Intelligence." Boolean operators were used to connect related keywords appropriately. Only studies including an application of at least one machine learning algorithm implemented on an appendicitis-specific dataset were considered. Studies with pediatric and/or adult cases were accepted.

Results: 41 relevant studies were identified with an average sample size of 15,997 patients. The most common use case of ML algorithms was for predicting diagnosis (56% of studies). Other common applications included predicting various post-operative outcomes including length of hospital stay, development of sepsis, and 30-day mortality (29% of studies). On average, the algorithms used in these studies reported accuracy of 89%, a sensitivity of 85%, and specificity of 77%. The area under the receiver-operating curve (AUROC) metric was only reported in 14 studies. No specific algorithm seemed to be superior to all others; logistic regression was the optimal model in 17% of studies, a neural network in 15%, a random forest in 12%, and a support vector machine in 7%. Remaining studies involved models based in various ensemble or otherwise rare techniques. Each of the three studies that compared their highest-performing algorithm to the Alvarado Score reported that their machine learning-based method demonstrated greater accuracy than the Alvarado scoring system.

Conclusion(s): The identified studies suggest that machine learning may augment a clinician's ability to diagnose appendicitis and to prepare for patient-specific post-operative complications. Further studies will be needed to elucidate the relative performance of such approaches to the Alvarado Score and to assess the feasibility and advisability of implementing machine learning-based tools in clinical practice.



Impact of COVID-19 on the Gastrointestinal Surgical Oncology Patient Population

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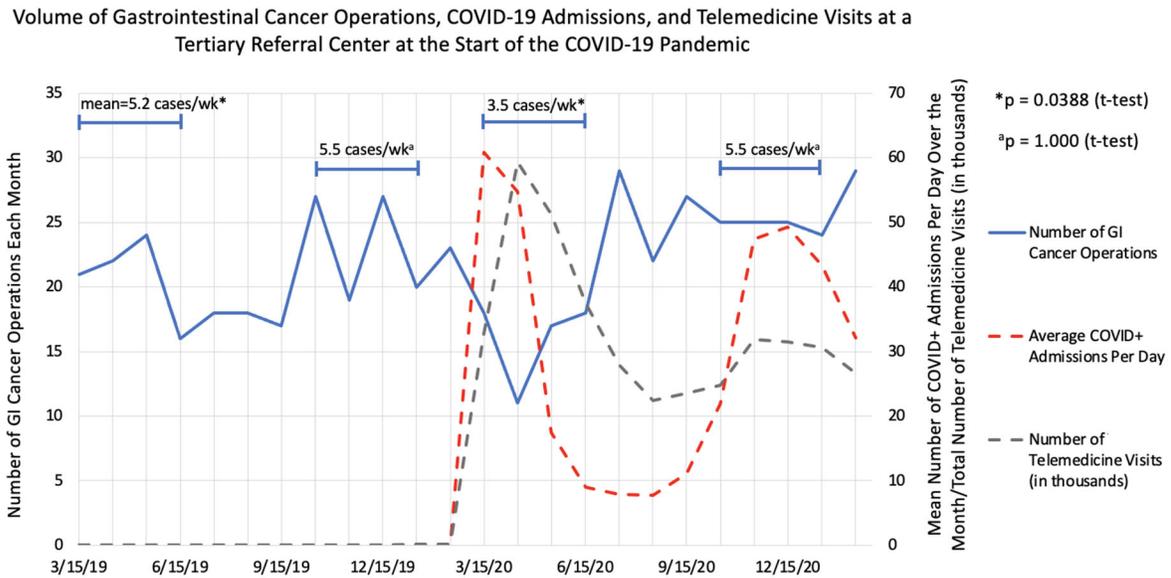
Introduction: The height of the COVID-19 pandemic saw substantial changes in healthcare resources and delivery, including postponements of elective and semi-elective surgeries. We hypothesized that COVID-related disruptions in care would result in more advanced stage cancer presentations among surgically treated gastrointestinal (GI) cancer patients.

Method(s): The Electronic Medical Record (EMR) of a large, tertiary referral center was used to identify patients who underwent surgery for a cancer of the esophagus, stomach, small bowel, large bowel, anus, biliary system, liver, or pancreas between March 15, 2019 and March 15, 2021. March 15, 2020 was considered the start of the COVID-19 pandemic. Patient, tumor, and treatment characteristics, and telemedicine encounters were examined before and during the pandemic.

Results: Of 522 patients that met study criteria, 252 were treated before and 270 were treated during COVID. During the first local COVID wave, weekly case volume was one-third lower than baseline ($p=0.0388$, Figure); during the second wave, case volume remained at baseline levels ($p=1.000$) likely owing to the availability of PPE and refined COVID-19 management protocols. However, there were no differences between patients receiving GI cancer surgery before vs. during COVID with respect to age, gender, race, ethnicity, or site of cancer ($p>0.1$ for all), and no difference in rate of emergency surgery ($p>0.9$). Patients were more likely to receive preoperative chemotherapy during the first six months of the pandemic compared to the subsequent six months (35.6% vs. 15.5%, $p<0.001$). There were no overall differences in the tumor characteristics before vs. during COVID with

respect to pT stage, pN stage, metastasis, perineural invasion, or lymphovascular invasion ($p > 0.05$ for all). Patients seen during COVID were more likely to have Medicaid insurance (10.7% vs. 6.0%, $p = 0.049$). Telemedicine visits for the entire health system increased dramatically during COVID from nearly zero visits pre-pandemic to almost 60,000 visits during the second month of the pandemic. Telemedicine utilization rates were lower in Black vs. White patients (4.1% vs. 4.8%, $p < 0.001$), especially during the first three months of the pandemic (7.4% vs. 9.0%, $p < 0.001$).

Conclusion(s): The COVID-19 pandemic caused an initial disruption to the rate at which GI cancer surgery was delivered, but did not compromise stage at presentation for this population. These findings suggest that use of preoperative chemotherapy, adoption of telemedicine, and implementation of appropriate peri-operative protocols may mitigate the impact to GI cancer care at a large hospital system during a pandemic.



Morphomic Factors Are Associated With Poor Prognosis In Early-Stage Esophageal Cancer

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Introduction: Sarcopenia and osteopenia have been studied, and their association with complications and prognosis after surgery is reported these days. Analytic morphomic study is a novel approach to predict and improve clinical outcomes, using semi-automated image processing to quantitate various factors of body composition such as muscle area, bone mineral density, and adipose tissue area from computed tomography (CT). The aim of this study was to investigate whether morphomic factors are associated with poor prognosis after surgery (relapse-free survival and overall survival) in patients with early-staged esophageal cancer.

Method(s): Patients who underwent an esophagectomy from 2011-2019 for pathologically-staged I or II esophageal cancer were included. Preoperative CT scans were processed using semi-automated algorithms (MATLAB; MathWorks, MA). Patients were excluded when preoperative CT scan data was not available. Skeletal muscle area (divided by squared height, cm^2/m^2), bone mineral density (HU), and subcutaneous fat area (divided by total body area, proportion) were measured at L3 level. Decreased skeletal muscle, bone mineral density, and subcutaneous fat were defined as below each mean value. The morphomic index was determined using the number of decreased morphomic factors present (0-3). Patient demographics, tumor characteristics, and morphomic index were analyzed. The Cox proportional hazard model for relapse-free survival was used to determine significant factors contributing to poor prognosis. The number of included variables was limited to the number of events (recurrence or death) divided by 10.

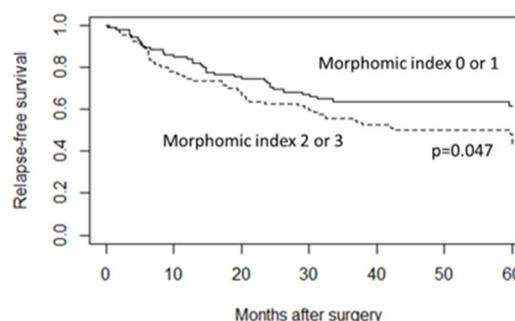
Results: 205 patients were evaluated. The diagnosis was adenocarcinoma in 169 patients (82.4%) and squamous cell carcinoma in 36 (17.6%). Patients had a mean age of 63.7 years, with 98 patients (47.8%) aged older than 65. 92 patients (44.9%) had cancer recurrence or died within five years after surgery, with 57 patients developing cancer recurrence and 35 dying without recurrence. In the Cox proportional hazard model analysis, which including nine variables, only a morphomic index of 2 or 3 was a significant risk factor contributing to poor relapse-free survival after esophagectomy ($p=0.045$, Table 1). The Kaplan-Meier curve for relapse-free survival was shown in Figure 1. However, none of the nine variables correlated with overall survival in the Cox proportional hazard model analysis.

Conclusion(s): Decreased preoperative skeletal muscle, bone mineral density, and subcutaneous fat were associated with poor relapse-free survival after surgery for early-staged esophageal cancer when multiple morphomic factors were simultaneously decreased. These findings may be useful to predict prognosis after surgery and to identify patients who need adjuvant therapy.

Table 1. Cox proportional hazard model for relapse-free survival (pStage I-II)

Variable	Hazard ratio (95% CI)	p
Age >65	1.14 (0.75-1.75)	0.545
Sex (male)	0.83 (0.48-1.43)	0.501
Charlson comorbidity index ≥ 4	1.12 (0.66-1.88)	0.678
Squamous cell carcinoma	1.27 (0.75-2.16)	0.379
Clinical stage III or IV	1.17 (0.69-2.00)	0.558
Chemoradiation	2.01 (0.84-4.83)	0.119
R 1, 2	0.84 (0.20-3.52)	0.814
Anastomotic leak	0.69 (0.41-1.17)	0.171
Morphomic index 2 or 3	1.57 (1.01-2.44)	0.045

Figure 1. Kaplan-Meier curve for relapse-free survival



Peritoneal Catheter Removal Using the Sustained Traction Method – A Safe and Practical Alternative

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Introduction: Patients with end-stage renal disease requiring regular dialysis are often burdened with the need for in-center hemodialysis three times each week. Peritoneal dialysis (PD) offers a convenient alternative, allowing patients to instead carry out their dialysis needs from home. The placement of a PD catheter is typically performed using a minimally invasive technique with the positioning of subcutaneous and peritoneal cuffs that secure the catheter in place within the abdominal wall. When PD catheters need to be removed, for various reasons including malfunction and infection, the ideal method for removal has been debated. The standard technique is typically done under general anesthesia using surgical dissection to remove both the superficial and deep cuffs. This invasive approach carries a potential for complications, particularly in patients with multiple comorbidities. An alternative technique for PD catheter removal has been employed at our institution under a single surgeon. Using this technique, sustained traction is utilized to pull the PD catheter until it separates from the cuffs, which are then left behind. This technique is performed in the operating room under minimal sedation. The objective of this study was to investigate if the pull technique is a safe and practical alternative to surgical dissection without an increase in complication rate.

Method(s): This study was performed using data on thirty-one patients who underwent PD catheter removal using the pull technique at a community teaching hospital from July 2017 to December 2021. Indications for PD catheter removal included 10 patients with peritoneal dialysis-related infection (32%), 12 due to mechanical failure (38%), and the remaining 9 patients transitioning to hemodialysis for personal reasons (29%). The time from PD catheter placement to removal ranged from 10 days to 58 months. Postoperative infection rate and complication rate were both measured.

Results: Of the thirty-one patients in our cohort undergoing PD catheter removal using the pull technique, there were none who developed significant postoperative infections that would necessitate cuff removal. One patient in cohort developed cellulitis around the catheter site, which was treated with a course of oral antibiotics. One patient required conversion from pull technique to open removal due to catheter breakage during sustained traction, as the patient had an extension tubing with additional

connection (3%). The mean time for catheter removal using the pull technique was 4 minutes. Following PD catheter removal, 26 patients (84%) required subsequent transition to hemodialysis.

Conclusion(s): Patients with end-stage renal disease and multiple comorbidities may require removal of their PD catheter but are not ideal candidates for invasive surgical procedures under general anesthesia. Our case series demonstrates that the pull technique for PD catheter removal performed under minimal sedation is a safe and practical method with no increase in complication rate.

Robotic Ladd's Procedure for Intestinal Malformation in Adult: A Video Presentation

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Aziz Benbrahim MD, FACS, FASMBS, Midstate Medical Center, Hartford Healthcare, Meriden, CT

Introduction: Intestinal malrotation of the midgut is a rare gastrointestinal anomaly that is traditionally seen in the pediatric population, with 90% of cases presenting during the first year of life. Due to the malrotation, two key anatomic variations develop, narrowing of the mesenteric base and obstructing Ladd's bands, which puts the patient at risk for midgut volvulus. Correction of this is addressed via the Ladd's procedure done openly or laparoscopically. The laparoscopic approach in the pediatric population is well documented, however, this is not the case for adults with intestinal malrotation, which make up about 0.2-0.5% of the cases. Furthermore, the literature on a robotic approach is lacking. We present a case of a symptomatic adult patient found to have intestinal malrotation that was successfully treated by a robotic Ladd's procedure.

Case Presentation: A 22-year-old female presented with a two-year history of worsening epigastric pain, nausea, vomiting, GERD, and globus sensation, likely exacerbated by a helicobacter pylori infection. On CT scan and upper GI series, she was found to have intestinal malrotation with the duodenum not crossing the midline. Additionally, imaging found a clustered small bowel. Given her symptoms and imaging findings, a robotic Ladd's procedure was offered.

Methods: Patient has undergone classic technique for the Ladd's procedure, which involves reducing the volvulus via counterclockwise rotation of the bowel, lysing the fibrous Ladd's bands, widening of the mesenteric base, functional repositioning of the intestines with the cecum on the left side, and an appendectomy as a precautionary measure. We present the procedure done robotically.

Results: The patient tolerated the procedure well. They were seen 2 weeks postoperative and noted some episodic pain on the right side for the previous 2 days. However, she reported resolution of her preoperative signs and symptoms overall.

Conclusions: The robotic method allowed for better dexterity, improved range of motion, greater precision, better visualization, and reduced fatigue for the surgeon compared to the laparoscopic approach. However, further studies need to prove the clinical impact of this method.

Role of Colectomy for Appendiceal Tumors

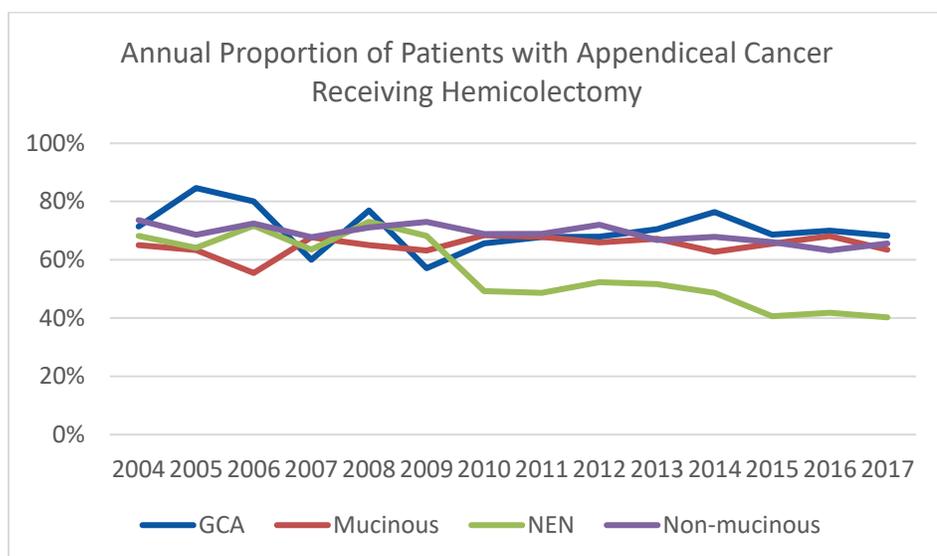
Victoria Marks BS, Daniel Kerekes MD, Nita Ahuja MD MBA, Kiran Turaga MD MPH, Sajid Khan MD
Yale School of Medicine

Introduction: Appendiceal tumors are rare, comprised of a range of histologies which vary in cellular behavior. National guidelines for the role of completion colectomy have evolved over time. We hypothesized that the national frequency of colectomies for appendiceal tumors based on histology has changed over time and affected clinical outcomes.

Method(s): Patients with appendiceal tumors diagnosed between 2004 and 2017 were identified in the National Cancer Database. Goblet cell adenocarcinoma (GCA), mucinous neoplasm, neuroendocrine neoplasm (NEN), and non-mucinous neoplasm histologies were studied. Characteristics of patients receiving appendectomy versus right hemicolectomy (RHC) were described and compared. Predictors of RHC were identified. Survival by extent of surgery for each histologic subtype was compared using Cox proportional hazards regression.

Results: Of 18216 study cases, 1970 (11%) were GCAs, 6219 (34%) mucinous neoplasms, 5603 (31%) NENs, and 4424 (24%) non-mucinous neoplasms. While RHC was performed for the majority of GCAs (69%), mucinous neoplasms (65%), and non-mucinous neoplasms (68%) across the study timeframe, the overall rate of RHC for NEN dropped from 68% in 2004-2009 to 44% from 2010-2017 ($p < 0.001$) (Figure 1). For all subtypes, stage was the strongest predictor of type of operation, with higher stage associated with greater odds of RHC ($p < 0.001$ for all). Higher grade and lymphovascular invasion were strongly associated with RHC for mucinous neoplasms ($p < 0.001$). Lymphovascular invasion was a predictor of RHC for non-mucinous neoplasms ($p = 0.047$). RHC was associated with higher rate of unplanned readmission for the cohort as a whole (5% vs. 3%, $p < 0.001$). On risk-adjusted analysis, RHC was associated with increased survival compared to appendectomy alone for GCA (HR: 0.74, $p = 0.018$), mucinous neoplasms (HR: 0.85, $p = 0.001$), and non-mucinous neoplasms (HR: 0.84, $p = 0.002$), but not for NEN (HR: 0.99, $p = 0.947$).

Conclusion(s): The rate of completion colectomy for appendiceal GCAs, mucinous neoplasms, and non-mucinous neoplasms remains high, while rate of completion colectomy is decreasing for NENs. Survival benefit of colectomy varies significantly based on histology. These findings suggest that surgeons should be selective in offering colectomy to patients based on histologic subtype.



The Role of Implicit Bias as a Barrier to Gender Parity in Thoracic Surgery Career Selection During Medical School: A Pilot Study

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3. Emmanuel College, Boston, MA
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Introduction: There are several barriers to gender parity within thoracic surgery, including gender-career implicit bias. Limited data exists on implicit bias and career selection during medical school. Therefore, our objective was to utilize the implicit association test (IAT), a validated tool to measure gender-career implicit bias amongst pre-clinical medical students.

Method(s): A gender-career IAT was designed by Project Implicit (<https://www.projectimplicit.net>) and distributed electronically to preclinical medical students (1st and 2nd year) at a single US institution, following IRB approval. Participants' IAT D scores, indicating the direction and strength of bias was calculated and analyzed with SPSS. In addition to descriptive statistics, we used a Mann-Whitney U to test male versus female distribution of gender-career bias. Alpha was set at 0.05.

Results: Survey response rate was 76/223 (34%) with 62% women (Group I) and 32% men (Group II). Table 1 lists the aggregate data. Scores ranged from -0.741 to 1.368 where positive scores indicated stronger gender career bias associating male with career and female with family. Mean IAT for the whole group was 0.27 (+ 0.37), indicating a slight preference for male + career and female + family. Females in this sample had stronger bias although there was not a significant difference among men and women with regard to gender-career bias ($p = 0.22$).

Conclusion(s): This study demonstrated the presence of implicit bias amongst male and female medical students, in which they tend to associate men with career and women with family. This is another potential barrier for achieving gender parity in thoracic surgery and potentially influences future career selection for medical students. Additional measures are needed to address this issue amongst early learners of medicine.

Table 1 – Survey Results Based on Gender

	Women – 68% (n = 52)	Men – 32% (n = 24)	p-value
IAT Scores (low-high)	-0.741 to 1.008	-0.39 to 1.37	
IAT Score Mean (SD)	0.30 (+ 0.36)	0.21 (+0.41)	0.22
IAT Score Median (IQR)	0.35 (0.11-0.52)	0.18 (-0.13-0.43)	

Plastic and Reconstructive Surgery

<i>Plastic & Reconstructive</i>		
Christopher Lemoine, MD	University of Connecticut School of Medicine	Capsular Pneumatosis: A Rare Radiographic Sign for Internal Breast Implant Capsule Penetration Resulting in Communication to the Thorax
Sean Ramras, MD	Waterbury Hospital	Complex Laceration Repair After Traumatic Ear Injury
Ka'la Drayton, MD, MHIT	University of Connecticut School of Medicine	Lumbar Fusion Resulting in Painful Foreign-Body Response in Abdominal Scar: Case Report and Review of the Literature

Capsular Pneumatosis: A Rare Radiographic Sign for Internal Breast Implant Capsule Penetration Resulting in Communication to the Thorax

Christopher Lemoine MD, Austin Healy MD, Alan Babigian MD
University of Connecticut School of Medicine

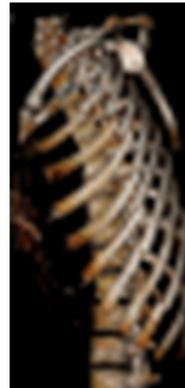
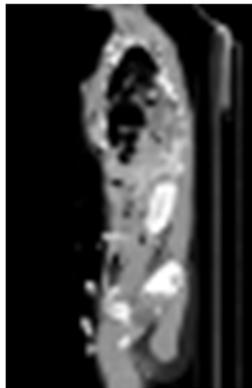
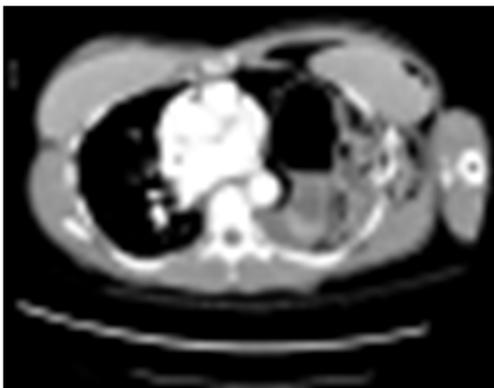
Introduction: Breast augmentation is considered one of the most commonly performed procedures by plastic surgeons, representing 16% of all global plastic surgery procedures in 2020. Given the fact that thoracic trauma comprises over 20% of trauma worldwide, it is not surprising that there is potential for overlap between these two patient populations. However, the incidence of traumatic rupture of breast implants appears relatively low, essentially confined in the medical literature to isolated case reports. Despite this finding, an index of suspicion must be maintained in trauma patients with history of breast augmentation for the potential of traumatic breast implant rupture and capsule violation. This is especially true in the presence of significant accompanying injuries found commonly in thoracic trauma, including rib fractures.

Method(s): We present the case of a 59-year-old female who had undergone bilateral breast augmentation over 10 years prior to presentation. She arrived as a highest-level trauma activation after being a helmeted cyclist struck by a motor vehicle resulting in significant left-sided thoracic trauma. Primary survey found her to have a patent airway, decreased left-sided breath sounds, a regular heart rate (70 bpm) with no evidence of hypotension (132/64), and a GCS of 15. On secondary survey, the patient was found to have crepitus over the left chest with an angiocath in place which had been used in the field for needle decompression of suspected pneumothorax. However, there was no evidence of penetrating injury to the bilateral breasts. A bedside Focused Assessment with Sonogram in Trauma (FAST) exam did not reveal evidence of a pericardial effusion or free abdominal fluid. However, given decreased breath sounds on the left, a chest tube was placed emergently. Trauma bay chest X-ray revealed multiple left-sided rib fractures and multifocal airspace opacities on the left. Subsequent CT imaging of the thorax demonstrated multifocal left pulmonary contusions and lacerations, multiple left-sided rib fractures (ribs 2-12), a small left pneumothorax, and

left-sided subcutaneous emphysema. Imaging also demonstrated the presence of bilateral breast implants with the left implant appearing irregular in shape with the retropectoral space corresponding to the implant capsule having evidence of significant free air (capsular pneumatosis) concerning for acute traumatic rupture of the capsule. After the patient was stabilized and brought to the operating room for surgical stabilization of her left-sided rib fractures, one of her ribs was noted to have violated the posterior wall of the breast capsule. Upon implant removal, the implant was found to have been ruptured with tears in the shell corresponding to patient's rib fractures.

Results: This case represents a rare and unexpected complication of traumatic rib fractures; mainly the traumatic rupture of a silicone breast implant, which was identified by the presence of capsular pneumatosis on CT imaging.

Conclusion(s): The presence of this rare radiographic sign (capsular pneumatosis) in the setting of a patient who has undergone breast augmentation should raise concern for possible implant rupture and capsule violation, even in the absence of external signs of penetrating injury.



Complex Laceration Repair After Traumatic Ear Injury

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Introduction: Ear lacerations should be repaired within 24 hours of presentation after injury has occurred. Ear lacerations must be repaired to reduce the risk of complication if auricular cartilage is exposed. Complications include chondritis, infections, deformities, or necrosis. Any patient who presents after 24 hours of injury should have delayed or staged closure. This technique is also utilized in patients with active infection of laceration and those with increased risk for sepsis. In this case report, we demonstrate a traumatic ear laceration that required complex closure in the operating room urgently.

Case presentation: 47 year old male who presented as a trauma to Waterbury hospital after falling off his motorcycle without wearing a helmet and slid across the road for approximately 6 feet. Primary survey revealed no injury to airway, breathing or circulation but noticeable was a partial amputation of the left ear. Physical exam was significant for partial amputation of the left auricle from the helical root to the midportion of the external ear canal both anteriorly and posteriorly, mild oozing and debris in auricular region, with the tympanic membrane not visualized due to large debris load. As well, hearing was decreased in the left ear. Patient was consented and taken to the operating room for laceration washout, complex laceration repair and otoscopy. Intraoperatively the partial amputation was examined and found to have good blood flow and cleaned edges with approximation achieved using 3-0 Vicryl the for preauricular fascia and exposed cartilage, and 5-0 prolene for full thickness tissue approximation. Penrose drain was placed to drain any microscopic debris and serosanguinous drainage. Otoscopy was performed demonstrating a clear tympanic membrane with no injury. Patient tolerated the procedure well, with the return of complete left side hearing on postoperative day zero. Patient was discharged within 24 hours of surgery, followed-up in the clinic, and penrose drain and 5-0 Prolene sutures were removed with good scar formation.

Discussion: Given the severity of these lacerations in regard to tissue viability, otolaryngology or plastic surgery who are consulted for repair. Narrow pedicle injuries or partial amputations need acute surgical attention due to the severity of injury and tenuous blood supply.

Figure 1.



Lumbar Fusion Resulting in Painful Foreign-Body Response in Abdominal Scar: Case Report and Review of the Literature.

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Introduction: Plastic surgeons are frequently called upon to evaluate and treat patients for scars that they previously developed, either as a result of trauma or a surgical procedure. Often, a patient is displeased with the aesthetics of the scar, but scars can also cause pain, contracture, or other functional limitations. The aesthetic appearance of a scar is to some, the most important outcome of a surgical procedure. Scar formation is a foreseeable outcome of wound healing. The general principles of wound healing evolve around its three stages: inflammation, granulation, and remodeling. The foreign body response (FBR), as it is called, is described by its persistent inflammatory response with macrophage infiltration and fusion to form foreign body giant cells, and fibrotic capsule formation.

Case Report: We present a case of a 49-year-old female who previously underwent multiple lumbar fusion procedures, including bone graft, for chronic back pain. She presented for evaluation approximately 3 months after her most recent spinal procedure with complaints of periumbilical abdominal pain. After failed conservative measures and an unremarkable CT imaging to determine symptom etiology, she underwent surgical scar revision (Fig. 1-2). The patient was found to have a small, chronic cavity in the mid-portion of her incision with a smooth, solid foreign body inside. Pathologic examination revealed an osteoma. In retrospect, it appears that the osteoma in her scar was likely result of a particle of bone graft that had seeded the incision during her spinal fusion.

Results: An elliptical skin incision was created over the previous midline skin incision, down to an organized fibrous cavity within adipose tissue. This cavity measured 5.5 x 3.5 x 3.0 cm. There was a band of fibrous tissue that extended from the skin, down the full depth of the specimen to the concave area (Fig. 3-4). Within this fibrous capsule, was a small bone fragment. Pathology confirmed, the fragment was an osteoma (Fig. 5-6).

Conclusion: Many patients seek scar revision for a painful scar, however at times the pathology is unrevealing. Contrary to some individuals who undergo scar revision with no origin of their complaint, the patient presented had a peculiar finding that ultimately was the culprit of her pain. Debris retained from the previous lumbar spinal fusion within the abdominal wall caused a localized foreign body response with the development of a fibrous capsule. The presence of foreign body response to an ectopic osteoma found within the abdominal wall has not been documented or discussed in the literature. The foreign body response is an altered mechanism of wound healing. After the host's reactions to foreign material, the released chemoattractions subsequently regulate the subsequent phases of altered wound healing.

Surgical Subspecialties

<i>Surgical Subspecialties</i>		
Karan Kumar, DO	Danbury Hospital	A Rare Case of Hepatocellular Carcinoma Metastasis to the Duodenum
Joshua Wetzler, MD	Stamford Hospital	Chylothorax as a Complication of Laparoscopic Paraesophageal Hernia Repair: A Case Report
Krist Aploks, MD, MBA	Danbury Hospital	Minimally invasive radical cholecystectomy offers a safe alternative to open radical cholecystectomy for gallbladder cancer: A meta-analysis.
Minha Kim, MD	Danbury Hospital	National Cancer Database Analysis of Gallbladder Cancer: Evaluating Survival Benefit of Chemotherapy in Early-Stage Gallbladder Cancer

A Rare Case of Hepatocellular Carcinoma Metastasis to the Duodenum

Karan Kumar, DO^a, Minha Kim, MD^a, Ramanathan M. Seshadri, MD^{a,b}

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Introduction: Hepatocellular carcinoma (HCC) is the most common type of liver cancer and the fourth most common malignancy related to death worldwide.¹ With the increasing survival rate from HCC, there has been a proportional rise in the incidence of extrahepatic metastases.¹ The most common sites of metastases are the lung, abdominal cavity, lymph nodes, bone, soft tissue, and adrenal gland. HCC metastasis to the small bowel is exceedingly rare. The incidence of HCC metastasis to the duodenum is 0.5%-2%.² Here, we describe a case of a patient with gastrointestinal bleeding from metastatic HCC to the duodenum.

Method: Literature review of hepatocellular carcinoma metastasis

Case Presentation: A 67-year-old male presented to the emergency department with melena and right upper quadrant abdominal pain. His medical history was notable for radiation for prostate cancer. Imaging revealed a liver mass measuring 4cm in segment seven, as well as hemoperitoneum in the right paracolic gutter. The patient underwent an exploratory laparotomy and hepatectomy. His pathology was consistent with HCC with negative margins. One month after his surgery, he re-presented with melena. An esophagoduodenoscopy (EGD) was performed and demonstrated an eight-millimeter pedunculated sessile polyp in the duodenal bulb. Histologic evaluation and immunohistochemistry were consistent with metastatic HCC. He was subsequently found to have developed an adrenal mass which was biopsy proven to be yet another metastatic focus from HCC primary. For further treatment, our patient has been following with medical oncology to initiate chemotherapy (immunotherapy).

Discussion: Metastasis of HCC to the gastrointestinal tract, especially the duodenum, is rare and associated with poor prognosis.³ Diagnosing metastasis to the small bowel is difficult as most patients do not present with any gastrointestinal symptoms. If symptomatic, most patients who are found to have duodenal metastasis have gastrointestinal bleeding. A retrospective study, on patients with HCC with duodenal metastasis, showed that out of 21 cases; 18 presented with symptomatic gastrointestinal bleeding.⁴ Although rare, given the occurrences of HCC metastasis to the duodenum, we would recommend that these patients undergo screening endoscopies to rule out potential spread to the GI tract.

References

1. Kumar, D., Hafez, O., Jain, D., & Zhang, X. (2021). Can primary hepatocellular carcinoma histomorphology predict extrahepatic metastasis? *Human Pathology*, 113, 39-46. <https://doi.org/10.1016/j.humpath.2021.04.008>
2. Mohamed AO, Joshi S, Czechowski J, Branicki F. Hepatocellular carcinoma directly invading the duodenum. *Saudi Med J*. 2005 Mar;26(3):478-80. PMID: 15806225.
3. Kim, H. S. (2006). Metastasis of hepatocellular carcinoma to the small bowel manifested by intussusception. *World Journal of Gastroenterology*, 12(12), 1969. <https://doi.org/10.3748/wjg.v12.i12.1969>
4. Liang, J.-D., Chen, C.-H., Hsu, S.-J., Sheu, J.-C., Yang, P.-M., Lee, H.-S., Lee, C.-Z., & Huang, G.-T. (2012). Hepatocellular carcinoma with duodenal invasion and metastasis. *Journal of Gastroenterology and Hepatology*, 27(4), 677-683. <https://doi.org/10.1111/j.1440-1746.2011.06869.x>

Chylothorax as a Complication of Laparoscopic Paraesophageal Hernia Repair: A Case Report

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Stamford Hospital

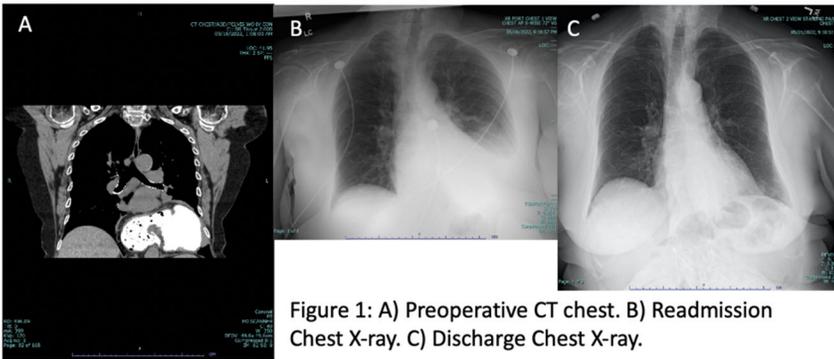
Chylothorax has not been previously reported as a complication of laparoscopic paraesophageal hernia repair (PEHR). A chylothorax develops when there is disruption or dysfunction of the flow of chyle through the lymphatic system in the chest. Patients commonly present with dyspnea secondary to pulmonary compression from the pleural effusion, while additional symptoms may include a heavy feeling in the chest, fatigue, and weight loss. While malignancy is typically the leading cause of nontraumatic chylothorax, a surgical procedure in the vicinity of the thoracic duct or nearby lymphatics is the leading cause of traumatic chylothorax. The diagnosis is supported by evidence of pleural effusion on imaging, more typically involving the right hemithorax. The appearance of the fluid is generally described as milky, with elevated triglycerides (>110mg/dL). Chylothorax is categorized as low or high output using the benchmark of one liter per day. Low output chylothorax is sometimes seen after pulmonary resection with mediastinal lymph node dissection, whereas high output chylothorax may be seen after esophagectomy or operations that risk disrupting the main thoracic duct.

We present a case of laparoscopic PEHR complicated by chylothorax. The patient was a 73-year-old female with history of heart failure with preserved ejection fraction, coronary artery disease, atrial fibrillation on warfarin, and deep vein thrombosis status post inferior vena cava filter, who had been hospitalized for symptomatic bradycardia. Her electrophysiology team believed that the bradycardia might have been triggered by increased vagal tone from a large paraesophageal hernia. She also had significant dysphagia. She presented for elective repair once her medications were optimized. The entirety of the stomach was above the diaphragm causing significant atelectasis of the left lower lobe. The repair was uneventful, consisting of complete resection of the hernia sac, mediastinal dissection generating adequate esophageal length, primary crural repair, and Dor fundoplication. An esophagram was performed the next day showing restoration of normal foregut anatomy and no leak. She was started on a diet and was ultimately discharged on POD3 after weaning off supplemental oxygen.

She presented to the Emergency Department on POD12 with non-exertional burning chest pain radiating to the back for the past two days without shortness of breath, dizziness, or palpitations. She also had epigastric discomfort, unrelated to eating. A chest x-ray on readmission showed a left pleural effusion. A CT of the chest confirmed these findings. A left sided pigtail thoracostomy tube was placed, draining 1300cc of milky white fluid suspicious for chyle. The diagnosis was confirmed by chemical analysis showing an elevated triglyceride level of 696mg/dL. The patient was made nil per os, started on total parenteral nutrition, as well as subcutaneous octreotide (50mcg q8h). Thoracostomy tube output quickly decreased to 0-100mL/day. By POD20 (seven days after readmission), the patient was challenged with a high fat diet. The pleural drainage remained minimal and clear. Complete resolution of the effusion was confirmed on repeat chest X-ray, and the patient was discharged on POD25.

Chylothorax has not been previously reported as a complication of laparoscopic paraesophageal hernia repair. Injury to the duct or its tributaries is feasible during this operation, as extensive mediastinal dissection is often necessary for large paraesophageal hernias such as in this patient. Although in most patients the dominant thoracic duct ascends to the right of midline, anatomic variation is very common, and multiple tributaries cross midline to join the duct as it ascends within the thorax, ultimately crossing midline and entering the junction of the left subclavian and internal jugular veins. It is unlikely that the main thoracic duct was transected in this case, as the chylothorax was low-output and resolved with conservative management alone.

To our knowledge, this is the first reported case of chylothorax after laparoscopic paraesophageal hernia repair. It illustrates the need to be familiar with the anatomy of the thoracic duct within the mediastinum, and to be knowledgeable about the management of this complication. Non-thoracic surgeons may not be as familiar, or appropriately aggressive, in the management of chylothorax, which can be associated with significant morbidity. *(Cont next page...)*



Minimally Invasive Radical Cholecystectomy Offers A Safe Alternative To Open Radical Cholecystectomy For Gallbladder Cancer: A Meta-Analysis.

Krist Aploks MD, Minha Kim MD, Alexander Ostapenko MD, Arash Rahimi-Ardabili MD, Amy Chang, Ramanathan Seshadri MD, Xiang Dong MD

Introduction: Gallbladder cancer today accounts for an estimated 1.2% of all new cancer diagnoses worldwide. For localized stage T1b gallbladder cancer and above, the treatment of choice is a radical cholecystectomy with negative gross and histologic margins. This procedure involves removal of the gallbladder and a portion of the liver, with or without concurrent resection of the bile duct and regional lymph nodes. In the past, performing this resection laparoscopically has been contraindicated due to fears of increased metastasis and inadequate lymph node sampling. With the advancement of laparoscopic techniques, however, minimally invasive radical cholecystectomies have the potential to be as safe and effective as the classic, open approach. This study seeks to use the current available literature to compare outcomes between an open and a laparoscopic radical cholecystectomy.

Method(s): Pubmed, CINAHL, Web of Science, Ovid Cochrane Library, Medline, Embase, and ClinicalTrials.gov were searched. A meta-analysis of selected studies was performed, looking at intra- and post-operative outcomes.

Results: Eighteen studies with a total of 1,507 participants met inclusion criteria. Meta-analysis showed that there was less blood loss (mean difference 89.31 cc, 95%CI 39.25-139.37, $p < 0.001$), shorter length of stay (mean difference 2.86 days, 95%CI 2.00-3.72, $p < 0.001$), and less post-operative complications (13.36 vs 19.26, OR 0.50, 95%CI 0.50-0.99, $p = 0.05$) in the minimally invasive radical cholecystectomy group when compared to the open radical cholecystectomy group. There was no statistically significant difference in the total operative time or the number of lymph nodes harvested between the two groups.

Conclusions: Minimally invasive radical cholecystectomy is a reliable and safe alternative to an open radical cholecystectomy for patients with localized stage T1b and greater gallbladder cancer. Further multi-institutional, randomized prospective studies are needed to better compare the two approaches for the treatment of advanced gallbladder cancer.

National Cancer Database Analysis of Gallbladder Cancer: Evaluating Survival Benefit of Chemotherapy in Early-Stage Gallbladder Cancer

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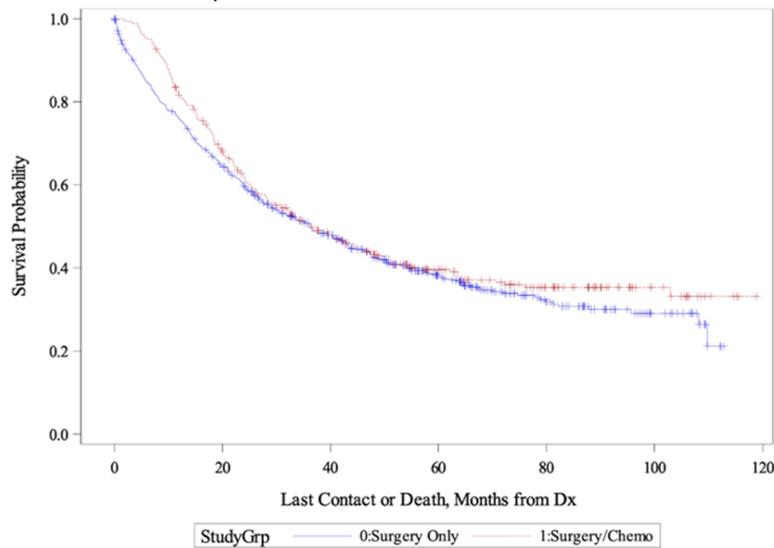
Introduction: Gallbladder cancer is the most common biliary tract malignancy. Treatment for gallbladder cancer is controversial, as there are no definitive consensus guidelines regarding the use of neoadjuvant or adjuvant chemotherapy. Previous clinical studies have shown an overall survival benefit with the use of chemotherapy in locally advanced gallbladder cancer; data demonstrating a similar survival benefit with early-stage gallbladder cancer, however, is limited. This study was performed to evaluate the impact that chemotherapy and surgery has on survival in patients with early-stage gallbladder cancer.

Methods: We performed a retrospective analysis of the National Cancer Database from 2010 to 2017 to evaluate the survival of patients with early-stage gallbladder cancer. We specifically worked to determine if there were any statistically significant survival differences between those who received surgery and chemotherapy versus those who only underwent surgery.

Results: Of the 899 patients with stage II gallbladder cancer, 328 patients had received chemotherapy. The average overall survival for those who had surgery and chemotherapy versus those who only had surgery was 52.6 months and 51.1 months, respectively. This difference was not statistically significant ($p=0.20$).

Conclusions: The overall survival for patients who only had surgery was 1.52 months less than those who had surgery and chemotherapy. Surgeons should exercise caution while recommending adjuvant chemotherapy given the additional morbidity and lack of a statistically significant survival benefit in early-stage gallbladder cancers.

Table 1: Kaplan-Meier survival curve by treatment group



Trauma

Trauma		
Maya Petashnick, MD	University of Connecticut School of Medicine	A Close Call - Stab Injury to the Face
Sean Ramras, MD	Waterbury Hospital	Survival after Emergent Thoracotomy for Blunt Chest Trauma: A Case Report

A Close Call - Stab Injury to the Face

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UConn Surgery – Hartford Hospital

Introduction: Penetrating facial trauma is rare but complex.¹ Diagnostic accuracy and time between the traumatic event and operation can have functional outcomes. Here we highlight alternative approaches to managing these complex presentations.

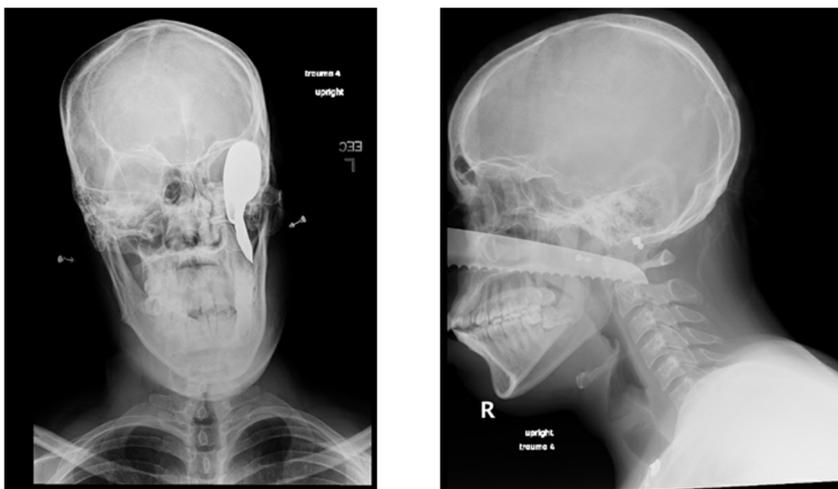
Case: Our patient is a 29-year-old male with no significant past medical history who presented to our facility as a full trauma after he sustained a stab wound to the face with a large knife embedded in his face on arrival to the trauma bay. He reported that he was walking when someone threw the knife at him. Primary survey was performed without abnormal finding. He was able to speak, though somewhat garbled due to inability to open his mouth without pain. He arrived hemodynamically stable with GCS 15. There was no sign of vascular injury. On secondary survey, a large, serrated knife was seen lodged in the left cheek inferior to

the orbit and just lateral to the left ala. Xray was obtained revealing that the knife was deep through his maxillary sinus and into the infratemporal fossa. He was taken for awake nasotracheal intubation in OR, a CTA, then operative removal. Nasotracheal intubation was successful. No airway compromise seen. CTA showed knife penetrating left maxilla through posterior masticator space, 1cm from internal carotid with the top of the knife displacing external carotid branches. Neurointerventional Radiology took patient for coil embolization of left external carotid artery as his left internal maxillary artery branch was narrowed. He returned to OR where the knife was removed, and wound was closed in three layers. On post-operative day three, after repeat CTA, the patient was extubated, observed throughout the day, and subsequently discharged on antibiotics.

Discussion: Initial consultation by the maxillofacial surgeons, after plain films, recommended that the knife be removed and the wound closed without a need for further imaging or intervention. Yet the patient received additional imaging studies and a multidisciplinary assessment by ENT, ophthalmology, OMF, neurosurgery and neuroIR. There is literature support for plain films when there is no sign of vascular injury on physical exam.² Alternatively, there is evidence that multidisciplinary approach and advanced diagnostic imaging is necessary. Effort should be taking to streamline these recommendations and optimize care in this vulnerable patient population.

¹Alessandro, A., Sassano, P., Mustazza, M. C., & Fabio, F. (2006). Complex-Type Penetrating Injuries of Craniomaxillofacial Region. *Journal of Craniofacial Surgery*, 17(3), 442-446.

²Meer M, Siddiqi A, Morkel JA, Janse van Rensburg P, Zafar S. Knife inflicted penetrating injuries of the maxillofacial region: a descriptive, record-based study. *Injury*. 2010 Jan;41(1):77-81.



Survival after Emergent Thoracotomy for Blunt Chest Trauma: A Case Report

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Introduction: The role of emergency thoracotomy (ET) in blunt trauma has been a subject of considerable debate. A systematic review performed by the Trauma Committee of the American College of Surgeons, including 2193 blunt trauma patients who underwent an ET reported a survival rate of 1.6%. Retrospective studies and reviews have reported survival rates from 0 to 12.2%. The outcomes of ET in trauma patients, either after penetrating or blunt trauma, are poor but not negligible, and the possibility of organ donation should also be considered. Our case demonstrates a patient that underwent ET who not only survived but did well post-operatively and recovered with full cardiovascular function.

Case Presentation: 29 y/o “full trauma” activation after being restrained in a motor vehicle accident for approximately 45 mins during extrication. Upon arrival at the trauma bay, the patient had an intact airway but was confused and intubated. Notable traumatic amputation to the left lower extremity with evidence of tibia/fibula fracture and soft tissue loss. Immediately after intubation, the patient had lost peripheral pulses and given that this was less than 10 mins to arrival in the setting of blunt

trauma an emergent thoracotomy was performed bedside. Aorta was cross clamped, bimanual cardiac massage was performed for approximately 90-120 minutes. During this time, she would lose pulses every 15 minutes which returned after rounds of Epinephrine per ACLS and she was eventually started on an epinephrine drip. At the same time, a massive transfusion protocol was initiated. Patient received a total of 9 units of packed red blood cells, 2 units of fresh frozen plasma, and 1 unit of platelets. Patient had a return of pulses, chest was closed primarily, and taken to ICU for further resuscitation. She eventually went to the operating room for a washout of the left chest cavity with proper closure and 28Fr chest tube placement, and completion left below knee amputation for her mangled extremity. Patient had long recovery complicated by neurologic injury that require LTACH placement, but she eventually presented for skin flap and formalization of left lower extremity wound. Patient retained almost completely neurologic function except for that left lower extremity.

Conclusion: Some guidelines recommend that ET be contraindicated in cases of blunt trauma with no signs of life at the scene of trauma or on arrival at the emergency department. However, good outcomes have been achieved for patients who had vital signs on admission and those who received an ET within 15 minutes of cardiac arrest. In the absence of on-scene signs of life, survival following ET is improbable. Survival is significantly higher in non-USA publications; the reasons for this are highly complex. Further studies should be centered on patient vital signs and assessment of primary survey, with regards to ET. Despite the rarity of these patient's surviving an ET, research has been limited.