Surgical Subspecialties - Room 1

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Identifying Factors That Are Associated With Survival In Patients With Solid Pseudopapillary Tumors Of The Pancreas: A National Cancer Database Analysis.

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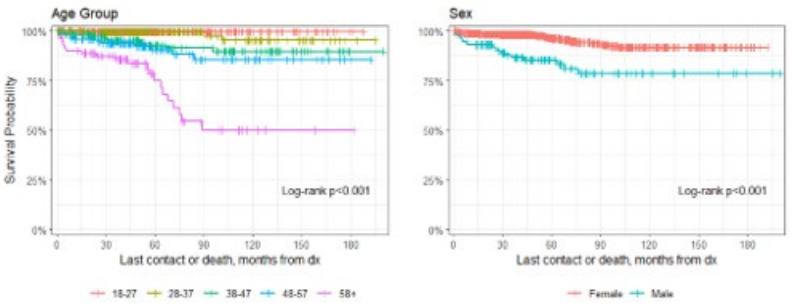
Introduction: Solid pseudopapillary neoplasms (SPN) of the pancreas are rare, low-grade tumors constituting roughly 2% and 3% of pancreatic neoplasms. Most commonly afflicting females in the third and fourth decades of life, the tumors usually present with nonspecific symptoms of nausea and abdominal pain. Although most patients with SPNs have favorable long term survival, a small subset of tumors exhibit aggressive features like local invasion, reoccurrence, and metastasis. Using data from a national database, we sought to identify variables that influence survival among individuals with SPNs.

Method(s): We performed a retrospective analysis of the National Cancer Database from 2010 to 2019 to evaluate the survival of patients with solid pseudopapillary neoplasms. We specifically used univariable and multivariable analysis to identify factors that were associated with survival among patients with SPN's.

Results: A total of 929 patients with SPNs were included in the study. The majority of the SPNs were found in the body or tail of the pancreas (57.8%), and the mean age at the time of diagnosis was 37 years old. 86.8% were female. After a mean follow-up of 64 months, 6% of patients had died/were lost to follow-up. Male sex, old age, advanced stage, and no surgical resection were all associated with increased risk of mortality ($p<0.001$).

Conclusions: The majority patients with solid pseudopapillary neoplasms respond well to surgical resection. Older males with advanced stage disease are at the greatest risk for decreased survival.



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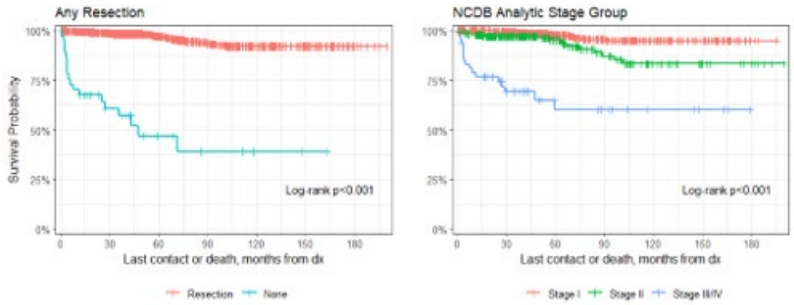

Retrieval of Long-Term Central Venous Foreign Body via Endovascular Technique

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Background: Long-term indwelling central venous devices for over two years have been associated with difficult removal. Prolonged dwell time increases the risk of device migration, fracture, penetration into organs, increased risk of DVT, and bloodstream infections. Proceduralists today face the challenges of retrieving these central venous devices.

Methods We are reporting two patients with long-term indwelling central venous devices, which were retrieved via endovascular approach using advanced and complex endovascular techniques including the loop snare technique.

Results

Case #1

This is a 54-year-old female patient with a right internal jugular vein central venous port-a-cath placed 10 years ago. She was diagnosed with lymphoma involving the mediastinum and base of the neck, for which she completed chemoradiation. She underwent right clavicular plating for a displaced fracture three years ago. Per Oncology recommendation, Interventional radiology attempted to remove the port-a-cath. However, the catheter could not be removed due to severe scarring of the catheter within the internal jugular and innominate veins behind the right sternoclavicular joint. The port was removed with the catheter left behind. Vascular surgery was consulted emergently for assistance. Hybrid retrieval from the right internal jugular and endovascular retrieval from the right common femoral venous access was unsuccessfully attempted due to extensive scar tissue at the retroclavicular region. Serial and circumferential balloon angioplasty of the proximal right internal jugular vein was done to break the scar tissue. The catheter was finally retrieved with a combination of constant pulling force applied via snare and advancing the sheath over the catheter.

Case #2

This is a 66 year old female patient with an inferior vena cava filter placed 12 years ago, which could not be retrieved with the conventional IVC filter retrieval system via the right internal jugular vein. The left femoral vein was accessed, and balloon angioplasty was carried out to release scar tissue from the inferior vena cava filter. A 16 Fr sheath was placed through the right internal jugular vein. A Glide wire was passed into the inferior vena cava filter via a SOS catheter, followed by snaring of the free end of Glide wire and externalizing it. The inferior vena cava filter was eventually retrieved using the loop snare technique.

Both patients were discharged home within 24 hours and had no complications within 30 days postoperatively.

Conclusions: There are a variety of endovascular techniques that are useful and safe for retrieving long-term indwelling intravascular devices. Familiarity of surgeons with these techniques increases the likelihood of successful retrieval.

Incidence And Characteristics Of Vascular Trauma At A Level 2 Trauma Center

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Introduction: Despite the significant number of trauma patients treated at level 2 trauma centers (L2TC) in the United States, most of the literature describing vascular trauma is from level 1 trauma centers (L1TC). The purpose of this study was to characterize the incidence, characteristics, and outcomes of traumatic vascular injuries and the types of patients with these injuries at our institution.

Method(s): A retrospective chart review was performed for all trauma patients with a vascular surgery consultation (VSC) seen at our L2TC between 2013 and 2018. Exclusion criteria included age less than 18 years, pregnancy, and VSC for reasons other than the initial traumatic injury on admission. Patient demographics, injury characteristics, and outcomes were collected and analyzed with descriptive statistics.

Results: Of the 3,062 trauma patients evaluated at our L2TC, 110 (3.6%) had a VSC. Four (3.6%) patients were transferred to a L1TC. Operative intervention was performed in 35.2% of consults, and 1.0% of all trauma patients had a vascular intervention. Average age was 57 years-old, and the majority was male (68.2%, *n*=75). Mean Injury Severity Score (ISS) was 12.0 +/- 9.6, and blunt injury (87.5%, *n*=77) was more common than penetrating (12.5%, *n*=11). The most common location of injury was the lower extremity (74.2%, *n*=23), followed by upper extremity (9.7%, *n*=3), chest (6.5%, *n*=2), neck (6.5%, *n*=2), and pelvis (3.2%, *n*=1). All vascular interventions were performed by a vascular surgeon. Of these procedures, 67.7% (*n*=21) were repaired endovascularly (Table I). There was one (3.2%) amputation and one (3.2%) post-operative mortality.

Conclusion(s): At our L2TC, postoperative morbidity and mortality rates at 30 days were substantially lower compared to previously reported data. However, mean ISS and the incidence of penetrating and polytrauma were also lower at our institution. Most patients were managed nonoperatively, but when they did require an operation, endovascular therapies were more commonly implemented. Vascular surgery should be considered an integral service in trauma level designation, and there is a need for further investigation of these outcomes in L2TCs.

Table I. Interventions categorized by repair type and injury.

	Injury, *n* (%)	Intervention
Endovascular		
	LE artery, 9 (39.1)	Diagnostic angiography
	LE artery, 5 (16.1)	Angioplasty, stent
	LE artery, 4 (12.9)	Angioplasty
	Thoracic aorta dissection, 1 (3.2)	TEVAR
	Thoracic aorta rupture, 1 (3.2)	TEVAR
	Iliac artery dissection, 1 (3.2)	Stent
Open		
	Posterior tibial artery, 3 (9.7)	Ligation
	ATA, 1 (3.2)	ATA to ATA bypass
	Popliteal artery, 1 (3.2)	Primary repair
	Radial artery, 2 (6.3)	Ligation
	Brachial artery, 1 (3.2)	Interposition graft
	Expanding neck hematoma, 2 (6.3)	Open exploration

LE = lower extremity, TEVAR = thoracic endovascular aortic repair, ATA = anterior tibial artery

Intersphincteric Fistulotomy: A Novel, Safe, and Effective Procedure for Transsphincteric Fistula-in-Ano in Comparison with Ligation of Intersphincteric Fistula Tract (LIFT)

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Introduction: For treating mid-high transsphincteric fistula, a two-stage approach is usually administered: an initial seton placement followed by a sphincter-sparing procedure, such as LIFT, endoanal advancement flap, fibrin glue, or fistula plug. However, success rates are not optimal. Therefore, we aim to demonstrate and describe a novel, single-staged procedure for managing transsphincteric fistula with or without associated anorectal abscess, and we will compare its efficacy with the LIFT procedure.

Method(s): The procedures in this study were performed at an academic teaching hospital and data was analyzed as a retrospective study. All patients (26) who presented with mid or high transsphincteric fistula with or without associated anorectal abscess and consented to the procedure from 2020 to 2022 were managed with intersphincteric fistulotomy. The primary outcome measures were recurrent fistulas and fecal continence 8 months and 14 months post-operatively. Data was analyzed using Fischer's exact test.

Results: From 2020 to 2022, 26 patients with mid or high transsphincteric fistula received intersphincteric fistulotomy; 7 (26.9 %) had an associated ischiorectal abscess. At the 8-month and 14-month follow-up, 0 patients experienced fistula recurrence or fecal incontinence. In comparison with our previous study data from 2011 to 2013, 24 patients with transsphincteric fistula with or without associated abscess were treated with initial seton placement, and then LIFT procedure. With a follow up range of 14-36 months, 5 (20.8%) patients presented with recurrent fistulas; no patients experienced fecal incontinence. These results were statistically significant.

Conclusion(s): Our results reflect that intersphincteric fistulotomy is a safe, simple, and effective procedure for treating patients with transsphincteric fistula-in-ano with or without associated abscess. Patients healed with no fistula recurrence or fecal incontinence, which is significant in comparison with previous patients treated with LIFT procedure. Intersphincteric fistulotomy does not require an initial seton placement unlike previous operations for managing transsphincteric fistula with associated abscess. Limitations of this study include a small sample size as a single-center retrospective study. Further studies should be considered to strengthen the generalizability of our results.

Study Group	Associated Abscess	Prior Seton	History of UC	Prior LIFT	Fecal Incontinence	Fistula Recurrence (%) [a]
Intersphincteric Fistulotomy n= 26	7	4	1	2	0	0
LIFT n = 24	0	24	0	N/A	0	5 (21%)

UC: Ulcerative Colitis.
[a] P value = 0.02 (Fischer's exact test)

Management of Mechanical Aortic Valve Pannus: A Minimalistic Approach

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Replacement of a diseased aortic valve (AV) has been shown to improve cardiac function and symptoms. Prosthesis-related valvular obstruction is one of many potential complications following replacement. Management of thrombotic obstruction is well-described; however management of pannus-related obstruction is less well-defined. The incidence of pannus formation in prosthetic valves ranges from 0.7-1.8%. Pannus is thought to originate in the neointima of the periannular tissue and is a bioreaction to prosthetic valves, which leads to an increased production in cytokines inducing fibrosis and scar tissue formation.

The formation of pannus is related to surgical technique, thrombus organization from inadequate anticoagulation, infection, and shear wall stress. Here, we discuss management of a patient with mechanical AV obstruction secondary to pannus overgrowth.

Diagnosis of suspected prosthetic valve obstruction involves a complete history and physical examination as well as echocardiography. Diagnosis can be made if there is an increase in the mean transvalvular gradient by more than 50%. Both patient history and imaging findings can help to differentiate between thrombus and pannus obstruction. Indicators suggesting pannus include higher density, especially extending along the ring, less acute symptom onset, and restricted leaflet motion with an absence of leaflet attachment.

Management of valvular obstruction depends on symptomatology and underlying cause. Urgent temporizing medical management is indicated in patients with moderate to severe symptomatic mechanical valve obstruction. This includes respiratory support, treatment of hypertension and heart failure, and anticoagulation. Diuretics and antihypertensive agents can lead to instability. Thrombolytic therapy is recommended in patients with thrombus obstruction who are particularly high-risk surgical patients, NYHA Class I or II patients, patients with first episode of valve thrombosis, patients without contraindications to fibrinolysis, and patients with small clots (<0.8cm^2) and no atrial thrombus. Operative intervention is recommended in patients with valvular obstruction due to thrombus who are low surgical risk patients, have NYHA Class IV symptoms, have contraindications to fibrinolysis, those who have experienced recurrent thrombosis, and large clots (>0.8cm^2) with left atrial thrombus. Fibrinolytic therapy is not indicated in patients with pannus obstruction, and surgical intervention is recommended. Though there are few outcome studies, re-do valvular surgeries are associated with a high overall 30-day mortality rate (10-15%), with risks including re-entry complications and damage to the endocardium when excising the previously implanted valve. Herein, we present an alternative surgical management in a patient with prosthetic valve obstruction secondary to pannus formation.

A 53-year-old female presented with a history of Guillain-Barre syndrome and prior mechanical AV replacement (23mm St. Jude's) and mitral valve repair (Duran ring) for infective endocarditis 10 years prior to presentation. She recently developed shortness of breath, and an echocardiogram demonstrated normal left ventricle function, moderate left ventricle hypertrophy, and restriction of her AV leaflet without evidence of thrombus or vegetation. Her peak velocity was 5cm/s with mean gradient 56mm Hg. The echo also demonstrated moderate aortic regurgitation and mild mitral regurgitation. Patient underwent diagnostic catheterization which showed normal coronaries and confirmed restricted opening of the mechanical AV leaflets. Given that her AV leaflets were restricted without evidence of thrombus, and coupled with a supratherapeutic INR (8), pannus overgrowth was suspected. She was taken to the operating room for redo-sternotomy. Upon visualization of the mechanical AV, there was pannus growing through the AV, restricting leaflets. There was also growth on the Duran ring. The pannus was carefully resected in pieces until the leaflets were freely mobile. The valve was irrigated thoroughly. Following pannus resection, her valve was found to be normally functioning on intraoperative TEE. She had an uncomplicated postoperative course, including a normal TTE with a new AV mean gradient of 13mmHg, and she was discharged on post-operative day 6 on warfarin therapy.

This case demonstrates an alternative surgical management to mechanical valve replacement in a patient with obstruction secondary to pannus formation. Resection of pannus offers a shorter bypass and cross clamp times and is less technically challenging. We infer that this surgical technique can be used for pannus on mechanical valves in other positions when possible. While this patient's short-term outcome was positive, we still do not know the long-term outcome of pannus resection compared to valve replacement. We also do not have clarity on the precise etiology of her pannus formation. We recognize a limitation to this approach is that there still is a risk of recurrence for pannus formation but this is also true for prosthetic valve replacement as well. While valve obstruction due to pannus formation is rare, this less invasive surgical approach should be considered.

Outcomes of Balloon-Assisted Maturation Utilizing Large-Diameter Angioplasty Balloons

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Introduction: Arteriovenous fistula (AVF) maturation failure continues to be an important clinical problem. Traditionally, the "rule of 6" has been used to evaluate AVF maturity and suggests that functional access should have a depth no greater than 6mm below the skin surface. Balloon assisted maturation (BAM) is a well-established technique for maturation of inadequate AVFs. The objective of this study was to evaluate outcomes of initial BAM using large-diameter (≥7mm) angioplasty balloons, as well as patient and anatomical factors associated with ability to tolerate BAM with large balloon size.

Method(s): A retrospective cohort study of 239 patients, who underwent BAM between 2018 and 2021 in a single academic medical center, was performed. AVF maturation rate was the primary outcome. The secondary outcomes included procedural complications, re-intervention rates, post-procedure vein diameter, and time to catheter-free hemodialysis (HD). Outcomes in patients that underwent initial BAM with ≥7mm diameter balloons (Group I, n=149) were compared to the patients that had initial BAM with <7mm balloons (Group II, n=90). These groups were not randomized prior to interventions, as our intent was to utilize large balloons in all the patients, as tolerated. Large balloons were not used if extravasation was observed after angioplasty with a smaller balloon. AVF was considered matured if it was used consistently with two needles for more than two-thirds of prescribed dialysis sessions within four consecutive weeks.

Results: Group I was a significantly younger cohort and was comprised of more men, compared to Group II. Other demographics and preoperative characteristics were similar between the two groups. On post-procedure duplex ultrasound (DUS), the median vein diameter was 5.9mm (IQR: 5-6.4) in Group I and 5.1mm (IQR: 4.2-5.9) in Group II, p=0.03. There was also a higher incidence of vein stenosis on post-procedural DUS in Group II. There were no significant differences associated with procedural details and complication rates (Table I). The overall maturation rate was 95% (n=173): 97% (n=145) in Group I and 88% (n=79) in Group II, p=0.003. A significantly higher number of patients in Group II required more than one BAM to achieve maturation (33% vs. 16%, p=0.002). The median time to catheter-free HD after the first BAM procedure was 29 days (IQR: 19-47) in Group I and 42 days (IQR: 24-75) in Group II, p=0.002. At 60 days after first BAM, the incidence of catheter-free HD was 83% in Group I and 67% in Group II, p=0.001.

Conclusion(s): BAM is a relatively safe procedure with low complication rates. In our cohort, initial BAM with large-diameter balloons (>7mm) after AVF creation was associated with improved fistula maturation rates and fewer number of reinterventions, as well as shorter time to catheter-free HD. This may also have an impact on decreasing overall cost associated with dialysis access, which should be a focus of future research efforts. Additional studies are needed to help refine patient selection prior to a maturation procedure to determine which patients will tolerate AVF angioplasty with large-diameter balloons.

Table I. Procedural details, complications, and outcomes

Characteristics	Group I (n=149)	Group II (n=90)	p
Mean procedure duration ± SD, min	38 ± 17	38 ± 13	0.8
Mean fluoroscopy time ± SD, min	5 ± 4	5 ± 3	0.7
Mean contrast used ± SD, mL	31 ± 16	28 ± 15	0.2
Contrast extravasation, n (%)	22 (15)	18 (21)	0.2
Periprocedural fistula thrombosis, n (%)	2 (1)	2 (2)	0.6
Maturation rate, n (%)	145 (97)	79 (88)	**0.003**
Re-intervention rate, n (%)	24 (16)	30 (33)	**0.002**
Median time to catheter-free HD, days (IQR)	29 (19-47)	42 (24-75)	**0.002**

SD = standard deviation, HD = hemodialysis, IQR = interquartile range

Retroperitoneal Bleed Secondary to Ruptured Spontaneous Right Inferior Phrenic Artery Pseudoaneurysm: A Case Report

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Introduction: Ehlers-Danlos syndrome (EDS) encompasses a heterogeneous group of disorders caused by alterations in fibrillary collagen metabolism. Among these disorders is Vascular EDS, or Type IV EDS, which is caused by an autosomal dominant defect in type III collagen synthesis. Despite constituting only approximately 5% of all EDS cases, this subtype has one of the worst prognoses in terms of life expectancy and susceptibility to life-threatening vascular complications. Patients with EDS type IV are at high risk for arterial dissection, rupture, and aneurysm formation as well as hollow organ rupture, with a median life expectancy of 40 to 50 years. Inferior phrenic artery (IPA) aneurysms are a particularly rare form of visceral pseudoaneurysm. Herein, we present a rare case of a ruptured spontaneous inferior phrenic artery pseudoaneurysm leading to retroperitoneal hemorrhage in a patient with Type IV EDS

Method(s): A 28-year-old gentleman with Ehlers- Danlos syndrome and history of multiple bilateral pneumothoraces, status post bilateral partial pleurectomies, initially presented to an outside hospital with acute onset of right flank pain. He underwent a CTA of the abdomen, which identified a small right retroperitoneal hematoma without any active bleeding. He was admitted for observation, his symptoms completely resolved, and he was able to be discharged. Over the course of the next two days, he developed severe flank pain again, which brought him back to the emergency room, where a repeat CTA showed a significantly larger retroperitoneal hematoma with active extravasation. The patient was diagnosed with an 11 mm pseudoaneurysm of the right inferior phrenic artery which had ruptured, leading to significant retroperitoneal hemorrhage in both anterior and posterior pararenal space.

Results: After a thorough discussion with the patient, the decision was made to pursue emergent inferior phrenic angioembolization. Access was gained via the right common femoral artery. A focal aneurysm/pseudoaneurysm was visualized angiographically with no active extravasation identified initially. The right inferior phrenic artery was embolized distally with gelfoam and proximally with microcoils, including the aneurysmal segment. Post embolization angiography demonstrated mild hemorrhage. Additional coiling into the inflow resulted in cessation of bleeding. Patient remained hemodynamically stable and repeat CTA showed a stable hematoma without any further evidence of extravasation. Patient was discharged home six days following angioembolization.

Conclusion(s): Inferior phrenic pseudoaneurysms represent a rare entity. To our knowledge, this is the first reported case of retroperitoneal hemorrhage secondary to spontaneous inferior phrenic artery pseudoaneurysm rupture. Existing literature on management options for EDS patients with complications related to arterial dissection or rupture is limited to case reports and very small series. Given the fragility of the tissues and vessels in patients with vascular EDS, it is recommended that management of spontaneous bleeding be conservative as long as possible. When indicated, the options for intervention can vary ranging from endovascular to open surgical exploration. In our perspective, the decision to intervene and the choice of intervention should be an individualized process that is guided by the patient's clinical status and the extent of hemorrhage.