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Dr. John Heysham Gibbon, Jr. graduated from Jefferson Medical College in 1927, and after an internship at Pennsylvania Hospital, began a research fellowship at Massachusetts General Hospital. In 1930, he found himself assisting Dr. Edward Churchill in an emergency pulmonary embolectomy. At that time, the procedure was one of desperation, as no patient in the U.S. had survived the removal of blood clots in open-heart surgery. As Dr. Gibbon recorded the patient’s waning vital signs prior to the procedure, he thought, “If only we could remove the blood from her body by bypassing her lungs, and oxygenate it, then return it to her heart, we could almost certainly save her life.” Despite a successful removal of large clots from the patient’s pulmonary artery, the patient never regained consciousness. This “critical event” initiated Dr. Gibbon’s determination to produce a heart-lung machine.

Dr. Gibbon was Chief of Surgical Services at the 364th Station Hospital in the Pacific Theater. After the war, upon returning to Philadelphia, his alma mater offered him the position of Professor of Surgery and Director of Surgical Research, which he accepted. Through Jefferson Medical College’s connections, IBM and its premier engineering department entered the picture and worked with Dr. Gibbon to develop a device known as IBM “Model I.” His wife, Maly Gibbon, and the Jefferson Medical College surgical residents were also deeply involved in the evolution of this huge apparatus (too heavy for the building’s elevators), which proved to be successful in repeated experiments on dogs. However, limitations on the machine for human patients existed and the decision was made to cannibalize parts of Model I for Model II, which was ready for its first test in February 1952. Although the heart-lung device was fully functional, the first patient, a 15-month-old child, died during the operation. The defect, in this case, was much larger than the surgeons had been prepared for.

On May 6, 1953, at Jefferson Medical College Hospital, Dr. Gibbon and his staff, with the help of his latest-designed heart-lung machine, “Model II,” closed a very serious atrial septal defect between the upper chambers of the heart of 18-year-old Cecelia Bavolek. This was the first successful intra-cardiac surgery of its kind performed on a human patient. “Jack” Gibbon did not follow this epoch-making event by holding an international press conference or by swiftly publishing his achievements in a major medical journal. According to a recent biographical review by C. Rollins Hanlon, “Therein lies a hint of the complex, unassuming personality behind the magnificent technical and surgical achievement of this patrician Philadelphia surgeon.” After the triumphant Bavolek case in May of 1953, both children subsequently died, prompting Gibbon to declare a year’s moratorium regarding use of the heart-lung machine, pending investigations into solving clotting problems and blood loss.

During the years leading up to his successful surgery, Dr. Gibbon had been sharing his blueprints and experiences with Dr. John Kirklin at The Mayo Clinic. Eventually, the Mayo Clinic built the “Model III” based on the proposed changes from Dr. Gibbon’s lab, which led to several successful operations there. While Dr. Gibbon turned to his non-cardiac interests, others continued to perfect cardiac surgery. It is clear that Dr. Gibbon’s contributions to the field of cardiac surgery were necessary in order for the field to develop, which is why he is often referred to the “father of cardiac surgery.”
A History of ECMO and its Use During the COVID-19 Pandemic

By Michelle Schafer, Class of 2024

Throughout the COVID-19 pandemic, extracorporeal membrane oxygenation (ECMO) has emerged as a treatment for patients with severe respiratory distress as a temporary solution to bypass the lungs and heart in favor of a mechanical oxygenator. Although the earliest versions of ECMO were developed in the 1950s and 1960s, the popularity of ECMO as a ICU treatment of last resort is recent, and it is largely due to its success during the H1N1 influenza pandemic. However, ECMO use comes with a fair share of adverse risks, which should be thoroughly evaluated when its use is considered in the management of patients with severe COVID-19.

ECMO is designed to be a mechanical device that can function as an external artificial cardiopulmonary system. Oxygenated blood is drawn from a large vein, such as the femoral, internal jugular, or subclavian, is pumped out of the body through a membrane oxygenator. The oxygenated blood is then returned back to the venous system and acts as lung support, while veno-venous (VV) ECMO returns blood to the venous system. A blood oxygenator provides respiratory and hemodynamic support for the patient. In the 1950s, clinicians attempted to use the cardiopulmonary bypass machine as a form of life support in patients with acute cardiac or respiratory failure. Unfortunately, the bypass machine exposed the blood directly to oxygen, which induced both hemolysis and protein denaturation and caused major complications. Subsequently, clinicians began to study technologies that could externally oxygenate blood. Earlier attempts included the use of various plastic films as well as modified methods of hemodialysis, and attempts at modifying blood gases. Venovenous (VV) ECMO returns blood to the venous system and acts as lung support, while veno-venous (VV) ECMO returns blood to the venous system. 

ECMO was used in the treatment of ARDS since its origination. Traditional ARDS is driven by release of proinflammatory cytokines, which ultimately leads to a protein-rich fluid accumulation in the alveoli and to decreased ability of the alveoli to ventilate the blood in the pulmonary circuit. In an early case series published in the Journal of Cardiac Surgery in 2020, VV-ECMO failure in a small population of hypercoagulable patients was found to stem from thrombi states causing oxygenator dysfunction. This case report was one of many at the time that allowed physicians and scientists to realize that the ARDS seen in COVID-19 patients was unique. COVID-19 has been observed to cause a hypercoagulable state in some patients, which can result in microthrombi and damage to vessels endangering the extracorporeal circuits and vessels, mimicking the physiology of pulmonary emboli.

The slightly altered pathophysiology of COVID-related ARDS warranted a novel name, leading to the term COVID-19 acute respiratory distress syndrome (ARDS)1 Importantly, recognizing ARDS as unique from traditional ARDS led to changes and improvements in care. Many patients with COVID-19 had evidence of hypoxemia and hypercapnic states, leading to a decision early in the pandemic to intubate and mechanically ventilate patients as promptly as possible; however, there was increasing potential for ventilation-induced lung damage. ECMO also presented challenges with increased dead space and greater carbon dioxide retention. Moreover, ECMO use is not without consequences, so physiotherapy and rehabilitation activities are exceedingly important in patients recovering from any ECMO use.2

The recency of ECMO as a widely adapted technology allowed for recommended use early in the COVID-19 pandemic without having wide spread studies for the previously mentioned adverse events. A study published in 2022 highlighted these knowledge gaps, as well as the debate between experts and the use of ECMO in CARDS due to significant complications, such as increased bleeding risk and intracranial hemorrhage (ICH).3 Due to the nature of the hypercoagulable state and formation of microthrombi in COVID-19 patients, the Extracorporeal Life Support Organization recommended that institutional anticoagulation guidelines be followed with the option to increase the anticoagulation intensity to potentially prevent the blood clots from catching in the oxygenator. This study tried to determine if the anticoagulation recommendations were the primary reasons for increased bleeding risk and ICH incidence, but were unable to determine if it was the cause or if the undetermined pathophysiology of the disease. However, they found that patients receiving VV-ECMO had a six-fold increased risk of ICH compared to a control group with ARDS due to a non-SARS-CoV-2 viral disease. Investigating if there was something specific about the use of ECMO for COVID-19 patients, including the level of anticoagulation, the risk of potential bleeding from ECMO use in critically ill COVID-19 should be considered before cannulation.

The swift emergence of the SARS-CoV-2 virus and the severe lung disease caused by COVID-19 drove physicians and scientists to develop treatment guidelines that employed the use of ECMO. Because many COVID-19 patients have respiratory distress presenting similarly to traditional ARDS, and because the use of ECMO saw relative success during the influenza A H1N1 pandemic, the use of ECMO as a life support in patients with severe CARDS was utilized in the pandemic. As it became clear that COVID-19 patients were presenting with hypercoagulable states, the associated thrombotic risks of using ECMO were explored. The use of ECMO as a treatment for patients with COVID-19 suffering from severe ARDS needs to be continually evaluated to determine whether the improvements in care eclipse the associated risks and potentially fatal adverse events.

References

The First Pig-to-Human Heart Xenotransplantation

By Eric Teicher, Class of 2025

The final gene deletion removed a growth hormone to prevent any abnormal growth once the heart was implanted into the donor. The researchers wanted to mitigate the possibility of heart failure by preventing any additional growth of the already innately larger pig heart.

Finally, to prevent rejection after transplant, Mr. Bennett was given a novel, experimental antibody called KPL-404. Typical immunosuppressants would not be as effective given the strong antibody response against the transplanted organ. KPL-404 is an anti-CD40 immunosuppressant, meaning that it binds to a specific receptor called CD40 that suppresses the activity of antibody-producing B cells, which also prevents T cell activation. Prior to transplantation, the heart was bathed in a circulating bath, including water, adenalin, cortisol, and cocaine as part of the priming process prior to transplantation.

The University of Maryland transplant team has said the surgery went well and “the heart function looks great.” However, despite all efforts to keep Bennett alive, he passed away on March 8th. The University of Maryland did not report on an exact cause of death but reported his condition had been deteriorating since days earlier.

Although most of the prior research in xenotransplantation has involved transplantation into baboons, researchers state that it is important to study the transplants in humans given the vast differences in antibody profiles between the species. Non-human primates often have antibodies that humans lack, making it difficult to predict a response. Although the FDA has only authorized this single transplant pertaining to Mr. Bennett’s case, the team is optimistic that future clinical trials, hopefully eradicated in the virtual setting. Saving this huge sum of money was around $2,198 in travel costs per applicant.5

References

1. Kerrigan TP, Jeong CY, Pannu S, Yen SP, Rooney TB. Increasing Applicant Engagement During the 2020-2021 Virtual residency interview cycle and beyond: The Dartmouth-Hitchcock radiology program’s positives and negatives. In fact, some programs decided to shift their budget from pre-interview dinners and hospital tours to creative media solutions, i.e., videos, websites, etc.1 While these help medical students in getting to know the program, it does not allow them to truly gauge the residency experience. Students need to choose their top choices based on how well they felt the interview went, as well as how much they learned about the program and the city from the screen. As one of the interviewed students mentioned: “It does make it harder to decide how to rank programs in cities that I’ve never been to.”

Residency Interviewing in the Zoom Era

By Jose Ariolla, Class of 2025

This is the second year in a row in which residency programs conducted virtual interviews as a result of the COVID-19 pandemic. This meant swapping their hospital tours for YouTube videos or providing Uber Eats gift cards in lieu of lunch sessions. Similarly, 4th year medical students needed to adapt to this new situation. From an outsider perspective, it may seem these changes are double and reasonable for the time being. However, there is evidence suggesting that these changes might be more permanent. A recent survey showed that 56 General Surgery program directors (PDs) agreed that virtual interviews are less expensive. In fact, 40 out of those 60 agreements that they will adopt both virtual and in-person interviews in future cycles.1 On the other hand, another study showed that 45% of surveyed PDs in other fields disagree that the 2022-2023 interviews should be virtual regardless of COVID-19.1 This aligns with a study from the University of Texas which found that medical students still favor in-person interviews.2 Due to this conflicting information, we decided to explore this dichotomy.

Pro: The cost of interviewing for residency has been highly reduced

The Association of American Medical Colleges (AAMC) has estimated that a student spends around $4,000 during an in-person interview cycle. In fact, those same estimations suggest the amount can even be as high as $13,225.3 However, expenses such as traveling, meals and lodging are eradicated in the virtual setting. Saving this huge sum of money is advantageous for 4th year medical students. According to a study done with 2021 urology applicants, the amount of money saved was around $2,198 in travel costs per applicant.5

Pro: Planning interviews is easier

Another advantage of online interviewing is the ability to prepare and plan an interview more easily. During interview season, 4th year medical students are still participating in clinical rotations; hence, there is a whole science behind scheduling interviews. Generally, students schedule interviews during the small vacations, but sometimes they need to ask their directors for additional days off. Furthermore, sometimes students need to group interviews geographically to avoid multiple continental trips. Zoom meetings allow students to avoid these hassles and focus more on practicing for the actual interview.

Con: You are not able to showcase your true self

One of the main disadvantages of online interviewing is that you do it behind a screen. This can cause different problems such as the inability to properly use body language. This can be worrisome, considering some studies suggest nonverbal behaviour can account for around 55% of effective communication.4 In conclusion, online interviewing also makes it hard to portray one’s personality correctly as it is sometimes more difficult to form a connection with the interviewer. Interestingly, one of the medical students we interviewed did not find these issues too worrisome. In fact, she commented that when practicing for interviews with her home institution, she focused more on setting up the correct lighting and Zoom background. While being able to showcase one’s true self may be more challenging during online interviews, there are other issues the applicants needed to consider in these virtual times.

Con: It is difficult to assess the residency program

The same way it is hard for students to express themselves to programs, it is difficult for students to fully assess a program’s positives and negatives. In fact, some programs decided to shift their budget from pre-interview dinners and hospital tours to creative media solutions, i.e., videos, websites, etc.1 While these help medical students in getting to know the program, it does not allow them to truly gauge the residency experience. Students need to choose their top choices based on how well they felt the interview went, as well as how much they learned about the program and the city from the screen. As one of the interviewed students mentioned: “It does make it harder to decide how to rank programs in cities that I’ve never been to.”

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An Interview with Dr. Andrew Newman

By Ari August, Class of 2025 and Gregory Whitehorn, Class of 2025

Dr. Newman is a Clinical Assistant Professor of Surgery in the Division of Plastic Surgery. He received his Bachelor of Science from the College of William and Mary and attended medical school at The University of Virginia School of Medicine. He completed consecutive residencies in General Surgery and Plastic Surgery at The Hospital of the University of Pennsylvania. Dr. Newman specializes in microsurgery. He is certified by the American Board of Plastic Surgery and is a Member of the American Society of Reconstructive Microsurgery.

What led you to pursue a career in surgery?

I was super psyched to go to my medicine rotation. I was in med school at UVA... I love headfarts and I loved it. I kind of thought, “Oh, I’m going to do neurology or radiation oncology, and then they see us. They’ve had a ton of patients, and they’re going to go into surgical oncology.” Once I went into surgery to the different places and that person was gone, I realized, “Oh! This sort of just wanted to be around that person, not necessarily do surgery.”

How do you maintain work-life balance?

I think it’s about defining your boundaries. I think that’s what I’ve had to figure out, and every medical student who goes into surgery may wonder, “Is [the time commitment] a potential negative for my career choice?” I don’t think that should be a negative for my career choice. I think that as a student–and I think that’s been something important to me personally, and I’m probably not the best at it. But it made me realize I made a really good decision because if I’m having a hard time with some of these complications I just never would’ve been able to deal with something like cardiac surgery.

What do you consider your most challenging experience?

Our time course is fairly short, so I get to see them through every stage of treatment. The outcomes can be challenging in something like that, so emotional burnout ended up directly informing my decision to say, “Oh, I can’t do this.” You have to think about how you deal with complications because they’re going to happen, and they’re going to happen again, and again.

How do you help your patients to get better?

What do you think the future of medicine holds?

Some things really liked in surgery when I was a med student is when we went to M&Ms. I really liked the sort of directness of surgical M&Ms and that, “Let’s talk about our mistakes, let’s face them, let’s not avoid confronting them.” I think ultimately to get better we are going to have to look very critically at what we’ve done and how we can make that better. I liked that as a student–I think that’s been something important to ultimately avoid emotional burnout.

You have to really love what you do.

There’s no substitute for being enthusiastic about what you’re learning and what you’re striving to do because it’s going to take time no matter what you pick.

What is your advice for students looking for their right path in medicine?

What is your advice for students looking for their right path in medicine?

First and foremost, you have to really love what you do. There’s no substitute for being enthusiastic about what you’re learning and what you’re striving to do because it’s going to take time no matter what you pick.

In looking at surgical residency, one habit that a lot of surgical residents develop later in their residency is meticulously documenting how to do a particular procedure. For me, that was a little notebook, I didn’t really start keeping one until towards the end of residency, and I was like, “Gosh, I’ve got to remember this!” But that was enjoyable for me to do, that didn’t feel like work, it was sort of fun to kind of piece all that together. If work becomes uninteresting, then I don’t care what your work ethic is, eventually you will burn out. This is the moment you do your best to figure out an area that will keep you interested and keep you engaged.

General surgery is interesting, I think, because there’s not going to be a long time, but you’re not picking something so you are happy in five years–you’re picking something so you are happy in fifteen years. There’s going to be such a long period of time for you to practice whatever your field of choosing. I can’t oversaturate this: it’s going to be a long time–in a good way–but man, don’t sweat the extra year or two or three that it takes if that’s where you want to go.

What kind of qualities do you think are important characteristics of a successful surgeon like yourself?

- It's important to be passionate about what you're doing.
- It's important to be curious and keep learning.
- It's important to be able to work under pressure.
- It's important to have good communication skills.
- It's important to have good teamwork skills.

First and foremost, you have to really love what you do. What's your advice for students looking for their right path in medicine?

Two things that I want to talk about. One: being a medical student on a surgical rotation can be a bore because you might end up doing the same thing week after week. That's really important. While that's useful as a resident because you're going to need the physical reps to get good at that procedure, as a medical student you're either going to be observing or doing something fairly basic like microneurolysis. You don't need a good conversation or it's not a good vibe, that can get really boring. When I was a medical student, I was the laparoscopic camera driver on a bariatric rotation so I saw umpteen-gallon grotesque bypasses and I held the camera and didn't hold it well. I had to figure out, and every medical student who goes into surgery has to do this, “Do I really want to be going to like being the person across the table from me? Because I really don't like doing what I’m doing right now.”

I think that's the most important thing to keep in mind. There's no substitute for being enthusiastic about what you're learning and what you're striving to do because it's going to take time no matter what you pick.

What kind of qualities do you think are important characteristics of a successful surgeon like yourself?

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As of January 2022, there have been approximately 60 Amillion confirmed cases of the coronavirus disease 2019 (COVID-19) and nearly 850,000 COVID-19 deaths in the United States.1 The symptoms of COVID-19 range from those of a minimal upper respiratory tract infection to severe respiratory failure with multiple organ failure.2 In patients with severe disease, a robust host immune response mediated by both cytokines and inflammatory cells plays a major role in lung destruction. Severe COVID-19 lung injuries may result in acute respiratory distress syndrome (ARDS) and pulmonary fibrosis with characteristic pulmonary ground glass opacification on CT scan.3

Lung transplantation is a life-saving treatment for a variety of end-stage lung diseases. The indications for lung transplantation are usually due to end-stage lung diseases, like pulmonary fibrosis. Lung transplant, however, is infrequently considered for patients with ARDS attributable to infectious causes.4 Significant dysfunction of other vital organs, such as those seen after severe COVID-19 infection, poses potential contraindications to lung transplantation.5 Lung transplant (LT) after severe COVID-19 disease due to COVID-19 infection represents an unexplored territory. Several concerns limit the use of LT as a therapy for patients with severe ARDS secondary to COVID-19. First, it is possible that the superinfecting pathogen might recur in the allograft. Second, severe vascular and pleural damage secondary to COVID-19 infection might create technical barriers to the transplant procedure, like acute lung disease, such that due to COVID-19, has been shown to make the vascular anastomosis technically more challenging.6 This subsequently increases the time of tissue ischemia, further worsening outcomes. Third, the majority of patients with COVID-19 have likely endured extensive anterior and posterior compartments, the decision to proceed with LT in the cases of severe pulmonary disease is not a clear path. King et al. have proposed a potential diagnostic algorithm for the evaluation of inpatient lung transplant candidates with COVID-19, shown in Figure 1.7,8

Khozani et al. have suggested ten considerations that should be taken into account during a COVID-19 patient evaluation for LT candidacy: (1) patients must not be older than 65, as cases of older patients showed poorer outcomes such as increased length of stay, 1 and 3-year mortality, and risk of postoperative infection due to declining immunity.7 (2) In order to estimate the maximum age limit for LT; and (3) Candidates must be single-organ dysfunction only, as the feasibility of LT for multi-organ dysfunction.

The earliest reports were those in China, suggesting that LT may be an option for COVID-19 patients with severe COVID-19 infection due to declining immunity.15 Later cases in the United States expanded upon Chinese reports by demonstrating that LT can be completed in patients with positive RT-PCR results, provided that Vero cell cultures confirm non-infectivity.16

A case series of successful LTs at Northwestern University Hospital found that lung disease after severe and prolonged COVID-19 infection associated with pathological and molecular features with pulmonary fibrosis requiring LT, suggesting LT may be the only option for survival in these patients.5 Based on their experiences with successful LTs, researchers made the following recommendations: (1) bilateral rather than single LT to decrease subsequent development of pulmonary hypertension, (2) allowance of sufficient time to exclude possible spontaneous lung recovery, (3) patient involvement in the transplant decision when possible, (4) requirement of two negative PCR test of bronchoalveolar fluid,17(12) Given the many considerations and complex interplay between COVID-19 infection and various comorbidities, the decision to proceed with LT in the cases of severe pulmonary disease is not a clear path. King et al. have proposed a potential diagnostic algorithm for the evaluation of inpatient lung transplant candidates with COVID-19, shown in Figure 1.7,8

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Despite these concerns, however, there have been successful LTs in patients who experienced COVID-19 pneumonitis in whom full lung recovery was unlikely without surgical intervention. The earliest reports were those in China, suggesting that LT may be an option for COVID-19 patients with severe COVID-19 infection due to declining immunity.15 Later cases in the United States expanded upon Chinese reports by demonstrating that LT can be completed in patients with positive RT-PCR results, provided that Vero cell cultures confirm non-infectivity.16

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There have been reports of promising outcomes, lung transplantation for treatment of severe pulmonary disease caused by COVID-19 is far from a panacea. Even studies reporting positive LT outcomes for patients with irreversible lung disease call for more research to determine the long-term outcomes of LT for patients with severe COVID-19.12,18 LT for COVID-19 should be limited to patients requiring mechanical ventilation or ECMO despite several weeks of care in the ICU, advancing disease severity, radiographic signs of irreversibility, and a high risk of developing life-threatening complications. Though it may prove life-saving, the decision to proceed with LT for COVID-19 infection is not without risk and should be made by a multidisciplinary team following sufficient time to rule out spontaneous recovery.
Atherosclerotic disease is a leading cause of modern-day morbidity and mortality. Carotid stenosis, caused by a build-up of cholesterol plaque, commonly burdens the carotid artery bifurcation and is among one of the most studied vascular pathologies. Clinically, carotid stenosis may manifest as a transient ischemia attack, stroke, or other neurologic sequelae; however many patients experience asymptomatic disease that is found incidentally. Current management guidelines recommend carotid endarterectomy (CEA) for asymptomatic carotid stenosis if occlusion is greater than 70% in patients with acceptable surgical risk. Yet, depending on patient demographics and comorbidities, the risk of 5-year mortality for this population can reach up to 70% following CEA.

Using the robust Vascular Quality Initiative (VQI) online database, Blecha, DeJong, & Carlson (2022) explored risk factors for 5-year mortality in asymptomatic patients following CEA. Historically, studies have demonstrated the benefit of CEA versus medical management in asymptomatic patients; however recent research shows the implementation of modern medical management has proven to decrease risk of stroke in this population. Notably, the authors underscore that the benefits of elective CEA for asymptomatic disease requires a long survival. Therefore, this research aims to more precisely pinpoint risk factors in surgical candidates to assist with reducing unnecessary surgeries when medical therapy may be a more suitable option for asymptomatic disease.

This study is a retrospective review of 30,615 patient records from the VQI database. Inclusion criteria consisted of documented survival status, complete data on all of the study variables, and asymptomatic neurological status. Of the patients that met study parameters, 5,414 (18%) experienced mortality within 5 years post-CEA. Variables that were studied include demographics (gender, age, race, body mass index), past medical history (specifically assessing history of congestive heart failure, diabetes, chronic obstructive pulmonary disease, end-stage renal disease and dialysis status, active coronary artery disease, and prior myocardial infarctions) prior surgical history (with a focus on coronary artery bypass or percutaneous artery stenting), and medical therapy (aspirin, P2Y12 antagonists, statins, and beta-blockers). Importantly, this study also assesses social determinants of health such as housing status (homelessness vs. assisted living vs. home) and social factors (e.g., smoking).

Of the variables studied several identified risk factors and their associated odds-ratios include: housing status other than home (2.1) > black race (1.3) > age (1.04) > female gender (0.99). High risk comorbidities include hemoglobin less than 10mg/dl (2.1) > history of congestive heart failure (1.9) > history of COPD (1.8) > BMI under 20kg/m2 (1.7) > history of lower extremity major amputation (1.5) > LE bypass = history of neck radiation = renal insufficiency = smoking history = diabetes (1.3). It was also found that taking statins and aspirin at the time of surgery was protective against 5-year mortality. Beta blockers and P2Y12 inhibitors were not found to be protective. The results were formulated into an advanced mortality risk calculator. With one point for renal insufficiency, history of smoking, diabetes mellitus, history of radiation, history of lower extremity bypass or venous intervention, black race, and major amputation. Two points are added for BMI under 20 kg/m2, COPD, and history of congestive heart failure. Three points are allotted for hemoglobin under 10, living status other than home, age greater than or equal to 80 years old. Five points are given for end stage renal disease on dialysis. The authors highlighted as the risk calculator score increases, so does the risk for 5-year mortality following CEA for asymptomatic disease.

Patients with a score of zero are at a 5% risk 5-year mortality, compared to those with a score of 3 and nearly a 20% risk and those with a score of 8 with slightly over 40% risk.

The greatest risk factors for 5-year mortality in this study were hemoglobin less than 10mg/dl and 2.1 and housing status other than home, both demonstrating odds-ratios of 2.1 and reaching statistical significance with p-values <.001. The significance of housing status influencing mortality highlights the importance of socially responsible surgical care that assesses all spheres and variables of a patient’s life that may impact success both in and out of the hospital.

These findings offer novel insight into the long-term risks of CEA in patients with asymptomatic carotid stenosis. Importantly, this work emphasizes the need to screen asymptomatic patients prior to surgery, fully assessing their demographic, social, and medical risk factors that may contribute to their risk of 5-year mortality following the procedure. This study’s novel risk calculator will lead to thorough screening and better inform pre-surgical risk stratification and allow patients with asymptomatic carotid disease to make a more informed decision regarding their care.

Reference
INTERVIEW

By Anjali Patel, Class of 2023 and Amiti Jain, Class of 2025

Dr. Scott Cowan is a trained general and thoracic surgeon who now serves as the Medical Director for Enterprise Risk and as the Enterprise General Surgery Quality lead. He completed medical school and general surgery residency at Jefferson before completing his thoracic surgery fellowship at Massachusetts General Hospital. After training, Dr. Cowan worked as a general thoracic surgeon at Penn Medicine for 3 years until returning home to Jefferson in 2010. Here, he was exposed to the field of quality and safety and was inspired by mentors including Dr. David Nash and the thoracic surgery legend, Dr. Herbert Cohn.

Dr. Cowan received his Master’s degree in Healthcare Quality and Safety through the Jefferson School of Population Health and then functioned as the Vice Chair for Quality in the Department of Surgery while he was clinically active as a thoracic surgeon—a challenging feat. Dr. Cowan also served as Vice President and then President of the Pennsylvania National Surgical Quality Improvement Program (NSQIP) Consor
tium and played a role in developing the City of Philadelphia Perioperative Opioid Prescribing Guidelines.

I just wanted to begin by recognizing the Gibbon Surgical So-
-ciety for all of the incredible work that has been accomplished in the past and all of the great work that is currently underway. I had the true pleasure of serving as the Faculty Advisor to the Gibbon Surgical Society for many years and miss collaborating with our Gibbon medical students on projects and activities.

How much of your current job involves interacting with patients versus administrative duties?

I have transitioned to 100% administration over the past few years given my strong interest in risk management and my background in quality and safety. This transition has provided the incredible opportunity to learn from the true leaders in these fields including Drs. David Nash, Jonathon Gleason, Herbert Cohn, Joshua Clark, Lisa Ramthun, and many others. It has been an exciting journey.

In situations resulting in patient harm, how are underlying causes determined?

In terms of patient harm related to medical errors, there was a landmark publication by the Institute of Medicine (IOM) in 1999 that you will see referenced in many talks and writings about quality and safety that changed the way we think about medical errors and adverse events. The authors of the IOM re-

port, “To Err is Human: Building a Safer Health System” noted that most errors are systemic in the healthcare system and that the majority of these errors can’t be resolved at the provider level.

Jefferson’s approach to errors involves a very well-structured error classification system that follows the root cause analysis (RCA)’ approach that was implemented largely by Dr. Oren Guttmann and other Enterprise leaders. The approach allows for a rapid categorization of the event followed by a systematized process that is used to identify the underlying cause of these events. The final step involves developing and implementing an action plan to prevent these events from happening again. RCA’s looks and feels very different from our previous pro-

cesses and has been functioning extremely well in our enter-
prise hospitals.

Can you touch on how physician burnout and fatigue po-
tentially contribute to system failures?

The COVID pandemic has brought the issues of fatigue and burnout to the forefront of medicine and now are a large focus of health systems. Not only has COVID impacted the mental and physical wellness of our health care staff, COVID has also created a large staff shortage in hospitals across the country which introduces a new component of risk. Jefferson has a robust, multifaceted wellness program that has been designed to provide staff with much needed wellness resources. Stud-
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es have shown that burnout and fatigue have definitely been associated with medical errors and the goal is to help reduce these issues to further improve the quality and safety of care provided to our patients.

I have had the privilege of working with wellness leads from our Jefferson Enterprise hospitals in implementing a peer sup-
port program called RISE (Resilience in Stressful Events). Al-
though system errors are evaluated by RCA following adverse events, attention is rarely focused on the emotional impact on our healthcare colleagues that are involved. Peer supporters are trained to provide psychological first aid (PFA) to Jefferson employees who experience difficult hospital-related adverse events. The Jefferson RISE Program started at Jefferson Abington Hospital and is now live at nearly all enterprise hospitals with a plan to go live at Einstein Hospital in July, 2022. RISE is a very proactive program and, to date, over 200 employees have received peer support following adverse events.

Since the COVID pandemic began, there have been countless changes in healthcare. What’s your perspective on tele-

health appointments from a risk standpoint?

Great question. All hospital systems had to pivot quickly to accommodate the high-volume of telehealth visits during the COVID pandemic. Prior to the pandemic, our IT leadership at Jefferson had developed and implemented a strong telehealth program that required some optimization and proved successful throughout the COVID pandemic. Telehealth does introduce a variety of new risks including diagnostic errors, patient access issues, patient confidentiality and documentation re-

quirements and the risk management team works closely with IT leads to help reduce risk with these processes.

We know that one of the prominent projects run by the En-

terprise quality and safety leads is the initiative to decrease CLABSI (Central Line Associated Bloodstream Infections). What has our health system done to reduce these?

CLABSI’s can be life threatening infections with an associ-

ated mortality of 12-25%. Best evidence shows that CLAB-
SI’s can be reduced using central line bundles which include best practices for line insertion, maintenance and monitoring. Through a coordinated multidisciplinary effort across the Jef-

feson Enterprise, the CLABSI reduction team efforts resulted in a decrease in the standardized infection ratio (SIR) by 14% which is an incredible achievement. There is an ongoing effort to reduce this complication and a CLABSI Temporary Action Group (TAG) has been created to focus on standardizing best practices around central lines.

Many of us have read and highly regard Atul Gawan-
de’s book, The Checklist Manifesto, detailing how even the most competent surgical team can benefit from using checklists. How are surgical checklists and timeouts used at Jefferson?

First of all, I love Dr. Gawande’s book. I have a copy of The Checklist Manifesto right next to me on my bookshelf. I love the idea and utility of using checklists in many areas of medi-
cine and surgery particularly as they apply to time outs. There are great data to support the use of surgical checklists. The real opportunities now lie in how to best integrate these check-

lists into our electronic medical record and use data entered into our EMR to audit compliance with checklist elements. At Jefferson, the quality and safety teams, risk management and many of our providers work closely with our EPIC optimiza-
tion team and IT colleagues to leverage technology to increase data transparency and make data usable at the patient’s bed-

side. Over the past 2 years, an incredible quality, safety and experience program was created at Jefferson called OnPoint.

OnPoint includes a Safety Management System, Quality Man-

agement System, Patient and Family Centered Care, as well as the OnPoint Reporting and Feedback/OnPoint Insights pro-

gram.

Any message you’d want to convey to folks reading this interview?

As a student, I never realized all of the opportunities to pur-

sure interests in areas that are, in a sense, non-traditional when you think of medicine. There are many paths you can go down to enhance your career and create a satisfying and rewarding experience. There are also opportunities to become involved regionally and nationally in societies related to your area of practice and interest. Even as an attending who completed training 15 years ago, I still feel like a student and enjoy learn-

ing more about surgery, medicine, quality and safety and risk management every day.

You have a lot to look forward to!

References
2. Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global popula-


JAMA0810119.
The idea of an ileal-anal anastomosis was first developed as an alternative to an ostomy. In 1933, Rudolph Nissen was the first physician to attempt an anastomosis between the ileum and anal sphincter, but unfortunately was unsuccessful. Following Nissen, between 1941 and 1947 various physicians began experimenting with alternative methods of ileo-anal anastomosis. In Philadelphia, PA, during 1952, Valente and Bacon developed the idea of a three-loop ileal pouch with an effenter spout that was sutured to the anal sphincter. While they noted anal sphincter control was maintained, the test subjects all suffered from severe post-operative complications that proved fatal.1,2

In 1978, Sir Alan Parks and Mr. John Nicholls successfully put together the idea of an ileal anal anastomosis and 3 limbed ileal reservoir, as they are the first to describe an ileal pouch anastomosis (IPAA). Parks and Nicholls created an S pouch, using 3 loops of small intestine and a hand-sewn anastomosis between the pouch and the anus.2

Today, the favored approach is the J-pouch which was created by Dr. Usunomiya. He built on the previous methods and developed the concept of using 2 loops of small intestine to make the J-pouch. The basis of the J pouch was designed around 2 main concepts, a lateral anastomosis between the looped terminal ileum and an anastomosis between the anal canal and top of the ileal loop. Additionally, the use of a hand-sewn anastomosis has fallen out of favor for a stapled approach which reduces the incidence of damage to the anal sphincter and transition zone.3,4

### The Procedure

1. Proctocolectomy: A midline vertical incision is made and the sigmoid colon and rectum are mobilized. The rectum is transected at the top of the anal columns, making sure to cut 1-2 cm above the dentate line which is important in the maintenance of continence. The mesentry of the descending colon is incised lateral to the inferior mesenteric vein. Mobilization of the left side of transverse colon is done along Todd’s fascia until reaching the inferior margin of the pancreas. Todd’s fascia serves as a surgical landmark in mobilization of the mesocolon. The greater omentum is then dissected out. Dissection is continued until full mobilization of the descending colon and splenic flexure is achieved. A right colectomy is then performed first by freeing peritoneal attachments, once again following along Todd’s fascia. Once mobilized, dissection is continued from the cecum, to the hepatic flexure and extending with the transverse colon.5-7

2. J Pouch Creation: The ideal site for stoma placement is typically within the rectus abdominus and beneath the umbilicus laterally. An area of small intestine proximal to J-pouch is brought through the skin and sutured into a stoma.5,6,7

3. Ileostomy Creation: Small bowel is mobilized from its mesentry to the third part of the duodenum. The terminal 30-40 cm of ileum is used for the creation of the pouch, and is folded into two segments, each 15-20 cm long. The two segments are then anastomosed side to side using a GIA stapler creating a large pouch lumen. At the apex of the pouch, a longitudinal enterotomy is made which serves to facilitate anastomoses between the two ileal loops and connects to the anus. The blind end of pouch is stapled closed.5,6,7

## Indications and Goal of Procedure

The indications for the J-pouch procedure are: Ulcerative Colitis refractory to medical management, colorectal cancers requiring total abdominal colectomy and Familial Adenomatous Polyposis (FAP). The aim of the J Pouch procedure is to provide continence, avoid permanent stoma, prevent malignant degeneration and cure disease.4

### Contraindications to Procedure

A complete contraindication to the procedure is patients with diseased small bowel commonly seen in Crohn’s disease. In addition, obese patients and women with past obstetric complications are at increased risk of pouch failure, and women can be at an increased risk of infertility.6,8

### Common Complications

- Pouchitis, inflammation of the ileal reservoir; pelvic sepsis, pouch failure; and small bowel obstruction.6,8

## References


5. IPAA: Ileal Pouch-Anal Anastomosis

6. The anvil of stapler is placed through the enterotomy opening at the apex of the J-pouch. This is secured with a purse string suture. At the anorectal stump another purse string suture is sutured closed.5,6,7


Mentorship
Mentorship is a double-edged sword for women. The small number of senior female surgeons creates a mentorship burden as the growing number of residents and young attendings struggle to find mentors whose experiences mirrored their own. Mentorship and support not only play a role in successful training but are also crucial in the development of an academic career and professional advancement. As a whole, women represent only 19% of tenured professors, 12% of department chairs, and 11% of medical school deans.13 With a scarcity of mentors, innovative solutions that consider the unique challenges faced by female surgeons must be developed.

Professional Fulfillment
Lack of representation, decreased autonomy, and suboptimal guidance and support during training can have negative long-term effects on the career of women surgeons. A survey by the Michigan Medicine Department of Surgery found that female surgeons reported lower professional satisfaction compared to men.14 Two well-studied aspects contributing to this finding include compensation and career advancement. Greenup et al.1 found that across the board, female surgeons make 8% less than their male counterparts even when controlling for years of training, subspecialty, faculty rank, and metrics of clinical and academic productivity. Referrals, an important component of compensation, also favors male surgeons. Dossa et al.15 reported male physicians were significantly more likely to refer female surgeons than their male counterparts for high-volume surgeries. In academic medicine, advancement is closely tied to research and editorial activities. Stephens et al.16 outlined differences in research funding, with junior faculty women receiving a median of $350,000 compared to the $889,000 men received even after controlling for degree, years of experience, and institutional characteristics. In addition, men consistently receive more ROI grants at all career stages and are more likely to have higher scores on their renewal applications than women.17 The disparity in funding could also explain why women are underrepresented as primary investigators in scientific journals representing only 17% of last author publications in the top 25 surgical journals.18 In 2017 only 19% of those serving in high impact surgical journals were women.17 The lack of inclusion of women in editorial boards came under a national spotlight when the Journal of Vascular Surgery published an article about “unprofessional behavior in surgeons. The all-male authored and edited article drew backlash for essentially grading the social feeds of surgeons, particularly women surgeons. In its statement announcing the retraction of the article, editors of the journal pledged to increase the diversity of their editorial boards.19

Residency
From recruitment to program logistics, residency programs should be continuously evaluated and improved to be consistent with formalized expectations. Odgers et al.20 noted the rigid schedule. Part of increasing representation of women in surgical residencies, women make up 43% of internal medicine residency programs. In academic medicine women only make up 19% of academic surgeons compared to 36% of internists. Additionally, female surgeons make up only 9% of professors in medical schools, compared to 19% of internal medicine faculty. Only 7% of surgical department chairs are women compared to 19% of medicine department chairs.21 Furthermore, Elmore et al.1 found that women surgeons were 60% more likely to experience burnout and were more likely to have symptoms of depression than their male counterparts. According to current literature, residency training, mentorship, and professional fulfillment are the 3 biggest factors impacting the careers of female surgeons.

Moving Forward
Renowned liver surgeon Dr. Nancy Asher once made the following remarks highlighting Dr. Olga Jonasson’s career as a pioneering female surgeon: “Dr. Jonasson was the first to ask where are all the women? This question focused our attention on the pipeline, lack of female leadership, and decreased visibility on the pattern of patient referrals to male and female surgeons. JAMA. Jun 1 2019;321(21):2110-2112.”

Though the outlined obstacles may seem daunting, advocates within the field have made great strides towards recruiting and retaining more women in surgical specialties since Dr. Jonas. Since 2000 the percentage of female academic surgeons has nearly doubled.2 Arial has also been made towards improving the lives and careers of the women already in surgery. Mentorship, and specifically, trained mentorship-mentor relationships empower women within their practice to seek professional programs. Programs like the University of Wisconsin’s Entering Mentorship program, where 500 women from 39 institutions have received formal mentorship training, are effective and act as a platform to connect women surgeons across the United States. Considering the shortage of female surgeons currently, support must also come from willing male surgeons. An example of successful male mentorship is The American Thoracic Society’s program recognizing effective male mentors to female residents. To bridge the pay gap, recent initiatives by several organizations such as the Mayo Clinic now offer identical salaries to men and women.2 In effort to be more mindful of women’s issues, many hospitals now have dedicated lactation rooms. Changes over the last 20 years came only as a result of the sacrifice prior women surgeons made in order to establish themselves as equals in the operating room. It is because of their dedication, the obstacles which were once walls are now merely hurdles.

References
The John H. Gibbon, Jr. Surgical Society (GSS) at Sidney Kimmel Medical College (SKMC) at Thomas Jefferson University is a unique student interest group that has been working hard to increase interest in the field of surgery among medical students for the last 38 years. The society has over 400 total active members on a year to year basis, spread across the four-year curriculum. The GSS increases exposure and interest to the surgical field through a unique blend of episodic and longitudinal programming that helps bring together students, residents, and faculty in an educational setting.

The crux of the GSS approach to bolstering medical student interest is early exposure. Over the years, the GSS has run many programs specifically targeted at students in the pre-clinical curriculum to increase surgical exposure, including overnight shifts on the trauma service, call with the organ procurement team, and SCALPELS, a longitudinal surgical curriculum that runs concurrently with the pre-clinical curriculum. There are also events that are available to all students. The GSS runs a quarterly journal club, which is led by a surgeon at Jefferson in the field that is currently being studied by the second-year medical students. Many surgeons take this time to not only educate the students in critical review of the findings of papers, but also the underlying statistics that were used. The Philadelphia Surgical Symposium is the GSS’s signature event each year. Students from all medical schools in the Philadelphia region are invited, and it is intended to be an informative opportunity for medical students interested in surgery. There is an associated regional medical student research poster session and competition during the event, complemented by presentations from a faculty member from each school, ranging in topics from clinical experiences, to advocating for a particular field of surgery, to hot topics in research.

While the COVID-19 pandemic has changed the landscape of medical education, the GSS has worked tirelessly to create new and exciting programs to keep students engaged. Between moving some previously established programming to a virtual format to starting new and innovative experiences including podcasts and virtual anatomy sessions, the GSS board has ensured a robust experience for all students wanting to become more involved with the surgery department at Jefferson.

The GSS was presented at the AAMC’s Learn, Serve, Lead 2017 conference as a model for an effective medical student interest group. This journal, the GSR, is written, compiled, and curated by SKMC students through the invaluable help and planning of the GSS members, and stands not only as a testament to the involvement and hard work of the GSS, but also of the student body as a whole.

The Gibbon Surgical Society

Gibbon Surgical Review

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