

IMPRS Award Winners

Design Improvement and Deployment Efficacy of Novel 3D-Printed Bioresorbable Vascular Scaffolds in Coronary Artery Atherosclerosis

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Background: Endovascular stents are an effective treatment for coronary stenosis. However, the permanent presence of metal stents can hamper normal vasomotion, limit adaptive arterial remodeling, and provoke long-term foreign-body responses. Bioresorbable stents are designed to circumvent these issues. To maintain commensurate radial strength, polymeric bioresorbable stents require 2-4-fold thicker struts than metal stents, leading to increased risk of cardiovascular complications. To address this issue, a low-profile bioresorbable vascular scaffold (BVS) was produced by a citrate-based polymer and 3D printing technique. The patency of the BVS was compared to the metal Abbott Xience stent, employing swine with metabolic syndrome (MetS) as a clinically relevant translational model for coronary disease in humans.

Methods: Stents were deployed in coronary arteries of MetS swine. BVS vs metal selection and artery placement were randomized. Angiography was conducted pre- and post-stent deployment to determine target site, accuracy of stent placement, and degree of vasospasm. Intravascular ultrasound (IVUS) was

performed to determine target vessel diameter and assess percent deployment. MetS was substantiated by obesity, dyslipidemia, and hypertension. IVUS quantified coronary atherosclerosis.

Results: MetS swine exhibited increased atherosclerotic coronary artery wall coverage ($37 \pm 9\%$, N=5) compared to lean swine ($11 \pm 2\%$, N=4). BVS required increased time of deployment (24.8 ± 2.4 min, N=9) compared to metal (11.8 ± 2.8 min, N=7). BVS demonstrated a deployment success rate of 88% (N=6) compared to metal 100% (N=8). BVS exhibited suboptimal expansion with an average percent of target diameter deployment at $74 \pm 0.4\%$ (N=8) compared to metal at $94 \pm 0.4\%$ (N=6). Coronary intervention with BVS generated increased frequency of electrocardiographic T-wave abnormalities compared to metal.

Conclusion: The metal stents outperform the BVS with shorter time of deployment and increased average percent of target deployment. Future analysis following long-term recovery will assess hypothesized benefits of BVS, including reduced inflammation and in-stent restenosis compared to metal.

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Hazel and Tommy Thompson Cardiac Research Scholarship Award

Creating a Patient Registry for the Parkview Vein Clinic

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Background/Objective: The Parkview Vein Clinic provides individualized care to patients suffering from venous disease by providing assessment, education, treatment, ultrasound imaging, and surgical interventions all under one roof. The Vein Clinic has experienced a consistent increase in patient volume since opening in 2019, creating a need for tracking patient outcomes. Patient registries are useful tools for tracking high volumes of patients, assessing outcomes, and improving treatment guidelines. The main objective of this quality improvement project is to define the workflow for creating a patient registry for the Vein Clinic and determine which data points are feasible to collect.

Methods: This is a retrospective chart review of patients with the diagnosis of "venous stasis ulcer" seen at the Vein Clinic from September 2019 to July 2022. A total of 84 data fields were collected on each patient, including information on demographics, medical history, ulcer descriptions, imaging, procedure

information, and post-procedure follow-up. The Society for Venous Surgery Vascular Quality Initiative was used as a template for registry design, with the goal of merging the registry with the national database in the future.

Results: Venous ulcer information, including number of healed ulcers, duration of ulcer, and largest diameter active ulcer, was not readily accessible within the chart and required expanded review find and quantify. All other categories were readily accessible in the chart.

Conclusions: The data collected by the registry will be useful for future quality improvement purposes of the Vein Clinic. Creation of a structured reporting template in Epic would help facilitate the ease and accuracy of data extraction and help maintain the internal validity of the registry. More detailed follow-up assessments should be implemented to track patient outcomes, which could include use of the Venous Clinical Severity Score or a patient-reported outcomes assessment.



Hazel and Tommy Thompson Cardiac Research Scholarship Award

Katrina Fliotics is a third-year medical student, who is currently undecided about her future specialty; however, she knows she wants to integrate research into her future medical practice.

"I really enjoyed learning more about venous disease and the incredible impact that non-invasive surgical techniques can have on a patient's quality of life. This was my first time participating in quality improvement research, and I was given a lot of freedom to choose which parameters to include in the registry. Through this experience, I learned about the vital role that quality improvement research has in driving medical innovation, enhancing patient outcomes, and improving the standard of care."