THE HARD CHALLENGE OF CALCIFIC SAPHENOUS VEIN GRAFT STENOSIS: THE LARGEST REPORTED EXPERIENCE WITH INTRAVASCULAR LITHOTRIPSY AND/OR MECHANICAL ATHERECTOMY: INSIGHTS FROM BMC2

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BACKGROUND

- Coronary artery bypass surgery (CABG) remains the most common cardiac operation in the United States with an estimated 400,000 annual procedures[1].
- Despite significant advances in the field of interventional cardiology, CABG is the preferred method of revascularization for patients with multivessel coronary artery disease, left main coronary artery disease, diabetics and/or those with ventricular dysfunction[2].
- Currently, saphenous vein grafts (SVGs) are the most used bypass conduit and less than 10% of CABG operations utilize arterial grafts other than the left internal mammillary artery[3].
- The rate of saphenous vein graft failure remains a significant impediment to successful, long-term revascularization. Research shows up to 12% of vein grafts occlude prior to hospital discharge and only 50% may be patent after 10 years[3].
- Studies show nearly one in five PCIs are performed on patients with prior CABG. Of those patients with prior CABG undergoing PCI, one in four require SVG PCI[4].
- Compared to interventions on native coronary arteries, SVG PCI is associated with a higher rate of procedure-related complications and adverse events, including in-hospital mortality[4].
- Calcification of saphenous vein grafts add an additional layer of complexity to percutaneous interventions and may require calcium modification strategies. These interventions have traditionally been considered high risk and were avoided in clinical practice.
- With the development of newer technologies to address calcified vessels, such as intravascular lithotripsy and atherectomy, select operators have demonstrated successful calcific SVG interventions using these strategies[5].

METHODS

- Using BMC2, a large registry in the state of Michigan, we sought to assess the safety and clinical outcomes in those requiring atherectomy and/or lithotripsy for SVG PCI.
- BMC2 encompasses 51 hospitals and ambulatory service centers in the state of Michigan
- Our analysis included 7,201 patients who underwent SVG PCI between April 2018 and March 2024.
- We stratified this population based on PCI indication, use of a calcium modification strategy, and if used, the type of calcium modification performed.
- Outcomes included rates of perforation, rates of no reflow and rates of in-hospital mortality.
- Statistical analysis was performed using Pearson Chi square test for categorical measures and ANOVA overall (F-test) was performed for continuous values

RESULTS

Table 1: SVG PCI Indications

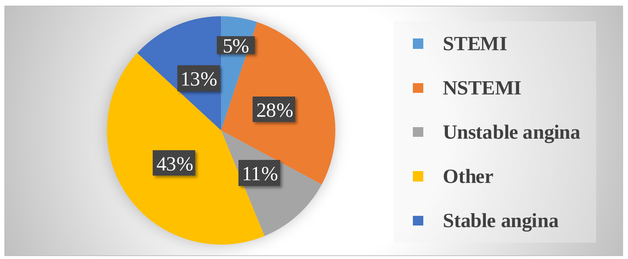


Figure 1: Outcomes with and without Calcium Modification

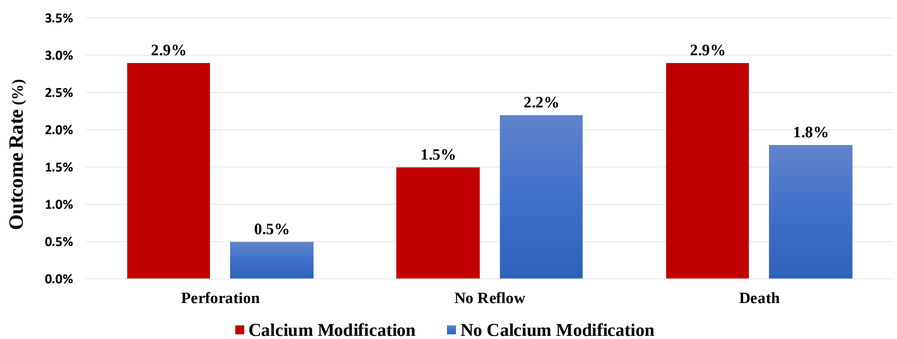
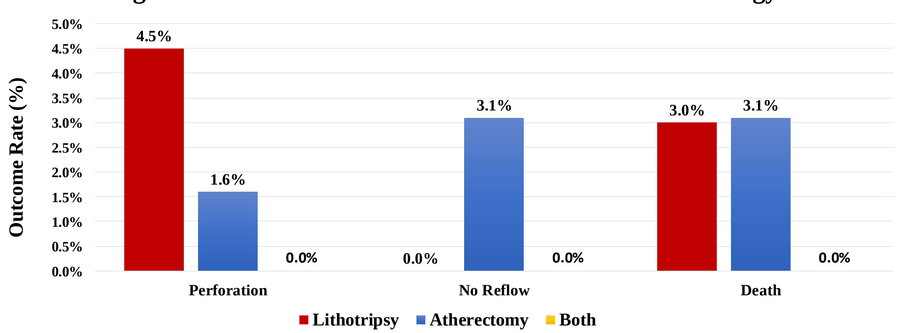


Figure 2: Outcomes based on Calcium Modification Strategy



RESULTS

- Of the 7,201 patients who underwent SVG PCI, calcium modification strategies were performed in 137 cases (1.9%).
- Of these patients, the average age was 74.3 years old, and the majority (80.3%) were male.
- Within this cohort, 66 patients underwent intravascular lithotripsy alone and 64 patients underwent atherectomy alone. There were 7 cases that involved the use of both strategies during the SVG intervention.
- When compared to those without calcium modification, patients who underwent lithotripsy and/or atherectomy had a higher rate of perforation (2.9% vs. 0.5%; p-value < 0.001) (Figure 1).
- There was no statistically significant difference in no reflow and in-hospital mortality between these two groups (Figure 1).
- Differences in outcomes between calcium modification strategies were not found to be statistically significant (Figure 2).
- Outcomes in patients undergoing atherectomy and intravascular lithotripsy were generally similar and acceptable compared with historic reports.

CONCLUSION

- The optimal management of calcific vein graft stenosis, including the role of both intravascular lithotripsy and atherectomy, is not well defined.
- To the best of our knowledge, this is the largest analysis of lithotripsy and atherectomy during SVG PCI.
- Calcium modification was associated with a higher rate of perforation, however, rates of no reflow and in-hospital mortality were similar.
- Our analysis suggests that calcium modification strategies in calcific vein graft interventions are rarely used and generally safe.
- Our study should help guide interventional cardiologists encountering these hard-to-treat lesions in clinical practice.

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