

# Hypotension Management During TCAR

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Hypotension can occur during carotid stenting in anywhere from 29 to 51% of patients.<sup>1</sup> The underlying mechanism of stretching the carotid sinus leads to inhibition of sympathetic tone in peripheral blood vessels with resultant reduction of systemic blood pressure.<sup>2</sup> Although the effect is transient, prolonged hypotension has been associated with a greater incidence of myocardial infarction, neurologic complications, length of stay, and death.<sup>3</sup> Several studies have demonstrated that a greater than 70% carotid stenosis, symptomatic disease, severely calcified lesions, advanced age, female gender, nitrate and tobacco use, prior myocardial infarction, and compromised ejection fraction have all been reported to be predictors of postprocedural hypotension.<sup>3-5</sup> Although hypotension is more prevalent in carotid stenting compared to CEA, rates of hypertension<sup>6</sup>, (a potentially more serious event), are much higher with CEA according to recent data presented from the vascular quality initiative (VQI).

Management and prevention of hypotension should begin preoperatively by identification of patients at risk with particular attention paid to antihypertensive medications taken the morning of the procedure. In consultation with corresponding specialists and the anesthesiologist, antihypertensives may be held the morning of the procedure. Before and during the procedure, adequate intravenous hydration should be considered. Intraoperative technical considerations include prophylactic administration of glycopyrrolate (0.4 mg) to prevent bradycardia, which can cause or aggravate hypotension during and after stenting and ballooning. Should bradycardia occur despite prophylactic glycopyrrolate, intravenous atropine should be available to counteract this. Avoidance of overstretching the carotid artery with the proper selection of balloon and stent size is important.<sup>7,8</sup> Improved hemodynamic outcomes have been observed in patients who have received glycopyrrolate compared to those who have received atropine.<sup>9</sup>

Careful attention to arterial line blood pressures during flow reversal is especially important with recommended systolic blood pressures between 140 and 160 mm Hg. This is assisted by careful titration of intravenous administration of vasopressors. Good communication with the anesthesia team and a pause prior to stent deployment and any ballooning to assess the hemodynamics and strategize treatment are best TCAR practices. Postprocedural management is also critical and consideration of intraarterial cannulation for several hours postoperatively will allow for the most accurate determination of blood pressure. Postoperative hypotension is to be avoided and the target systolic blood pressure should be 120-150. Notably, if a patient has required IV vasopressors during the flow reversal phase of TCAR, they are much more likely to require hemodynamic support in recovery. Many experienced users would suggest that the patient leave the OR with an IV neo-synephrine drip hanging on the drip stand for immediate connection if needed.

### **Tips and Tricks – Our Technique for Prolonged Hypotension Management**



*Figure 1. TCAR procedure photo; used with permission of Dr David O'Connor Hackensack University Medical Center*

In our center we introduced over a one year period of time from July 2018 to August 2019 a modified technique during TCAR for management of prolonged postoperative hypotension. A total of eight patients required sustained vasopressors at the end of the procedure. In these patients after the patient was taken off flow reversal and the carotid sheath was removed, the femoral venous sheath was exchanged out over a wire and an Abbott Perclose ProGlide® Suture-Mediated Closure (SMC) system was used to “pre-close” the femoral vein. Wire access was then re-established over

the Perclose ProGlide® system and a triple lumen catheter was then advanced into the femoral vein. The Perclose ProGlide® system was then subsequently tightened while the triple lumen was in place to prevent venous bleeding resulting from downsizing to a smaller French size. The duration of hypotension in these patients ranged from 2.2 to 36 hours, mean 12.6 hours. Once the hypotension resolved, the triple lumen was removed with manual pressure. There were no hematomas, infections, or venous thromboembolic events related to the triple lumen.

### Summary

Hypotension during and after TCAR can be minimized or prevented by identification of patients at risk preoperatively, management of oral blood pressure medications, appropriate hydration, and by the administration of atropine or glycopyrrolate prior to balloon dilations. In patients who require vasopressors, early recognition and administration can help effectively manage this transient effect. Rarely, oral isometheptene can be administered for prolonged hypotension cases to assist with vasopressor weaning. Alternatively, the administration of oral pseudoephedrine (60mg TID), or oral midodrine can both be used to reduce the need for IV pressors. It is important to note that graded and supervised mobilization by a nurse the evening of the TCAR procedure is an important consideration in the patient's recovery as it aids in resetting the baroreceptors.

### References

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