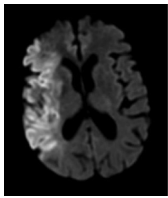


Author has nothing to disclose with regard to commercial support.



**REPLY TO AUTHOR:
FURTHER EXPANSION ON
THE HORIZON?
THROMBECTOMY FOR
STROKE AFTER
CARDIOTHORACIC
SURGERY**



Reply to the Editor:

We read with great interest the response to our publication¹ from Schweitzer and colleagues.² They found similar rates of cerebrovascular complications in their patients after cardiac surgery: just under 3%. As with our population, computed tomography angiography was the preferred acute imaging modality. Of patients with neurological deficits 5.3% had a large vessel occlusion (LVO) stroke, compared with the 10.1% in our series. In our population, we highlighted the fact that expanded time windows opened the therapeutic opportunity of thrombectomy for LVO to patients waking from anesthesia with deficit. We wholeheartedly agree that increased awareness is required among all who care for these patients.

Mechanical thrombectomy for LVO is an extremely powerful therapeutic intervention. The 3 steps implemented at our center and outlined by Schweitzer and colleagues (early clinical detection, emergent cerebrovascular imaging, and emergent involvement of neuroendovascular teams²) should be a process undertaken in cardiothoracic surgery settings across the world. Awareness generally lags, and both our data and the data from France show that a significant proportion of patients with cerebrovascular concerns after cardiovascular surgery never undergo vessel imaging of the intracranial circulation. With improved provider awareness and more thorough evaluation, we suspect the pool of potential treatment candidates is much larger than available data suggest.

Increasing awareness will involve many of the usual channels. This includes relevant publications and discourse such as this, content at national meetings and continuing medical education events, education of staff, and quality improvement processes at departmental and institutional levels. A subtler challenge is the underlying biases that have long accompanied major stroke, including as a complication of cardiothoracic surgery. A variety of implicit biases come to play,³ including prominently catastrophe bias (the tendency to perceive a condition as devastating and beyond salvage for the patient), and ineffectual bias (the tendency to perceive therapeutic options as limited or absent). The influence of these implicit biases on decision

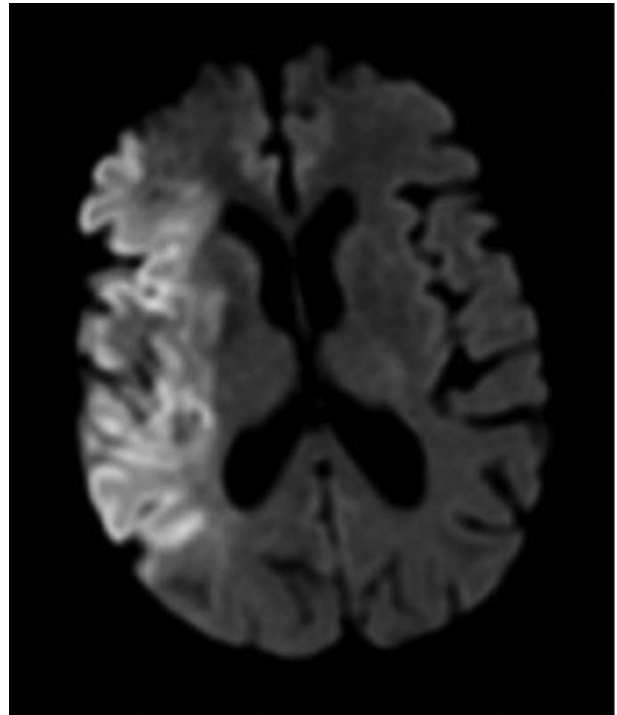


FIGURE 1. Diffusion-weighted magnetic resonance imaging in a patient with large vessel occlusion of the right middle cerebral artery and a large volume of established right hemisphere stroke. Patients such as this one are currently excluded from thrombectomy due to futility and concerns about harm, but these considerations are currently being tested in randomized clinical trials.

making and motivation for change is important for all providers to realize and resist.

Further, our study evaluated the role of thrombectomy under current selection parameters. There are multiple efforts underway to expand indications for thrombectomy. Confirmation of an LVO is the first key step, hence the focus on cerebrovascular imaging. The primary reason an ischemic stroke patient with significant neurological deficit does not undergo mechanical thrombectomy is the absence of a proximal occlusion to target.⁴ This is certainly true in the cardiothoracic population, as results of both studies indicate. However, if an LVO is present the most common exclusion from mechanical thrombectomy is too large a pretreatment stroke volume⁴ (Figure 1). Clinical trials are actively evaluating the effect of thrombectomy on patients with pretreatment infarct volumes >100 cc and as far as 24 hours from onset of symptoms (eg, TENSION, [clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT03094715) identifier NCT03094715; SELECT2, [clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT03876457) identifier NCT03876457; and TESLA, [clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT03805308) identifier NCT03805308).

Further expansion of indication is the role of thrombectomy for patients with LVO and a neurological exam that is either reassuring or rapidly improving. This is the second most frequent reason a patient with documented LVO does not undergo thrombectomy.⁴ However,

there is a risk of subsequent neurological deterioration for as many as 40% of these patients. To better understand the role of treatment, patients with minimal or limited neurological deficits but with the presence of a LVO are being randomized to medical therapy or thrombectomy (eg, In Extremis Moste, clinicaltrials.gov identifier NCT03796468).

If these varied trial results are positive, thrombectomy indications will expand dramatically in the general stroke population, but also in the cardiothoracic surgery population. It is conceivable that simply documenting the presence of a large vessel occlusion will be enough to prompt treatment with thrombectomy, without brain tissue or clinical examination qualifiers or modifiers. The import of cerebrovascular imaging and accelerated detection and evaluation of patients will therefore gain further impetus. The great opportunity presented to us to modify the outcome of this feared complication of cardiothoracic surgery may therefore continue to expand.

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