Stentriever

The advent of endovascular therapy for acute large vessel occlusion has revolutionized stroke treatment. Timely access to endovascular therapy, and the ability to restore intracranial flow in a safe, efficient, and efficacious manner has been critical to the success of the thrombectomy procedure. The stentriever has been a mainstay of endovascular stroke therapy, and current guidelines recommend the usage of stentrievers in the treatment of large vessel occlusion stroke. Despite the success of existing stentrievers, there continues to be significant development in the field, with newer stentrievers attempting to improve on each of the three key aspects of the thrombectomy procedure. Ahmed et al. elucidate the technical requirements that a stentriever must fulfill. They reviewed the basic variables of stent design, including the raw material and its form, fabrication method, geometric configuration, and further additions. Lastly, a selection of stentrievers from successive generations are reviewed using these engineering parameters, and clinical data are presented. Further avenues of stentriever development and testing are also presented [1)].

The stentriever is used to treat ischemic strokes, which occur when a blood clot (usually in the heart or neck) becomes dislodged and travels to one of the smaller blood vessels in the brain. Once in the brain, the clot disrupts blood flow in a way that is similar to a heart attack. Since brain cells die quickly without the oxygen that blood provides, our goal is to re-establish normal blood flow as quickly as possible. The procedure for removing blood clots is called mechanical thrombectomy or embolectomy.

The stentriever is a long, thin, self-expanding mesh tube that is attached to a wire. The device is placed inside a catheter (a larger tube), which allows us to position it where needed. At the start of the procedure, we make a small incision at the patient’s femoral artery, which is next to the hip bone. Using angiography (video x-ray), we can see the patient’s vascular system on a video screen. This allows us to feed the catheter and stentriever into the brain. Once the stentriever is positioned near the blood clot, we release it from the catheter and expand the mesh tube. As the stentriever expands, we use it to push the gelatinous clot against the wall of the blood vessel. This immediately allows blood to flow more freely. We then use the stentriever to grab the clot. As we pull the catheter and stentriever out, the clot is removed too.

One of the most significant benefits of the stentriever is that blood flow begins to be restored as soon as the device makes contact with the blood clot. With other devices, blood flow is not restored until the clot is fully removed. Restoring blood flow quickly can minimize damage to the patient’s brain that can cause partial paralysis, difficulty speaking and cognitive problems. Another advantage is that using a stentriever requires a less than ¼-inch incision. Since we are not performing open surgery on the brain, patient recovery time is reduced.

Patients who are having a stroke require evaluation to determine if the stentriever procedure is a good option. Typically, when a patient comes in during a stroke, we conduct a CT scan or MRI to determine if brain cells have already died or if the damage can be reversed. If brain damage has already occurred, the patient may not benefit from the procedure.

The combined stentriever-aspiration approach to thrombectomy leads to better angiographic recanalization rates than use of the stentriever alone. Further experiments are needed to test the value of balloon-guide catheters and aspiration performed using other types of catheters and modes of aspiration [2)].

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Ahmed SU, Chen X, Peeling L, Kelly ME. Stentrievers : An engineering review. Interv Neuroradiol. 2022 Mar 7:15910199221081243. doi: 10.1177/15910199221081243. Epub ahead of print. PMID: 35253526.

2)

Mokin M, Ionita CN, Setlur Nagesh SV, Rudin S, Levy EI, Siddiqui AH. Primary stentriever versus combined stentriever plus aspiration thrombectomy approaches: in vitro stroke model comparison. J Neurointerv Surg. 2014 Apr 30. doi: 10.1136/neurintsurg-2014-011148. [Epub ahead of print] PubMed PMID: 24789594; PubMed Central PMCID: PMC4214918.