Stent

Stents and flow diverters have revolutionized the cerebrovascular disease treatment. Guglielmi Detachable Coils, flexible microcatheters, and first-generation intracranial stents, such as Neuroform (Stryker Neurovascular) and Enterprise stents (Codman/DePuy-Synthes), have paved the way for the development of the Pipeline Embolization Device (PED) (ev3/Covidien/Medtronic) and other endovascular approaches.

Karsy M, etr al. discusses the historical development of flow diverter technologies from the PED to similar devices, such as the Surpass Evolve stent (Stryker Neurovascular), the Flow-Redirection Endoluminal Device (FRED; MicroVention, Inc.), the SILK stent (Balt Extrusion), and the p64 Flow Modulation Device (Phenox). In addition, the potential use of drug-eluting stents and various bioresorbable scaffolds (e.g., poly-L-lactic acid, magnesium), new developments in stent material (e.g., thin-film nitinol), design (e.g., biocompatible polymers, embedded microcircuitry, flow models), and potential applications for flow diverters will be considered. Endovascular treatment of cerebrovascular disease is rapidly advancing via continued development of new technology [1)]

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see Stenting.

A stent is a mesh 'tube' inserted into a natural passage/conduit in the body to prevent or counteract a disease-induced, localized flow constriction.

see Flow diverter.

see Stent-assisted coiling.

Types

There are several types of stents used in medical procedures to treat various cardiovascular and non-cardiovascular conditions. Stents are designed to support and hold open narrowed or blocked blood vessels or other ducts within the body. Here are some common types of stents:

Bare-Metal Stents (BMS): These are basic stents made of metal (usually stainless steel or cobalt-chromium) without any special coatings. They provide structural support to the treated vessel, holding it open. However, they do not have any medication to prevent restenosis. Bare-metal stents are often used in larger vessels or situations where the risk of restenosis is lower.

Drug-Eluting Stents (DES): As discussed earlier, these stents are coated with medication to prevent in-stent restenosis. The medication is slowly released over time to inhibit excessive cell growth in the treated area. DES are commonly used in coronary arteries and have significantly reduced the rate of restenosis compared to bare-metal stents.

Bioabsorbable Stents: Also known as bioresorbable stents, these stents are made from materials that gradually dissolve or get absorbed by the body over time. They provide temporary support to the

blood vessel during the initial healing phase and then gradually disappear, leaving the vessel in a more natural state. The most well-known example is the bioabsorbable vascular scaffold (BVS).

Covered Stents: These stents are covered with a fabric or polymer material. They are often used in situations where there is a risk of tissue growth through the stent struts, such as in cases of aneurysms or strictures in blood vessels.

Self-Expandable Stents: These stents are designed to expand on their own after being inserted into the body. They are made from materials that have shape memory properties, allowing them to open up to a predetermined size once they are deployed from the delivery system.

Balloon-Expandable Stents: These stents are mounted on a balloon catheter. The stent is crimped onto the deflated balloon, and when the balloon is inflated at the target location, it expands the stent to the desired size.

Ureteral Stents: Used in urology, these stents are placed in the ureters (the tubes that connect the kidneys to the bladder) to help urine flow in cases of obstruction or other urinary tract issues.

Esophageal Stents: These stents are used to treat narrowing or strictures in the esophagus, often caused by conditions like cancer or other diseases.

Tracheobronchial Stents: These stents are inserted into the airways to treat obstructions or narrowing in the trachea or bronchi.

Current available stents approved for CNS use: [2].

Acandis Acclino Stent

Flow Re-Direction Endoluminal Device

Wingspan

Neuroform

Enterprise

Pipeline

Stent placement

Stent placement

1)
Karsy M, Guan J, Brock AA, Amin A, Park MS. Emerging Technologies in Flow Diverters and Stents for Cerebrovascular Diseases. Curr Neurol Neurosci Rep. 2017 Oct 28;17(12):96. doi: 10.1007/s11910-017-0805-3. PMID: 29081013.
2)
White JB, Ken CG, Cloft HJ, Kallmes DF. Coils in a nutshell: a review of coil physical properties. AJNR Am J Neuroradiol. 2008 Aug;29(7):1242-6. doi: 10.3174/ajnr.A1067. Epub 2008 Apr 16. Review. PubMed PMID: 18417605.