

Adjustable Banding Device for Arteriovenous Fistula

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Technology description

Short Description

An arteriovenous fistula (AVF) banding device that can be operated remotely from outside the body to help control the blood flow in the fistula

Abstract

Arteriovenous fistulas (AVFs) are surgically created for patients on hemodialysis. The AVF provide easy access to blood and are the preferred access type because they have superior longevity, lower infection rate resulting in improved patient survival and lower cost when compared to other types of access. Despite these advantages, more than 30% of AVFs fail to mature. Limited blood flow at the time of AVF creation and intimal hyperplasia are the two major causes for AVF maturation failure. Surgical creation of AVF with higher blood flow might help with increasing the maturation rate. However, surgeons are usually reluctant to create such AVFs because high uncontrollable blood flow rates may develop and result in steal-syndrome, heart failure, pulmonary hypertension and cephalic arch stenosis. These complications may require the placement of a band or knot around the AVF to decrease its diameter and thus decrease the blood flow. This secondary surgical procedure is irreversible and risks the possibility of not diminishing the high rate sufficiently or may restrict the flow more than needed. A Northwestern physician is developing a novel band that can increase or decrease in size by remote control from outside the body. The device would offer the physician more control in changing the flow rate depending on the required situation. By placing this device at the time of the initial AVF creation, it can assist with AVF maturation by allowing the surgeon to create a higher flow AVF using larger arteries and veins while having the adjustable band as a safety valve that can be tightened to reduce the high-flow should it occur. An alternate approach is to use the adjustable band to gradually increase the blood flow through the AVF, as gradual increase in flow has been shown to accelerate vein maturation process. It also offers a preemptive measure to avoid future complications, particularly for those that have complications of high output. Flow can be measured for example via a Doppler Ultrasound built into the device. The band size is then adjusted accordingly to achieve a target flow rate. This invention will fill the gap in current clinical care by improving AVFs primary maturation rates while simultaneously reducing complications from high flow.

Application area

Placement of AVF for patients on Hemodialysis

Hemodialysis Patients with AVF and heart failure, pulmonary hypertension and/or steal syndrome

Advantages

Assist in AVF maturation

Offers a preemptive, preventative and interventional solution

Provides flexibility in controlling blood flow

Avoids need for follow-up surgeries

Institution

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