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Angioplasty: An Overview

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Editorial

Angioplasty, commonly known as balloon angioplasty or percutaneous transluminal angioplasty (PTA), is a minimally invasive endovascular surgery that widens restricted or obstructed arteries or veins to treat arterial atherosclerosis. A deflated balloon attached to a catheter (a balloon catheter) is inserted into the constricted conduit over a guidewire and then inflated to a predetermined size. The balloon causes the blood vessel and surrounding muscle wall to expand, allowing for better blood flow. A stent may be put during ballooning to keep the vessel open, after which the balloon is deflated and removed. Angioplasty has come to refer to a wide range of vascular procedures that are usually done through the skin [1].

Uses and Indications

Coronary angioplasty: A coronary angioplasty is a treatment for stenotic (narrowed) coronary arteries in the heart, which are present in people with coronary heart disease. The accumulation of cholesterol-laden plaques in a condition known as atherosclerosis causes these stenotic segments of the coronary arteries to form. PCI, also known as coronary angioplasty with stenting, is a non-surgical technique that improves blood flow to the heart.

Coronary angioplasty is used to treat conditions like unstable angina, NSTEMI, STEMI, and spontaneous coronary artery perforation. PCI for stable coronary disease has been found to improve functional limitations and quality of life by considerably reducing symptoms such as angina or chest pain [1].

Peripheral angioplasty: The use of a balloon to open a blood artery outside of the coronary arteries is known as peripheral angioplasty. It's most typically used to treat atherosclerotic narrowings in the belly, legs, and kidneys caused by peripheral artery disease. A guide wire, peripheral stenting, and an atherectomy are frequently utilised in combination with peripheral angioplasty.

Chronic limb-threatening Ischemia: Advanced peripheral artery disease can be treated by angioplasty to relieve the claudication, or leg pain that is commonly associated with the condition. The bypass vs angioplasty in severe ischemia of the leg (BASIL) experiment compared infrainguinal bypass surgery to angioplasty in patients who were suitable for both procedures. The BASIL trial discovered that angioplasty was associated with less short-term morbidity than bypass surgery, but that bypass surgery has better long-term results.

The ACCF/AHA recommendations support balloon angioplasty only for patients with a life expectancy of less than two years or who do not have an autogenous vein available, based on the BASIL trial. Patients with a life expectancy of more than two years or who have an autogenous vein may benefit from bypass surgery initially.

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Renal artery angioplasty: Hypertension and renal function decline are linked to renal artery stenosis. Angioplasty with or without stenting of the renal artery can be used to treat atherosclerotic blockage of the renal artery. Renal artery angioplasty is only recommended in patients with renal artery stenosis, flash edoema, or congestive heart failure [2].

Technique

Percutaneous access to the circulatory system is most common (through the skin, without a large surgical incision). The Seldinger procedure is used to insert an introducer sheath into a blood artery. Fluoroscopic guidance employs magnetic resonance or X-ray fluoroscopy, as well as radiopaque contrast dye, to direct angled wires and catheters to the treatment site in real time. For tiny occlusions, a tapered guidewire is used, followed by intermediate guidewires for tortuous arteries and problematic passage through extremely narrow channels, and stiff wires for hard, dense, and blunt occlusions. A wire is placed through the stenosis in the vessel, and a balloon on a catheter is passed over the wire and into the desired position to correct a narrowing in a blood vessel. The balloon is inflated to 75 to 500 times normal blood pressure (6 to 20 atmospheres) using water mixed with contrast dye, with the majority of coronary angioplasties requiring less than 10 atmospheres. A stent may or may not be necessary. The balloons, wires, and catheters are withdrawn at the end of the treatment, and the vessel puncture site is treated with direct pressure or a vascular closure device [3].

Percutaneous coronary intervention procedures include transradial artery access (TRA) and transfemoral artery access (TFA). When compared to the TFA approach, TRA is the procedure of choice for the management of acute coronary syndrome (ACS). It has a considerably reduced rate of haemorrhage and vascular sequelae. TRA also shows a mortality benefit for individuals with high-risk ACS and haemorrhage. TRA has also been shown to increase quality of life while lowering healthcare expenses and resources [4].

Risks and complications

Angioplasty is a lower-risk alternative to surgery for treating the illnesses for which it is employed, but it comes with its own set of risks and complications:

- The launching of particles into the bloodstream is known as embolization.
- Over-inflation of a balloon catheter, the use of an excessively large or stiff balloon, or the presence of a calcified target vessel can all result in bleeding.
- Formation of a hematoma or pseudoaneurysm at the access point
- Radiation-induced burns caused by the X-rays used
- Renal damage from contrast
- Cerebral Hyperperfusion Syndrome, which can lead to stroke, is a significant side effect of carotid artery stenting.

In comparison to vascular bypass or coronary artery bypass grafting, angioplasty may give a less long-lasting therapy for atherosclerosis and be more prone to restenosis. When compared to uncoated balloon angioplasty for femoropopliteal artery occlusive disease, drug-eluting balloon angioplasty has considerably less restenosis, late lumen loss, and target lesion revascularization at both short and midterm follow-up. Although angioplasty of the femoropopliteal artery using paclitaxel-coated stents and balloons has been shown to minimise vessel restenosis and target lesion revascularization, it has also been shown to increase the risk of death [5].

Conflict of Interest

None.

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