Coronary Stents

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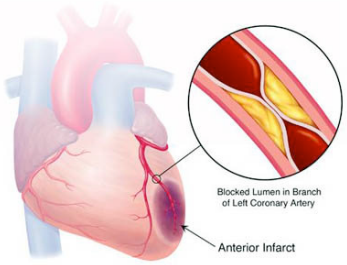
BME 281 Second Presentation, November 30, 2011 <courtpm@my.uri.edu>

***Abstract*—Coronary stents are mesh like metal tubes that increase the efficiency of coronary angioplasty, a procedure for patients with coronary artery disease. This procedure widens hardened arteries to allow sufficient blood flow to heart.**

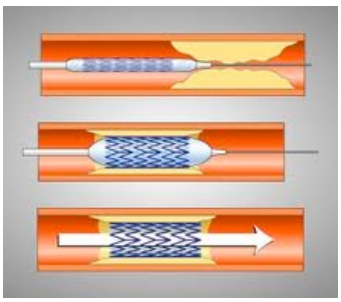
I. Coronary Artery Disease

CORONARY artery disease, also known as coronary heart disease, is the leading cause of death in the United States for both men and women. Every one in five deaths are due to this disease. Coronary artery disease is caused by plaque buildup in the coronary arteries that supply the heart with vital nutrients. As a result, the heart tissue is deprived of nutrients and blood flow slows or even stops. It is a hereditary disease that is more common in older men. Smoking and obesity also put a person at a higher risk. People with this disease have chest pain, fatigue, shortness of breath, and weakness. The symptoms of this disease vary in strength, they can be really noticeable or may not appear. This is a dangerous lethal disease that can go undetected. If it is detected by the available tests, then there is a common successful treatment. However, there is no cure.



II. Coronary Angioplasty

Coronary angioplasty with stents is the common treatment for coronary artery disease. The surgery is also known as percutaneous coronary intervention. First the location, shape, size, and type of blockage are defined through a coronary angiography. Then an incision is made near the femoral artery. A cardiac catheter is guided to the heart through the artery. A dye is released in the artery so it is visible under an x-ray. Under x-ray visualization, a guide wire is manipulated to lie across the blockage. The stent balloon catheter is then transported along the guide wire and is positioned over the blockage. This balloon catheter has metallic markers that mount the unexpanded stent. Saline is pumped into the balloon to inflate it. The balloon is inflated for 30 to 60 seconds to expand the stent. The expanded stent gets embedded into the wall of the artery and holds it open. This process widens the artery and allows blood to flow more regularly. The stent provides support for the widened artery so it will not collapse or narrow again.



III. Stents

Stents are small, expandable, flexible, mesh-like tubes. They were invented to overcome the shortcomings of regular coronary angioplasty. Without stents, the procedure is not as smooth because the balloon does not evenly expand the blockage area due to different levels of hardness. This creates an irregular surface within the artery. The irregular surface has a large surface area that new plaque can attach to, which increases the risk of complete arterial blockage. Also, without stents, the blood vessel can recoil making the blood vessel even smaller than the vessel prior to the surgery. Stents open a smoother more uniform channel in blood vessels and decreases surface area for plaque to stick to. Also, stents stay expanded to create support and make sure the blood vessel stays open and doesn't get any smaller.

There are two kinds of stents. Uncoated stents are bare metal. Newer stents are drug-coated and control the release of medicine into the surrounding tissue. The most common drug-coated stents are Cypher stents. They are coated with sirolimus. This drug limits the overgrowth of natural tissue during the healing process. Also, the drug acts as an anti-rejection medicine. Drug-coated stents have a 10% rejection rate, while uncoated stents have a 26% rejection rate.

IV. Conclusion

Stents and coronary angioplasty are only a treatment for coronary artery disease. They extend the life of patients, but plaque build up will continue. If precautions and lifestyle changes are not taken seriously, the patient's life remains severely threatened. Hopefully one day a cure for coronary artery disease will be invented. The potential cure is in the hands of biomedical and genetic engineers.

References

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