Dissolvable Heart Stents

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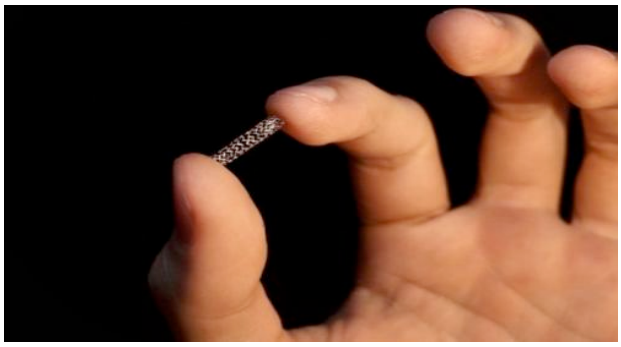
***Abstract*—Traditional heart stents have been used for years to treat Coronary Heart Disease, Carotid Artery disease, and many other heart diseases through a minimally invasive procedure known as angioplasty. While these stents, usually made up of a metal or fabric mesh, are effective at widening and strengthening weak arteries, often delay the healing process of the arteries and may even cause further plaque buildup in the effected artery. Dissolvable heart stents aim to fix this shortcoming.**

I. Introduction

Coronary Heart Disease is currently the leading cause of death for men and women in the United States. CHD is a disease where plaque within the blood sticks to the walls of the coronary artery. Once the plaque accumulates into a large buildup, the heart constantly receives less oxygen-rich blood, and can lead to blood clots and heart attacks within the constricted walls of the artery. Heart stents are most commonly used to treat this condition. These stents are usually made of a metal mesh, but newer models, created by Abbott Laboratories in Illinois, involve the use of a biodegradable polymer drug eluting stent (DES) called polylactide. The aim of this new heart stent is to increase blood flow through the artery by forcing the plaque buildup against the wall and supporting the artery until the body heals itself on the site where the stent was inserted. After the artery has healed, the stent is made to dissolve into the bloodstream, so that the remaining mesh would not cause further blockages or damage.

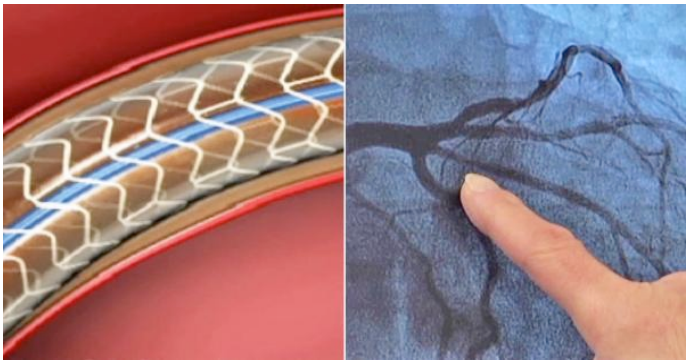
II. Methods



Heart stents are inserted into the body through a minimally invasive procedure called angioplasty. This procedure involves a catheter that is often inserted through the groin, thigh, or arm which is led through the circulatory system until the blockage is reached within the coronary artery. Once this point is reached, a balloon fixed inside of the polylactide mesh is expanded, forcing the mesh against the wall and opening up the artery to increased blood flow. The catheter is removed from the body while the mesh stays in place. The polylactide remains in the artery for 2-3 years before dissolving. The mesh often is modeled to release drugs that prevent further blockages and other complications, such as stent thrombosis, which is when a blood clot forms on the inserted stent. Stent thrombosis occurs in about 1 out of 200 patients and is the cause of less than 10% of all cardiac deaths after stent placement. The procedure normally lasts from 1.5-2.5 hours.

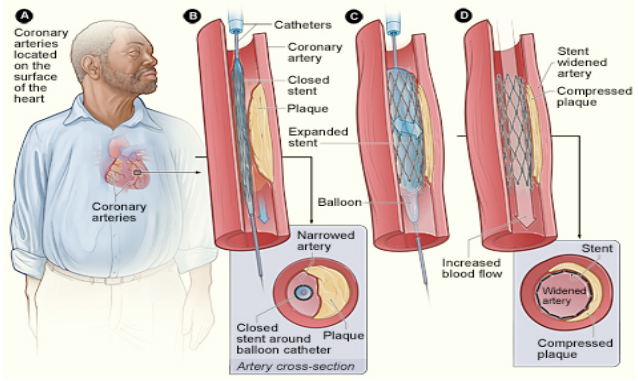
III. Results

Results for dissolvable heart stents have been very promising in recent trials. DES stents made of metal have been shown in recent studies to cause more instances of heart complications than metal stents without supporting drugs. The risk of stent thrombosis, lesion revascularization and incidences of myocardial infarction in comparison to durable polymer stents were significantly reduced with biodegradable polymer DES. This is a large step towards safer treatment of CHD, since this stent can still release supporting drugs without furthering risk of heart complications and stent thrombosis.



IV. Discussion

Many physicians believe that someday, this design will replace the metal stents of angioplasty, which have been used in over 6 million procedures. It has been said to be "a future game-changer for the way we treat coronary artery disease and heart attack in the United States" (Woods), as well as "the latest technology to treat vessel blockages… may promote natural vessel motion to the treated tissue" (Stony Brook Heart Institute…). Starting this month, the ABSORB III clinical trials will enroll over 2,250 patients from all over the country in places such as the Mount Sinai Medical Center and Stony Brook University Heart Institute to test the effectiveness of biodegradable heart stents. In 2011, it was approved for testing in Europe and has been gaining success in trials. It is estimated to cost from $1500-$2000, and if further tests are found to be successful, it is projected to be available in the United States by 2015.



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