



## ADVANCEMENT AND USE OF STENT IN HEART DISEASE:

### an alternative to open heart bypass surgery

Coronary angioplasty refers to non-surgical method in opening clogged-up heart arteries. The method is made popular with the advent of stent, a wire-mesh coiled tube developed to open and support any blocked heart arteries. Balloon dilatation was the first available technique but this resulted in 30% to 50% recurrence of cases. Stenting represents advancement over balloon dilatation only. The metal stent is often made of stainless steel or cobalt-chromium material. The stent is mounted onto a balloon and it is then delivered into the heart arteries via a pin hole puncture either from the leg or the hand. The stent is then deployed by inflating the balloon at the site of artery blockage. (Fig 1 and 2) The blocked artery is therefore opened by the stent permanently. (Fig 3 to 5) After the procedure, the patient can be discharged from hospital within one to two days.



Fig 1 - stent mounted onto balloon

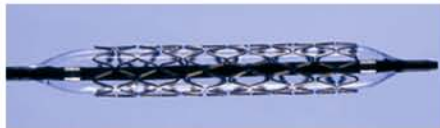


Fig 2 - stent opened by balloon

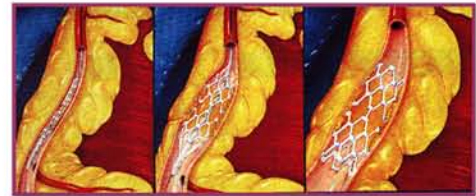


Fig 3 - deployment of stent in the heart artery



Fig 4 - severe long segment blockage of the right heart vessel



Fig 5 - successful coronary angioplasty with stents inserted into the right heart vessel.

The first generation stent is a bare metal stent but this has a 10-30% chance of the vessel clogging up again. This process happens mainly as a result of vessel wall injury from the stent deployment. The likelihood of the artery blocking up again depends on the following unfavorable factors: multiple vessel obstructions, diabetes, calcified artery, long diseased artery segment, small arteries and chronic total 100% obstruction of the artery.

Drug-coated stent represents the latest advancement in stent technology by coating the stent with a layer of drug. This will lessen the vessel wall reaction to injury from the stent deployment and thus reducing the chance of the artery from clogging up again. Since the introduction of these drug-coated stents in early 2000, the rate of stent re-occlusion has reduced to only 5-15%. However, there is a recent major concern with late stent thrombosis (sudden clogging up of the stent with blood clots) happening in 2-3% of the patients who have drug-coated stents within a year. The American College of Cardiology has hence recently revised the guidelines that all patients with drug-coated stents must be on two antiplatelet drugs (aspirin and clopidogrel) for a period of at least one year to reduce this event.

The two different types of stents are therefore used for different types of vessel obstruction. The bare metal stent is for larger vessels and those which are not suitable for drug-coated stents. The drug-coated stent is widely used for vessel obstructions which are most likely to recur after intervention as mentioned above.

In fact, some of the difficult cases which previously will only be sent for open heart bypass surgery can now be offered coronary angioplasty too. Since coronary angioplasty can access and repair the heart vessel blockage simply through a small puncture in the body without resorting to opening the chest wall means most patients may prefer this less invasive procedure. However, each case has to be individualized and discussed between the Cardiologist and Surgeon to find what will be the best possible procedure for the well being of the patient.

The intervention cardiology field is certainly an exciting arena to keep a watch on. Going forward, the scene of stent technology is rapidly changing. The next generation of stents include using reabsorbable polymer coating (used to hold the drug onto stent) to allow better vessel healing. New drugs or combination drugs used for coating the stent may result in better long term effect. Bio-absorbable stent made from bio-degradable metals which are completely reabsorbed into the body within months are under investigation. That means the vessel will be free of any foreign metal material and allow the possibility of repeat procedures on the same vessel site with minimal problems.

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