

and/or Clopidogrel, or because they would need to have either therapy stopped prematurely because of the need for surgery or major dental work.

In contrast, a non-coated stent may be preferred in a patient who has no risk factors for re-stenosis, in whom the narrowed artery appears to be suited for deployment of a short and large [diameter] stent, as in this setting the probability of re-stenosis is very slight.

In all other patients, coated stents are generally preferred as the risk of re-stenosis is known to be 50-70% lower when compared to the risk of re-stenosis of an uncoated stent in these settings.

*In these cases the benefit of reducing the risk of re-stenosis to avoid the possible need for further stenting and/or bypass surgery, is being trading against the possible increased risk of late stent thrombosis [0.5% Vs 1.0%] and the need for longer term blood thinning agents with its attendant [1-2%] risk of serious bleeding.*

### **What should you do if you are unsure about which stent you should have inserted at the time of angioplasty?**

Before agreeing to have an angioplasty it is important that you understand why it is indicated, and to have a clear understanding of the other options of therapy including medical treatment or bypass surgery.

If medical therapy is not controlling your symptoms and there are only discrete narrowings in only 1 portion of 1 or 2 major coronary arteries, then angioplasty may be a reasonable option to consider, particularly if the risks of bypass are considered to be high.

If stenting is required, then the choice of stent should then be made after considering your risk of re-stenosis, your risk of bleeding due to combined Aspirin and Clopidogrel therapy, and the risk of stent thrombosis in your case which mostly relates to the ability to tolerate combined Aspirin and Clopidogrel therapy and whether or not you smoking after stent implantation.

The check list below can be used to help you decide what may be the best choice of stent for you. In general, unless otherwise agreed by your Cardiologist, the more risk factors for re-stenosis and the less risk factors for bleeding and stent thrombosis, the greater the benefit of choosing a coated stent.

### **Factors favouring deployment of a coated stent relate to the risk of re-stenosis**

#### **Patient Related**

- Age >70 years
- Diabetes
- Renal Impairment
- Reduced heart function
- Previous bypass surgery
- Previous stent failure
- Smoking

#### **Coronary Disease Related**

- Long segment [>1.5cm] of disease
- Size of narrowed artery [<3mm]
- Ostial or bifurcation disease
- 'Within stent' stenosis
- 'Within graft' stenosis
- [L] main or multi-vessel disease

### **Factors favouring deployment of either no stent or an uncoated stent related to the risk of bleeding and/or stent thrombosis**

#### **Increased risk of bleeding**

- Any active bleeding
- History of serious gastric or intra-cranial bleeding
- Need for elective surgery or major dental work in coming year
- Warfarin therapy

#### **Increased risk of stent thrombosis**

- Need to prematurely stop combined Aspirin and Clopidogrel therapy
- Inability to tolerate or sensitivity to either Aspirin or Clopidogrel
- Current Smoking

# Coronary Angioplasty and the Choice of Coronary Stent

# Coronary Angioplasty and the choice of coronary stent

In patients with coronary artery disease, there is often a benefit in improving the blood supply to the heart to control symptoms or reduce the likelihood of heart damage.

In some patients this is best achieved with bypass surgery. In other patients it is possible to achieve this with coronary angioplasty and stenting. The decision to undergo either procedure requires careful discussion with your Cardiologist and consideration of the relative risks and benefits of each procedure.

The purpose of this brief document is to help you understand the risks and benefits of angioplasty and to highlight how the Cardiologist usually makes the choice of stent used in a particular patient undergoing angioplasty.

## Coronary [balloon] Angioplasty:

Coronary balloon angioplasty is a procedure in which a focal narrowing in a coronary artery is expanded with the use of a balloon. The procedure is performed in the same manner as the diagnostic angiogram, and in some cases may be performed immediately after the diagnostic pictures have been taken.

Although immediately effective in expanding a narrowed segment of artery, balloon angioplasty may be associated with acute problems including arterial dissection and early thrombosis. These events can occur because of the injury caused to the artery at the time that the balloon is expanded.

Even in the absence of these acute events, however, as the initial injury to the artery begins to heal there is a risk of re-narrowing of the artery [re-stenosis] over the next 6-9 months. *Following angioplasty without stenting, the risk of clinically significant re-stenosis has been observed in up to 20-30% of patients.*

## Coronary Stenting:

In order to overcome the problems of balloon angioplasty, the procedure is now most often performed in association with deployment of a metal stent [or coil] into the narrowed segment of the artery either immediately after or

at the time of the initial balloon dilatation of the narrowed segment of artery.

The early complications of balloon angioplasty are almost completely avoided with the use of stents, however, the problem of re-stenosis still occurs in 10-20% of patients. Dealing with in-stent may prove very difficult, as the deployment of a stent within a stent at a later time is associated with a high probability of failure and as a result, the eventual need for bypass surgery.

## Coated Stents: The good and the bad

In an effort to reduce the risk of re-stenosis a new generation of stents has been developed. These stents have been coated with a drug to reduce the response in the artery to the initial injury that occurs at the time of balloon angioplasty. Although these stents have proved to be very effective in reducing re-stenosis to between 0 to 5%, there have been some early reports to indicate that coated stents *may* be associated with a small additional risk of late stent thrombosis – clotting – when compared with uncoated stents [0.5% vs 1.0%] however, this has not been universally reported.

## Countering the risk of stent thrombosis:

To counter the risk of stent thrombosis, patients with stents are required to take a combination of blood thinners – typically Aspirin and Clopidogrel [Plavix or Iscover]. For those with uncoated stents, this combined therapy is usually continued for 3-6 months, and for patients with coated stents the combined therapy is typically continued for up to 12 months, and in some cases even longer.

*During the period of combined Aspirin and Clopidogrel therapy, patients should not cease either drug without prior advice from their Cardiologist, as there is a definite risk that the stent may block acutely if the combined Aspirin and Clopidogrel therapy is ceased for any length of time. This risk is greatest in the first 2 weeks after stopping combined therapy.*

Although very effective in reducing the risk of stent thrombosis, the combined use of blood thinners does place a patient at an increased risk of bleeding, which over the usual period of treatment may be potentially serious in 1-2% of cases. This increased risk of bleeding needs to be considered when deciding which if any stent is used at the time of angioplasty.

## Choosing the right stent for the right patient:

The choice of which stent to use in any given patient is never straight forward. Although the decision to use a stent and the exact choice of stent can be made prior to the procedure, based upon a number of factors outlined below, it should be appreciated that sometimes technical factors encountered during the procedure necessitate a change in the pre-operative decision.

## Which patients are at increased risk of stent re-stenosis?

One of the major concerns of the Cardiologist who treat patients with coronary artery disease is the avoidance of in-stent stenosis as this represents a failure of stenting and is difficult to treat. Although some patients can undergo a repeat stenting procedure, this is not always possible and as such some patients may need to have bypass surgery, or if unsuited for bypass, will have to continue with medical therapy which may not always be effective in preventing angina.

In general, factors that increase the risk of re-stenosis include factors related to the patient and the affected artery.

*Factors related to the Patient that affect the risk of re-stenosis include age >70, a history of diabetes, renal disease, reduced heart function, previous bypass grafts or failed angioplasty, multi-vessel disease and current smoking.*

*Factors related to the artery that affect the risk of re-stenosis include its size, the length of the narrowed segment, narrowing at the origin – ostium - of the artery, the need to deploy the stent when the patient is clinically unstable [during a heart attack or period of unstable angina], and whether the stent is to be placed into a graft or another stent.*

*Although it is generally true that the greatest absolute benefit of a coated stent is seen in patients with risk factors for re-stenosis, other factors need to be considered when making the final choice of stent in any given individual*

For example, it may be best to avoid using a stent if a patient is considered to be at especially high risk of stent thrombosis either because they cannot tolerate Aspirin