Drug-Eluting Stents

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When blockages in the arteries of the heart (coronary arteries) develop, individuals may experience symptoms caused by inadequate blood supply to the heart muscle. This typically produces chest pain or pressure and/or shortness of breath. Treatment for this condition (coronary artery disease) will depend on the type of the blockage and its extent. Treatment options include medication, surgery (coronary artery bypass surgery), or catheter-based procedures, which are discussed below. Patients should discuss these options with their physician to determine which may be best for them.

Several types of catheter-based procedures are available. During balloon angioplasty, the physician passes a special balloon catheter into the narrowed segment of the artery and expands the balloon, which thus opens the artery and compresses the blockage against the wall of the artery. More than one third of patients who undergo balloon angioplasty may experience restenosis (renarrowing) of the diseased artery segment within 6 months of the procedure. Stents are very small metal tubes that can be inserted via a balloon catheter into the narrowed segment of the artery (Figure). When the balloon is inflated, the stent expands and is embedded into the artery vessel wall, which thus opens the previously narrowed segment of artery. The balloon is then deflated and removed along with the catheter, and the stent is left behind to serve as a metal framework for the artery. Although stented arteries have less chance of renarrowing than arteries opened with a balloon alone, in-stent restenosis can still occur in more than 1 in 5 patients after stent placement.

Because restenosis within the stented region of a heart artery is caused by tissue growth, some stents (called drug-eluting stents) have medication on them to inhibit or prevent this tissue growth. Drug-eluting stents are placed in a fashion similar to other stents; however, their use markedly reduces the rate of renarrowing. In fact, about 1 in 10 patients develops renarrowing in the several years after drug-eluting stent implantation, a rate about half of that seen for stents without medication.

Because stents expose foreign material to the blood stream, a small risk exists that a blood clot may develop in the stent, a process called stent thrombosis. These blood clots can occur many months and even years after stent implantation and may lead to a heart attack or death. All stents can potentially be affected by stent thrombosis. For this reason, most patients with stents are instructed to take anticlotting medication, usually a combination of aspirin and clopidogrel or ticlopidine. Each of these medications stops platelets (particles in the blood that help clots to form) from functioning to their full capacity. The precise duration of anticlotting medication depends on the type of stent placed by your doctor and your overall medical condition. **If you have been prescribed anticlotting medications, you should not stop them (even for a few days) unless instructed to do so by your doctor.**

Concerns about the safety of drug-eluting stents have received much publicity, primarily related to a small increase in the number of blood clots that develop within drug-eluting stents late (more than 1 year) after implantation. In December 2006, the US Food and Drug Administration

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The opinions expressed herein are the personal views of the authors and do not necessarily represent the policies, practices, positions, or opinions of the US Food and Drug Administration.

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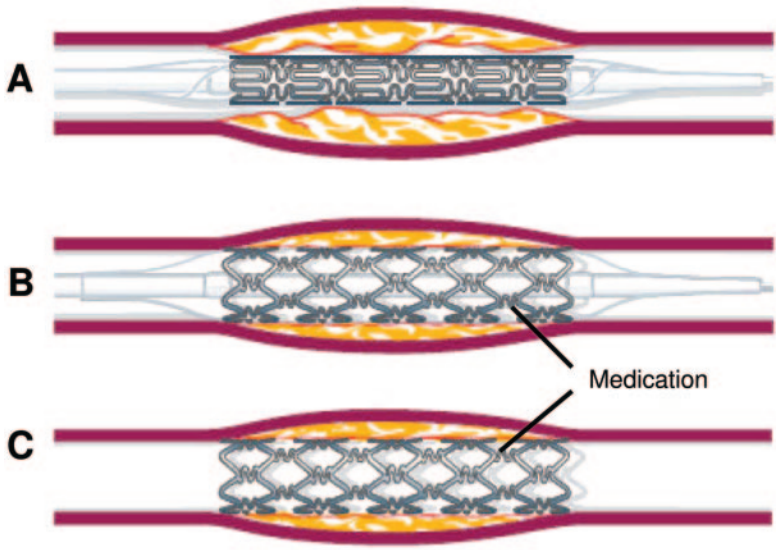

A, The stent is mounted on a balloon catheter and advanced to the diseased, narrowed portion of the heart artery. B, The balloon is inflated and the stent is expanded, which opens the narrowed section of the artery. C, The balloon is deflated and removed; the stent is embedded into the wall of the artery and stays in position. Medication coats drug-eluting stents and reduces the chance of renarrowing, or restenosis, of the blood vessel.

convened a panel of cardiovascular experts to review drug-eluting stent safety data. The panel concluded that for many patients, such as those with uncomplicated medical histories who undergo elective stenting of simple coronary blockages, drug-eluting stents remain a safe and appropriate therapy. For others, such as those who have suffered an acute heart attack or those with multiple or complicated coronary blockages, current data are inadequate to determine whether drug-eluting stents are better or worse than bare-metal stents or coronary artery bypass surgery. Patients are advised to discuss with their physician which treatment option(s) may be most appropriate for them. In all cases, patients who receive drug-eluting stents are reminded to take their prescribed anticlotting medications without interruption for at least 1 year after stent implantation, unless otherwise instructed by their cardiologist (Table).

Important Instructions for Drug-Eluting Stent Patients

Notify your doctor immediately if you experience chest discomfort, chest pain, or shortness of breath, particularly if the symptoms are new or worsening.
Take your medications as prescribed by your doctor.
Report any side effects from your medication immediately. Side effects may include bleeding, easy bruising, nausea, vomiting, headache, or rash.
Do not stop any of your medications unless instructed to do so by your doctor.

Additional Resources

American Heart Association. Patients who receive drug-eluting stents should continue antiplatelet medications for at least one year: American Heart Association joint science advisory. Available at: http://www.americanheart.org/presenter.jhtml?identifier=3044640. Accessed April 20, 2007.

Boston Scientific. Answers to common questions for patients and families. Available at: http://www.taxus-stent.com/index.html?clickType=ts_us_hp. Accessed April 20, 2007.

Cordis. Cordis Cypher Sirolimus-Eluting Coronary Stent: the safety of coronary stenting. Available at: http://www.cordis.com/active/crdus/en_US/html/cordis/downloads/155_5119_1_Patient-Safety.pdf. Accessed April 20, 2007.

Disclosures

Dr Maisel is the chair and Dr Laskey is the immediate past chair of the Circulatory System Devices Advisory Panel.

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