ment with the use of neurostimulation is well standardized,[19,20] the search for specific muscle response is well defined,[3,9,21] and the incidence of infection, a crucial issue in this context, is low.[3,4] Some of these concerns, particularly the issue of sterility, must be further investigated regarding ultrasound-guided perineural catheters. In any case, as written by J. Giraudoux, the Trojan War will not take place.[22]

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Drug-eluting Coronary Stents

What Are the Risks?

DESPITE the initial enthusiasm regarding the efficacy of drug-eluting coronary stents (DES) in the care of the patient with cardiovascular disease, there now seems to be a growing concern about the risk of adverse outcomes related to stent thrombosis. This initial risk became apparent in the perioperative period through a case series in which patients with a recent stent placement (less than 90 days) were at markedly higher risk of reinfarction or death after presenting for noncardiac surgery.[1] The risk of stent thrombosis has also been debated recently in a series of articles and presentations in which the general utility of DES *versus* bare metal stent placement for decreasing the long-term risk of myocardial infarction and death has been questioned. In this issue of the Journal,[2] the authors describe a case of very late thrombosis of a DES occurring in the postanesthesia care unit, 12 months after completion of a course of dual antiplatelet therapy. This case and recent evidence in the literature highlight unresolved questions regarding the risks and benefits of interventions aimed at improving cardiovascular outcomes in patients undergoing planned or unplanned noncardiac surgery.

Drug-eluting stents were initially popularized because these stents were thought to remain patent for a longer period of time compared with their bare

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metal counterparts. However, the BASKET-LATE trial demonstrated that despite improvements in target vessel revascularization, there was a substantial increase in late rates of myocardial infarction and death in patients treated with DES compared with bare metal stents after discontinuation of clopidogrel.[3] In an observational study of 4,666 patients, extending clopidogrel use from 6 to 12 months in patients with DES, but not bare metal stents, was associated with a reduced risk of myocardial infarction or death.[4] These findings suggested that continuation of clopidogrel might provide protection against late stent thrombosis; however, the optimal duration of such therapy was undefined. In the current report, stent thrombosis occurred perioperatively after a 12-month course of clopidogrel was completed, but when aspirin was discontinued 10 days before surgery. The occurrence of thrombosis after aspirin withdrawal substantiates the importance of maintaining this antiplatelet therapy in the perioperative period in patients with DES.

The question of the optimal preoperative evaluation of a patient with a drug-eluting coronary stent remains controversial. One of the main reasons to perform testing is to determine whether there is myocardium at risk for ischemia, and whether the coronary artery anatomy is amenable to preoperative revascularization. In the Coronary Artery Revascularization Prophylaxis trial,[5] patients with single- or double-vessel coronary artery disease who had a percutaneous coronary intervention did not have improved perioperative and long-term outcome compared with patients who had medical therapy alone. In addition, several authors have shown that noncardiac surgery within the first 30–90 days after coronary stent placement is associated with increased thrombosis or bleeding diatheses, depending on the extent of anticoagulation.[6] These results suggested that preoperative revascularization may not provide a benefit and may increase the risk of complications during subsequent noncardiac surgery. Therefore, when consideration is given to performing preoperative testing and possible use of percutaneous coronary intervention, the risks and benefits of testing/intervention must be carefully weighed. Given the lack of efficacy of coronary stents for single- or double-vessel coronary interventions in this population generally, one might ask whether there is any value to performing further diagnostic testing in the asymptomatic patient with a coronary stent in place. In these authors' opinion, the potential yield will be small to negligible because it would be unlikely that any additional interventions would be contemplated. Therefore, proceeding with surgery as the authors describe is a prudent and reasonable approach.

The value of other medical therapies to decrease cardiovascular risk in patients with DES undergoing noncardiac surgery is unclear. The American College of Cardiology/American Hearth Association focused update on perioperative β-blockade[7] stratified β-blockade treatment recommendations on the basis of the degree of preoperative risk. The value of β-blocker therapy in low-risk patients or patients without ongoing ischemia and who currently were not taking β-blockers has been questioned. Several studies have been unable to demonstrate a benefit in low-risk patients; however, these studies did not specifically address the question of β-blocker therapy in patients with coronary stents. Similarly, although statin drugs favorably impact overall cardiovascular outcome, the benefit of statin therapy in patients with coronary stents is not clear.

The potential for DES thrombosis influences the overall assessment of benefit and risk in patients who are considered for preoperative testing and revascularization. In a study of 770 intermediate-risk patients, those patients randomly assigned to receive no testing and tight heart rate control with β-blockers for major vascular surgery had similar outcomes compared with the group receiving testing with or without preoperative revascularization.[8] Therefore, testing may be of little value in low-risk patients or in intermediate-risk patients treated aggressively with β-blockers. It is probably reasonable to reserve preoperative revascularization for high-risk patients, with consideration given to the use of DES *versus* bare metal stents depending on the feasibility of completing a course of antiplatelet therapy before surgery and to continue aspirin indefinitely.

In conclusion, this report illustrates the occurrence of acute coronary stent thrombosis as a sudden and unexpected event, which, in this case, occurred postoperatively and remotely from discontinuation of clopidogrel. Treatment was initiated quickly, and proceeding to the catheterization laboratory makes the most sense in these situations. The case exposes this important and potentially lethal complication in the perioperative care of patients with DES, and should lead clinicians to consider how assessment of both benefit and risk should impact decision making before, during, and after surgery.

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