

Is Acute Myocardial Infarction an Appropriate Setting for Drug-Eluting Stents?

Raúl Moreno

Sección de Hemodinámica, Servicio de Cardiología, Hospital Universitario La Paz, Madrid, Spain

Drug-eluting stents (DESs) represent the most important advance in interventional cardiology in the last 15 years.¹ These devices have altered the outcomes of patients undergoing percutaneous coronary interventions (PCIs) by drastically reducing the recurrence of angina and the need for repeat revascularization procedures.² Despite the limitations that are still present with this type of stent (higher cost, need for twice as much antiplatelet therapy for longer, and a slight increase in the incidence of stent thrombosis from the first year of implantation), the obvious clinical advantages that they offer has meant that they are implanted in 2 out of every 3 patients undergoing PCI in Spain, a figure similar to the rest of Europe.³

Primary angioplasty is the treatment of choice for ST-elevation acute myocardial infarction (STEMI), and so the number of PCIs performed in such patients has increased year after year.^{3,4} In view of the large thrombotic component of lesions, STEMI is often one of the settings in which the use of new devices is most controversial, and so they were incorporated later into clinical practice. In the case of bare-metal stents, the most important concern was the possibility of a high risk of stent thrombosis, but randomized studies showed that treatment of STEMI through systematic stent implantation clearly reduced the need for repeat revascularization procedures in the target vessel.⁵ Although no benefit was observed in terms of infarction size, mortality, or the risk of reinfarction compared to balloon angioplasty alone, the decrease in the rate of repeat revascularizations was largely responsible for ensuring that patients with STEMI undergoing PCI usually also underwent stent placement.

Even with the use of stents, one of the most important limitations of primary angioplasty in the medium and

long term is restenosis, which in many cases is associated with recurrence of the ischemia so necessitating repeat revascularization procedures. Restenosis may also limit recovery of left ventricular function.⁶ Therefore, the potential advantages of DESs in patients with STEMI lie particularly in a decrease in the risk of restenosis, recurrence of ischemia, and the need for repeat revascularization procedures. Of the possible drawbacks, the risk of stent thrombosis is particularly high in STEMI⁷ and probably the clinical relevance of restenosis is less in vessels that irrigate completely or partially necrotized myocardial territories. Deserving of particular attention is the risk of stent thrombosis in STEMI. Some registries of DES implantation in patients with STEMI have reported a high risk of DES thrombosis (2%-4%).⁸ We should however remember that this 2% to 4% risk of stent thrombosis in STEMI had already been reported for patients treated with bare-metal stents,⁹ and what was really important was determining whether the risk was greater with DESs than with bare-metal stents.

In this issue of the *Revista Española de Cardiología*, a study of treatment of STEMI with DESs in a Spanish hospital is published.¹⁰ Despite the obvious limitations recognized by the authors of the study (which was done in a single center with few PCIs in STEMI patients and was not randomized), this type of study shows that when we use DESs in STEMI, we improve the prognosis of patients with this condition as the need for repeat revascularization procedures is reduced, thereby improving their quality of life. The authors managed to do this safely, without any increase in the risk of stent thrombosis in comparison with a similar population of patients with STEMI who were treated with bare-metal stents.

As was the case at the time with bare-metal stents, initially, implantation of DESs in patients with STEMI was also not recommended due basically to fear of a significant increase in the incidence of thrombosis compared to bare-metal stents. The authors of some recent studies that were not particularly rigorous in that they drew conclusions from patients not randomly assigned to treatment and with no data from the PCI procedure (DES type, number of stents, lesion length, etc) have suggested that DESs might even increase mortality in patients with STEMI compared to bare-metal stents.¹¹ The findings of such studies have caused

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Correspondence: Dr. R. Moreno.
Sección de Hemodinámica y Cardiología Intervencionista.
Hospital Universitario La Paz.
P.º de la Castellana, 261. 28046 Madrid, España.
E-mail: raulmorenog@terra.es

a strong debate even in the general press and have triggered a certain degree of alarm among some patients. Furthermore, some cardiologists have decided not to implant DESs in patients with STEMI and treat them all systematically with bare-metal stents. Nevertheless, as physicians, we should act responsibly and should not forget that the way to compare therapeutic approaches is through randomized trials; if such designs are not implemented, patient selection bias may lead to erroneous conclusions and, therefore, prevent our patients from receiving the best treatment available.

There are 10 studies that have compared DESs with bare-metal stents in studies with randomized treatment allocation. These studies have consistently shown that, compared to bare-metal stents, DESs reduce the need for repeat revascularization in patients with STEMI, with no differences in the incidence of stent thrombosis.^{12,13} For example, a recent metaanalysis demonstrated the efficacy of DESs compared to bare-metal stents in 2786 patients with STEMI in that the patients assigned to DESs had a significant reduction in the rate of repeat revascularization compared to control (5.1% vs 13.1%; $P < .001$).¹² In this same metaanalysis, the safety of DESs in this setting was also demonstrated as there were no differences in mortality, reinfarction, or stent thrombosis compared to bare-metal stents. In fact, all these events occurred in a lower percentage of patients assigned to DESs (4.1% vs 5.1% for mortality, 3.1% vs 4% for reinfarction, and 1.6% vs 2.2% for stent thrombosis in patients assigned to DESs and bare-metal stents, respectively), although these differences were not statistically significant.

The randomized trials also point to 2 weak points for DESs in the STEMI setting: *a*) the safety evaluation of DESs currently requires long-term follow-up (probably 5 years), and most studies that have compared DESs and bare-metal stents in STEMI had a follow-up time of 2 years or less; and *b*) the clinical benefit of DESs in patients with STEMI seems to be less than in other clinical settings—something which is probably related to the lower clinical significance of restenosis in vessels that irrigate partially or totally necrotized myocardial territories. In patients with STEMI, the number needed to treat (NNT) to avoid a repeat revascularization procedure is approximately 8 (between 4 and 12 depending on the study).¹⁴ In the STEMI setting, the NNT lies between 8 and 50 depending on the study. Therefore, the clinical benefit of DESs in STEMI seems to be less than in patients with non-ST-elevation MI.¹³ This means that to avoid target vessel revascularization, more patients need to be treated and, therefore, the cost is also greater.

With these data, and from a personal point of view allowed in an editorial comment, I can affirm that STEMI is an appropriate setting in which to use DESs, although their use should probably be somewhat more restricted than in other settings given that the clinical benefit is

apparently smaller. In the future, it will be important to identify the patients with STEMI who would stand to gain clear benefit from DESs, as well as to confirm that the clinical benefit of DESs in STEMI is maintained in the long-term (4 to 5 years) with the randomized trials that are already underway. In the meantime, the proposal in patients with STEMI could be to use DESs in patients who are not only at greatest risk of restenosis but who also have a large amount of potentially viable myocardium (probably those with shorter disease courses or those with a patent vessel in the initial coronary angiography).¹⁵

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