

## Temporary Transvenous Pacing: a Simple and Safe Technique?

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Temporary transvenous cardiac pacing is a widely used technique that can save the life of a critically ill patient. It is in fact the only painless therapeutic way of maintaining a prolonged, stable adequate heart rate in patients with asystole or extreme bradycardia. Its extraordinary use in these situations sometimes causes us to forget that it is in fact an invasive technique whose operation requires minimum infrastructure, basic knowledge and sufficient operator experience, as well as control of the patient both during and after the procedure. Strict compliance with each of these requirements is essential in order to maintain within reasonable limits the rate of associated, possibly very severe complications, as well as enabling these complications to be detected quickly and resolved efficiently. However, the widespread use of this procedure, its many indications and the not inconsiderable incidence of potentially fatal complications contrasts with the paucity of recently published information. It is true that the indications for the procedure and its underlying principles have changed little over the last 20 years, but much still remains to be learnt about the true application of these principles in our setting. Temporary pacing is undertaken in several very different circumstances, ranging from its prophylactic use in an asymptomatic patient (for instance, as a bridge during generator replacement of a permanent pacemaker) to its use during asystole after prolonged cardiopulmonary resuscitation. The setting where it is used also varies widely, from a multifunction area in the emergency service of a local hospital to the electrophysiology laboratory of a tertiary care center. The person in charge may be an emergency service physician, an in-

tensive care specialist or anesthetist, a cardiologist, with or without specialization in invasive cardiology, an electrophysiologist, or a cardiovascular surgeon, and the physicians' experience can vary from that of a resident starting a rotation in the coronary or intensive care units to that of a specialist with many years experience doing invasive electrophysiology. Finally, the control and later care of the patient who has some system of temporary pacing must be undertaken by experts in continuous electrocardiographic recording with an adequate staff-to-patient ratio, although this ideal situation is not always possible and is occasionally far from daily reality.

The simple listing of all these variables which can affect the use of this technique suggests that its results can also vary greatly, depending on the type of patient, the setting and the health care personnel involved. Accordingly, detailed information regarding all these aspects is essential to determine the true situation of temporary pacing in our setting. The article by López Ayerbe et al<sup>1</sup> published in this issue of REVISTA ESPAÑOLA DE CARDIOLOGÍA provides some very interesting facts. The authors reviewed a series of 530 temporary pacemakers implanted in a single center over the last 6 years. Around half the patients had advanced symptomatic atrioventricular block unassociated with acute myocardial infarction. Other common indications were atrioventricular block associated with the acute phase of myocardial infarction (13%), bradycardia secondary to treatment with pharmacological agents (12%), and sinus dysfunction (7%). The group of patients who underwent temporary prophylactic pacing for elective replacement of a pacemaker generator represented 15% of the sample and, although no specific data are given concerning this population, they probably form a low-risk subgroup because the procedure is scheduled, with the patient clinically stable and with a clearly shorter duration of temporary electrode placement than in other groups. The patients with block associated with acute myocardial infarction, however, have a worse prognosis, due especially to the complications derived from their underlying disease<sup>2</sup>; their 31% intrahospital mortality rate is there-

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fore not surprising. Fortunately, this indication has been drastically reduced as a result of early reperfusion therapy in patients with myocardial infarction, as the authors conclude after comparing their figures with those from series in the prethrombolytic era.

The rate of complications in this study was high: 22% of the patients had some sort of complication, which was severe in 57 cases (9% of the population). Moreover, 6 patients (1% of the total) died as a result of a procedure-related complication. These figures are similar to or lower than those of other series,<sup>3,4</sup> but nevertheless warrant some reflections on the performance conditions of temporary transvenous pacing. All the procedures in this study were undertaken by cardiologists or cardiology residents under the supervision of a cardiologist in a coronary care unit provided with an x-ray room. The authors performed 530 procedures in six years, which equates to around 100 procedures per year. This number would seem sufficient for the personnel responsible for undertaking or supervising the procedure to have become sufficiently experienced. Although the authors found no differences in the number of complications according to the experience of the physician performing the procedure, this conclusion should not be considered as extrapolatory to other settings. All the procedures in this series were supervised by trained cardiologists and the more severe patients or those who had complications were supposedly attended by a physician experienced at resolving emergencies in a coronary care unit. In small hospitals, however, the number of procedures may be much lower and the experience of the physician implanting the device may be reduced to one or two procedures per year. Furthermore, specific training is required in the management of cardiologic emergencies, because many of the acute complications associated with the procedure (pericardial tamponade, ventricular arrhythmia during implantation) require quick therapeutic decisions which are not always easy. The convenience of the regular recycling of health care personnel who work in low-volume centers, or the possibility of rapid transfer to a referral center with the patient supported by a transthoracic external pacemaker, are aspects which require detailed evaluation.

The loss of capture or detection in the hours immediately following the start of temporary pacing is also a relatively common problem; this situation arose in 9% of the patients in the series reported in this issue, with the figures for other published series generally being higher.<sup>3,4</sup> Achieving a suitable, stable position of the electrocatheter at the apex of the right ventricle can be difficult, especially in the presence of important co-existing anatomic disorders. Adequate operator experience and a radiosopic system which provides a good image and permits the projection to be changed easily may be essential in complex cases. Displacement of the electrode in the subsequent hours or days

is difficult to predict (interestingly, the authors found that this problem was most common in disoriented patients). Furthermore, if this displacement is sudden, it may lead to a possibly life-threatening asystole. All patients who have a temporary pacemaker implanted should therefore undergo continuous electrocardiographic control and be overseen by suitably trained health care personnel (able to discern detection failure on the monitor, for example). The simple presence of a telemetry system is not sufficient guarantee for the patient if nobody watching the monitor is able to recognize an incipient or severe dysfunction of the pacemaker.

Another interesting result seen in the article is the possibility of using the femoral route for instauration of the temporary pacing in almost all the patients, provided sufficient experience is available. As the authors mention, this approach permits easy compression in case of hemorrhage, as well as being perceived by the patient as less aggressive than jugular vein puncture and avoiding the potential complications associated with the subclavian approach, which may be severe. Although no clear superiority of one approach over another was shown, it is always necessary to respect the subclavian vein, which can provide access for the later implantation of a permanent pacemaker if this indication is warranted. Finally, the low rates of venous thrombosis and embolism which were clinically significant in this series (3 cases of deep venous thrombosis and 1 case of fatal pulmonary embolism were detected), together with the acceptable number of hematomas (4 cases requiring transfusion), confirm the convenience of giving anticoagulant doses of heparin whilst the pacing electrode is in place. Using vascular ultrasound, other authors have seen a substantial reduction in the incidence of deep venous thrombosis in these patients.<sup>5</sup> Thus, in the absence of any contraindications, it seems reasonable to indicate the systematic use of anticoagulant doses of heparin, at least when the femoral route is used.

This study also poses several questions. Even in a unit with a high volume of patients and adequate implantation conditions and post-procedural care, the number of potentially severe complications associated with transvenous pacing is high. This suggests the convenience of strict evaluation of the indications for the procedure, especially with the current availability of transthoracic pacing. In fact, many indications for transvenous pacing included in the most recent guidelines of the American Heart Association/American College of Cardiology for the management of acute myocardial infarction have been replaced by recommendations for a transcutaneous pacemaker.<sup>6</sup> The advantages of this type of pacing are its immediateness (efficient pacing can be achieved in just a few seconds) and its ease of use, as it does not require vascular access or a radiosopic system. Moreover, the cur-

rent devices for transcutaneous pacing are able to detect the patient's rhythm and are usually integrated into an external defibrillation system, thereby enabling the patient to be immediately defibrillated if necessary.

Although suggested in only a few reports, it seems feasible to suppose that stable transcutaneous pacing may be achieved in most patients long enough to allow their emergency transfer to a nearby hospital.<sup>7</sup> Inconveniences associated with this type of pacing include the fact that capture of the ventricles is not always achieved, that pacing is usually painful and that it may be difficult to evaluate whether effective pacing is being achieved. Detailed evaluation of the feasibility of this alternative emergency approach should be undertaken, as well as of the training and minimum experience required to implant a transvenous pacemaker quickly and safely. The infrastructure and the adequate personnel for care of the patient after the procedure and the volume of cases necessary to maintain the competency of the units performing the procedure should also be evaluated. Other aspects, such as the ideal approach or the optimum anticoagulation regimen, also require more exhaustive study. Finally, the type of electrocatheter used is rarely analyzed. Nevertheless, it may play an important role in obtaining suitable thresholds, electrode stability and in the incidence of complications. A fine, flexible electrocatheter is less traumatic, but it may be more difficult to direct, especially if the femoral approach is used. All these questions suggest the need, mentioned by the authors, of a prospective, multicenter registry of the use of tempo-

rary pacemakers. Availability of solid information about the current situation of the procedure in Spain is the first step towards its improvement.

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