fixation system when this occurs could be compromised. Thus, particular care should be taken when dressing the wound and in ensuring that the system is stably fixed in the cervical region of the patient. On the other hand, the fact that it can be connected to a permanent pacemaker generator allows for programming of more physiologic pacing modes that help to maintain the patient in a stable clinical condition and allow the patient to walk about without clinical deterioration. Such advantages are particularly desirable in patients who are totally dependent on pacing and who require very prolonged temporary pacing. The small size of the generator is conducive to portability, and this in turn helps ensure that the patient can walk around and has greater mobility in general.

As a precaution, the resterilized pacemaker generators that are used for this purpose, although only ever in contact with the skin of the patient, should come from patients without evidence of infection at the time of switching to minimize the possibility of infection. The greater cost of the active fixation electrode used compared to the usual temporary pacing electrodes is compensated by the fact that the patient does not require admission to hospital in a unit with facilities for close patient monitoring.

This technique should be considered in patients who will require prolonged temporary pacing for any reason, particularly those who are pacing-dependent.

Continuous variables are described as median [interquartile range] and compared with the Wilcoxon signed-rank test. Correlation was calculated with Spearman’s coefficient.

Initially, we enrolled 22 patients; 5 were excluded (2 for obesity, 1 for difficulty in transseptal puncture, 1 for asthma, and 1 for kidney failure). RRA was performed with no complications in 17 patients; 2 in the pilot phase, leaving 15 who constituted our study group (Table 1).

In 3 patients, RRA images could not be analyzed. In these patients, pause duration was too short for analysis, 2.1 [1.2-4.8] vs 12.3 s [7.8-16.2] (P=0.34). The RRA enabled us to observe 4 PVs with independent ostia in 8 of 12 patients with images suitable for analysis, and common antra in 4. When compared with 3D NS, RRA identified the same number of PVs and common antra in 10 of 12 patients (Fig. 1). In the remaining patients, 3D NS showed 1 left common antrum and 1 intermediate right PV missing in RRA and MRI.

MRI and measurements were available for 10 patients and identification of PVs and common antra proved the same as in RRA in 9 of them (Fig. 1). In the one remaining patient, MRI identified 1

<table>
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<th>Table 1 Baseline Characteristics</th>
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<td>Patients</td>
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<tr>
<td>Age, years</td>
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<td>Men</td>
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<td>LVEF, %</td>
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**Indication for ablation**

| Paroxysmic AF                   | 13 (86.7) |
| Persistent AF                   | 2 (13.3) |
| Sinus rhythm                    | 10 (67) |
| AF                              | 5 (33) |

AF, atrial fibrillation; LVEF, left ventricular ejection fraction; RRA, radiologic rotational angiography.

Data are expressed as no. (%) or mean±standard deviation.

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Figure 1. Magnetic resonance imaging reconstruction of left atrium (A), rotational radiologic angiography (B) and Ensite-NavX™ (C). Posterior view. Note in B the catheters and sheaths penetrating into the left atrium (arrows). L, left; R, right.

left intermediate PV that RRA did not. PVs diameter was 14 mm (14.1-17.3) in MRI and 14.8 mm (14.1-17.7) in ARR, and we obtained a statistically significant positive correlation (r=0.722; P<.001).

RRA offers precise identification of LA anatomic structures provided the postadenosine pause is significant. In a minority of patients, this cannot be achieved.

Our study is consistent with other publications in that the pause duration was decisive for RRA images to be suitable for analysis.3–5 This is probably because the relaxation following ventricular contraction drains contrast towards the ventricle and reduces the intensity of atrial opacification. We were able to identify PVs and measure PV diameter accurately. We coincide with other authors5 in finding that RRA slightly overestimates diameters, perhaps because of distension caused by the contrast injection or atrial cycle phase changes.

We also compared RRA with 3D NS. A recently published study randomized patients to 3D NS or RRA during PV ablation.6 However, we have found no publication that compares methods in the same patient. In our study, identification of PVs and common antra using both methods was identical in all except 2 cases. In these patients, RRA was concordant with MRI, suggesting it is more accurate than 3D NS.

The use of high-dose adenosine suggests general anesthesia is needed. Although neither our study nor others have found complications with this method, its safety in patients with structural heart disease has not been determined. RRA could not be used in 5 patients, but in 4 of them this limitation could have been identified earlier, thus permitting the use of a different imaging method.

In conclusion, intraoperative RRA of the LA provides anatomic information crucial to AF ablation provided there is always a significant pause secondary to adenosine.

CONFLICTS OF INTEREST

Dr Almendral has received lecture fees from St. Jude Medical and his institution has received payment from St. Jude Medical for educational presentations.

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