series would help to determine whether there are other factors, such as pacing, that could influence RVF during follow-up. The small number of patients and the lack of hemodynamic data obtained during the follow-up period, for the purpose of assessing their relationship to the echocardiographic measurements, would be limitations to the study.

In conclusion, there is an early, and significant, improvement in RVF, quantified by all the echocardiographic techniques, and that 2DSTE parameters show a further improvement throughout the first month, possibly due to the greater accuracy of this technique for the quantification of changes in ventricular function.

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REFERENCES

Table
Baseline Clinical Characteristics and Angiographic Parameters for the Patients

<table>
<thead>
<tr>
<th>Patient</th>
<th>Sex</th>
<th>Age</th>
<th>Clinical symptoms</th>
<th>Obstruction</th>
<th>Etiology</th>
<th>Time from intervention until percutaneous treatment</th>
<th>Type of surgery/PM</th>
<th>Balloon</th>
<th>Stenting</th>
<th>Post-dilatation balloon</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>12</td>
<td>Jugular distension and severe superficial thoracic circulation</td>
<td>Subtotal</td>
<td>APPVD</td>
<td>6 months</td>
<td>Opening of atrial septum and tunneling with patch</td>
<td>Match 7×40</td>
<td>No</td>
<td>Monofoil 15×40</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>47</td>
<td>AVB; Edema of the neck and collateral venous circulation</td>
<td>Long total (3 cm)</td>
<td>APPVD; PM balloon</td>
<td>6 years since surgery and 4 months since PM</td>
<td>Widening of SVC with patch and drainage of anomalous veins via an AS; PM DDD</td>
<td>Balt 20×50</td>
<td>Covered Stent Numed 82 45 mm</td>
<td>Mullins 18×30</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>68</td>
<td>AVB; facial congestion and collateral venous circulation</td>
<td>Short total (2 cm)</td>
<td>PM electrode</td>
<td>9 years 1 month</td>
<td>PM DDD</td>
<td>Bili 18×50/9×40</td>
<td>Covered Stent Numed 82 35 mm</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>74</td>
<td>Brugada; impossible to place new electrode</td>
<td>Subtotal</td>
<td>ICD</td>
<td>6 years 10 months</td>
<td>ICD</td>
<td>Maxi LD 14×30</td>
<td>Covered Stent Numed 82 45 mm</td>
<td>Mullins 16×30 y 18×30</td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>10</td>
<td>Edema of the neck and collateral venous circulation</td>
<td>Subtotal</td>
<td>APPVD</td>
<td>8 years</td>
<td>Widening of SVC with patch and opening atrial septum and tunneling with patch</td>
<td>Optapro 12×30</td>
<td>Palmaz XD 29</td>
<td>No</td>
</tr>
</tbody>
</table>

APPVD, abnormal partial pulmonary vein drainage; AS, atrial shunting; AVB, atrioventricular block; ICD, implantable cardioverter/defibrillator; PM, pacemaker; RA, right atrium; SVC, superior vena cava.

and 8 Zig® (Numed) and 1 Palmaz® XD 29 (Cordis) stents were used. These were mounted in their own balloons with the balloon/SVC ratio =1 (Fig. H, Table). In 2 cases, the underexpanded stent was redilated at high pressure (9 atm) with the Mullins balloon (Fig. I and J).

In all cases, the obstruction was completely removed and all patients were discharged from hospital after 24 h with antiplatelet treatment for patients 1, 2, 4, and 5, and anticoagulant therapy for patient 3.

All patients have remained asymptomatic since the procedure, with a mean follow-up of 46.6 months (range, 9-120 months). After 1 year, the patency of the coated stent was confirmed by magnetic resonance imaging in patient 1 and chest computed tomography in patients 2 and 3. The pacemakers implanted in

Figure. Angiographic images of the procedure to remove the obstruction of the superior vena cava. IVC, inferior vena cava.
patients 2 and 3 were checked in the arrhythmia unit, and they were found to be working properly.

There is limited existing experience in the treatment of SVC obstruction, with an initially positive hemodynamic outcome in all patients treated by stenting and 78% of those treated by balloon angioplasty, without any long-term differences in outcome between the 2 percutaneous options.2

In patients who are also bearers of a cardiac pacing electrode, 3 strategies have been considered: simple balloon angioplasty, with the risk of restenosis due to recoil; initial withdrawal of the lead followed by removal of the obstruction by implantation of a coated or conventional stent; or placement of a new pacemaker.3,4 This last option reduces the risk of restenosis and electrode damage, but it requires a new pacemaker to be placed.

One final measure consists of implanting a stent without removing the lead, which remains trapped between the venous wall and the stent.5 With this strategy though, there is a risk of immediate pacemaker dysfunction due to the metallic scaffold, although there is now some experience on this point that shows normal function of pacemakers immediately after the procedure. However, the long-term effects arising because the electrode comes into repeated contact with the end of the stent are unknown. Cardiac motion itself could generate a point of fatigue because the lead is fixed by the stent.6 It is also difficult to remove in the event of infection or thrombosis. This last approach could be of interest in patients in whom it is impossible or very difficult to remove the lead and/or in very elderly patients or those with a short life expectancy.

Our group proposes the use of coated stents in order to avoid possible acute and chronic deterioration of the electrode, given that the coating itself could help cushion the compression of the lead until neoendothelialization has occurred.

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