

Graded balloon dilatation as a prerequisite to Amplatzer device closure of perforated interatrial septal aneurysm

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ABSTRACT This case report describes a modification in the technique of atrial septal device closure in a patient with atrial septal defect (ASD) with associated atrial septum aneurysm and significant left-to-right shunt through multiple perforations. Graded balloon dilatation of the aneurysm was performed in this patient, as a preamble to successful deployment of a single large Amplatzer atrial septal occluder, closing the ASD completely and entrapping the aneurysm as a whole.

Keywords: Amplatzer device closure, atrial septal defect, balloon dilatation, interatrial septum aneurysm
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INTRODUCTION

Amplatzer atrial septal occluder (ASO) is an accepted alternative to surgical closure for anatomically suitable ostium secundum type atrial septal defects (ASDs). A unique morphological variation of septal anatomy includes perforated aneurysm of the interatrial septum (IAS) with associated significant left-to-right shunt. Such cases present a technical challenge for the interventional cardiologist, and several of such cases reported in the literature are fraught with failures or technical difficulties entailing the use of multiple devices, residual shunts and at times, requiring surgery.^(1–4)

We describe a modification in the technique of ASD device closure in a patient, whereby graded balloon dilatation of the aneurysm was performed as a preamble to successful deployment of a single large device, closing the ASD completely and entrapping the aneurysm, thus helping to prevent future episodes of thromboembolism.

CASE REPORT

A 32-year-old woman presented with shortness of breath (New York Heart Association Class II) for the past two years. Clinical examination was consistent with ASD, with significant left-to-right shunt. A transoesophageal echocardiogram (TOE) confirmed a large IAS aneurysm with multiple perforations and significant L-R flow (Fig. 1). The maximum dimension of the defect, including the entire aneurysmal segment from strong rim to strong rim of IAS, was about 21 mm.

The patient underwent transcatheter device closure. Repeated attempts to size the defect with the sizing balloon demonstrated a tight waist in the sizing balloon with persistent L-R flow on echocardiographic examination (Fig. 2). This confirmed that the wire passed through one of the small perforations within the aneurysmal segment. Attempts were made to re-cross the defect through a different hole, so that a larger hole could be accessed. However, most individual defects were quite

small relative to the amount of left-to-right shunt seen on echocardiogram. We felt that sizing the device on the basis of these holes would undersize the device, while deploying a larger device through any of the holes could lead to under-deployment and instability of the device.

We decided to improvise and planned to balloon dilate one of the smaller perforations, thus stretching/tearing the aneurysm and then attempt to fit an adequately sized device across the segment, including the entire segment of the aneurysmal part of the IAS from strong rim to strong rim. Graded balloon dilatations of the perforated septum were done using 8-mm, 12-mm, 18-mm and 23-mm balloons (NuMed Inc and Tyshak, ON, Canada), which finally achieved a near actual size of the aneurysm (Figs. 3a–d). The fenestrations responded to low dilation pressures of 2–3 atmospheres. A final balloon sizing using the AGA sizing balloon catheter confirmed a stop flow diameter of 22 mm, following which a 24 mm ASO was successfully deployed, with complete abolition of the shunt.

DISCUSSION

Various anatomic variations of the IAS can influence decisions when percutaneous device closure is planned. The presence of multiple perforations in the fossa ovalis area of the IAS along with a septal aneurysm is seen in about 8% of cases, and it represents a unique technical challenge.⁽¹⁾ In such cases, it is not only imperative to achieve complete closure of the defect, but also important to ensure that both the left and right atrial discs of the selected device should be larger than the maximal diameter of the aneurysm (strong rim to strong rim) in order to ensure stability. This also enables entrapment of the aneurysm within the device, reducing the chances of potential thromboembolism from within the aneurysm.

In our case, multiple attempts to balloon size the defect revealed tight waisting of the sizing balloon, indicating that it

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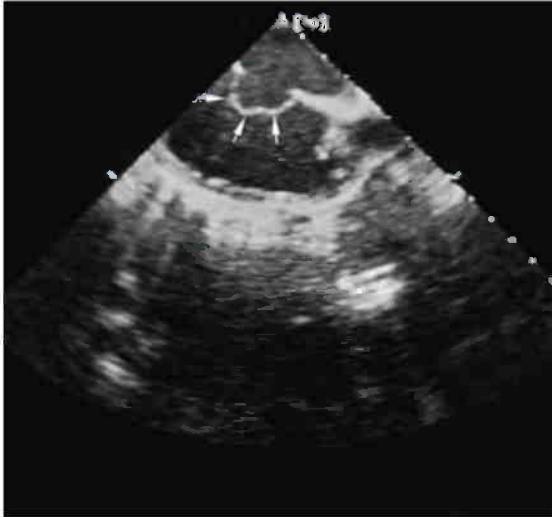


Fig. 1 Transoesophageal echocardiogram shows interatrial septum aneurysm with multiple perforations.



Fig. 2 Amplatzer sizing balloon across one of the perforations in the interatrial septum shows a tight waist.

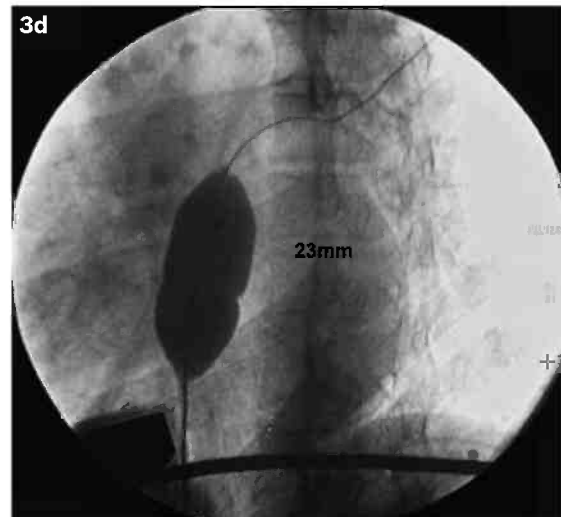
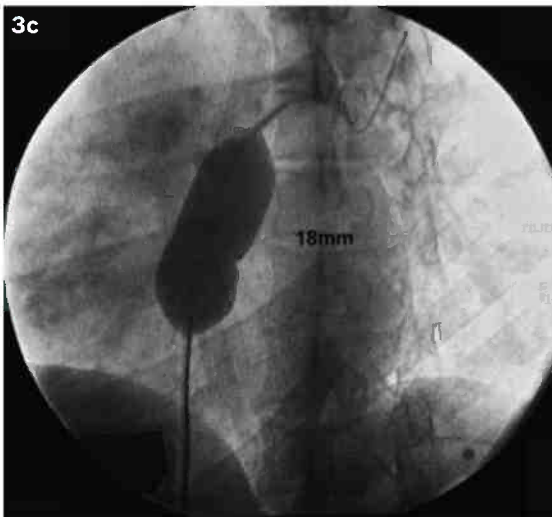
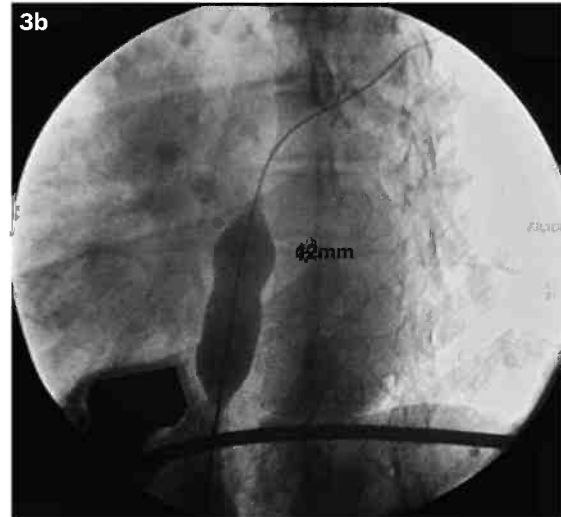
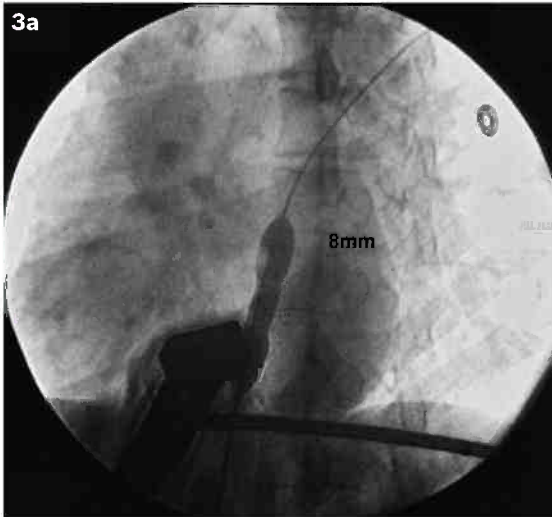


Fig. 3 Graded balloon dilatation across the interatrial septum using (a) 8 mm, (b) 12 mm, (c) 18 mm and (d) 23 mm balloons.

was across one of the small perforations. Previous reports in the literature have advocated either the use of multiple devices with their own technical challenges/difficulties,⁽³⁾ or a single large device that is often underdeployed.⁽⁴⁾ However, both these techniques are not uncommonly associated with residual shunts.^(1,2) The largest

series on perforated atrial aneurysms suggests that atrial septal aneurysms with more than two perforations should be sent for elective surgical closure.⁽⁴⁾

We decided to perform graded balloon dilatations of one of the perforations using a regular angioplasty balloon so as to

truly tear the hole in the aneurysmal part of the IAS, followed by a final balloon sizing and deployment of an optimum sized device, an attempt that, to the best of our knowledge, has not yet been made. Previous reports have suggested dilatation of the IAS as a preamble, but have used the sizing balloon itself.⁽¹⁾ However, we feel that the sizing balloon may not have the strength to truly dilate or tear the aneurysmal IAS, as evident by the tight waisting observed, which was followed by a melon-seed effect on further pushing of the contrast, with no true dilatation or tearing of the aneurysm noted.

Since the maximum diameter of the IAS aneurysm on TOE was 21 mm, we wanted the device to be at least 1–2 mm larger than this so as to achieve complete entrapment of the aneurysm within the discs and stable disc positions post deployment. This was successfully achieved with the 24-mm device with complete closure and no residual shunt. This case illustrates that

transcatheter closure of perforated IAS aneurysms can be done more predictably with elective graded balloon dilation of the IAS as a prerequisite, followed by optimum-sized device deployment.

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