



## **FEASIBILITY, SAFETY AND CHOICE OF DEVICE FOR TRANSCATHETER CLOSURE OF GERBODE DEFECT: FOUR CASES AND A BRIEF REVIEW OF LITERATURE**

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### **Introduction:**

Gerbode defect is a rare anomaly where there is a communication between the left ventricle (LV) and the right atrium (RA) through a defect in the ventricular septum. This anomaly accounts for 0.08% of intracardiac shunts and <1% of all cardiac defects. Historically, treated exclusively by open heart surgery, but now a day transcatheter closure of such defects by different devices are described. However, device closure is restricted to closure of small sized direct (Type-1) defects. We report, first time in world literature of two intermediate ( type III) defect closure by single device along with two direct defect closure and provide a brief review of literature about feasibility and safety and choice of device of such procedure.



**Table 1**- showing demographic data, size and type of defects and device used.

	Case 1	Case2	Case3	Case 4
Age	8yrs	5 years	11 months	10 years
Weight (Kg)	18	11	8	25
Type of defect	Intermediate (type III)	Direct (type I)	Intermediate (type III)	Direct (Type I)
Size of defect	9mm	4.5mm	9-10mm	5.5mm
Crossing	Aorta	Aorta	Venous	Aorta
A-V loop	Yes	No	No	No
Sheath	7F PDA delivery system (Amplazer)	5F Guiding JR	7F Mullin	6F guiding JR
Approach	Anti-grade	Reto-grade	Anti-grade	retrograde
Device	12/10 ADO I	5/4 ADO II	10/8 MFO	6/4 ADO II

**Table 2** ; Comparison of different devices

	ADO I	ADO II	MUSCULAR	MFO
Profile	High	Low	High	Medium
Disk	Single	Double	Double	Double
Retention skirt in RA side( 10 size device)	No	Size not available	18mm	14mm
Lobe of device		Trilobed		Bilobed
Approach	Only from venous side.	Both	Both	Both



### **Case 1:**

An 8-year-old girl evaluated for recurrent chest infection, poor growth. Clinically, there was cardiomegaly and loud pan systolic murmur and echocardiography revealed intermediate type Gerbode defect with two jets of left to right shunts above and below the septal leaflet of TV [Figure 1]. Angiography detected intermediate Gerbode defect measuring 7 mm at left anterior oblique view with cranial tilt [Figure 2]. After crossing the defect with angulated Glide wire an arterio venous loop was made by snaring out the wire from the femoral venous end (AO- LV- RA- IVC) . A 12/10 mm Amplatzer Duct Occluder (AGA Medical Corporation, Golden Valley, MN, USA) was deployed in the same technique as that for perimembranous VSD device closure. A meticulous assessment of the device was made by echocardiogram and LV angiogram after deployment. The device was placed in such a way that both the direct and indirect shunts were closed by its retention skirts [Figures 3 and 4].

### **Case 2**

An 11-month-old infant was referred for frequent chest infections and poor weight gain. Clinical examination and echocardiogram revealed an intermediate Gerbode defect with shunt both above and below the attachment of septal leaflet of the tricuspid valve measuring 8 mm. after angiogram defect was crossed from the RV side by 0.035" X 260 cm angulated glide wire. The wire passed from inferior vena cava to RA to LV and up through the ascending aorta and parked in the left subclavian artery. A 7F Mullin's delivery sheath was taken over the wire and parked into the LV facing its apex. A Multifunctional occluder size 10/8 mm (Lifetech scientific corporation, Shenzhen, PRC) was placed across the defect in such a way that its conical portion remained across the defect while the two discs on either side held the device securely in place [Figure 6]. Device was released following assessment by trans thoracic echocardiography. The patient remained in sinus rhythm during and after the procedure.

### **Case 3**

A 5-year-old boy weighing 13 kg was referred for cardiac murmur. A pan systolic murmur was appreciated and echocardiography revealed a gap in the atrioventricular septum above the septal leaflet of the TV allowing shunting from LV to RA. A direct Gerbode defect was diagnosed which measured 4.5 mm. After LV angiogram, the defect was crossed with 5F JR and 0.032" X 260 cm angled tip glide wire from the aortic side. The wire was kept within the RA (AO LV RA) and a 5F guiding JR was exchanged over it from retrograde approach from aortic side. A5/4 ADOII (AGA Medical Corporation, Golden Valley, MN, USA) device was deployed across the defect such a way that one disc remained in LV side and other one on RA side and closed the defect successfully.



#### **Case 4**

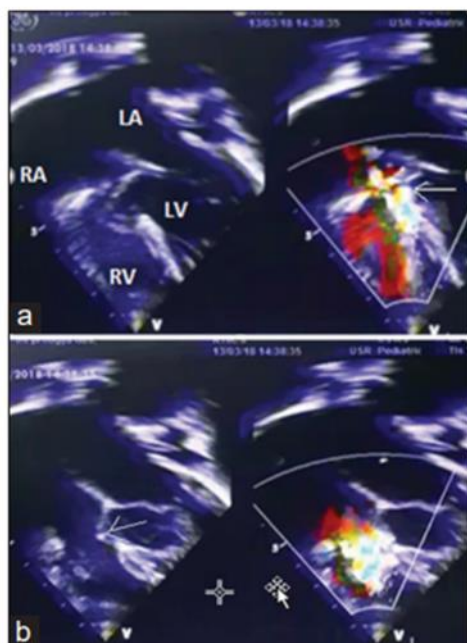
A 10 years old known case of VSD. Clinical examination and echocardiogram revealed a direct Gerbode defect measuring 5.5 mm. As similar to the previous case after crossing the defect from aorta defect was successfully closed by a 6/4 ADOII device by retrograde approach.

#### **Discussion:**

Gerbode defect is rare congenital abnormality traditionally treated by surgery but has got significant risk of complete heart block (CHB). Reports are available for transcatheter closure of acquired type. Only very few reports are available regarding closure of congenital form. Various devices which have been used are duct occluders (ADOI and II), muscular VSD occluder, Nit-occlud coil, vascular plug, Ampatzer septal occluder, etc. [9,10].

#### **Conclusion:**

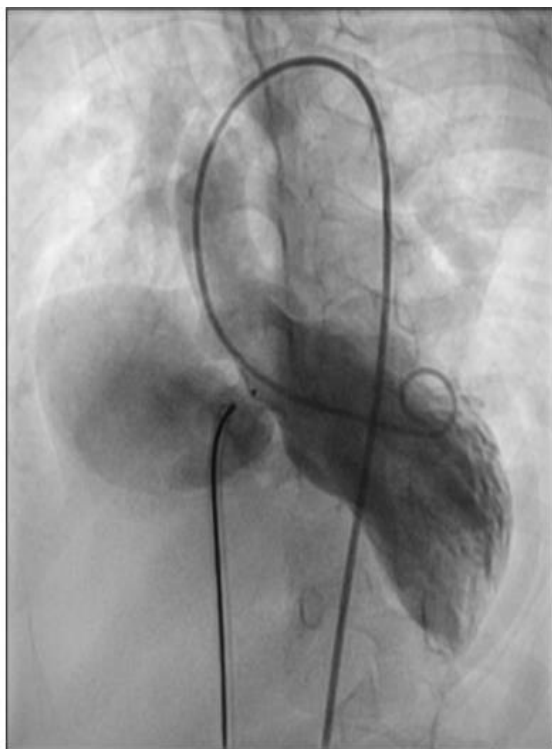
Transcatheter device closure of congenital Gerbode defect is a feasible option. It is well established for direct defects which are relatively small in size. Here, we report the closure of even relatively larger intermediate (type III) defects percutaneously by a single large device with high success rate and very few complications.



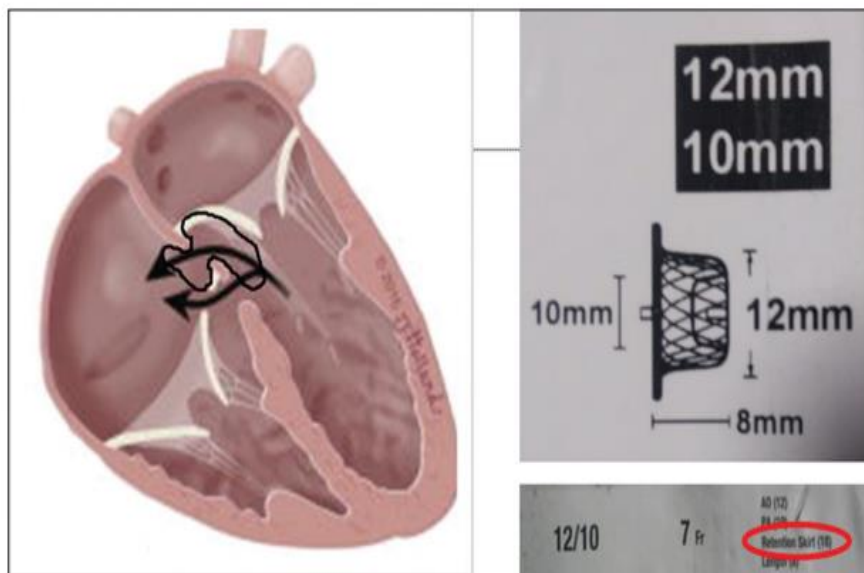
**Figure 1:** Color Doppler flow of a 4-chamber view showing systolic flow in to right atrium from the left ventricle (a) directly from the left ventricle to right atrium above the tricuspid valve (b) through the perimembranous ventricular septal defect through right ventricle below the tricuspid valve. A diagnosis of Type III Gerbode Defect (combination of direct and indirect) was made



**Figure 2:** Left ventricle angiogram confirmed the Gerbode defect of intermediate type



**Figure 3:** Defect was closed with 12/10 mm Amplatzer Duct Occlude-I, angiography showing large intra-device shunt



**Figure 4:** Cartoon showing how single device completely occluding intermediate Garbode defect