

# PERCUTANEOUS CLOSURE OF SECUNDUM ASD BENI-SUEF EXPERIENCE

By

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## BENI-SUEF EXPERIENCE

Widest part of the Nile river

Meidum Pyramid

Sheikh Taha Al-Fashny

Sheikh Al-Boseiry

Prof. Mohsen Ibrahim

**BENI-SUEF**

Prof. Mohamad El-Guindy

BENI-SUEF UNIVERSITY

**BENI-SUEF**

Beni-Suef University  
RANKED =1<sup>st</sup>  
IN EGYPT



# BENI-SUEF EXPERIENCE



# EXPERIENCE

*noun*

practical contact with and  
observation of facts or  
events.

**2003** Hemodynamic studies, BPV, PDA coils

**2010** Coarctation Stenting

**2012** ASD, PDA & muscular VSD  
percutaneous device closure

**2013** The 1<sup>st</sup> TAVR in an Egyptian University

**2015** Perimembranous VSD coil closure

**EXPERIENCE**

**PERCUTANEOUS ASD DEVICE CLOSURE**

## DEVICES



The Amplatzer Septal Occluder



The Occlutech Septal Occluder



The Hyperion ASDO

## PATIENTS & METHODS

## PATIENTS & METHODS, INCLUSION CRITERIA

- Secundum ASD  $\geq 5$  mm in diameter with a distance of  $\geq 5$  mm from the margins of the ASD to most ( $\geq 4/6$ ) of the important surrounding structures as measured by echocardiography plus at least one of the followings:
  1. Presence of symptoms such as exercise intolerance, shortness of breath, heart failure or atrial arrhythmias;
  2. Pulmonary-to-systemic flow ratio ( $Q_p:Q_s$ )  $> 1.5:1$ ;
  3. Evidence of RV or RA dilatation on echocardiogram;
  4. Presence of paradoxical embolism (regardless of the size of the defect).

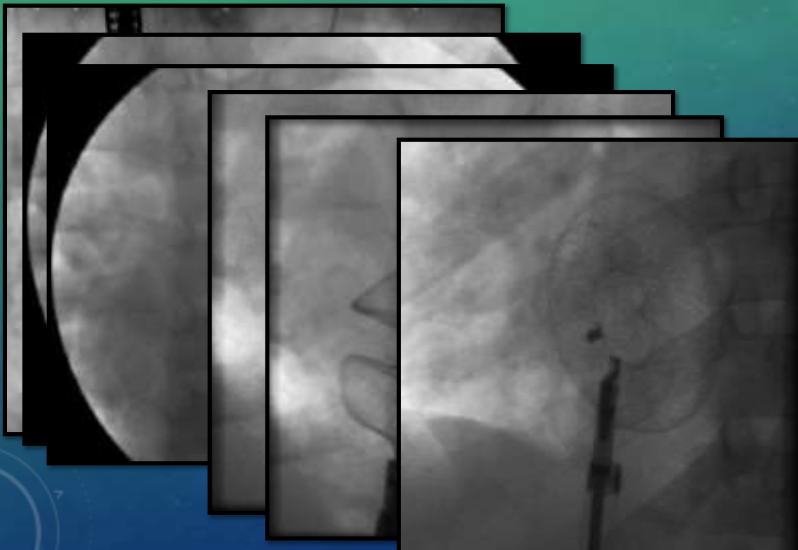
## PATIENTS & METHODS, EXCLUSION CRITERIA

1. Presence of other cardiac deformities which would require surgical correction;
2. Defect size  $> 40$  mm;
3. Deficient rims of tissue from the defect to more than two important surrounding structures (patients with deficient or absent retroaortic rims were not excluded);
4. Multiple defects that could not be adequately covered by device(s);
5. Severe irreversible pulmonary HTN and no evidence of left to right shunt;
6. Reversal right-to-left shunt at the atrial level;

## PATIENTS & METHODS, EXCLUSION CRITERIA (CONTD.)

7. Presence of intracardiac thrombi;
8. More than moderate degree of mitral regurgitation.
9. Documented allergy to aspirin &/or clopidogrel;
10. Thrombocytopenia with a platelet count  $< 100,000$  cells/mm<sup>3</sup>,
11. Sepsis;
12. Any type of serious infection  $<$ one month before the procedure.

## IMPLANTATION PROCEDURE



## POST-IMPLANTATION CARE & FOLLOWUP

- Chest radiograph (PA view).
- TTE before discharge, at 1, 3 & 6 months post-procedure then every year.
- Aspirin 2-5 mg/Kg orally per day for 6 month.
- Clopidogrel for device size > 30 mm for 6 months unless contraindicated.

## ENDPOINTS

### Primary Endpoint

Effectiveness (closure success) defined as ASD closure with no or  $\leq 2$  mm residual shunt without the need for surgical repair (time frame: 6 months)

### Secondary Endpoints

Hemodynamic effects (RV, LV, LA sizes & PASP by TTE).  
 Procedure-related major complications  
 Procedure-related minor complications

### Definition of Safety:

Absence of major adverse events directly related to the device, procedure and/or antiplatelet medical therapy.



## RESULTS

### BASELINE PATIENT DEMOGRAPHIC, CLINICAL AND ECHOCARDIOGRAPHIC DATA

	n (%)	Mean ± SD	Median	Range
Age (years)		14.2 ± 14.6	7.8	8 m to 59 years
Male (n, %)	44 (40%)			
Dilated right side	111 (100%)			
Sinus rhythm (n, %)	111 (100%)			
PASP > 35 mmHg	57 (51%)			
Deficient or absent retroaortic rim	30 (27%)			
ASA	5 (4.5%)			
MVP (n, %)	6 (5.4%)			
VSD (n, %)	1 (0.9%)			
More than mild PS	1 (0.9%)			
CVA prior to enrollment	1 (0.9%)			
Down Syndrome	1 (0.9%)			
Holt-Oram Syndrome	1 (0.9%)			
Meningocele	1 (0.9%)			

## BASELINE PATIENT ECHOCARDIOGRAPHIC MEASUREMENTS

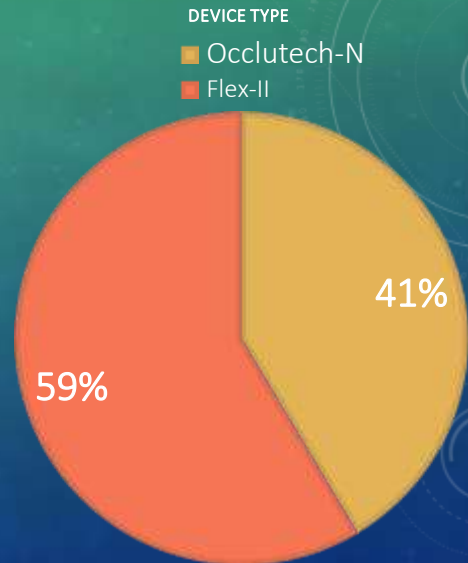
	Mean ± SD	Median	Minimum	Maximum
ASD size (mm)	16.8±7.3	16.5	5.0	38
LA (mm)	24.1±6.6	23	9.5	42.2
LVED (mm)	33.5±7.8	33	17.5	51
PASP (mmHg)	34.5±9.3	35	15	57
Tricuspid annulus (mm)	35.2±8.5	34	16.8	52.2
RV mid cavity (mm)	29.7±7.9	28	13.2	49.4
RV length (mm)	50.6±13.3	47	26.4	79
Pulmonary annulus (mm)	19.5±5.9	19	8.5	37
SVC rim (mm)	13.8±5.2	13	5.9	36
IVC rim (mm)	14.1±5.7	12.7	6	32
Retroaortic rim (mm)	5.9±2.2	5.5	0	16.6
Posteroinferior rim (mm)	11±3.9	11	4	25
AV valve rim (mm)	11.3±4	10.4	4.2	23
Posterosuperior rim (mm)	10.6±3.5	10	4.3	21

## PREDICTORS OF ELEVATED PASP > 35 MMHG

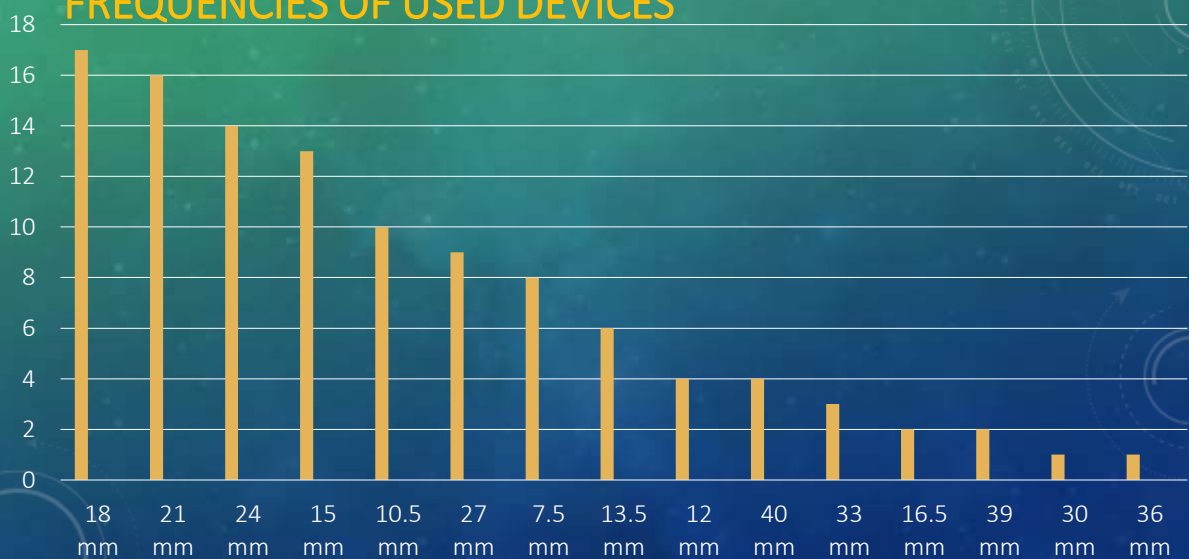
Factor	PHTN	N	Mean	Std. Deviation	P value
Age	1.00	57	16.028	15.2955	.192
	.00	54	12.408	13.6780	
ASD size (mm)	1.00	57	19.221	7.5894	.001
	.00	54	14.583	6.8084	
LA size (mm)	1.00	57	25.011	7.4459	.226
	.00	54	23.467	5.7384	
LVED (mm)	1.00	57	33.958	8.2600	.547
	.00	54	33.057	7.3948	
Tricuspid annulus (mm)	1.00	57	36.454	9.0160	.157
	.00	54	34.141	8.0451	
RV dimension in mid cavity (mm)	1.00	57	30.830	8.3190	.150
	.00	54	28.656	7.4462	
RV length (mm)	1.00	57	54.102	13.6806	.006
	.00	54	47.313	11.7991	
PA annulus (mm)	1.00	57	20.070	6.4395	.358
	.00	54	19.037	5.2430	
SVC rim (mm)	1.00	56	13.471	5.1192	.543
	.00	54	14.076	5.2688	
IVC rim (mm)	1.00	56	14.302	6.4031	.701
	.00	54	13.883	4.8587	
Retro-aortic rim (mm)	1.00	56	5.582	2.3214	.167
	.00	54	6.154	1.9653	
Postero-inferior rim (mm)	1.00	56	11.059	4.2855	.877
	.00	54	10.943	3.5272	
AV rim (mm)	1.00	56	11.230	3.7422	.753
	.00	54	11.472	4.2830	
Postero-superior rim (mm)	1.00	56	10.287	3.7404	.405
	.00	54	10.852	3.3153	

## TYPES OF USED OCCLUTECH DEVICES

- Size ranges from 7.5 mm to 40 mm
- Mean size =  $19.4 \pm 8$  mm (larger by mean ASD diameter by 2.6 mm)



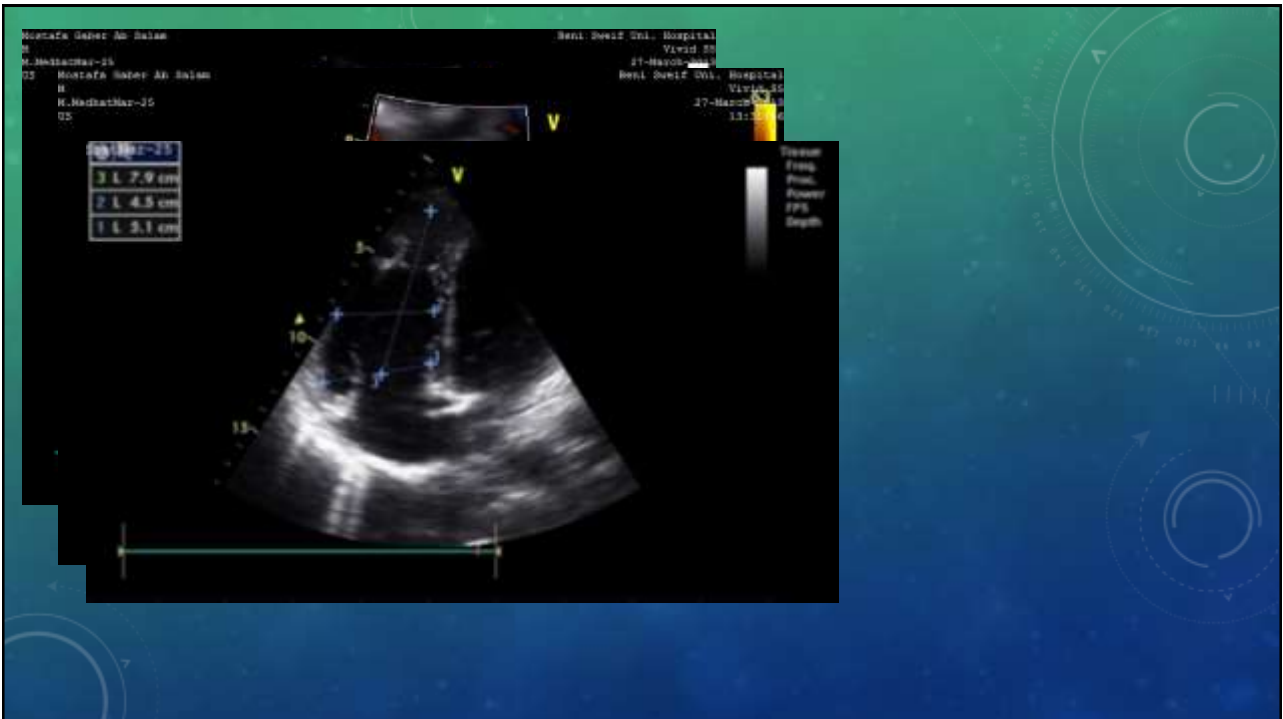
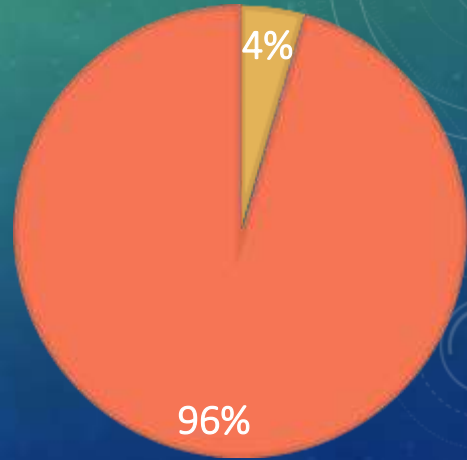
## FREQUENCIES OF USED DEVICES



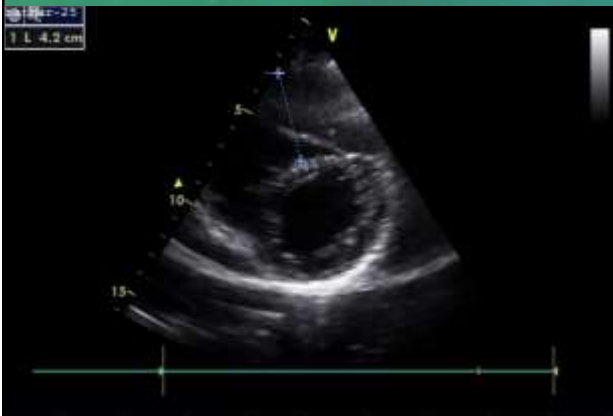
# PROCEDURAL OUTCOME

## PROCEDURAL OUTCOME

- Failure
- Success



Pre



Post



## CHARACTERISTICS PATIENTS WITH CLOSURE FAILURE

	Sex	Age	ASD size	SVC rim	IVC rim	Retro-aortic	Postero-inferior	Postero-superior	AV rim	Device size	Details
1	M	10	18	12	7	5	9	5	8	18	Device embolization to PA
2	M	3	22	13	6	5	6	7	6	24	Device embolization to RV
3	F	24	38	9	11	7.8	9.6	13.2	14	40	Device embolization to PA
4	F	13	12	20	11	6	13	11	12	15	Moderate residual shunt (4 mm)
5	F	29	10	18	11	7	12	10	10	15	Large residual shunt (6 mm)

## PREDICTORS OF SUCCESS

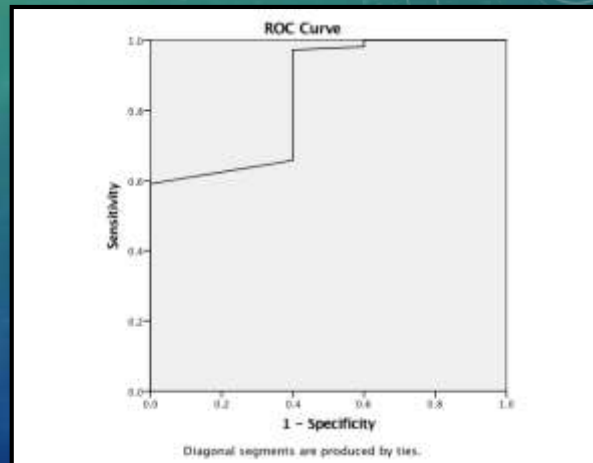
Factor	Closure success	N	Mean	Std. Deviation	P value
Age	No	5	11.3	11.0	.781
	Yes	106	14.4	14.8	
ASD size (mm)	No	5	16.4	4.3	.972
	Yes	106	17.0	7.7	
LA size (mm)	No	5	24.2	9.5	.949
	Yes	106	24.3	6.6	
LVED (mm)	No	5	29.8	8.6	.296
	Yes	106	33.7	7.8	
Tricuspid annulus (mm)	No	5	37.7	12.8	.413
	Yes	106	35.2	8.4	
RV dimension in mid cavity (mm)	No	5	31.0	10.4	.513
	Yes	106	29.7	7.9	
RV length (mm)	No	5	51.1	14.8	.876
	Yes	106	50.8	13.2	
PA annulus (mm)	No	5	16.3	6.1	.261
	Yes	106	19.7	5.9	
SVC rim (mm)	No	5	12.8	4.3	.672
	Yes	106	13.8	5.2	

## PREDICTORS OF SUCCESS

Factor	Closure success	N	Mean	Std. Deviation	P value
IVC rim (mm)	No	5	8.2	2.6	.009
	Yes	106	14.4	5.6	
Retro-aortic rim (mm)	No	5	5.1	1.0	.390
	Yes	106	5.9	2.2	
Postero-inferior rim (mm)	No	5	9.1	3.9	.318
	Yes	106	11.1	3.9	
AV rim (mm)	No	5	9.1	2.4	.241
	Yes	106	11.5	4.0	
Postero-superior rim (mm)	No	5	7.5	3.0	.052
	Yes	106	10.7	3.5	
PASP	No	5	34.8	1.6	.602
	Yes	106	34.6	9.7	
Device size	No	5	18.6	3.9	.989
	Yes	106	19.4	8.2	
Device type	Occlutech	No	2		.947
		Yes	44		
	Flex-ii	No	3		
		Yes	62		
Sex	Male	No	2		.987
		Yes	42		
	Female	No	3		
		Yes	64		

## IVC RIM AS A PREDICTOR OF PROCEDURAL SUCCESS

- An IVC rim of **7.2 mm** or larger is 97.1% sensitive and only 60% specific for closure success, while an IVC rim of **11.2 mm** or larger is 59% sensitive and 100 % specific for procedural success



## HEMODYNAMIC CONSEQUENCES

	Before procedure	1 month	3 months	6 months	P-value
Tricuspid annulus (mm)	35.2±8.5	33.1±8.2	30.8±7.8	29±7.4	<0.001
RV mid (mm)	29.7±7.9	27±7.4	24.7±7.3	22.7±6.6	<0.001
RV length (mm)	50.8±13.1	48.3±12.8	45.2±12.3	42.8±11.4	<0.001
Pulmonary annulus (mm)	19.7±5.9	19.2±5.7	18.4±5.5	17.9±5.1	<0.001
PASP (mmHg)	35.6±9.4	31±6.9	28.3±5.4	26.3±5.1	<0.001
LA (mm)	24.3±6.6	25.1±6.2	26.6±6	28±6.2	<0.001
LVED	33.7±7.8	35.7±8	38±7.9	40.3±8.2	<0.001

## CONCLUSION

## CONCLUSION

- Transcatheter closure of secundum ASDs is safe, and effective in children, adolescents, and adults. The device performed well in a wide range of anatomical scenarios resulting in excellent short-term outcomes.



## CONCLUSION

- Sufficient IVC rim is the most important factor in predicting successful closure. An IVC rim  $\geq 7.2$  mm is 97.1% sensitive, while an IVC rim  $\geq 11.2$  mm is 100% specific for closure success.
- Elevated pulmonary artery pressure values are associated with larger atrial septal defects.

## CONCLUSION

- Transcatheter closure of ASD is associated with improvement of pulmonary arterial hypertension and regression of right ventricular size and increase in left atrial & ventricular sizes.
- Much larger number of patients and longer follow-up are needed to evaluate for the risk of erosion.

Dreaming to see you at

# CardioSuef 2020