

# INTEREST OF 3D ECHOCARDIOGRAPHY FOR THE ASSESSMENT OF BICUSPID AORTIC VALVE IN CHILDREN



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## BACKGROUND

- Bicuspid aortic valves (BAV) is the most common congenital heart malformation (incidence = 0.4 - 2.25%).
- Accelerated aortic dilatation (Fig. 1) or infective endocarditis may lead to aortic valve surgery
- 3D echocardiography seems to be useful to accurately depict the morphology of the aortic valves <sup>1,2</sup>
- According to Sievers, BAV was classified using both the presence and the position of raphe <sup>3</sup>
- Prognosis closely depends on the type of BAV <sup>3,4</sup>

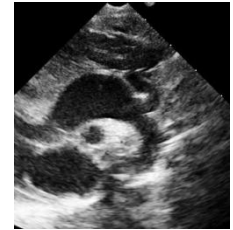


Figure 1. Dilatation of the ascending aorta due to a stenotic bicuspid aortic valve

**OBJECTIVE:** To assess the usefulness of 3DE in order to depict BAV according to the Sievers classification

## PATIENTS AND METHODS

- Inclusion criteria: BAV suspicion on 2DE < 18 years
- Exclusion criteria: Surgery or catheterism already performed
- Material: IE 33 (Philips) with X 3-1 and X 7-2 probes (Fig. 2); QLab software  
=> 2D + 3D X-plane (Fig.3) + 3D live acquisitions



Figure 2. X 3-1 (left) and X 7-2 (right) probes used for the 3D analysis of BAV

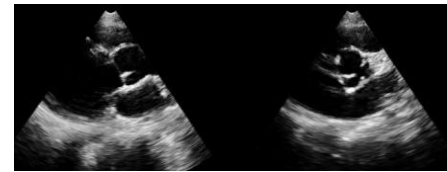


Figure 3. X-Plane 3DE allowing a visualization of BAV in two dependent cross-sectional views

## RESULTS

- 72 consecutive children included

Mean age : 6.3 years ± 5.5 [0-17.8] (Fig.4)  
Mean weight : 21.8 kg ± 16.8 [2.8-74.2]  
Sex ratio : 1.88 (47 males/25 females)

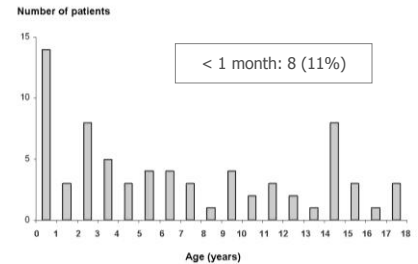
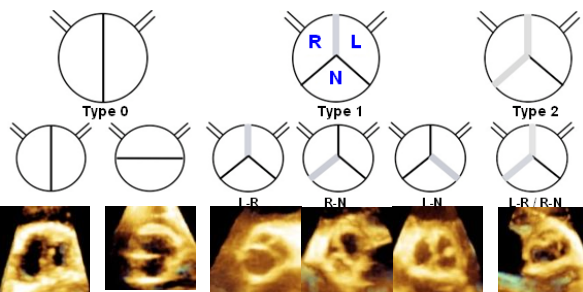


Figure 4. Age repartition

### BAV classification according to the 3 echocardiographic modes



	Type 0	Type 1	Type 2	n=70			
2DE	14%(10)	25%(18)	38%(27)	15%(11)	0%(0)	6%(4)	n=70
3D XP	6%(4)	20%(13)	39%(25)	22%(14)	1%(1)	11%(7)	n=64
3D live	4%(3)	12%(8)	47%(30)	20%(13)	5%(3)	11%(7)	n=64

- Feasibility of 3DE = 100%

- Excellent interobserver concordance

#### INTEROBSERVER VARIABILITY

2DE	52.9% (K=0.35)
3D XP	77.8% (K=0.69)
3D live	94.4% (K=0.93)

- Concordance 2DE/3DE

2D vs 3D X-Plane: K = 0.72  
2D vs 3D live: K = 0.57  
3D X-Plane vs 3D live: K = 0.85

- ⇒ 8 aortic valves were falsely diagnosed as BAV by 2DE
- ⇒ 22 BAV ( 34.4%) were « reclassified » using 3DE

## DISCUSSION

- 3DE is a feasible and reproducible method
- In comparison to 2DE, 3DE provides an improvement for the diagnostic of BAV
- 3DE contributes to a better morphologic description of the aortic valve  
⇒ This technique should allow a better assessment of the BAV prognosis

## References

1. Espinola-Zavaleta et al. J Am Soc Echocardiogr 2003
2. Singh et al. Echocardiography 2009
3. Sievers et al. J Thorac Cardiovasc Surg 2007
4. Fernandes et al. J Am Coll Cardiol 2007