

EP08.07 Clinician vs AI prenatal prediction of the need for balloon atrial septostomy in transposition of the great arteries: the multicentre CAIFE study data

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Introduction

Transposition of the great arteries with an intact interventricular septum (simple TGA) is a common cyanotic heart defect. In some fetuses, simple TGA is associated with a restriction of the foramen ovale (FO), which can result in hemodynamic compromise and potential perinatal complications. When FO restriction occurs, an urgent balloon atrial septostomy (BAS) is necessary within the first few hours after delivery (*Figure 1*). However, predicting fetal FO restriction through clinical ultrasound remains challenging.

Methods

Artificial Intelligence (AI) BAS prediction models were trained and validated in 50 fetuses with simple TGA (mean gestational age 34±2 weeks) with known neonatal outcomes (30 requiring BAS and 20 not). A total of 757 B-mode and Colour Doppler video clips were analysed across 4 echocardiographic views. The AI model was trained directly from videos. Two AI models were compared: 1. using only B-mode ultrasound images; 2. using B-mode and Colour Doppler images. BAS prediction was compared between clinicians and AI.

Results

- The B-mode BAS prediction model demonstrated a sensitivity of 63%, specificity of 50%, accuracy of 58%, and an area under the curve (AUC) of 0.55.
- In comparison, the B-mode and Colour Doppler model had a sensitivity of 53%, specificity of 55%, accuracy of 54%, and an AUC of 0.53.
- Conversely, the predictions made by clinicians showed a sensitivity of 27%, specificity of 100%, accuracy of 56%, and an AUC of 0.63.
- Overall, the AI models exhibited higher sensitivity but lower specificity; the clinical AUC was slightly higher (*Figure 2*).

Conclusions

- Our findings have demonstrated that AI-based predictions are possible and effective in identifying fetuses with simple TGA who need urgent BAS after birth.
- Given this principle, we expect improvements in predicting postnatal outcomes for CHD by utilising a larger dataset of specific fetal CHD.

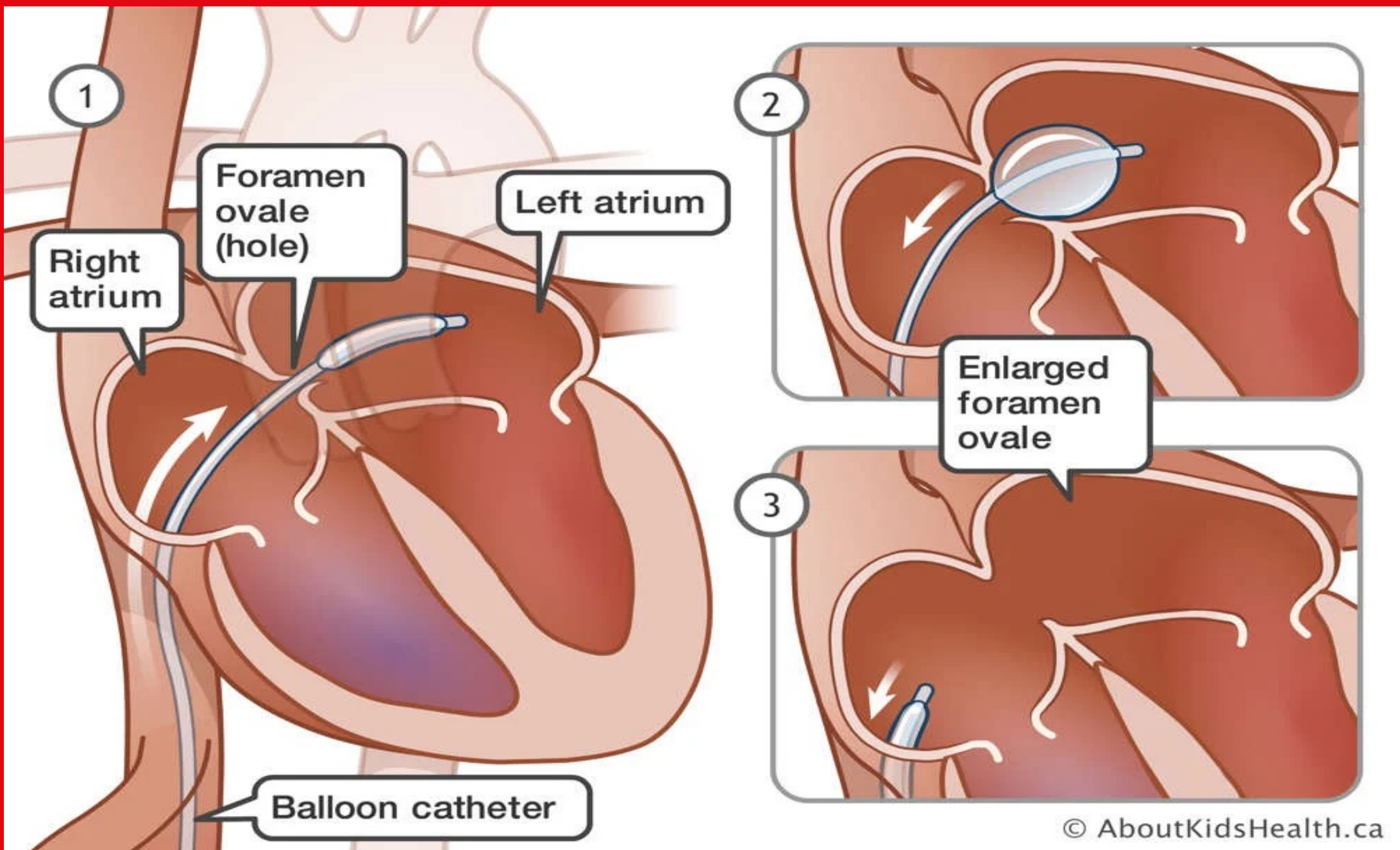


Figure 1. Balloon atrial septostomy (BAS) procedure

The B-mode AI model:	The B-mode and Colour Doppler AI model:	Clinician's prediction:
<u>Sensitivity 63%</u> <u>Specificity 50%</u> AUC 0.55	<u>Sensitivity 53%</u> <u>Specificity 55%</u> AUC 0.53	<u>Sensitivity 27%</u> <u>Specificity 100%</u> AUC of 0.63

Figure 2. Results of BAS prediction by clinician vs AI

Fundings:



1. Innovation and Technology Commission of Hong Kong, Centre for Cerebro-cardiovascular Health Engineering, Hong Kong

2. Oxford Biomedical Research Centre, Oxford, UK

3. European Research Council (ERC)