

Helping Mothers to Better Understand Their Child's Fetal Cardiac Anomaly with 3D printing

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1. Fetal Ultrasound

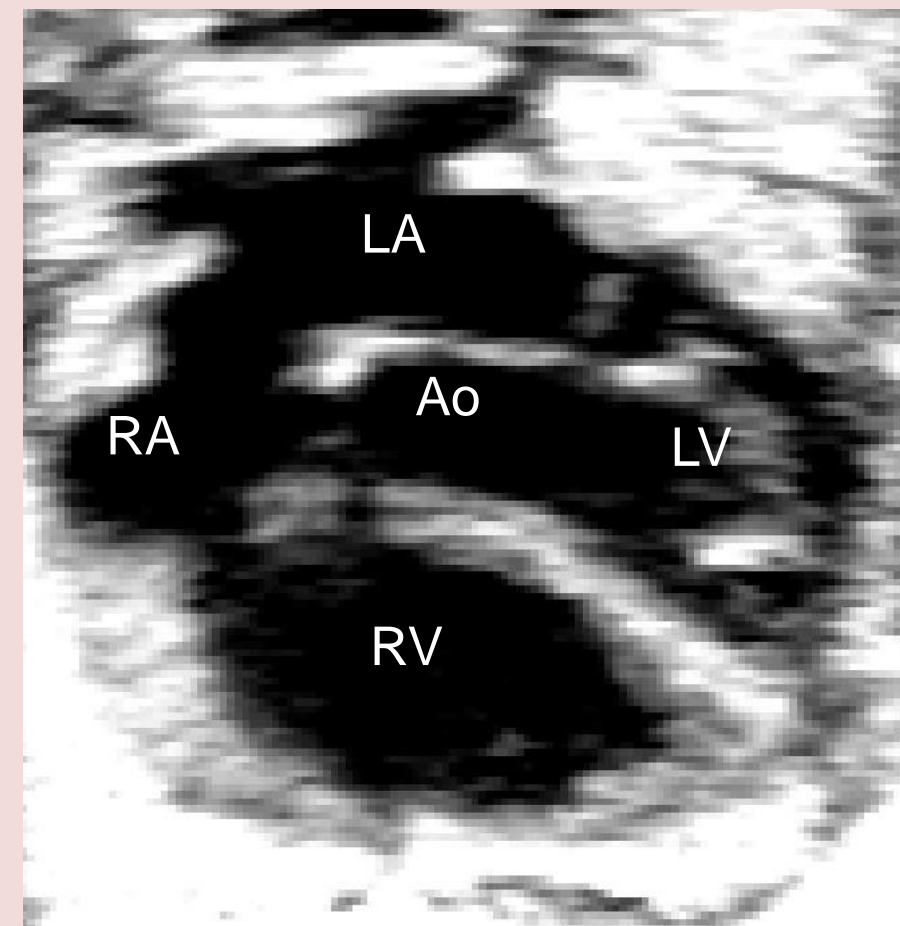


Figure 2. Fetal echocardiogram of the heart.

2. Segment Geometry

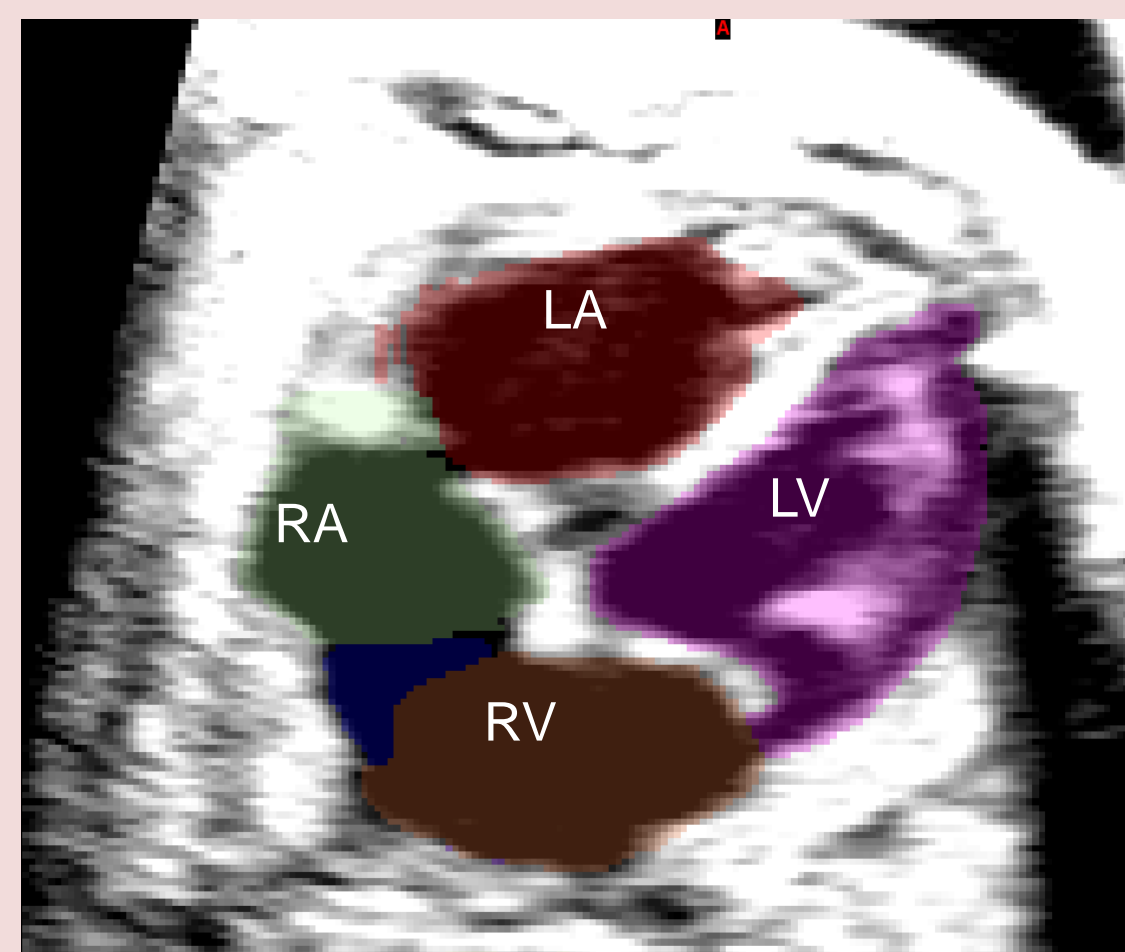


Figure 3. Segment the heart geometry in Mimics (Materialise)

3. Virtual Model

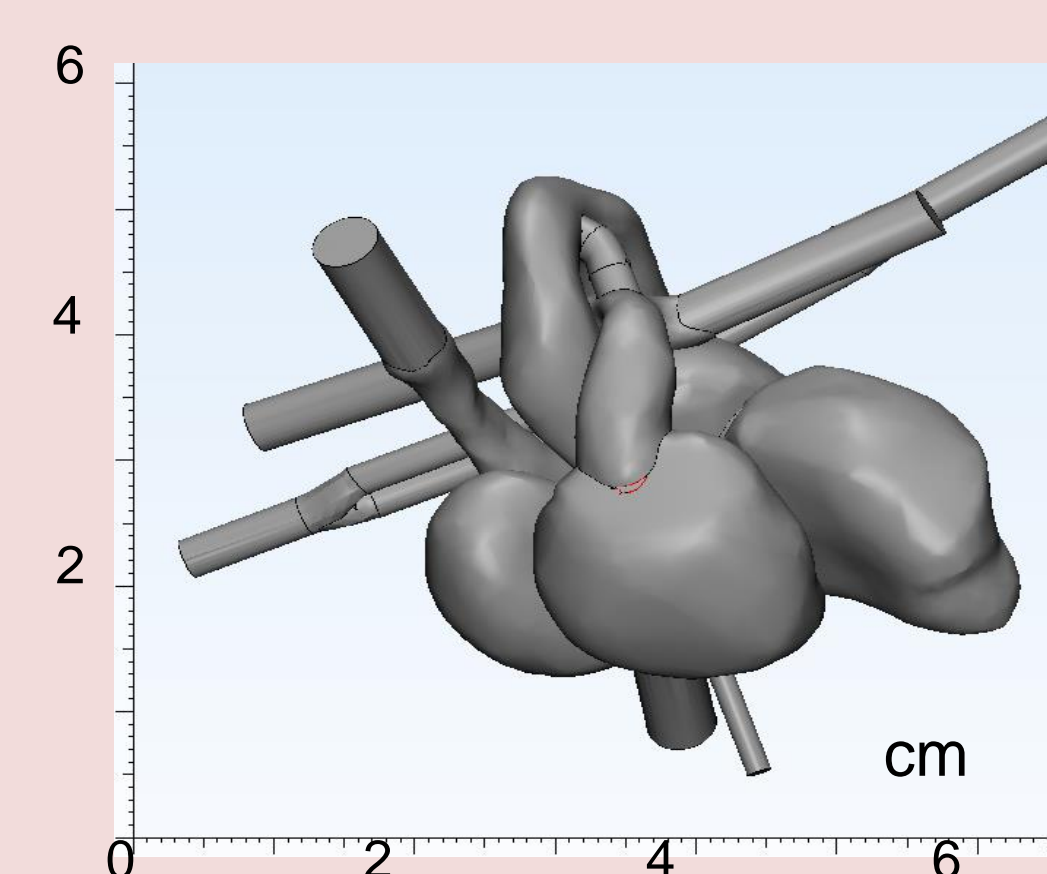


Figure 4. The 3D geometry is imported into 3-Matic for post-processing and smoothing. Measurement checks are made with literature.

4. 3D-Printed Heart Model

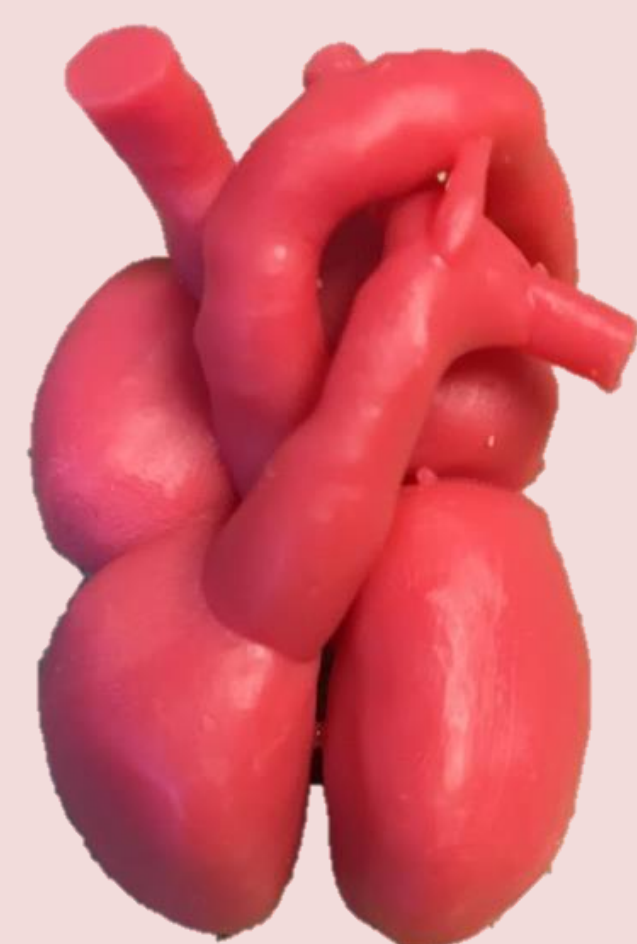


Figure 5. The real-size 3D printed model is made out of a photopolymer resin (Form2, FormLabs).

How it's made¹

What are we doing with it?

Giving mothers 3D-printed fetal hearts at the appropriate gestational age



1

Provide Mothers a survey

Patient Group Education Assessment

1. What is your child's heart defect called?
2. Why does your child's heart need a surgery?
3. What does the surgery do?
4. How is the surgery done?
5. What changes can you expect to see in your child after the surgery?

Patient-Specific 3D printed models ...	Disagree		Neutral		Agree
6. ...provides information I need.	1	2	3	4	5
7. ...helped me to understand my child's CHD	1	2	3	4	5
8. ...helped me to understand the treatment	1	2	3	4	5
9. ...reduced my worries about my child's CHD	1	2	3	4	5
10. ...has given me courage ⁴	1	2	3	4	5
11. ...has given me the hope that my child will be fine	1	2	3	4	5
12. ...helps me to participate in decisions about treatment	1	2	3	4	5
13. ...showed me how I can contribute to the treatment	1	2	3	4	5

2

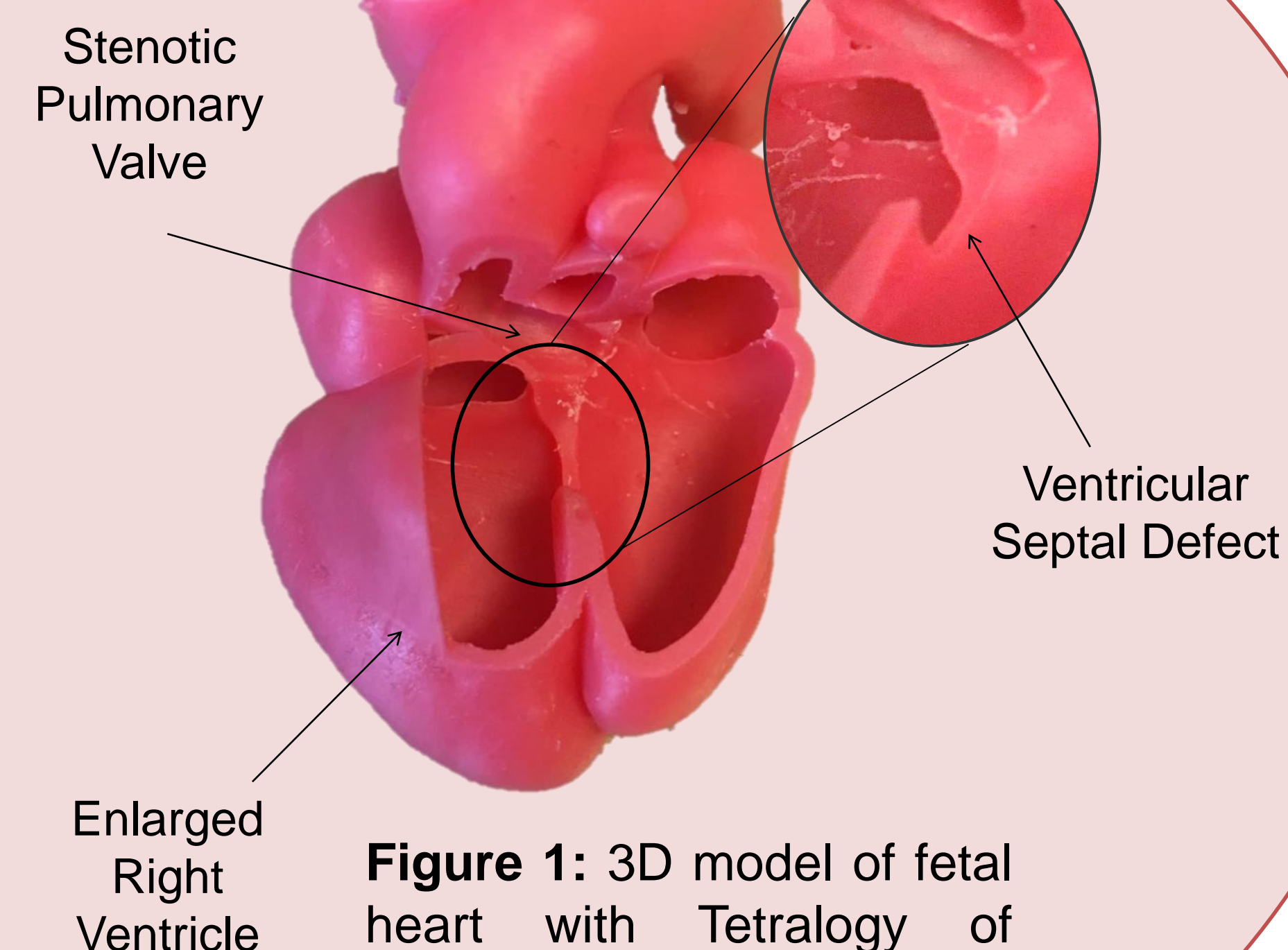


Figure 1: 3D model of fetal heart with Tetralogy of Fallot. The heart wall is removed so the TOF characteristics can be seen by the mother

Did it work?

- The 3D printed heart provided the **maximum amount** of helpfulness to understand the baby's cardiac anatomy, the upcoming treatment, and to form realistic expectations of the outcome.
- **Maximum scores** for its ability to aid in physician-patient interaction and communication

Future Directions:

- Increase sample population to include more than one normal heart, several congenital heart defects, and multiple patient/physician consult surveys

Acknowledgements

We are grateful to Amber Noggle, for allowing us to include her in our study and sharing her story about her son's congenital heart defect

References

- ¹ Ruedinger et al, *Circulation*, 2018

