BACKGROUND

- 3D printing offers the ability to rapidly manufacture customized models and devices with complex characteristics.
- The demands of the pediatric airway are especially well suited for this technique.
- Our objective is to convey the number of ways this technology has been utilized for the pediatric airway.

MODELING & SIMULATION

- Patient specific models may be produced in traditional materials, or with lumen, capable of simulating reconstruction.
- High fidelity surgical simulations of advanced procedures demonstrated high value in expert validation and a pilot trainee course.

PATIENT SPECIFIC MEDICAL DEVICES

- 3D Printing facilitated development and implementation of a novel airway splint which successfully treats severe tracheobronchomalacia.
- Since the first infant treated in 2012, 15 total patients have benefitted from this innovation.
- Splints have been implanted under the FDA Expanded Access program (n=14 patients) and the Custom Device Exemption (n=1 patient).

TISSUE ENGINEERING

- 3D Bioprinting: Tissue can be 3D printed to produce living functional implants.
- Bioprinted LTR Grafts and Tracheal Segments have been tested in animal models of airway surgery.

CONCLUSIONS

- CAD/3D printing has transformed aspects of airway reconstruction. It has extended evaluation capabilities, preoperative planning, introduced novel tools for surgical education and training, created patient specific surgical solutions, and holds promise to further open therapeutic doors with the potential to dramatically improve patient care.

GRANTS & DISCLOSURES

- Grant funding: NIH T32 DC005356, UM CRLT
- Dr. Green is an inventor of the airway splint and this IP has been licensed to Materialise.

REFERENCES

For more information about Biodesorbable Airway Splints, please see: