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Commentary: Bioresorbable stents for the treatment of airway collapse in children—How effective are they?

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In this issue of *JTCVS Techniques*, Kamran and colleagues¹ from Boston look at their short-term experience using bioresorbable tracheal and bronchial splint placement for children with symptomatic airway collapse. In total, 14 patients who received external splints between July 2018 and February 2020 were studied. Of note, these were not the custom 3-dimensional (3D)-printed splints that have been described by other groups^{2,3} but rather ones that are shaped intraoperatively using Hegar dilators. One potential advantage of this technique is the avoidance of the often-lengthy wait time necessary to produce the 3D-printed stent. Multiple concomitant procedures were also performed, including various forms of tracheopexy, aortopexy, and chest wall repair. Median follow-up was 20 months. Only 4 patients demonstrated resolution of respiratory symptoms and required no further intervention. Seven required additional procedures, 1 patient required replacement of the stent, and another required removal of the stent. Two patients died in this cohort (from unrelated causes). All remaining patients were discharged, and 7 remained with a tracheostomy (4 on a trach collar, 3 with lower vent settings than preoperatively). The authors concluded that an external bioresorbable splint can provide successful temporary external support for treatment of airway collapse.

Children with airway issues can be a challenging population to treat. External splinting of the airways has emerged as one potential intervention in a wide array of treatments.⁴ The concern of external splints in children is the potential

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CENTRAL MESSAGE

Bioresorbable stents have great potential in the treatment of airway collapse in infants and children. Long-term effectiveness and durability remain unclear.

for “outgrowing” the splint as well as any significant inflammatory reaction that could occur in the long term, further exacerbating (rather than improving) the issue. The development of bioresorbable stents has been a welcome and exciting one in this field. A few centers have had successful outcomes using a 3D-printed bioresorbable stent to treat difficult airway issues.^{2,3} One disadvantage of that technique is the long preparation times that are necessary to produce the stent; however, once made, they can be easily implanted.

The technique has great potential, but there are significant limitations in the study that make conclusions about the effectiveness of the stents uncertain. The novelty and potential benefit of the technique used is both the bioresorbable material as well as the intraoperative “customization” process; however, follow-up is not long enough to show durability after the stent has been resorbed. At the time of study, there was no clear evidence that any of the stents had been resorbed. In addition, of the 14 patients studied, 10 (70%) required further reintervention and 7 (50%) required tracheostomy. Understandably, this is a very difficult patient population to treat; however, it is still difficult to show whether the use of these stents resulted in significant improvement of the condition of these patients.

Development of new techniques and bioresorbable materials such as the one described here are necessary to treat this extremely challenging patient population. Hopefully, these techniques will prove to become a durable and effective treatment for these children.

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References

1. Kamran A, Smithers CJ, Baird CW, Jennings RW. Experience with bioresorbable splints for treatment of airway collapse in a pediatric population. *J Thorac Cardiovasc Surg Tech*. 2021;8:160-9.
2. Zopf DA, Hollister SJ, Nelson ME, Ohye RG, Green GE. Bioresorbable airway splint created with a three-dimensional printer. *N Engl J Med*. 2013;368:2043-5.
3. Les AS, Ohye RG, Filbrun AG, Ghadimi Mahani M, Flanagan CL, Daniels RC, et al. 3-D printed, externally-implanted, bioresorbable airway splints for severe tracheobronchomalacia. *Laryngoscope*. 2019;129:1763-71.
4. Ando M, Nagase Y, Hasegawa H, Takahashi Y. External stenting: a reliable technique to relieve airway obstruction in small children. *J Thorac Cardiovasc Surg*. 2017;153:1167-77.