Meghan Brar, 3MT® Presentation

"If the shoe (stent) fits.."

A veterinary medical device story:

Have you ever come across the most amazing find in a shoe store, only to realize, that they don't actually come in your size. Well, if you're like me, you'll convince yourself that you can squeeze and get the smaller pair anyway. Of course, 30 minutes later your feet are already hurting, and you can't seem to enjoy the beautiful day you're supposed to be having.

Now we all know from experience, the fit can make all of the difference, but did you know that this problem can also be applied to airway implants that are used to combat complex diseases such as nasopharyngeal stenosis?

Nasopharyngeal stenosis is a disease that causes airway obstruction. The fibrous tissue in the nasopharynx proliferates into a webbing that's known as a stricture. That stricture blocks airflow and impacts quality of life.

To treat this disease in dogs metallic stents are medical devices that are used to hold the airway open, like a brace while it heals. Unfortunately, 63% of stent patients end up experiencing major complications from this procedure.

Complications like breakage, infection and oronasal fistulas are amplified by the metal material that's currently used, combined with the lack of proper stent sizing, resulting in a poor fit in the airway. For patients, this experience can be quite painful, just like your poor cramped feet, in those tiny uncomfortable shoes.

In an ideal world, our medical implants would be catered to the anatomy of every patient, fit seamlessly and be acquired in a moment's notice.

So... what if I told you that this could be the new standard of care in veterinary practice?

Here at the University of Guelph, we have developed a range of silicone nasopharyngeal medical devices using 3D-printing techniques to provide that flawless fit. These stents have been optimized through experimental studies, to resist airway collapse, while still allowing for dynamic movement within the airway.

From CT studies, we are capable of segmenting and reconstructing the diseased airway, to create a fully customized stent that is as closely aligned to the actual airway as possible.

We have also designed a semi-customized stent representing the 'ideal' nasopharynx shape, that may be simply resized to fit any canine airway. The third option is a cylindrical stent that is the most efficient to manufacture.

We believe these stents will improve the lives of dogs experiencing nasopharyngeal stenosis. And, at the end of the day, we aim to introduce 3D-printed, patient specific implants as a new intervention to the OVC, bringing these state of the art, medical devices to the forefront of veterinary clinical practices.