

CASE REPORT

Use of a 3D-printed custom-designed tracheostomy tube to stabilise a permanent tracheostoma in a 25-year-old Icelandic mare

D. C. Debald¹ | J. P. Schramel² | E. Haltmayer³ | N. M. Biermann¹

¹Equine Surgery Unit, Department for Small Animals and Horses, Centre for Equine Health and Research, University of Veterinary Medicine Vienna, Vienna, Austria

²Department for Small Animals and Horses, Anaesthesiology and Perioperative Intensive Care Medicine Unit, University of Veterinary Medicine Vienna, Vienna, Austria

³Pferdeklinik Tillysburg, Sankt Florian, Austria

Correspondence: D. C. Debald
Email: daria.debald@vetmeduni.ac.at

SUMMARY

Although commonly used in human and veterinary medicine, reports on the use of 3D-printed custom-designed implants in equine upper airway surgery are rare. This case report describes the enhancement of a permanent tracheostoma in a pony mare using a 3D-printed tracheostomy tube and provides all required information to apply the used techniques to other cases. In a 25-year-old Icelandic mare diagnosed with several obstructive upper airway conditions a permanent tracheostomy was performed. Following a surgical site infection and dehiscence, surgical revision was successful, but the final stoma tended to collapse during exercise, resulting in respiratory distress. To stabilise the stoma a tracheostomy tube was constructed with Autodesk Fusion® and printed from TPU95 material with an Ultimaker® S5 3D-printer. Precision adjustments were conducted on an ambulatory basis over several weeks. Intermittently placed by the owner, the device prevented stomal collapse and was well tolerated by the horse. It was easy to clean, robust and could be replaced and adapted easily. The mare, intolerant to any physical exercise prior to

surgery, was now back to the same level of performance it had prior to onset of respiratory symptoms. The present case suggests that a 3D-printed tracheostomy tube is an affordable and effective measure for stomal stabilisation and improves airway function of affected horses. It also illustrates the versatility of 3D-printing in veterinary medicine.

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/eve.14211>

Key points

- A pony mare experienced intermittent stomal collapse following a permanent tracheostomy.
- To stabilise the stoma, a 3D-printed tracheostomy tube was designed using Autodesk Fusion® and printed from TPU-95 material, which enabled the mare to return to her previous level of performance.
- This case highlights the versatility of 3D-printing in veterinary medicine, offering a cost-efficient solution for the customised design of medical devices.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2025 The Author(s). *Equine Veterinary Education* published by John Wiley & Sons Ltd on behalf of EVJ Ltd.