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Promoting Technology and Collaboration

3D Printed Bowel Anastomosis Models for Surgical Training: Bridging Technology and Collaboration

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Background: Mastering bowel anastomosis is a critical skill in general surgery, yet opportunities for safe, hands-on practice remain limited. Traditional models and cadaveric tissue are expensive, logistically challenging, and may not allow repeated practice. Recent advances in 3D printing provide an opportunity to create anatomically accurate, reproducible, and cost-effective models for surgical education.

Technology Overview: We have developed a 3D printing–assisted bowel anastomosis model using 3D-printed molds to fabricate components from biocompatible and flexible materials that simulate tissue properties. The model replicates normal bowel anatomy and allows practicing suturing and hand-sewn anastomosis techniques. It is designed for both laparoscopic and open surgical practice, enabling versatile use across different training scenarios. Its modular design enables repeated use and easy replacement of damaged segments. The development involved collaboration between surgeons, biomedical engineers, and simulation specialists to ensure realism, usability, and durability.

Potential Application in Surgical Simulation and Education: The model provides trainees with repeated, hands-on practice in a controlled and safe environment. It supports both laparoscopic and open procedural training, enhancing competency before operating on live patients. It is suitable for use in simulation labs, bootcamps, and skills courses. By standardizing training, it supports objective assessment of technical skills, reduces variability in learning, and complements existing educational curricula.

Potential Opportunities to Collaborate: Collaboration with surgical educators, residency programs, simulation centers, and engineering teams can refine the model, expand its applications, and validate its educational impact. Partnerships with industry may enable large-scale production, integration into surgical curricula, and further innovation in 3D printing–assisted models.