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Promoting Technology and Collaboration

3D-Printing–Assisted Laparoscopic Fundoplication Model for Surgical Training

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Background: Fundoplication is a fundamental surgical procedure for the treatment of gastroesophageal reflux disease, yet opportunities for safe, hands-on practice are limited. Traditional cadaveric and animal models are costly, logistically complex, and often unavailable for repeated practice. 3D printing–assisted simulation offers a solution by incorporating anatomically accurate, reproducible, and cost-effective components into surgical education models.

Technology Overview: We are utilizing 3D-printed moulds to fabricate components of a fundoplication training model using flexible and biocompatible materials that mimic tissue properties. The molds enable accurate replication of anatomical structures while allowing the final model to be constructed from materials that better simulate tissue handling. The model is designed specifically for laparoscopic fundoplication practice. Its modular design allows repeated use, easy replacement of worn components, and adaptation to various patient anatomies. Development involves collaboration between surgeons, biomedical engineers, and simulation specialists to ensure realism, usability, and durability.

Potential Application in Surgical Simulation and Education: The model allows trainees to practice key steps of laparoscopic fundoplication in a controlled environment, improving technical proficiency and confidence before live surgery. It is intended for integration into simulation labs, skills courses, and surgical bootcamps, providing standardized training and supporting objective assessment of competency.

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