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Summary

ENDOSCOPY-COMPATIBLE IN SITU NANOFIBER DEPOSITION SYSTEM FOR ESOPHAGEAL POST-ESD WOUND REPAIR

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Oesophagus

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A novel endoscopy-integrated platform for real-time nanofiber deposition during upper gastrointestinal endoscopic submucosal dissection demonstrated preclinical efficacy in preventing strictures and promoting mucosal healing in porcine esophageal models.

KEY POINTS

- The 3D-printed coaxial nozzle system (3.0-mm outer diameter) is compatible with standard upper GI endoscopes and uses blow spinning technology to deposit nanofibers with uniform fiber diameter of 15.2±3.6 micrometers.
- In porcine esophageal ESD models, immediate nanofiber application provided complete wound coverage, reduced perioperative bleeding, and prevented stricture formation.
- Histological analysis at 4 weeks revealed markedly reduced fibrosis and enhanced mucosal regeneration in nanofiber-treated groups compared to controls.
- The system operated seamlessly within the standard ESD workflow without procedural interference, and nanofiber adhesion remained robust under simulated physiological flushing conditions.
- Further optimization of biomaterial formulations and rigorous human trials are required before clinical adoption in therapeutic upper GI endoscopy.

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