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Summary

PHYSIOLOGICALLY BASED PHARMACOKINETIC MODELING OF DRUG ABSORPTION FOLLOWING ENDOSCOPIC SLEEVE GASTROPLASTY

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Surgery | Small Intestine & Nutrition | Endoscopy | Oesophagus

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Physiologically based pharmacokinetic modeling predicts that endoscopic sleeve gastroplasty alters oral drug absorption primarily through delayed gastric emptying, with drug-specific effects including reduced levothyroxine exposure by 15–25% and potential dose-dumping risk for extended-release metoprolol.

KEY POINTS

- PBPK simulations in virtual ESG patients showed acetaminophen Cmax decreased 15–25% with Tmax delayed 30–60 minutes, levothyroxine Cmax decreased 10–20% with AUC reduced 15–25%, and metoprolol extended-release Cmax increased up to 35% suggesting dose-dumping risk
- Sensitivity analysis identified gastric emptying as the dominant driver of pharmacokinetic variability, with intragastric pH having moderate effect and gastric volume minor impact
- Post-ESG physiological inputs incorporated prolonged gastric emptying half-time from 90 to 120–135 minutes, reduced gastric volume to 20–30% of baseline, and altered intragastric pH from 1–3 to 3–5
- Models were validated against published pharmacokinetic profiles from non-surgical and bariatric populations but not against direct ESG patient data; findings are hypothesis-generating and require clinical validation
- The presenter suggested monitoring TSH for levothyroxine patients and heart rate and blood pressure for metoprolol patients after ESG, and recommended proton pump inhibitors as a priority for future pharmacokinetic investigation in ESG populations

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