

Factors Affecting the Efficacy of Proton Pump Inhibitor Administration via Post-Pyloric Feeding Tubes (Nasojejunal, PEG-J, and Jejunostomy)

M. Piergies, K. Krupa, U. Kvinta, A. Hodurek, D. Hliabovich, G. Florek, **W. Brniak** (w.brniak@uj.edu.pl)
Faculty of Pharmacy, Jagiellonian University Medical College, Kraków, Poland

BACKGROUND

Efficacy and safety of administration of **proton pump inhibitors (PPI)** directly to the duodenum or jejunum have been confirmed in several studies. PPI absorption occurs mainly in these regions of the gastrointestinal tract, and post-pyloric administration has been shown to be effective and safe. However, administration via enteral feeding tubes may be compromised by technical issues such as **tube obstruction**, **adherence of dosage form fragments** to feeding tubes or enteral syringes, and **inappropriate preparation techniques**, which may result in incomplete dosing. Currently, limited data are available on the compatibility of PPI dosage forms with enteral feeding tubes, as well as the clinical implications for **therapeutic efficacy and patient safety**.

AIM

To evaluate the feasibility of administering various PPI formulations via jejunal access devices by assessing physical compatibility, transit through tubes of different diameters (6–20 Fr), and the influence of different media on formulation integrity and delivery efficiency.

MATERIALS AND METHODS

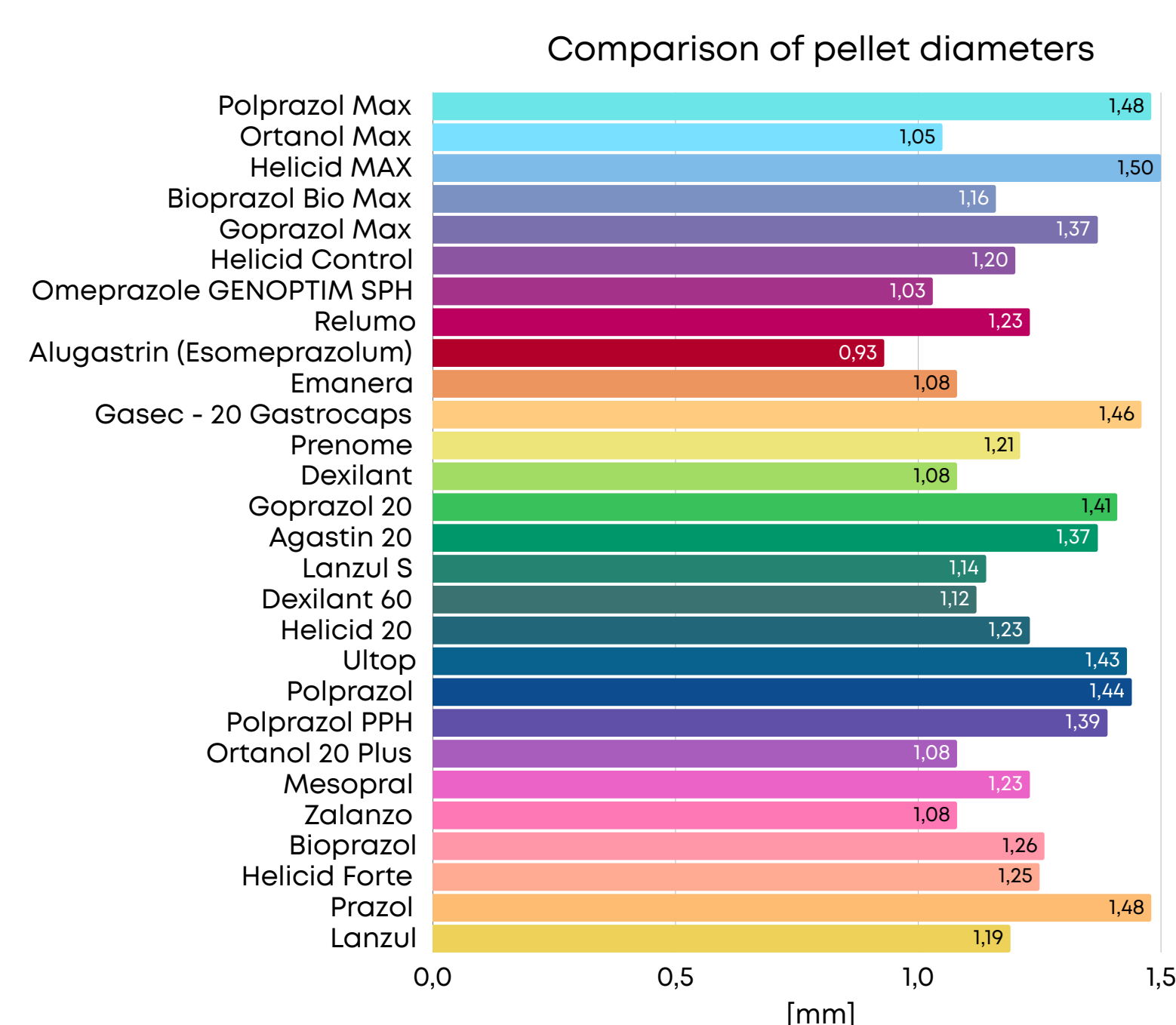
1. Evaluation of the dosage forms:

A total of 39 marketed PPI formulations available in Poland, containing omeprazole, pantoprazole, esomeprazole, or lansoprazole were evaluated. They included capsules containing enteric coated pellets, capsules containing powdered omeprazole with sodium bicarbonate or enteric coated tablets. Their size, number of units, and resistance to crushing were analyzed.

2. Preparation of dosage forms for administration:

- pellets were suspended in an apple juice or sucrose syrup
- enteric tablets were crushed and dispersed in either normal saline or 8.4% sodium bicarbonate solution

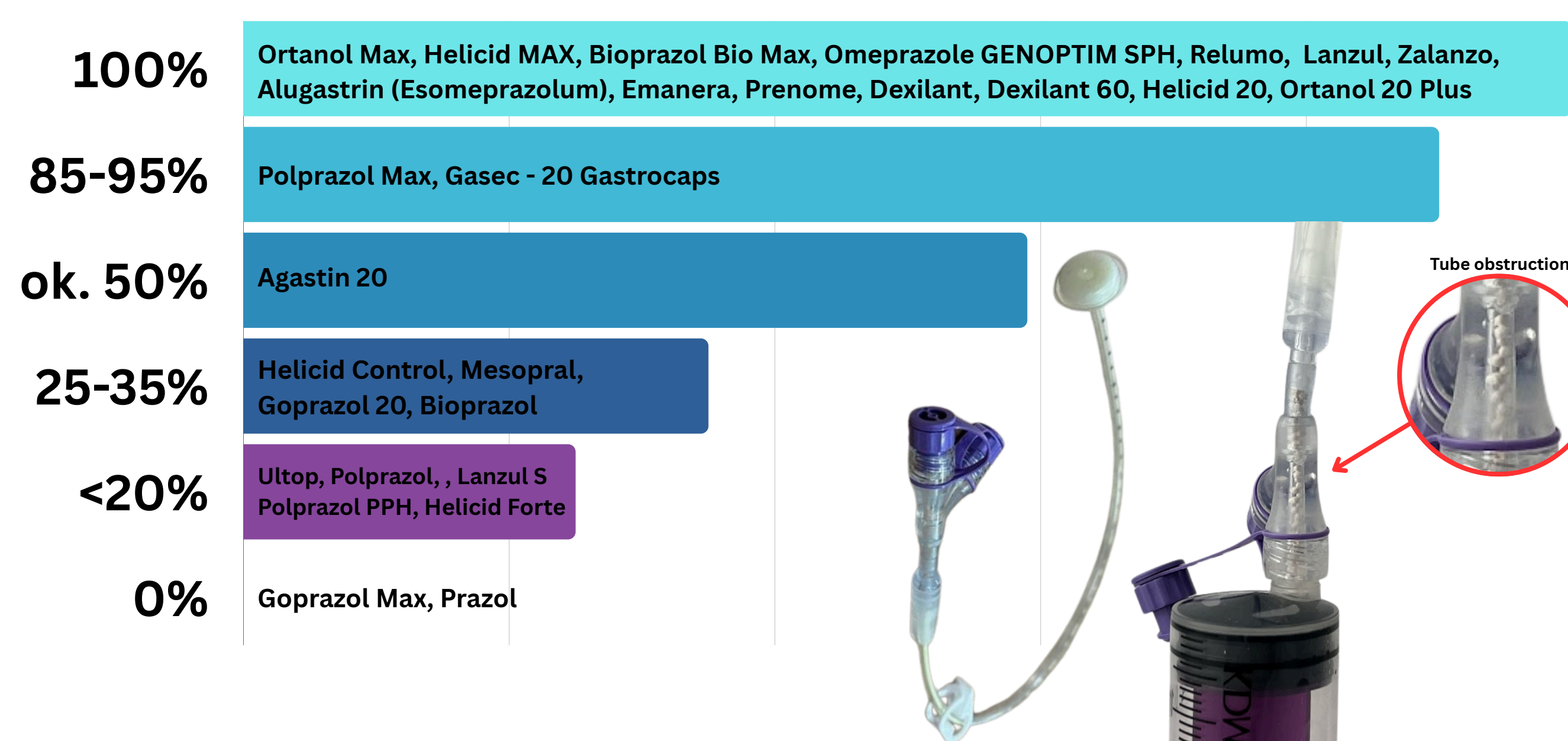
3. Simulation of the administration: prepared suspensions were administered (in vitro) using nasojejunal feeding tube, PEG-J, and microjejunoscopy tube with an external diameter from 6 Fr to 20 Fr. Percentage of delivered fraction and incidence of tube obstruction were registered.



RESULTS

Enteric coated pellets	Enteric coated tablets	Capsules containing powdered omeprazole and sodium bicarbonate
<ul style="list-style-type: none"> • Diameter of evaluated pellets ranged from 0,93 to 1,5 mm. • Tube diameter significantly influenced delivery efficiency. Complete, unobstructed delivery (100%) of pellet formulations was achieved through 20 Fr tubes. • High passage efficiency (90–97%) was found in PEG-J and jejunostomy tubes ≥ 14 Fr. • Delivery was markedly reduced (0–10%) in narrow and low-profile tubes and tubes ≤ 10 Fr, with frequent obstruction observed. • Apple juice facilitated pellet flow. • Suspensions prepared in viscous sucrose syrup enabled nearly complete delivery (~100%) through wider tubes. 	<ul style="list-style-type: none"> • Crushed enteric-coated tablets passed through all tested tube types without any obstruction. • Dose loss of 5–15% was observed, likely due to damage of the enteric coating during crushing. • Sodium bicarbonate solution improved tablet dispersion compared with saline. • Syrup enabled nearly complete delivery (~100%) through wider tubes. 	<ul style="list-style-type: none"> • Content of capsule was easily dispersed in water and apple juice. • Suspension passed through all tested tube types without any obstruction; however partial loss of the powder was noticed due to adherence of undissolved particles to the internal walls of the feeding tubes.

12 Fr passage efficiency



16 Fr low-profile passage efficiency



CONCLUSIONS

- **Crushed enteric-coated tablets** demonstrated the highest technical feasibility for jejunal PPI administration, passing through all tested tube types without obstruction. However, partial material loss and enteric coating damage may compromise dose accuracy.
- **Enteric-coated pellets** frequently obstructed narrow and low-profile tubes, limiting their practical applicability.
- Delivery efficiency strongly correlated with **tube diameter** and **formulation type**. Optimization of preparation method and appropriate tube selection are essential to ensure safe and effective post-pyloric PPI administration.

