



PYLORIC MOTOR FUNCTION IN THE
CONTROL OF GASTRIC EMPTYING.

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by

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ABSTRACT

The role of the pylorus in the control of gastric emptying remains poorly defined. This thesis examines the relationship between pyloric motor function and gastric emptying of liquids and digestible solids in a pig model.

In unsedated pigs antral, pyloric and duodenal pressures were recorded with a sleeve sensor and multiple perfused side holes, positioned with dual point trans-mucosal potential difference measurements. Gastric emptying was measured by drainage of the proximal duodenum through a Thomas cannula.

In 6 pigs, motor activity of the pylorus and antrum was stimulated by ingestion of solid and liquid meals and modulated by infusion of differing contents into the duodenum. Duodenal infusion of saline was associated with antro-pyloric pressure waves (APW) and rapid emptying of an ingested radio-labelled liquid. Duodenal infusions of dextrose, fatty acid, amino acids and hyperosmolar solutions were associated with stimulation of isolated pyloric pressure waves (IPPW), suppression of APW and slowing of liquid gastric emptying. Distension of the duodenum produced similar effects.

Clearly defined episodes of pulsatile flow produced slightly more than half of the total liquid emptying that occurred. This pulsatile flow was intimately associated in time with APW.

In 6 pigs with pylorotomy, liquid emptying was unretarded by duodenal nutrient or hyperosmolar solutions. Pylorus excised animals emptied more of a radio-labelled digestible solid than control animals, but the proportion of particle sizes that emptied did not alter.

The role of ascending duodenal intramural nerves was investigated by duodenal transection. In 6 transection animals, both duodenal nutrient and hyperosmolar solutions and duodenal distension failed to stimulate IPPW. Liquid emptying was significantly more rapid in transection animals than control animals during duodenal nutrient and osmolar stimulation, but was unaltered during duodenal distension.

In a further series of experiments, the motor effects of the proximal stomach were minimised by a water barostat. With the gastroduodenal pressure gradient positive, duodenal dextrose infusion stimulated IPPW and retarded transpyloric flow. In pylorus excised animals, flow was unretarded.

The pylorus has a major role in the control of gastric emptying, both as a component of an antro-pyloric peristaltic pump and as a resistor to transpyloric flow. By contrast the pylorus is unimportant in determining the size of solid food particles emptied from the stomach. Ascending duodenal intramural nerves are one major pathway of feedback control of pyloric motility and gastric emptying.