



**MECHANICS OF GASTRIC EMPTYING
AND THE
INFLUENCE OF GASTRIC SURGERY**

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by

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ABSTRACT

Emptying of ingesta from the stomach is controlled by a complex mechanism which is affected by therapeutic gastric surgeries, and can lead to significant symptoms in patients following such surgery. The aim of this thesis was to identify some of the motor mechanisms involved in emptying of gastric contents, the effect of therapeutic gastric surgery on these motor mechanisms, and evaluation of new surgical techniques aimed at minimizing the effects of surgery on normal patterns of gastric emptying. The work has been carried out on human subjects and conscious pigs, using recently developed antropyloroduodenal manometric techniques concurrent with measurements of gastric emptying, transpyloric flow, and gastric wall motion or tension.

The studies performed found the following. Phasic contractions of the corpus and antrum are important in initiating pulses of transpyloric flow through pressurization of gastric cavity in a fluid-distended stomach. The pylorus acts as a major braking mechanism to regulate the volume of transpyloric flow pulses. The timing of gastric contraction in relation to ensuing pyloric contraction is a major determinant of the volume of gastric contents passing across the pylorus, this timing being in part regulated by antral intramural pathways which are often transected during surgery.

Posture was shown to influence gastric emptying through changes in gastric motility. And, CCK pathways were shown to be important in inhibition of gastric pumping and stimulation of pyloric braking mechanisms seen during delivery of lipids into the intestine.

Changes in antropyloric motility and gastric emptying were correlated in patients following vagotomy and pyloroplasty, highly selective vagotomy, and partial gastrectomy, confirming our earlier observations in pigs.

In a final series of studies, a one centimeter bridge of muscle was shown to be capable of preserving the relative timing of gastric and pyloric contractions, and a normal pattern of gastric emptying after otherwise complete antral transection, indicating that this bridge carried important control signals to the pylorus from the stomach.

The work presented in this thesis has helped to improve our understanding of the mechanics of gastric emptying and some of the control mechanisms involved in its regulation. Studies were also done on the disturbances to these mechanisms caused by various therapeutic gastric surgical procedures, and possible new techniques to minimize these.