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Pyloric valve transposition as substitute for a colostomy in humans: a preliminary report

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Abstract

BACKGROUND: The purpose of this article was to show that a transposed pyloric valve (PV) can be mobilized to the perianal region and can function as a replacement for an excised rectal sphincter. Surgical research on animals has shown that a vascularized PV can be taken out of gastroduodenal continuity, transposed to the pelvic region with maintenance of fecal control when positioned in the anal area.

METHODS: The surgical procedure has recently proved successful in humans in which the distal end of the left colon was anastomosed to the proximal end of the transposed PV with the distal end of the PV sutured to the skin in the perianal area as the replacement for an excised rectal sphincter. Fecal control was established after the operation.

RESULTS: The PV healed in an anal position in humans with no apparent anatomic or physiological reasons to suggest that the operation might not be successful in the future as a substitute for a surgically excised or a severely damaged rectal sphincter.

CONCLUSIONS: A vascularized PV supplied by the gastroepiploic artery within an omental pedicle can serve as a replacement for an excised rectal sphincter, thus eliminating the need for a permanent colostomy.

The absence of a rectal sphincter either through trauma, congenital absence, or surgical removal requires a permanent colostomy. The experimental question this raised was whether a vascular supplied pyloric valve (PV) could be mobilized to the perianal area as a replacement for a rectal sphincter with resulting fecal continence.

The gastrointestinal tract has 2 major valves, the iliocecal, which is weak and frequently incompetent, and the PV which is strong. It was theorized that a PV might have the potential to replace an absent, damaged, or surgically excised anal sphincter. Because the ultimate success of such an operation would be focused on the eventual use of a PV in human patients, autopsied individuals were carefully examined before animal experiments to be certain that a pedicled PV could be anatomically transposed to the perianal region.

Animal experiments were begun with PV transposition in dogs. To be certain that a PV could survive in an ectopic position, a vascularized PV was successfully placed and retained on the abdominal wall of an animal. After it was established that a PV could exist in an ectopic location, PVs were subsequently mobilized to the anal region in a group of dogs after an abdominoperineal resection (APR), with the PVs remaining viable as the replacement for their excised rectal sphincter.

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Even though PV transposition after an APR proved surgically successful when performed in dogs, it was impossible to know if the animals had any degree of fecal continence because dogs are not discriminating in their bowel movements. This situation made it impossible to know if the dogs had any fecal control of the PV in their anal region. Therefore, it was concluded that the PV operation in dogs was not suitable for evaluating fecal continence.

It was then decided to use cats as a model for the PV experiment because cats are known to be very fastidious regarding their fecal elimination as evidenced by their well-known persistence in using a kitty litter box for defecation purposes. It was considered that if cats were kept for up to several weeks after an APR with a PV in place and they defecated only in their kitty litter box, this would strongly suggest that the cats were aware of their fecal elimination and that PV transposition might prove in the future to be successful in humans.

All PVs transposed to the perianal region in the cats remained viable during the postoperative period up to the time the animals were killed 6 to 10 weeks after surgery. Four of 9 cats with PV transposition showed complete anal continence, which reflected the functional ability of the PV to maintain fecal control during the postoperative period. Of interest were 2 additional cats who defecated frequently in their kitty litter box, but occasionally stool was found outside this receptacle. These 2 particular cats had persistent fecal impaction during their postoperative period, which required weekly oil-retention enemas under general anesthesia (ketamine) for the temporary relief of their constipation. Perhaps it was the persistence of fecal impaction that led to the inability of these 2 cats to have complete anal continence. Three other cats in the study had an unsuccessful operative procedure because they developed a perineal fistula.

History

After completion of the cat experiments, which showed the feasibility and effectiveness of PV transposition, an article on the results of the operations was published in 1982.[1] The article elicited little if any interest, and there was a strong belief by many that the operation was dangerous and would never work in humans.

The complete lack of interest in the procedure persisted over the next 20 years. In 2002, however, Dr Goldsmith was asked to give a talk before 800 colorectal surgeons, and the possibility was presented to the group that pyloric transposition had the potential to eliminate the need for a permanent terminal colostomy. An article on the subject followed the presentation,[2] but again there was no interest in the clinical evaluation of the procedure.

In 2006, Dr Goldsmith was fortunate to have encountered a colorectal surgeon who saw the possibility of the operation. A protocol proposing a PV study was presented to the hospital authorities, fully discussing the possible benefits and the liabilities of the operation. Unfortunately, the Institutional Review Board at the institution did not allow the operation. Once again, there appeared to be little, if any, interest regarding the transposition of a PV as a substitute for a resected rectal sphincter.

In 2009, Dr Goldsmith was involved in a research project at the King George Medical University, Lucknow, India. People at the institution were informed of the research work that had been performed years prior concerning the use of a transposed PV to replace a rectal sphincter followed by apparent fecal control. Ethics committee approval was obtained for the procedure, and the operation was readily accepted by the first patient when he learned of the possibility that he might not require a permanent colostomy. The patient was enthusiastic about becoming the first human to undergo the operation.

Surgical Method

The operative steps in PV transposition are seen in Figs. 1–3. The omentum is carefully separated from its central attachments to the greater curvature of the stomach leaving the gastroepiploic vessels within the omental apron (Fig. 4). The detachment of the omentum from the stomach is further carried distally along the gastric wall to a point just proximal to the PV (Fig. 5). The PV is then separated proximally and distally from the stomach and duodenum (Fig. 6). Gastroduodenal continuity is reestablished by performing either a gastroduodenal anastomosis or closing (stapling) the gas-

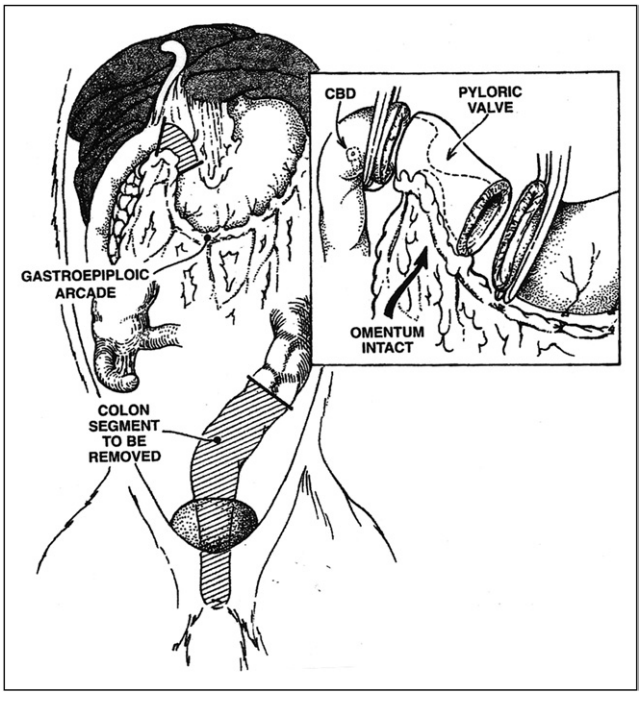

Figure 1 The technique for isolating the PV with its intact omental blood supply. CBD, common bile duct.