TRIALS OF THE KTs-28 MECHANICAL SUTURING APPARATUS IN ABDOMINAL SURGERY

M. P. Vilyanskii and A. M. Zhelnina

In 1962-63, S. I. Babkin, V. S. Kasulin, G. M. Gamibazhidze, and T. V. Kalinina modified the PKS-25 apparatus to produce the KTs-28 instrument, designed for suturing the rectum with a circular tantalum suture. The basic difference in its design is that the head of the apparatus is detachable from its shaft, the end of which is pointed and can be completely buried in the body of the apparatus. In this way the apparatus can also be used for the formation of various types of anastomoses. Several different techniques have now been developed for the use of the KTs-28 apparatus for operations on the rectum and also on more proximal divisions of the large intestine. Experimental results [1, 2] have shown that anastomoses formed with the KTs-28 apparatus are strong and heal with complete regeneration of the mucous membrane within 3-5 weeks. The authors of this present paper, dealing with anastomoses in gastro-intestinal surgery [1-7], have reported the successful use of the KTs-28 apparatus in clinical surgery for various operations on the intestine.

The KTs-28 apparatus has been used to form a rectosigmoid anastomosis after anterior resections of the rectum in 8 patients. In another 8 cases this apparatus was also used to form interintestinal anastomoses after operation on more proximal divisions of the large intestine. In one case, the mechanical suture came apart after an anterior resection of the rectum.

The views of T. V. Kalinina, G. N. Zakharova, and E. S. Smirnova, that the use of the KTs-28 apparatus considerably simplifies formation of the anastomosis in a zone of the pelvis which is difficult of access and in many cases allows natural passage of the intestinal contents to be preserved, can be shared.

Familiarization with all methods of using the KTs-28 apparatus for operations on the intestine showed convincingly that this instrument can also be used to form anastomoses on other divisions of the alimentary tract. Favorable results of experimental investigations on dogs in which the KTs-28 apparatus was used to form gastro-intestinal and esophago-intestinal anastomoses justified the use of this apparatus on a wide scale in gastric surgery also: for gastrectomy of the Billroth I and Billroth II types, for gastrectomies and resections of the cardial portion of the stomach, and also in repeated and reconstructive operations on the stomach.

The technique of the Billroth I type of gastrectomy, using the UKL-60 and KTs-28 instruments is as follows: after mobilization of the stomach and detachment from the duodenum, a purse-string suture is applied to the duodenal stump. The tube of the KTs-28 apparatus, from which the head has first been removed, is introduced into the lumen of the stomach through the pylorus or through an additional incision into the wall of the resected part of the stomach. The shaft is made to pierce the stomach wall along the greater curvature in the region of the future anastomosis. The head of the apparatus, placed on the shaft, is introduced into the lumen of the duodenum. The purse-string suture is tied over the head of the instrument. After approximation of the walls, a circular tantalum suture is inserted. Distally to the gastro-intestinal anastomosis the stomach is sutured with the UKL-60 apparatus and the part of the stomach to be resected is removed. The lines of the tantalum sutures are peritonized with interrupted sero-serosal sutures.

The use of the KTs-28 apparatus for the Billroth type I gastrectomy enabled an end-to-side gastro-duodenostomy with a short duodenal stump without the need for further mobilization of the duodenum. The large (compared with PKS-25 instrument) diameter of the tube of the KTs-28 apparatus is a factor preventing stenosis of the gastroduodenostomy.

The KTs-28 apparatus was used to form a direct gastroduodenostomy on 46 patients of whom 21 underwent gastrectomy for carcinoma, 21 for gastric and duodenal ulcer, and 4 for polyposis of the stomach.

Fig. 1. Division of afferent and efferent loops of gastroenterostomy.

Fig. 2. Formation of end-to-side anastomosis between afferent and efferent loops by means of the KTs-28 apparatus.

mach. In one patient, on whom subtotal gastrectomy was performed for carcinoma, the mechanical suture used to form the anastomosis failed. In one case, inflammatory changes were detected in the anastomosis after the operation. Roentgenograms taken 10-14 days after the operation on all patients showed a small duodenal stump, with satisfactory tone and distinct and smooth outlines. Traces of distension of the gastric stump and of stasis of its contents were not found in any patient. The contrast material was evacuated through the anastomosis intermittently in all cases. On repeated investigation of 29 patients between 3 months and 2.5 years after operation, the gastroduodenostomy in every case was easily passed.

The technique of the Billroth II gastrectomy using the UKL-60 and KTs-28 instruments is as follows: mobilization of the stomach and duodenum is performed as usual. The duodenum is closed by sutures with UKL-60 apparatus and divided. The tube of the KTs-28 apparatus is introduced into the lumen of the stomach along the greater curvature. The head of the apparatus is fitted onto the shaft and introduced into the lumen of the small intestine. To do this, a transverse incision is made on the antimesenteric border of a short loop of jejunum, through a window in the transverse mesocolon. A purse-string suture, inserted as a preliminary measure around the incision, is drawn tight over the head of the apparatus. After formation of the anastomosis and withdrawal of the apparatus (distally to the anastomosis) the stomach is sutured through with the UKL-60 apparatus and the part of the stomach for resection is removed. The line of the mechanical suture in the region of the gastric stump and anastomosis is peritonized with interrupted sero-serosal sutures.

When using the KTs-28 apparatus for Billroth type II resections of the stomach, as a rule the wall of the jejunum is not divided longitudinally, but transversely, interfering much less with the blood supply to the anastomosed part of the jejunum and providing the best conditions for healing. Preservation of the circular muscle fibers by making a transverse incision through the wall of the intestine ensures better emptying of the gastric stump.

A Billroth type II gastrectomy using the KTs-28 and UKL-60 instruments was performed on 72 patients; in 4 cases the walls of the organs to be anastomosed were not completely cut through, making it difficult to withdraw the head of the KTs-28 apparatus. This type of complication of work with the PKS-25 instrument has been described previously [1, 8, 9]. In our opinion the reason for this complication is the blunting of the knife as a result of its prolonged sterilization by boiling, and the softening of the supporting nut during boiling, when the wall of the organ is pressed into the supporting nut but is not cut through. To prevent this complication the method of sterilization of the KTs-28 apparatus was modified: instead of being boiled it was autoclaved. The supporting nuts for the apparatus are sterilized in disinfecting solution. If the apparatus is treated in this manner, the knife cuts through the tissue perfectly. No other complications occurred due to use of the KTs-28 apparatus. Control fluoroscopy of the stomach 10-14 days after the operation revealed rhythmic emptying of the gastric stump in every case.

To facilitate the formation of anastomoses in the subphrenic space and on higher divisions of the esophagus, the PKS-25 apparatus was designed in 1960 at the All-Union Research Institute of Surgical Apparatus.