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Pigs and rats have artificial openings in their stomachs that are covered by their abdominal wall. AMIT DADHEECH, SANJAY KUMAR

ABSTRACT: In order to cover the missing resected area with the abdominal wall, experimental examinations were conducted on the sewing of an artificially produced hole in the stomach to the parietal peritoneum. The contents of the stomach were touching the surface of the peritoneum. The six pigs and ten rats used in the trial all made it through the procedure unscathed, which goes against popular belief about the increased risk of peritonitis and mortality. The artificial hole was partially filled with overgrown gastric mucosa and partly with newly created fibrous tissue within eight weeks after the laparotomy ("a second look"). Common beliefs on the progression of generalized peritonitis are disproved by the findings of this peculiar experiment. The tests aren't meant to be a standalone but rather to pave the way for future human clinical trials. The case study focuses on a single patient who had perforated ulcer-carcinoma.

Keywords: porcupine, rodent, gastrointestinal tract, artificial perforation, and surgical procedure

INTRODUCTON:

The first successful trial to stitch a perforated gastric ulcer was carried out by Ludwig Heusner in the year 1892 (cit. Lau and Leow, 1997; Martin, 1992). Gradually a num-ber of authors increased the use of the ulcer stitching in one or more layers, some of them excised the ulcer and sutured the incurred defect. If narrowing-down took place, the situation was solved by means of pyloroplastic sur- gery or by formation of enteroanastomosis. Where the ulcer is closed with stitches some authors applied the tam- ponade with a tip of omentum major. The omentum inserted in the perforation opening was secured in this position by stitching through. Later on the stomachic resections approached the mentioned procedures, however, the imple-mentation of such an intervention requires the early de- termination of perforation. In desperate situations when the ulcer could not be closed by either stitching or by resection of stomach, the gastrostomy was carried out at a point of perforation. In extraordinary situations we may consider the closing of perforation with stitching the gall- bladder fundus in the perforation opening (cholecystogastrostomy) or the stitching of perforated stomach into the abdominal wall. The latter intervention, i.e. the stitch- ing of perforation into the abdominal wall, was been de-scribed in an

earlier book by Jirásek (1958). He attributed this method to Braun, however, Braun has not been in- cluded in the list of references. We searched for this type of operation in the literature available, however, with the exception of the mentioned incomplete reference nobodywas dealing with this unusual intervention. We therefore decided to elucidate the problems in an experimental way. The experiments were carried out on 6 laboratory miniature pigs at the weight of 15–30 kg and 10 rats of the Wistar strain at the weight of 270-320 g. The technique of opera- tion was uniform. In a complete anaesthesia we opened the peritoneal cavity on the middle line in the epigastrium. We established the model perforation on the gastric bodyin the region above the angle of stomach. Among foursupporting stitches we excised the fore wall so obtaining an opening with a diameter 5–7 cm for pigs and 1.5 cm forrats. We seamed the opening around the whole periphery with single stitches. Then we stitched by degrees the fore stomach wall with a perforation point to the parietal peri-toneum with single stitches. In the stomach we took theseromuscular layer, on the abdominal wall the serous mem-brane and the subserous fibres. Thus, we attached knot-ting stitches to the stomach wall over the periphery ofperforation to the abdominal wall, namely the



left part of the operation wound. The abdominal cavity was gradu-ally closed in layers. For 2-3 days following the operation the animals were administered liquid food. We observed the animals clinically and by histology. After 8 weeks we excised from laparotomy a part of abdominal wall with the original perforation opening (biopsy in pigs). As for rats, we killed them and took the same part of stomach for the post-mortem examination. The material was stained histologically with haematoxylin-eosin.All animals have survived in good condition. Around the point of the stomach stitched to the abdominal wall, there were some adhesions of the omentum major. The peritoneal cavity was found to be without any adhesions. The findings on the stomach at the point of perforation were similar for pigs and rats. In both groups of animals the perforation opening was narrowed by about 1/3 in size. The stomachic mucous membrane was gradually narrowed down and passed to the point of defect in the wall with a sharp line. Only in the bottom part was the fibrous tissuepartly defibered. The abdominal wall was of stiffer consis- tence without any demonstrable inflammatory changes. No dehiscence has been demonstrated at the point of sutur- ing.



tients remains high. The patients even with marked and long-term troubles have been hospitalised very late as far, to be subjected to detailed examinations. Besides regularsurgical interventions we recorded in the old literature an interesting approach that is based on a stitching of ulcer-ous lesions to the abdominal wall. To our

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The histological changes could be divided into changes at the edge of defect and into its bottom part (Figure 1). At the edge of defect the mucous membrane passed in the bottom part of defect with a sharp line. The mucous layerwas mildly attenuated. The foveolae gastricae were larger and shallower. The glandulae gastricae fell into their bot-tom part. In the mucous layer no lymphatic follicles wereobserved. The muscularis mucosae towards the bottom part of perforation was irregularly arranged and in the sub- mucous fibres there was almost a lack of lymphatic follicles. Here and there the muscularis mucosae linked up to the outer muscular layer. The bottom part of defect was cov-ered with a fibrous layer. The collagen fibres, irregularly arranged, were joined to the stiffer fibrous layer, covering the fibres of striated muscles. The fibres on the bottom part of defect comprised only a smaller number of fibro-cytes. The collagenous fibres prevailed. The perforations of gastroduodenal ulcers in old pa- tients represent serious sudden abdominal accidents. Even though in the last years the metabolic and anaesthetic care has been substantially improved, the risk to geriatric pa-

surprise, the moredrastic simulating experiments with extensive stomach openings did not endanger the life of our experimental ani- mals. This experience has also been confirmed in the case of 81-year old patient (surgeon K.F.) where the laparotomy was applied as late as 12 hours from the beginning of per-foration of mediogastric ulcercarcinoma, verified histo-logically as an adenocarcinoma (histology J.T). With regard to the developed diffuse peritonitis, only the simplest and most considerate intervention could be chosen. To avoid the penetration of carcinoma in the periphery we chose the ischaemization by means of a series of stitchesover the whole periphery of carcinomatous focus. Stitch-ing into the abdominal wall was chosen in an extreme dis- tress. We carried out this procedure also for the reason that the excision of the whole focus could produce a consider-ably large defect complicating the situation. The suturing of a part of stomach with perforation to the abdominal wall resulted in the healing. The patient survived for the pe- riod of 3 years without any difficulties (her death occurred due to cerebral vascular apoplexy). The results of this experimental study and of one



clini-cal case outlined several yet not answered questions. Why is not the stomach content harmful (high acidity, absence of pathogenic microbes, relative intactness of abdominal wall)? The experimental results could be verified in an extremely desperate situation on a clinical experiment that was the only solution to save the patient. In this case, in addition, the problem of ulcer-carcinoma was also facili-tated by ischaemization and thus limited propagation of

Figure 1. The junction site between a margin of the artificial stomach opening and abdominal wall. The arrowhead – the edge of the stomach. Two months after operation (haematoxylineosin, enlarged 135 times)

the tumour. The ischaemia was probably produced during stitching and tightening of sutures around the carcinomabase. Similar experiments with ischaemia-induced destruc- tion (by devascularization, devitalization) of different in-

testinal segments did not endanger the life of experimental pigs (Fortýn et al., 1985, 1989). The clinical case and the experimental experience haveshown that even the exceptional operational solutions of perforating ulcers have their validity if the whole scale of current interventions employed will be shown as quite inapplicable.

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