

The mucosal loss is the critical mechanism of esophageal stricture after mucosal resection: A pilot experiment in a Porcine Model

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Abstract

Background and Aim: Esophageal stricture may be a major complication of huge area endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD). To date, the critical mechanism of esophageal stricture has not been fully elucidated. Here, we designed this experiment to explore the role of mucosal loss in esophageal stricture after mucosal resection during a porcine model. **Material and Methods:** Twelve swine were used for this study and randomly divided into two groups. Firstly, altogether the swine, two submucosal tunnels were made from 5 cm long and 1/3rd in breadth on the anterior and posterior wall of the esophageal circumference. After that, the covered mucosa was resected along the lateral edges of the tunnel within the group 1. The meanwhile covered mucosa was incised on the midline of the tunnels within the group 2. The process of stricture formation was evaluated by endoscopy after one, two and 4 weeks respectively. Anatomical and histological examinations were performed after euthanasia.

Result: Ulcer formation was observed on endoscopy after one week. Group 1 (mucosa resected) developed mild to severe esophageal stricture with dysphagia and weight loss, whereas no esophageal stricture was evident within those of group 2 (mucosa incised) after two and four weeks respectively. Macroscopic appearance showed severe esophageal stricture and shortening of the esophagus within the group 1 while no evident esophageal stricture and shortened esophagus was found within the group 2. Inflammations and fibrous hyperplasia of the submucosal layer were observed in both groups, on histological examination. **Conclusion:** The loss of esophageal mucosa might be the crucial factor for esophageal stricture after mucosal resection. Fibrosis followed by inflammation may slightly attribute toward esophageal stricture formation but isn't the most mechanism of the postresection stricture. These results have significance for developing an appropriate treatment for esophageal stricture

Esophageal stricture may be a serious adverse event secondary to extensive endoscopic submucosal dissection (ESD). The present study aimed to research the efficacy of cellulose (CMC) sheets for the prevention of esophageal stricture after full circumferential ESD in an animal model. Fourteen porcine models were randomized into an impact group (n = 7) and a CMC group (n = 7). Five-centimeter-long

circumferential esophageal ESD was administered at a distance of 40 to 45 cm from the incisors altogether models. In the CMC group, CMC sheets were placed over the mucosal defect completely after ESD, whereas the control group underwent routine ESD only. Endoscopic examination was conducted after the primary and second week post-ESD. Esophageal specimens were harvested during post-mortem and were evaluated for macroscopic and histological appearance. Blood serum levels of 4 pro-inflammatory or profibrotic cytokines were measured quantitatively.

The CMC group had better food tolerability during the second week post-ESD. The CMC group showed a significantly lower esophageal mucosal stricture rate compared to the control group. Histological assessments showed less fibrosis within the submucosal layer, milder damage to the muscularis propria, and enhanced re-epithelization within the CMC group. Serum transforming protein beta 1 levels were significantly lower within the CMC group post-ESD. Deployment of CMC sheets on the mucosal defect appears to be a promising method for preventing esophageal strictures after extensive ESD.

According to previous studies, the fibrotic changes and scar formation leads to esophageal stricture [4]. Scar formation is an integral part of wound healing, starting with inflammation, followed by proliferation and remodeling [5]. Esophageal damage followed by connective tissue formation and biomechanical deterioration caused by the change of collagen components within the submucosal layer have also been considered to contribute to the pathogenesis of esophageal stricture formation [4–8]. Tunneling techniques are used widely in peroral endoscopic myotomy (POEM) for esophageal achalasia. Tunneling endoscopic muscularis dissection (tEMD) and sub-mucosal tunneling endoscopic resection (STER) also cause extensive damage to the submucosal layer and are followed.

Overall, the esophageal stricture may be a common post-ESD complication that a various array of approaches has been investigated thoroughly to stop with each approach entailing its own advantages and limitations (Table 3). Among these strategies, steroid prophylaxis, particularly in its local injection application, is currently the foremost commonly and effectively applied strategy to stop esophageal post-ESD stricture. In terms of endoscopic prevention strategies, this prevention

measure is superior to treatment through the utilization of bougie dilatation, EBD, and stent implantation. Tissue engineering technology has also demonstrated the promising curative effect. and CMC sheets, and self-help inflatable balloon, thanks to their good histocompatibility and tolerance, have opened new doors in prevention of esophageal stricture. Moreover, other novel strategies like esophageal mucosa transplantation, stomachic mucosa transplantation, PGA,. In any case, with the progress of endoscopic technology and therefore the in-depth study of esophageal post-ESD stricture, we unhesitatingly believe that simpler and safer strategies will arrive, and the issue of esophageal post-ESD stricture will eventually be solved. Among chronic diseases with high mortality rates, cancer is considered one of the most devastating diseases. In the normal process of the human body, cells continuously undergo division, death, and replacement by themselves in a controlled fashion.

Cancer starts when cells are altered and uncontrollably divide without diminishing. The growth of abnormal cells in an uncontrolled fashion could spread the cancer to different parts of the body, impacting the normal functionality of organs throughout the body. Some prevalent cancer diseases include lung & bronchus, colon & rectum, prostate, pancreas, breast, ovary, etc. In this research, a brief review and compilation of key information pertaining to pancreatic cancer is discussed along with historical data. Conclusion & Significance: Due to the severity of pancreatic cancer, it is important that individuals be aware of the symptoms and signs of pancreatic cancer. With awareness, individual may be able to be proactive about the disease in its earlier stages so that the probability for successful long-term treatment may increase.

This work is partly presented at 14th International Conference on Clinical Gastroenterology and Hepatology,