

A comparative study regarding the effect of an intraperitoneal anti-adhesive agent application in left-liver living donors

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Backgrounds/Aims: After left-sided hepatectomy due to a living donor, the stomach can become adhered to the hepatic cut surface. An unwanted gastric stasis can occur. For prevention of such gastric adhesion and laparotomy-associated adhesive ileus, some anti-adhesive agents have been developed for intra-abdominal application. The purpose of this study is to evaluate the effect of an intraperitoneal anti-adhesive agent application compared with a historical control group. **Methods:** The study group consisted of 220 consecutive living donors who donated a left-liver graft during the time period between January 2006 and December 2011. The anti-adhesive agent which was used was composed of sodium hyaluronate and sodium carboxymethyl cellulose. The historical control group which used no anti-adhesive agent included 220 consecutive left-liver donors during the time period between January 1998 and December 2004. **Results:** An overt gastric stasis which required fasting was observed in 5 subjects (2.3%) in the study group and in 7 subjects (3.2%) in the control group ($p=0.77$). An additional work-up to determine gastric stasis or prolonged ileus was performed in 17 (7.7%) and 22 (10%) donors, respectively ($p=0.51$). Only one donor in the control group underwent a laparotomy for an intestinal obstruction. No clinical factors such as patient age, sex, body mass index, remnant right liver proportion, shape of skin incision, and duration of surgery were significant risk factors of gastric stasis or prolonged ileus. No harmful side-effects of the anti-adhesive agent were identified. **Conclusions:** As a result of this study, the application of an anti-adhesive agent could not be proved as to be effective for prevention of gastric stasis and postoperative ileus. A further randomized and controlled study will be required to demonstrate the real benefits of an anti-adhesive application in left-liver living donors. (Korean J Hepatobiliary Pancreat Surg 2014;18:26-28)

Key Words: Living-donor liver transplantation; Left hepatectomy; Gastric stasis; Ileus

INTRODUCTION

Peritoneal adhesion is an inevitable consequence of abdominal surgery and a cause of significant postoperative morbidity. It predisposes patients to recurrent episodes of abdominal pain and intestinal obstruction that frequently require hospitalization and adversely affects their quality of life.^{1,2} Some anti-adhesive agents were developed for the intra-abdominal use to prevent such gastric adhesion as well as a laparotomy-associated adhesive ileus.³⁻⁸

After left hepatectomy in a living donor, an unwanted gastric stasis can occur due to adherence of the stomach to the livers cut surface. Although the incidence was usu-

ally low,^{9,10} one report indicated that it was as high as 23% in their small-volume series.¹¹ The purpose of this study is to evaluate the effect of an intraperitoneal anti-adhesive agent application compared with that in a historical control group of living donors who underwent a living-donor left hepatectomy.

METHODS

In this study, our institutional living-donor liver transplantation database which contains more than 3,000 cases was used. Study design was a retrospective controlled study with a historical control group. The study design

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was approved by the Institutional Review Board of the Asan Medical Center.

Our study group consisted of 220 consecutive living donors who donated a whole left-liver graft during the study period from January 2006 to December 2011. The anti-adhesive agent which routinely was used in this study is known to function as a mechanical barrier for intrinsic adhesion. It is composed of sodium hyaluronate and sodium carboxymethyl cellulose. In the historical control group, no anti-adhesive agent was used. This control group consisted of 220 consecutive living donors with left-liver surgery during the study period from January 1998 to December 2004.

The incidence of gastric stasis or ileus which required a prolonged, supportive care or repeated imaging studies performed over a period of one week were analyzed. Also various clinical factors, including patient age, sex, body mass index, remnant liver proportion, shape of skin incision, and duration of surgery were investigated. The incidence variables were compared using the chi-square test or Fisher's exact test, and continuous variables were compared using the Student *t*-test. A *p*-value <0.05 was considered significant.

RESULTS

After left-liver donation, 438 of the 440 living donors recovered their liver function soon after the donation surgery. One donor suffered from a delayed recovery of the remnant liver function for three weeks due to a hepatic venous congestion superimposed on excessive fatty change.¹² The mean hepatic parenchymal resection rates of the whole liver volume were 32.1±3.2%. Three of these 440 patients underwent a repeated laparotomy due to subcapsular hematoma in the remnant right liver (n=1), liver cut surface bile leak (n=1) and intestinal obstruction (n=1).¹⁰

Overt gastric stasis requiring prolonged fasting was observed in five of the 220 (2.3%) patients in the study group and in seven of the 220 (3.2%) patients in the control group (*p*=0.77). An additional workup for gastric stasis or prolonged ileus was necessary in 17 (7.7%) and 22 (10%) living donors, respectively (*p*=0.51). One patient in the control group underwent laparotomy for a bowel obstruction caused by small bowel intussusception.

No harmful side-effects of the anti-adhesive agent were identified in the study patient group. No clinical factor, including patient age, sex, body mass index, remnant liver proportion, shape of incision, and duration of surgery, were significant risk factors for gastric stasis or prolonged ileus (all *p*-values >0.5).

DISCUSSION

As a result of this study, it could not be proved that the application of an anti-adhesive agent composed of sodium hyaluronate and sodium carboxymethyl cellulose will be effective for the prevention of gastric stasis and ileus. It might be primarily due to that their incidences were too low in both the study and the control group.¹⁰

A randomized controlled trial where hyaluronate gel was used for the prevention of adhesions after abdominal surgeries showed a high rate of anastomotic dehiscence and prolonged postoperative ileus in the study group compared with the control group.¹³ This study was suspended prematurely due to this adverse results which were caused by anti-adhesive agents.

The underlying mechanisms of gastric stasis after left hepatectomy differ from those of the usually with a laparotomy associated adhesive ileus. This may be possibly due to dislocation of the stomach after left hepatectomy and adhesion of the stomach and the cut surface of the liver.¹¹ To prevent such adhesive complications like bowel obstructions, a mixture of sodium hyaluronate and carboxymethyl cellulose membrane was reported as effective,^{14,15} although a clear and effective adhesion prevention between the cut surface of the liver and the stomach could not be demonstrated. The results of this present study also could not demonstrate any beneficial preventive effect. Additionally, a unique method of omental patching between the cut surface of the liver and the stomach was presented, in which only one case (2%) of gastric stasis occurred in 45 left-liver donors.¹¹

In conclusion, in this study the intraoperative application of an anti-adhesive agent was not proven as an effective prevention of gastric stasis and ileus after living left-liver donation. A further randomized controlled study will be necessary to demonstrate the actual benefit of anti-adhesive applications in left-liver living donors.

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