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Influence of gum chewing on postoperative bowel activity after complete staging surgery for gynecological malignancies: A randomized controlled trial

Ibrahim Egemen Ertas *, Kemal Gungorduk, Aykut Ozdemir, Ulas Solmaz, Askin Dogan, Yusuf Yildirim

Department of Gynecologic Oncology, Tepecik Education and Research Hospital, Izmir, Turkey

HIGHLIGHTS

- Gum chewing is associated with faster recovery of bowel function after complete surgical staging for malignant gynecologic disease.
- Gum chewing is safe, practical, inexpensive, and well tolerated.
- Gum chewing should be used in routine practice with postoperative care of gynecologic oncology.

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ABSTRACT

Objective. To investigate whether gum chewing affects the return of bowel function after complete staging surgery for gynecologic malignancies.

Methods. A total of 149 patients undergoing abdominal complete surgical staging for various gynecological cancers were randomized into a gum-chewing group (n = 74) or a control group (n = 75). The patients chewed sugarless gum three times from the first postoperative morning until the first passage of flatus. Each chewing session lasted 30 min. Total abdominal hysterectomy with systematic pelvic and para-aortic lymphadenectomy was performed on all patients as part of complete staging surgery. Groups were compared in terms of time to first bowel movement time, first flatus and feces pass time, postoperative analgesic and antiemetic drug requirement, postoperative oral intake tolerance, mild ileus symptoms and hospital stay.

Results. The mean time to flatus (34.0 ± 11.5 *vs.* 43.6 ± 14.0 h; $p < 0.001$), mean time to defecation (49.6 ± 18.7 *vs.* 62.5 ± 21.5 h; $p < 0.001$), mean time to bowel movement (41.5 ± 15.7 *vs.* 50.1 ± 15.9 h; $p = 0.001$), mean time to tolerate diet (4.0 ± 0.8 *vs.* 5.0 ± 0.9 days; $p < 0.001$), mean length of hospital stay (5.9 ± 1 *vs.* 7.0 ± 1.4 days; $p < 0.001$) were significantly reduced in patients that chewed gum compared with controls. Mild ileus symptoms were observed in 27 (36%) patients in the control group compared to 11(14.9%) patients in the gum-chewing group [relative risk, 2.4; 95% confidence interval, 1.2–4.5; $p = 0.004$]. Severe symptoms were observed in two patients (2.7%) in the control group.

Conclusions. Gum chewing early in the postoperative period following elective total abdominal hysterectomy and systematic retroperitoneal lymphadenectomy hastens time to bowel motility and ability to tolerate feedings. This inexpensive and well-tolerated treatment should be added as an adjunct in postoperative care of gynecologic oncology.

Introduction

A delay in the return of normal bowel function with the passage of flatus and feces is one of the most important factors affecting early recovery and discharge in patients undergoing open complete staging surgery for gynecological malignancies. A prolonged hospital stay increases the risk of hospital-acquired infections, deep vein thrombosis, pulmonary compromise and total hospital costs [1]. A variety of procedures have been implemented for management bowel function, including adequate pain control [1], epidural anesthesia [2], gum chewing [3–5], laparoscopic surgery [6], drugs such as metoclopramide, erythromycin, neostigmine, alvimopan [1,7,8], and supportive strategies including nasogastric decompression [9], intravenous fluids [10], and early enteral feeding [11,12].

Gum chewing is a simple, inexpensive and harmless intervention for early recovery of bowel function after gastrointestinal surgery [3], radical cystectomy [4], and cesarean section [5]. However, the favorable effects of gum chewing on return of gastrointestinal function in patients

* Corresponding author at: Department of Gynecologic Oncology, Tepecik Education and Research Hospital, Gaziler Street, 35120, Izmir, Turkey. Fax: +90 232 457 96 51.
E-mail address: drertas@gmail.com (I.E. Ertas).

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undergoing elective total abdominal hysterectomy and systematic retroperitoneal lymphadenectomy have not been investigated. The aim of this randomized controlled trial was to assess the effectiveness of gum chewing on postoperative bowel function in patients undergoing abdominal complete staging surgery for gynecological malignancies.

Materials and methods

This study was conducted from January 21, 2012–April 20, 2013 at Tepecik Education and Research Hospital, Department of Gynecologic Oncology, Izmir, Turkey. Approval for the study was obtained from the hospital ethics committee and it was registered with the federal government (NCT01835119).

Female patients preparing for complete surgical staging for malignant gynecologic disease such as endometrial cancer, cervix cancer and ovarian cancer were assessed for eligibility. Systematic retroperitoneal lymphadenectomy was performed up to the level of the left renal vein in a greater proportion of cases. Exclusion criteria for the study included thyroid diseases, inflammatory bowel disease, complaints of chronic constipation (defined as two or fewer bowel movements per week), a history of prior abdominal bowel surgery, abdominal radiation, or neoadjuvant chemotherapy, need for intensive care more that 24 h postoperatively, nasogastric tube drainage beyond the first postoperative morning, or bowel anastomosis and upper abdominal multivisceral surgical approaches in relation to the debulking surgery.

The study information was explained to all enrolled subjects, informed written consent obtained and randomization performed as soon as the patients were admitted to our gynecologic oncology service. Eligible patients were randomly assigned to one of two groups by an investigator (I.E.E.) by consecutive opening of sequentially numbered, opaque, sealed envelopes. Envelope randomization was performed by a computer-generated code using the blocked randomization method. Group A acted as the control group and received no treatment, and Group B received sugar-free peppermint-flavored chewing gum.

The same evidence-based protocol of perioperative management, except for chewing gum, was used for all patients. On the day before surgery, patients received a clear liquid diet and bowel preparation with 20-g MgO (Magnesi Kalsine Toz®, İstanbul İlaç, Istanbul, Turkey) and 28.5-g NaH_2P + 10.5-g Na_2HP (BT Enema®, Yenisehir Laboratory, Ankara, Turkey), low-molecular-weight heparin, and prophylactic intravenous antibiotics at induction of anesthesia. Three consultant anesthesiologists who used the same anesthetic technique provided general analgesia with or without an epidural anesthetic. Surgery was perormed *via* a sub-supra umbilical vertical midline incision. All patients underwent total abdominal hysterectomy with systematic pelvic and para-aortic lymph node dissection as part of their staging procedures. The same surgical team performed all operations.

All subjects received the same postoperative care regimen, including the prokinetic agent metoclopramide as an antiemetic if required, stress gastritis prophylaxis in the form of histamine H_2 blockers, and low-molecular-weight heparin for 48 h after surgery. The nasogastric tube was removed on the first postoperative morning. Following the removal of the epidural catheter, patients were placed on regular oral paracetamol. Additional opioid or nonsteroidal analgesia was provided when required and their use documented carefully. All patients received standard chest physiotherapy and were mobilized as soon as possible in the postoperative period. Other antiemetic agents were prescribed for nausea if required. No opioid antagonists were used postoperatively.

To reduce the effects of other variables, the postoperative feeding regime was standardized for the study patients: 30–60 ml of water and if tolerated other liquids were started from the first postoperative day until the first passage of flatus. Upon passing flatus, clear fluids and if tolerated semiliquid fiberless diet was allowed. Patients were allowed to progress to a solid diet according to the patient's toleration or the passage of feces. Group B began chewing gum on postoperative day one and chewed gum three times daily. Each chewing lasted 30 min. The administration of therapy was implemented by nursing ward staff and recorded in the patients file. All gum-chewing patients completed their course of gum chewing until the return of bowel function.

The nature of the study did not permit complete blinding after assignment of intervention. Criteria for hospital discharge included stable vital signs with no fever for at least 24 h, ability to ambulate without assistance, ability to tolerate solid food without vomiting, normal urination, and absence of other postoperative complications.

The main outcome variable of the study was postoperative first flatus and defecation time (hours from end of operation). Secondary outcome measures included time to first bowel movement (hours from end of operation), time to tolerate diet, antiemetic need, additional analgesic requirement, tolerance of gum chewing in the study group, postoperative ileus (PI) rate, and length of hospital stay. Time to first bowel movement was defined as hearing the first bowel sound during postoperative routine control.

PI was considered resolved after the first passage of flatus and in the absence of abdominal distention or vomiting. Symptoms were classified as mild, if they spontaneously resolved in a few days with observation and basic support, moderate if vomiting was persistent and a nasogastric tube re-insertion was clinically necessary, and severe if symptoms persisted for more than two days, or resisted previous treatment.

An outcome assessor, who was blinded to the study allocation, evaluated the symptoms and signs of ileus three times daily. To be able to precisely monitor the recovery of bowel function, patients were instructed to notify ward nurses or investigators immediately after the first passage of flatus or a bowel movement and defecation. We checked every patient's bowel sounds using a standard stethoscope six times per day beginning 24 h postoperatively until first bowel sounds were noticed. To accurately monitor recovery of bowel function, patients were instructed to notify nurses or study investigators immediately after they passed either gas or they feeled a bowel movement.

At the start of this randomized controlled trial, all of the studies that addressed gum chewing involved patients with colonic surgery, cesarean section, or radical cystectomy. Thus, we conducted a non-blinded pilot trial of 20 patients in each group (A and B) before the full trial. In Group A, the mean time to flatus was 39.7 ± 12.9 h and in Group B it was 33.1 ± 11.6 h. On this basis, power analysis determined that with a power of 80% and an α level of 0.05, a sample size of 66 patients in each group was required. An additional 10 subjects were recruited to account for possible attrition.

Med Calc version 9.3 was used for statistical analyses. Analysis was done on an intention-to-treat basis. Normal distribution of continuous variables was assessed by the Kolmogorov–Smirnov test. The χ^2 test was used for analysis of categorical variables, Student's *t*-test was used for normally distributed variables in the analysis of continuous variables, and the Mann–Whitney *U*-test was used for variables that were not normally distributed. Relative risk (RR) with 95% confidence interval (CI) was calculated. P values < 0.05 were considered to indicate statistical significance. Survival curves were created using Kaplan–Meier analysis.

Results

Of the 203 eligible patients, 152 were enrolled; 77 patients were randomly assigned to the control Group A and 75 to the gum-chewing Group B. Two patients in the control group and one in the gum group did not enter the study following randomization because they no longer fulfilled the inclusion criteria. In total, 75 patients in the control group and 74 in the gum group were analyzed. The reasons for pre- and post-randomization exclusions are shown in Fig. 1. Baseline demographic data and clinical characteristics of the two study groups were similar and are presented in Table 1.

Patients in both groups had similar operative characteristics, including mean duration of surgery, type of hysterectomy, mean number of removed pelvic and para-aortic lymph nodes, rate of appendectomy,