



The Role of Chewing Gum on Post-operative Bowel Recovery after Gynecological Laparoscopic Surgery: A Short Report and Updated Review

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Abstract

BACKGROUND: Adverse post-operative complication of gynecological laparoscopic surgery, post-operative ileus, could be reduced by mimicking early post-operative oral feeding; however, the role of chewing gum is still lack evidence.

AIM: This study was conducted to assess chewing gum's role in post-operative bowel recovery after gynecological laparoscopic surgery.

METHODS: This prospective clinical trial recruited 60 participants who had undergone gynecological laparoscopic surgery under general anesthesia. The study was conducted at Arifin Achmad Hospital, Riau Province, Indonesia, from January to April 2021. The patients were equally divided into two groups: Intervention (n = 30) and control (n = 30). They were asked to chew sugar-free gum every 2 h after the surgery (i.e. 5 times within 10 h post-surgery). Time of the first flatus and the first bowel sounds were recorded (i.e. 5 times of assessment within 10 h post-surgery). In addition, a literature review was conducted to add evidence of the role of chewing gum on postoperative bowel recovery after gynecological laparoscopic surgery.

RESULTS: Patients from both groups had a close age range (23–44-year-old versus 21–42-year-old). Our data suggested a significant difference in the time of the first flatus between the treatment and control group (15.95 h vs. 45.05 h), $p < 0.001$. The length of stay in the hospital among those from the treatment group was also significantly shorter compared to controls (15.50 h vs. 45.50 h), $p < 0.001$. The literature review of four updated randomized clinical trials suggests chewing gum in the early onset of first flatus and bowel movement.

CONCLUSION: Chewing gum following gynecological laparoscopic surgery could accelerate gastrointestinal recovery.

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Introduction

Patients are undergoing abdominal surgery experience a reduction of gastrointestinal peristalsis, delaying the routine defecation that lasts for 3–5 days [1], [2]. This common abdominal surgery complication, post-operative ileus (POI), has been reported to be a notable economic burden [3], even equal to that of serious complications [4]. In fact, POI is responsible for the cost of 1.46 billion USD annually for prolonged hospitalization in the US [5]. Longer hospitalization due to POI may also increase the risk of infection [6]. Even worse, POI may induce the development of deep vein thrombosis, myocardial infarction, and sepsis [7]. Therefore, a multimodal approach has been developed to hasten the recovery through a series of Enhanced Recovery after Surgery (ERAS) protocols [8], [9].

ERAS has introduced a measure of early feeding after the surgery to stimulate bowel motility

as an effort to reduce POI [10], [11]. Nonetheless, an earlier report revealed that 27% of the total patients could not tolerate the early feeding, leading to nausea and vomiting [12]. In the 1800s, the concept of sham feeding was introduced to mimic normal feeding, which can stimulate bowel movement through the parasympathetic nervous system [13]. It is ascribed to images and sensations of foods that increase the vagal nerve-induced gastrointestinal hormones [14]. Similar responses have been observed in sham feeding using chewing gum, where saliva, gastrin, and pancreatic juices are secreted [15], [16], and gastrointestinal tract was stimulated [17], [18]. Hence, chewing gum can be used as a sham feeding to prevent prolonged POI.

Some studies have reported the accelerated intestinal function recovery for patients treated with chewing gum after gynecological surgery [19], [20], [21]. Furthermore, chewing gum may reduce the level of post-operative pain and analgesic requirement [22], [23], [24], [25]. Nevertheless, these results are inconclusive between studies, where a

study in China showed a null result [26]. A multicenter randomized clinical trial (RCT) also reported the insignificance of chewing gum following abdominal surgery [27]. Systematic review and meta-analysis studies revealed that chewing gum after colorectal [28] and gynecological surgeries [29], [30] improves POI complications. Those reviews agreed that more RCTs are required to clarify the role of chewing gum in the recovery of intestinal function after surgery. This study sought to assess the role of chewing gum on post-operative bowel recovery after gynecological laparoscopic surgery.

Methods

Study design

A prospective trial was conducted at a referral hospital, Arifin Achmad Hospital, Riau Province, Indonesia, from January to April 2021. Before the study, all patients were asked for written informed consent, and the ethical clearance had been approved by the Review Ethic Committee of RSUD Arifin Achmad (01/2021). A total of 60 women, aged 23–42 years old and receiving gynecological laparoscopic surgery under general anesthesia, participated in this study following the previously described procedure [1]. The participants were divided equally into intervention groups (gum) and control groups. In the intervention group, the patients were asked to chew sugar-free gum 5 times with 2 h intervals right after the surgery for 15 min. In the control group, the patients received normal postoperative treatment. Patients with a loose tooth (or teeth) or chronic obstipation were excluded. Patients who underwent the surgery for more than 3 h or underwent laparotomy were excluded from the study.

Data collection

Patients' characteristics were collected from the interview and medical record. The time of the first flatus and time of the first bowel sounds were assessed every 2 h. The first passage of flatus was noted by asking the patients, and bowel sounds were detected using a stethoscope. The detected flatus or bowel sounds were denoted as positive mark (+), and the absence was denoted as negative marks (-). The endpoint of this research was up to the fifth 2 h after the surgery as recommended by the previous studies [26], [31], [32], [33], [34].

Statistical analysis

The normality of the data was assessed using Kolmogorov–Smirnov. The first passage of flatus and

the length of the stay in the hospital was compared between two groups (treatment and control) using Mann–Whitney test since the data were not normally distributed.

Search and selection strategies of literature of the literature review

To provide more robust data, a literature review was conducted. The online search was conducted in May 2021 using PubMed and Scopus databases using the following terms combination: ((laparoscopic) OR (laparoscopy)) AND ((chewing) OR (gum)) AND (surgery) AND ((gynecological) OR (gynecological) OR (gynecologic) OR (gynecological)). Only literature reporting a RCT of chewing gum after the gynecological laparoscopic surgery with full access was included in the study. Clinical trials involving laparotomy and cesarean section were excluded from the study. All articles published between January 1950 and May 2021 were eligible.

Results

The subjects' characteristics of this study are presented in Table 1. Patients in the intervention group had an age range of 23–44 years old, a similar range to the control group (21–42 years old). Similarities between groups were also obtained in the duration of surgery and length of hospitalization. Patients received different surgical procedures depending on their respective gynecological conditions.

Table 1: Characteristics of women participated in the study

Characteristics	Gum (n = 30)	Control (n = 30)
Age (range, year)	23–44	21–42
Cases in laparoscopy		
Leiomyoma uteri	Laparoscopy and hysterectomy	Laparoscopy and hysterectomy
Endometriosis cyst	Laparoscopy and cystectomy	Laparoscopy and cystectomy
Ovarian cyst	Laparoscopy and cystectomy	Laparoscopy and cystectomy
Endometrial polyps	Hysteroscopic resection of the polyp	Hysteroscopic resection of the polyp

The clinical outcomes from intervention and control groups are presented in Table 2. The time to first flatus and time to first bowel sounds were observed 8 h after the surgery in the intervention group. However, the flatus and bowel sounds were not detected in the control group, even at the endpoint of the trial. These findings suggest the role of chewing gum in accelerating the onset of flatus passage and bowel motility after gynecological surgery.

Table 2: Comparison of the outcomes between treatment and control groups

Characteristics	Gum (n = 30), hour	Control (n = 30), hour	p-value
Duration of surgery, mean	2.5	2.5	>0.05
Hospitalization length, mean (min-max)	15.50 (range: 48–48)	45.50 (range: 72–72)	<0.001
Flatus occurrence, mean (min-max)	15.95 (range: 2–12)	45.05 (range: 24–48)	<0.001

The clinical outcomes from intervention and control groups are presented in Table 3. The time to first flatus and time to first bowel sounds were observed 8 h after the surgery in intervention group. However, the flatus and bowel sounds were not detected in control group, even at the end point of the trial. These findings suggest the role of chewing gum in accelerating the onset of flatus passage and bowel motility after gynecological surgery.

Table 3: Chewing gum effect on the post-operative clinical outcome

Group	Clinical outcomes observed with 2 h interval									
	Flatus occurrence					Bowel movement				
	1 st	2 nd	3 rd	4 th	5 th	1 st	2 nd	3 rd	4 th	5 th
Gum (n = 30)	-	-	-	+	+	-	-	-	+	+
Control (n = 30)	-	-	-	-	-	-	-	-	-	-

(+): If the outcome was detected, (-): If the outcome was not detected.

Discussion

The implementation of ERAS protocol has been proven to lower the economic burden of hospitalization associated with prolonged POI [35]. As a part of ERAS protocol, sham feeding through chewing gum has been studied in multiple RCTs to prevent the prolonged POI [19], [20], [21], [36], [37]. These trials were initiated by a research group led by Asao in 2002 [38], who was motivated by early post-operative oral feeding [10], [11]. Most of the RCTs found that chewing gum improved the gastrointestinal recovery rate. Similar with the findings of those studies, our present study found that the flatus occurrence and bowel sounds were detected earlier in patients in intervention group with chewing gum than those in control group. A study found that the stimulation of bowel motility in those with chewing gum was associated with cephalic-vagal stimulation [39].

A recent systematic review of chewing gum after gynecological surgeries was published in 2018, extracting the data from 10 RCTs; eight studies of laparotomy and two studies of laparoscopy [29]. As of May 2021, we have recorded two additional clinical trials for chewing gum as post-operative treatment in gynecological laparoscopy [1], [25], as presented in Table 4. Those studies revealed that chewing gum increased the recovery time of gastrointestinal function. The most common outcomes with statistical significance were time to first flatus and time to the first defecation.

A study in China with a wide range of laparoscopic surgeries revealed significantly shorter the first passage of flatus or first defecation in intervention group than that in control group [40]. Indication of post-operative pain level reduction was shown by studies conducted in Turkey [25] and Austria [32]. However, none of the included studies reported the reduction in hospital stay duration, which is considered as the primary outcome.

Table 4: Clinical outcomes of chewing gum following gynecological laparoscopic surgery from studies

Year	Country	Samples (gum/control)	Surgical procedures	Improved outcomes	Reference
2018	India	50/51	<ul style="list-style-type: none"> Total laparoscopic hysterectomy Medical Termination of Pregnancy Salpingophorectomy or salpingectomy Diagnostic hysterolaparoscopy Laparoscopic hysterectomy 	Time to first flatus, time to first bowel sound	[1]
2019	Turkey	58/51	<ul style="list-style-type: none"> Laparoscopic hysterectomy 	Time to first flatus, time to first defecation, time to first bowel sound, postoperative pain level	[25]
2015	China	53/56	<ul style="list-style-type: none"> Minor to major laparoscopic surgeries 	Time to first flatus, time to first bowel sounds	[40]
2013	Austria	85/94	<ul style="list-style-type: none"> Salpingophorectomy or salpingectomy Salpingophorectomy Total laparoscopic hysterectomy Myomectomy Ovarian cystectomy Diagnostic laparoscopy 	Time to first flatus, time to first bowel sound, and opioid analgesic requirement	[32]

In conclusive results obtained by the previous studies could be attributed to the heterogeneity in the type of surgery undergone by the patients [28]. Another heterogeneity factor affecting the clinical trial's outcome is the patients' characteristics, such as body mass index and age. Patients with higher body mass index and older age could have increased levels of risk in developing POI. Therefore, studies with different surgical approaches and patient populations could yield different results. Only one study performed the analysis in quartiles based on the body mass index and age of the patients [25]. In comparison to others, the aforementioned study had a significance because they were the first to report the results of chewing gum after total laparoscopic hysterectomy, where chewing gum significantly shortened the time to first defecation and lowered the level of post-operative pain [25]. Other than heterogeneity, the number of participants may also affect the trial's final outcome [27].

There are some limitations of this study. The study had a relatively small number of patients. Besides, the first flatus times were measured in periodic time with long ranges.

Conclusion

Sham feeding by means of chewing gum following the gynecological laparoscopic surgery accelerates the recovery of gastrointestinal functions. More robust RCTs are necessary to reach a conclusive result.

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