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Original Research Article

A Study of Effect of Motility Chewing Gum in Gut after Abdominal Surgery at NMCH Sasaram

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Abstract

Aim: The aim of the present study was to analyze the clinical outcome of effect of chewing gum mainly to avoid post-operative paralytic ileus in post-operative patients of abdominal surgeries.

Methods: The study was conducted in Department of General Surgery, Narayan Medical College and Hospital, Sasaram, Bihar, India for the period of one year. Total 100 patients were enrolled, 50 were cases gum chewing and 50 were controls. This was an interventional (Experimental) prospective study. The intervention was very simple, it was allowing the cases to chew chewing gums after surgery.

Results: Mean duration of hospitalization (days) was 12.8, 12.48 in cases and control groups respectively. Flatus (mean duration of first flatus passed) in hours was 50.9, 67.3 in cases and control groups respectively. Motion (mean duration of first bowel passed) in hours was 93.7, 128.2 in cases and control groups respectively. Bowel sound (mean duration first sound heard) in hours was 21.5, 35.3 in cases of routine surgery, emergency surgeries respectively. Flatus (mean duration of first flatus passed) in hours 47.3, 66.4 in cases of routine surgery, emergency surgeries respectively. Motion (mean duration of first bowel passed) hours 91.6, 119 in cases of routine surgery, emergency surgeries respectively. Bowel sound (mean duration first sound heard) in hours is 37.6, 38.2 in cases of gastric and small bowel surgeries respectively. Flatus (mean duration of first flatus passed) in hours 68.4, 72.8 in cases of gastric and small bowel surgeries respectively. Motion (mean duration of first bowel passed) in hours 123.7, 124.6 in cases of gastric and small bowel surgeries respectively. Bowel sound (mean duration first sound heard) in hours was 23.4, 35.5 in cases of traumatic surgery, pathological surgeries respectively. Flatus (mean duration of first flatus passed) in hours 53.5, 68.2 in cases of traumatic surgery, pathological surgeries respectively. Motion (mean duration of first bowel passed) in hours 100.8, 113.7 in cases of traumatic surgery, pathological surgeries respectively.

Conclusion: It was observed that chewing gum has significant effect over bowel motility as bowel sounds appeared significantly earlier in cases than control and time for first flatus passed and first bowel passed were also noted significantly earlier in cases than controls. Hospital stay of cases were found significantly lesser than control hence simple intervention like chewing can decrease the burden of disease of paralytic ileus from community.

Keywords: Abdominal Surgery, Bowel Function, Chewing Gum, Effectiveness.

Introduction

Normal bowel motility results from complex interactions among the enteric nervous system, central nervous system, hormones, and local factors affecting smooth muscle activity Motility in the stomach and small intestine varies based on whether one is in the fasting or fed state. Compared with fasting, the fed pattern consists of continuous low varying-amplitude, ungrouped contractions whose number, intensity, and duration depend on the food ingested (amount and physical and chemical composition). [1] Postoperative gastrointestinal dysfunction, especially postoperative ileus, is a major contributing factor in discomfort and prolonged hospital stay after abdominal surgery. Gastrointestinal dysfunction can cause the accumulation of secretions and gas, resulting in nausea, vomiting, and abdominal distension and pain. Recovery of gastrointestinal function is an important aspect and demands due attention.

The etiology of postoperative gastrointestinal dysfunction is believed to be multifactorial [2] and contributing factors included the stress response to surgery and the use of perioperative interventions. The severity of gastrointestinal dysfunction depended on the extent of surgical trauma and bowel manipulation. Surgical trauma caused a decrease in bowel motility through activation of sympathetic activity. Associated with the stress response is release of inflammatory mediators such as vasoactive intestinal peptide, substance P and nitric oxide, which contributed to postoperative gastrointestinal dysfunction and ileus. [3-6] Chewing gum is a type of sham feeding that promotes intestinal motility, via cephalic-vagal stimulation. In normal volunteers chewing gum is as effective as food in stimulating cephalic-phase gastric secretion and has therefore been used as a modified form of sham feeding to investigate physiological responses such as gastric secretion. [7,8] Several randomized controlled trials have investigated the effects of gum chewed after abdominal surgery.

The use of chewing gum chewing has emerged as a new and simple modality for decreasing POI. It acts by stimulating intestinal motility through cephalic vagal reflex and by increasing the production of gastrointestinal hormones associated with bowel motility. [9] Recently, it has been proposed that hexitols present in sugarless chewing gums might also be playing a role in the amelioration of POI because these are known to cause gastrointestinal symptoms such as gas, bloating, and abdominal cramps in a dose-dependent manner. The published literature reveals that gum chewing in the postoperative period is a safe method to stimulate bowel motility and it has been shown to reduce ileus and helps to resume early bowel functions normally. [10]

The aim of the present study was to analyze the clinical outcome of effect of chewing gum mainly to avoid post-operative paralytic ileus in post-operative patients of abdominal surgeries.

Materials and Methods

The study was conducted in department of General Surgery,Narayan medical College and Hospital, Sasaram, Bihar, India for the period of one year. Total 100 patients were enrolled, 50 were cases gum chewing and 50 were controls. This was an interventional (Experimental) prospective study. The intervention was very simple, it was allowing the cases to chew chewing gums after surgery. This study was a randomized and controlled clinical trial.

Inclusion Criteria

- Age ≥18 Years
- Satisfactory Consciousness (I.E., Alertness)
- Cooperativeness Toward Chewing
- Underwent Abdominal Surgery
- Any Gender
- Any BMI
- Informed Consent.

Exclusion Criteria

- Age <18 years
- Unconsciousness after surgery
- No teeth or defective or incomplete chewing movement
- Need of long-term fasting and having received total parenteral nutrition
- Pyloric obstruction
- Remnant of gastric cancer
- Recurrence of gastric cancer
- Palliative surgery for advanced gastric cancer
- Refusal to participate in the trial
- Muscular and neurological disorders
- History of drug addiction
- Especially opioids
- Severe water and electrolyte disturbances.

The participants were given a thorough description of the research approach before entering the study. After eligibility had been established and patients provided written informed consent, patients were randomly allocated by a 1:1 ratio to the gum-chewing (Gum) or control (No gum) groups using a computer-generated randomization sequence in our coordinating office. The sequence was then provided to the participating nurses by telephone after the operation. The same surgical group, to ensure technical replication, performed all the operations. All patients remained enrolled until the end of the study.

Statistical Analysis

Summarized data were analyzed using SPSS (version 19.0; SPSS Inc, Chicago, IL). Continuous variables, such as age, duration of surgery, analgesic drug consumption, time to first flatus, and defecation, were presented as the mean±standard deviation. Categorical variables, such as sex, ASA grade, comorbidities, postoperative complications, pain scores, and nausea and vomiting scores were expressed as frequencies. Student t tests were used to compare the means of continuous variables with normal distribution, whereas Mann-Whitney U tests were used for those with nonparametric distribution. Categorical variables were compared using the $\chi 2$ test. For small samples, we used Yate correction for continuity, as appropriate. A probability value ≤ 0.05 ($P \leq 0.05$) was considered significant.

Results

Table 1: Hospitalization duration compared between cases and controls

Patients	Mean duration of hospitalization (days)	±SD
Cases (50)	12.8	2.4
Controls (50)	12.48	2.8
P value	0.038	

Mean duration of hospitalization (days) was 12.8, 12.48 in cases and control groups respectively.

Table 2: Indicators compared between cases and controls

	Bowel sound (mean duration of first sound heard) in hours	± SD	Flatus (mean duration of first flatus passed) inhours	± SD	Motion (mean duration of first bowel passed) nhours	± SD
Cases (50)	25.5	1.3	50.9	0.76	93.7	2.5
Controls(50)	37.3	1.6	67.3	12	128.2	1.78
P Value	<0.001		<0.001		<0.001	

Flatus (mean duration of first flatus passed) in hours was 50.9, 67.3 in cases and control groups respectively. Motion (mean duration of first bowel passed) in hours was 93.7, 128.2 in cases and control groups respectively.

Table 3: Indicators compared between cases in routine and emergency surgeries

Cases	Bowel sound (mean duration of first sound heard)in hours	±SD	Flatus (mean duration of first flatus passed) in hours	±SD	Motion (mean duration of first bowel passed) n hours	±SD
Cases of routinesurgery	21.5	1.7	47.3	0.76	91.6	2.2
Cases of emergency surgeries	35.3	2.5	66.4	1.3	119	0.76
P value	< 0.001		< 0.001		< 0.001	

Bowel sound (mean duration first sound heard) in hours was 21.5, 35.3 in cases of routine surgery, emergency surgeries respectively. Flatus (mean duration of first flatus passed) in hours 47.3, 66.4 in cases of routine surgery, emergency surgeries respectively. Motion (mean duration of first bowel passed) hours 91.6, 119 in cases of routine surgery, emergency surgeries respectively.

Table 4: Indicators compared between cases of gastric and small bowel surgeries

Cases	Bowel sound (mean duration of first sound heard) in hours	±SD	Flatus (mean duration of first flatus passed) in hours	±SD	Motion (mean duration of first bowel passed) nhours	±SD
Cases of gastric surgeries	37.6	3.2	68.4	6.6	123.7	6.8
Cases of small bowel surgeries	38.2	3.7	72.8	3.6	124.6	4.7
P value	0.004		0.012		0.018	

Bowel sound (mean duration first sound heard) in hours is 37.6, 38.2 in cases of gastric and small bowel surgeries respectively. Flatus (mean duration of first flatus passed) in hours 68.4, 72.8 in cases of gastric and small bowel surgeries respectively. Motion (mean duration of first bowel passed) in hours 123.7, 124.6 in cases of gastric and small bowel surgeries respectively.

Table 5: Indicators compared between cases in traumatic and pathological surgeries

Cases	Bowel sound (mean duration of first sound heard)in hours	±SD	Flatus (mean duration of first flatus passed) in hours	±SD	Motion (mean duration of first bowel passed) nhours	±SD
Cases of traumatic surgeries	23.4	2.8	53.5	3.7	100.8	5.5
Cases of pathological surgeries	35.5	3.7	68.2	4.2	113.7	2.7
P value	<0.001		<0.001		<0.001	

Bowel sound (mean duration first sound heard) in hours was 23.4, 35.5 in cases of traumatic surgery, pathological surgeries respectively. Flatus (mean duration of first flatus passed) in hours 53.5, 68.2 in cases of traumatic surgery, pathological surgeries respectively. Motion (mean duration of first bowel passed) in hours 100.8, 113.7 in cases of traumatic surgery, pathological surgeries respectively.

Discussion

Ileus may delay patient recovery following abdominal surgery. [1] The extent of ileus following abdominal surgery is influenced by the degree of surgical trauma and bowel manipulation. [11] The effect of surgical trauma on ileus is mediated through a stress response that results in a state of high sympathetic activity; a known extrinsic inhibitor of intestinal motility. [4] In addition inflammatory mediators such as nitric oxide, vasoactive intestinal peptide, substance P and calcitonin gene-related peptide are released as part of the stress response and these also appear to contribute to postoperative ileus. [3,5,11] The pathophysiology underlying postoperative ileus is complex and multifactorial, consisting of endogenous and pharmacological characteristics. It has been described into 2 distinct phases in which the first phase, or neural phase, results from activation of mechanoreceptors and nociceptors by stimuli, such as incision of the skin and, more importantly, by direct manipulation of the intestine. Activation of these receptors initiates a neural reflex, which is dependent on release of mediators, such as α- calcitonin gene-related peptide and substance P, which inhibit gastrointestinal motility and result in generalized intestinal hypomotility. [5] The neural phase of postoperative ileus lasts minutes to hours and resolves after closure of the wound when the noxious stimuli have ceased. The motility of the colon in particular depends heavily on input from the autonomic nervous system, which might explain colonic susceptibility to isolated and prolonged ileus. [12]

Mean duration of hospitalization (days) was 12.8, 12.48 in cases and control groups respectively. Flatus (mean duration of first flatus passed) in hours was 50.9, 67.3 in cases and control groups respectively. Motion (mean duration of first bowel passed) in hours was 93.7, 128.2 in cases and control groups respectively which was similar to Kouba et al where the time to flatus was shorter in patients who received gum compared with controls (2.4 versus 2.9 days; P <0.001). [13] Flatus (mean duration of first flatus passed) in hours 47.3, 66.4 in cases of routine surgery, emergency surgeries respectively. Motion (mean duration of first bowel passed) hours 91.6, 119 in cases of routine surgery, emergency surgeries respectively. The finding was similar to the study of Terzioglu F et al of Turkey in which the first defecation occurred earlier in the 1st group of women who chew gum, were hydrated orally and were mobilized early after surgery than the other groups. [14] Bowel sound (mean duration first sound heard) in hours was 21.5, 35.3 in cases of routine surgery, emergency surgeries respectively this finding was similar to the study of Watson et al in which the cases of routine surgeries recovered early. [15]

Bowel sound (mean duration first sound heard) in hours was 37.6, 38.2 in cases of gastric and small bowel surgeries respectively. Flatus (mean duration of first flatus passed) in hours 68.4, 72.8 in cases of gastric and small bowel surgeries respectively. Motion (mean duration of first bowel passed) in hours 123.7, 124.6 in cases of gastric and small bowel surgeries respectively. [16] This finding was similar to the study of Matros et al in which the cases of gastric surgeries recovered early. Bowel sound (mean duration first sound heard) in hours was 23.4, 35.5 in cases of traumatic surgery, pathological surgeries respectively. Flatus (mean duration of first flatus passed) in hours 53.5, 68.2 in cases of traumatic surgery, pathological surgeries respectively. Motion (mean duration of first bowel passed) in hours 100.8, 113.7 in cases of traumatic surgery, pathological surgeries respectively. This finding was similar to the study of McCormick et al in which the cases of traumatic surgeries recovered early. [17]

Conclusion

All patients were observed hourly for appearance of first bowel sound. First flatus passed, and first bowel passed and were analysed. It was found that chewing gum have significant effect over bowel motility as bowel sound appear significantly earlier in cases than control and time for first flatus passed and first bowel passed were also found significantly earlier in cases than controls. On comparing routine and emergency surgeries it was found that in routine surgeries among the cases, first bowel sound, first flatus and first bowel passed appears significantly earlier than emergency surgeries owing to effect of duration of surgery, effect of anaesthesia and duration of surgery. First flatus and first bowel passed appears significantly earlier than pathological surgeries owing to effect of underlying pathology over bowel function and patient condition and immunological status of patients. Also, it was found that hospital stay of cases was found significantly lesser than control owing to early enteral feeding, early ambulation, and decreased complications and hence decreased burden of disease from community.

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