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Does abdominal massage improve gastrointestinal functions of intensive care patients with an endotracheal tube?: A randomized clinical trial



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ABSTRACT

Introduction: Gastrointestinal dysfunction is one of the most common problems among patients hospitalized in intensive care units. Currently, medicinal and non-medicinal methods are being used to prevent gastrointestinal problems. Among non-medicinal methods, abdominal massage is considered as a relatively acceptable method. The present study aims to examine the effect of abdominal massage on gastrointestinal functions of the intensive care patients with an endotracheal tube.

Materials and methods: In this clinical trial, 70 intensive care patients with an endotracheal tube were chosen by convenience sampling and allocated to an intervention or a control group randomly. In the intervention group, a 15-min abdominal massage was conducted twice a day for three days, while the control group received only routine cares. The abdominal circumference, gastric residual volume, times of defecation, and frequency of constipation were measured.

Results: Gastric residual volume decreased significantly in the intervention group and increased significantly in the control group; however, there was no significant difference between two groups ($P = .15$). There was a significant difference between two groups regarding abdominal circumference and it was decreased in the intervention group ($P < .001$). The defecation times significantly increased in the intervention group ($P = .002$). After the intervention, the prevalence of constipation was significantly decreased in the intervention group ($P = .008$).

Conclusion: The results revealed that abdominal massage could improve gastrointestinal functions in enterally fed patients with an endotracheal tube. It is suggested to use abdominal massage as an adjunct therapy for improving gastrointestinal functions in intensive care patients.

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1. Introduction

The intensive care patients face several digestive problems including damage to digestive mucosa due to stress, increase of residual volume, diarrhea, constipation, and malnutrition [1]. Therefore, proper nutrition and nutritional support are important in caring and treating patients especially ones in intensive care units. Researches show that appropriate and timely nutritional support improves outcomes of patients hospitalized in intensive care units [2]. Based on guidelines and patient's status, enteral or

venous nutrition support is applied [2]. Enteral nutrition (EN) is a common method used in patients incapable of having food via mouth, which reduces infection, catabolic responses, developing gastric ulcers, and hospital length of stay [3]. The main role of enteral nutrition is to maintain structure and function of the gastrointestinal mucosal barrier, to improve the movement of the digestive system, and to prevent side effects of infection and high costs of venous nutrition [4].

Although enteral nutrition is appropriate, there are side effects such as reflux, aspiration, diarrhea, abdominal distention, constipation, and intestinal ischemia. They were reported by 62% of patients who received this type of nutrition [5,6]. Constipation is a digestive side effect in intensive care patients which has not been paid much attention. Immobility, hypotension, use of vasopressors

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and narcotics, and lack of access to appropriate facilities and conditions are among causes of developing constipation. Constipation increases the time of mechanical ventilation, so it prolongs the length of stay in intensive care units [1]. Gastroparesis is another great problem of intensive care patients who are fed by a gastric tube; 40–60% of patients reported gastroparesis. Gastroparesis increases residual volume which leads to the limitation of nutrition and malnutrition of patients [7]. 43% of intensive care patients, due to receiving low amounts of foods and the increase of residual volume, suffer from malnutrition [2]. The comparison between the patients who could not tolerate enteral feeding versus those who could do showed that the former group received low amounts of diets and had a poor prognosis of the length of stay and mortality in intensive care units [8]. In addition, digestive problems in mechanically ventilated patients (such as residual volume) had a significant correlation with developing hospital infections [9]. As a matter of fact, it is not common to completely stop enteral nutrition because of such problems, but such side effects can influence strictly on sufficient energy and protein uptake [5].

At the moment, many different medicinal and non-medicinal methods are used to prevent gastrointestinal problems such as semi-Fowler's position, feeding by naso-jejenum tube, and drug prescription for stimulating the movements of the digestive system such as erythromycin and metoclopramide. The last two methods improve the digestive function and intestinal movements in intensive care patients. Studies indicated that promotility agents were not effective enough on the function of the digestive system, and they caused some side effects as well [7]. 80% of patients with constipation are taking different types of laxative medications [10]. Use of laxative medications is the most common method in the management of constipation, but the use of such medications for a long time will cause some side effects [11].

Recently, massage therapy and other types of complementary medicine have been taken into consideration especially in palliative cares [12,13]. Massage is a therapeutic method with a long history in medicine and it was mostly used in the late 19th century and early 20th century. Abdominal massage has been addressed as a method to increase movements of the digestive system and as a result to reduce constipation [10]. It seems that abdominal massage increases peristalsis, changes abdominal pressure, and forms a mechanical and reflexive effect. Therefore, the passage of the foods and nutrients from the digestive system is accelerated which leads to the reduction of pain and constipation [3,14].

A few studies have been conducted in different countries with this regard. Kahraman and Ozdemire conducted a research on Turkish intensive care patients in 2014. Results showed that abdominal massage in mechanically ventilated patients fed by a gastric tube reduced the residual volume and distention [15]. Ayas et al. studied the effect of abdominal massage on the intestinal function in patients with spinal cord injury in 2006. Results indicated that constipation, abdominal pain, difficult defecation, and the time of emptying were not significantly different before and after the abdominal massage, but a significant difference was seen in the amount of distention, fecal incontinence, and the average times of defecation before and after abdominal massage [16]. Uysal et al. (2012) studied the effect of abdominal massage on the residual volume in patients hospitalized in the neurosurgical-medical intensive care unit. Results showed that abdominal massage reduced the residual volume and distention of patients fed by a naso-gastric tube. In addition, 4 patients in the control group suffered from vomiting while no patients vomited in the intervention group [3]. In addition, some other studies revealed that abdominal massage reduced constipation in patients with multiple sclerosis [17], chronic constipation [14], and cancer [18] with no adverse effects [17].

The literature review showed that a few studies examined the effect of abdominal massage on the gastrointestinal function [3,14–18]. Most of them focused on constipation [14,17,18] and residual volume [3,15,16]. Furthermore, the population under study was different in these studies. Some studies focused on conscious patients [14,17,18] and few studies focused on unconscious patients hospitalized in intensive care units [3,15]. The type of interventions, the process and the number of abdominal massages were various in different studies [7,9,19–21]. Therefore, according to the literature, the effect of abdominal massage on the gastrointestinal function cannot be confirmed or rejected in unconscious patients hospitalized in intensive care units. As abdominal massage is inexpensive and has fewer side effects, it could be a good adjunct care with common medicinal and invasive methods which have many side effects [11]. Therefore, the present study aims to examine the effect of abdominal massage on the digestive function of intensive care patients with an endotracheal tube.

2. Materials and methods

2.1. Study design and setting

This was a randomized clinical trial. The research setting was trauma intensive care units (4 wards) in Shahid Bahonar Hospital in Kerman, Iran. This Hospital is the center of trauma intensive care in the southeast of Iran.

2.2. Sample size and sampling

The study sample size of 52 patients (26 interventions and 26 controls) was powered enough (80%) to detect a mean difference of gastric residual volume (GRV) of at least 37.9^{cc}; our assumption for such calculation was the result of the previous study (GRV: $\mu_1 = 105$, $\mu_2 = 142.91$, $S_1 = 15.3$, and $S_2 = 66.75$) [3]. However, regarding the probability of drops out and to increase the power of our study, 41 samples and 38 samples were assigned in intervention and control group respectively (totally 79 samples).

We conveniently selected intensive care patients with an endotracheal tube who were being fed by nasogastric tube. Inclusion criteria were: being between 18 and 75 years old [9], not taking prokinetic medications such as metoclopramide and anticholinergic medications such as atropine [20], not experiencing radiotherapy and abdominal surgery during recent 6 weeks [15], no contraindication for abdominal massage such as cellulite, abdominal tumors, peritonitis, abdominal aneurysm, and ascites (according to physician diagnosis), and Glasgow Coma Scale (GCS) less than 9 [9]. Moreover, we excluded patients who were being NPO due to laboratory tests and surgical procedures, had diarrhea (having three or more watery defecation with amount of 200–250 cc per day) [15], hyperglycemia (blood sugar above 200) and hypokalemia (blood potassium below 3.5) [20], were developed gastrointestinal bleeding (according to physician diagnosis) or ascites [7], were suffered from spinal cord injury, could not properly positioned for massage due to severe trauma, and were extubated or discharged from the ICU during the intervention period [7].

The eligible patients then were allocated into a control or an intervention group using the stratified random method (using sex, age (± 2), and being addicted as stratums).

2.3. Measures

In the present study, a checklist was used to collect information. The checklist contained demographic, background information, and some information about gastrointestinal functions. The form of demographic and background information included code, age,

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