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The Effect of Green Tea Gargle Solution on Sore Throat After Coronary Artery Bypass Grafting: A Randomized Clinical Trial

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Abstract

Background: Tracheal intubation is an essential method of keeping the airway open in patients under general anesthesia. Sore throat is a prevalent complication after endotracheal intubation.
Objectives: The aim of this study was to investigate the effect of green tea gargling on sore throat after coronary artery bypass grafting (CABG).
Patients and Methods: This was a single-blind, randomized clinical trial, in which 121 patients who had undergone CABG were divided into two groups: those who gargled distilled water and those who gargled a green tea solution. An hour after extubation, the patients of the intervention group were asked to gargle 30 cc of green tea, and the patients of the control group were asked to gargle 30 cc of distilled water, every 6 hours for up to 24 hours (four times per patient). A sore throat questionnaire was filled out 6, 12, and 24 hours after endotracheal extubation.
Results: The results showed that there were no significant differences between the two groups with regard to patient age, sex, body mass index, smoking background, and duration of anesthesia. There was no significant difference between the two groups in terms of sore throat before the intervention (P = 0.461) and 6 hours after the intervention (P = 0.901). However, a significant difference was observed between the two groups in terms of sore throat 12 hours (P = 0.047) and 24 hours (P < 0.001) after removing the endotracheal tube.
Conclusions: Gargling a green tea solution, an anti-inflammatory, natural, and harmless substance, can reduce the pain of sore throat in patients after endotracheal extubation.

Keywords: Coronary Artery Bypass Grafting (CABG), Sore Throat, Intubation

1. Background

Coronary artery bypass grafting (CABG) has been one of the most commonly performed heart surgeries for over two decades; its goals are to relieve angina pain and preserve the heart muscle function (1). For open cardiac surgery, patients undergo general anesthesia and are consequently moved to the intensive care unit (ICU) to recover from the anesthesia and gain consciousness (2).

Endotracheal intubation is a fundamental method of controlling and maintaining the airway while a patient is under general anesthesia. This method is normally performed in unconscious patients with a laryngoscope after the head is placed in a suitable position, in order to keep the airway direct and straight (3). Sore throat is a common problem after endotracheal intubation. Postoperative sore throat (POST) is a minor complication, but it can cause patients a great deal of discomfort (4). Superficial abrasion, inflammation, and airway mucus abrasion are mainly experienced in the larynx due to contact with the tools and instruments (5). The prevalence rate of sore throat ranges from 12% to 50% (4, 6, 7). This problem occurs 1 - 24 hours after removal of the endotracheal tube, and recovery occurs after 5 - 7 days (8). The type and size of the endotracheal tube (7), lubrication of the endotracheal tube with water-soluble jelly, the duration of the surgical operation (9), and the medicines used during anesthesia are all potential factors in sore throat after endotracheal intubation (10).

There are different pharmacological and non-pharmacological methods for treating this problem (7). Some medicinal treatments include beclomethasone oral inhalation and an azulene sulfonate gargling solu-

tion (11), aspirin and benzydamine hydrochloride (12), lidocaine gel and intravascular injection of lidocaine (10), lubricants (13), and application of dexamethasone during tube removal (14). The effect of a licorice gargle solution on sore throat after anesthesia and unconsciousness has been studied (15), with the results showing that it can reduce the cause and intensity of sore throat. In spite of prevention, treatment, and attempts to reduce the effects of endotracheal intubation, it appears that the prevalence of these effects is high (16).

Green tea has been used since 3,000 BC (17), and its anti-inflammatory and antioxidant properties have been proven (18). Green tea contains caffeine, catechins, polyphenol, vitamins B, C, and E, flavonoids, glycoproteins, fiber, and carotenoids (19). Glycoproteins have different bioactivities, such as anti-inflammatory properties (20). Since inflammation is the main cause of sore throat after endotracheal extubation (8) and anti-inflammatory medicines are helpful in reducing these effects (8, 21), green tea may also be effective in the reduction of these symptoms. Thus, the present study was performed with the belief that green tea is a natural, anti-inflammatory, and harmless substance that can reduce the prevalence of sore throat.

2. Objectives

The purpose of this study was to examine the effect of a green tea gargle on sore throat after removal of endotracheal tubes in post-CABG patients.

3. Patients and Methods

This was an interferential, witnessed, randomized, clinical, experimental, single-blind study performed on 121 patients who had undergone CABG and were admitted to the intensive care unit (ICU) of Mazandaran heart center of Mazandaran University of Medical Sciences in northern Iran. The approval of the ethics committee of Mazandaran University of Medical Sciences was obtained on September 7, 2014.

The inclusion criteria of the study included an age of 30 - 70 years, a willingness to enter the study (22), no history of sore throat or a cold during the last week, and no addiction to narcotic drugs. The exclusion criteria were intubation taking more than 30 seconds (23), a Mallampati score of higher than 2, more than one attempt to intubate (24), active infection of the airway, an allergy to green tea (15), or having undergone the cricoid pressure technique (25). In addition, patients who were intubated for over 16 hours in the ICU, and patients with risky dysrhythmia, hemorrhage, reduced consciousness, or any communication problems were excluded (26). Therefore, 130 patients entered the study and were randomized into two groups: experimental and control. After explaining the project and obtaining written consent from the chosen patients, the first checklist, which contained demographic and medical information, was completed. The checklist was filled out in the operating room and before anesthesia in both groups. The patients were anesthetized in the same way and with the same anesthesia drug. All of the patients were intubated with the same type of endotracheal tube, made by Supa Company in Tehran, Iran (with a Macintosh laryngoscope blade) (27). For all male patients, 6.5 mm and 7 mm endotracheal tubes were used, and for all female patients, 6 mm and 6.5 mm tubes were applied. Endotracheal tube cuff pressure during the surgery and in the ICU was in the range of 10 - 20 cm of water. After the operation, each patient was transferred to the ICU and placed under supervision. Within 4 - 16 hours after entering the ICU, the endotracheal tubes were removed according to a checklist and under the supervision of an anesthesiologist. All tubes were removed using the same method. An hour after tube removal, when patients were able to communicate, the sore throat questionnaire was completed, and the visual analog scale (VAS) criterion was used to evaluate sore throat. This scale is the most commonly used method of measuring pain. In addition to its validity and reliability, the most important characteristic of this tool is that it is easy to use and is simple for patients to understand. The useful function of VAS has been investigated for clinical studies. It is a 10-point tool in which 0 represents lack of pain and 10 represents intense pain (7). The patients in the experimental group were asked to gargle 30 cc of green tea solution at room temperature, while the patients in the control group gargled 30 cc of distilled water at room temperature. The patients of both groups gargled their prescribed solutions every 6 hours for up to 24 hours after tube removal. During the intervention, the sore throat questionnaire was filled out by a nurse (who was uninformed of the identity of the control and intervention groups) 1, 6, 12, and 24 hours after removal of the endotracheal tube. It should be mentioned that the sore throat questionnaire was filled out for the first time an hour after tube removal and before gargling the green tea or distilled water, to compare the two groups with regard to sore throat at baseline, before any intervention.

3.1. Analysis

In the present study, descriptive and inferential statistics were used to analyze the data. Descriptive statistics, such as frequency distribution, median, and standard deviation, were used for demographic characteristics. To com-

pare pain at different times in the two groups, ANOVA, Student's independent t-test, and the chi-square test were used.

4. Results

In this study, of the total 130 patients, nine were excluded. These were five patients who were intubated twice, two who had a Mallampti score of > 2, one who removed his endotracheal tube himself in the ICU, and one who was unconscious for more than 16 hours. Of the 121 remaining patients (62 males and 59 females), 58 were in the experimental group and 63 were in the control group. The average age of the patients was 58.03 years. The results indicated that the patients in the two groups did not differ significantly in terms of age, sex, body mass index, smoking background, and duration of anesthetic-induced unconsciousness (Table 1).

Furthermore, the results suggest that there was no significant difference between the two groups in terms of sore throat before the intervention (P = 0.461). This result was reported 6 hours after endotracheal tube removal (P = 0.901). A significant difference was observed between the groups with regard to sore throat 12 hours (P = 0.047) and 24 hours (P < 0.001) after endotracheal tube removal (Table 2).

Table 1. Comparison Between the Two Groups in Terms of Demographic and Clinical Characteristics[a]

Value	Experimental Group, n = 58	Control Group, n = 63	P Value
Sex, male/female	29/29	33/30	0.794
Age, y	57.7 ± 6.4	58.2 ± 7.8	0.688
Intubation time, hours	11.3 ± 3.06	11.4 ± 4.1	0.825
Body mass index, kg/m²	26.4 ± 3.4	26.3 ± 3.4	0.897
Smoker, yes/no	14/44	16/47	0.813
History of diabetes, yes/no	14/44	15/48	0.966

[a]Values are expressed as mean ± SD or number.

Table 2. Average Pain at Different Times After Extubation[a]

Times, Hour	Moderate Pain in Intervention Group	Moderate Pain in Control Group	P Value
1	2.6552 ± 1.68	2.8730 ± 1.69	0.461
6	2.9655 ± 1.60	3.0000 ± 1.69	0.901
12	1.4655 ± 0.73	1.8730 ± 1.46	0.047
24	1.2414 ± 0.47	1.7460 ± 0.87	< 0.001

[a]Values are expressed as mean ± SD.

5. Discussion

This study was conducted to explore the effect of green tea gargling on sore throat caused by intubation in patients after CABG surgery. The results showed that green tea gargling was effective against sore throat 12 and 24 hours after removal of endotracheal tubes; the patients who gargled green tea felt less pain. Ghaleb et al. (15) studied the effect of a licorice gargle on sore throat after surgery and found that the prevalence of sore throat in the experimental group differed significantly from that of the control group. This finding was in agreement with the present study. In another study by Canbay et al. (28), the effect of a ketamine gargle on sore throat was investigated and was found to reduce sore throat after surgery. In another study, the effect of lidocaine spray was investigated and was found to be ineffective, having no effect on the endotracheal tube cuff before endotracheal intubation and on sore throat after surgery (29). This was not in accordance with results of the present study. The reason for this difference is that inflammation occurs in the trachea; thus, anti-inflammatory medicines are more effective than topical analgesia (8). In a study by Park et al. (30) that investigated the inhibition effect of dexamethasone on sore throat after surgery, the results showed that it had a positive effect. This was in agreement with the findings of the present study. In previous studies, patient age, sex, weight, and smoking background were presented as factors effecting sore throat after surgery (4, 12, 31). In the present study, the two groups were the same in terms of these aspects, with no significant differences. In another study on the effect of aspirin gargling and benzydamine hydrochloride gargling, the results showed that these two solutions reduced sore throat after surgery in all cases. Moreover, the benzydamine gargle 12 and 24 hours after surgery reduced sore throat more than did the aspirin gargle (14). This is in agreement with the results of our study, which showed that sore throat was reduced 12 and 24 hours after surgery and removal of endotracheal tubes. In the present study, 24 hours after tube removal, no patients in either of the groups had severe sore throat. This indicates that inflammation in the throat reduces with the passage of time without any intervention. However, the green tea gargle reduced the prevalence and intensity of sore throat due to its combination of glycoprotein and catechins. Therefore, the prevalence and intensity of sore throat was lower in those who gargled green tea solution than in the control

group. Glycoproteins have biological activities, such as anti-inflammatory effects. Catechins come from polyphenols, and four main groups of catechins have been identified in green tea leaves: epigallocaechin gallate (EGCG), epicatechin (EC), epicatechin gallate (ECG), and epigallocatechin (EGC). EGCG is a main compound of green tea polyphenols, which have anti-inflammatory effects (17). Studies on the effects of intubation have mainly investigated performance techniques and various drugs, such as anti-inflammatories, topical analgesics, and painkillers. It appears that gargling green tea, which is a beneficial and harmless technique used since ancient times, can be effective in reducing sore throat caused by the endotracheal tube during surgery.

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Footnote

Authors' Contribution: Mohammad Reza Ariaeifar participated in the study design, data collection, and drafting of the manuscript. Hedayat Jafari participated in the study design, statistical analysis, and supervision, and approved the final manuscript. Jamshid Yazdani performed statistical analyses. Aria Solimani helped with data collection, and Ebrahim Nasiri Formi helped us in approving the final manuscript.

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