

# Influence of Oral Care with Yunnan Baiyao on Post-Operative Pain in Severe Obstructive Sleep Apnea-Hypopnea Syndrome Patients

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**Abstract:** (1) Background: Obstructive sleep apnea-hypopnea syndrome (OSAHS) refers to a clinical syndrome in which a series of pathophysiological changes occur in the body due to various causes of repeated apnea and/or hypopnea, hypercapnia, and sleep interruption in sleep. Surgery is an important way to treat OSAHS. Postoperative oral care causes wound pain. However, effective oral care is an important measure to prevent wound infection and ensure wound healing. Our goal is to study the influence of oral care with Yunnan Baiyao on post-operative pain of severe obstructive sleep apnea-hypopnea syndrome patients. (2) Methods: Randomization was used to separate 108 severe OSAHS patients into experimental ( $n = 54$ ) and control groups ( $n = 54$ ). Post-operatively, conventional mouth care was used for the control group and oral care with Yunnan Baiyao was used for the experimental group, then the pain scores in the resting and swallowing states was assessed in both groups of patients before and after mouth care. (3) Results: From the third day post-operatively, the resting state pain in the experimental group was relieved compared with the control group ( $P < 0.05$ ). From the fourth day post-operatively, the resting and swallowing state pain in the experimental group was relieved compared with the control group ( $P < 0.05$ ). (4) Conclusion: Oral care with Yunnan Baiyao significantly relieved pain, prevented surgical site infections, bleeding and other complications, and promoted recovery.

**Keywords:** Oral Care, Severe OSAHS, Yunnan Baiyao, Post-Operative Pain

## 1. Introduction

Obstructive sleep apnea-hypopnea syndrome (OSAHS) is a common sleep-disordered breathing disease. The patients often have hypertension, diabetes, cardiovascular, and cerebrovascular diseases due to long-term snoring and labored breathing during sleep, and may have cardiac arrest in severe cases, together which will seriously affect patients' work and quality of life. Surgery is an important treatment method for patients with OSAHS. However, surgical wounds cause uncomfortable symptoms, such as regional pain and dysphagia [1]. Although medical staff have paid more

attention to post-operative analgesia for patients with OSAHS in recent years, post-operative analgesia is still unsatisfactory [2]. Yunnan Baiyao is a famous traditional Chinese medicine in Yunnan. It is grayish yellow to light brown yellow powder. It has specific aroma, slightly cool taste, numb tongue, and can relieve pain. It can remove blood stasis and stop bleeding. It has effects of detoxification and detumescence. In this study, oral care with Yunnan Baiyao was used to clean the patient's mouth, reduce food residue in the mouth, inhibit bacterial reproduction, reduce the occurrence of surgical site bleeding, infection, and other complications, relieve patient pain, shorten the time to resume eating, and promote recovery.

## 2. Materials and Methods

### 2.1. General Data

One hundred eight patients who underwent surgery due to severe OSAHS in the Otolaryngology Department of our hospital from January to December 2019 were selected, including 38 females and 70 males. A random number table was used to divide the patients into experimental ( $n=54$ ) and control groups ( $n=54$ ). The inclusion criteria were as follows: > 18 years of age; diagnosed with severe OSAHS with polysomnography; and receives expanded uvulopalatopharyngoplasty (UPPP)+ tongue plasma ablation. The exclusion criteria were as follows: long history of treatment with analgesics and sedatives; history of drug abuse; allergic to opiates; history of hypertension, myocardial infarction, coronary insufficiency, and liver disease; and history of elevated intracranial pressure.

### 2.2. Methods

#### 2.2.1. Control Group

Number 18 hemostatic forceps were used to clip cotton balls soaked in 0.9% normal saline (no water should drip from the cotton ball) to conduct conventional mouth care 30 min after breakfast, lunch, and supper, and before sleep. We first wiped the surgical site in the pharynx, then wiped the soft palate, hard palate, surfaces of the upper teeth, lingual surface, the sublingual area (when wiping the sublingual area, we placed the cotton ball under the tongue due to limitations of tongue body motions, then wiped along a U-shaped line), surfaces of the lower teeth, both cheeks, and the lips.

#### 2.2.2. Experimental Group

The patients were given Yunnan Baiyao oral care four times a day (8:00-12:00-16:00-21:00): after completing the oral care method of the control group, Yunnan Baiyao Powder was evenly sprayed on the operation area or ulcer area 5-10cm away from the wound, and the effective spray amount was about 3-4spray, so that the wound surface was covered with a thin layer of powder. Tell the patient not to gargle or eat within 30 minutes.

#### 2.2.3. Pain Assessment

A visual analogue scale (VAS) [3] was used to assess pain, as follows: 0, no pain; 1~3, slight pain which was not unbearable; 4~6, patient feels the pain and the pain is not unbearable, but the pain affects sleep; and 7~10, patient feels strong pain and cannot bear. Before post-operative mouth care and 12, 24, 48, 72, and 96 h after mouth care, rest pain and swallowing pain scores were assessed. The nurse recorded the pain scores. All nurses were trained on pain assessment and provided guidance for the correct pain assessment method before and after surgery.

#### 2.3. Observation Indicators

The following information in the two groups of patients was recorded: age; gender; body mass index (BMI); changes in rest and swallowing VAS scores before and 12, 24, 48, 72, and 96 h after post-operative mouth care; time when the patient started to eat post-operatively; mouth cleanliness (score according to the entries in the mouth cleanliness questionnaire: Grade I,  $\leq 8$ ; Grade II, 9-16; and Grade III, 17-24); facing the patient at a distance of approximately 10 cm; asking the patient to close the mouth and breathe through the nose for 1 min, then open the mouth to exhale; checking whether a peculiar smell existed; and the wound healing conditions (good: the wound surface shrinks, the seepage decreases, and granulation tissue grows; bad: the wound surface expands and the seepage increases [4]).

#### 2.4. Statistical Method

SPSS19.0 statistical software was used to analyze the data. The measurement data are expressed as the mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ). Variance analysis and t-tests were used for comparison among groups with a normal distribution. Differences were statistically significant at a  $P < 0.05$ .

## 3. Results

### 3.1. General Data

The two groups of patients were comparable with respect to age, gender, and BMI ( $P > 0.05$ , Table 1).

Table 1. Comparison of general data from the two groups of patients.

	Age ( $\bar{x} \pm s$ , years)	Gender (n)		BMI ( $\bar{x} \pm s$ , kg/m <sup>2</sup> )
		Male	Female	
Experimental group (n=54)	36.03 $\pm$ 9.12	38	16	25.91 $\pm$ 3.32
Control group (n=54)	32.95 $\pm$ 7.12	32	22	27.17 $\pm$ 2.84
t/ $\chi^2$	1.261 <sup>a</sup>	0.217 <sup>b</sup>		1.384 <sup>a</sup>
P	0.213 <sup>a</sup>	0.642 <sup>b</sup>		0.172 <sup>a</sup>

Note: <sup>a</sup>: T-test of two independent samples; <sup>b</sup>:  $\chi^2$  test of four-fold table data.

### 3.2. Changes in Pain Score

The changes in rest and swallowing pain were compared before and 12, 24, 48, 72, and 96 h after 2 post-operative mouth care methods (Table 2). Forty-eight hours post-operatively, the rest and swallowing pain of the patients

in the experimental group were relieved compared with the control group, and the difference was statistically significant ( $P < 0.05$ ). Post-operatively, the time that elapsed for the patients in the experimental group to begin a liquid or semi-liquid diet was shorter than the control group, and the difference was statistically significant ( $P < 0.05$ ).

**Table 2.** Comparison of changes in rest and swallowing pain at different times and the time elapsed before beginning a diet in the two groups of patients ( $\bar{x} \pm s$ ).

	Rest		<i>t</i>	<i>P</i>	Swallowing		<i>t</i>	<i>P</i>
	Experimental group	Control group			Experimental group	Control group		
12 h post-operatively	0.01±0.69	-0.44±0.69	1.411	0.093	-0.32±0.57	-0.39±0.61	4.37	0.691
24 h post-operatively	-0.16±0.64	0.28±1.07	1.712	0.054	0.03±1.17	-0.22±1.06	0.762	0.603
48 h post-operatively	-0.39±0.61	-0.16±0.37	1.073	0.023	-0.05±0.23	-0.00±0.07	0.982	0.042
72 h post-operatively	-0.34±0.58	-0.19±0.39	0.975	0.012	-0.24±0.49	-0.16±0.55	1.102	0.039
96 h post-operatively	-0.40±0.62	-0.22±0.47	0.991	0.015	-0.33±0.45	-0.17±0.36	1.055	0.020
Time elapsed to begin a liquid diet (h)	-	-	-	-	12.39±10.27	20.24±14.11	0.953	0.048
Time elapsed to begin a semi-liquid diet (h)	-	-	-	-	29.42±18.23	45.38±21.09	0.984	0.041

### 3.3. Oral Health and Wound Healing Conditions

The oral health and Wound healing conditions of the two groups were compared 96h after operation (Table 3). The difference of mouth cleanliness ( $P = 0.039$ ), halitosis ( $P = 0.038$ ), and wound healing ( $P = 0.037$ ) between the experimental group and the control group were statistically significant.

**Table 3.** Comparison of mouth care effects in the two groups of patients (%).

	Mouth cleanliness			Halitosis		Wound healing	
	Grade I	Grade II	Grade III	Yes	No	Good	Bad
Experimental group (n=54)	87.04	92.59	3.70	5.56	94.44	98.15	1.85
Control group (n=54)	62.96	27.78	9.26	18.52	81.48	85.19	14.81
$\chi^2$	8.372			4.285		4.364	
<i>P</i>	0.039			0.038		0.037	

## 4. Discussion

OSAS is a common and frequently occurring disease that is related to multisystem disciplines. OSAHS patients repeatedly have apneic episodes during sleep, which causes hypoxemia and hypercapnia. Furthermore, hypoxemia and hypercapnia stimulate the release of catecholamines, renin, and angiotensin, then causes disorders in autonomic nerve function and endocrine metabolism and increases blood pressure, thus resulting in changes in multiple organs and systems, such as the heart, lungs, brain, and kidneys [5]. OSAHS is an independent risk factor for the occurrence and development of cardiovascular, cerebrovascular, and metabolic diseases [6], and severely affects human health and the quality of life. Because the standards of living have improved, the obese population has increased and the prevalence of OSAHS has increased accordingly [6].

UPPP + tongue plasma ablation is a common surgical method for OSAHS treatment; post-operative pain and dysphagia are the most common complications [8-9]. Expanded UPPP for patients with severe OSAHS will leave a large wound surface with increased pain and dysphagia. Post-operatively, the patients often refuse to eat due to pain and discomfort in the surgical field. Mouth movements are weakened, the mouth opening is restricted due to pain, and the oral and pharyngeal lacunae are irregular and concealed, which cause poor mouth care and bad oral hygiene, increase the probability of surgical site infections, and aggravate the pain. Mouth care can clean mouth, whet the appetite, relieve pain, build up the patient's resistance, and prevent the occurrence of surgical site infections, bleeding, and other

complications [10]. Zeru Pan [11] used the new atomization device to implement the atomization inhalation of Yunnan Baiyao for the patients after uvulopalatopharyngoplasty, which effectively reduced the postoperative pain of the patients, achieved remarkable results and promoted the patients' health.

Due to the need of surgical anesthesia through pharyngeal intubation, resulting in uvula swelling, combined with the inevitable injury of pharyngeal constrictor muscle, most patients will have sore throat after operation. Sore throat will affect the patient's swallowing function, increase secretion, and even cause laryngeal obstruction. After OSAHS surgery, mouth care is usually performed by cleansing with mouthwash. The thick oral secretions are not easily removed, because a large number of bacteria remain in the mouth, and the mouthwash cannot fully contact the surgical site due to the pharyngeal cavity surgical site, uvula, motion limitations of the tongue, and pharyngeal cavity regurgitation. Therefore, the thick oral secretions cannot be completely removed. Repeated wiping can easily damage the surgical incision and increase patient pain [12]. In this study, Yunnan Baiyao oral care method was applied to patients with severe OSAHS after operation. Under the condition of pharyngeal reflux and limited tongue movement, the pseudomembrane, scab skin, blood scab, plaque and residual dirt in the mouth were removed. At the same time, Yunnan Baiyao powder can stay in the pharynx for a long time to effectively play the role of anti-inflammatory and anti-oxidation. To keep the wound clean, reduce oral pain, promote the regeneration of damaged mucosal epithelial cells, and promote wound healing.

Expanded UPPP changes the natural anatomic structure of the pharynx, increases hyoid movement time, prolongs the retention duration of swallowed food, and reduces the pharyngeal contraction time. When the patient swallows after surgery, the food will cause pain when passing the swollen wound, then the patient will have difficulty in swallowing [13-14]. This study showed that Yunnan Baiyao oral care can shorten the time for severe OSAHS patients to tolerate a liquid or semi-liquid food diet after surgery, promote patients to return to the normal diet state, ensure nutrition, and facilitate recovery.

Yunnan Baiyao oral care for severe OSAHS patients cannot only effectively remove the dirt remaining in the mouth, keep the mouth clean, reduce the risk of infection, and reduce the pain of the patient, but also can shorten the time for the patient to start eating post-operatively, reduce halitosis, improve comfort, and promote wound healing and disease recovery. Therefore, flush suction mouth care is worthy of popularization and application in clinical care.

## 5. Conclusions

Through the improvement of oral care measures, it was proved that Yunnan Baiyao oral care significantly relieved post-operative pain in severe Obstructive Sleep Apnea-Hypopnea Syndrome Patients, prevented surgical site infections, bleeding and other complications, and promoted recovery.

## Author Contributions

Conceptualization, Y. L. and G. L.; methodology, S. Z.; software, G. L.; validation, Y. L., H. J. and H. W.; formal analysis, J. Z.; investigation, Q. L.; resources, H. J.; data curation, H. W.; writing—original draft preparation, G. L.; writing—review and editing, J. Z.; visualization, Y. L.; supervision, S. Z.; project administration, Y. L.; funding acquisition, S. Z. All authors have read and agreed to the published version of the manuscript.

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## Conflicts of Interest

The authors declare no conflict of interest.

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