

The Effect of Tetracaine Gel in Male Patients with Indwelling Catheterization on Agitation and Urethral Irritation During Recovery from General Anesthesia

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Abstract: *Objective:* To observe the effect of tetracaine mucilage applied to male patients with indwelling urinary catheter on agitation and urethral irritation during recovery from general anesthesia. *Methods:* A total of 60 male patients who were scheduled to undergo thoracoscopic radical resection of lung cancer under general anesthesia in our hospital from January 2022 to May 2022 were selected and randomly divided into two groups according to the random number table method, 30 cases/group. Control group: lubricate the anterior end of the catheter and urethral mucosa with liquid paraffin oil after general anesthesia double-lumen bronchial intubation; experimental group: use 1-2 g tetracaine gel to fully lubricate the anterior end of the catheter and urethral mucosa, and then the two groups All patients underwent conventional catheterization. The Ricker sedation-agitation score (SAS) scale was used to evaluate the agitation of the two groups of patients during the recovery period, and the degree of urethral stimulation in the two groups of patients during the recovery period was also recorded. Results: Compared with the control group, the incidence of agitation during recovery and the degree of urethral irritation in the experimental group were significantly reduced, and the difference was statistically significant ($P < 0.05$). *Conclusion:* Tetracaine gel applied to male patients with indwelling catheter after general anesthesia can significantly reduce agitation and urethral irritation during recovery from general anesthesia.

Keywords: Tetracaine, General Anesthesia, Indwelling Catheter, Nursing

1. Introduction

For major surgeries with long estimated time, such as thoracic surgery, preoperative indwelling catheterization is a necessary treatment for most patients undergoing surgery, which can keep the perineum clean, avoid urinary retention, and facilitate anesthesiologists to evaluate patients' systemic perfusion. [1-2] Due to the medical concept of painless and comfortable, more and more surgeries use catheterization after anesthesia to eliminate patients' tension and anxiety. However, because the catheter is inserted into the patient in the unconscious state, the urethral mucosa has not undergone the process of adaptation to the catheter, and it is prone to emergence agitation (EA) and urinary duct related bladder irritation (CRBD) in patients under general anesthesia. [3-4] Patients with severe agitation may have the phenomenon of self-removal of the catheter. Studies have shown

that the application of tetracaine gel to the catheter and urethral opening can reduce the incidence of agitation during the recovery period of patients, and reduce the degree and incidence of urethral irritation symptoms. [5-6] In order to further clarify the intervention effect, this study observed the effects of tetracaine gel applied to indwelling catheterization of male patients on agitation and urethral stimulation response during the recovery period of general anesthesia, and the results were described as follows:

2. Data and Methods

2.1. Research Object

A total of 60 male patients undergoing thoracoscopic radical lung cancer surgery under general anesthesia in the Department of Thoracic Surgery of The General Hospital of

Western Theater Command from January 2022 to May 2022 were selected as the study objects. Inclusion criteria:

1. ≥ 18 years old, male, ASA grade I-III;
2. Thoracoscopic radical resection of lung cancer was performed in the operating room;
3. General anesthesia, double-cavity tracheal intubation and urinary catheterization were proposed;
4. Volunteer to participate in the study. Exclusion criteria:
 - 1) Patients with mental disorder can not cooperate;
 - 2) Patients with sensory disorders;
 - 3) Patients with urinary system diseases such as urinary system infection and deformity. According to the random number table method, the study subjects were randomly divided into experimental group and control group, 30 cases/group. This study was approved by the Ethics Committee of our hospital, and all patients signed informed consent.

2.2. Methods

Subjects in both groups underwent induration catheterization after anesthesia induction tracheal intubation, and disposable sterile catheterization kit was used in both groups (manufacturer: Zhanjiang Shida Industrial Co., LTD.). Control group: Liquid paraffin oil was applied on the skin sac, glans head, urethral orifice and catheter surface, the urinary tube was inserted to the conventional length, 8-10 ml of water was injected into the air sac, and the drainage bag was connected and fixed. Experimental group: Tetracaine gel (manufacturer: Zhenao Honeysuckle Pharmaceutical Co., LTD.; Batch number: H20123292), the other steps were the same as the control group. Strictly follow the aseptic principle during operation, master the precautions of indurating catheter, and be skilled in intubation. The double-lumen tracheal catheter was removed and sent to PACU to observe resuscitation.

2.3. Evaluation Index

1. The degree of urethral stimulation: 0 is no discomfort;

Class I is mild discomfort, tolerable; Class II is moderate discomfort, accompanied by urgency and pain in urine; Class III is severe discomfort and unbearable, accompanied by obvious urgency, urination pain, and lower abdominal distension. [3] The incidence of each grade was calculated at 5min and 30min after tracheal catheter extubation.

2. Agitation during the recovery period (EA) of patients under general anesthesia: the agitation of patients in the two groups 5min and 30min after extubation was assessed by Ricker sedation-agitation score (SAS) scale. The score was ≤ 4 without agitation, and 5-7 was classified as agitation, [4] and the score and incidence of agitation in each group were recorded.

2.4. Statistical Analysis

SPSS25.0 statistical software was used for data analysis. Normal distribution measurement data were expressed as mean \pm standard deviation ($\bar{x} \pm s$), and group T-test was used for comparison between groups. The measurement data of non-normal distribution were expressed as median (M) and interquartile distance (IQR). Mann-Whitney U test was used for comparison between groups. The statistical data were expressed as frequency or percentage. χ^2 test or Fisher test were used for comparison between groups. Grade data are expressed as frequency or percentage and are tested with non-parametric tests. $P < 0.05$ was considered to be statistically significant.

3. Results

3.1. Comparison of General Data Between the Two Groups

There was no statistically significant difference in age, BMI, ASA grade and operation duration between the two groups ($P > 0.05$), indicating comparability, as shown in Table 1.

Table 1. General data ($n=30$).

| | Control group | Experimental group | t/χ^2 | P |
|---------------------------------------------|--------------------|--------------------|------------|-------|
| age ($\bar{x} \pm s$, year) | 46.97 \pm 9.17 | 45.50 \pm 8.11 | 0.656 | 0.514 |
| BMI ($\bar{x} \pm s$, kg/m ²) | 21.74 \pm 2.54 | 21.21 \pm 2.68 | 0.786 | 0.435 |
| ASA (I/II/III, Number of cases) | 4/23/3 | 6/22/2 | 0.626 | 0.731 |
| Operation time (min) | 165.60 \pm 27.89 | 175.47 \pm 30.31 | -1.312 | 0.195 |

3.2. Comparison of the Degree and Incidence of Urethral Stimulation Between the Two Groups

The proportion of grade 3 urinary tract stimulation in experimental group was significantly lower than that in control group ($P < 0.05$). The incidence of urinary tract stimulation in test group was significantly lower than that in control group ($P < 0.05$). See Table 2.

Table 2. The degree and incidence of urethral stimulation between the two groups ($n=30$).

| Group | The degree of urethral stimulation | | | | The incidence of urinary tract stimulation |
|--------------------|------------------------------------|---------|----------|-----------|--------------------------------------------|
| | Class 0 | Class I | Class II | Class III | |
| Control group | 5 | 10 | 7 | 8 | 83.3% |
| Experimental group | 20 | 6 | 4 | 0 | 33.3% |
| χ^2 | 15.429 | 1.364 | 1.002 | 9.231 | 15.429 |
| P | 0.000 | 0.243 | 0.317 | 0.002 | 0.000 |

3.3. Comparison of Scores and Incidence of Agitation During Recovery Between the Two Groups

The proportion of agitation score ≤ 4 points in experimental group was significantly higher than that in control group ($P < 0.05$). The incidence of agitation in experimental group was significantly lower than that in control group ($P < 0.05$). See Table 3.

Table 3. Scores and incidence of agitation during recovery ($n=30$).

| Group | Agitation score | | | | The incidence of agitation |
|--------------------|-----------------|----------|----------|----------|----------------------------|
| | ≤ 4 points | 5 points | 6 points | 7 points | |
| Control group | 7 | 12 | 6 | 5 | 76.7% |
| Experimental group | 21 | 5 | 3 | 1 | 30% |
| χ^2 | 13.125 | 4.022 | 1.176 | 2.963 | 13.125 |
| P | 0.000 | 0.045 | 0.278 | 0.085 | 0.000 |

4. Discussion

4.1. Effect of Indentation Catheterization After General Anesthesia on Urinary Tube-Related Bladder Irritation (Crbd) and Restlessness During Awakening (EA)

Postoperative patients with catheter indwelling are prone to agitation, which may be caused by catheter-related bladder irritation (CRBD). CRBD refers to the burning sensation of urination impulse or discomfort in the suprapubic region caused by urinary tract and bladder mucosal stimulation caused by the catheter, and is a general term for pain and discomfort related to urinary catheterization. [7] The lower urethra is rich in peripheral nerves and is very sensitive to various stimuli. A meta-analysis [8] showed that compared with women, men had less tolerance to urinary tubes and a higher incidence of postoperative agitation. The reason may be that male urethra is long and curved, with three strictures. During catheterization, urethral mucosa and bladder are vulnerable to damage, resulting in the occurrence of CRBD after recovery. CRBD associated with indwelling catheter was an independent risk factor for restlessness during recovery. A retrospective study of 150 patients undergoing thoracic general anesthesia found that indignant catheter after anesthesia induction is one of the risk factors for causing agitation during anesthesia recovery in thoracic surgery patients. [9-11] In addition, among the various stimuli leading to agitation during anesthesia recovery, catheter stimulation accounted for 33.77%. [12] The urinary tube inserted after the patient's consciousness disappeared is a foreign body for the patient, and the patient has not experienced the adaptation process, and has no psychological expectation for the foreign body implantation after waking up. Patients in the recovery period of general anesthesia who have not been fully awake can not accept urethral swelling pain, resulting in tension, irritability, anxiety and anxiety, and severe agitation may remove the catheter by themselves.

4.2. After Tetracaine Gel Lubrication of the Catheter, the Incidence of Agitation and Symptoms of Urethral Irritation Can Be Reduced

The results of this study showed that after intervention, the number of cases of agitation and urethral stimulation response in the experimental group was less than that in the control group, indicating that the application of tetracaine gel to the

catheter and urethral opening could reduce the symptoms of urethral stimulation after recovery from general anesthesia, thereby reducing the incidence of agitation during recovery. The reason may be that tetracaine plays the role of local anesthetic, blocks the sensory nerve endings of urethral mucosa, inhibits the transmission of injurious stimulation signals caused by catheterization to the central system, and reduces the pain stress response.

M-receptor antagonists (scopolamine, oxybutynin), anesthetics (ketamine, tramadol, paracetamol, etc.), can greatly improve the clinical symptoms and reduce the incidence of CRBD, but the systemic application of these drugs has a high incidence of side effects, [13-15] so the use of local anesthetic creams such as tetracaine gel for mucosal local anesthesia is a patient-friendly method.

5. Summary

The results of this study show that tetracaine gel can be applied to indurating urinary tube after general anesthesia in male patients, which can not only significantly reduce urethral stimulation response, but also reduce the incidence of agitation during the recovery period of general anesthesia, thus reducing the occurrence of multiple postoperative complications. The main limitation of this study is whether the lubricant is double-blind. The appearance and smell of the two lubricants are quite different, and the operating nurses can easily distinguish them. In addition, the sample size of this study is small, and large sample and multi-center trials are expected to further support this conclusion.

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