

Development and Clinical Application of Shapeable Head Braking Device

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Abstract: Objective: To evaluate the application effect of a plastic head brake device after radical resection of oral malignant tumors and flap repair for defects. **Methods:** 2018-2019 years, 5 months Sun Yat-sen Memorial patients oral and maxillofacial surgery for oral malignant tumor resection surgery period skin flaps hospital 150 patients randomly divided into groups. Test groups 70 examples and the control group of 80 cases, two different head braking methods were used. The experimental group used a self-designed head brake device, which was prepared to suit the height of the patient before operation. It was used from 0 to 3 days after operation. After the operation, the head lateral range was adjusted according to the braking requirements, and the pillow height was adjusted. The control group wrapped a 500 g salt bag with a treatment towel on both sides of the patient's head for head braking. The incidence of flap vascular crisis, head and neck deviation, head occipital pressure ulcer incidence and patient comfort during braking were evaluated in both groups. **Results:** The occurrence of vascular crisis in patients with oral tumors was significantly correlated with the patient's gender, alcoholism, and head movement ($P<0.05$), and the movement of patients' head and neck was also significantly correlated with the occurrence of vascular crisis. Compared with the control group, the experimental group had significant differences in head and neck deviation, incidence of vascular crisis, incidence of head ulcer pressure ulcers and patient comfort ($P<0.05$). **Conclusion:** The degree of head movement and incidence of vascular crisis in patients Closely related. Mouldable head brake device has more than ordinary salt bag ProA better head and neck braking effect can significantly

reduce the incidence of postoperative vascular crisis, improve patient comfort, and have a better clinical application effect. In addition, this device can also be used repeatedly, reducing economic costs and better improving the satisfaction of doctors, nurses and patients.

Keywords: Clinical application; Oral malignant tumor; Tissue flap; Plasticity; Head movement restriction

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1 Background

Oral jaw portion malignant systemic cancer accounts for 3% to 5%, surgery is the treatment of oral jaw main face means malignancies^[1]. With the development of microsurgical techniques, more and more skin flaps are used to repair postoperative tumor defects. Free flap transplantation and repair is a repair method that matches the artery and vein of the donor flap with the artery and vein of the recipient area, so that the flap survives, and the purpose of restoring the shape and function of the defect is restored^[2]. Due to vascular anastomosis, patients need to routinely maintain head and neck brakes for at least 3 to 5 days to reduce the occurrence of vascular crisis caused by vasospasm contraction, twisting or pulling^[3]. Clinically, the salt bag fixation method is mainly used, that is, the salt bag is placed on both sides or one side of the patient's head and neck to achieve the braking effect^[4]. However, bags of salt readily displaced during use, the patient neck occipital brake

prone skin flushing time is too long, the slurry red even pressure sores, lesions. When lying in the supine position for a long time without support of the neck^[5], the cervical spine muscle strains appear sore, stiff and other uncomfortable symptoms^[6]. Therefore, this research designed and manufactured the head-shaped fixed braking device by itself, and obtained the national utility model patent (ZL201822113998.2) in 2018. After repeated clinical trials and continuous improvement, it has achieved satisfactory results. The reports are as follows.

2 Research object

Select 2018 years 10 dated ~ 2019 years. 5 dated oral and maxillofacial surgery in patients with malignant Sun Yat-sen Memorial Hospital ward 150 embodiment, randomly divided into test groups 70 name and controls 80 name. Inclusion criteria were: (1) oral cavity tumor resection with neck dissection year free flap, after braking the need for strict 3 to 5 days, an average of 4 Tian; (2) aged 18 to 88 years old; (3) conscious can use sign language, stroke communicate with. Exclusion criteria: (1) with limb hemiplegia and a history of cervical fracture; (2) those who do not want to cooperate. This research was approved by the provincial scientific research fund and filed by the hospital ethics committee. The design used has been awarded the national invention patent project.

3 Research methods

3.1 Brake device structure

The head braking device includes a pillow body with an inner cavity, and an elastic filler body is provided in the inner cavity of the pillow body, and the elastic filler body can be automatically adjusted according to the head and neck to be able to fit the head and neck and avoid the head and neck length Time to maintain a posture and pressure ulcers, but also avoid head and neck walking(Figure 1). The filling of the brake device is non- gel and air-filled, and there is a part of the pillow cavity that is not gel. It needs to be injected and adjusted according to the position and braking requirements when it is used. It is comfortable,

adjustable, convenient and fast, and economical Perspective(Figure 2-4).



Figure 1. A schematic plan view of the head braking device



Figure 2. A schematic front view of the head braking device

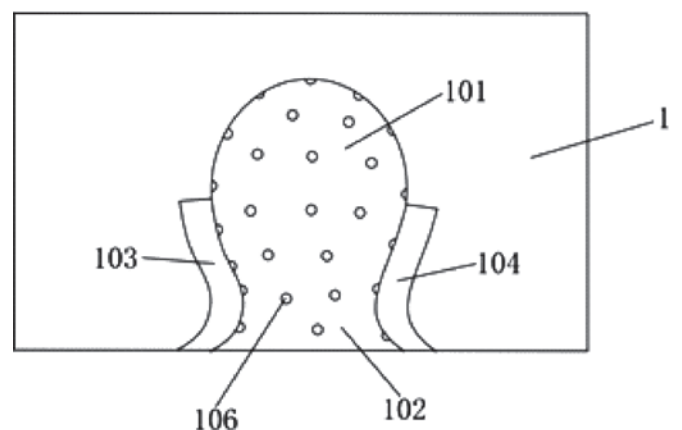


Figure 3. Schematic diagram of the head restraint device (overhead view)

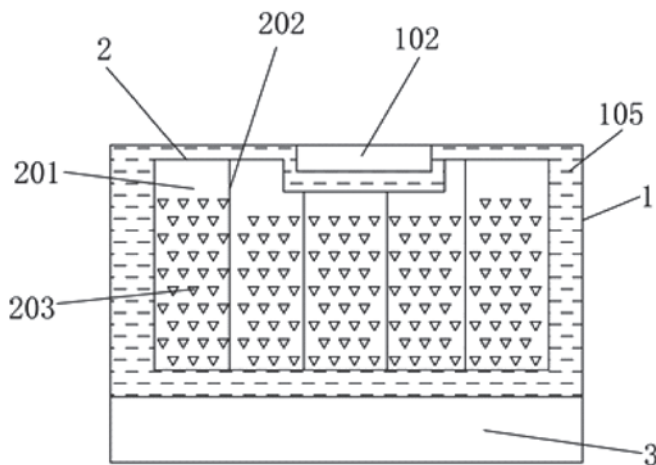


Figure 4. Schematic diagram of the head restraint device (front view)

In the picture, 1, pillow body; 2, elastic filling body; 3, flexible pillow cushion; 101, head groove; 102, neck groove; 103, first side cushion; 104, second side cushion; 105, First filler; 106, protrusion; 201, compartment; 202, partition plate; 203, second filler. Looking down on the physical map

3.2 How to use

(1) Fill the gel with the direction of flap transplantation according to the surgical method, adjust the amount of air at the head and neck grooves according to the height of the patient, and fill the thickness so that the pillow surface can better fit the physiological curve of the head and neck. Ask the patient for comfort, determine the thickness of the head and neck grooves and the thickness of the side pads on both sides, and then seal the pillow. The outer layer is protected by an ordinary pillowcase, which is easy to replace after being contaminated by blood and blood.

(2) Postoperative patient return chamber after use of a pillow, according to surgical procedures, the braking direction of the head, object of claim, patient comfort appropriately be appropriately adjusted.

(3) One full-time nurse in each shift should make a record of the patient's head orientation, angle, head and neck skin condition, patient's subjective comfort, flap condition, etc.

3.3 Test group

The responsible nurse prepares the pillow before the patient's operation. The patient returned to the room to try the head brake pillow. The responsible nurse asked the patient's subjective feelings and observed the effect of braking. Adjust the height of the neck pillow through the amount of air in the braking device, adjust the thickness of the fixing devices on

both sides, so that the head can reach the required braking direction and height. The responsible nurses in each shift observe and record the range of the patient's head displacement every day.

3.4 Control group

A conventional 500g salt bag is used to fix the head. The patient is in a lying position, and a 3cm thick water pad is placed on the pillow, and a protective pad is added to protect it, and it is placed on the left and right sides of the patient's head.

3.5 Evaluation index

3.5.1 Head and neck pillow angle

The method of measuring angles: the patient supine chin positive midline sternum projecting linearly as a reference position. Measure the angle between the auricle, clavicle, neck and shoulder process, and use a ruler to measure the angle of the head from the reference position. Take degrees as the unit of measurement^[7]. Evaluation criteria: Head shift <3 degrees is mild shift. <5 degrees is a medium shift, and shifts >5 degrees are a heavy shift. Every day at least one trained nurse takes measurements and takes the average.

3.5.2 Comfort of the headrest neck

The self-assessment comfort scale is used to subjectively judge the patient's own feelings and score. The items include: the material nature, softness and hardness of the patient's pillow, which can support the cervical spine, no taste, no effect on breathing, and no pain in the pillow. Explain the purpose of this study to the patient during use. Cooperate with the method, express the feeling of using the authenticity, the higher the evaluation score, the more comfortable^[8].

3.5.3 Observe the patient's head pillow and auricle every day for the occurrence of skin pressure redness, tenderness and even pressure ulcers, and record the incidence of pressure ulcers in the two groups

Use according to US pressure injury Advisory Panel 2012 staging year, US pressure sores Expert Advisory Group (National Pressure Ulcer Advisory Panel, NPUAP) 2007 annual updated staging of occipital pressure ulcers in patients with skin lesions were evaluated^[9].

3.5.4 The incidence of vascular crisis

During bracing head, 72 were observed in patients with flaps color, texture, skin elasticity within hours hourly pattern, skin temperature, swelling, and if necessary the results of the nail penetration test, it is determined whether or vascular compromise occurs.

3.6 Statistical methods

Chi-square test was used for all data analysis, and IBM SPSS statistical system was used for statistical analysis, $P < 0.05$, the difference was statistically significant.

4 Results

The analysis of the relationship between the incidence of vascular crisis and clinical characteristics in patients with oral cancer showed that male patients are more likely to develop vascular crisis, alcoholism is less alcoholic, and head movement is more serious than free skin of head and neck movements than female patients. Patients with flaps had a higher incidence of vascular crisis ($P < 0.05$). At the same time, it was found that the patient's age, surgical method and whether smoking was not related to the occurrence of vascular crisis (Table 1). As shown in Table 2, the effect of head bracing in patients with oral tumors is not related to the patient's age, gender, alcoholism, smoking, and surgical methods. It is only significantly associated with the occurrence of vascular crisis and pressure ulcers. Correlation ($P < 0.05$). Table 3 found that the experimental group and the control group had better head movement, patient comfort, pressure ulcer incidence, and vascular crisis incidence. Comfort. In addition, the experimental group had a lower incidence of pressure ulcers and vascular crisis than the control group.

5 Discussion

Oral flap period after resection of malignant tumor 72 within hours to ensure the flap blood supply, reduce the incidence of vascular compromise and improve tissue flap survival, the head often need brake^[10]. At present, the traditional bracing methods are: water bag, salt bag, sand bag, homemade U-shaped head fixing pad, travel air pillow and so on. Put a water pad and towel on the patient's head, and place sandbags or salt bags on both sides of the head to brake^[11]. This method can easily cause discomfort to the patient

and can easily cause local pressure ulcers. In clinical care, the patient's pillow still uses the ordinary pillow and is placed on both sides of the patient's head to fix the sandbag. Because the ordinary pillow cannot fix the patient's head, cooperate with postoperative treatment, and cannot be based on the size of the head To adjust its height and width, it can not make patients feel comfortable, which is not conducive to treatment and rehabilitation^[12]. In view of the above problems, there is an urgent clinical need for a plastic head brake device. The successful research and development of the device is a revolutionary reform in the field of nursing. The brake device has the advantages of softness, breathability, strong plasticity, fixation, and beautiful appearance. It uses biological safety materials, non-toxic and odorless, can be cleaned or sterilized with gas, and can be recycled. It is soft in texture, good in hand, and has memory function. It can achieve a good head fixation effect, improve the patient's postoperative comfort, and reduce the incidence of occipital pressure ulcers. The bracing means for the head and neck of the jaw portion of the surgical procedure, postoperative use, promote the use of maxillofacial surgery ward, with good social and economic benefits.

6 Conclusion

Oral and maxillofacial surgery to repair flap difficult, time-consuming, to ensure the blood supply and venous return flap is key to the success of the flap, and therefore often need to postoperative pillow lying, head and neck brake, 3 ~ 5D, In order to avoid the anastomosis of blood vessels twisted, discounted or excessively stretched to affect the survival of the flap. This study starts from clinical problems and addresses clinical needs. The self-designed head brake pillow can be used to shape the patients with oral malignant tumor tissue flaps according to the direction of the head brake, and fit the head and neck to keep the head fixed and not shift, and avoid excessive neck. rotation and displacement lead to vascular twisted, having an air permeability, while the brake functions to meet the patient in the supine position, can automatically adjust the transposition fixed directions from the head when the lateral position, holding the head and neck portion needs bracing reaches the bracing position The purpose is worthy of popularization and clinical use.

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