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Research Article

The Hemostatic Effect of Modified Three-Cavity and Two-Cystic Tube Fixation Method and Its Effect on Patient's Comfort

Xia-Mei Chen[1,2,#], Chun-Yan Liu[1,2,#], Shao-Li Huang[1,3,4,#], Yu Sun[2,5], Xi-He Zhang[2,4,✉]

1. Department of Gastroenterology, People's Hospital of Lianjiang, Guangdong 524400, China.
2. Guangdong Medical University Affiliated Lianjiang People's Hospital, Guangdong 524400, China.
3. Clinical laboratory, People's Hospital of Lianjiang, Guangdong 524400, China.
4. Doctoral Scientific Research Center, People's Hospital of Lianjiang, Guangdong 524400, China.
5. Department of Ultrasound Diagnosis, People's Hospital of Lianjiang, Guangdong 524400, China.

#, These authors contributed equally.

✉, Corresponding author

Xi-He Zhang, PhD, Doctoral Scientific Research Center, People's Hospital of Lianjiang, Guangdong 524400, China. Phone: +86 19126491230. Email: hljsnjx@163.com.

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Abstract

Three-cavity two-cystic tube compression hemostasis was an effective treatment for the control of the bleeding of esophageal varices. However, as an invasive operation, three-cavity two-cystic tube caused a variety of adverse reactions. The present study summarized traditional three-cavity two-cystic tube fixation method and the hemostatic effect of the modified three-cavity two-cystic tube fixation method on the patient's comfort. Compared to traditional one, it was found that the modified fixation method had ideal hemostatic effect in clinical application, and the patient's comfort and acceptance were better, which was convenient to carry out and reflected the high quality level of nursing.

Keywords: Three Cavity Two Capsule Tube, Improvement, Fixation Method, Hemostatic Effect, Comfort Degree.

Introduction

Chronic liver diseases often develop to decompensated cirrhosis, which cause liver failure and increase portal hypertension. Portal system

pressure ≥12 mmHg (1 mmHg =0.133 kPa) will lead to esophageal and gastric varices, and esophageal and gastric varices bleeding (EGVB) is the main complication and lethal factor of hepatic sclerosis. The features of EGVB in cirrhosis include sudden onset, substantial risk and rapid bleeding and hemostasis difficulty, which leads the mortality up to 10% to 30% (1). Internal medicines are difficult to control bleeding and three-cavity two-cystic tube compression hemostasis is still an effective treatment to control esophageal varices bleeding and save life which effective hemostasis rate are 90% (2). However, three-cavity two-cystic tube placement, as an invasive operation, will cause multiple adverse reactions (3). To reduce the adverse reaction, Jian-Fen Yan et al, have modified the method of pipe fixation for patients with three-cavity two-cystic tube traction compression hemostasis with large bleeding of esophageal and gastric varices, which did not affect the hemostatic effect, in the meantime, reduced the patient's pain, improved the patient's comfort and acceptance rate. Herein, we describe that as below.

Methods and Results

Three-cavity two-capsule tube

The three-cavity two-capsule tube was composed of three-cavity tube, gastric balloon and esophageal airbag, which was used in esophagus, gastric varices rupture bleeding by compression hemostasis. The principle was to use the soft air bag pressure to directly press on the bleeding varices to achieve the purpose of hemostasis. The tube placement method was used the liquid paraffin to fully lubricate the surface and tube of three-cavity two-capsule tube and insert the Sha's guide wire into the three-cavity two-capsule tube (be careful to operate gently). When apply three-cavity two-capsule tube, operators inserted the tube into one side of the patient's nostril about 55 cm - 65 cm combined with the patient's swallowing action, followed by pulling out the stomach contents and inflate the stomach sac (150 mL - 200 mL). Next, operators pulled out the Sha's guide wire and the three-cavity two-capsule tube outward, and fix when obvious resistance arise. The last step was injection with 80 - 100 mL air into esophageal sac according to patient's response (4).

Traditional three-cavity two-cystic tube fixation method:

The fixing method of traditional three-cavity two-cystic tube used the rope drawn with 500 mL saline (≈ 500 g) through a pulley device with 40 of the traction angle, the traction object was about 30 cm from ground to exert the function of compression and hemostasis. The traction usually takes 6 to 24 hours and the direction of traction need to be in line with the nostrils, however, some cases took more than 24 hours. Patients who turned over or moved the head led to retraction-pull process in traditional three-cavity two-cystic tube methods, which caused suffocation or pain of re-intubation. Furthermore, the patients lying flat in a long time resulted in back pain, and led to irritability, anxiety, insomnia, limb numbness and other complications (5). It also found that patients had bad physical and mental experience during tube traction, such as nausea, vomiting, nasopharyngeal pain, dizziness, panic, chest tightness, distended pain in the stomach area, dry mouth, thirst, hunger, poor sleep quality, unable to take care of themselves; uncomfortable posture, etc. (6). Most patients often suffered from the pain of continuous pulling by suspension, relax the traction secretly, and some patients even shout, attempt to extubate and refuse treatment (1), therefore, the effect of the treatment is not well satisfied (5).

Modified three-cavity two-cystic tube fixation

1 **Tape Fixation**

1.1 Tape Fixation

The conventional method of tape fixing method inflated the three cavity two capsule tube, stomach gas capsule and esophageal airbag after

placement. Followed by taking three tapes about 16 cm in length, 1.5 cm in width: the first tape should cross the three cavity two capsule tube from left to right and fix the nasal wing, while the second and the third tapes were diagonal cross and fix the three cavity two capsule tube on the upper lip and face for compression hemostasis (5).

1.2 Elastic Tape Fixation

Set three cavity two capsule tube as mentioned in 1.1 and fix the three-cavity two-cystic tube with elastic tape to one side of the nasal wing (7).

1.3 Tape fixing effect

Tape fixing method are better than traditional three-cavity two-cystic tube fixing method, which reduce the position limitation of patients and move into a more comfortable position (Table 1). At the same time, it can better prevent nasal mucosal breakage and air bag rupture and other complications for the prevention of retraction and pulling of the three-cavity two-cystic tube. Tape fixing method is easy to operate, cost less, and suitable for promotion and application (7). However, there are nasal secretion adhesive tape surface, the appearance is not elegant, facial skin sweat stains are easy to cause adhesive tape loose, not enough strength, poor hemostatic effect and so on. As the adhesive tape makes the skin itchy, the skin allergy symptoms, it makes patients discomfort. And the adhesive tape sustained compression of the nasal wing site, altered hemodynamics, resulted in nasal wing ischemia, pain, erosion, necrosis, and even disfigurement (5).

2 **Nasal congestion fixation**

2.1 Method

Take a rubber plug (e.g. penicillin vial, cefothia sodium vial, etc.) and remove the central part to reveal a hole about the size of a stomach tube in diameter, which was cut open on one side. After the three-cavity two-capsule tube, stomach gas capsule and esophageal air bag were inflated, operators take out the prepared vial of rubber plug and insert a three-cavity two-capsule tube into one side of the cut-off side crack. The bottle stopper protrudes inward, operators wrap around the inner side of the cork with a rubber tape, seal the opening of the bottle, then wrap around the lumen outside the cork (large caliber part) so that the cork does not slide, which is fixed accurately in the treatment position, and slowly sends the cork to the nostrils. In this way, the small part of the small bottle of rubber plug can just be put into the nasal cavity, while the large part is stuck outside the nasal wing for traction compression to stop bleeding (5).

2.2 **Observation effect**

The material of nasal congestion fixation method is convenient, surface of material is smooth, soft and firm, which also keep the traction constant pressure and enough support. Patients can turn over as their pleases without feeling tired, which is conducive to the contraction and closure of blood vessel bleeding points, keeping blood flow unobstructed. Effective hemostasis reduces the traction pressure contact with the patient's skin surface and avoids the injury of the nasal wing. Patients can turn over, lie on the side, sit up, defecate in bed and other bed activities at will, and reduce the complications of long-term bed rest, which improve the comfort of patients, alleviate the pain of patients and reduce psychological pressure and complications. The method of nasal congestion fixation is rigidly fixed, easy to operate, convenient to take materials, good hemostatic effect, and reflects the spirit of comfortable nursing (5). However, Zhang's study found that nasal congestion easily caused one side of the nasal cavity blocked feeling, the patient's psychology is not easy to accept (8).

3 Mask fixing method

3.1 Mask fixing method

The surface of the three-cavity two-capsule tube was fully coated with liquid paraffin oil and

slowly fed into the stomach, and then inserted the outer end of the three-chamber tube into the mask and perforated. Firstly, fixed the mask on patient's cheek, and injected 150-200 mL gas to the gastric sac. Secondly, to maintain the gastric sac pressure at 40 - 50 mmHg, pull outward to moderate resistance, use a hemostatic forceps to clamp the esophageal capsule interface end, and the direction to maintain a straight line with the nostril. Thirdly, injected 100-150 mL gas to esophageal capsule to maintain the pressure in the esophageal capsule at 30.40 mmHg, and fixed to the mask with two tapes, one tape gone around the three-cavity tube left and right cross and fixed on both sides of the mask, and the other tape presented diagonal cross fixed three-cavity tube to achieve the purpose of compression hemostasis.

3.2 Observation effect

The method equipment is simple, and there is no special requirement for the position, patients can turn over randomly without feeling fatigue, which is beneficial to the contraction and close of the bleeding point of the blood vessel, to keep the blood flow unobstructed and stop the bleeding effectively. Because each mask contact surface is smooth, it can avoid the injury of the patient's nasal wing. Patients can turn over, lie on the side, sit up and so on at their please, avoid the complications caused by lying long time in bed, improve the comfort of the patient and reduce the psychological pressure of the patient (9).

4 Table Tennis Fixation

4.1 Table tennis fixation method

Take a ping-pong ball, open two small holes along the axis at the two ends of the ball (the diameter equal to the outer diameter of the three-cavity and two-capsule tube), grind the circle around the hole, and cut a 5 cm × 7 cm 3M rubber cloth into a "Y" type reserve. Fully lubricate the surface and tube of the three-cavity two-capsule tube with liquid paraffin wax, and then insert the three-cavity two-capsule tube from patient's one side nostril according to the routine method. A small piece of non-fat cotton pad should be placed on the contact end of table tennis and embed the three-cavity two-capsule tube from one side of the cut-off side crack. The table tennis is fixed without sliding by three circles of tape. And the tail end of "Y" tape is fixed on both sides of table tennis, head end of the "Y" tape is fixed around three-cavity tube to achieve the purpose of compression and hemostasis.

4.2 Table tennis fixation effect

Observation effect: Yan and Li (6) have been compared traditional fixation methods with table tennis fixation methods in clinical hemostatic effect, complication rate and patient's tolerance. It was found that the success rate of hemostasis was comparable. The incidence of complications in the two groups was significantly lower than that in the control group ($P < 0.05$). The incidence of skin breakage, position restriction discomfort, pressure sore and chest pain were significantly decreased in the observation group, and the difference was statistically significant. Compared with the patient's tolerance degree, ping-pong fixation can maintain constant traction force in the patient's activity and can effectively avoid the change of traction force caused by the phenomenon of retracting-pulling. Thus, significantly reduce the incidence of chest tightness and chest pain, and then increase the patient's tolerance to three-cavity two-cystic tube. At the same time, the patient does not need to keep force posture, and can turn over, sit up or lie down at will. Therefore, the incidence of insomnia of patients reduces significantly (4). In terms of patient comfort and tolerance, smooth contact between table tennis and nasal tip can avoid pressure injury of nasal mucosa, reduce mucosal breakage, improve patient comfort and increase patient tolerance. Clinical daily nursing also reduced the nursing workload from two people to assist the patient to turn over to the patient can self-adjust the posture (10).

2.5 Other improvements

2.5.1 Method

Reduce the traction tension of the three-cavity two-cystic tube: the traction tension of the traditional method was reduced from the original 500 g to 250 g. Observation from the pain degree of patients: mild degree was none or mild chest tightness and no post-sternal pain; moderate degree was mild chest tightness with mild post-sternal pain; obvious degree was chest tightness with obvious post-sternal pain, etc. It was found that the 250 g traction force could effectively compress the hemostasis and have a small effect on the local mucosal blood supply, thus reducing the possibility of ischemic ulceration, erosion and erosion of the esophagus fundus mucosa. Compared the patient comfort with traditional group, $X^2=40.59$, $P<0.01$, it significantly reduced the suffering of patients and made them more receptive (11). The research of Yang Qin and Bai Guilian was based on patient's subjective no pain and effective compression, and to select the traction quality 200 ~ 600 g according to the patient's physique. By observing and evaluating the performance of the patients under different traction quality, attention to the subjective feelings of the patients during the indwelling process was increased. Patients' pain was alleviated, they were acceptable and easily accepted. Also, the compliance of patients to treatment is improved (12).

2.5.2 Effect

The use of adjustable external fixator: Tang Xiaoyan improves patient comfort by using modified adjustable external fixator (13). According to the needs of the patient's lying position, the traction frame was fixed in the appropriate position at the end of the bed, the longitudinal activity range reached 1000 mm, and the transverse activity range was 200 mm, which avoided the influence of the traction effect caused by the touch rope of the quilt and clothing touch caused by the low shelf. At the same time, the position of the traction frame was adjusted at any time with the patient's posture. It only needs to move the pulley left and right, and move the entire Traction frame around in necessary, which avoided the previous traction frame only in one position, and the patient's head cannot move the shortcomings. This traction frame was simple and practical to manufacture and install, it has satisfactory effect after 28 cases of clinical application (13).

Conclusion

1. It was divided into four levels according to the degree of acceptance: acceptance, general, reluctant, and unacceptable. The above fixation methods are summarized from three aspects: pipe fixation, hemostatic effect and subjective feeling of the patient as following (Table 1).

2. The effect of compression hemostasis can be achieved by the modified three-cavity two-cystic tube fixation with the traditional fixation.

3. Glue fixation, nasal congestion and ping-pong fixation can control the retracting-pulling phenomenon of three-cavity and two-cystic tube, which can prevent complications such as nasal mucosal breakage and rupture of air bag. There is no special requirement for the patient's position, and the patient can turn over at will, lie on the side, sit up and defecate in bed for a long time to reduce the complications of bed rest.

4. Table tennis fixation: because of the soft material of table tennis, the contact surface with the tip of the nose is smooth, which can avoid the damage to the nasal mucosa and reduce the rate of mucosal breakage.

5. Reducing the traction tension of the three-cavity two-cystic tube can avoid adverse reactions such as chest tightness and dyspnea, and obviously reduce the discomfort of the patients. Taking the subjective feeling of the patients as the standard and choosing different traction quality for different patients can make the patients acceptable and easy to accept,

which improve the compliance of patients' treatment.

6. In clinical application, the modified fixation method is better than the traditional fixation method.

Table 1. Comparison of different fixation methods

Fixed method / Observation	Traditional fixation	Modified fixed method						
		Tape fixing method		Nose fixation	Mask fixing method	Table Tennis Fixed	Other improved methods	
		General tape fixing method	Elastic tape fixing method				Lower traction tension	Use an adjustable external fixator
Retraction Pulling phenomenon	4	1	1	1	1	1	4	4
Hemostatic effect	1	3	3	2	1	1	2	1
Poor sleep quality	4	3	3	4	4	2	4	4
Forced position	4	1	1	1	1	1	3	3
Cannot take care themself	4	1	1	1	1	1	4	4
Damaged nasal skin	4	3	3	3	2	1	4	4
Posture restriction discomfort	4	1	1	1	1	1	4	4
Pressure sore rate	4	1	1	1	2	1	3	3
Chest tightness, chest pain	4	2	2	3	3	2	1	4

Note: Satisfactorily accepted: 1; accepted: 2; barely accepted: 3; not accepted: 4.

Summary

Patients with ruptured and bleeding of esophageal and gastric varices in liver cirrhosis have acute onset, large amount of bleeding, fast bleeding speed, and are difficult to control bleeding with hemostatic drugs in internal medicine. Patients will develop negative emotions such as anxiety, tension, fear, etc. Good or bad mood has a direct effect on the disease (14). Three-cavity two-cystic tube is one of the first-aid measures for bleeding of esophagus and gastric varices caused by portal hypertension. However, this invasive operation causes many discomforts, such as physical and psychological to patients, sometimes patients are hard to bear this pain (6). The modified three-cavity two-cystic tube fixation method can improve the patient's comfort. However, this disease patient's is critical, urgent

and serious, and at the same time, the invasion of three-cavity two-cystic tube make the patient highly nervous and psychological burden. If psychological intervention can be assisted in catheterization, different psychological care can be given to patients at various stages. Whether the modified fixation method can achieve twice the result with half the effort in patient's comfort and acceptance will need further study in clinic.

DECLARATIONS

1) ***Consent to publication***
We declare that all authors agreed to publish the manuscript at this journal based on the signed Copyright Transfer Agreement and followed publication ethics.

2) ***Ethical approval and consent to participants***
Not applicable.

3) ***Disclosure of conflict of interests***
We declare that no conflict of interest exists.

4) ***Funding***
None

5) ***Availability of data and material***
We declare that the data supporting the results reported in the article are available in the published article.

6) ***Authors' Contributions***
Authors contributed to this paper with the design (XMC, SLH, XHZ), literature search (XMC), drafting (XMC), revision (XMC, CYL, SLH, YS, XHZ), editing (XMC, CYL, SLH, YS, XHZ) and final approval (SLH, XHZ).

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8) ***Authors' biography***
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Reference

1. Ru Guoxia. Progress in the treatment of portal hypertension esophageal variceal bleeding [J]. Medical Review, 2019, 25(23): 4702-4706.
2. Wu Haizhen, Jiang Shuqiu, Fan Huiping. Effect of different traction force on hemostasis in patients with varicose esophagus and gastric varices. Modern integrated Chinese and Western medicine magazine. 2013 Jul,22(21):2357-2358.
3. Guo Jianyi, Shuai Zhang Li, Xie Yuxin et al. Nursing experience of cirrhosis with upper gastrointestinal bleeding using three-cavity two-cystic tube [J]. Journal of Practical Medical Technology, 24(02):237-238.
4. Yan Jianfen, Tan Qinghong, Wei Daoru et al. Clinical application of modified table tennis method for fixing three-cavity two-cystic tube [J]. Nursing Research, 2015(25):3145-3146.
5. Xie Xiufei. Modified nasal congestion method to fix three-cavity two-cystic tube in clinical application [J]. Journal of Clinical and Experimental Medicine, 2006,5(7):955.
6. Tian Maorong, Huang Yun, Xie Defen et al. reasons of discomfort and treatment of patients during hemostasis with three-cavity and two-cystic tube compression [J]. Journal of Zunyi Medical College, 2009, 32(1):51-52,57.
7. Chen Liping, Deng Caimei, Lin Liyan et al. Application of modified three-cavity and two-cystic tube in primary hospital [J]. Journal of Mudanjiang Medical College, 2016,32(5): 117-119.
8. Zhang Huiling, Lin Jiaxuan, Wang Xuehua et al. Effect of three-cavity two-cystic tube fixation on compression hemostasis in patients with esophageal varices bleeding [J]. General Care, 2010, 08(19):1723-1724.
9. Tang Qunhua. Clinical observation and nursing of three-cavity two-cystic tube with mask fixation [J]. Contemporary Nurses (Specialist Edition), 2009 (2): 70-71.
10. Li Minjiao, Zhong Xiuqiong, Liang Qiaoling et al. Table tennis-the clinical application of nasal fixation in the treatment of bleeding esophageal varices [J]. Lingnan Modern Clinical Surgery, 2017, 17(2):253-255.
11. Li Bingbing. Clinical observation of reducing hemostatic effect of three-cavity two-cystic tube

traction [J]. Chinese Practical Medicine, 2010, 05(22):85-86.
12. Yang Qin, Bai Guilian. A study on the treatment of traction quality and individual properties of esophageal and gastric variceal varices with bleeding three-cavity two-cystic tube.[J].Ningxia Medical Journal, 2015, (1):59-61.
13. Tang Xiaoyan, Wang Wenduo, Wang Rui et al. Clinical application of adjustable external fixators. [J]. Nursing Research, 2002,16(11):678.
14. Gao Tianxia, He Qingmei, Liu Ziqi et al. Psychological intervention and nursing of patients with three-cavity and two-cystic tube catheterization[J].China Disability Medicine, 2013,(4):317-318.