

Observation on the Effect of Radiotherapy with Different Postural Fixation Techniques for Patients with Thoracic and Abdominal Tumors

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Abstract: To analyze the effectiveness of different postural fixation techniques in clinical radiotherapy for patients with thoracic and abdominal tumors. **Methods:** 100 patients with thoracic and abdominal tumors who received corresponding treatment in the hospital from February 2022 to February 2023 were selected as subjects of the study, and they were randomly divided into the research group and the control group. Patients in research group used thermoplastic film fixation technique during radiation therapy, while that in control group used surface line drawing fixation technique during radiation therapy. These techniques was required to compare treatment effects of two groups. **Results:** The setup errors of the research group was smaller than that of the control group ($p < 0.05$). **Conclusion:** The use of thermoplastic film fixation technique has better results for patients with thoracic and abdominal tumors in clinical radiotherapy.

Keywords: Thoracic and abdominal tumors; Radiotherapy; Surface line drawing fixation technique; Thermoplastic film fixation technique

1. Introduction

Tumors can cause serious harm to patients. In recent years, the clinical incidence rate of tumors has increased. Patients can cure tumors at the early stage after the surgery, and they can also take comprehensive treatment such as radiotherapy and chemotherapy after surgery to cure tumor diseases through scientific treatment [1]. But when the tumor disease progresses to the mid to late stage, due to the large area of the tumor, surgical resection and treatment must be combined with radiotherapy and chemotherapy to effectively control the spread of cancer cells in the body. Postural fixation can greatly affect

the effectiveness of radiotherapy for patients, so it is necessary to choose appropriate postural fixation techniques based on the patient's situation in clinical practice. In this study, different postural fixation techniques were used for two groups of patients, and the detailed research content is as follows.

2. Information and Methods

2.1 General Information

100 patients with thoracic and abdominal tumors who received corresponding treatment in the hospital from February 2022 to February 2023 were selected as subjects of the study, and they were randomly divided into the research group and the control group with a total of 50 patients in both groups. The number of male patients in the research group is 22, and that of female patients is 28. The age range of patients is 26 to 62 years old, with an average age of (43.27 ± 1.64) years. The number of male patients in the control group is 23, and that of female patients is 27. The age range of patients is 27 to 63 years old, with an average age of (44.19 ± 1.73) years. After comparing the general information of patients in these two groups, the results suggest that the value of p is larger than 0.05.

2.2 Methods

Patients in control group used surface line drawing fixation technique during radiation therapy. The patients were placed in a flat position on a fixed body frame, and their body position was straightened and determined by using a three-dimensional laser lamp, followed by surface line drawing. Patients in research group used thermoplastic film fixation technique during radiation therapy. During the process, a CT simulation positioning machine was used. The patients could use a dedicated pillow for their head rest and adopt a supine position on a fixed bracket adapter with a ruler on both sides.

They can use a three-dimensional laser positioning lamp for body position adjustment. The patient would hold their hands behind their head and effectively fix them. After the patient completes the positioning, the heated thermoplastic film will be taken out of the constant temperature water tank. Medical staff would evenly cover the body film on both sides of the patient and fix it with the corresponding buckle slots on both sides of the body frame. After cooling, the body film will be completely released. Medical staff guided patients to sit up and engage in appropriate activities, and then they buckled the body membrane again, guiding the patient to maintain a natural and relaxed form and pulling the skin on the body surface. After shaping and fixing, medical staff would clearly doubly mark the corresponding lines on the patient's body surface and body membrane at the required positions, and they would regard the marked corresponding lines as a reference for the patient's repeated positioning. Then, medical staff would clearly mark the skin corresponding to the upper and lower edges of the body membrane, and use the marked skin lines as a reference for determining the upper and lower positions.

The research data indicates that patients are positioned through CT simulation. With the help of a CT simulator, the reference line is effectively transferred to the positioning line.

Table 1. Positioning Errors of Patients in Two Groups in Three Directions of Head and Foot, Front and Back, and Left and Right

Group	Case	direction of head and foot	directions of front and back	direction of left and right
The research group	50	2.38±0.79	2.49±1.15	2.37±1.85
The control group	50	6.75±4.36	8.78±3.76	5.56±4.21
t	-	8.984	9.136	9.053
P	-	0.001	0.001	0.001

4. Discussion

Patients with thoracic and abdominal tumors may experience significant physical pain during clinical radiation therapy that significantly increases the financial pressure on the patient's family [2]. When treating patients with thoracic and abdominal tumors in clinical practice, it is necessary to pay attention to their recovery, as well as their compliance and comfort during clinical treatment. The application of appropriate fixation methods in the radiotherapy process of patients with thoracic and abdominal tumors in

Before undergoing treatment, patients need to undergo 3-5 consecutive positions. Medical staff use electronic field imaging devices to take field verification films with 0-90 angle, and use a double-blind method to effectively measure the repeated positioning errors of the center points of the two fields in the three directions of head and foot, front and back, and left and right.

2.3 Observation Indicators

The positioning errors in different directions of patients in the research group and the control group after different fixation techniques are observed in this study.

2.4 Statistical Methods

SPSS 26.0 software was used for data analysis in this study, and mean ± standard deviation was used to measure the data. The t-value was used as the research test value, and if $p < 0.05$, it can fully demonstrate the statistical significance of the research data.

3. Results

The positioning errors of patients in the research group in the three directions of head and foot, front and back, and left and right were significantly smaller than those of the control group ($p < 0.05$). The research data is shown in Table 1 below.

clinical practice can significantly improve the comfort of radiation therapy. It significantly reduces the pain of patients and further enhances patients' compliance with clinical treatment. Correspondingly, the overall effectiveness of radiation therapy will also be significantly improved [3].

Tumors may experience abnormal growth regulation due to local tissue, which can lead to benign or malignant tumor proliferation. In clinical practice, radiation therapy is mainly used for patients with thoracic and abdominal tumors. During the radiation therapy process, it

is necessary to minimize the radiation dose to the normal tissues around the tumor as much as possible [4]. Abdominal tumor radiotherapy and chemotherapy have significantly higher requirements for accuracy of body positioning. Only by ensuring high accuracy can doctors ensure the consistency of the irradiation target range and radiotherapy plan in the field during the operation, which can significantly reduce treatment errors. Modern tumor radiotherapy pursues the function of low damage, high dose, high accuracy, and high efficacy. The radiotherapy effect of patients with thoracic and abdominal tumors is influenced by their own anatomical characteristics, such as body mass, abdominal breathing, skin traction, and subcutaneous fat thickness. It can lead to poor repeatability in patient's body positioning during radiotherapy. Therefore, it is necessary to enhance the accuracy of patient's postural fixation in clinical practice to achieve true high-precision in patient treatment [5]. Clinical radiotherapy positioning techniques include surface line drawing fixation positioning technique, thermoplastic film fixation positioning technique, etc. Among them, thermoplastic film fixation positioning technique has advantages such as good repeatability, high positioning accuracy, and prevention of cross infection. Moreover, it can effectively prevent repeated colored drawing on the patient's surface, which significantly reduces the patient's psychological and life discomfort. During the production process of thermoplastic films, it is necessary to consider the patient's physical condition and obtain their approval. The high compatibility of the patient can ensure the smooth production of the body film, so the error rate of the fixed body position technique of thermoplastic body film is low [6]. The results of this study also indicate that the positioning errors of patients in the research group in the directions of head and foot, front and back, and left and right are significantly smaller than those in the control group. Therefore, the radiotherapy effect of thermoplastic film fixation positioning technique is better than that of surface line drawing fixation positioning technique.

Based on the above content, it can be concluded that patients with thoracic and abdominal tumors can prioritize the use of thermoplastic film fixation positioning technique, because it can precisely fix the positioning and fully guarantee the overall radiation treatment effect of patients.

References

- [1] Chen Minjie, Cao Yan (2022). Clinical Efficacy of Different Postural Fixation Techniques in Radiation Therapy of Patients with Thoracic and Abdominal Tumors. *Contemporary Medicine*, 28 (13): 158-161.
- [2] Zhou Jingting, Yuan Shikun, Wang Lei (2021). Observation of the Effect of Different Postural Fixation Techniques in Radiation Therapy of Patients with Thoracic and Abdominal Tumors. *YingXiang YanJiu Yu YiXue YingYong*, 5 (20): 229-230.
- [3] Wang Xiang, Liu Yang, Wang Baosheng (2020). The Effect of Different Postural Fixation Techniques on Positioning Errors and Clinical Efficacy in Patients with Thoracic and Abdominal Tumors undergoing Radiotherapy. *Chronic Pathematology Journal*, 21 (10): 1507-1508+1511. DOI: 10.16440/j.cnki.1674-8166.2020.100.19.
- [4] Jiang Renwei, Deng Chuntao (2020). Comparison of the Application Effects of Different Postural Fixation Techniques in Radiation Therapy of Patients with Thoracic and Abdominal Tumors. *Medical Equipment*, 33 (14): 23-24.
- [5] Sun Xixing (2020). Comparison of Application of Different Positional Fixation Techniques in Radiotherapy of Patients with Thoracic and Abdominal Tumors. *Electronic Journal of Clinical Medical Literature*, 7 (16): 44+56. DOI: 10.16281/j.cnki.jocml.2020.16.036.
- [6] Hou Peng (2020). Observation on the Effectiveness of Radiation Therapy for Patients with Thoracic and Abdominal Tumors by Using Different Postural Fixation Techniques. *Clinical Medical Practice*, 29 (02): 91-93. DOI: 10.16047/j.cnki.cn14-1300/r.2020.02.004.