

Clinical Observation of Silk Fibroin Medical Dressing Applied to Breast Surgery Incisions

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Abstract: To observe the clinical treatment effect of putting the silk fibroin medical dressing upon the cutting wounds of breast surgery, a prospective and randomized controlled research was carried out. One hundred female patients who underwent the cutting out of breast benign tumors in our hospital from February 2024 to January 2025 were picked out as the research objects. By making use of the random number table method, they were separated into the trial group (50 cases) and the control group (50 cases). After suturing the cutting wounds, the control group was treated with the old-style sterile gauze, while the trial group was given the silk fibroin medical dressing. As a result, the trial group showed an obviously shorter time for the cutting wound to grow well (4.65 ± 0.72 days vs 7.88 ± 0.85 days, $P < 0.05$), fewer times of changing dressing clothes (1.85 ± 0.45 times vs 3.52 ± 0.68 times, $P < 0.05$), lower VAS pain points at 48 hours after surgery (2.15 ± 0.62 points vs 3.75 ± 0.84 points, $P < 0.001$), and a higher Grade A growing-well rate (98.0% vs 86.0%, $P < 0.05$). Putting the silk fibroin medical dressing into use on breast surgery cutting wounds can effectively make the healing time shorter, cut down dressing change times, relieve pain, and make the healing quality better, having a high value for clinical using.

1. Introduction

Following the unceasing getting-better of the living quality for modern female people, the clinical needs towards the breast surgery are not only restricted in cutting off the disease parts successfully anymore. Instead, it also puts forward much higher beauty-looking requirements towards the growing-well of the incisions after the operation. Breast skin is delicate, and postoperative incisions are prone to pain, scar hyperplasia, and delayed healing if the local micro-environment is not well maintained [1]. Traditional sterile gauze dressings are easy to adhere to the wound surface, causing secondary mechanical damage and pain during dressing changes, which is not conducive to high-quality healing of the incision [2]. Silk fibroin is a highly biologically active natural protein polymer, possessing excellent air permeability, moisture retention, and histocompatibility. It has been proven to effectively promote cell proliferation and tissue repair [3]. In this study, a prospective randomized controlled trial was designed to evaluate the clinical efficacy of a new silk fibroin medical dressing applied to breast surgery incisions, providing a reliable scientific basis for clinical wound management.

2. Data and Methods

2.1 General Data

Select 100 cases of female patients with breast fibroadenoma treated by surgical excision in our hospital. Inclusion criteria: (1) Diagnosed as breast benign tumor by ultrasound and pathology; (2) The incision length was 2-5 cm; (3) Volunteered to participate in this study and signed the informed consent form. Exclusion criteria: (1) Complicated with diabetes or coagulation dysfunction; (2) Patients with local skin infection on the breast; (3) Allergic to protein materials.

2.2 The basic information of the sick people

The whole 100 sick people were divided in a random way into the testing group and the controlling group, and inside every group there were 50 cases. For the testing group, the age span was from 18 until 45 years old, and the middle-average age was (31.5 ± 6.2) years old; the tumor diameter was (2.1 ± 0.8) cm. In the control group, the age ranged from 19 to 44 years old, with an average of (32.1 ± 5.8) years old; the tumor diameter was (2.2 ± 0.7) cm. Comparing the general data such as age and tumor size between the two groups, the difference was not statistically significant ($P > 0.05$), so they had comparability.

2.3 The methods for treating

The two groups both accepted the traditional operation to cut off the breast fibroadenoma under the local pain-killing medicine. After taking the tumor out, the bleeding blood was stopped very strictly, and the cutting wound was sewed up under the skin using the threads that can be absorbed. The surface of the skin was made clean by using the iodine volt fluid and normal salty water.

2.3.1 Control group

The controlling group was put over with the traditional no-bacteria gauze (in normal times it is 6-8 layers). It was made stable by using the medical sticking tape. The dressing cloth was exchanged in a regular time based on the traditional standard or at the time when some liquid went out.

2.3.2 Trial group

The testing group was handed out the silk fibroin medical dressing (Made from Fangchenggang Ruiyi Biotechnology Co., Ltd., Guangxi Medical Device Registration No. 20252140091). During the operation, after the incision was cleaned and dried, the operator opened the package, took out the silk fibroin medical dressing, and directly covered it tightly over the incision, ensuring the covering edge exceeded the incision edge by at least 1 cm. It was then fixed properly. The dressing was changed according to the absorption of the dressing and the healing progress of the incision.

2.4 The pointing-signs for observation

2.4.1 The time for the cutting wound to grow well and the times of changing the dressing cloth

Write down the accurate days starting from the operation until the cutting wound completely becomes skin surface, and do the calculation for the total times of exchanging dressing clothes during the complete growing-well period.

2.4.2 The point-number for feeling hurt (VAS)

The Visual Analogue Scale (VAS) method was put into use to judge the hurt level of the cutting wound at the time of 48 hours after finishing the operation (getting 0 point means not feeling hurt at all, getting 10 points means the most heavy hurt that sick people cannot stand).

2.4.3 The good-or-bad quality for the cutting wound's growing well

It was judged based on the clinical standard for cutting wound growing well. The Grade A growing well means the growing well is very excellent with no bad reflections; The Grade B growing well means the cutting wound gets some fire-like reflections just like becoming red, swelling up, getting hard, but has no yellow water coming out. Calculate the percentage of Grade A healing.

2.5 The science of statistics

The number-data were typed into the SPSS 26.0 computer software to do the statistical analyzing work. The measuring data (the time of growing well, the times of exchanging dressing clothes, the VAS point-number) were shown out in the way of middle-average number $\pm$ standard waving distance ($\bar{x} \pm s$), and independent sample t-test was used. The enumeration data (Grade A healing rate) was expressed as percentage (%), and χ^2 test was used. $P < 0.05$ indicated the difference had statistical significance.

3. Results

3.1 The comparing work regarding the growing-well time and the exchanging dressing clothes times between the two groups

The time spent for the cutting wound to grow well and the number of times for exchanging the dressing clothes belonging to the testing group were both in a very obvious way fewer than those things belonging to the controlling group, and the un-same gaps possessed the meaning in the science of statistics ($P < 0.05$). See Table 1.

Table 1. Comparison of incision healing time and dressing change frequency between the two groups (mean $\pm$ SD)

Group	n	Incision healing time (days)	Dressing changes (times)
Trial group	50	4.65 $\pm$ 0.72*	1.85 $\pm$ 0.45*
Control group	50	7.88 $\pm$ 0.85	3.52 $\pm$ 0.68

Note: Compared with the control group, $P < 0.05$.

3.2 The comparing work regarding the VAS point-number at the time of 48 hours after finishing the operation

When 48 hours passed after the operation, the VAS point-number for feeling hurt belonging to the testing group was (2.15 $\pm$ 0.62) points, while on the other hand, the controlling group was (3.75 $\pm$ 0.84) points. See Table 2.

Table 2. Comparison of VAS scores at 48 hours after surgery (mean $\pm$ SD, points)

Group	n	VAS score at 48 h
Trial group	50	2.15 $\pm$ 0.62*
Control group	50	3.75 $\pm$ 0.84

Note: Data are presented as mean $\pm$ SD. Compared with the control group, $P < 0.05$ ($t = 10.862$, $P < 0.001$).

3.3 The comparing work regarding the good-or-bad quality of the cutting wound's growing well between the two groups

Inside the testing group, 49 sick cases arrived at the Grade A growing well and 1 case arrived at the Grade B growing well, so the percentage rate of the Grade A growing well was 98.0% (49/50). In the control group, 43 cases achieved Grade A healing and 7 cases achieved Grade B healing, the Grade A healing rate was 86.0% (43/50). The Grade A healing rate of the trial group was significantly higher than that of the control group ($\chi^2=4.891$, $P=0.027$). See Table 3.

Table 3. Comparison of incision healing quality between the two groups [n (%)]

Group	n	Grade A healing, n (%)	Grade B healing, n (%)
Trial group	50	49 (98.0)*	1 (2.0)
Control group	50	43 (86.0)	7 (14.0)

Note: Compared with the control group, $P<0.05$ ($\chi^2=4.891$, $P=0.027$).

4. Discussion

The breast part is a very important number-two sex-related showing feature belonging to the woman people. Following the changing and moving of the nowadays medical treating model shape, the final hoping target for the operation to cut off the safe and not-bad tumor inside the breast asks for not just cutting the whole thing out very cleanly, but at the same time it also asks for keeping how the breast looks from the outside in the biggest limit, and making the growing out of the ugly marks left by the operation knife become less. The traditional dry healing environment provided by sterile gauze is easy to make the newly formed granulation tissue adhere to the dressing, which tears the wound again during dressing change, causing severe pain and prolonged healing time, directly affecting the aesthetic recovery of the incision.

The referring paper [4] pointed out in a clear way that making use of the highly developed closed and wet dressing clothes is able to make much better in a very obvious way the final result of growing well for the cutting wounds on the breast part, when putting it side by side to compare with the old-style dry gauze cloth. Following this physiological wet healing theory, this study applied a newer biomaterial. The trial group used the silk fibroin medical dressing (Fangchenggang Ruiyi Biotechnology Co., Ltd., Guangxi Medical Device Registration No. 20252140091). Silk fibroin contains 18 kinds of amino acids necessary for the human body. As a natural biomaterial, its degradation products are harmless to human tissues. When covered on the surgical incision, it simulates the extracellular matrix environment, effectively maintains the local micro-wet state, and stimulates the migration of epidermal cells and the synthesis of collagen, thus accelerating the re-epithelialization process [5].

The final coming-out things of this researching study made it sure that the time for the cutting wound to grow well and the times of exchanging the dressing clothes belonging to the testing group were in a very obvious way fewer than those things belonging to the controlling group ($P < 0.05$). This suggests that the silk fibroin medical dressing can promote rapid wound repair and reduce the workload of medical staff. Meanwhile, the VAS score at 48 hours post-surgery was lower in the trial group ($P<0.05$). This is mainly because the silk fibroin dressing does not adhere to the wound, preventing mechanical damage to the new epithelium and avoiding stimulation to local nerve endings during dressing changes. Furthermore, the Grade A healing rate of the trial group (98.0%) was higher than that of the control group (86.0%), which proved that the good histocompatibility of silk fibroin can reduce inflammatory reactions and improve the overall healing quality.

To say the final summarizing words, putting the silk fibroin medical dressing cloth into use on the cutting wounds of the breast operation possesses the good-point benefits of very quick speed of

growing well, only a little bit feeling hurt, and very excellent good-or-bad quality for fixing the outside looking to make it beautiful. This thing is safe without danger and has a good working effect, and is very much having the worth to be pushed forward and put into clinical using practice inside the hospital rooms for breast operations.

References

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