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# Effect of operating room care combined with home care for the postoperative rehabilitation and prognosis of gastric cancer patients with low PTEN gene expression

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**Abstract.** The aim of the present study was to analyze the effect of operating room (OR) care combined with home care on postoperative rehabilitation and prognosis of gastric cancer patients with low PTEN gene expression. Ninety-six gastric cancer patients with low PTEN gene expression, who underwent surgical treatment in our hospital were recruited. PTEN expression was measured by semi-quantitative polymerase chain reaction. Participants were randomized into the observation and control groups, with 48 cases each. Participants in the two groups received the same preoperative examination, gastric cancer surgery, postoperative drug therapy, and general care, while observation group participants were provided more comprehensive OR care combined with home care. After 1 year of home care, the self-rating anxiety scale (SAS) and Hamilton anxiety scale (HAMA) scores, rehabilitation status, overall quality of life, and Family Adaptability and Cohesion Scale were applied to compare postoperative rehabilitation and prognosis status in both groups. Data were statistically analyzed. Patients were followed up for 3 years, and survival time was analyzed. The operative time and bleeding volume between the two groups were not significantly different ($p>0.05$). The time of extubation and postoperative recovery time in the observation group were shorter than in the control group ($p<0.01$). The postoperative SAS and HAMA scores in both groups were significantly decreased compared with those preoperatively ($p<0.01$). Additionally, these scores were significantly lower in the observation than in the control group ($p<0.01$). The rehabilitation status of body function in the observation group was better than in the control group ($p<0.01$). Regarding the overall quality of life score and family adaptability and cohesion score, the observation group was better than the control group ($p<0.01$). In conclusion, OR care combined with home care was effective for the care of gastric cancer patients with low PTEN expression. Improving patient mood and mental state played a positive role in postoperative rehabilitation and prognosis.

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*Key words:* operating room care, home care, rehabilitation and prognosis

## Introduction

Gastric cancer is the most common type of gastrointestinal cancer. It significantly shortens patient survival time, and reduces the quality of life (1,2). Studies worldwide have shown that the treatment effect of gastric cancer is closely related to the PTEN gene (3,4). When PTEN expression is low, it can affect downstream proteins, contributing to cancer cell proliferation and deterioration of the condition of gastric cancer, thereby significantly reducing quality of life, and shortening survival time (5,6).

Currently, surgery is the main clinical method for treating malignant tumors. Surgical resection is one manner to avoid cancer cell proliferation. However, it can also cause patients to experience negative emotions, affecting treatment efficacy (7). Previous findings showed that when close care and nursing are provided for patients with ovarian cancer, the therapeutic effect can be significantly improved. However, to the best of our knowledge, no studies have reported on whether close care and nursing can improve the rehabilitation and prognosis of gastric cancer patients with low PTEN expression (8,9).

In the present study, we analyzed the influence of operating room (OR) care combined with home care on the postoperative rehabilitation and prognosis of gastric cancer patients with a low expression of PTEN, and analyzed the relationship between them, to provide a theoretical basis for the importance of patient OR and home care.

## Patients and methods

*Patients*. Between August 2010 and July 2013, 96 patients in the Department of Digestive Surgery of Weifang People's Hospital, who underwent surgical treatment, and had been diagnosed with gastric cancer were selected for this study. The male:female ratio was 5:3, and the age of patients was 48-76 years, with a mean age 62 years. This study was approved by the Ethics Committee of Weifang People's Hospital. Signed written informed consents were obtained from all participants before the study. Inclusion criteria for the study were: all gastric

Table I. PCR primers.

| Gene | Sequences |
|---|---|
| *PTEN* | F: 5'-CTACAATGAGCTGCGTGTGGC-3' |
| | R:5'-CAGGTCCAGACGCAGGATGGC-3' |
| *GAPDH* | F: 5'-GAGTCAAC GGATTTGGTCGT-3' |
| | R: 5'-TGTGGTCATGAGTCCTTCCA-3' |

PCR, polymerase chain reaction.

cancer patients were diagnosed and treated according to the criteria of the World Health Organization, with postoperative pathological examination that confirmed the presence of gastric cancer. Genetic testing was provided for each patient to determine the state of PTEN expression. All the selected participants were diagnosed without any other consumptive diseases. A total of 96 participants, gastric cancer patients with low PTEN expression, were selected, and informed consent was provided. The patients were randomized into the control and observation groups, with 48 participants each. In terms of sex and age, there were no significant differences between the two groups ($p>0.05$). Participants in the control and observation groups were given the same preoperative monitoring of physical signs, preoperative preparation, gastric cancer surgical treatment, postoperative drug therapy and general care. In addition to the above care and treatment, participants in the observation group were provided more comprehensive OR and home care.

*Selection of participants with a low PTEN gene expression*. Gastric cancer tissue samples were obtained from patients, and centrifuged at 1,788.8 x g for 10 min. The supernatant was then collected, and RNA was extracted using a TRIzol kit. RNA integrity was confirmed by agarose gel electrophoresis. The results of electrophoresis showed that the bands corresponding to 28S, 18S, and 5S RNA were clear, and the brightness of the 28S band was nearly double that of the 18S band, indicating that RNA was of high integrity. Therefore, the extracted RNA could be used for follow-up experiments. A reverse transcription kit was utilized to obtain cDNA. The expression of PTEN was detected via semi-quantitative polymerase chain reaction (PCR), with GAPDH as the internal control. The reaction conditions were: 95˚C for 30 sec, 64˚C for 25 sec, and 72˚C for 30 sec, for 35 cycles in total. The primers were synthesized by Tiangen Biotech (Beijing) Co., Ltd., Beijing, China. Sequences are shown in Table I. After the reaction, samples were analyzed by agarose gel electrophoresis, and the results were observed with a UV imaging system.

*OR care and home care*

*OR care*. Participants were provided preoperative psychological assessment to rule out emotions such as anxiety and fear (psychological care). Surgery was conducted in a quiet environment throughout the entire procedure, and strictly according to operating norms to avoid any accidents (environment care). Patient body temperature was maintained within the normal range, and infusion liquid was maintained at 37˚C (temperature care). Following surgery, the series intraoperative procedures were described to the patients. Medical staff coordinated with patients for the pull of tracheal cannula, further informed patients that the operation went smoothly and guided the correct way to cough (extubation care).

*Home care*. A home care team was established, the eating quality of participants was asked to follow strict requirements; participant body functional recovery training was also required; simple yoga and jogging were performed to improve the mood of participants, allowing them to feel good during recovery, and reduce their burden; family members expressed support for participants, and timely informed them of the doctor's advice to increase their information; and follow-up visits were enhanced to strengthen the contact between patients and doctors. The family members of participants described their recovery status to them in detail, and health care professionals gave a detailed assessment of participant prognosis.

*Observational indicators*. Both in the observation and control groups, the operative time, bleeding volume, extubation time, and postoperative recovery time of participants were recorded and analyzed. Self-rating anxiety scale (SAS) and Hamilton anxiety scale (HAMA) scores were applied 1 year after surgery to evaluate and collect the rehabilitation and prognosis status of all the participants, comparing changes and improvements of participant mental state before and after care was provided. In addition, scores of participant rehabilitation, overall quality of life, family adaptability and cohesion were gathered for statistical analysis (10,11). At the time of recruitment, participants in the observation and control groups did not show significant differences in any of the above indicators. Finally, participant survival time within 3 years after surgery was analyzed statistically and survival was graphed.

*Effect assessment*. SAS scores >50 indicated anxiety, while lower scores showed that participants had less negative emotions. Lower HAMA scores indicated less negative feelings experienced by participants, lower scores of rehabilitation indicators indicated better rehabilitation status, and the score of overall quality of life was calculated via the Functional Assessment of Cancer Therapy (FACT), where higher score suggested better quality of life during illness. The family adaptability and cohesion score was assessed through the Family Adaptability and Cohesion Scale. Lower score suggested lower degree of family cohesion and poorer adaptability (12,13).

*Statistical analysis*. Data are presented as mean ± standard deviation (SD). Data were analyzed with SPSS19.0 software (SPSS, Inc., Chicago, IL, USA). A t-test was applied to analyze numerical data, and a $\chi^2$-test was applied to conduct intergroup analyses of numeration data. The correlation between the expression level and clinicopathological characteristics was analyzed in a related program. The Kaplan-Meier log-rank test was utilized to perform survival analysis. $P\leq0.05$ was considered statistically significant.

## Results

*Selection of participants with a low PTEN expression*. Gastric carcinoma and paracancerous tissue samples were collected

Table II. Comparison of surgical indicators between groups.

| Group | n | Operative time (h) | Intraoperative bleeding volume (ml) | Extubation time (min) | Postoperative recovery time (min) |
|---|---|---|---|---|---|
| Observation group | 48 | 4.39±1.21 | 168.32±28.32 | 15.82±3.51[a] | 46.26±10.25[a] |
| Control group | 48 | 4.52±1.19 | 175.29±29.87 | 25.27±2.97 | 82.18±12.26 |
| P-value | | 0.762 | 0.521 | <0.01 | <0.01 |

[a]Compared with the control group, p<0.01.

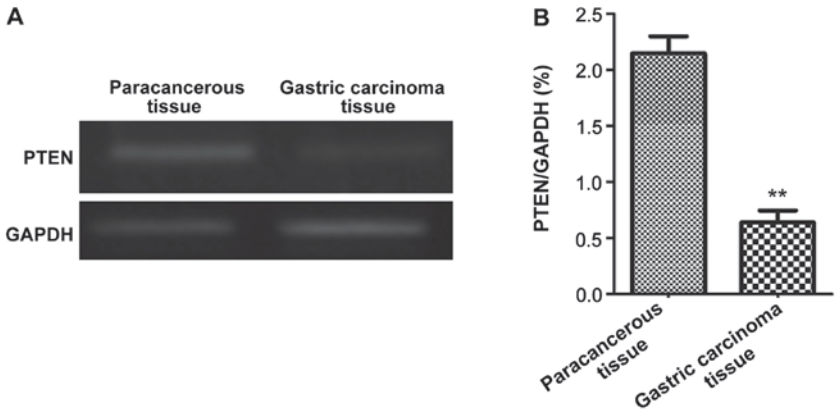


Figure 1. Semi-quantitative PCR was used to measure PTEN gene expression in gastric carcinoma tissue. (A) Agarose gel electrophoresis. (B) Relative levels of PTEN in paracancerous and gastric carcinoma tissue. The relative levels of PTEN in gastric carcinoma tissue were significantly lower than that in paracancerous tissue (**p<0.01). PCR, polymerase chain reaction.

Table III. Comparison of SAS scores before and after care.

| | | SAS scores | | |
|---|---|---|---|---|
| Group | n | Before care | After care | P-value |
| Observation group | 48 | 45.28±5.87 | 29.32±4.85 | <0.01 |
| Control group | 48 | 46.32±5.69 | 42.98±5.04 | <0.05 |
| P-value | | 0.426 | <0.01 | |

SAS, self-rating anxiety scale.

Table IV. Comparison of HAMA scores before and after care.

| | | HAMA scores | | |
|---|---|---|---|---|
| Group | n | Before care | After care | P-value |
| Observation group | 48 | 16.32±5.28 | 7.98±3.02 | <0.01 |
| Control group | 48 | 16.63±4.92 | 12.36±3.53 | <0.01 |
| P-value | | 0.724 | <0.01 | |

HAMA, Hamilton anxiety scale.

from gastric cancer patients. Semi-quantitative PCR was used to measure the expression of PTEN. The expression of PTEN in gastric carcinoma tissue varied significantly among patients. In some patients, PTEN expression in gastric carcinoma tissue was significantly lower compared with the level in paracancerous tissue (p<0.01). Representative semi-quantitative PCR results are shown in Fig. 1. Patients with a lower PTEN expression in gastric carcinoma tissue compared with paracancerous tissues were selected as participants and randomized into the observation and control groups with 48 participants each.

*Surgical indicators in participants of the two groups.* Participants in the observation and control groups were treated by the same operation. There were no significant differences in operative time or bleeding volume between the two groups (p>0.05). However, there were differences between the groups in extubation time and postoperative recovery time. Participants in the control group underwent longer extubation time and delayed recovery compared with the observation group (p<0.01, Table II).

*SAS scores of participants before and after care.* There were no significant difference in SAS scores between groups before care was provided. After care was provided, SAS scores in the two groups were significantly reduced (p<0.05). Furthermore, after care was provided, the SAS scores in the observation group were significantly lower than in the control group (p<0.01, Table III).

Table V. Comparison of postoperative rehabilitation.

| Group | n | Dysphagia | Stomach discomfort | Reflux | Eating disorders | Taste |
|---|---|---|---|---|---|---|
| Observation group | 48 | 18.52±13.28 | 16.32±12.32[b] | 23.82±17.51[b] | 22.26±15.25[a] | 16.29±12.34[b] |
| Control group | 48 | 17.65±14.89 | 23.29±15.87 | 32.27±21.97 | 27.18±18.26 | 22.26±19.64 |
| P-value | | 0.762 | <0.01 | <0.01 | <0.01 | <0.01 |

[a]Compared with control group, p<0.05. [b]Compared with control group, p<0.01.

Table VI. Scores of quality of life after care.

| Group | n | Total score of quality of life | Society/Family | Emotion | Function |
|---|---|---|---|---|---|
| Observation group | 48 | 57.89±8.26[a] | 22.28±4.29[a] | 19.76±5.23[a] | 15.85±3.27 |
| Control group | 48 | 47.77±7.95 | 16.83±3.67 | 15.25±4.96 | 15.69±3.56 |
| P-value | | <0.01 | <0.01 | <0.01 | 0.835 |

[a]Compared with control group, p<0.01.

Table VII. Scores of family adaptability and cohesion after care.

| Group | n | Family cohesion | Family adaptability |
|---|---|---|---|
| Observation group | 48 | 26.83±5.26[a] | 24.82±4.24[a] |
| Control group | 48 | 18.67±4.25 | 17.67±3.85 |
| P-value | | <0.01 | <0.01 |

[a]Compared with control group, p<0.01.

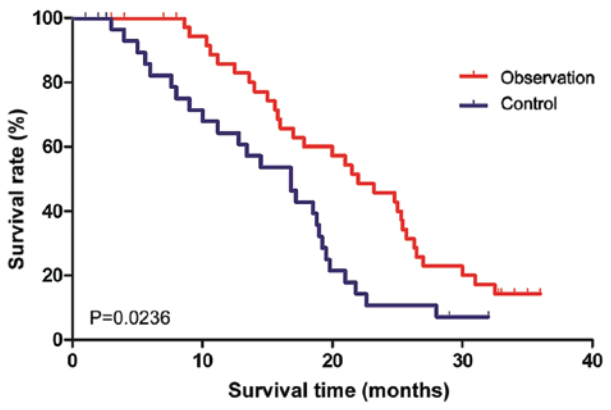


Figure 2. Survival curve of the two groups of patients. Patients in the observation group were provided OR care combined with home care. Their survival time was significantly longer than that of the control group, and the difference was statistically significant (p<0.01). OR, operating room.

*HAMA scores of the two groups before and after care*. There were no significant differences in HAMA scores between the groups before care was provided. After care, HAMA scores in both groups were significantly reduced (p<0.05). Furthermore, the HAMA scores in the observation group were significantly lower than in the control group (p<0.01, Table IV).

*Rehabilitation status of patients in the two groups*. Rehabilitation status of the two groups of patients was assessed. In the observation group, the scores of stomach discomfort, reflux, eating disorders and taste changes in rehabilitation assessment were significantly higher than those in the control group (p<0.01, Table V).

*Scores of overall postoperative quality of life of the two groups of participants after care*. Patients in the two groups were provided the same treatment, but accepted different OR and home care. After care, the scores of overall quality of life were compared between groups. The scores of the observation group were significantly higher than those of the control group (p<0.01). The scores related to society/family and emotional parameters in the observation group were significantly higher than those in the control group, while scores of function recovery were not significantly different between the two groups (p=0.835, Table VI).

*Scores of postoperative family adaptability and cohesion of the two groups of patients after care*. Patients in the two groups were provided the same treatment, while different care procedures and scores of family adaptability and cohesion were compared between the groups. The scores of family adaptability and cohesion in the observation group were significantly higher than those in the control group (p<0.01, Table VII).

*Comparison of participant postoperative survival time between groups*. The two groups of patients were followed up for 3 years to collect detailed visit reports. In the observation group, 42 valid reports were collected while 38 in the control group. When the participant survival time was compared

between the two groups. In the observation group, in which patients were provided OR care combined with home care, the participant survival time was significantly longer than that in the control group (p=0.0236, Fig. 2).

## Discussion

In recent years, a clear increase in postoperative survival time of cancer patients has been reported with constant improvements of surgical techniques. However, operation-induced negative emotions such as anxiety and pain severely influence the treatment effect and postoperative rehabilitation (14). With improvements of the concepts of patient care, many domestic and international studies have reported that necessary OR care can ensure a smooth operation and distinctly increases disease treatment effect (15).

In the present study, we analyzed the effect of OR care combined with home care on postoperative rehabilitation and prognosis of gastric cancer patients with a low PTEN expression. We found that although thorough OR care did not shorten operative time or reduce bleeding volume (p>0.05), it significantly reduced postoperative extubation time and recovery time (p<0.01). Informing patients of surgical details can effectively reduce their negative emotions, thereby shortening their recovery time. Various forms of care such as coordinating with patients to pull the tracheal cannula, informing them of the right way to cough, and providing regular backslapping are helpful for patients remove various secretions from their mouth, avoiding respiratory tract clogging, thus influencing prognosis (16). Comparison of SAS and HAMA scores before and after care was provided, showing that postoperative SAS and HAMA scores of the two groups of patients were significantly reduced compared with their preoperative scores (p<0.05), with the scores in the observation group reduced more significantly than in the control group (p<0.01), demonstrating that comprehensive OR care could relieve the negative emotions of patients and improve prognosis. Preoperative psychological care can reduce patient anxiety and fear caused by not understanding details of the operation, thereby smoothing its process (17). Postoperative body temperature care reduces the effects of low temperature on patient rehabilitation and prognosis, excluding unfavorable factors and promoting patient recovery (18). Various postoperative indicators demonstrated that rehabilitation status of the observation group was significantly better than that of the control group (p<0.01), suggesting that OR care could effectively improve patient rehabilitation and prognosis, which was consistent with relevant studies (19). When comparing the overall quality of life between the observation and control groups, the scores of quality of life and family adaptability and cohesion in the observation group were significantly higher than those in the control group, demonstrating patient improvement in these areas after care was provided (p<0.01). Many studies from around the world have also reported that advanced care provided in different disease treatment regimens can significantly reduce patient anxiety and improve patient quality of life and family cohesion (20). This was the first study to analyze the effect of home care on postoperative quality of life in patients with low PTEN expression. This intervention plays an important role in improving patient quality of life and prognosis by involving family function to increase patient confidence.

Postoperative care ensures the process of treatment and rehabilitation. Nurses, as daily care providers, are able to understand treatment effects, and timely communicate with doctors to optimize the effects. Family members also play a positive role in disease treatment by providing home care and supervising and accompanying patients for their necessary follow-up visits (21,22). Some studies have also demonstrated that receiving comprehensive OR and home care significantly improves the quality of life and family cohesion of cancer patients (23,24). In conclusion, OR care combined with home care is an effective form of care for gastric cancer patients with low PTEN expression and plays a positive role in their rehabilitation and prognosis by improving patient mood and mental state.

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