

Retrospective Study

Influence of preoperative comprehensive education on anxiety, depression, pain, and sleep in elderly patients operated under general anesthesia

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Abstract**BACKGROUND**

Owing to the particularities of their physical characteristics, older patients undergoing surgery under general anesthesia experience great surgical traumas. Thus, exploring more refined and individualized nursing approaches is an urgent need to mitigate the negative effects of surgery on such patients.

AIM

To analyze the influence of preoperative comprehensive education on anxiety, depression, pain, and sleep in older patients who underwent surgery under general anesthesia.

METHODS

In total, 163 older adults who underwent surgery under general anesthesia between June 2022 and November 2023 were selected, 77 of them received routine nursing care (control group), and 86 received preoperative comprehensive education (research group). Subsequently, comparative analyses were performed from the following perspectives: Surgical indicators (operation time, time to complete regain of consciousness, and temperature immediately after the procedure and upon recovery from anesthesia) before and after nursing care; negative emotions [self-rating anxiety scale (SAS)/self-rating depression scale (SDS)]; pain severity [visual analog scale (VAS)]; sleep quality [Pittsburgh sleep quality index (PSQI)]; incidence of sleep disturbances (difficulties in falling asleep for the first

time, falling asleep again after waking up frequently at night, falling asleep again after waking up early, and falling asleep all night); and incidence of adverse events (airway obstruction, catheter detachment, aspiration, and asphyxia).

RESULTS

The research group had significantly lower operation time and time to complete regain of consciousness than the control group after nursing care and markedly better recovery of postoperative body temperature and body temperature at awakening. In addition, more notable decreases in SAS, SDS, VAS, and PSQI scores were observed in the research group than in the control group. Furthermore, the incidence rate of sleep disturbance (8.14% *vs* 29.87%) and adverse events (4.65% *vs* 19.48%) were lower in the research group than in the control group.

CONCLUSION

Preoperative comprehensive education in older patients who underwent surgery under general anesthesia can improve postoperative indicators, effectively reduce the occurrence of anxiety and depression, alleviate postoperative pain, and improve sleep quality.

Key Words: Preoperative comprehensive education; Surgery under general anesthesia; Elderly patients; Anxiety and depression; Pain; Sleep

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Core Tip: This study primarily analyzed the influence of preoperative comprehensive education on anxiety, depression, pain, and sleep in older patients who underwent surgery under general anesthesia to address the relatively greater surgical traumas endured by older patients owing to their particular physical characteristics. We conducted a comprehensive analysis from multiple dimensions, including surgical indicators, negative emotions, pain levels, sleep quality, incidence of sleep disturbances, and the incidence of adverse events. Providing comprehensive preoperative education to older patients undergoing surgery under general anesthesia can improve postoperative indicators, significantly reduce anxiety and depression, alleviate postoperative pain, and enhance patients' sleep quality. Our findings can provide more optimized management options for older patients undergoing general anesthesia surgery.

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INTRODUCTION

Anesthesia plays a crucial role in the surgical process because it can inhibit the function of the central and peripheral nervous systems, thereby temporarily depriving the patient of pain sensation and providing a guarantee for smooth surgical progress[1]. General anesthesia is a frequently employed form of anesthesia in surgical procedures[2]. However, for patients who underwent surgery under general anesthesia, particularly older adults who require higher doses of drugs to achieve anesthesia and analgesia, their health is compromised to a certain extent[3]. Considering the particular physical characteristics of older patients and surgical trauma, appropriate preventive measures must be taken when performing surgery under general anesthesia[4].

As the number of patients receiving general anesthesia continues to increase, optimizing and improving the overall quality of care have become core issues in surgical care[5]. However, surgery as a strong external stimulus often causes both physical and mental stress to patients, which may trigger adverse stress reactions and adversely affect patients' recovery[6]. Therefore, more sophisticated and individualized care methods must be explored to reduce the negative effects of surgery on patients[7]. Routine nursing care for patients who underwent surgery under general anesthesia can help them quickly respond to complications and take timely measures to ensure patient safety. However, this nursing model is ineffective in promoting rapid recovery and reducing complications, which limits its clinical application[8]. On the contrary, one-on-one preoperative physiotherapy education sessions were found to effectively shorten the postoperative hospital stay and reduce the number of postoperative visits in patients who underwent total arthroplasty [9]. Moreover, preoperative comprehensive education, as a form of preoperative physical therapy education, is essentially a cognitive orientation that elaborates on the anesthesia methods to be used in the operation and informs patients in advance of physical reactions they may encounter during their postoperative regain of consciousness[10]. This education intervention aims to prepare the patient psychologically and adjust the patient's perception of the procedure, thereby relieving tension and eliminating the effects of negative emotions[11]. Another study showed that for colorectal surgery requiring catheterization (using tetracaine mucus), patients who received preoperative simulated education experienced significantly mild catheter-induced bladder discomfort and postoperative pain within 6 hours after the operation

compared with those who did not receive such education[12].

This study included 163 older patients who underwent surgery under general anesthesia to comparatively analyze the effects of preoperative comprehensive education on anxiety, depression, pain, and sleep in these patients.

MATERIALS AND METHODS

Patient selection and grouping

This retrospective study included 163 patients who underwent surgery under general anesthesia between June 2022 and November 2023. Seventy-seven participants (control group) received routine nursing care, whereas 86 (research group) received comprehensive preoperative education.

Eligibility and exclusion criteria

Inclusion criteria: Patients who received surgical treatment and could tolerate general anesthesia, had normal temperature measured before surgery, and were > 65 years old.

Exclusion criteria: Preoperative fever and infection; abnormal function of vital organs, such as the heart, liver, kidneys, and lungs; cognitive dysfunction; recovery affected by other drug interventions; failure to effectively control diabetes and hypertension; and coagulation dysfunction.

Nursing models

The control group was cared for by routine nursing interventions: Patients received daily health education and psychological support to enhance their understanding of the surgery process under general anesthesia and help them lessen their psychological stress and negative emotions. In addition, they were guided to perform preoperative preparations such as fasting and water prohibition. The operating room temperature was adjusted to an appropriate level, and all instruments needed for the operation were comprehensively inspected to ensure that everything was in good condition. To manage possible emergencies, corresponding emergency items were also prepared. During the procedure, nurses worked closely with the anesthesiologists and surgeons and monitored the patient's vital signs in real time to ensure the safety and smooth progress of the procedure.

The research group received comprehensive education interventions: (1) Admission evaluation: The patient underwent a comprehensive physical examination upon admission, and based on the results of the examination and questionnaire, a detailed admission evaluation form, particularly the assessment of anesthesia risk, was developed. For high-risk patients identified during anesthesia evaluation, specialized clinical coping strategies and nursing plans were formulated in advance to provide better medical services. Patients who undergo surgery under general anesthesia often bear a heavy psychological burden because of their severe and complex condition and aggravated anxiety because of upcoming major surgical procedures. Therefore, since admission to the hospital, the nursing staff explained the importance of surgical treatment and previous successful cases to appease their emotions and encourage them to wait for the surgery with peace of mind. The nursing staff also explained the necessity of general anesthesia to patients to dispel their concerns;

(2) Psychological nursing: Through active communication, medical staff helped family members to face patients' condition with a more optimistic attitude, thereby providing necessary family support for patients, inspiring their yearning for a new postoperative life, and helping them face surgery and illness more bravely. To allow patients and their families have a deeper understanding of the disease, surgery, and general anesthesia, nurses provided relevant knowledge, particularly possible adverse reactions caused by anesthesia, prepared patients for minor postoperative discomfort and reduced psychological and physiological stress reactions;

(3) Intraoperative thermal insulation: During the operation, nursing staff paid special attention to the patient's thermal insulation and closely monitored vital signs. To ensure the stability of the patient's body temperature, the fluids used for fluid replacement were preheated and kept at approximately 37 °C to prevent a sudden drop in the body temperature and local blood circulation caused by a large volume of low-temperature fluids entering the body quickly;

And (4) Postoperative care: After the operation, the patients were transferred to the postanesthesia care unit, where the nursing staff would choose a comfortable posture for them and regularly assisted them in adjusting their posture to ensure a smooth respiratory tract. Once changes in the patient's vital signs were noted, the nursing staff immediately notified the doctor and took appropriate measures promptly. When patients gradually regained consciousness, nurses inquired about their feelings in time, and analgesic drugs were administered as prescribed for those with unbearable pain.

Analysis indexes

Surgical indicators: The surgical indicators of the two groups were recorded in detail and compared. These parameters include the operation time (OT), time to complete regain consciousness, and temperature (measured using an infrared tympanic thermometer) immediately after the procedure and upon recovery from anesthesia.

Negative emotions: Before and after nursing care, a comprehensive assessment of the patient's psychological state was conducted using the specialized self-rating anxiety scale (SAS) and self-rating depression scale (SDS). An SAS score > 50 points and an SDS score > 53 points indicate anxiety and depression symptoms, respectively. Higher scores indicate greater anxiety or depression.

Pain severity: Pain levels before and after nursing were evaluated using the visual analog scale (VAS). The score is capped at a score of 10, and the resulting score is proportional to the level of pain felt, *i.e.*, higher scores indicate more intense pain experienced by the patient.

Sleep quality: The Pittsburgh sleep quality index (PSQI) was used to evaluate the sleep quality of patients before and after receiving nursing care. The total scale score is 21 points, and the score is inversely proportional to sleep quality; that is, the higher the score, the less satisfactory the patient's sleep quality.

Incidence of sleep disturbances: The incidence of sleep disorders in the two groups, such as difficulties in falling asleep for the first time, falling asleep after waking up frequently at night, falling asleep again after waking up early, and falling asleep all night, were observed and recorded.

Adverse events: The incidences of respiratory tract obstruction, catheter detachment, aspiration, and asphyxia were recorded.

Statistical analysis

The normality test for quantitative data was conducted using the Kolmogorov–Smirnov test. The quantitative data are expressed by as means \pm SE. The independent sample *t*-test was used for intergroup comparisons, whereas paired *t*-tests were used for intragroup comparisons before and after treatment. Categorical data are presented as the number of cases (percentages), and χ^2 tests were used for intergroup comparisons. All data analyses were performed using IBM SPSS Statistics for Windows version 22.0 (Armonk, NY, United States). Significance was indicated by a *P* value < 0.05 .

RESULTS

Comparative analysis of general data

The research and control groups did not differ significantly in terms of age, body mass index, sex, American Society of Anesthesiologists grading, surgical grading, and anesthesia mode ($P > 0.05$; [Table 1](#)).

Comparison of surgical indexes

In the two groups, the surgical indicators observed were the OT, time to complete regain of consciousness, temperature immediately after the procedure, and temperature upon recovery from anesthesia before and after nursing. After nursing, the OT and time to complete regain of consciousness were significantly lower in the research group than in the control group, whereas the temperatures immediately after the procedure and upon recovery from anesthesia were significantly better ($P < 0.05$; [Table 2](#)).

Comparison of psychological states

The psychological states of the patients in the two groups were evaluated by SAS and SDS. No significant intergroup differences were found in SAS and SDS scores before nursing care ($P > 0.05$). After nursing care, the SAS and SDS scores of both groups were significantly reduced, with a more notable decrease in the research group than in the control group ($P < 0.05$; [Figure 1A](#) and [B](#)).

Intergroup comparison of pain assessed by the VAS

A light difference in the VAS scores was noted between the two groups before nursing care ($P > 0.05$). An obvious decrease in VAS scores was observed in both groups after nursing care. Moreover, the research group had a more significant decrease in VAS scores than the control group ($P < 0.05$; [Figure 1C](#)).

Intergroup comparison of sleep quality evaluated by the PSQI

The two groups had similar PSQI scores before nursing care ($P > 0.05$). PSQI scores were markedly reduced in both groups after nursing care. Moreover, the research group exhibited a more significant decrease in the PSQI score than the control group ($P < 0.05$; [Figure 1D](#)).

Intergroup comparison of the incidence of sleep disturbances

The number and percentage of difficulties in falling asleep for the first time, falling asleep again after waking up frequently at night, falling asleep again after waking up early, and falling asleep all night in the two groups were counted. The incidence of sleep disturbances was 8.14% in the research group, which was significantly lower than the 29.87% in the control group ($P < 0.05$; [Table 3](#)).

Intergroup comparison of the incidence of adverse events

By counting the number and percentage of cases of respiratory tract obstruction, catheter detachment, aspiration, and asphyxia, the adverse event rate in the research group (4.65%) was significantly lower than that in the control group (19.48%) ($P < 0.05$; [Table 4](#)).

Table 1 Comparative analysis of general data, n (%)

Indicators	Research group (n = 86)	Control group (n = 77)	χ^2/t	P value
Age (years old)	57.63 ± 7.39	58.44 ± 6.81	0.725	0.469
Body mass index (kg/m ²)	21.31 ± 2.37	21.55 ± 2.24	0.662	0.509
Sex			1.086	0.297
Male	45 (52.33)	34 (44.16)		
Female	41 (47.67)	43 (55.84)		
ASA grading			0.034	0.983
Grade I	34 (39.53)	30 (38.96)		
Grade II	29 (33.72)	27 (35.06)		
Grade III	23 (26.74)	20 (25.97)		
Surgical grading			0.237	0.972
Grade I	21 (24.42)	18 (23.38)		
Grade II	25 (29.07)	22 (28.57)		
Grade III	24 (27.91)	24 (31.17)		
Grade IV	16 (18.60)	13 (16.88)		
Anesthesia mode			0.547	0.908
Epidural anesthesia	27 (31.40)	23 (29.87)		
Subarachnoid block	15 (17.44)	11 (14.29)		
Block anesthesia	18 (20.93)	19 (24.68)		
Combined spinal-epidural anesthesia	26 (30.23)	24 (31.17)		

The inter-group comparison of quantitative data and categorical data employed the χ^2 test and the independent sample *t*-test, respectively. ASA: American Society of Anesthesiologists.

Table 2 Inter-group comparison of surgical indicators

Groups	n	Operation time (minute)	Time to complete regain of consciousness (minute)	Temperature immediately after the procedure (°C)	Temperature upon recovery from anesthesia (°C)
Research group	86	143.17 ± 13.31	27.90 ± 2.66	36.38 ± 1.04	36.85 ± 0.49
Control group	77	188.12 ± 19.26	43.09 ± 3.17	35.62 ± 0.82	36.09 ± 0.64
<i>t</i>	-	17.480	33.250	5.139	8.562
P value	-	< 0.001	< 0.001	< 0.001	< 0.001

Independent sample *t*-tests were used for inter-group comparisons of quantitative data.

DISCUSSION

Surgery is undoubtedly a significant psychological and physiological stressor for older patients[13]. Typically, anxiety is evident in patients who are entering the operating room for major or minor surgeries, particularly those who are entering the operating room for the first time because they are often concerned about the possible detrimental effects of surgery on their health[14]. This intense sense of anxiety will not only affect the surgical process but may also adversely influence postoperative rehabilitation[15]. Many factors can cause perioperative anxiety in older patients, including the surgical procedure, anesthesia process, postoperative recovery, postoperative pain, and effect of surgery on physical function[16]. Therefore, to ensure a smooth recovery for patients after surgery, it is necessary to attach importance to and strengthen preoperative and postoperative nursing work[17].

In traditional preoperative visits, health education is often unilateral explanation by nurses without knowing whether patients understand and need these contents[18]. To improve this, a new comprehensive preoperative health education

Table 3 Inter-group comparison of sleep disturbances, n (%)

Indicators	Research group (n = 86)	Control group (n = 77)	χ^2	P value
Difficulty in falling asleep for the first time	3 (3.49)	7 (9.09)	-	-
Difficulty in falling asleep again after waking up frequently at night	2 (2.33)	8 (10.39)	-	-
Difficulty in falling asleep again after waking up early	2 (2.33)	5 (6.49)	-	-
Difficulty in falling asleep all night	0 (0.00)	3 (3.90)	-	-
Total	7 (8.14)	23 (29.87)	12.771	< 0.001

The inter-group comparison of categorical data was conducted using the χ^2 test.

Table 4 Inter-group comparison of the incidence of adverse events, n (%)

Indicators	Research group (n = 86)	Control group (n = 77)	χ^2	P value
Respiratory tract obstruction	1 (1.16)	4 (5.19)	-	-
Catheter detachment	2 (2.33)	4 (5.19)	-	-
Aspiration	1 (1.16)	5 (6.49)	-	-
Asphyxia	0 (0.00)	2 (2.60)	-	-
Total	4 (4.65)	15 (19.48)	8.676	0.003

The χ^2 test was used for the inter-group comparison of categorical data.

model was adopted[19]. The patient’s dedicated ward nurse will provide comprehensive and systematic preoperative education, including basic knowledge of surgery and anesthesia, and key points of perioperative care and postoperative recovery[20]. Unlike traditional methods, the current education approach encourages patients to take the initiative to raise questions, and professional health educators then provide detailed answers to ensure that the information is relevant to the actual needs of patients[21]. Preoperative patient education has been indicated to be the basic responsibility of any healthcare provider, and patients who receive detailed preoperative education have better extubation quality and improved quality of recovery from general anesthesia[22]. In the present study, the OT and time to complete regain of consciousness were significantly lower in the research group than in the control group after nursing, and the temperatures immediately after the procedure and upon recovery from anesthesia were significantly better. Thus, through comprehensive preoperative education, patients’ OT can be significantly shortened, they can regain postoperative consciousness faster, the intraoperative body temperature can be better stabilized, and the postoperative body temperature can be also quickly returned to normal. A study showed that patients’ deep fear, severe anxiety, and great concerns about surgery may have adverse effects on the perioperative progress. These findings highlight the importance of paying attention to the preoperative psychological state of patients undergoing surgery and propose strengthening patient education regarding anesthesia to alleviate their fear and enhance their understanding of the anesthesia process [23]. Peng *et al*[24] reported that successful preoperative anesthesia education effectively prevented anxiety in female patients before laparoscopic cholecystectomy, improved their overall health level, and shortened their hospital stays[24], which is similar to the results of this study. The results of the analysis of negative emotions showed that compared with the control group, the SAS and SDS scores of the research group decreased more significantly, proposing that preoperative comprehensive education can help patients maintain a stable mindset and emotional state during the perioperative period. Proactive communication before and after surgery, establishment of a trusting relationship, and provision of personalized comfort according to the patient’s situation are conducive to improving physical and mental comfort and preventing safety risks caused by negative emotions. Furthermore, surgery may induce physical and psychological stress to patients, whereas preoperative education can reduce anxiety, relieve pain, and improve postoperative outcomes[25]. The pain severity results showed that VAS score reduction was more significant in the research group than in the control group. Preoperative comprehensive education was suggested to help patients fully understand the relevant knowledge during the perioperative period, thereby reducing uncertainties and worries about the disease, helping them to be psychologically prepared, and reducing surgical pain. Surgery and general anesthesia have deleterious effects on sleep, and interference with perioperative sleep health is a risk factor for poor surgical outcomes[26]. The results of the analysis of sleep quality revealed that the PSQI score decreased more significantly and the incidence of sleep disturbances was significantly lower in the research group than in the control group. The results indicated that preoperative comprehensive education can help older patients stabilize their mental health by providing them with detailed surgical information, thus creating more favorable conditions for anesthesia and implementation of surgery, and indirectly promoting their emotional stability and relaxation. Therefore, the sleep quality of older patients was significantly improved, laying a good foundation for postoperative recovery. Finally, a significantly lower incidence of adverse events

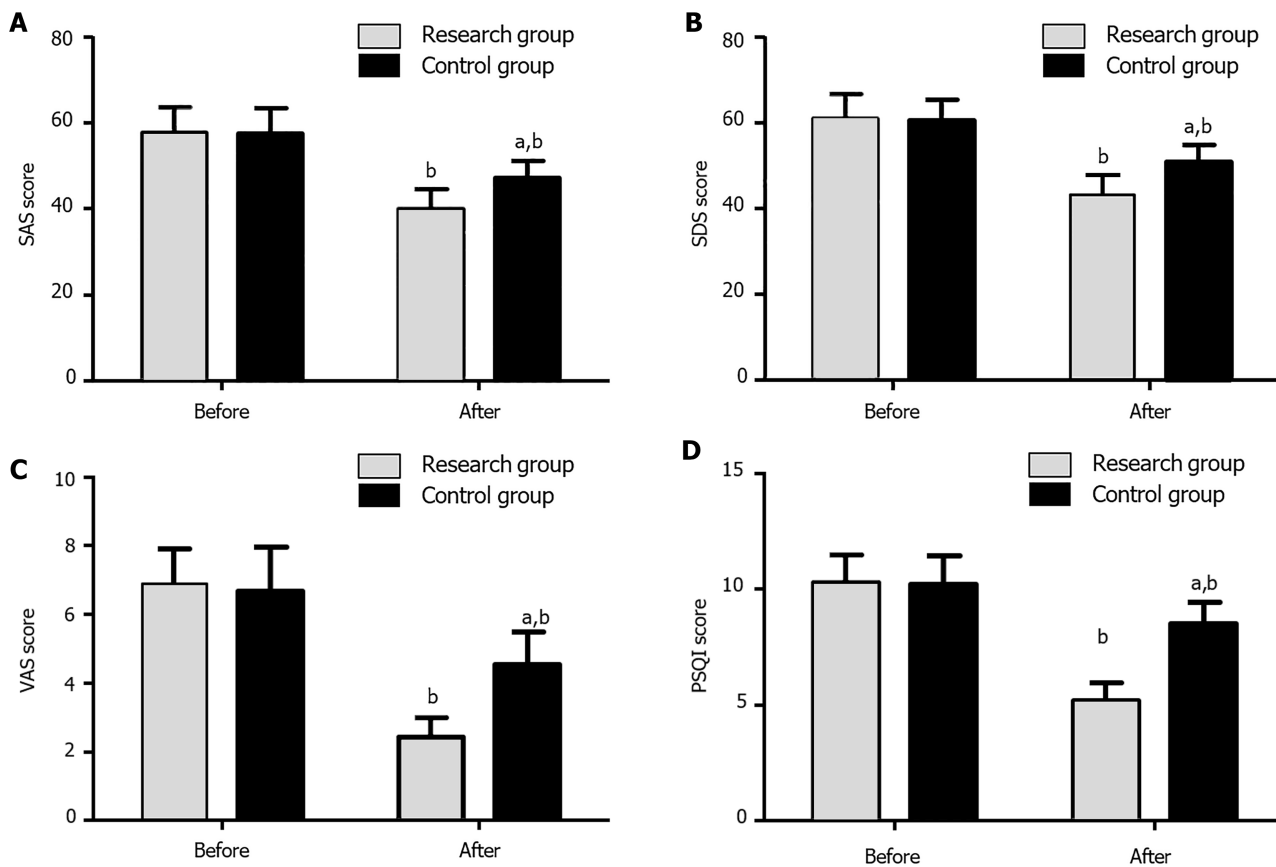


Figure 1 Detection of scores before and after nursing. A: Self-rating anxiety scale scores before and after nursing in the two groups; B: Self-rating depression scale scores of the two groups before and after nursing; The paired *t*-test was employed to compare the data before and after treatment. For the inter-group comparison, the independent sample *t*-test was utilized (A and B); C: The visual analogue scale scores of two groups before and after nursing. We used the paired *t*-test to compare the data before and after treatment and the independent sample *t*-test to compare the data between the two groups; D: The Pittsburgh sleep quality index scores before and after nursing in the two groups; The paired *t*-test was employed to compare the data before and after treatment, while the independent sample *t*-test was used to compare the data between the two groups. ^a*P* < 0.05 vs Control, ^b*P* < 0.01 vs before nursing; SAS: Self-rating anxiety scale; SDS: Self-rating depression scale; VAS: Visual analog scale; PSQI: Pittsburgh sleep quality index.

was noted in the research group than in the control group, indicating that preoperative comprehensive education not only focuses on preoperative preparation but extends to postoperative care. This education system prompts medical staff to closely monitor patients' vital signs in the postoperative stage, deeply analyze the risk factors that may lead to vital signs fluctuations, proactively identify and prevent various potential hazards, and provide meticulous comfort, thus lowering the probability of adverse events[27].

CONCLUSION

The application of preoperative comprehensive education for older patients who underwent surgery under general anesthesia can improve postoperative indicators, significantly reduce the occurrence of anxiety and depression, reduce postoperative pain, and improve the sleep quality of the patients.

FOOTNOTES

Author contributions: Qu L, Ma R and Xu GP designed the study, collected and analyzed data, and wrote the manuscript; Qu L, Ma R, Ma YK, Zhao X, Jin J, Zhu QQ, Chen XY and Xu GP participated in the study's conception and data collection; Qu L, Ma R and Xu GP participated in study design and provided guidance; All authors read and approved the final version.

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