The Effectiveness of Auricular Acupressure in Reducing Post-Surgical Anxiety and Pain in Hemorrhoidectomy Patients: A Randomized Controlled Trial

Qiong Pan[1,2], Feifei Shen [1], Wei Wei Niu [1], Hong Lu [1], Elsayed Mohammad Hassan Soliman Attia [2*],

[1] *Department of Proctology, Shuguang Hospital Affiliated to Shanghai University of Traditional Chinese Medicine, 528 Zhangheng Rd, 201203 Pudong, Shanghai, China.*
[2] *University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia.*
[*] *Corresponding Author:* ***Elsayed Mohammad Hassan Soliman Attia***

KEYWORDS

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Traditional Chinese Medicine

Post-surgical anxiety

Hemorrhoid

Post-operative pain

ABSTRACT:

Introduction: Hemorrhoids, particularly mixed hemorrhoids, are common anorectal diseases causing significant discomfort. Surgical intervention, often necessary for advanced stages, induces preoperative anxiety that can negatively impact recovery. Traditional Chinese medicine (TCM) suggests that auricular acupressure can alleviate anxiety by stimulating specific ear acupoints, thus promoting emotional and physiological balance.

Objectives: Despite promising results in various contexts, no scientific study has yet explored the effectiveness of auricular acupressure in reducing post-surgical anxiety and pain in hemorrhoid patients.

Methods: This randomized controlled trial involved 132 patients undergoing mixed hemorrhoidectomy. Participants were assigned to either a control group, receiving standard postoperative care, or an experimental group that also received auricular acupressure targeting acupoints such as Shenmen and Endocrine. Anxiety and pain were assessed using the State Anxiety Inventory (S-AI) and Visual Analog Scale (VAS) at multiple time points: pre-intervention, 24, 48, and 72 hours, and 7 days post-intervention.

Results: Statistical analysis revealed that the experimental group experienced significantly lower anxiety and pain scores compared to the control group ($P < 0.001$). Over time, both groups showed a decrease in anxiety and pain, but the experimental group demonstrated superior outcomes across all time points.

Conclusions: Auricular acupressure is an effective non-invasive intervention for reducing post-surgical anxiety and pain in hemorrhoidectomy patients. These findings support the integration of TCM techniques with conventional postoperative care, offering a holistic approach to patient recovery. Further research is recommended to explore its broader applications.

1. Introduction

Hemorrhoids are one of the most common anorectal diseases. The incidence rate is as high as 87% in China [1]. Hemorrhoids can be broadly categorized into internal hemorrhoids, external hemorrhoids, and mixed hemorrhoids. Clinically, isolated internal or external hemorrhoids cases are rare. Most of the cases are mixed hemorrhoids. The primary sites of mixed hemorrhoids are located above and below the dentate line at the same position in the anus. During flare-ups, patients experience symptoms such as rectal bleeding, anal swelling, and discomfort, often accompanied by a sensation of heaviness, pain, foreign body sensation, and sometimes local secretions or itching. Early-stage mixed hemorrhoids are treated with oral and topical medications, while patients with stage III, IV, or more severe hemorrhoids usually require surgical intervention to remove the hemorrhoids [2].

Surgery, regardless is minor or major, easily causes stress to the patients and stimulates the body to release adrenaline and norepinephrine, thus, increasing heart rate and blood pressure. Many surgical patients experience preoperative anxiety and negative emotions, with 15%-80% of patients showing varying degrees of preoperative anxiety, tension, or fear [3]. These patients may worry about the success of the surgery and post-operative pain, privacy concerns, and other issues, leading to a series of psychological and physiological reactions that directly affect surgical outcomes. Thus, alleviating or eliminating patients' anxiety and fear is essential for improving surgical outcomes.

Traditional Chinese medicine (TCM) believes that the ear (auricle) is a reflection of the whole body, with various organs and tissues corresponding to specific points on the ear. By massaging the ear meridians and stimulating corresponding acupoints, the functions of related organs can be regulated, alleviating negative emotions such as tension and anxiety. This helps patients to approach surgery with a calm mind [4, 5].

Auricular bean embedding, derived from traditional Chinese auricular acupuncture therapy, is an easy-to-learn and simple-to-perform method of TCM healthcare. The mechanisms through which auricular acupressure alleviates anxiety can be understood in several ways: First, the auricle has a rich distribution of nerves, blood vessels, and lymph nodes, including the great auricular nerve and lesser occipital nerve. Stimulating ear acupoints regulates the central nervous system by disrupting pathological nerve impulses and replacing them with normal physiological regulation, thereby suppressing exaggerated anxiety responses. Additionally, research has found that ear acupoints promote the clearance of lactic acid in the brain and inhibit free radical reactions, thus regulating neurotransmitter metabolism and reducing neuronal damage [6]. This suggests that ear acupoints exert their effects via the humoral pathway. When stimulating ear points related to anxiety, the thalamus-pituitary system is influenced, thereby alleviating anxiety. Lastly, according to holographic biomedical theory, every part of the human body can reflect the whole, and systemic diseases can manifest in a specific area of the body [7]. The ear is a microcosm of the body, and stimulating ear acupoints can affect the whole system, regulating organ functions and alleviating anxiety.

Research shows that auricular acupressure can significantly reduce anxiety scores. One study on students undergoing pre-exam anxiety found that auricular acupressure reduced both the Hamilton Anxiety Rating Scale (HAMA) and Self-Rating Anxiety Scale (SAS) scores [8]. Matthias et al. [9] found that in patients undergoing tooth extraction, auricular acupressure was as effective as midazolam in reducing pre-extraction anxiety. Another study by Li [10] showed that breast cancer patients undergoing radiotherapy had reduced anxiety and depression scores after receiving auricular acupressure in addition to standard care. Wang et al. [11] demonstrated that auricular acupressure, combined with standard postoperative care for patients with coronary heart disease, led to a significant reduction in anxiety scores compared to the control group. However, up-to-date, there is no scientific study investigating the effectiveness of auricular acupressure to reduce hemorrhoids patients' post-surgical anxiety.

2. Objectives

The aim of this study is to investigate the effectiveness of auricular acupressure to reduce hemorrhoids patients' post-surgical anxiety. Selected acupoints such as Shenmen and Endocrine are effective in regulating the excitation and inhibition functions of the cerebral cortex, providing analgesic and sedative effects during surgery, while also offering anti-infection properties. The Heart acupoint nourishes qi and calms the mind, and the Kidney acupoint, associated with fear, serves to stabilize emotions. The combination of these acupoints effectively improves mental well-being, producing a calming effect when paired with psychological counselling [12, 13].

3. Methods

2.1 Study Design

2.1.1 Clinical Data

2.1.1.1 Source of Participants

A total of 132 patients who were hospitalized and underwent mixed hemorrhoid surgery in the Department of Coloproctology at Shuguang Hospital were recruited into the study.

2.1.1.2 Participant Selection

Western Medicine Diagnostic Criteria: According to the 2006 Guidelines for the Clinical Diagnosis and Treatment of Hemorrhoids formulated by the Chinese Medical Association, the Chinese Society of Traditional Chinese Medicine, and the China Association of Integrative Medicine [14]:

a. Internal Hemorrhoids (above the dentate line) Staging:

Stage I: Bleeding during defecation, no prolapse of hemorrhoidal tissue;

Stage II: Frequent bleeding with defecation, hemorrhoids prolapse during defecation but retract spontaneously;

Stage III: Bleeding during defecation, hemorrhoids prolapse and need manual reduction;

Stage IV: Persistent hemorrhoidal prolapse, prolapsing even after manual reduction, often accompanied by bleeding.

b. External Hemorrhoids (below the dentate line) Classification:

1. Connective Tissue External Hemorrhoids: Skin tags formed due to the repeated stimulation of the anal margin by chronic inflammation;

2. Varicose External Hemorrhoids: Enlarged venous plexus under the anal margin, forming soft masses that can be pressed to disappear;

3. Inflammatory External Hemorrhoids: Localized redness, swelling, and pain at the anal margin due to infection;

4. Thrombosed External Hemorrhoids: Severe pain caused by the rupture of the external hemorrhoidal vein and subcutaneous blood accumulation.

c. Mixed Hemorrhoids: Fusion of internal and external hemorrhoidal venous plexus in the same region, resulting in a combination of internal and external hemorrhoid symptoms.

d. TCM Diagnostic Criteria: Based on the Criteria for Diagnosis and Therapeutic Effect of Diseases in Traditional Chinese Medicine [15]:

1. Rectal bleeding and anal mass, possibly accompanied by a sensation of anal distension, foreign body sensation, or pain;

2. Localized secretions or itching;

3. Anal mass appearing at the same location above and below the dentate line (sub dentate skin tags).

2.1.1.3 Inclusion Criteria

a. Aged 18-65 years; diagnosed with mixed hemorrhoids and undergoing surgery;

b. No abnormal anal morphology or function;

c. No severe respiratory, digestive, circulatory, or hematological diseases, and normal liver and kidney function;

d. Underwent circular stapled hemorrhoidopexy under intravenous anesthesia;

e. Understand the study, comply with the observations and treatment, voluntarily participate, and sign informed consent.

2.1.1.4 Exclusion Criteria

a. Concurrent other anal conditions (e.g., inflammatory external hemorrhoids, thrombosed external hemorrhoids, anal eczema, perianal abscess) that may affect treatment efficacy evaluation;

b. History of intestinal infections, intestinal polyps, malignant rectal tumors, or severe constipation;

c. Severe cardiovascular diseases, immune system deficiencies, mental disorders, or severe liver/kidney dysfunction; cognitive impairment affecting outcome evaluation;

d. Skin damage in the auricular region, or allergic reactions to adhesive tape;

e. Pregnant, breastfeeding, or menstruating women.

2.1.1.5 Criteria for Exclusion, Dropout, and Study Discontinuation

a. Poor compliance with treatment protocol;

b. Taking medications outside the study's scope, affecting the intervention's effectiveness and safety;

c. Unable to complete ear acupressure therapy due to auricular pain, skin damage, or allergic reactions;

d. Severe adverse reactions, such as arrhythmia, breathing difficulties, dizziness lasting over 5 minutes.

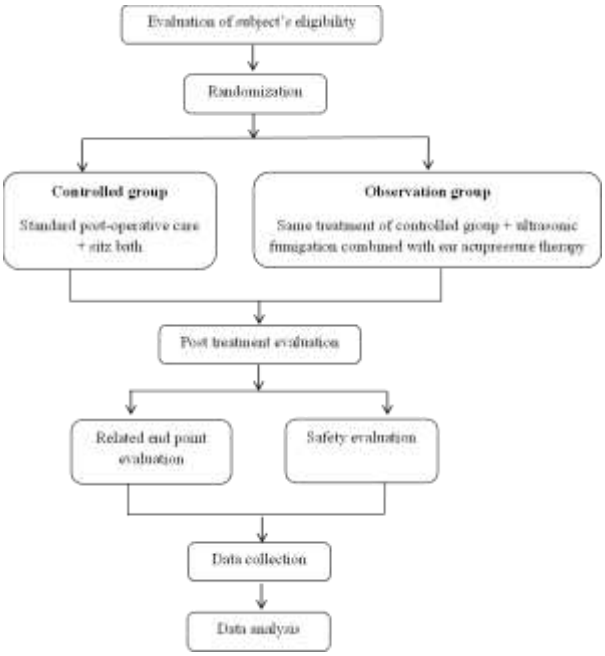
2.1.1.6 Handling of Exclusions and Dropouts

a. For dropouts, the reason should be documented, and the last treatment time noted;

b. Cases with severe adverse reactions or poor therapeutic outcomes should be recorded accordingly

2.2 Methodology

2.2.1 Flow chart of experiment



2.2.2 Randomization Method

Randomization was performed using the SPSS statistical analysis system. Participants were assigned to either the observation group or the control group based on the randomization method. The participants were blinded, and the code was managed by a designated research personnel. Clinical nurses were required to request random numbers from professionals when enrolling cases. The person responsible for generating the randomization scheme was not involved in clinical design, participant recruitment, or subsequent data analysis.

2.2.3 Sample Size Estimation

The required sample size was calculated using PASS 11.0 software. With Meant = 1.8, Meanc = 1.3, and both St and Sc set at 1, the ratio Nt = 0.9, and a significance level of $\alpha = 0.05$ and $\beta = 0.20$, accounting for a 10% clinical follow-up dropout rate, the required sample size for each group was 66 patients, with a total of 132 patients across both groups.

2.2.4 Preoperative Preparation

The subjects' perianal area was checked and cleaned prior to surgery. One glycerin enema was administered the night before surgery to clean the bowel.

2.2.5 Surgical and Anesthesia Methods

The subject was placed in the lithotomy position, and the perianal skin was disinfected following standard procedures. Intravenous anesthesia was administered to the subject. After successful

anesthesia, the perianal skin was disinfected again, and the appropriate surgical plan was implemented, which involved a mixed hemorrhoidectomy. The time of surgery initiation was recorded.

2.2.6 Postoperative Care

All patients received standard postoperative infection control and hemostasis treatment. Patients were given a standard hospital meal one hour after surgery. Gas-producing foods were avoided such as soy products and dairy, as well as spicy or irritating foods. Patients were instructed to maintain a lateral lying position to compress the wound and stop bleeding. After defecation, patients were treated with TCM fumigation and washing to keep the perianal area clean. Dressings were changed twice daily.

2.2.7 Intervention Measures and Procedures

2.2.7.1 Control Group

The control group received standard perioperative care for mixed hemorrhoidectomy:

a. Postoperative care included maintaining a lateral lying position and resuming eating one hour post-surgery, avoiding gas-producing foods (e.g., soy products, dairy) and constipation-inducing foods (e.g., bananas, honey).

b. The first urination post-surgery was facilitated by running water sounds, and if no urination occurred within 6-8 hours post-surgery, medication or catheterization was provided based on the doctor's advice;

c. On the second postoperative day, patients were allowed to move freely. They were encouraged to eat fresh fruits and vegetables, and advised to avoid spicy foods. Patients were encouraged to defecate once daily, followed by TCM fumigation and washing with hemorrhoid wash and laser treatment once daily to promote wound healing;

d. The traditional fumigation method involved mixing one bottle (150ml) of Huangbai liquid into a basin with 1000ml cold water (to prevent scalding), followed by 2000ml of boiling water. The liquid temperature was adjusted to 43-46°C, poured into a specialized sitz bath, and the patient was instructed to sit on it, first fumigating for 5 minutes, followed by a sitz bath when the temperature maintained at 38-42°C for 10 minutes, totaling 15 minutes. Psychological guidance, health education, and environmental care were provided to ensure optimal patient recovery. Dressings were changed twice daily until complete wound healing.

2.2.7.2 Observation Group:

The observation group received TCM ultrasonic fumigation combined with ear acupressure therapy:

a. Ear acupressure: The location and procedure followed the "Meridian and Acupoint Study" in China Traditional Chinese Medicine Press by Prof. Shen Xueyong for acupoint selection [16]. After disinfecting magnetic therapy stickers with 75% alcohol, one hand was used to expose the ear while the other pressed the corresponding acupoints (Shenmen, endocrine, heart, kidney). Patients were instructed to press the ear acupoints for 1-3 minutes, 2-3 times daily, until redness and soreness occurred. Additional guidance was provided to teach patients self-acupressure, with operator assistance if necessary to ensure treatment effectiveness.

b. Ultrasonic fumigation: Using an ultrasonic fumigation machine (Dalishen, model DC-200), 30ml of the herbal formula was added to the medicine cup, which was placed in the water container and positioned correctly. The nozzle was aimed at the anus, and the treatment was initiated with a preset mode. Water was heated to 42°C for 10 minutes of fumigation, followed by 4 minutes of hydrotherapy to wash the anus, and 4 minutes of heat therapy to dry the area. Each session lasted 18 minutes, with a treatment course of 10 days.

2.2.8 Concomitant Medications

During the clinical trial, necessary postoperative pain management was provided using dezocine injection (5mg intramuscularly; trade name: Garoning; manufacturer: Yangtze River Pharmaceutical Group Co., Ltd.; approval number: H20080328). Apart from essential postoperative analgesics, the use of additional medications was discouraged, with patients encouraged to rely on ear acupressure therapy. However, if patients experienced intolerable pain with a VAS score greater than 7, twelve hours post-treatment, additional oral diclofenac sodium dual-release enteric capsules (75-150mg; trade name: Difen; manufacturer: Fujisawa Deutschland GmbH, Germany; import license number: H20140548) were administered, with detailed records kept of medication timing and dosage.

2.3 Clinical Data Collection

2.3.1 General Information

The subject's name, enrollment date, home address, and contact information were recorded.

2.3.2 Biological Indicators

Demographic characteristics (date of birth, gender, age, marital status, education level, height, weight, occupation, vital signs (body temperature, resting heart rate, respiration, blood pressure) and medical history (family history, allergy history, surgical history). were recorded on the day of enrolment.

2.3.3 Diagnostic Indicators

Routine stool examination, anal visual inspection, and digital rectal examination were performed daily.

2.3.4 Efficacy Evaluation Indicators

2.3.4.1 Primary Observation Indicators

a. Pain Level: The Visual Analog Scale (VAS) [17] was used to assess pain levels as described in Table 1. The pain score was recorded by the researcher at different time points: before the intervention, and at 24h, 48h, 72h, and 7 days post-intervention.

Table 1 Visual analog scale (VAS) for pain assessment

Score	Description	Severity
0	No pain at the wound, no pain during dressing changes or defecation	No pain
1-3	Mild pain at the wound, discomfort only during defecation or dressing changes	Mild pain
4-6	Moderate pain at the wound, tolerable pain, no need for additional analgesics	Moderate pain
7-9	Severe pain at the wound, intense pain during defecation or dressing changes	Severe pain
10	Excruciating pain at the wound, unbearable, requires additional analgesics (injection)	Excruciating pain

b. Anxiety Status: The State Anxiety Inventory (S-AI) [18] was used to assess anxiety levels in the 132 participants at three time points: 30 minutes before surgery, 24 hours post-surgery, and 72 hours post-surgery. The questionnaire contains 40 items, with 20 items assessing anxiety and 20 assessing trait anxiety, for a total score of 80 points. Each item is rated on a 4-point scale: 1 = almost never, 2 =

sometimes, 3 = often, and 4 = almost always. Items 5, 9, 13, 17, and 19 are reverse-scored. The cumulative score for each item reflects the anxiety level of the patient, indicating their emotional state before and after treatment, with higher scores corresponding to greater anxiety. The validity of the test is 0.909. During the assessment, the researcher explained the specific details of the study to the patients, and questionnaires were administered and collected on-site. A total of 132 questionnaires were distributed, with a 100% return and validity rate.

2.3.4.2 Secondary Observation Indicators

a. Duration of Pain: The duration of pain experienced by the patient within one day was recorded, as shown in Table 2.

Table 2 Postoperative pain duration

Pain Duration per Day	**Score**
Pain duration < 2 hours	0
2 hours ≤ pain duration < 6 hours	2
6 hours ≤ pain duration < 12 hours	4
12 hours ≤ pain duration < 24 hours	6

b. Analgesic Use Rate and Total Dosage (Difen or increased dezocine injection): The proportion of subjects in each group who used analgesics was calculated as the ratio of analgesic users to the total number of subjects (a subject was considered a user if they took analgesics at least once). The usage rate was calculated as (Number of users)/(Total number of subjects) ×100%. The total dosage of analgesics used by subjects in each group was summarized.

c. Adverse Reactions Record: Any potential adverse reactions in patients were observed and recorded, including dizziness, headache, palpitations, local skin damage, ulceration, or allergic reactions due to ear acupressure treatment.

2.3.5 Adverse Event Observation and Analysis

Any adverse events occurring during the study was recorded using Case Report Form (CRF), with timely and appropriate treatment plans provided to the subjects. During the evaluation process, various potential adverse reactions were closely monitored and recorded. If any adverse events occur, they were handled promptly and appropriately until the subject fully recovers. Detailed records of the time, symptoms, severity, duration of the adverse event, and the treatment methods, progress, outcomes, and follow-up time were included in the CRF.

2.3.6 Statistical Analysis

All data were analyzed using SPSS 23.0 software. For continuous data that follow a normal distribution, the results were expressed as mean ± standard deviation (SD), and a one-way analysis of variance (ANOVA) was used for multiple sample comparisons. The LSD-t test was used for pairwise comparisons between groups. For data with unequal variances or that do not follow a normal distribution, the results were expressed as median (interquartile range), and non-parametric rank-sum tests were used for comparisons. Categorical data was expressed as frequency and percentage (%), and

inter-group comparisons were conducted using the chi-square (χ^2) test. Statistical significance was set at $P < 0.05$.

4. Results

3.1 Comparison of General Information Between the Two Groups of Patients

A statistical analysis was conducted on the gender, age, and length of hospital stay of 66 patients in both the experimental group and the control group. The results showed no statistically significant differences between the two groups ($P > 0.05$), indicating comparability. Details are presented in Table 3.

Table 3 Comparison of gender, age, and length of hospital stay between the two groups

Group	Sample Size	Gender (Male/Female)	Age (years)	Length of Hospital Stay (days)
Experimental	n=66	35/31	45.59 ± 12.21	11.71 ± 1.51
Control	n=66	32/34	44.65 ± 11.34	12.27 ± 2.11
X^2/t Value		0.273	0.458	-1.757
P Value		0.601	0.648	0.081

A statistical analysis was performed on the disease duration and occupational nature of the 66 patients in both the experimental and control groups. The results showed no statistically significant differences between the two groups ($P > 0.05$), indicating comparability. The specific results are shown in Table 4.

Table 4 Comparison of disease duration and occupational nature between the two groups

Group	Sample Size	Disease Duration	Occupational Nature
		≤1 year	1-3 years
Experimental	n=66	34 (51.5%)	18 (27.3%)
Control	n=66	37 (56.1%)	10 (15.2%)
X^2 Value		3.170	2.838
P Value		0.205	0.242

A statistical analysis was conducted on the dietary habits of 66 patients in both the experimental and control groups. The results showed no statistically significant differences between the two groups ($P > 0.05$), indicating comparability. The details are presented in Table 5.

Table 5 Comparison of dietary habits between the two groups

Group	**Sample Size**	**Dietary Habits**
		Bland Diet
Experimental	n=66	17 (25.8%)
Control	n=66	18 (27.3%)
X^2 Value		0.072
P Value		0.965

A statistical analysis was performed on the bowel movement duration of 66 patients in both the experimental and control groups. The results showed no statistically significant differences between the two groups ($P > 0.05$), indicating comparability. The details are provided in Table 6.

Table 6 Comparison of bowel movement duration between the two groups

Group	**Sample Size**	**Bowel Movement Duration <5 min**
Experimental	n=66	15 (22.7%)
Control	n=66	14 (21.2%)
X^2 Value		1.512
P Value		0.471

A statistical analysis was conducted on the frequency of bowel movements of 66 patients in both the experimental and control groups. The results showed no statistically significant differences between the two groups ($P > 0.05$), indicating comparability. The specifics are shown in Table 7.

Table 7 Comparison of bowel movement frequency between the two groups

Group	**Sample Size**	**Bowel Movement Frequency**
		2-3 times/day
Experimental	n=66	1 (1.5%)
Control	n=66	3 (4.5%)
X^2 Value		3.032
P Value		0.387

A statistical analysis was conducted on the bowel habits of 66 patients in both the experimental and control groups. The results indicated no statistically significant differences between the two groups ($P > 0.05$), suggesting comparability. Detailed results are shown in Table 8.

Table 8 Comparison of bowel habits between the two groups

Group	Sample Size	Bowel Habits
		Normal
Experimental	n=66	51 (77.3%)
Control	n=66	45 (68.2%)
X^2 Value		3.181
P Value		0.364

3.2 Comparison of VAS Scores at Different Time Points Between the Two Groups

The overall comparison of VAS (Visual Analog Scale) scores at five time points between the two groups was analyzed using repeated measures ANOVA. The main effect of the treatment factor (grouping) was $F = 127.89$, $P < 0.001$; the main effect of the time factor was $F = 2598.941$, $P < 0.001$; and the interaction between the two factors was $F = 52.169$, $P < 0.001$.

An independent t-test was used to compare the two groups at each time point. Before the intervention, there was no statistically significant difference between the two groups ($t = -0.253$, $P = 0.801 > 0.05$), indicating that the groups were balanced and comparable. At 24 hours after the intervention, the difference in pain between the experimental and control groups was statistically significant ($t = -7.499$, $P < 0.001$); at 48 hours after the intervention, the difference was statistically significant ($t = -11.133$, $P < 0.001$); at 72 hours after the intervention, the difference was also statistically significant ($t = -13.117$, $P < 0.001$). On the 7th day of treatment, the pain difference between the two groups was statistically significant ($t = -12.874$, $P < 0.001$).

Paired t-tests showed that the changes over time in both the experimental and control groups were statistically significant ($P < 0.05$), with both groups showing a decreasing trend. Overall, there was a statistically significant difference in VAS scores between the two groups at all five time points, with both groups showing decreasing scores over time, and the experimental group showing better efficacy than the control group. Details are presented in Table 9.

3.3 Comparison of S-AI Scores Between the Two Groups at Different Time Points

The overall comparison of S-AI (State Anxiety Inventory) scores at three time points between the two groups was analyzed using repeated measures ANOVA. The main effect of the treatment factor (grouping) was $F = 10.37$, $P < 0.01$; the main effect of the time factor was $F = 13.72$, $P < 0.01$; and the interaction between the two factors was $F = 25.11$, $P < 0.01$.

An independent t-test revealed no statistically significant difference between the two groups before the intervention ($P = 0.806 > 0.05$). At 24 hours and 72 hours post-operation, the S-AI scores of the experimental group were significantly lower than those of the control group ($P < 0.05$). Paired t-tests showed significant differences between time points for the control group ($P < 0.05$), indicating that the S-AI scores increased over time. However, the experimental group showed no significant difference

between time points (P > 0.05), indicating that their scores remained stable. Overall, there was a statistically significant difference between the two groups' S-AI scores over time, with the experimental group showing more stable scores, while the control group showed an upward trend. The specific results are shown in Table 10.

3.4 Comparison of Pain Duration Within One Day Between the Two Groups

The comparison of pain duration within one day between the two groups revealed no statistically significant difference (P = 0.800 > 0.05). The specific results are presented in Table 11.**Table 9** Comparison of VAS scores at different time points between the two groups

Group	Sample Size	Pre-intervention	24h Post-intervention	48h Post-intervention	72h Post-intervention	7th Day Post-intervention
Experimental	n=66	7.8 ± 0.77	5.27 ± 0.73[ab]	3.85 ± 0.56[ab]	2.68 ± 0.61[ab]	1.55 ± 0.68[ab]
Control	n=66	7.83 ± 0.6	6.29 ± 0.82[b]	5.11 ± 0.73[b]	4.11 ± 0.64[b]	3.09 ± 0.7[b]
t-value		-0.253	-7.499	-11.133	-13.117	-12.874
P-value		0.801	<0.001	<0.001	<0.001	<0.001

Note: Compared with the control group [a]P<0.05; compared with the pre-intervention within the same group [b]P<0.05.

Table 10 Comparison of S-AI scores before and after the intervention between the two groups

Group	Pre-operation (30 min)	24h Post-operation	72h Post-operation
Experimental	43.64 ± 10.03	44.94 ± 10.02[a]	45.17 ± 6.46[a]
Control	45.17 ± 6.46	49.37 ± 8.47[b]	51.37 ± 8.63[b]
t-value	-1.021	-2.743	-4.672
P-value	0.309	0.007	<0.001

Note: Compared with the control group [a]P<0.05; compared with pre-operation in the same group [b]P<0.05

Table 11 Comparison of pain duration within one day between the two groups

Group	Sample Size	Post-operative Pain Duration (minutes)
Experimental	n=66	2.61 ± 1.41
Control	n=66	2.55 ± 1.34
t-value		0.254
P-value		0.800

3.5 Comparison of Analgesic Use Between the Two Groups

The comparison of analgesic use between the two groups showed no statistically significant difference in usage rates (P = 0.161 > 0.05), with the experimental group having a usage rate of 12.1% compared to 21.1% in the control group. However, the mean dosage of analgesics in the experimental group (103.13 mg) was significantly lower than that in the control group (385.72 mg) (P < 0.001). The detailed results are shown in Table 12.

Table 12 Comparison of analgesic use between the two groups

Group	Sample Size	Usage Rate (n, %)	Dosage (mg)
Experimental	n=66	8 (12.1%)	103.13 ± 38.82
Control	n=66	14 (21.1%)	385.72 ± 205.62
X^2/t-value		1.964	-4.989
P-value		0.161	<0.001

5. Discussion

The present study investigated the efficacy of the experimental intervention compared to standard care in reducing post-operative pain and anxiety in patients, as measured by Visual Analog Scale (VAS) and State Anxiety Inventory (S-AI) scores, respectively. In addition, comparisons were made across general demographic factors, hospital stay length, bowel movements, dietary habits, and analgesic use. The results demonstrate the superiority of the experimental intervention in managing post-operative pain and anxiety, which has important implications for clinical practice.

One of the strengths of this study lies in the comparability of the two groups, as no statistically significant differences were found in gender, age, length of hospital stay, disease duration, occupational nature, dietary habits, or bowel movements (P > 0.05). This homogeneity ensures that the observed effects can be attributed to the intervention rather than underlying demographic or health disparities.

Post-operative pain management is a major focus of clinical care, and inadequate pain control can delay recovery, increase hospital stay length, and reduce patient satisfaction. In this study, the experimental intervention demonstrated superior efficacy in reducing pain, as evidenced by the significantly lower VAS scores at all post-operative time points compared to the control group ($P < 0.001$).

Moreover, both groups showed a reduction in VAS scores over time, which aligns with the natural course of post-operative pain resolution. However, the more rapid and significant reduction in the experimental group suggests that this intervention may enhance the body's pain-relieving mechanisms beyond what is achieved by conventional care alone. These findings suggest that incorporating this experimental approach into routine post-operative care could improve patient outcomes and reduce reliance on pharmacological interventions.

Anxiety is another critical factor in post-operative recovery, often associated with higher pain levels and delayed healing. In this study, the experimental group showed significantly lower S-AI scores compared to the control group at 24 and 72 hours post-operation ($P < 0.05$).

Interestingly, while the control group's anxiety levels increased over time, the experimental group's S-AI scores remained stable. This suggests that the experimental intervention not only alleviates anxiety but also prevents its escalation over the early post-operative period, a critical time for emotional well-being.

One of the most compelling findings of this study is the significant reduction in analgesic dosage in the experimental group ($P < 0.001$), despite no difference in overall usage rates between the groups. The reduced reliance on pharmacological pain relief suggests that the experimental intervention could serve as an effective adjunct to standard analgesic protocols, enhancing pain relief while reducing drug-related side effects.

Given the current emphasis on reducing opioid use in post-operative care due to the risk of addiction and adverse effects, these findings are particularly relevant. Similar reductions in analgesic requirements have been observed in studies incorporating complementary therapies such as acupuncture, yoga, and herbal medicine, which appear to enhance the efficacy of standard pain relief protocols.

The reduced dosage of analgesics in the experimental group could also contribute to faster recovery, as excessive use of certain analgesics, particularly opioids, has been linked to delayed healing and increased hospital stay lengths. Thus, the experimental intervention may offer a dual benefit in enhancing pain relief while promoting a faster, more complication-free recovery.

TCM methods involve the ear acupoints have a long history in China. The earliest records of ear acupoints date back to the Spring and Autumn and Warring States periods. The "Eleven Channels of Yin and Yang Moxibustion Classic" mentioned the close connection between the upper limbs, eyes, and throat with the ears. In the Tang Dynasty, Sun Simiao first proposed the localization of the "ear center" acupoint in the "Thousand Golden Prescriptions": "The ear center acupoint is located above the ear canal and can be treated with acupuncture to address jaundice and epidemic diseases caused by heat and cold." Despite the lack of specific names and locations for auricular acupoints in early records, the use of ear acupoints in diagnosing and treating diseases continued, laying the foundation for the later development of auricular therapy [19].

In modern times, in 1958, French physician Paul Nogier proposed the "inverted embryo" map of auricular points, identifying 42 acupoints. He later supplemented this with 26 additional points, such as the hunger point and depression point, in 1961 [20]. In 1975, Nogier published a new ear point map with over 200 points and introduced the concept of auricular reflex, also known as ear-cardiac reflex or autonomic vascular signal. In 1981, he proposed the three-phase theory, which described the

dynamic nature of disease reactions in the ear [7]. China then embarked on large-scale research on the localization and distribution of ear points, culminating in the establishment of the "National Standardization Scheme of Ear Acupoints" in 1988, which has facilitated international academic exchanges and laid a foundation for teaching and research in this area.

Ear acupressure therapy brings a number of medicinal benefits to the patients. It helps in regulating the function of internal organs and meridians: The "Ling Shu - Oral Inquiry" states, "The ear is where all the channels converge." The "Su Wen - On Correspondence and Manifestation of Yin and Yang" says, "The kidney governs the ear, and the orifice opens to the ear." Another passage in "Su Wen" indicates, "The red color of the south connects with the heart and opens through the ear." The "Source and Flow of Miscellaneous Diseases" mentions, "The lung governs qi, and the qi of the whole body connects with the ear." In "Essentials of Massage," it is noted that "the earlobe corresponds to the kidney, the helix to the spleen, the upper helix to the heart, and the ear cartilage to the lungs." These statements indicate that ancient scholars observed a close relationship between the ear and internal organs. The "Ling Shu" records that meridians passing through the ear include the hand shaoyang sanjiao meridian, foot shaoyang gallbladder meridian, and hand taiyang small intestine meridian. Although the six yin meridians do not directly connect to the ear, they can merge with the yang meridians through the twelve divergent meridians, thereby linking all twelve meridians to the ear. Liu Weizhou and others found that stimulating corresponding ear acupoints can trigger the sensation of meridian transmission. The small area of the ear serves as a convergence point for meridians, reflecting the condition of the five internal organs [21].

Besides, ear acupressure therapy also helps in regulating the nervous system: The auricle is composed of cartilage, fat, and connective tissue, with a dense distribution of blood vessels, lymph nodes, and nerves. Anatomical studies have revealed that the ear is innervated by various nerves, including the great auricular nerve and lesser occipital nerve from the cervical plexus, and branches of the auriculotemporal nerve, facial nerve, glossopharyngeal nerve, and vagus nerve from the cranial nerves, as well as sympathetic nerves accompanying the external carotid artery [22]. These nerves form a complex network in the ear. Research has found that vagus nerve excitation is related to the effects of auricular acupuncture. The ear's rich sensory receptors can detect various stimuli, such as pressure, pulse, and electrical stimulation. These stimuli are transmitted through the auricular nerves, converging in the trigeminal nerve and solitary nucleus before being integrated in the brainstem. The resulting signals regulate the body's central functions, including cardiovascular, respiratory, and sleep functions, by influencing the autonomic nervous system and improving abnormal cardiovascular activity [23-25].

Ear acupressure has the benefit of modulating humoral immunity. Auricular stimulation can also affect the body's humoral immune system. Stimulating the auricular vagus nerve sends signals to the solitary nucleus, which then transmits impulses to the hypothalamus. The hypothalamus influences the pituitary-adrenal axis, affecting hormone secretion, reducing the release of inflammatory cytokines, and modulating immune function [26, 27]. In addition to the theories of Paul Nogier, including the inverted embryo theory, the three-phase theory, and the holographic biological theory [28], modern research has contributed to the understanding of auricular acupuncture.

In conclusion, this study demonstrates that auricular acupressure is an effective method for alleviating post-surgical anxiety and pain in patients undergoing hemorrhoid surgery. By targeting specific acupoints, such as Shenmen and Endocrine, auricular acupressure helps regulate the nervous system and improves emotional well-being, leading to better post-operative outcomes. The results show that patients in the experimental group experienced significantly reduced anxiety and pain levels compared to the control group, highlighting the potential of combining traditional Chinese medicine techniques with standard post-surgical care. This approach offers a non-invasive and cost-effective alternative to managing post-operative discomfort, warranting further research to explore its broader applications.

References

[1] Li J. Clinical study on the impact of different sitz bath frequencies on complications after mixed hemorrhoidectomy. Nanning: Guangxi University of Chinese Medicine, 2022;3.

[2] Li M, Song H. Research progress on clinical treatment of hemorrhoids. Chin Folk Ther, 2020;28(3):88-89.

[3] Xue F, Yuan F. Perioperative Nursing. Beijing: Scientific and Technical Documentation Press, 2001:42.

[4] Jiang Q. Medical Psychology. Beijing: People's Medical Publishing House, 2006:86.

[5] Liu J, Xu Y, Xu G, et al. Ear acupuncture therapy serves as a 'bridge' between Chinese and Western medicine. Chin J Integr Trad West Med, 2019;39(06):750-752.

[6] Liu M, Li Z, Ma H. Efficacy evaluation of Xiaoyao Powder combined with auricular acupuncture for post-stroke depression. World J Integr Trad West Med, 2019;14(03):310-312.

[7] Liu J, Wang R, Zhang Z, et al. Comparative study of different schools of Chinese ear acupuncture. Chin Acupunct Moxibust, 2020;40(12):1363-1368.

[8] Yu S, Shen X. Effect observation of auricular acupoint pressing in treating pre-exam anxiety of middle school students. Chin School Doc, 2004;(06):541.

[9] Karst M, Winterhalter M, Munte S, et al. Auricular acupuncture for dental anxiety: A randomized controlled trial. Anesth Analg, 2007;104:295-300.

[10] Li J. Nursing effect of auricular acupressure on radiotherapy patients with breast cancer. J Longdong University, 2020;31(05):88-91.

[11] Wang Y, Wu H, Wu S. Effect of auricular acupoint pressing combined with mindfulness stress reduction therapy on quality of life in patients with psychological disorders after PCI for coronary heart disease. Modern Chin Med, 2021;41(01):86-91.

[12] Cai X. Observation on the effect of ultrasonic atomization fumigation on wound healing after mixed hemorrhoid surgery. Tianjin Nursing, 2013;(3):254-255.

[13] Liu Y. Clinical analysis of the effect of ultrasonic atomization fumigation with traditional Chinese medicine on wound healing after mixed hemorrhoid surgery. Med Hygiene, 2016;(10):270-270.

[14] Guidelines for Clinical Diagnosis and Treatment of Hemorrhoids (2006 Edition). Chin J Gastrointest Surg, 2006;(05): 461-463.

[15] Diagnostic Criteria, Syndrome Classification, and Efficacy Evaluation of Mixed Hemorrhoids — Traditional Chinese Medicine Industry Standard of the People's Republic of China "Diagnostic and Therapeutic Standards for Internal Medicine Diseases in TCM" (ZY/T001.1-94). J Liaoning University Trad Chin Med, 2017;19(05):216.

[16] Shen X. Meridians and Acupoints. Beijing: China Traditional Chinese Medicine Press, 2006:65-255.

[17] Bi J, Chen Y, Zhu C, et al. Research on Pain Assessment and Measurement Method. Chin Med Device Information, 2017;23(2):6-8.

[18] Zhang M. Handbook of Psychiatric Rating Scales. 2nd Edition. Changsha: Hunan Science and Technology Press, 1998:137-141.

[19] Luo H. Clinical evaluation and mechanism study of ear acupuncture for treating low back pain. Nanjing University of Chinese Medicine, 2010.

[20] Paul FMN. From Auriculotherapy to Auriculomedicine. Sainte-Ruffine: Maisonneuve, 1981.

[21] Liu W, Yang B, Li D. Observation of single-blind and double-blind phenomena of meridian transmission in ear acupoints. Acupunct Research, 1986;(02):158-161.

[22] Fu L, Wang C, Wang Z, et al. Progress in clinical applications of auricular acupressure therapy. World Latest Med Information Digest, 2019;19(98):130-131.

[23] But MF, Albusoda A, Farmer AD, et al. The anatomical basis for transcutaneous auricular vagus nerve stimulation. J Anat, 2020;236(4):588-611.

[24] Xu D. Clinical observation of the immediate antihypertensive effect of auricular electroacupuncture for primary hypertension. Nanjing University of Chinese Medicine, 2019.

[25] Wan L. Study on the adjustment effect of ear acupuncture on the perioperative body of gynecological surgery under general anesthesia. Guangzhou University of Chinese Medicine, 2013.

[26] Bellavance MA, Rivest S. The HPA-immune axis and the immunomodulatory actions of glucocorticoids in the brain. Front Immunol, 2014;5:136.

[27] Li S. Effects of electrical stimulation in the auricular region on depression in rats with CUMS model and the ERK signaling pathway mechanism. China Academy of Chin Med Sci, 2018.

[28] Chen X, Zhao J, Liao X, et al. Progress in the study of auricular acupoint pressing for anxiety and depression in patients with chronic heart failure. Massage Rehabilitation Med, 2017;8(03):6-8.