

ORIGINAL RESEARCH

Study on the use of auricular pressure bean combined with compound tung leaf burn oil in incision healing after circumcision

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Abstract

The present study aimed to observe the combined effect of auricular pressure bean and compound tung leaf burn oil on postoperative incision healing in patients who have undergone circumcision. Total 160 patients who have undergone circumcision with disposable circumcision anastomosis at The First Affiliated Hospital of Nanchang University between August 2023 and October 2023, were recruited as participants for the study. They were divided into two groups, *i.e.*, the control group and the observation group, using the randomised numerical table method. Each group consisted of 80 participants. The control group had received standard postoperative care, whereas the observation group had received additional treatment, *i.e.*, the application of auricular pressure beans along with compound tung leaf burn oil along with routine care. Comparative analyses performed for various parameters such as postoperative 24-h pain score, initial changes in pain scores, duration of oedema subsidence, time of anastomotic nail dislodgement, the manual removal rate of anastomotic nails, incision healing time, the incidence of complications, and patient satisfaction statistically significant difference ($p < 0.05$) were observed in all parameters except the manual removal rate of anastomotic nails and the complication rate. In these two parameters, no statistically significant difference ($p > 0.05$) was observed. The application of auricular pressure bean along with compound tung leaf burn oil in patients who had undergone circumcision can significantly reduce the postoperative oedema duration, accelerate anastomotic nail removal and incision healing, reduce post-circumcision pain, and effectively promote overall patient recovery, thereby improving patient satisfaction.

Keywords

Auricular pressure beans; Compound tung leaf burn oil; Circumcision; Oedema; Pain

1. Introduction

Circumcision is the removal of excess foreskin from the penis, exposing the penile head [1]. It is an effective intervention for the treatment of redundant prepuce and phimosis, while preventing associated complications [1]. Despite its ever-increasing acceptance the inherent nature of circumcision tends to elicit anxiety and fear in patients which can lead to adverse effects such as increased postoperative stress disorder and prolonged incision healing time [2]. The postoperative complications such as pain, oedema and bleeding, imposes considerable distress on patients. So, addressing the methods which can alleviate patient anxiety and fear, minimise or effectively manage postoperative complications, and promote incision healing are the key elements in the realm of circumcision.

Recently, the Action Plan for Further Improvement of Nursing Services (2023–2025), issued by the National Health Commission (NHSC) and the State Administration of Traditional Chinese Medicine (TCM), required its active implementation

for Chinese medicine special nursing. The plan emphasises about the significant role of Chinese medicine and special nursing in disease prevention, treatment and rehabilitation [3]. Ear acupoint pressure beans, involve the application of appropriate pressure, kneading, pressing and pinching on these points. This technique aims to unblock meridians and collaterals qi and blood, regulate qi, and alleviate pain, ultimately promoting incision healing [4]. Compound tung leaf burn oil, known for its anti-inflammatory, antihypertensive and epithelial tissue growth-promoting properties, has profound and widespread application in addressing skin-related problems [5].

To date, there is a dearth of research on the combined applicability of auricular pressure beans and compound tung leaf burn oil in circumcisions. A combined application of auricular acupressure beans and compound tung leaf burn oil for patients was done in the Department of Urology at a tertiary care hospital in Nanchang City China to explore its effects on postoperative incision healing.

2. Materials and methods

2.1 Participants

One hundred and sixty patients who had undergone circumcision anastomosis at The First Affiliated Hospital of Nanchang University during August 2023 to October 2023 were recruited for study. The random numerical table method was employed to divide them into two groups: a control group and an observational group, each comprising 80 patients.

2.2 Sample size calculation

The G*power 3.1.1 program (University of Dusseldorf, Dusseldorf, Nordrhein-Westfalen, Germany) for power analysis to determine the sample size of the study, with an anticipated medium effect size was used for sample size calculation. A 5% margin of error, 90% confidence interval and an effect size of 0.6, 66 participants per group were deemed necessary for the study [6]. Accounting for Total 160 participants was recruited for the study due to an expected dropout rate (20%) in a parallel study design.

2.3 Inclusion and exclusion criteria

2.3.1 Inclusion criteria

Only those participants were included who met the diagnostic criteria for phimosis or redundant prepuce as per Chinese Diagnostic and Treatment Guidelines for Urological and Male Diseases (Edition 2022) [7]; who were of age ≥ 18 years; absence of any history of psychiatric disorders, cognitively normalcy and capability of understanding and completing information feedback for active participation in the clinical intervention study; absence of external ear malformation; those who gave informed consent.

2.3.2 Exclusion criteria

The exclusion criteria were as: having acute infection of the genitourinary system; history of allergic reactions; individuals with severe cardiovascular and cerebrovascular diseases, diabetes mellitus and sexually transmitted diseases (STDs); patients with contraindications to auricular pressure beans.

2.3.3 Criteria for exclusion and dropout

The criteria for exclusion and dropout were as: individuals who failed to adhere to the treatment as per the prescribed method; participants who wish to voluntarily withdrew from the study before its completion; participants who withdraw their informed consent; individuals who were inadvertently omitted by the researcher. Flow diagram of the patient selection has been shown in Fig. 1.

2.4 Methods

2.4.1 Establishment of the research groups

The research team was comprised of eight members, including one nurse (leader) from the urology department to oversee the overall programme design and guidance; one deputy chief physician and one physician from the same department these were responsible for participant screening, circumcision pro-

cedures and baseline data collection. Further one more nurse (leader) from the TCM department to look after the training, guidance, and assessment of TCM nursing techniques; two nurses from the urology department handling ear acupoint pressure bean application, postoperative dressing change and health guidance. Two researcher holding masters of nursing degree to manage follow-up, data collection and statistical analysis.

2.4.2 Training

Two weeks before the official commencement of the study, the chief nurse from the urology department provided an overview of the background of the study, purpose, methodology and specific considerations. The deputy chief urologist briefed about the entire surgical implementation process by highlighting key aspects of postoperative care and observation. The head nurse from the TCM Department conducted comprehensive training for all research team members on the theory and practical application of the auricular acupuncture point pressure bean technique. Subsequently, each member was tested and examined through practical exercises to ensure proficiency.

2.4.3 Implementation of interventions

2.4.3.1 Intervention methods for the control group

The control group received standard care, from the following aspects: Psychological care: Patients were informed about the surgery's specific process and potential adverse reactions. Effective communication was done to alleviate tension and anxiety. Diet and activity guidance: Postoperatively, a light diet was recommended, with avoidance of spicy and stimulating foods. Patients were advised to wear loose clothing, refrain from prolonged standing or sitting, having an ample rest and to avoid strenuous exercise for the initial five days. Wound care: Following circumcision, a three-layer dressing was applied, comprising a waterproof inner layer (using petroleum jelly gauze), a middle gauze layer (using sterile dry gauze), and an outer pressurised layer (employing an elastic bandage). Patients were instructed to remove the outermost elastic bandage 2 h after surgery. The first dressing was changed after 72 h. of the surgery at the hospital, and further the patients were guided to self-administer daily wound disinfection with iodophor. They were also advised to change the sterile dry gauze dressings. All dressings were to be removed after 7 days. The wound was disinfected daily in the morning and evening with iodophor wipes. Patients were advised to careful during urination to keep the wound clean and dry to avoid infection. Complications prevention and care: Patients were instructed to promptly consult a physician if the wound bleed continuously, significant subcutaneous haematoma, pronounced oedema or increased secretion from the wound. Nail removal instruction: Postoperative suture nails were expected to naturally fall off; however, individuals with longer than usual retention (>45 days) were advised to return to the hospital for suture nail removal. Postoperative sexual activity: Adults were advised to refrain from engaging in sexual activity for next 50 days after surgery.

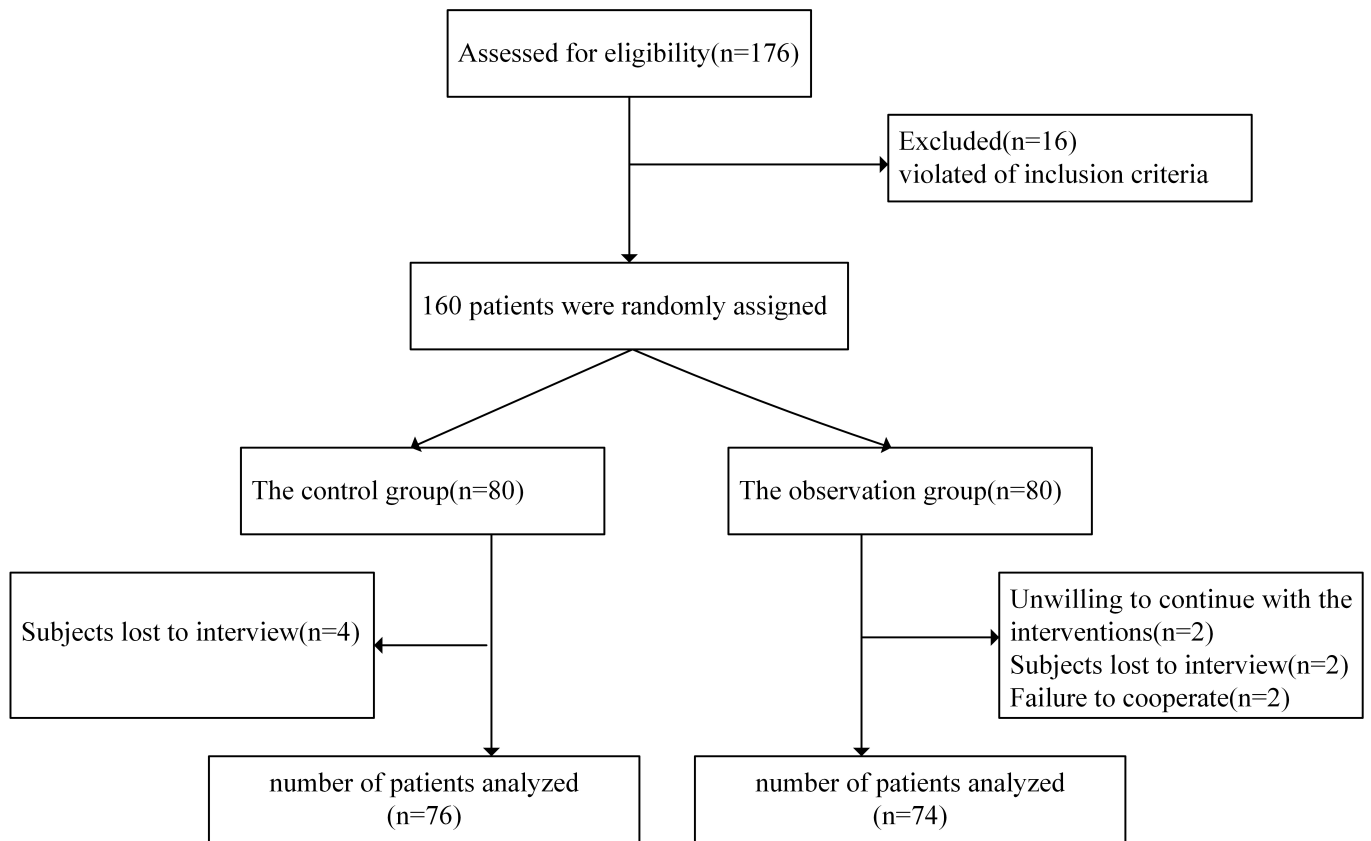


FIGURE 1. Flow diagram of the patient selection criteria.

2.4.3.2 Intervention methods of the observation group

The observational group underwent a combined treatment, *i.e.*, receiving auricular acupoint pressure beans along with compound tung leaf burn oil, in addition to standard nursing care or treatment. Auricular acupoint pressure bean treatment: The auricular acupoint pressure bean treatment was given 30 min before the surgery. Auricular acupoints, were selected which include Shenmen, subcortical, sympathetic, endocrine and external genitalia [8]. Ear probe was used to detect sensitive points. Probe was sterilized 5% alcohol (twice). Subsequently, adhesive tape with Wang Bu Liuxing seeds was applied to the auricular acupoints. Patients and their family members were instructed to use either the pair pressure method or direct pressure method for applying continuous pressure on the ear points until sensations of acidity, numbness, distension and pain were relieved. Pressure sessions were performed three to five times a day, with a focus on strengthening stimulation for 30 min before bedtime. Each acupoint area should receive pressure for 1–2 min during each session. Bilateral auricular acupoints were sequentially pressed, selecting on one side daily for a treatment duration of 7 days. Compound tung leaf burn oil application: after day one of circumcision, gauze soaked in compound tung leaf burn oil replaced with petroleum jelly gauze as the innermost layer of the circumcision incision dressing. The initial medication change occurred within the first 72 h after of the surgery, followed by self-administration as described above section. After povidone (iodine) sterilisation, burn oil was poured onto two layers of sterile gauze, to saturate them. The gauze impregnated with burn oil was

then wrapped around the wound which was further covered by dry gauze. After 7 days, all the dressings were removed and the wounds were wiped with the burn oil every morning and evening. The auricular pressure bean used for the treatment has been shown in Fig. 2.

2.5 Observation indicators

The 24-h postoperative pain scores, first dressing change pain scores, oedema subsidence time, anastomotic nail dislodgement time, manual removal rate of anastomotic nails, incision healing time, incidence of complications, and patient satisfaction in both groups were evaluated and recorded. The primary observations were included the pain score, time to oedema subsidence and time to incision healing, while the secondary observations were anastomotic nail dislodgement time, incidence of complications and satisfaction. Pain score: Using visual analogue scale (VAS) scores, the assessment involved a scale of 0–3 for mild pain without affecting sleep, 4–6 for obvious but tolerable pain and 7–10 for severe and intolerable pain [9]. Oedema subsidence time: Measured from the day of surgery till complete oedema subsidence. The criteria for oedema subsidence were soft skin at the incision edge without abnormal protuberance [10]. Incision healing time: From the day of surgery till the day of complete healing, the healing criteria was included scab loss, dry and non-secretive wounds, natural fusion of the incision margins of the inner and outer circumcision plate, and absence of obvious pressure pain [11]. Anastomotic nail dislodgement time: Recorded as the duration from the initiation to complete dislodgement of the anastomotic nail. Manual removal of anastomotic nails: Applied

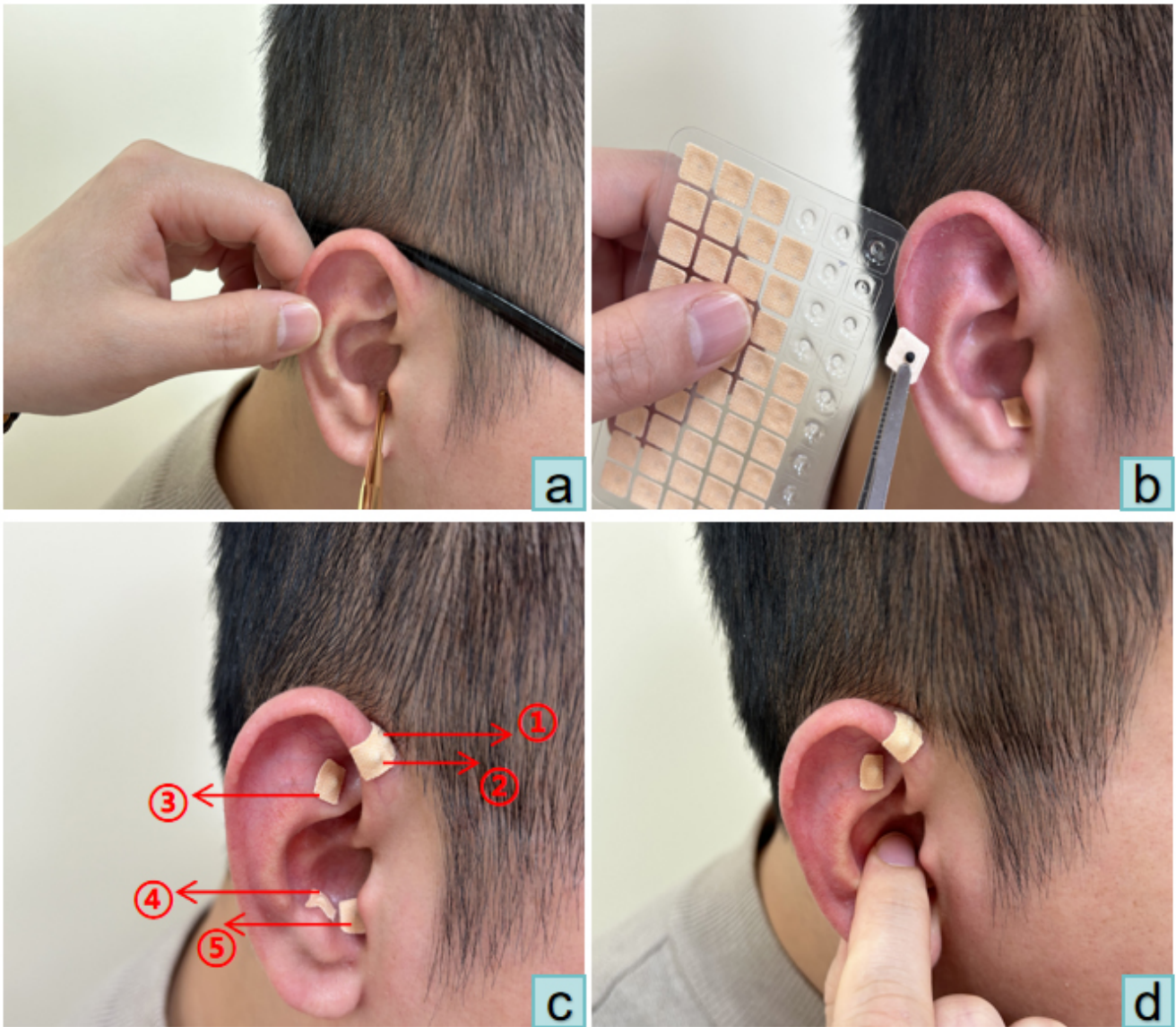


FIGURE 2. Diagram of the auricular pressure bean use. (a) detecting sensitive spots with an ear probe; (b) adhesive tape with Wang Bu Liuxing seeds to the ear acupoints; (c) selected points (external genitalia acupoints; sympathetic acupoints; Shenmen acupoints; subcortical acupoints; endocrine acupoints); (d) instruction the patient to apply pressure on selected acupoints.

when the anastomotic nail did not naturally fall off within 45 days after circumcision, necessitating manual removal by medical staff using instruments. Complications: Documented occurrence of postoperative bleeding, infection, incision split and other abnormalities and complications in both groups. Patient satisfaction: Assessed using a VAS with scores ranging from 0 to 10. Participants with scores ≥ 6 were categorised as satisfied.

2.6 Statistical analysis

Statistical analysis was performed by using SPSS version 26.0 (IBM, Chicago, IL, USA). Measurement data are expressed as the mean \pm standard deviation ($\bar{x} \pm s$), and between-group comparisons were performed using independent samples *t*-test. Count data are described using the frequency and percentage, with comparisons made by using the χ^2 test. Statistical significance was set as $p < 0.05$.

3. Results

3.1 The general information of two groups

In the present study, four participants from the control group and six participants from the observation group were dropped due to non-compliance with the treatment protocol and follow-up visits. Therefore, the study was finally completed with 150 participants, comprising 76 participants in the control group and 74 in the observational group. The total cost for the control group was ¥1689, while the observation group incurred an extra cost of ¥21 (1.24%), equivalent to approximately \$2.89 due to additional treatments. There was no significant difference was observed between the two groups with respect to their age and other socio-demographic variables ($p > 0.05$), as shown in Table 1.

TABLE 1. The general information of the two groups.

Characteristic	Control group (n = 76)	Intervention group (n = 74)	Test	p-value
Age (yr)	23.29 ± 6.422	22.84 ± 4.563	0.495 ⁽¹⁾	0.621
Body Mass Index	22.58 ± 1.284	21.96 ± 1.221	1.941 ⁽¹⁾	0.054
Diagnostic (number (Percentage, %))			0.296 ⁽²⁾	0.586
Phimosis	9 (11.84)	11 (14.86)		
Redundant prepuce	67 (88.16)	63 (85.14)		
Natural penis length (cm)	7.04 ± 0.824	7.22 ± 0.745	-1.377 ⁽¹⁾	0.171
Natural penis girth (cm)	8.80 ± 0.691	8.96 ± 0.608	-1.516 ⁽¹⁾	0.132
Length of surgery (min)	12.45 ± 2.840	12.89 ± 2.687	-0.984 ⁽¹⁾	0.327
Intraoperative bleeding (mL)	0.92 ± 1.230	0.99 ± 1.233	-0.325 ⁽¹⁾	0.745

Note: ⁽¹⁾t-value; ⁽²⁾χ² value.

3.2 Comparison of 24-h postoperative pain scores and first dressing change pain scores between the two groups

The postoperative 24-h pain score and the first dressing change pain score in the experimental group were significantly lower than those of the control group ($p < 0.05$) as shown in Table 2.

3.3 Comparison of the postoperative oedema subsidence time, anastomotic nail dislodgement time, the manual removal rate of anastomotic nails and incision healing time between the two groups

The experimental group exhibited significantly shorter postoperative oedema subsidence time, commencement of nail removal time, overall nail removal time, and incision healing time when compared with the control group ($p < 0.05$). Further, there was no statistically significant difference in the manual nail removal rate between the two groups ($p > 0.05$) as shown in Table 3.

3.4 Comparison of the postoperative complication and patient satisfaction rates between the two groups

In the control group, there was only one case of postoperative infection, seven cases of bleeding, two cases of incision splitting and one case of urination difficulty (other complications), resulting in a total incidence rate of 14.47%. Conversely, in the experimental group, there was not a single case of postoperative infection. However, five cases of bleeding, and one case of incision splitting, were observed resulting in a total incidence rate of 8.11%. The comparison of the two groups did not reveal any statistical significance ($p > 0.05$). Regarding satisfaction, 64 individuals in the control group had a satisfaction score of ≥ 6 , resulting a satisfaction rate of 84.21%. Contrarily, 70 individuals in the experimental group had satisfaction score of ≥ 6 , resulting in a satisfaction rate of 94.59%. The difference between the two groups was statistically significant ($p < 0.05$), as shown in Table 4.

4. Discussion

Redundant prepuce and phimosis represent common genitourinary conditions which lead to penile inflammation and circumcision due to inadequate local hygiene, potentially causing urinary tract infections [12]. As a major risk factor for STDs, these conditions can adversely affect the male health and his sexual partner [13]. Global Health Organisations emphasize the circumcision. It is a surgical procedure currently undertaken by male community worldwide (approximately 38%). This can help to control STDs, reduce the incidence of urinary tract infections, transmission of HIV and penile and cervical cancers [14]. However, the nature of circumcision triggers anxiety and fear and postoperative complications such as pain, oedema and bleeding. There may be a delay in incision healing in patients who have undergone circumcision. So, it becomes imperative to adopt proactive approach and measures to mitigate adverse reactions during the perioperative period of circumcision. Auricular pressure beans, as a characteristic non-pharmacological therapy rooted in TCM, are widely used as an analgesic remedy due to their remarkable efficacy, economic value, simplicity and minimal adverse reactions [15]. The primary components of compound tung leaf burn oil (namely tung leaf) and sesame oil have gained extensive pharmaceutical applications such as in wound healing which attributed to their efficacy in clearing heat and detoxification, reducing oedema and relieving pain, as well as reducing decay and promoting muscle regeneration [5]. In the present study, the use of auricular pressure beans in combination with compound tung leaf burn oil in perioperative circumcision was evaluated for their impact on postoperative pain, oedema subsidence time, incision healing time, nail removal time, and patient satisfaction. The results revealed significant improvements in postoperative pain, oedema subsidence time, incision healing time, nail removal time, and patient satisfaction in the observation group compared with the control group. Notably, no significant adverse reactions were observed, highlighting the effectiveness and safety of combining the auricular pressure beans with compound tung leaf burn oil.

Present study indicates that pain at the incision site is most intense within the first 24 h after surgery, primarily due to

TABLE 2. Comparison of 24-h postoperative pain scores and first dressing change pain scores between the two groups.

Characteristic	Control group (n = 76)	Intervention group (n = 74)	t-value	p-value
24-h postoperative pain score	4.80 ± 0.980	3.39 ± 1.031	8.590	<0.001
First Change Pain Score	6.24 ± 1.082	4.77 ± 0.820	9.339	<0.001

TABLE 3. Comparison of the postoperative oedema subsidence time, anastomotic nail dislodgement time, the manual removal rate of anastomotic nails, and incision healing time between the two groups.

Characteristic	Control group (n = 76)	Intervention group (n = 74)	Test	p-value
Edema subsidence time (d)	10.38 ± 3.854	8.28 ± 3.041	3.695 ⁽¹⁾	<0.001
Start of anastomotic nail dislodgement time (d)	11.26 ± 3.272	9.85 ± 1.773	3.298 ⁽¹⁾	0.001
Complete anastomotic nail dislodgement time (d)	26.58 ± 6.461	24.05 ± 3.157	3.053 ⁽¹⁾	0.003
The manual removal of anastomotic nails (number (Percentage, %))			1.358 ⁽²⁾	0.244
Yes	12 (15.78)	7 (9.45)		
No	64 (84.22)	67 (90.55)		
Incision healing time (d)	15.49 ± 3.873	12.96 ± 2.097	4.988 ⁽¹⁾	<0.001

Note: ⁽¹⁾t-value; ⁽²⁾χ² value.

TABLE 4. Comparison of postoperative complication and patient satisfaction rates.

Characteristic	Control group (n = 76)	Intervention group (n = 74)	χ ² value	p-value
Complications (number (Percentage, %))			1.512	0.219
Infection	1 (1.32)	0 (0)		
Hemorrhage	7 (9.21)	5 (6.76)		
Incision gap	2 (2.63)	1 (1.35)		
Other complication	1 (1.32)	0		
Satisfaction (number (Percentage, %))			4.243	0.039
Satisfaction (score ≥6)	64 (84.21)	70 (94.59)		
Unsatisfactory (score <6)	12 (15.79)	4 (5.41)		

the large quantity of nerve endings in the foreskin. These nerve endings play a crucial role in sensory information transmission, rendering patients more susceptible to pain [16]. Furthermore, the daily physiological penile erection increases the tension on incision, exacerbating pain. Currently, the common clinical dressing for circumcision comprises three layers, *i.e.*, a waterproof inner layer, a middle layer of gauze, and an outer compression layer. Vaseline gauze is usually chosen as the waterproof layer; however, it exhibits excellent water repellence activity, and lacks anti-adhesive properties, complicating subsequent dressing changes. It resists soaking and moistening by saline or diluted iodine, adhering strictly to the incision or peeling wound on the penile head leading to increased pain during the first dressing change after circumcision. In present study, the experimental group demonstrated significantly lower pain scores as compared to control group after 24 h of surgery and during the first dressing change. This suggests that the treatment involving auricular pressure beans combined with compound tung leaf burn oil effectively produces analgesic effect. Ying *et al.* [17] and Mengmeng *et al.* [6] had the similar findings in their investigations. TCM

posits that all internal organs and tissues correspond to specific reaction zones (auricular points) in the ear. By stimulating these auricular pressure points, a regulatory effect on the corresponding internal organs is initiated. In present study, auricular points including Shenmen, subcortical, sympathetic, endocrine and external genitalia were selected based on guidance from Chinese medicine specialist from the hospital. Further the location of these auricular points was confirmed. Shenmen auricular points are present in the upper part of the posterior one-third of the triangular fossa which has tranquilising effect on mind, relieve spasms and pain, and has anti-inflammatory and anti-itching properties. The subcortical auricular acupoints are situated on the medial side of the opposite ear screen. These acupoints regulate the cerebral cortex, tranquilises the mind and relieves pain and swelling. The sympathetic acupoints are located in the opposite ear at the junction between the lower foot of the wheel end and the inner margin of the ear wheel. These points regulate the sympathetic and parasympathetic nerves. Sympathetic points are situated at the junction of the lower foot end on the opposite auricle and the inner edge of the auricle, regulate both sympathetic and parasympathetic nerves,

providing analgesic and antispasmodic effects. Endocrine points present in the cleft between screen and the bottom of the auricular cavity, play a vital role in regulating hormone secretion, reducing infection, diuresis and swelling. The analgesic efficacy is synergistically enhanced by combined use of aforementioned acupoints. Concurrently, it is speculated that these acupoints modulate the neuroendocrine function, potentially inhibiting nocturnal penile erection to a certain level, thereby alleviating postoperative pain. However, the specific mechanism of action is unexplored yet. Relevant studies suggest that stimulating auricular acupuncture points can accelerate the release of plasma β -endorphin, exhibiting an analgesic effect by attenuating pain conduction and elevating the pain threshold [17]. Substituting gauze infused with compound tung leaf burn oil for petroleum jelly gauze the innermost layer of the dressing in patients who undergo circumcision serve a dual purpose. Firstly, the oil promotes continuous miniaturisation and facilitate the wet healing of the wound. Secondly, its enhanced anti-adhesive property contributes to the smooth progression of dressing changes and reduced the pain experienced during the patient's first dressing change.

Circumcision-related oedema is a common complication, despite all the ongoing advancements in medical equipment, surgical techniques and procedural innovations. Regardless of these improvements, complete prevention of oedema in clinical practice remains challenging, significantly impacting patients' lives and postoperative rehabilitations. In present study, the experimental group exhibited significantly reduced postoperative oedema duration, incision healing time, and nail removal time compared to the control group. These findings indicate that auricular pressure beans along with compound tung leaf burn oil intervention alleviates oedema and promotes incision healing. These findings are in good agreement with the results of Mengmeng *et al.* [6]. The mechanisms underlying postoperative circumcision oedema primarily involve impaired blood reflux, altered capillary permeability, impaired lymphatic circulation and neurogenic oedema [12].

Modern medical research [18] highlights the presence of blood vessels, lymphatic vessels, nerves and their intricate branches on the ear auricle. The stimulation of these corresponding acupoints on the ear by the application of Wang Bu Liu Xing seeds facilitates the unblocking of meridians and collaterals promoting the movement of qi and enhancing blood circulation, thus improving local microcirculation and alleviating impaired blood reflux and compromised lymphatic circulation. Further, stimulating these acupoints is conducive to inhibiting the release of inflammatory mediators, which play a vital role in reducing infection and inflammatory oedema. Compound tung leaf burn oil, known for its moisturising effect, diminishes wound exudate, lowering the risk of wound infection and creating a favourable environment for wound healing. Its components, *i.e.*, lignin and vitamin E exhibit antiseptic and anti-inflammatory properties, leading to the dilation of peripheral blood vessels and improved blood circulation [19]. By enhancing local microcirculation, the oil promotes the absorption of oedema in the tissue interstitial space, thereby reducing the duration of oedema, promoting incision healing, and facilitating early debridement. Whereas

these findings present a promising perspective, further enrichment of evidence-based medical data is required, and a deeper exploration of related mechanisms is needed.

5. Conclusions

The use of auricular pressure beans along with compound tung leaf burn oil treatment in patients who undergo circumcision significantly reduces the incision healing time and enhancing patient satisfaction. However, the limitations of this study, including exclusively enrolling adults undergoing circumcision under local anaesthesia with disposable circumcision anastomosis in a single hospital's urology department, introduce potential bias due to the singular surgical procedure and limited sample size. Therefore, the study results might exhibit some degree of biasness. Future research should involve large-sample, multicentre clinical trials to achieve more robust insights into the improved outcomes regarding incision healing.

AVAILABILITY OF DATA AND MATERIALS

The data are contained within this article.

AUTHOR CONTRIBUTIONS

BF, HXY—designed the research study; wrote the manuscript. YL, WH and YYH—performed the research. ZFX, YZ—provided help and advice on data collection. WQY—analyzed the data. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Ethics and Research Committee of the First Affiliated Hospital of Nanchang University (IIT2023224) and informed consent was obtained from each participant.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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