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Therapeutic benefits of acupoint massage at Yuji (LU10) and Zhaohai (KI6) for postoperative hoarseness in thyroid surgery patients

Mingzhu Lu[1], Yizhuo Lu[1*], Jing Li[1], Yunzhang Li[2] and Qinggui Chen[1]

Abstract

Objective This study aimed to evaluate the therapeutic efficacy of acupoint massage at Yuji (LU10) and Zhaohai (KI6) in alleviating hoarseness following thyroid surgery.

Methods A total of 106 patients who underwent thyroid surgery at our hospital between March 2023 and June 2023 were enrolled in this study. Patients diagnosed with postoperative hoarseness were randomly allocated into either the control group or the observation group using a computer-generated randomization table, with 53 patients in each group. The control group received standard postoperative treatment with neurotrophic drugs, while the observation group received additional acupoint massage therapy targeting Yuji and Zhaohai points. Subjective and objective voice parameters, cure rates of accompanying symptoms, and patient satisfaction were compared between the two groups.

Results After treatment, both subjective and objective voice indicators improved significantly in the observation group compared to the control group ($P < 0.01$). The Voice Handicap Index (VHI) scores were lower in the observation group, with mean differences of Total score: 13.48 (95% CI: [10.89, 16.07], Cohen's d = 2.01); Function: 4.06 (95% CI: [2.39, 5.73], Cohen's d = 0.94); Physiology: 4.07 (95% CI: [2.56, 5.58], d = 1.04); Emotion: 3.48 (95% CI: [1.88, 5.08], Cohen's d = 0.84). Objective voice indicators also showed significant differences, with the observation group having lower Jitter (0.17, 95% CI: [0.13, 0.21], Cohen's d = 1.48) and Shimmer (1.05, 95% CI: [0.86, 1.24], Cohen's d = 2.13), and higher MPT (-5.21, 95% CI: [-7.26, -3.16], Cohen's d = -0.98). Additionally, the observation group had a significantly higher cure rate (96.2% vs. 16.98%), with RR = 5.67 (95% CI: [3.12, 10.30]), and higher satisfaction rate (98.1% vs. 84.9%), with RR = 1.16 (95% CI: [1.03, 1.30]).

Conclusion Early postoperative acupoint massage stimulation of thenar and Zhaohai points is conducive to the recovery of patients with hoarseness after thyroid surgery, improve the quality of patients' voice, and effectively promote the rehabilitation of voice.

Keywords After thyroid surgery, Hoarse voice, Thenar point, Zhaohai acupoint, Acupoint massage

*Correspondence:
Yizhuo Lu
Luyizhuo79@163.com

[1]Department of General Surgery, Zhongshan Hospital Xiamen University, No. 201-209 Hubinnan Road, Siming District, Xiamen 361005, Fujian Province, China
[2]Department of Orthopedic, Xiamen Wucun Orthopedic Hospital, Xiamen 361010, Fujian Province, China

Background

Postoperative hoarseness represents one of the most prevalent complications following thyroid surgery, with significant implications for patient recovery and quality of life. Extensive clinical studies have demonstrated that the incidence of this complication ranges from 1.33 to 29.73% [1–2], while some research indicates that transient voice alterations may affect an even broader population, reaching 30-87% of surgical patients [3]. This wide variation in reported incidence rates underscores the complexity of postoperative voice disorders and the need for comprehensive management strategies.

The pathogenesis of post-thyroidectomy hoarseness is multifactorial, with recurrent laryngeal nerve (RLN) injury being the predominant etiological factor, occurring in approximately 1-6% of cases. The mechanisms of RLN injury are diverse, including intraoperative traction, contusion, thermal damage, and postoperative complications such as local hematoma formation, seroma accumulation, and inflammatory edema-induced nerve compression. Beyond direct neural injury, other contributing factors include arytenoid cartilage dislocation, laryngeal edema secondary to endotracheal intubation, and muscular injury with subsequent adhesion formation.

Contemporary surgical practice emphasizes meticulous anatomical dissection and refined surgical techniques to minimize RLN injury. Postoperative management often incorporates neurotrophic medications to address voice alterations. However, patients frequently experience concomitant symptoms including pharyngeal dryness, discomfort, and persistent irritative cough, which significantly impact their postoperative recovery and quality of life. These symptoms not only prolong the recovery period but also contribute to psychological distress, potentially affecting overall surgical outcomes.

In recent years, the integration of traditional Chinese medicine (TCM) with conventional Western medical approaches has emerged as a promising therapeutic strategy for managing postoperative complications. This integrative approach has shown particular promise in addressing post-thyroidectomy hoarseness, offering potential benefits in symptom relief and functional recovery. Among various TCM modalities, acupoint massage has gained attention for its non-invasive nature and potential therapeutic effects.

This study focuses on the clinical application of acupoint massage at two specific points: Yuji (LU 10) and Zhaohai (KI 6). These acupoints were selected based on TCM theory and previous clinical observations suggesting their efficacy in voice-related disorders. The investigation aims to systematically evaluate the therapeutic effects of this intervention on post-thyroidectomy hoarseness, with particular attention to symptom improvement, recovery time, and patient satisfaction.

Table 1 Comparison of general information of two groups of patients

group	male	female	Age ≤ 45	Age > 45
control group	10	43	25	28
Observation group	11	42	27	26
χ2	0.059		0.154	
P	0.8075		0.712	

Table 2 Comparison of operation related data between the two groups

group	Solitary nodule	Multiple nodules	Unilateral lobectomy	Bilateral lobectomy
control group	8	45	20	33
Observation group	7	46	22	30
χ2	0.078		0.164	
P	0.7805		0.685	

The following sections present a detailed analysis of clinical case data, methodological considerations, and therapeutic outcomes associated with this integrative treatment approach.

The significance of this study lies in its potential to provide evidence-based support for the integration of TCM modalities in postoperative care, particularly in the management of a common yet challenging surgical complication. By combining traditional wisdom with modern medical practice, this research contributes to the growing body of knowledge regarding comprehensive, patient-centered approaches to post-thyroidectomy recovery.

Materials and methods

Study design and ethical considerations

This prospective, comparative study was conducted at Zhongshan Hospital, Xiamen University, following approval from the institutional ethics committee (Approval No.: XMUZH-2023-ENT-015). The study design adhered to the principles outlined in the Declaration of Helsinki and Good Clinical Practice guidelines. Written informed consent was obtained from all participants and their legal representatives prior to study enrollment. The patients baseline profiles are shown in Tables 1 and 2.

Participant selection

Inclusion criteria

Participants were eligible for inclusion if they met the following criteria:

1. Diagnosis of postoperative hoarseness following thyroidectomy.
2. Preoperative stroboscopic laryngoscopy confirmation of normal vocal cord anatomy, excluding organic lesions.

3. Intraoperative confirmation of intact recurrent laryngeal nerve (RLN) without ligation or transection.
4. Willingness to comply with study protocol and follow-up requirements.
5. Age between 18 and 65 years.

Exclusion criteria

Patients were excluded from participation if they presented with:

1. Pre-existing vocal cord pathologies (tumors, polyps, or nodules).
2. Concurrent neurological disorders affecting vocal function.
3. Chronic respiratory diseases or pulmonary dysfunction.
4. Significant cardiovascular, hepatic, or renal impairment (ASA classification ≥ III).
5. History of previous laryngeal surgery or radiation therapy.
6. Pregnancy or lactation.
7. Known hypersensitivity to study medications.

A total of 106 patients who underwent thyroid surgery in our hospital from March 2023 to June 2023 were selected for this study. Patients diagnosed with hoarseness after thyroid surgery were randomly assigned to either the control group or the observation group using a computer-generated random number table. Simple randomization was employed to ensure equal allocation of participants between the two groups. To maintain allocation concealment, the group assignments were placed in sealed, opaque envelopes, which were opened sequentially only after patient enrollment. Given that the study involves subjective outcome measures such as patient satisfaction and the Voice Handicap Index (VHI), blinding was implemented at the assessor level (single-blind design) to reduce bias. Outcome assessors were unaware of group assignments.

Sample size

The sample size was determined using power analysis, based on preliminary data or previous studies assessing acupoint therapy for similar conditions. A power of 80% ($\beta = 0.20$) and an α level of 0.05 were set to detect a clinically significant difference in primary outcomes (e.g., VHI scores, patient satisfaction). The final sample size of 50 patients per group accounted for a potential dropout rate of 10%.

The control group received standard postoperative care, which included: 1) Neurotrophic medication: Patients were administered oral Mecobalamin (methylprednisolone tablets, Eisai China Pharmaceutical Co., Ltd., National Medicine Approval No. H20143107) at a dosage of 0.5 mg per dose, three times daily, for a duration of one month. 2) Routine nursing care: Patients were advised to maintain a healthy lifestyle, increase water intake, and avoid consuming acidic, spicy, or other irritating foods.

The observation group, in addition to receiving the same standard care as the control group, was provided with targeted acupoint massage therapy. This involved massage of the Yuji (LU10, located on the thenar eminence) and Zhaohai (KI6) acupoints, aiming to enhance therapeutic outcomes through traditional Chinese medicine techniques.

Acupoint stimulation began 6 h after surgery, with massage applied alternately using the thumb and palm, progressing from light to firm pressure. Patients were instructed to experience sensations of soreness, swelling, numbness, and moderate pain during the stimulation. Each massage session lasted approximately 15 min, performed three to four times daily for one month. To ensure consistency in technique delivery and minimize variability, all massages were administered by licensed therapists with at least 5years of experience in acupoint massage. Before the study, therapists underwent standardized training, which included detailed instruction on acupoint location, pressure application, and massage duration. A standard operating procedure (SOP) was established, and compliance was periodically monitored through supervisory checks.

To ensure patient safety and comfort: a 10-point visual analog scale (VAS) was used to monitor patient discomfort during massage. Patients were instructed to report their pain level before, during, and after each session. If a patient reported a VAS score above 6 (severe pain), therapists were instructed to adjust the pressure or stop the session if necessary. A logbook was maintained to record patient-reported sensations, pain scores, and any adverse reactions.

Observation indices

Objective voice acoustic parameters

The objective voice parameters were assessed and compared between the two groups, including:

- Fundamental frequency perturbation (jitter)
- Amplitude perturbation (shimmer)
- Maximum phonation time (MPT)

Measurements were conducted in a soundproof room with ambient noise levels maintained below 45 dB, using the German Xion voice analysis software. Patients were seated upright, with the microphone positioned approximately 30 cm from the lips and aligned at the same horizontal level. Participants were instructed to sustain the

Table 3 Comparison of VHI scores between the two groups (points, X ± s)

Score	Observation group(*n* = 53)	Control group (*n* = 53)	T value	*P* value	Mean Differences (Control - Observation Group)	Effect Sizes (Cohen's d)	95% Confidence Intervals (CI) for Mean Differences
Total score	43.54 ± 6.61	57.02 ± 6.83	10.3249	< 0.01	13.48	2.01 (large effect)	[10.89, 16.07]
Function	13.92 ± 4.52	17.98 ± 4.15	3.1097	< 0.01	4.06	0.94 (moderate to large effect)	[2.39, 5.73]
Physiology	16.24 ± 3.68	20.31 ± 4.14	5.3429	< 0.01	4.07	1.04 (large effect)	[2.56, 5.58]
Emotion	14.18 ± 4.35	17.66 ± 3.96	4.3068	< 0.01	3.48	0.84 (moderate to large effect)	[1.88, 5.08]

Table 4 Comparison of objective voice acoustic parameters between the two groups (x ± s)

Index	Observation group(*n* = 53)	Control group (*n* = 53)	t value	*P* value	Mean Differences (Control - Observation Group)	Effect Sizes (Cohen's d):	95% Confidence Intervals (CI) for Mean Differences:
Jitter (%)	0.27 ± 0.11	0.44 ± 0.12	5.326	< 0.01	0.17	1.48 (large effect)	[0.13, 0.21]
Shimmer (%)	1.31 ± 0.44	2.36 ± 0.54	3.547	< 0.01	1.05	2.13 (very large effect)	[0.86, 1.24]
MPT (s)	19.36 ± 6.21	14.15 ± 4.23	6.387	< 0.01	-5.21	-0.98 (moderate to large effect)	[-7.26, -3.16]

Note: Negative due to higher MPT in the observation group

vowel /a:/ three times in a comfortable and stable tone. A 3-second stable segment of the vocal signal was sampled and input into the computer-based speech analysis system. Each parameter was measured three times, and the average value was calculated for analysis.

Subjective voice quality assessment

Subjective voice quality was evaluated using the Voice Handicap Index (VHI), a widely validated tool for assessing voice-related disability. Patients completed the VHI self-assessment scale, which comprises three domains: functional, emotional, and physical. The total score ranges from 0 to 120, with higher scores indicating more severe voice impairment.

Therapeutic efficacy and symptom satisfaction

The efficacy of treatment and patient satisfaction with accompanying symptoms were evaluated through regular follow-up examinations and telephone interviews after discharge. The improvement of symptoms such as dry throat and/or irritative dry cough, as well as patient satisfaction with medical care, were recorded and compared between the two groups.

Statistical analysis

Statistical analyses were performed using SPSS 20.0 software. Categorical data were expressed as frequencies and percentages [n (%)] and analyzed using the chi-square (χ^2) test. Continuous data were presented as mean ± standard deviation (x ± s) and analyzed using the independent samples t-test. A *p*-value of < 0.01 was considered statistically significant. To further evaluate the clinical relevance of the findings, effect sizes (Cohen's d) and 95% confidence intervals (CIs) were calculated for the differences between the observation and control groups. These measures provide additional insight into the magnitude and reliability of the treatment effects.

Results

Comparison of VHI scores between the two groups

After treatment, the subjective indicators of voice were measured in the two groups, and the VHI of the observation group was lower than that of the control group ($P < 0.01$), Statistical analysis revealed that the mean differences were: Total score: 13.48, (95% CI: [10.89, 16.07], Cohen's d = 2.01); Function: 4.06 (95% CI: [2.39, 5.73], Cohen's d = 0.94); Physiology: 4.07 (95% CI: [2.56, 5.58], Cohen's d = 1.04);

Emotion: 3.48 (95% CI: [1.88, 5.08], Cohen's d = 0.84), see Table 3.

Comparison of objective voice acoustic parameters between the two groups

After treatment, the objective voice indicators—Jitter, Shimmer, and MPT were measured in both groups. The observation group showed significantly lower Jitter and Shimmer and higher MPT compared to the control group ($P < 0.01$). Statistical analysis revealed that the mean differences were: Jitter: 0.17 (95% CI: [0.13, 0.21], Cohen's d = 1.48) Shimmer: 1.05 (95% CI: [0.86, 1.24], Cohen's d = 2.13) MPT: -5.21 (95% CI: [-7.26, -3.16], Cohen's d = -0.98), see Table 4.

Table 5 Comparison of the cure of concomitant symptoms and patient satisfaction between the two groups (cases)

Group	Cure	Healed	Satisfaction	Dissatisfied
Observation group($n=53$)	51	2	52	1
Control group($n=53$)	9	44	45	8
X^2 value	4.97		5.95	
P value	0.023		0.015	

Comparison of the cure of concomitant symptoms and patient satisfaction between the two groups

The results demonstrated that the observation group exhibited significantly higher cure rates and patient satisfaction rates compared to the control group ($P<0.05$), as detailed in Table 5. To further quantify these outcomes, we calculated the cure rate, satisfaction rate, relative risk (RR), and 95% confidence intervals (CIs) for both groups.

Patients in the observation group were 5.67 times more likely to achieve clinical cure than those in the control group (RR = 5.67, 95% CI: [3.12, 10.30]). Additionally, the satisfaction rate in the observation group was 15.6% higher than in the control group (RR = 1.16, 95% CI: [1.03, 1.30]). These findings indicate that the intervention in the observation group was significantly more effective in enhancing both clinical outcomes and patient satisfaction compared to the standard treatment.

Discussion

Hoarseness after thyroid surgery has several causes: (1) Nerve injury: Damage to the recurrent laryngeal nerve (0.5-3% permanent injury rate) or superior laryngeal nerve can lead to vocal fatigue, low tone, and hoarseness [4]. (2) Muscle and tissue injury: Damage to neck and laryngeal muscles, along with surgical incision adhesion (up to 22% incidence), may cause laryngeal dyskinesia [5, 6]. (3) Anesthesia-related injury: Endotracheal intubation can harm the throat [7]. (4) Psychological factors: Stress and emotions may contribute to vocal dysfunction [1].

Modern surgery focuses on precise anatomy, nerve monitoring, and postoperative nerve-nourishing treatments to prevent hoarseness after thyroid surgery [8]. Traditional Chinese medicine (TCM) calls hoarseness "throat mute," but thyroid surgery presents unique challenges for TCM diagnosis and treatment. Since ancient China had no thyroid surgery, it requires new syndrome differentiation approaches. Scholars like Li Lijing and Peng Jing suggest diagnosis based on disease duration and organ syndromes [9]. Common syndromes include phlegm-blood stasis obstructing orifices and Qi-Yin deficiency. Early postoperative hoarseness often results from blood stasis blocking the throat, damaging meridians, and impairing glottis function, causing hoarseness, pain, and discomfort [10, 11].

In addition to voice changes, patients often present with clinical manifestations such as dry mouth, reduced fluid intake, and irritative dry cough, which are consistent with the traditional Chinese medicine (TCM) syndrome of "transforming heat." Throat-related disorders are generally associated with heat, which can manifest as either excess heat (solid fire) or deficient heat (weak fire), often described as "heat rising and cold descending." The etiology of this "heat" is closely linked to the inflammatory response and thermal injury induced by thyroid surgery. In the later stages, patients often develop deficiencies of both Qi and Yin, leading to a loss of nourishment in the vocal tract. Some scholars attribute this to prolonged intraoperative exposure of the surgical field in the anterior cervical region, which depletes bodily fluids and causes Qi to dissipate along with the fluids, resulting in dual deficiency of Qi and Yin. Furthermore, surgical trauma exacerbates the consumption of blood and Qi, reinforcing the syndrome differentiation of Qi and Yin deficiency [12].

The abnormal voice in some patients may also be influenced by emotional and psychological factors. As proposed by Professor Ganzuwang, "the vocal cords are associated with the liver, and lung Qi facilitates vocal vibration." Dysfunction of the heart and stagnation of liver Qi can lead to tension in the glottic tendons, contributing to voice changes [13]. According to the *Lingshu·Channels*, the Lung Meridian of Hand Taiyin traverses the diaphragm, connects to the lungs, and extends to the throat and chest. This anatomical and functional relationship underscores the close connection between the Lung Meridian and the throat, chest, and diaphragm. The Yuji (LU10) acupoint, located on the Lung Meridian of Hand Taiyin, is widely used in TCM clinical practice to regulate lung Qi, clear wind-heat, resolve phlegm, and relieve asthma. It is particularly effective in treating conditions such as sore throat, cough, and asthma, whether due to deficiency or excess patterns [14].

Zhaohai (KI6), also known as Yin Qiao or Yin Leakage, is an acupoint on the Kidney Meridian of Foot Shaoyin. As one of the confluence points of the Eight Extraordinary Meridians, Zhaohai connects to the Yin Qiao vessel and is traditionally used to treat pharyngitis and nourish Yin. Modern acupuncture research has shown that Zhaohai is located approximately 1 inch below the medial malleolus, in the depression along the lower border of the calcaneus. It can be used either as a single acupoint or in combination with other acupoints. Studies by Houchunying, Zhaoyaodong, and others have demonstrated that stimulation of Zhaohai may reduce levels of inflammatory factors such as TNF-α and vascular endothelial cell adhesion molecule-1 [15, 16], thereby modulating inflammatory and immune responses and exerting anti-inflammatory effects. Additionally, some researchers have found that acupuncture at Zhaohai can alter throat temperature [17], suggesting that its therapeutic mechanisms

may include promoting blood circulation, unblocking collaterals, and improving vocal and pharyngeal function.

This study utilizes thenar acupoint plus Zhaohai acupoint massage, a technique based on meridian theory. Compared with proximal acupoint selection, this method avoids stimulation in the head and neck region, preventing patient discomfort caused by postoperative incision pain, tension, or limited mobility. Additionally, this technique is advantageous due to fewer acupoints, ease of application, and minimal interference with normal postoperative activities. The high cure rate in the observation group suggests that the treatment protocol implemented was highly effective and could be considered for broader clinical application. The significant improvement in patient satisfaction implies that not only was the treatment effective, but it also enhanced the overall patient experience, which is crucial for adherence to post-treatment care. These findings highlight the importance of refining current treatment approaches in the control group to improve outcomes.

Acupoint massage involves repeated benign stimulation applied over an extended period, aiming to regulate meridians and Qi flow to correct yin-yang imbalances and restore physiological function. However, beyond traditional explanations, it is essential to consider its physiological effects on post-thyroidectomy recovery and voice rehabilitation. (1) Neuromuscular Modulation: Acupoint stimulation may promote neuromuscular activation in the laryngeal region, improving coordination of intrinsic laryngeal muscles. This could facilitate faster recovery of vocal cord mobility in patients experiencing post-thyroidectomy vocal cord dysfunction. (2) Autonomic Nervous System Regulation: Stimulation of Zhaohai and thenar acupoints may activate the parasympathetic nervous system, reducing laryngeal tension and improving vocal function. It may also enhance microcirculation in the laryngeal region, potentially reducing edema and promoting tissue healing. (3) Pain Modulation and Relaxation: Massage therapy may stimulate mechanoreceptors and inhibit nociceptive pathways, leading to pain relief and reduced discomfort that can interfere with vocal recovery. By reducing postoperative tension, patients may experience improved voice projection and resonance. While the VHI provides subjective data on patient-reported voice impairment, additional objective voice parameters could strengthen the study's findings.

While the results are statistically significant, long-term follow-up would be necessary to determine if the cure rate remains stable over time. Further research could explore underlying mechanisms contributing to the differences in outcomes, including potential differences in post-operative care, medication adherence, or psychological support. Jitter and shimmer (measuring voice frequency and amplitude stability); maximum Phonation Time (MPT) (assessing breath support for sustained phonation); harmonics-to-noise ratio (HNR) (indicating vocal fold vibration efficiency). These parameters, measured via acoustic analysis software (e.g., PRAAT or MDVP), could help elucidate the physiological impact of acupoint massage on voice recovery post-thyroidectomy. A larger sample size would help confirm these findings and enhance generalizability.

Conclusion

Thyroid cancer, especially papillary cancer, has good biological behavior, leading to long postoperative survival. However, persistent hoarseness affects recovery and quality of life. Neurotrophic drugs have limitations, while traditional Chinese medicine shows advantages. This study added acupoint massage at thenar and Zhaohai points, improving hoarseness, dry throat, and cough more effectively. This approach promotes faster recovery and helps patients regain normal life after thyroid surgery.

Abbreviations

VHI Voice disturbance index

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Author contributions

MZL is responsible for the guarantor of integrity of the entire study, study concepts & design, literature research, clinical studies, experimental studies, data acquisition & analysis, manuscript preparation & editing; YZL is responsible for study concepts & design, definition of intellectual content, clinical studies, experimental studies, data acquisition, manuscript review; JL is responsible for the experimental studies, data acquisition, statistical analysis, manuscript preparation & editing; YZL is responsible for the study design, clinical studies, experimental studies, data acquisition & analysis, statistical analysis, manuscript preparation & editing; QGC is responsible for the study design, clinical studies, manuscript review. All authors read and approved the final manuscript.

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Data availability

All data generated or analysed during this study are included in this. Further enquiries can be directed to the corresponding author.

Declarations

Ethics approval and consent to participate

The study was approved by the Zhongshan Hospital Xiamen University. Informed consent was obtained from the patients and their families.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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