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REVIEW ARTICLE

Quality of life after thoracic sympathectomy for palmar hyperhidrosis: a meta-analysis

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Abstract

Objective Palmar hyperhidrosis affects 0.6–10% of the general population, having an important impact in patients' quality of life. The definitive treatment for palmar hyperhidrosis is thoracic sympathectomy. The purpose of this study is to evaluate the quality of life after thoracic sympathectomy for palmar hyperhidrosis.

Methods The interest studies were searched in six comprehensive databases. The quality of the studies was assessed using the risk of bias tool recommended by the Cochrane system evaluation manual. Meta-analysis was performed with RevMan version 5.3. The outcome of interest was quality of life. The subgroup analysis and sensitive analysis were performed.

Results Nine trials, including 895 patients, with accessible data comparing preoperative quality of life score with postoperative quality-of-life score were used for data analysis. Compared with preoperative quality-of-life score, application of thoracic sympathectomy improved the postoperative quality of life of palmar hyperhidrosis patients (MD = 57.81, 95% CI 53.33–62.30). Subgroup analysis of the different thoracic sympathectomy segment showed that there was no significant difference in the results obtained when operated with single segment or multiple segments (single segment: MD = 61.16, 95% CI [56.10, 66.22], multiple segments: MD = 52.14, 95% CI [48.39, 55.88]).

Conclusion The meta-analysis provided evidence of the improved quality of life after thoracic sympathectomy for palmar hyperhidrosis.

Keywords Palmar hyperhidrosis · Thoracic sympathectomy · Quality of life · Meta-analysis

Background

Palmar hyperhidrosis (PH) is a condition defined by excessive secretion of exocrine glands on the palms [1]. PH is classified into primary type and secondary type depending on the cause [2]. Both of the two types negatively impact the patients' quality of life (QoL) [3]. The prevalence of PH is 2.1% in Chinese adolescents and about 0.6–10.4% in other countries [4–6]. The severe symptoms are often triggered by stressful situation, heat, or physical activity, which could cause embarrassment, low self-esteem, and social and psychological problems [7].

Whereas various medical treatments such as anticholinergic drugs, botulinum toxin A injection, iontophoresis, and topical anesthetics alleviate symptoms only transiently, thoracic sympathectomy (TS) may provide a permanent solution [8]. Because PH is caused by sympathetic nervous system dysfunction, surgical treatment usually focuses on disconnect the sympathetic thoracic ganglia T2, T3, or T4. It is an effective procedure with a success rate over 95% [9–11].

Comparing to symptom resolution and the incidence of complication, such as compensatory hyperhidrosis, QoL seems to be a more important index to evaluate the long-term effect of operation [12, 13]. Several reviews focused on the short-term effect of operation [14–17]. However, there is no research to evaluate patients' QoL after thoracic sympathectomy for palmar hyperhidrosis. Due to a lack of data to answer this relevant clinical question, we aimed to systematically review the existing literature on the QoL outcome

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after thoracic sympathectomy for palmar hyperhidrosis and did a meta-analysis. The goal of this project was to ascertain whether QoL improved after thoracic sympathectomy for palmar hyperhidrosis.

Research methods

The authors devised a systematic review methodology which underwent internal peer review by a specialist in systematic review methodology. This review was registered on the international prospective register of systematic review database prior to commencement.

Literature screening

The eligibility criteria used were: patients with palmar hyperhidrosis; surgical treatment was adopted; thoracic sympathectomy was performed; the level of the segments of the TS was recorded in detail; and Campos questionnaire was adopted to evaluated patients' quality of life.

The exclusion criteria were: patients diagnosed with secondary hyperhidrosis; patients received non-surgical treatment; no clear preoperative and postoperative QoL scores were recorded; follow-up time was less than 1 year; and patients received more than one operation. The outcome was score of quality of life.

Literature search

The interest studies were searched in the following databases: PubMed, Ovid MEDLINE, EMBASE, Web of Science, ScienceDirect, and Cochrane database. The key words used to construct the search strategy were: hyperhidrosis, palmar hyperhidrosis, hand sweating, thoracic sympathectomy, quality of life and Campos questionnaire [18].

Data extraction

The titles and abstracts of the articles were analyzed by two reviewers to identify those obeyed the inclusion criteria. A third reviewer was available to resolve possible disagreements. The data were extracted by two reviewers independently in a standard form, including general data and statistical data. A third reviewer verified the completeness and accuracy of the extracted data. The general data include the author of the literature, the time of publication, and the condition of the patients included in the study. The statistical data include the grouping of patients, the number of operative effective cases in each group, the preoperative and postoperative QoL scores, and follow-up time.

Literature quality assessment

The literature quality evaluation criteria provided by Cochrane system evaluation manual were used to evaluate the literature quality. The quality of the individual studies was evaluated by two reviewers and verified by a third reviewer. The risk of bias included in the literature was assessed mainly from the aspects of selection bias, performance bias, detection bias, attrition bias, and reporting bias. The evaluation criteria are "low risk", "unclear risk", and "high risk".

Statistical analysis

Revman 5.3 software provided by Cochrane Collaboration Network was used as the analysis tool. Evidence tables containing study characteristics, results, and quality bias ratings were developed and synthesized. Studies were organized chronologically based on publication year. For each study, the number of participants that experience operation and the score of QoL were collected and entered into the study database. The random-effects model was used, because it better accounts for heterogeneity between studies. Heterogeneity between studies was assessed using Cochran Q. Funnel plots was used to assess the presence of publication bias.

Results

Study characteristics

According to the search strategy (Fig. 1), 562 publications were initially identified from database. After the removal of duplicate sources of titles and abstracts and applying the inclusion and exclusion criteria, 32 studies were identified and screened. Of these, 9 studies fit the review criteria and were used for meta-analysis [11, 19–26]. These articles involved a total of 895 patients with PH. Table 1 summarizes the main characteristic of each study.

Risk of bias

As shown in Fig. 2, in the random sequence generation analysis, 70% of the trials were found to have a "low risk bias". Notably, 35% of the trails were found to have a "low risk of bias" in allocation concealment. 50% had a "low risk of bias" in the blinding of participants and 80% of the trials had a "low risk of bias" in the blinding of outcome assessment. 10% of high risk of bias was detected in incomplete outcome data

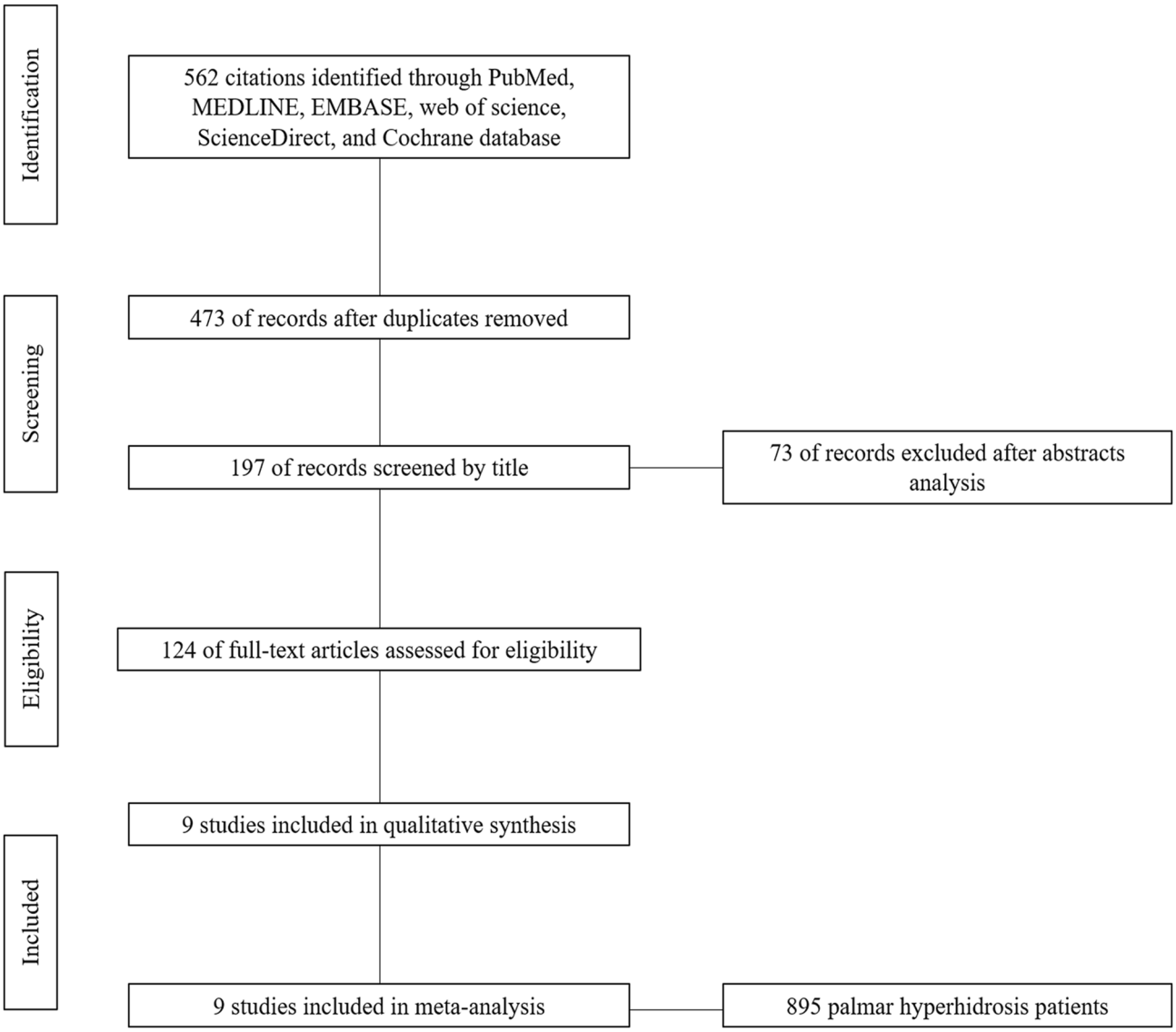

Fig. 1 Flow diagram of the literature screening process and results

Table 1 Summary of 9 studies included in the present meta-analysis

Authors	Year	Country	Study design	PH case (*N*)	TS level	Preoperative QoL	Postoperative QoL	Follow-up period
Soares et al. [23]	2019	Portugal	Retrospective study	88	T3	92 ± 7.1	23.5 ± 13.8	32 months
Dogru et al. [25]	2019	Turkey	Retrospective study	165	T2-4	86.5 ± 12.5	38.8 ± 16.3	1 year
Romero et al. [7]	2018	Brazil	Prospective study	36	T3-4	83.94 ± 4.74	33.94 ± 4.6	1 year
Menna et al. [20]	2016	Italy	Retrospective study	126	T2-4	92 ± 11	36 ± 12	1 year
Baroncello et al. [26]	2014	Brazil	Cross-sectional study	51	T3	77.5 + 14.5	34.6 + 11.7	1 year
Ibrahim et al. [24]	2013	Italy	Retrospective study	130	T2-4	90 ± 12	35 ± 15	1 year
Ishy et al. [19]	2011	Brazil	Cross-sectional study	20	T3	93.1 ± 4.7	26.9 ± 7.1	1 year
				20	T4	93.4 ± 4.6	28.4 ± 10.7	1 year
Yazbek et al. [11]	2009	Brazil	RCT	30	T2	92 ± 7	26 ± 6	20 months
				30	T3	87.5 ± 7.3	29 ± 4.7	20 months
Panhofer et al. [21]	2006	Austria	Prospective study	199	T4	84 ± 12	24 ± 13	21.9 months

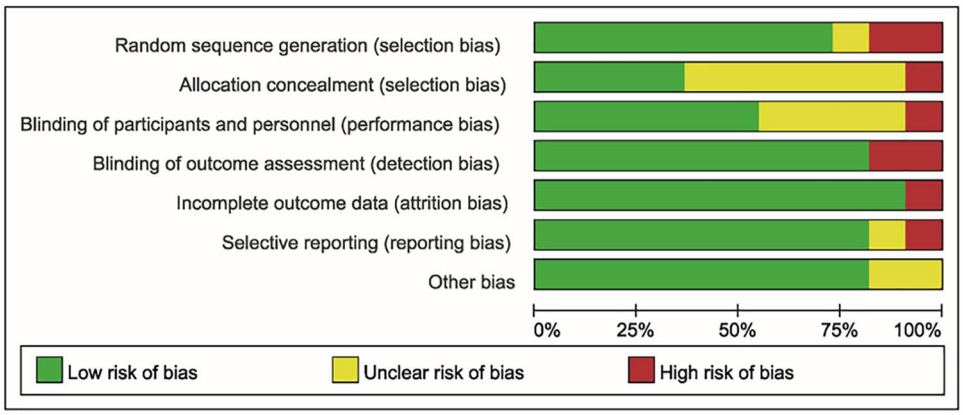

Fig. 2 Risk of bias assessment for the included studies

and selective reporting. Overall, the certainty of the evidence was high.

Quality of life

Nine trials, including 895 patients, with accessible data comparing preoperative QoL score with postoperative QoL score were used for data analysis. Four types of follow-up period, including 1 year [19, 20, 22, 24–26], 20 months [11], 21.9 months [21], and 32 months [23], were reported. Compared with preoperative QoL score, application of TS improved the QoL of PH patients (MD = 57.81, 95% CI 53.33–62.30) (Fig. 3a). Subgroup analysis of the different TS segment showed that there was no significant difference in the results obtained when operated with single segment or multiple segments (single segment: MD = 61.16, 95% CI [56.10, 66.22], multiple segments: MD = 52.14, 95% CI [48.39, 55.88]) (Fig. 3b). The statistical heterogeneity was detected and the results showed that there was significant heterogeneity difference ($I^2 = 95\%$, $p < 0.00001$). The overall results of the meta-analysis did not change significantly when sensitivity analysis was conducted by omitting a single-choice study or studies with a high risk of bias. However, the heterogeneity was significantly reduced when removed the single segment TS studies and two of the multiple segments' TS studies (Fig. 3c) [11, 19, 21–23, 25, 26].

Publication bias

The funnel chart method was used to make statistics on publication bias of meta-analysis (Fig. 4). Visual inspection of the plot and Egger's test suggested that no publication bias was observed, with the funnel plot showing a relatively symmetrical distribution (Egger's test, $p > 0.05$).

Discussion

Summary of main result

This is the first meta-analysis of QoL after thoracic sympathectomy for palmar hyperhidrosis patients. We identified 9 publications including a total of 895 patients from Portugal [23], Turkey [25], Italy [20, 24], Austria [21], and Brazil [11, 22, 26]. Compared with the preoperative QoL, our meta-analysis showed that TS may be useful to improve the QoL of the PH patients. Single segment TS is more effective to improve the QoL when compared with the multiple segment TS. Because there was high heterogeneity in the subgroup of single segment sympathectomy, the corresponding impact requires further analysis.

TS is considered to be the best surgical treatment method for PH at present [27–29]. The postoperative effective rate of this method is more than 95% [30–32]. Traditional method of TS can resolve the symptoms of PH, but also increases the risk of postoperative complications, including compensatory hyperhidrosis and dry hands, which lower the QoL [33–35]. Compensatory hyperhidrosis (CH) is the main side effect of TS, which involves excessive sweating in a body part that was previously unaffected. This is the most frequent and most feared side effect of, which is considered to be the main cause of patient dissatisfaction [36]. Besides, adapting to their situation also needs to be taken into accounts. It is worth noting that some people report very poor QoL without severe PH [37, 38]. Considering all these factors, it is necessary to analyze the QoL of patients who received TS operation.

Some statistical heterogeneity was found in our meta-analysis on QoL. Subgroup analysis showed that single

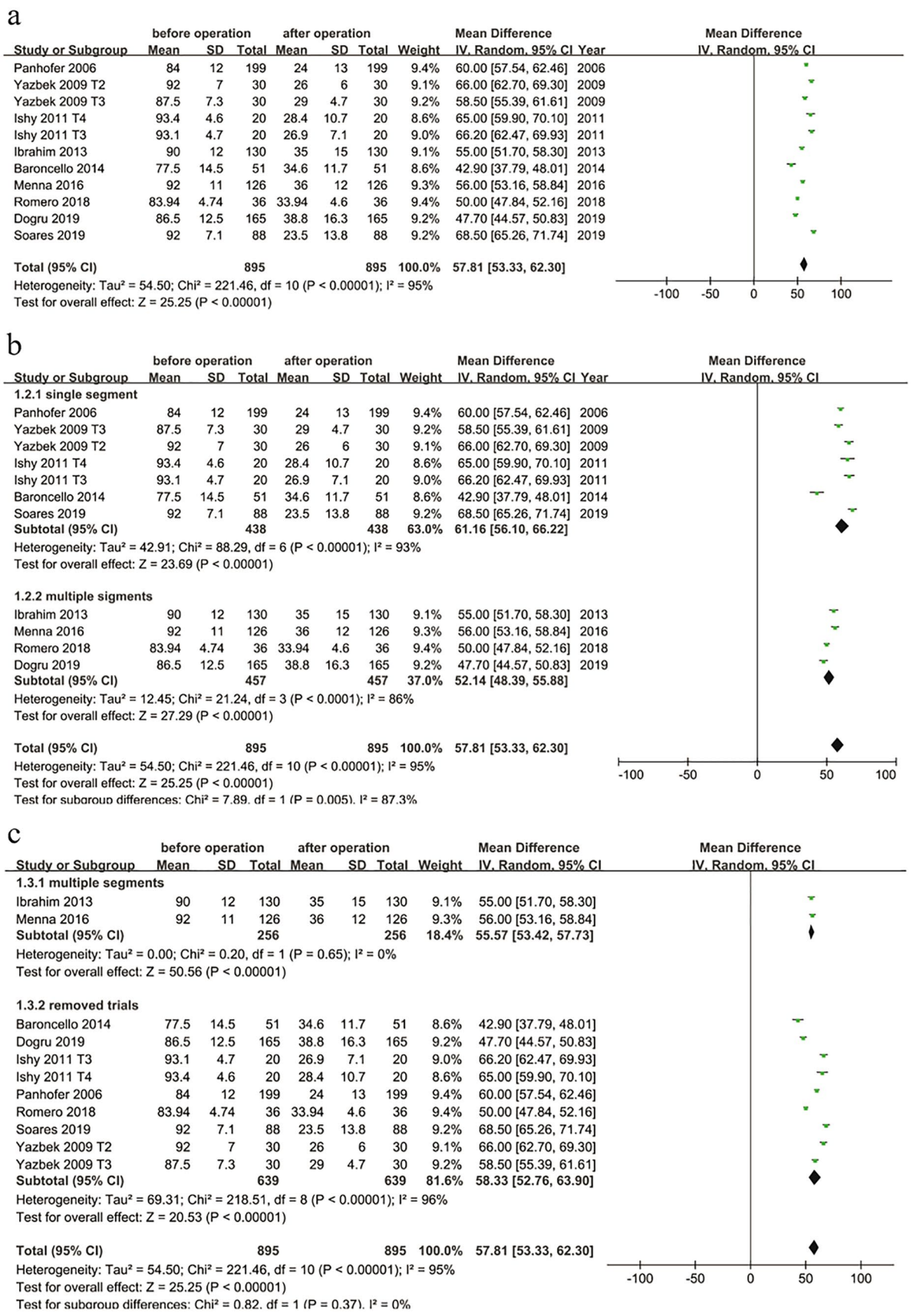

Fig. 3 Assessment of QoL after thoracic sympathectomy for palmar hyperhidrosis

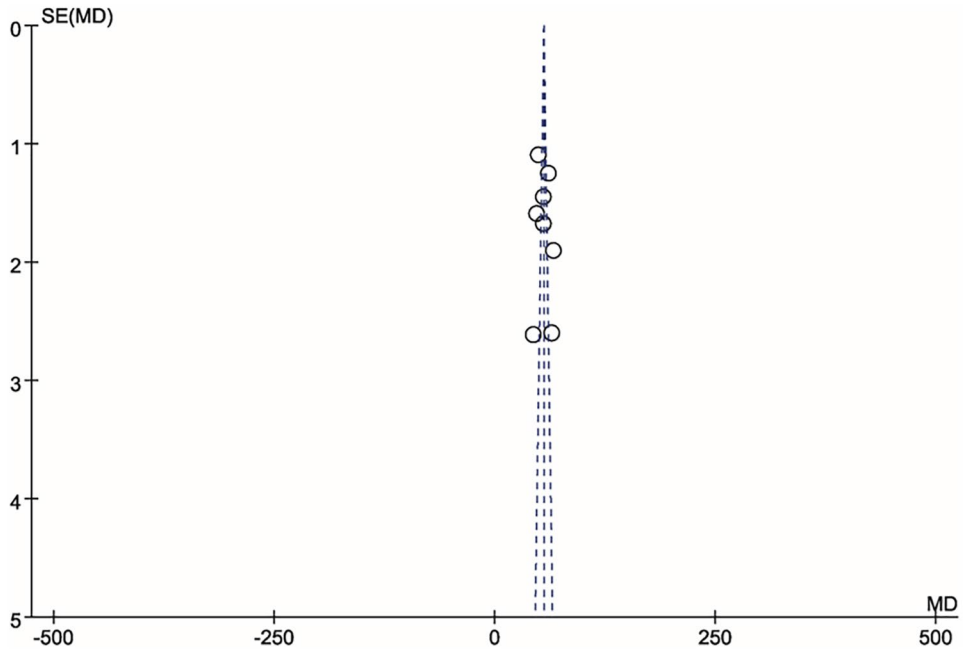

Fig. 4 Funnel plot for publication bias

segment TS or multiple segment TS contributes little to the heterogeneity. However, the statistical heterogeneity was significantly reduced when the single segment studies and two of the multiple segment studies with high risk of bias were excluded [11, 19, 21–23, 25, 26]. This suggested that the statistical heterogeneity may derive from the difference in the quality of evidence included in the study. Despite all this, the overall results of the meta-analysis did not change significantly when sensitivity analysis was conducted.

The results of this review should be interpreted with caution owing to the risk of bias of the included studies. In our analyses, an unclear risk of bias existed in allocation concealment and the blinding of participants [21, 25]. At present, the most commonly used method of blinding involves the use of placebo and strict intervention process confidentiality measures. However, for surgery intervention, it is difficult to blind the participant to the intervention. Four studies were judged to have unclear risk of bias in allocation concealment, because the method of allocation concealment was not described [19, 22, 23, 25]. Two studies were judged to have a high risk of selection bias, because patients were divided into two groups [11, 19]. Two studies were judged to have a high risk of detection bias, because outcome assessors were not blinded and the outcomes were likely to be influenced by lack of blinding [20, 24]. Therefore, the quality of evidence was downgraded potentially by the presence of selection bias and detection bias.

In addition, the funnel plot showed no significant publication bias for the assessment of QoL, which made our results more robust.

Strength and limitations

Compared with the previous studies about the QoL, we used meta-analysis to quantitatively analyze the included studies, and at the same time, we systematically collected and analyzed trials of the TS for PH patients to improve the reliability of the evidence included [13, 39–41]. Second, unlike the previous studies focusing on symptom resolution and compensatory hyperhidrosis, this is the first meta-analysis focusing on QoL after TS operation [17, 42, 43]. Some limitations of this study should also be mentioned. First, although we used a comprehensive search strategy, the current study only included reports that were published in the English language. Second, in spite of applying the random effect model, we still acknowledge that the heterogeneities presented among the studies. Third, our findings were based solely on the research currently included. Therefore, with the emergence of newly related studies, regular updates of the existing results are required.

Clinical implications

This article systematically reviews the currently published studies about QoL after TS for PH to clarify the value of its application for clinical decision-making. However, due to the influence of the small sample, no definitive conclusion can be drawn. Our results show that TS could significantly improve the QoL of PH patients despite the occurrence of CH complication in some multiple segment TS cases [20, 24, 25]. Therefore, TS may be a very promising approach.

Conclusion

The present systematic review and meta-analysis provided evidence of the improved QoL after thoracic sympathectomy for palmar hyperhidrosis. The evidence supports the application of TS for the management of PH.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

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