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Postauricular Incision Versus Conventional Transcervical Incision in Second Branchial Cleft Cyst Excision: A Systematic Review and Meta-Analysis

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Abstract: Surgical removal is the treatment of choice for second branchial cleft cysts (SBCCs), which are congenital anomalies. The conventional procedure is performed through a transcervical approach, which would lead to a visible scar in the anterior neck. Conversely, the postauricular approach could keep the scar in the hairline or retroauricular sulcus, rendering it almost invisible after the surgery. The purpose of this meta-analysis was to evaluate the differences between the postauricular and conventional transcervical approaches to SBCC excision. A systematic review was performed using PubMed, Embase, and the Cochrane Library to identify studies comparing outcomes of SBCC surgery via postauricular and conventional transcervical approaches. The data of interest were analyzed with Comprehensive Meta-Analysis software (version 3). The data of interest were analyzed by calculating the risk difference (RD), the standardized mean difference, and the mean difference (MD) with the 95% confidence interval (CI). Three studies were eligible for the final analysis. The pooled analysis demonstrated that the cosmetic satisfaction score was significantly higher with the postauricular approach (standardized mean difference, 2.12; 95% CI, 0.68–3.56). The operative duration was significantly longer with the postauricular approach than with the conventional transcervical approach (MD, 12.81; 95% CI, 2.39–23.23). The incidences of postoperative marginal mandibular nerve palsy (RD, 0.00; 95% CI, −0.09 to 0.09), bleeding complications (RD, −0.02; 95% CI, −0.09 to 0.05), salivary complications (RD, −0.00; 95% CI, −0.07 to 0.06), cyst size (MD, 0.02; 95% CI, −0.96–0.99), and length of hospital stay (MD, −2.50; CI, −7.30 to 2.30) were comparable between the 2 groups. The postauricular approach is feasible for use in SBCC excision and yields better cosmetic outcomes, a longer operative duration, and a similar rate of complications.

Key Words: Cosmesis, hairline, hidden scar, postauricular, second branchial cleft cyst

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Branchial cleft anomalies are congenital cervical lesions, including fistulas, sinuses, and cysts.[1] Branchial cleft cysts are classified into 4 types depending on their embryonic origin, among which the second branchial cleft cyst (SBCC) is the most common type.[2] Second branchial cleft cysts usually lie in the lateral neck region and present as round and painless masses along the anterior border of the upper third of the sternocleidomastoid muscle.[3] Complete surgical excision is the treatment of choice to avoid recurrence and reintervention.[1,4] The conventional procedure is performed through a transcervical transverse incision or stepladder incisions.[3–6] A direct transcervical incision has been used safely and widely in the removal of neck masses. However, in some patients, the external scar left in the anterior neck is considered a problem, especially in patients with a tendency to develop keloids.

To achieve better cosmetic outcomes, Roh[7] used the postauricular surgical approach in the management of upper neck masses in 2005 and reported his experience. Since then, alternative approaches for SBCC excision have been developed to either minimize[8,9] or hide[10–12] external neck scars. When the incision line is placed in the hairline or retroauricular sulcus, the postoperative scar can only be noted by close inspection, which can improve cosmetic satisfaction.[10–12] However, there are no meta-analyses in the existing literature on the differences between the postauricular incision (PI) and the conventional

transcervical incision (CTI) in SBCC surgery. Therefore, the objective of the present meta-analysis was to compare intraoperative parameters and postoperative outcomes between PI and CTI in SBCC surgery.

MATERIALS AND METHODS

This systematic review and meta-analysis was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[13] Since it was a meta-analysis of published studies, institutional review board approval and written consent were not required.

Literature Search

Two authors (C.-F.H. and Y.-C.L.) searched PubMed, Embase, and the Cochrane Library extensively and independently for studies of interest published before June 2021. The terms used in the search process included "second branchial cleft cyst," "branchial anomalies," "postauricular," "retroauricular," "hairline," "cosmetic," "aesthetic," and "esthetic," alone or combined with the Boolean operators "OR," "AND," and "NOT" in the Title/Abstract/Keywords field. In addition, the references of the included articles were reviewed to identify other eligible studies. The literature search process is described in eTable 1 of the Supplementary Material (Supplemental Digital Content 1, http://links.lww.com/SCS/E123).

Study Selection and Data Extraction

The inclusion criteria used were studies of patients who underwent SBCC excision, articles published in the English language, and studies that compared parameters between a PI group and a CTI group. The PI described in the present meta-analysis includes a postauricular hairline incision with or without extension to the retroauricular sulcus. The exclusion of articles was based primarily on failure to meet the inclusion criteria. Studies without a control group, studies not published in English, review articles, and studies using other types of incisions were excluded from the present analysis. Data were extracted by 2 researchers (C.-F.H. and Y.-C.L.) independently. The quality of the included articles was independently assessed by the 2 researchers (C.-F.H. and Y.-C.L.) using the Newcastle-Ottawa scale.[14] Any discrepancies in the study bias results were resolved by discussion between the 2 authors until a consensus was reached.

Outcomes

The outcomes of this meta-analysis included the following: cosmetic satisfaction; operative duration (minutes); incidences of postoperative marginal mandibular nerve palsy, postoperative bleeding complications (hematoma or hemorrhage), and postoperative salivary complications (salivary fistula or seroma); cyst size (centimeters); and length of hospital stay (days).

Data Analysis

The results of interest were analyzed with Comprehensive Meta-Analysis software (version 3; Biostat, Englewood, NJ). The standardized mean difference was used to compare cosmetic satisfaction between the PI and CTI groups. The mean difference (MD) was used to compare the intergroup operative duration, cyst size, and length of hospital stay. The risk difference (RD) was used to compare the incidence of postoperative marginal mandibular nerve palsy, postoperative bleeding complications, and postoperative salivary complications between the PI and CTI groups. The overall effect was calculated using a random-effects model. Heterogeneity among studies was analyzed using the I^2 statistic, which reflects the proportion of overall variation attributable to between-study heterogeneity. An I^2 value exceeding 50% suggested moderate heterogeneity, and an I^2 value exceeding 75% suggested high heterogeneity.[15] Potential publication bias was analyzed using the Egger intercept test[15] and funnel plots. Two-tailed P values <0.05 were considered statistically significant.

RESULTS

Study Selection

The literature search process initially yielded 142 articles. A total of 37 duplicate studies were excluded; 90 studies were excluded after the titles and abstracts were reviewed. The full texts of the remaining 15 potentially eligible articles were carefully reviewed. Among them, studies without a control group, studies using incisions other than the PI, review articles, and studies not published in the English language were excluded. Three articles were included in the final analysis.[16–18] A flow diagram describing the study selection and inclusion/exclusion processes is shown in Figure 1.

Demographics

The basic demographics of the included study subjects are listed in Supplemental Table 1 (Supplemental Digital Content 2, http://links.lww.com/SCS/E124). A total of 99 SBCC surgeries were included for analysis. The results of the quality assessment for the included studies are shown in eTable 2 of the Supplementary Material (Supplemental Digital Content 1, http://links.lww.com/SCS/E123). The PRISMA checklist can be found in eTable 3 of the Supplementary Material (Supplemental Digital Content 1, http://links.lww.com/SCS/E123).

Outcomes

The raw results of outcomes of interest are shown in eTable 4 of the Supplementary Material (Supplemental Digital Content 1, http://links.lww.com/SCS/E123).

Cosmetic Satisfaction

All of the included studies evaluated cosmetic satisfaction after surgery. Two studies used the Visual Analog Scale score, ranging from 0 to 10, with a higher score indicating better cosmetic satisfaction with the incision scar.[17,18] Another study used the "emotional component" of the questionnaire "Attitude to health" by R.A. Berezovskaya to evaluate subjective satisfaction with the incision scar.[16] One study evaluated cosmetic satisfaction 6 months after surgery,[16] and the other 2 studies evaluated cosmetic satisfaction 3 months after surgery.[17,18] Pooled analysis of the 3 studies demonstrated that the cosmetic satisfaction score was higher in the PI group than in the CTI group [standardized mean difference, 2.12; 95% confidence interval (CI), 0.68–3.56] (Fig. 2A). We did not perform a subgroup analysis due to the number of eligible studies. However, the study reported by Chen was found to be a source of heterogeneity.[18] The heterogeneity was obviously reduced after this study was removed from the analysis ($I^2 = 0.00\%$).

Operative Duration

Three studies[16–18] recorded the operative duration in both groups. Pooled analysis showed that the operative duration was longer in the PI group than in the CTI group (MD, 12.81; 95% CI, 2.39–23.23) (Fig. 2B). Subgroup analysis was not conducted

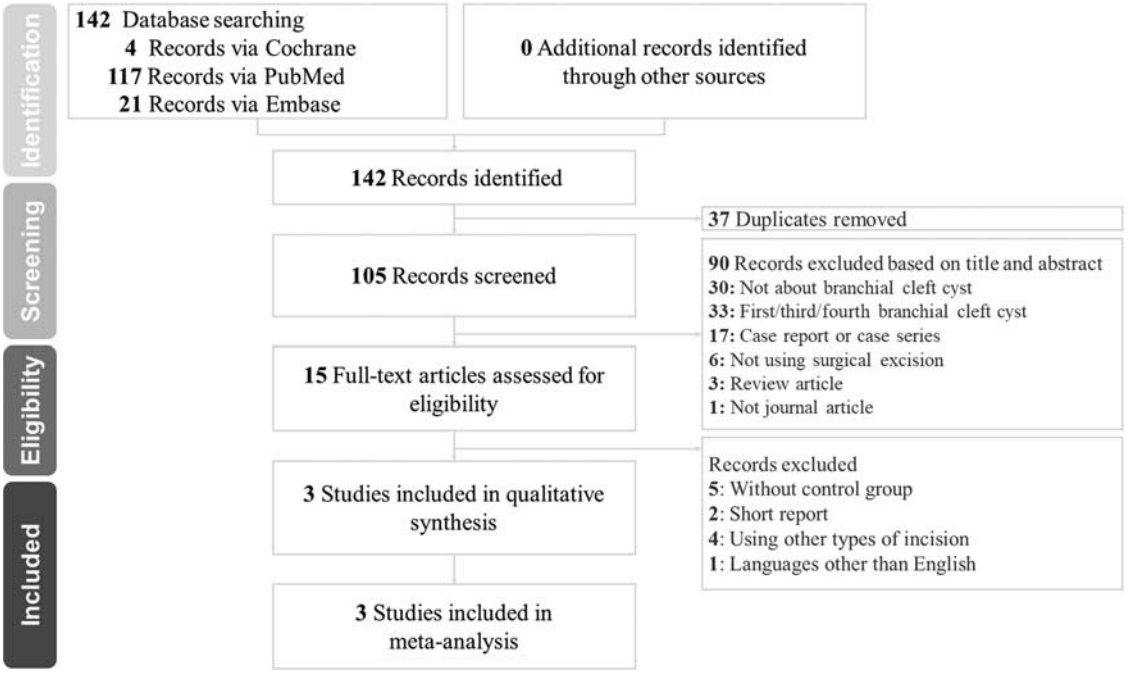

FIGURE 1. Flow diagram of the literature search. The κ coefficient was 0.748 for the screening stage.

due to the number of included studies. However, we found that the study reported by Chen et al[18] was a source of heterogeneity since, when the study was deleted, the heterogeneity was obviously reduced ($I^2 = 0.00\%$).

Postoperative Marginal Mandibular Nerve Palsy

Two studies[17,18] recorded the incidence of marginal mandibular nerve palsy after surgery. Pooled analysis demonstrated that the rate of marginal mandibular nerve palsy was comparable between the 2 groups (RD, 0.00; 95% CI, −0.09 to 0.09) (Fig. 3A).

Postoperative Bleeding Complications (Hematoma/Hemorrhage)

Three studies[16–18] reported the incidence of postoperative bleeding complications in both groups. Pooled analysis showed that the rate of postoperative bleeding complications was similar in the 2 groups (RD, −0.02; 95% CI, −0.09 to 0.05) (Fig. 3B).

Postoperative Salivary Complications (Salivary Fistula/Seroma)

Three studies[16–18] reported the incidence of salivary complications in both groups. Pooled analysis showed that the difference between the 2 groups in the rate of salivary complications was not significant (RD, −0.00; 95% CI, −0.07 to 0.06) (Fig. 3C).

Cyst Size

Three studies[16–18] reported cyst size in both groups. Pooled analysis showed that the difference between the 2 groups in cyst size was not significant (MD, 0.02; 95% CI, −0.96 to 0.99) (Fig. 4A).

Length of Hospital Stay

Two studies[16,17] reported the length of hospital stay in both groups. Pooled analysis showed that the difference between the 2 groups in the length of hospital stay was not significant (MD, −2.50; 95% CI, −7.30 to 2.30) (Fig. 4B).

Publication Bias

The results of the heterogeneity test and funnel plots are presented in eTable 5 in the Supplementary Material (Supplemental Digital Content 1, http://links.lww.com/SCS/E123). The funnel plots and the results of the Egger intercept test suggested that there was no apparent publication bias.

DISCUSSION

The present meta-analysis was conducted to evaluate the differences between PI and CTI in SBCC excision according to the existing scientific literature published in English. Alternative approaches, such as the postauricular approach or the endoscope-assisted transcervical approach, might have advantages in terms of cosmesis over the traditional lateral transcervical approach in selected patients.[8–11,19] The present study, which included 3 articles and 99 patients, is the first meta-analysis to compare parameters between a PI group and a CTI group. According to our meta-analysis, in the PI group, cosmetic satisfaction was higher, and the operative duration was longer. Regarding cyst size, length of hospital stay, and incidences of postoperative complications, such as marginal mandibular nerve paralysis, bleeding complications, and salivary complications, there were no differences between the 2 groups.

The essential role of a surgical incision is to create a sufficient surgical field for lesion access so that the lesion can be removed safely and thoroughly. However, the head and neck region is an important area of cosmetic concern, and a cervical scar after surgery can have negative social and psychological effects on patients.[20] Thus, with advances in surgical techniques and technology, many surgeons have attempted to increase

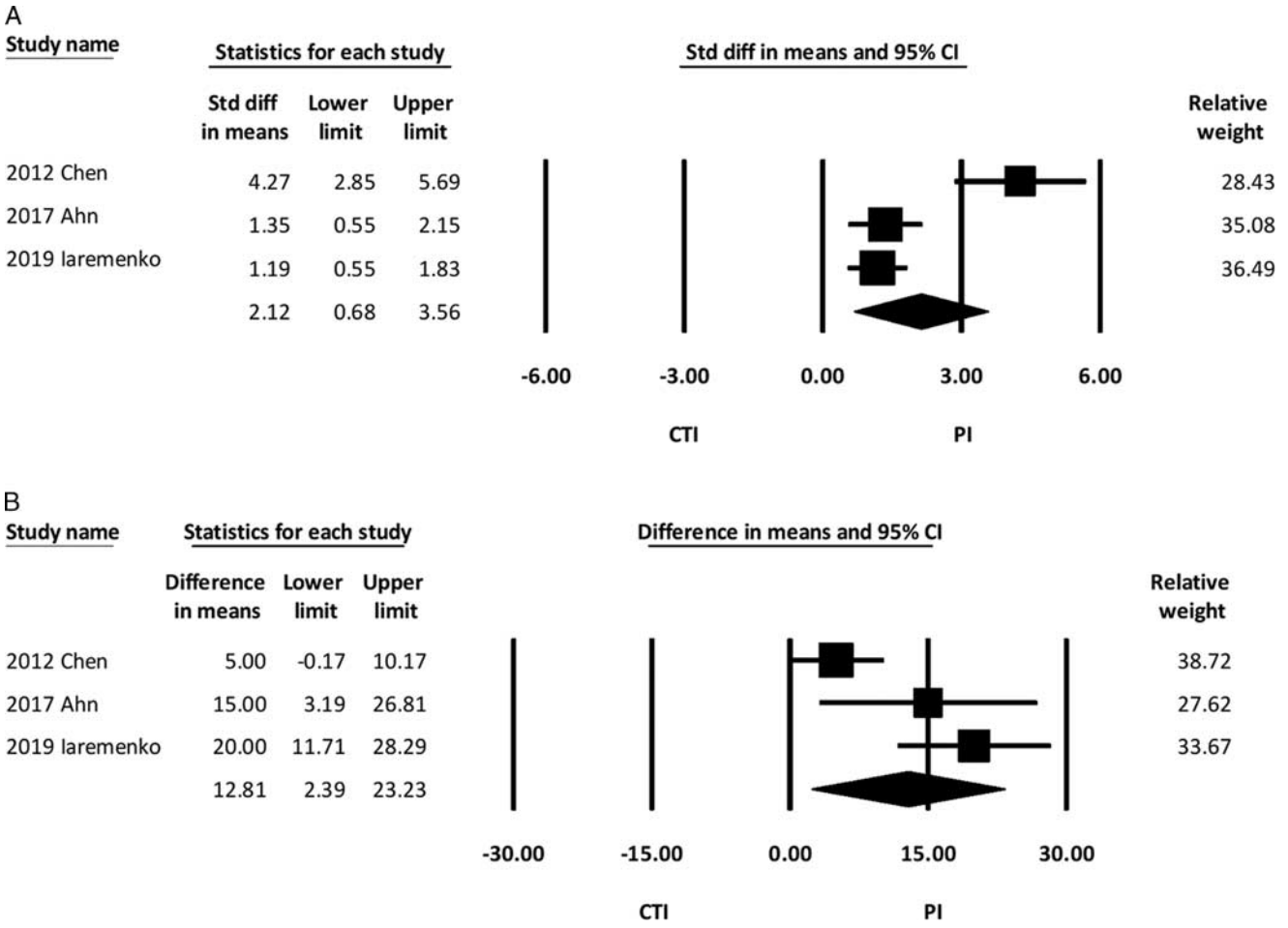

FIGURE 2. (A) Forest plot of cosmetic satisfaction after second branchial cleft cyst surgery. (B) Forest plot of the operative duration of second branchial cleft cyst surgery (minutes). CI indicates confidence interval; CTI, conventional transcervical incision; PI, postauricular incision.

cosmetic satisfaction with neck surgeries without increasing the rate of surgical morbidities or complications.[12,21] Over the past 2 decades, several types of incisions have been proposed to improve the physical appearance after excision of lesions from different parts of the head and neck, as well as after neck dissection, with or without the assistance of an endoscope or robotic system. Previous studies have suggested that the use of PI in SBCC removal improves cosmetic results.[10,11,19] The main advantage of PI is that the operative scar is kept in the hairline or retroauricular sulcus, making it almost invisible after the surgery. All of the included articles in the present meta-analysis showed greater cosmetic satisfaction in the PI group. The results of the pooled analysis revealed that the use of PI significantly improved cosmetic satisfaction after SBCC surgery. The pooled results of the present analysis indicate that the operative duration of SBCC surgery was ~12 minutes longer with PI than with CTI. This result is not surprising since SBCC surgery with PI requires more time to raise the skin flap. The longer operative duration has been reported as a disadvantage of the PI approach for the excision of not only SBCCs but also other neck masses.[7,12] It seems that higher cosmetic satisfaction with PI is achieved at the cost of a longer operative duration.

Injury to the marginal mandibular nerve can cause cosmetic and functional deficits.[22] The marginal mandibular nerve innervates the oris of the depressor anguli and the inferioris of the depressor labii. Injury to this nerve causes weakness of the ipsilateral mouth angle, resulting in an asymmetric smile.[23] Facial palsy has also been reported to be perceived as abnormal, and individuals with facial palsy have been considered less trustworthy and more distressed.[24] Therefore, careful dissection is important during surgery to avoid iatrogenic injury to the marginal mandibular nerve. In the present study, no temporary or permanent facial palsy was observed in either group. Furthermore, in the meta-analysis, there was no significant difference in the incidence of temporary or permanent facial palsy between the 2 groups. This result suggests that the PI approach does not increase the risk of marginal mandibular nerve injury. However, the incidences of postoperative bleeding and salivary complications, as well as the size of the cyst removed and the length of hospital stay were comparable between the PI and CTI groups. These results demonstrate that a longer operative duration did not increase the incidence of complications or the length of hospital stay. In, the size of the SBCC is not considered when deciding which approach should be used.

Among the 3 studies included in this meta-analysis, 2 studies included endoscope-assisted surgeries,[16,18] and Ahn et al[17] used only a 2.5× loupe to assist in surgery. The results of these studies demonstrated that the use of PI for SBCC removal is safe and feasible with all of these methods. When PI is used in SBCC excision, a longer working distance is needed, and it seems that,

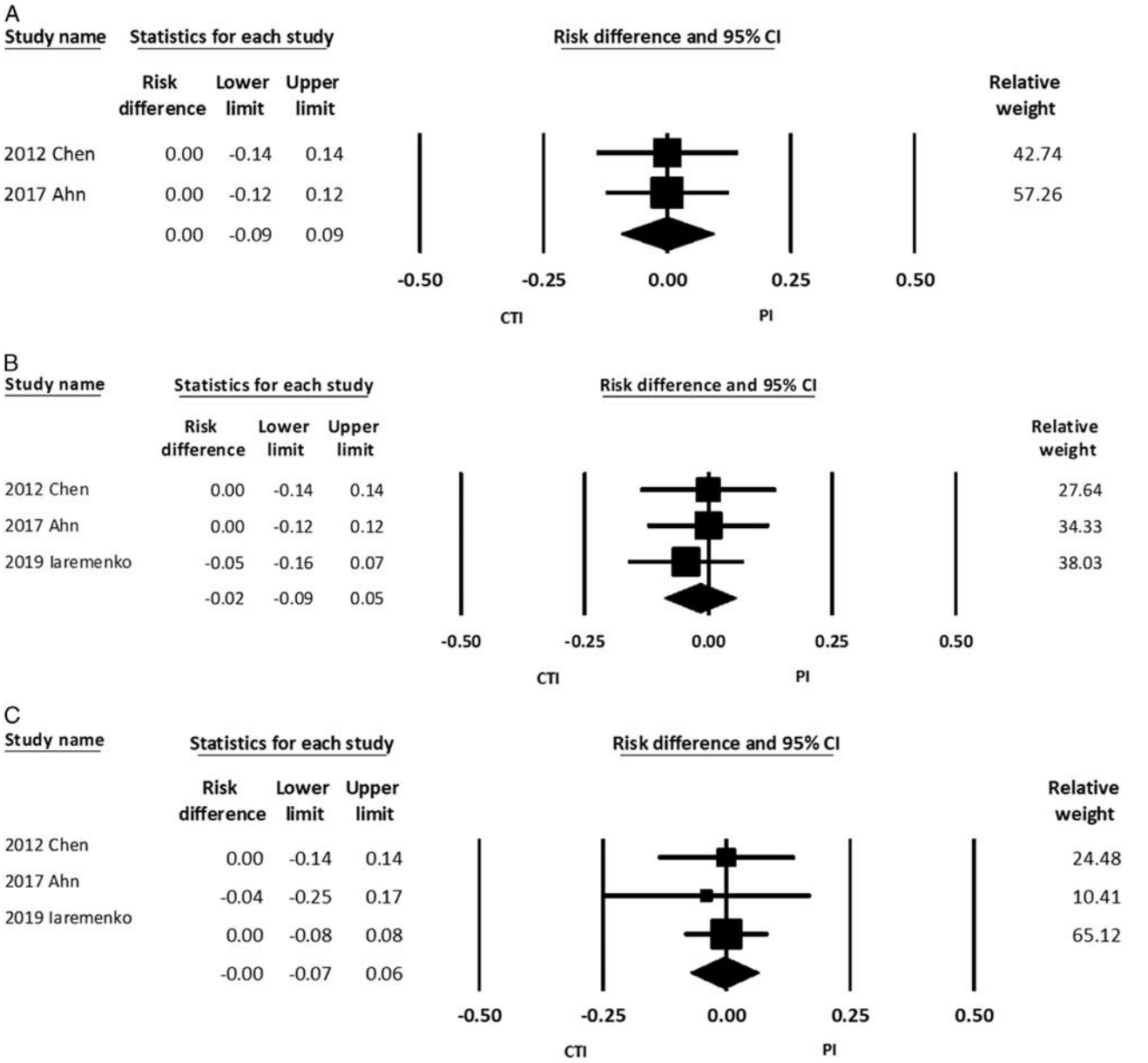

FIGURE 3. (A) Forest plot of the incidence of marginal mandibular nerve palsy after second branchial cleft cyst surgery. (B) Forest plot of the incidence of postoperative bleeding complications (hematoma/hemorrhage). (C) Forest plot of the incidence of postoperative salivary complications (salivary fistula/seroma). CI indicates confidence interval; CTI, conventional transcervical incision; PI, postauricular incision.

in recent years, more surgeons have preferred using an endoscope or a robotic system to assist surgery.[16,25–27] SBCC excision using PI can be performed more easily with a magnified endoscopic view or articulated robotic arms. Surgeons could choose the appropriate assistive tools for surgery according to their own experience, hospital equipment, and patient preference.

There are several limitations to the present study. The first is the small number of included studies. Only 3 studies were included in this meta-analysis; more studies are needed to confirm the pooled results. The second limitation is that no randomized trials were included in the present meta-analysis due to a lack of available data. The third limitation is the presence of statistical heterogeneity. Some comparisons performed showed $I^2 > 75\%$, suggesting high heterogeneity, and these results should be interpreted with caution.

In conclusion, this study is the first meta-analysis to compare PI and CTI in SBCC resection. Compared with CTI, PI resulted in higher cosmetic satisfaction and longer operative duration. The incidences of postoperative facial palsy, bleeding complications, salivary complications, and the length of hospital stay were comparable between the 2 groups. Surgeons can discuss the advantages and disadvantages of the different surgical approaches for SBCC resection in patients. For patients who wish to avoid a visible neck scar, PI could be considered. Because of the small sample size in our meta-

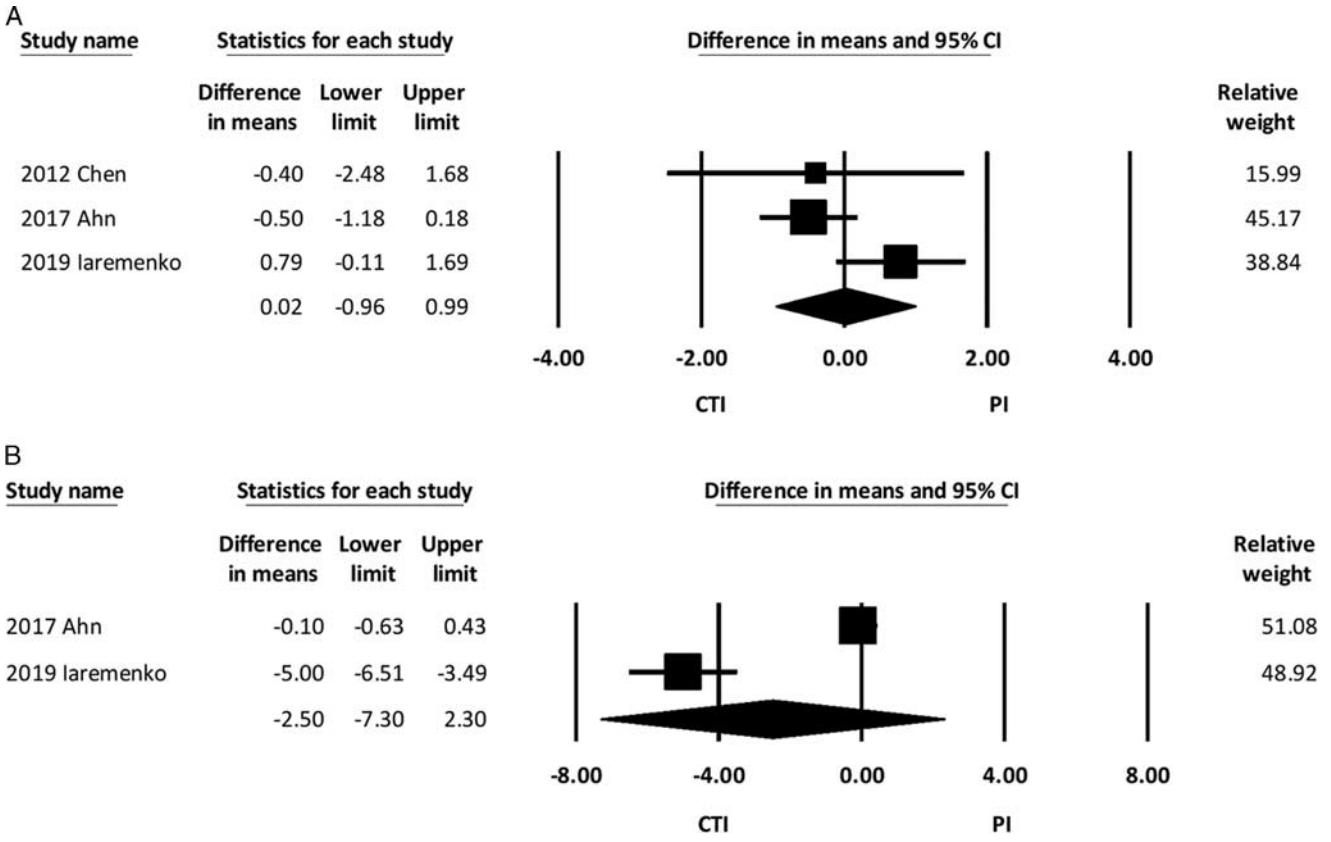

FIGURE 4. (A) Forest plot of the removed cyst size after second branchial cleft cyst surgery. (B) Forest plot of the length of hospital stay. CI indicates confidence interval; CTI, conventional transcervical incision; PI, postauricular incision.

analysis, it would be more conclusive when more future prospective studies are included.

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