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Patient-Reported Satisfaction After Autologous Auricular Reconstruction in Patients with Microtia: A Systematic Review

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Abstract

Importance: In a patient-centered field such as plastic surgery, patient-reported satisfaction can measure the success and value of surgery, since it is not uncommon for patient and surgeon assessments to differ. Currently, there is no standard for evaluating patient-reported satisfaction postauricular reconstruction.

Objective: To systematically review the literature regarding patient-reported satisfaction postauricular reconstruction in microtia patients.

Evidence Review: The databases MEDLINE, EMBASE, Cochrane, and Scopus were searched and preferred reporting items for systematic reviews and meta-analyses guidelines were followed. Studies documenting patient-reported satisfaction postauricular reconstruction in microtia patients were included. All techniques for ear reconstruction have been included in this review.

Findings: Nineteen studies utilizing autologous reconstruction technique, comprising 3694 patients, met inclusion criteria. No standardized patient satisfaction assessment was used throughout the studies, indicating criteria variability to measure outcomes. Auricular substructure analysis highlighted lower patient satisfaction with the tragus and antitragus compared with the upper units. In addition, satisfaction depended on patient perception, not on a low surgical complication rate.

Conclusions: There is a clear need to incorporate a standardized validated surgery-specific questionnaire related to patient satisfaction in the auricular reconstruction protocol.

Introduction

Microtia is the underdevelopment or complete absence of the external ear.[1] It is a congenital malformation that occurs in 1 to 10 per 10,000 births, depending on the type of deformity and geographical location.[2] Although not life threatening, it produces psychological morbidity in affected patients.[3] A greater prevalence of mood disorders, including depression, interpersonal sensitivity, and hostility with a tendency to increase with age, has been identified among patients who have not received surgical repair.[4] Reconstructive surgery restores not only functional impairments, including the ability to wear glasses and/or hearing aids, which is important due to the high incidence of concomitant craniofacial or ocular abnormalities, but also reduces psychosocial burdens through significant social skills improvement after reconstruction.[3,5]

The main treatment options include autologous costal cartilage, alloplastic, or prosthetic reconstruction.[6] Autologous reconstruction ranges from a one-stage to a six-stage method. It provides a durable framework that elicits no immune reactions.[6] However, its use is debated due to its complications, such as chest wall morbidity, hypertrophic scars, and inconsistent outcomes.[6,7] Alloplastic and prosthetic reconstructions are a one- to two-stage procedure that allows earlier age treatment and eliminates the morbidity associated with cartilage harvest.[8,9]

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KEY POINTS

Question: How satisfied are patients after ear reconstruction?

Findings: Unfortunately, no standardized method is available to assess satisfaction after ear reconstruction.

Meaning: This study highlights the fact that patient satisfaction has not been adequately addressed after total ear reconstruction.

The use of MedPor, a synthetic biocompatible porous polyethylene alloplastic implant, although intended to improve structural stability and aesthetics, has a high rate/risk of extrusion, placing its lifetime stability in question.[6,10] Similarly, adhesive-based or osseointegrated implants provide a single- or two-stage reconstruction, advantageous for compromised tissues, with minimal morbidity.[11] However, the continuous 2- to 5-year replacement expense, strict hygiene, and prosthetic nature are often not readily accepted by patients.[6,11]

Plastic surgeons have modified techniques to enhance functionality, refine contours, and ameliorate morbidity, with improvement in complication rates and aesthetics. However, although the surgeon's technical perspective is important, it is imperative to consider the patient's expectations and satisfaction postsurgery. We cannot place value on a surgery, such as microtia reconstruction, if we cannot assess patient satisfaction when measuring related outcomes. For this purpose, we sought to assess the postsurgical satisfaction among patients undergoing microtia reconstruction and the consideration given to this parameter in published studies, including how surgical techniques, modifications, and complicate rates impact patient satisfaction assessment.

Methods

Design

This systematic review was conducted following the guidelines defined in the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement.[11,12] The PRISMA statement includes the 27-item checklist, to assure complete and transparent reporting.

Search strategy

A comprehensive search of several databases from each database's inception to January 25, 2021, in any language, was conducted. The databases included Ovid MEDLINE(R) and Epub Ahead of Print, In-Process and Other Non-Indexed Citations, and Daily, Ovid EMBASE, Ovid Cochrane Central Register of Controlled Trials, Ovid Cochrane Database of Systematic Reviews, and Scopus. The search strategy was designed and conducted by an experienced librarian with input from the study's principal investigator.

The following keywords were used in all combinations to search for patient satisfaction and aesthetic outcomes after autogenous and nonautogenous methods of total auricular reconstruction for microtia: [external adj4 (ear or ears or auricl*) adj4 (abnormalit* or deform*)] or (anotia or anotias or microtia or microtias) AND (Allograftic or Alloplastic or Autogenous or Autologous or ''Costal cartilage'' or Graft* or Implant* or Medpor or ''Non-autogenous'' or Polyethylene or procedure* or Prosthe* or reconstruct* or repair* or ''Rib cartilage'' or surg* or transplant*) AND [(''self report*'' adj3 outcome*) or (patient* adj3 satisf*) or (patient* adj5 outcome*) or aesthetic* or ePRO or ePROM or ePROMS or ePROs or esthetic*].

Eligibility criteria

Studies were included if they (1) mentioned auricular reconstruction using autologous, alloplastic, or prosthetic techniques for patients with microtia, (2) reported patient satisfaction, including the patient's perspective of aesthetic outcomes, (3) included details of satisfaction measurement/documentation, and (4) were in English. Articles that reported auricular reconstruction for etiologies were excluded because trauma or irradiation such as in cancer impacts the quality of flaps required for coverage thus affecting postsurgical outcomes. Review articles, meta-analyses, case reports, single cases, and articles lacking full text or reported patient satisfaction without details, or pooled outcomes between techniques were excluded.

Data extraction and processing

The evaluation of each study was examined by two reviewers (D.W. and J.M.) for adherence to the inclusion/exclusion criteria. Disagreements related to article identification, eligibility, and final selection for inclusion were resolved by the first author (N.K.). The titles and abstracts were reviewed for suitability to include both total auricular reconstruction of microtia and patient satisfaction assessment. The full texts were checked against the eligibility criteria. When full-text studies were not found or did not meet the eligibility criteria, they were excluded.

The following items were extracted: year of study, number of patients and ears, country of origin, age range, reconstruction type/technique, tissue expander use, follow-up period, patient/guardian satisfaction rate, patient-reported satisfaction assessment method, surgical complications, and rate.

Results

Study selection

The initial search yielded 641 records, of which 76 non-English studies were removed. Another 413 articles were excluded after screening abstracts for inclusion criteria.

The full texts of 150 articles were assessed for eligibility. A total of 20 studies were considered suitable, the use of alloplastic technique was found in one study but was excluded due to unlikelihood to provide significant data. Nineteen studies met final inclusion in this review. Figure 1 outlines the search strategy.

Study characteristics

The 19 articles include 3694 patients (3897 ears) with an age range of 5–62 years and a follow-up period between 1 month and 10.3 years. The country producing the highest number of studies was the People's Republic of China ($n=12$), the United Kingdom ($n=2$), and South Korea ($n=2$). Autologous reconstruction was utilized in all 19 studies, no studies reported using prosthesis met our eligibility criteria. Autologous reconstruction was performed in two stages ($n=9$), three stages ($n=8$), and one stage ($n=2$). Tissue expander use was reported in 1584 patients (7 studies). Table 1 summarizes study characteristics and surgical details.

The satisfaction assessment method was reported in 12 studies. The most utilized was face-to-face interviews ($n=9$). The response rate ranged from 36.5% to 100%. Eight studies did not specify response rate, implying all patients responded as part of the in-person follow-up visit. The studies ($n=5$) with the highest response rate conducted in-person assessment, demonstrating a minimum response of 90%. Eight studies reported minor's parents helped with assessment.

Eleven studies measured satisfaction using a numerical scale, six used an ordinal scale, and two studies used both. Nine studies (45%) evaluated the aesthetic satisfaction of the substructures (helix, antihelix, concha, tragus, antitragus, and lobule). In addition, four studies incorporated a previously validated method. Details regarding satisfaction rate, scale used, method, and basis for evaluation are summarized in Table 2.

Fourteen publications (73.6%) reported surgical complications with an overall rate of 15.6% ($n=499$). Chest wall deformity was most frequently recorded (4.9%), followed by peripheral circulation disturbance (2.6%) and

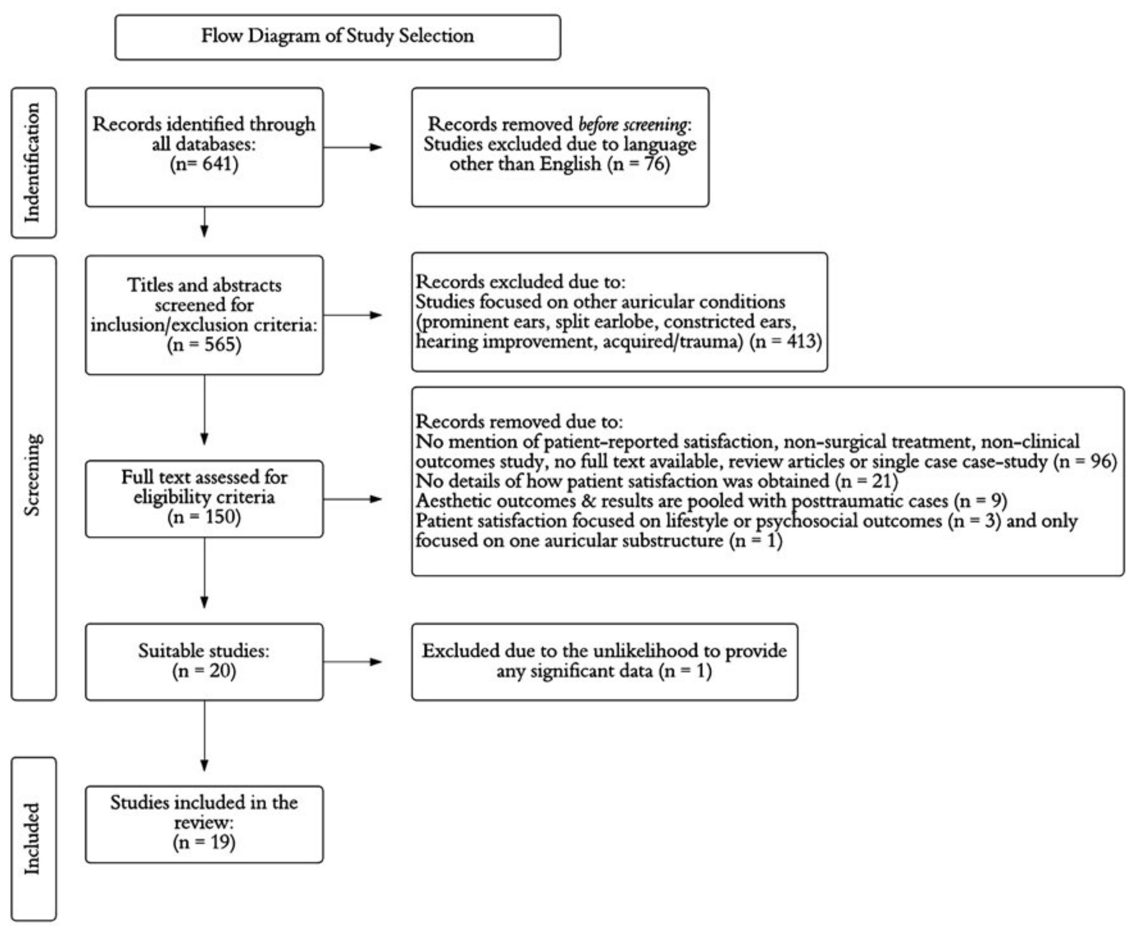

Fig. 1. Flow diagram illustrating the steps in the literature search.

Table 1. Characteristics and surgical details from the studies included in the review

Study	*No. of patients (ears)*	*Country of origin*	*Age range (years)*	*Reconstruction type*	*Technique*	*Follow-up range*
Akter et al.[16]	69 (69)	United Kingdom	10–17	Autologous	Two-stage	7 mo–3 y
Choi et al.[15]	47 (52)	South Korea	7–26	Autologous	Two-stage	18 mo–10.3 y
Cui et al.[18]	80 (80)	China	7–45	Autologous	Two-stage	NR
Dashan et al.[14]	342 (366)	China	5–21	Autologous/w TE	Three-stage	1–6 y
Fan et al.[28]	257 (257)	China	6–34	Autologous/w TE	Three-stage	6 mo
Fan et al.[33]	12 (24)	China	6–18	Autologous	Three-stage	6 mo
Karimi-Yazdi et al.[30]	9 (10)	Iran	10–30	Autologous	One-stage	1–8 y
Kristiansen et al.[22]	78 (78)	Sweden	9–23	Autologous	Three-stage	1 y
Li et al.[26]	1350 (1427)	China	6–40	Autologous	Two-stage	1 mo–5 y
Ma et al.[13]	243 (254)	China	6–62	Autologous	Two-stage	6 mo–4 y
Park et al.[29]	62 (62)	South Korea	10–30	Autologous/w TE	Three-stage	3 mo–3 y
Soukup et al.[17]	55 (63)	United Kingdom	9–17	Autologous	Two-stage	4 mo–4 y
Suutarla et al.[23]	22 (22)	Finland	7–24	Autologous	One-stage	10 mo–3.5 y
Xing et al.[20]	683 (738)	China	6–35	Autologous/w TE	Three-stage	3 mo–2 y
Xing et al.[37]	69 (69)	China	7–17	Autologous/w TE	Three-stage	6 mo–7 y
Xing et al.[27]	89 (95)	China	24–50	Autologous	Two-stage	6 mo–2 y
Yan et al.[35]	68 (72)	China	5–10	Autologous/w TE	Two-stage	2–15 mo
Yang et al.[34]	56 (56)	China	6–25	Autologous	Two-stage	2–15 mo
Zhou et al.[25]	103 (103)	China	16–43	Autologous/w TE	Three-stage	7–13 mo

mo, months; NR, not reported; PR, People's Republic [of China]; w/TE, with tissue expander; y, years.

skin necrosis (2.4%). The complication rates for each study are presented in Table 2. Six studies published a 16.8% ($n = 223$ cases) complication rate after the use of tissue expander. Overall, procedures reported a 17.2% adverse event rate when completed in one stage, 14.1% in two stages, and 18.4% in three stages.

Discussion

Patient-reported satisfaction is significant in predicting the future quality of health, thus, a pre-eminent aim of surgery. The variability and paucity of information used to evaluate and define satisfaction reflect an absence of a standardized patient-reported satisfaction assessment specific to microtia reconstruction. Most outcomes are reported as *satisfactory*. However, when studies published individual rates, many patients gave an intermediate-range score.[13–17] This observation may suggest that although patients are content, aesthetic outcomes are not optimal.

Studies that evaluated individual substructures revealed the helix and lobule fulfill patient's expectations, but the tragus and antitragus require improvement.[16–20] Choi et al. stated the primary focus should be the larger contouring, location, and degree of projection, rather than more detailed factors.[15] In contrast, these findings indicate that enhanced definition of the lower auricular units could potentially lead to an increase in patient satisfaction.

Minimal literature exists on the overall autologous complication rate due to variability among surgeon's operative techniques. Our finding of an average complication rate of 15.6% is similar to the incidence reported by Long et al.[7] in their review (16.2%), with chest wall deformity as the greater complication (36.06% in Long et al.[7]), which is consistent with our results. However, one study mentioned chest wall deformity in 50% of patients, thus skewing results.[14] To address this issue, Nagata recommends maintaining the perichondrium intact at harvest time.[21]

As the two-staged versus three-staged approach debate continues among surgeons, our results demonstrated a higher complication rate in a more extensive three-staged procedure. With the use of tissue expander, particularly where skin expansion was combined with excessive soft tissue manipulation, higher complication rates were evident.[21] Clearly, however, a low complication rate does not correspond to an inflated patient satisfaction, demonstrated by the higher satisfaction rate (91.1%) after three-staged reconstruction, compared with the two-staged (79.6%) and one-stage (67.9%) reconstruction.

Nonetheless, the plastic surgeon's skill and technique with concomitant satisfaction rate have evolved. Kristiansen et al. identified greater satisfaction among patients operated on in later years of their study (2006–2010 and 2000–2005) at 83% and 62%, respectively, implying an advancement in the surgical technique.[22] Assessment of the learning curve of microtia reconstruction indicates that aesthetic enhancement can be achieved by addressing skin flap thickness, sufficient vascularity, wound healing, and framework positioning.[23]

It remains unknown what leads to satisfaction despite a high complication rate. Although it can be hypothesized that the ultimate aesthetic outcome might not be compromised after a successful salvage postcomplication, satisfaction might essentially be determined by patient perception.[16,22] Any degree of body image dissatisfaction and/or the patient's perception of appearance are dependent on age and personality, which influence their satisfaction.[18,24]

Our findings reported a lower satisfaction rate in older aged patients.[13,15,18,20,25–30] Yet, arguably a higher rate in younger patients is a factor of development and minors

Table 2. Details of autologous reconstruction reported patient satisfaction rate and scale, assessment method and basis of evaluation, and complication rate

Study	*Reported patient satisfaction rate and scale*	*Assessment method for patient satisfaction (response rate)*	*Complication rate*
Akter et al.[16,a]	At GOSH: 83% satisfied At RHSC: 85% satisfied 5-point scale: 1 poor, 5 excellent *(Overall satisfaction reported in percentage)*	Two questionnaires by mail. (At GOSH: 43.5%, 36.5%) (At RHSC: 56.2%) *Basis of evaluation:* Q1: General appearance. Individual substructure aesthetics. Donor site. Q2: Psychosocial behavior, aesthetics and function, satisfaction with care and information received, choice of management	NR
Choi et al.[15]	3.9 out 5 points 5-point scale: 5 very satisfied, 4 satisfied, 3 neither satisfied nor unsatisfied, 2 unsatisfied, 1 very unsatisfied	Satisfactory surveys during an outpatient appointment (NR) *Basis of evaluation:* Degree of the ear projection and ear shape after elevation	Decrease of projection by partial absorption of cartilage block and contracture of full-thickness skin graft: (3, 6%) Shallow auricular sulcus: (6, 13%) Dehiscence: (4, 8.5%) Widened scar of donor site: (4, 8.5%) **Total: 36%**
Cui et al.[18,a]	Younger patients: 60% satisfied Older patients: 29% satisfied 5-point scale: 5 very satisfied, 4 satisfied, 3 neither satisfied nor unsatisfied, 2 unsatisfied, 1 very unsatisfied *(Overall satisfaction reported in percentage)*	Face-to-face interviews. Pictures of ear anatomy outlined sent before the interview. Photograph of patient's normal ear for comparison. (90%) *Basis of evaluation:* Three-stage method by Cano et al.[39]: substructures, superior and inferior parts, and overall satisfaction	NR
Dashan et al.[14]	Excellent: 17.8% Good: 63.5% Fair: 13.6% Poor: 5.1% 10-point scale: excellent (8 or more); good (7); fair (6); poor (5 or less)	Aesthetic assessment of five domains (NR) *Basis of evaluation:* Location, size, projection of symmetry, appearance of substructures, convolution, thickness and color match, stability, and endurance	Framework absorption/distortion: (7, 2%) Exposure of stainless-steel wire: (2, 0.6%) Chest wall deformity: (158, 46.2%) **Total: 48.8%**
Fan et al.[28,a]	3D group: Highly satisfactory: 88% Basically satisfactory: 12% Unsatisfactory: 0% 2D group: Highly satisfactory: 72% Basically satisfactory: 26% Unsatisfactory: 2%	Two face-to-face interviews (100%) *Basis of evaluation:* Q1: General aesthetics. Q2: if pts < age 18 years GCBI: 18 items in two subscales; health-related benefits of an intervention	NR
Fan et al.[33]	Highly satisfied: 88% Basically satisfied: 11% Unsatisfactory: 0%	Three face-to-face questionnaires (100%) *Basis of evaluation:* Q1: General aesthetics. Q2: if pts < age 18 GCBI: 18 items in two subscales; health-related benefits of an intervention	0%
Karimi-Yazdi et al.[30,b]	66.7% satisfied Scale: good, moderate, no satisfaction	Three face-to-face questionnaires (100%) *Basis of evaluation:* General aesthetics	Cartilage resorption: (1, 11%) Adhesion: (2, 22%) **Total: 33%**
Kristiansen et al.[22,a]	From 2000 to 2005: 62% satisfied From 2006 to 2010: 83% satisfied Four-grade scale: fully agree, agree, fully disagree, disagree	Four domain questionnaire (76%) *Basis of evaluation:* Aesthetic, psychosocial, functional, and clinic-related outcomes	NR
Li et al.[26]	90.1% satisfied Scale: reported as "estimation" satisfied or not satisfied	Five domain survey (100%) *Basis of evaluation:* Shape, color, texture, location	Hematoma: (21, 1.5%) Peripheral circulation disturbance: [Lobule: (29, 2.1%); Conchae: (11, 0.81%); Tragus: (17, 1.3%); Helix: (28, 2.1%)] Skin necrosis: [Lobule: (5, 0.4%); Tragus: (5, 0.4%); Helix: (7, 0.52%)] Cartilage exposure: (8, 0.6%) Infection in stage 1: (1, 0.07%) Partial Skin Necrosis: (43, 3.2%) Infection in stage 2: (8, 0.6%) **Total: 13.6%**

(*continued*)

Table 2. (Continued)

Study	Reported patient satisfaction rate and scale	Assessment method for patient satisfaction (response rate)	Complication rate
Ma et al.[13]	90% satisfied Four grades: very good, good, fair, and poor	Four-grade evaluation (NR) *Basis of evaluation:* Shape, definition, projection	Infection: (1, 0.4%) Partial skin graft necrosis: (7, 2.9%) Flap necrosis: (2, 0.8%) Bad projection of the constructed auricle: (8, 3.3%) Exposure of cartilage: (6, 2.5%) Hypertrophic scars: (16, 6.6%) **Total: 16.5%**
Park et al.[29,a]	Tissue expander group: 91.8% satisfied Conventional group: 81.8% satisfied *(Percentages calculated from responses to five questions)*	Telephone surveys (100%) *Basis of evaluation:* Would you select the ''ear reconstruction'' you had again? Would you choose to have the same type of procedures (using tissue expanders) you had again? Would you recommend the same surgical procedures you had to others? Are you satisfied with shape of the ear? Do you think that it is similar with normal ear in shape, size, color, and texture?	Partial loss of skin graft: (5, 8.1%) Hypertrophic scar: (1, 1.6%) Complications w/tissue expander insertion: Hematoma: (3, 4.8%) Dehiscence: (2, 3.2%). **Total: 17.7%**
Soukup et al.[17]	3.4 out of 5 5-point scale: 1 poor, 5 excellent	Two questionnaires (61%) *Basis of evaluation:* Q1: GBI–quality of life. Q2: Individual substructures and facial integration; color, length, width, projection, cartilage donor site, realness	Wire exposure: (2, 3.17%) Auricular paresthesia: (2, 3.17%) Keloid scar: (1, 1.58%) Hypertrophic scar: (1, 1.58%) Frey syndrome: (1, 1.58%) Delayed healing of the skin graft: (1, 1.58%) **Total: 14.5%**
Suutarla et al.[23]	6.91 out of 10 Scale: 1–10, 10 best possible result	Postal survey using photographs (43%) *Basis of evaluation:* General aesthetic impression	NR
Xing et al.[20]	94% satisfied 15-point scale: Satisfactory: 10–15; partially satisfactory: 6–9; unsatisfactory: 0–5 *(Overall satisfaction reported as percentages)*	Questionnaire through outpatient appointments and phone calls (NR) *Basis of evaluation:* Symmetry, size, location of individual substructures, and cranioauricular angle	After 1st stage: Expander leakage: (5, 0.7%) Expander infection: (7, 1%) After 2nd stage: Seroma: (4, 0.5%) Skin necrosis and exposure of the helix section of the cartilage framework: (4, 0.5%) Excessive expansion and flap contracture: (21, 3%) **Total: 2.92%**
Xing et al.[37]	91.3% satisfied 15-point scale: Satisfactory: 10–15; partially satisfactory: 6–9; unsatisfactory: 0–5 *(Overall satisfaction reported as percentages)*	Survey through outpatient appointments, telephone calls, and communication apps. (NR) *Basis of evaluation:* Symmetry, size, location of individual substructures and cranioauricular angle	Expander leakage: (1, 1.4%) Hematoma: (4, 5.8%) Skin necrosis and cartilage exposure: (1, 1.4%) **Total: 8.7%**
Xing et al.[27]	89% satisfied 15-point scale: Satisfactory: 10–15; partially satisfactory: 6–9; unsatisfactory: 0–5 *(Overall satisfaction reported as percentages)*	Evaluation survey (NR) *Basis of evaluation:* Symmetry, size, location of individual substructures and cranioauricular angle	After 1st stage: Hematoma: (2, 2.2%) Infection: (1, 1.1%) Early postoperative partial skin disorders: (2, 2.2%) After 2nd stage: Partial skin necrosis and cartilage extrusion: (1, 1.1%) **Total: 6.7%**
Yan et al.[35]	97% satisfied Scale: Satisfied; ≥80; relative satisfaction: 60–80; dissatisfaction: <60 *(Overall satisfaction reported as percentages)*	Questionnaire (NR) *Basis of evaluation:* Height, size, position, realness, symmetry, helix and antihelix substructures, appearance of scar, cranioauricular angle, color match	Hematoma: (2, 2.9%) Infection in tissue expander: (1, 1.5%) Secretion around tissue expander: (1, 1.5%) Cartilage exposure at the helix region caused by local trauma: (2, 2.9%) **Total: 8.8%**

(*continued*)

Table 2. (Continued)

Study	Reported patient satisfaction rate and scale	Assessment method for patient satisfaction (response rate)	Complication rate
Yang et al.[34]	96% satisfied Scale: satisfied or dissatisfied	Survey during a follow-up session. Mail-in photographs. (NR) *Basis of evaluation:* General aesthetic, helix, antihelix, superior crus, and inferior crus	Partial skin flap necrosis caused by trauma (1, 1.8%) Hypertrophic scars: (1, 1.8%) **Total: 3.6%**
Zhou et al.[25]	81.5% satisfied 3-degree scale: satisfied, acceptable, unacceptable	Departmental patient satisfaction survey, telephone, and email. (100%) *Basis of evaluation:* Size, location, projection, chest wall morbidity (scar, contour deformity)	Hematoma: (9, 8.7%) Framework absorption/deformation: (6, 5.8%) Extruded steel wire: (5, 4.9%) Chest scar: (10, 9.7%) **Total: 29.1%**

Bold value denotes total complication rate reported within each article.
[a]Publications conducted assessments separated in different groups such as hospitals or techniques, results are detailed as reported in each study.
[b]Autologous data from the study were isolated, homograft data were excluded.
2D, two-dimensional; 3D, three-dimensional; GBI, Glasgow Benefit Inventory; GCBI, Glasgow Children's Benefit Inventory; GOSH, Great Ormond Street Hospital; Pts, patients; Q, questionnaire; RSHC, Royal Hospital for Sick Children.

reflection of self, thus addressing the difficulty of measuring satisfaction and outcomes in children. Although quality-of-life improvement exists across all ages, adult resilience tends to decrease with age, which might factor into why the impact is not equal in older patients.[31]

Regardless, the best age for microtia repair is not unanimous. Sufficient rib cartilage determines feasibility to shape the auricular framework. Yet, harvesting and sculpting can be challenging in adults due to the age-related rib calcification. Bulstrode et al. argue that earlier age surgery manages the guardian/parent's psychological distress rather than the child's well-being.[32] In contrast, Johns et al. advocate earlier treatment as a protective factor for children at higher risk of psychological concerns.[5] One study preferred Nagata's recommendations of age >9 years, due to the small amount of costal cartilage found in younger ages.[13]

Eight studies recommended age 6 years and three studies recommended age 5 years.[14,17,25-28,30,33–35] The decrease in age follows reports of how critical the first 5–8 years are for a child regarding early emotional experiences becoming rooted in the brain's architecture and social competence development, which carries into adulthood.[36]

Pre- and postsurgery questionnaires are integral to understand patients' needs and aligning their expectations with realistic goals. However, loss of patients during follow-up and the inconvenience of responding to postal and/or telephone surveys contribute to reduced feedback.[16,17,23] Our results conclude that in-person surveys, alone or combined with another method, could assure a good response rate.[20,25,34,37] However, face-to-face interviews possibly lead to bias from patients concerned about how their response affects their care quality.[18]

The use of electronic questionnaires during outpatient visits could mitigate risk of bias in answers, providing anonymity, and emphasizing the fact that responses will not interfere with treatment.[16] It should also be highlighted that the questionnaire should be assessed after the final stage of reconstruction. A survey taken in-between surgical stages, before proper healing or final revisions, might influence the patient's response and aesthetic perspective.

Henceforth when considering questionnaire design, it must be noted that patients prefer a disease-specific questionnaire over a generalized questionnaire, even if it is longer.[38] The response burden is reduced in a longer questionnaire with more straightforward questions compared with a shorter survey with complex choices, or multiple short questionnaires with similar concepts.[38] For example, Akter et al. identified a lack of response due to the patient not understanding the question.[16]

Modifications to improve response rates include anatomical pictures to explain questions and shifting to a more content-focused survey.[16] Future research should also address inclusive survey variables for patients with possible developmental delays or syndromes. Providing better preoperative information to meet patient expectations might enhance satisfaction rates, as well as obtaining consent to remind the patients of the importance of the questionnaire to achieve the most optimal outcomes for future patients.[22]

As with all systematic reviews, we recognize there are limitations. It is likely that due to a language restriction, studies in a non-English language that fit our eligibility criteria could have been overlooked. Moreover, the lack of large volume studies reporting patient satisfaction data for autologous reconstruction or the scarcity of data documenting satisfaction postalloplastic or prosthetic reconstruction, a comparison of satisfaction between the different techniques was not possible. Considering the complexity of the surgical procedure and the inclination toward reporting positive outcomes, surgeons might be more likely to document results from satisfied rather than unsatisfied patients.

In addition, the variable response rates from patients and follow-up times are a risk for a selective reporting bias. There is also a potential bias in interpreting data as considerable heterogeneity exists in the measured variables and reported outcomes, including inconsistency in how satisfaction has been defined and measured since no studies used a standardized validated microtia surgery-specific questionnaire checked for reliability. Large-volume multicenter studies using validated surgery-specific questionnaires are warranted for all techniques used for auricular reconstruction.

Conclusion

Plastic surgery focuses on quality-of-life improvement, which largely depends on the patient's overall satisfaction with the surgical results. The scarce literature analyzing patient-reported satisfaction postauricular reconstruction highlights the need to assess satisfaction outcomes. Assessing what patients' specifically value in microtia reconstruction can further refine the procedure. Focused evaluation of the substructures has highlighted that increasing satisfaction may also result from concentrating on more defined lower auricular regions. A reliable and validated surgery-specific questionnaire that standardizes the criteria outcomes for which satisfaction is measured must be developed and made an integral aspect of the reconstruction protocol.

Authors' Contributions

The authors confirm contribution to the article as follows: N.K. conceived the study and performed overall direction and planning of this study, with design input by A.D.W. and M.Z.; data collection was done by N.K., D.W., J.M.; data analysis and calculations were carried out by N.K., D.W., J.M., and A.D.W.; M.Z. contributed to the interpretation of the results. N.W., D.W., and J.M. wrote the article and designed the figures/tables in consultation with A.D.W. and M.Z. All authors provided critical feedback and helped shape the research, analysis, and article. All authors discussed the results and contributed to the final article and agree to be accountable for all aspects of the study in ensuring that questions related to the accuracy or integrity of any part of the study are appropriately investigated and resolved.

Author Disclosure Statement

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