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PRS GLOBAL OPEN

ORIGINAL ARTICLE

Pediatric/Craniofacial

Evaluation of 4 Outcomes Measures in Microtia Treatment: Exposures, Infections, Aesthetics, and Psychosocial Ramifications

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Background: In craniofacial microsomia, microtia and canal atresia pose formidable reconstructive challenges. We review our institutional experience in treating microtia and atresia to identify variables associated with 4 outcomes measures: complications, surgical revisions, aesthetic outcomes, and psychosocial function.
Methods: Craniofacial microsomia patients treated at the University of California Los Angeles Craniofacial Clinic between 2008 and 2014 greater than 13 years of age (n = 68) were reviewed for microtia and atresia treatment and outcomes.
Results: In total, 91.2% of patients diagnosed with craniofacial microsomia presented with microtia, affecting 75 ears. Both a male and right-sided predominance were observed. Fifty-six patients (90.3%) underwent autologous external ear reconstruction at an average age of 8.5 years. Age, type of incision, and size of cartilage framework did not predict total number of surgeries or complications. Severity of ear anomalies correlated with increased number of surgeries ($P < 0.001$) and decreased aesthetic outcomes ($P < 0.001$) but not complications. In total, 87.1% of patients with microtia had documented hearing loss, of which the majority were conductive and 18.5% were mixed sensorineural and conductive. Hearing deficits were addressed in 70.4% of patients with external hearing aids, bone anchored hearing aids, or canaloplasty. Of all variables, improvement of psychosocial function was correlated only to hearing loss treatment of any type ($P = 0.01$).
Conclusions: On evaluation of surgical and patient characteristics, severity of microtia predicted the total number of surgical revisions performed and aesthetic ratings. In addition, we found that the only factor that correlated with improved patient and parent-reported psychosocial outcomes was treatment of hearing loss. (Plast Reconstr Surg Glob Open 2017;5:e1460; doi: 10.1097/GOX.0000000000001460; Published online 20 September 2017.)

INTRODUCTION

Anomalies of the external ear and hearing apparatus are seen in 66–99% of patients diagnosed with craniofacial microsomia with variabilities in severity.[1,2] Treatment for patients with microtia and canal atresia requires consideration for the external ear deformity as well as rehabilitation of hearing loss.

Autologous rib cartilage is the most common material for external ear reconstruction due to complete biocompatibility and low infectivity.[3–5] Although variations of surgical techniques have been reported, modern reconstruction generally requires 1 or 2 major stages,

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Received for publication March 7, 2017; accepted July 6, 2017.
Presented at the 60th Annual Meeting of the Plastic Surgery Research Council, May 14–16, 2015, Seattle, Washington, and the 16th Congress of the International Society for Craniofacial Surgery, September 14–18, 2015, Tokyo, Japan.
Supported by the Bernard G. Sarnat Endowment for Craniofacial Biology (JCL) and the Jean Perkins Foundation (JCL). JCL is additionally supported by the U.S. Department of Veterans Affairs under award number IK2 BX002442-01A2.
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DOI: 10.1097/GOX.0000000000001460

Disclosure: *Supported by the Bernard G. Sarnat Endowment for Craniofacial Biology (JCL) and the Jean Perkins Foundation (JCL). JCL is additionally supported by the U.S. Department of Veterans Affairs under award number IK2 BX002442-01A2. All sources of funds supporting the completion of this article are under the auspices of the University of California Los Angeles. The Article Processing Charge was paid for by the authors.*

harvest of rib cartilages, sculpting of the cartilages into a well-defined ear, and a thin, albeit well perfused, skin flap.[6,7] Beyond the conceptual generalities, the details of the cartilage constructs and skin incisions are dependent on the individual deformity. Firmin[4] classified cartilage constructs into 3 major types: I, full construct containing all anatomical components (including helical rim, antihelix, tragus, anti-tragus, lobule), II, construct without the tragus, or III, construct without the tragus or anti-tragus. Similarly, skin incisions were classified into 4 major types: I, Z plasty incision, II, transverse (transfixion) incision, IIIa, incision over the vestigial cartilage for 1-stage reconstruction, and IIIb, incision away from the vestige.[4] Such classifications account for differences in cartilage deformities, skin availability, and location of the remnant. Drawbacks of autologous ear reconstruction include steep learning curve, disruption of the costal anatomy, revisions, and variable long-term resorption, which may affect the final aesthetic outcome.[8] Aesthetic results in autologous ear reconstruction are, thus, challenging to achieve causing significant frustration to surgeons.

Timing of autologous ear reconstruction requires consideration of the external ear development, psychosocial development of children with craniofacial anomalies, and the availability of cartilage for reconstruction.[9] Farkas's seminal work in characterizing the external ear growth from birth to maturity demonstrated that the external ear width reached nearly the mature size in males at 7 years and females at 6 years, whereas length reached 86.6% of the mature size by 5 years. In terms of psychosocial ramifications, we and others have reported that significant psychosocial disturbances occur specifically in children with craniofacial anomalies between 8 and 10 years of age including increased anxiety, depression, poor peer relationships, obsessive-compulsive behavior, and aggression.[10,11] For these reasons, many surgeons will aim to perform reconstruction between ages 6 and 8 years.

In patients with microtia, both conductive and sensorineural hearing loss occur in excess of the general population secondary to external auditory canal atresia and nerve abnormalities.[12] Thus, treatment of microtia and atresia requires both reconstruction of the external ear as well as addressing the functional hearing impairment. Aural atresia is frequently found in combination with fusion of the malleus and incus and varying deformity of the ossicles.[13] Treatment of hearing impairment can be accomplished nonsurgically, with external hearing aids, or surgically. Surgical correction includes canaloplasty, reconstruction of the tympanic membrane, and potentially implant placement in the presence of malformed ossicles. However, when the facial nerve path is anomalous, canaloplasty may not be an option. In such patients, a bone-anchored hearing aid (BAHA) is generally recommended.[14–16]

One limitation in the current literature on microtia reconstruction is the lack of information on outcomes with regard to treatment of the external ear and hearing impairment as a system. In this study, we review characteristics and variables in patients with craniofacial microsomia affecting the external ear and hearing apparatus that affect 3 long-term outcomes measures: wound complications, total number of surgeries, and psychosocial development.

METHODS

Patients

Patients over 13 years of age with craniofacial microsomia treated between 2008 and 2014 at the University of California Los Angeles (UCLA) Craniofacial Clinic were included (UCLA IRB #11-000925). Patients were excluded if unidentified operative interventions before entry into the craniofacial clinic were performed, other craniofacial syndromes were diagnosed, and if the patients were lost to follow-up before completion of surgical plan. Operative reports, clinic evaluations, photographs, and audiograms were reviewed to assess patient characteristics, surgical algorithm, and 4 outcomes measures: complications, surgical revisions, aesthetics, and psychosocial function. For aesthetic outcomes, 3 observers evaluated frontal and lateral photographs of all patients and rated the reconstructed ear on a scale of 3 with the following criteria: 3 (excellent)—all external ear anatomy well visualized, excellent projection, no revisions necessary; 2 (moderate)—major external ear anatomy visualized, reasonable projection, minor revisions may improve outcome; 1 (poor)—abnormalities in multiple anatomical components of the ear, major revisions necessary. Psychosocial function was derived from multidisciplinary records that detailed patient or parent-reported academic performance, relationships with family and friends, depression, anxiety, and anger. Function was rated as "good" or "poor."

Treatment Algorithm

All patients started ear reconstruction between ages 5 and 18 years. First-stage ear reconstructions were performed using a modified Nagata/Firmin technique as described previously.[3,4,6,17] Six months or more after first-stage reconstruction, the cartilage construct was elevated using banked costal cartilage. In a number of patients, we used a temporoparietal fascial flap for elevation. Minor revisions such as deepening of the conchal bowl, tragal revisions, lobule revisions, and deepening of the postauricular sulci occurred frequently following the completion of the primary stages of reconstruction. For hearing loss, all patients were recommended hearing aids or frequency modulation systems on initial evaluation. Correction of aural atresia with canaloplasty occurred following the second stage of microtia reconstruction and frequently in conjunction with ear revision. Placement of osseointegrated BAHA occurred in the event that a canaloplasty could not be performed, recurrent stenosis of reconstructed canals, or patient/family preference.

Statistical Analyses

Statistical analyses were performed using SPSS V.23 (SPSS, Inc., Chicago, Ill.). Descriptive statistics were reported. For total number of postoperative complications and number of surgeries, simple, robust negative binomial regression analyses were used to evaluate predictors for count

Table 1. Patient Characteristics

Descriptor	N (%)
Sex	
Male	42 (67.7)
Female	20 (32.3)
Laterality	
Right only	30 (48.4)
Left only	17 (27.4)
Bilateral	15 (24.2)
Microtia severity	
Grade I	10 (13.0)
Grade II	7 (9.1)
Grade III	58 (75.3)
Hearing loss	54 (87.1)
Conductive	44 (81.5)
Mixed	10 (18.5)

Table 2. Surgical Characteristics

Stage of Ear Reconstruction	
First stage (n = 56)	
Age, mean years (range)	8.5 (5.5–18.7)
Cartilage framework, n (%)	
Type I (complete)	20 (35.7)
Type II (no tragus)	8 (14.3)
Type III (no tragus, no anti-tragus)	28 (50.0)
Skin incision, n (%)	
Type I (W plasty)	9 (16.1)
Type II (transfixion)	36 (64.2)
Type IIIa	5 (8.9)
Type IIIb	6 (10.7)
Second stage (n = 52)	
Age, mean years (range)	9.5 (6.3–18.5)
Usage of fascial flap, n (%)	22 (46.2)
Aesthetic rating, mean (range)	1.81 (1.00–3.00)

Table 3. Surgical Complications

Stage of Reconstruction	N (%)
After autologous first stage (n = 56)	10 (17.9)
Exposures	9 (16.1)
Infections	2 (3.6)
Complete removal of cartilage	0 (0.0)
After autologous second stage (n = 50)	9 (18.0)
Exposures	8 (16.0)
Infections	1 (2.0)
Complete removal of cartilage	0 (0.0)

outcomes. For aesthetic ratings, Poisson regression analyses were used to evaluate predictors. Incidence rate ratios (IRR), 95% confidence intervals (95% CIs), and *P* values were reported. For psychosocial outcomes, univariate logistic regression analyses were used to evaluate predictors. Odds ratios (ORs), 95% CI, and *P* values were reported. Pre- and postoperative differences in speech reception threshold from audiograms were compared using paired samples Student's *t* test. $P < 0.05$ was considered significant.

RESULTS

Patient and Surgical Characteristics

Of the 68 patients who met inclusion criteria, 62 patients (91.2%) had auricular abnormalities (Table 1). In total, 67.7% of patients with microtia were male, and 63.8% occurred on the right side in unilateral cases; 24.2% of patients had bilateral microtia, usually of varying severity; and 75.3% of external ear abnormalities were categorized as grade III microtia.

A total of 75 ears were affected, of which, 10 were not surgical candidates due to the low severity of the deformity (grade I ears). One patient had an osseointegrated implant. In 5 patients with grade II ears, reconstructions were performed with suturing, local tissue rearrangement, or auricular cartilage grafts due to the lower severity. In 3 patients, reconstruction was not undertaken for unknown reasons. A total of 56 ears underwent total ear reconstruction using a modified Nagata/Firmin technique using autologous rib cartilage (Table 2). First stage of reconstructions occurred at an average of 8.5 years of age (range, 5.5–18.7 years). Using the Firmin classification system to describe cartilage constructs and incisions in ear reconstruction,[4] 35.7% of patients received a type I complete cartilage framework, 14.3% of patients received a type II (no tragus) cartilage framework, and 50.0% of patients received a type III (no tragus, no anti-tragus) framework. A type II transfixion, utilized in 64.2% of first-stage procedures, was the most commonly used skin incision, followed by type I (16.1%) and type IIIb (10.7%). Four ears were completed in 1 stage due to the presence of adequate skin coverage.

Second stage of reconstructions occurred at an average age of 9.5 years (range, 6.3–18.5) with 1.25 years on average elapsing between the first and second stages. The majority of second-stage procedures were completed using cartilage to elevate the cartilage construct (n = 52) with Medpor used in 2 procedures as an elevation block. A temporoparietal or occipital fascial flap was used in 46.2% of the second-stage procedures. To determine aesthetic outcomes, 3 independent observers rated reconstructed ears on frontal and lateral photographs with a scale of 1–3 with higher scores denoting better outcomes. The mean summed score for the cohort was 5.56 (range, 3–9).

All complications resultant from ear reconstruction were secondary to wound complications with no evidence of any systemic complications (Table 3). When each stage was separately analyzed, first-stage ear reconstructions resulted in a 17.9% complication rate and second-stage reconstructions resulted in an 18.0% complication rate. Two of the second-stage procedures utilized porous polyethylene for elevation, and these cases were excluded from the complication rate for autologous reconstructions. Of note, both these cases resulted in extrusion, infection, and removal of the porous polyethylene. Reconstruction revisions resulted in a small complication rate of 4.3%. None of the complications required complete removal of the cartilage construct.

Revisions occurred commonly after completion of ear reconstruction with 46 patients requiring a revision of the lobule, deepening of the concha, tragus, deepening of the helical root, or projection of the construction. In virtually all cases, each surgical revision was a combination of procedures for refinement of the final result.

Hearing Loss and Atresia Reconstruction in Microtia Patients

Fifty-four of the 62 patients (87.1%) with external ear abnormalities had documented hearing loss. Forty-four

Table 4. Hearing Loss and Treatment of Hearing Impairment

Descriptor	N (%)
Total patients with documented hearing loss	54 (87.1)
Type of hearing loss	
Conductive only	44 (81.5)
Mixed sensorineural and conductive	10 (18.5)
Nonsurgical treatment (external hearing aids)	16 (29.6)
Atresia repair/canaloplasty	16 (29.6)
Infections	1 (6.3)
Revisions	7 (43.8)
BAHA	12 (22.2)
Infections	2 (16.7)
Revisions	3 (25.0)
No treatment	16 (29.6)

patients (81.5%) had conductive hearing loss, and 10 patients (18.5%) had mixed sensorineural and conductive hearing loss (Table 4). Mixed hearing loss was bilateral in 70.0% of patients, whereas conductive hearing loss was only bilateral in 29.5% of patients. Of the patients with mixed hearing loss, 8 (80.0%) had grade III microtia, 1 patient (10.0%) presented with anotia, and 1 patient (10.0%) only had grade I microtia.

Hearing deficits were treated in 38 patients (70.4%), despite clinical recommendations for all hearing loss to be addressed. Among those treated for hearing impairment, 16 patients (42.1%) opted for nonsurgical treatment using external hearing aids and 22 (57.9%) underwent surgery to correct hearing loss. Canaloplasty was performed in 16 patients. Correction of aural atresia with canaloplasty occurred following the second stage of microtia reconstruction and frequently in conjunction with ear revision. In total, 17 BAHAs were placed in 12 patients. Placement of osseointegrated BAHAs occurred in the event that a canaloplasty could not be performed, recurrent stenosis of reconstructed canals, or depending on the wishes of the patient and family. Five patients underwent both canaloplasty and BAHA during treatment; 2 patients had canaloplasty in 1 ear and BAHA placement in the other, whereas the other 3 received a BAHA after failure of canaloplasty to adequately correct hearing loss. The differences in revisions and complications between BAHA usage and canaloplasty did not reach statistical significance.

To compare the pre- and postoperative hearing results, audiograms were analyzed using paired samples t test to determine the results of surgical intervention on speech reception threshold, the lowest intensity level (in decibels hearing level, dB HL) at which that the patient can correctly identify 50% of common 2-syllable words. Significant difference in the presurgery (48.1 ± 16.2 dB) and postsurgery (36.3 ± 20.0 dB) scores were found ($P = 0.03$).

Predictors of Total Number of Surgeries, Complications, and Aesthetic Ratings

To elucidate factors that predict surgical outcomes, patient and surgical variables were utilized in negative binomial regression analyses for 2 count outcomes: total number of surgeries (Table 5) and complications (Table 6). Additionally, patient and surgical variables were utilized in Poisson regression analyses for another count outcome: aesthetic ratings (Table 7).

Table 5. Negative Binomial Regression of Patient and Treatment Variables for Total Number of Surgeries

Patient and Treatment Variables	IRR	95% CIs	*P*
Patient variables			
Gender	0.816	0.599–1.189	0.289
Laterality	1.096	0.875–1.374	0.425
Severity of microtia	4.350	2.140–8.843	< 0.0001
Mandibular involvement	1.259	0.851–1.861	0.249
Hearing loss	2.082	0.532–8.142	0.292
Psychosocial issues	0.733	0.498–1.079	0.115
Surgical variables: first stage ear reconstruction			
Age at first stage ear reconstruction	0.956	0.906–1.009	0.100
Type of cartilage framework	1.103	0.947–1.285	0.209
Type of skin incision	1.055	0.942–1.181	0.355
Surgical variables: second stage ear reconstruction			
Age at second stage ear reconstruction	0.969	0.903–1.039	0.375
Usage of fascial flap	0.888	0.671–1.176	0.407
Treatment of hearing loss			
Any treatment of hearing loss	1.352	0.932–1.960	0.112
Surgical treatment of hearing loss	1.382	0.978–1.953	0.067
Total number of complications	1.411	1.201–1.659	< 0.001

Table 6. Negative Binomial Regression of Patient and Treatment Variables for Total Number of Complications

Patient and Treatment Variables	IRR	95% CIs	*P*
Patient variables			
Gender	1.565	0.667–3.668	0.303
Laterality	1.330	0.825–2.145	0.241
Severity of microtia	3.300	0.547–19.923	0.193
Mandibular involvement	2.022	0.514–7.953	0.314
Hearing loss	0.335	0.099–1.135	0.079
Psychosocial issues	0.696	0.311–1.554	0.376
Surgical variables: first stage ear reconstruction			
Age at first stage ear reconstruction	0.918	0.813–1.036	0.166
Type of cartilage framework	1.362	0.900–2.060	0.144
Type of skin incision	0.909	0.624–1.323	0.618
Surgical variables: second stage ear reconstruction			
Age at second stage ear reconstruction	0.947	0.837–1.072	0.388
Usage of fascial flap	0.858	0.409–1.803	0.686
Treatment of hearing loss			
Any treatment of hearing loss	0.968	0.415–2.258	0.939
Surgical treatment of hearing loss	1.333	0.606–2.934	0.475

The majority of patient characteristics including gender, laterality, involvement of surrounding anatomy, hearing loss, and psychosocial problems did not demonstrate any association to numbers of surgeries, complications, or aesthetic ratings. Patients with more severe microtic presentations required more surgeries to achieve optimal results than did patients with less severe presentations (IRR, 4.350; 95% CI, 2.140–8.843; $P < 0.001$). In addition, higher severity was associated with a lower aesthetic rating (IRR, 0.763; 95% CI, 0.658–0.886; $P < 0.001$). However, patients with more severe microtia did not have higher rates of exposures or infections when compared with patients with less severe deformities ($P = 0.193$).

In terms of surgical characteristics, age at the time of surgery, types of cartilage constructs, types of incisions,

Table 7. Poisson Regression of Patient and Treatment Variables for Improved Aesthetic Outcomes

Patient and Treatment Variables	IRR	95% CIs	*P*
Patient Variables			
Gender	1.096	0.890–1.349	0.387
Laterality	1.053	0.940–1.179	0.373
Severity of microtia	0.763	0.658–0.886	< 0.001
Mandibular involvement	0.996	0.766–1.295	0.974
Hearing loss	0.921	0.653–1.297	0.636
Psychosocial issues	1.054	0.852–1.303	0.630
Surgical variables: first stage ear reconstruction			
Age at first stage ear reconstruction	1.001	0.968–1.035	0.963
Type of cartilage framework	0.952	0.830–1.092	0.484
Type of skin incision	1.103	0.939–1.296	0.232
Surgical variables: second stage ear reconstruction			
Age at second stage ear reconstruction	0.985	0.938–1.034	0.537
Usage of fascial flap	1.031	0.812–1.308	0.805
Treatment of hearing loss			
Any treatment of hearing loss	1.100	0.885–1.366	0.390
Surgical treatment of hearing loss	1.045	0.849–1.286	0.679
Total number of surgeries	0.954	0.927–0.982	0.001
Total number of complications	0.984	0.882–1.097	0.768

Table 8. Logistic Regression of Patient and Treatment Variables that Predict Good Psychosocial Outcomes

Patient and Treatment Variables	OR	95% CI	*P*
Patient variables			
Gender	0.762	0.240–2.415	0.644
Laterality	0.934	0.478–1.824	0.841
Severity of microtia	0.936	0.345–2.540	0.897
Mandibular involvement	3.125	0.730–13.370	0.124
Hearing loss	1.029	0.171–6.188	0.975
Surgical variables			
Age at first stage ear reconstruction	0.901	0.746–1.089	0.281
Age at second stage ear reconstruction	0.780	0.573–1.063	0.116
Number of complications	1.304	0.642–2.647	0.463
Total number of surgeries	1.133	0.943–1.360	0.181
Aesthetic rating	0.926	0.440–1.945	0.838
Treatment of hearing loss			
Any treatment of hearing loss	4.889	1.459–16.381	0.010
Surgical treatment of hearing loss	3.810	0.940–15.446	0.061
Nonsurgical treatment of hearing loss	1.680	0.455–6.208	0.437

or treatment of hearing loss did not result in statistically significant differences in total number of surgeries, complications, or aesthetic ratings. Not surprisingly, total number of complications predicted total number of surgeries (IRR, 1.411; 95% CI, 1.201–1.659; $P < 0.0001$). In addition, increased number of surgeries predicted lower aesthetic ratings (IRR, 0.954; 95% CI, 0.927–0.982; $P = 0.001$), but increased complications was not associated with a statistically significant difference in aesthetic ratings.

Treatment of Hearing Loss Predicts Improved Psychosocial Outcomes

Nineteen patients (30.7%) had documented patient or parent-reported deficits in school performance and psychosocial function, including depression, anxiety, anger, or difficulties with peer interactions, during routine annual team evaluations. Thirty-nine patients (62.9%) reported good academic standing, mood, and social interactions. Data on psychosocial function and school performance were missing for 4 patients. Patient and surgical variables were analyzed in a univariate logistic regression to determine predictors of improved psychosocial outcomes (Table 8). Of all independent variables, treatment of hearing loss was the only statistically significant predictor of good psychosocial outcomes (OR, 4.889; 95% CI, 1.459–16.381; $P = 0.010$). Neither surgical nor nonsurgical treatment of hearing loss alone proved to be significant independently.

DISCUSSION

In this work, we review our long-term experience treating microtia and aural atresia in patients with craniofacial microsomia focusing on 4 outcomes measures: number of surgeries, number of postsurgical complications, aesthetic outcomes, and psychosocial outcomes. The demographics and characteristics of the patients with microtia are similar to those previously reported in the literature.[1,13,18] When we reviewed the surgical characteristics of the cohort, we found that age, severity of deformity, type of incision, or size of cartilage construct were not associated with postsurgical complications, which were uniformly related to exposure and infection. All complications were salvaged with either simple closure of the exposed area or a local, small fascial flap with skin grafting. None of the cases required complete removal of the cartilage construct. Two factors were significantly associated with increased number of surgeries: severity of the microtic ear and number of complications. None of the factors evaluated showed a statistically significant association to increased number of complications. However, both increase in microtia severity and increase in number of total surgeries were associated with decreased aesthetic ratings.

In terms of psychosocial outcomes, our experience demonstrated that treatment of hearing impairment was the only statistically significant predictor of improved psychosocial outcomes.

The total number of surgeries to achieve the optimal aesthetic result in ear reconstruction is often determined by a variety of factors. The most obvious and objective factor is addressing complications such as exposure or infection resultant from previous stages of ear reconstruction. Subjective factors such as aesthetic satisfaction from the surgeon and the patient also contribute to increased number of revisions. From both our cohort and our experience, ear reconstruction frequently entails revisions after the 2 major stages for various reasons. In our cohort, the primary reason for revision was to increase projection of the ear. This is a common occurrence as the scar tissue contracts down. However, while increased number of complications was not a significant predictor of aesthetic ratings, increased number of surgeries was a statistically significant predictor of poorer aesthetic outcomes.

Age of surgery for addressing microtia and aural atresia is an often-debated variable. Among the majority of surgeons, the ideal time to reconstruct a child's ear is prior to school age to avoid difficulties with social integration. However, the Nagata/Firmin technique frequently requires a sizeable construct, which may be difficult to acquire in young children. Furthermore, changes in the cartilage from resorption may also occur with time, thereby decreasing the likelihood of an aesthetic outcome. In our cohort, we have found no increases in surgical complications, reoperations, or improved aesthetic ratings when we performed regression analyses with age of reconstruction.

In our cohort of patients followed into teenage years, hearing loss was present in 87.1% of patients with microtia, the majority of which was conductive in nature due to middle ear deformities and canal atresia. In total, 18.5% of patients had mixed sensorineural and conductive hearing loss, which is a considerably larger number than that in other reports published.[12,19] The larger proportion of hearing loss that is sensorineural in nature has important consequences in treatment, as cochlear implants may have an expanding role. Our study has noted that canaloplasties have a tendency to have somewhat higher revision rates than BAHA placement, due to restenosis. However, we find correction of the abnormal anatomy via atresia reconstruction to be superior to BAHA placement in that we and others have observed that compliance with external devices in children is low and diminishes with time.[20]

It is now well established by many investigators that psychosocial benefits occur following reconstruction of the external ear.[10,21–23] Steffen et al.[21,22] have demonstrated a clear benefit to psychosocial functioning following microtia reconstruction using rib cartilage; however, consideration of functional hearing was not reported in this series. Similarly, many of the larger series on microtia reconstruction do not discuss the combined outcomes following treatment of functional hearing loss and external ear deformities.[7,24] With the recognized importance of binaural hearing, reconstruction of the appearance of the external ear and the impairment of the hearing apparatus requires consideration as a functional unit even when the anomaly is unilateral.[25–31] Our work focuses on a cohort of patients who have been offered treatment for both external ear deformities and hearing impairment. Although one may expect that severity of the ear deformity, bilaterality, deformities of other associated structures, total complications, total number of surgeries, or aesthetic ratings may affect psychosocial outcomes, we found that none of these variables predicted psychosocial outcomes in a statistically significant manner. In fact, treatment of hearing impairment, regardless of the unilaterality or bilaterality, was the only factor that had any bearing on psychosocial outcomes.

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