Incidence of Earlobe Ptosis and Pseudoptosis in Patients Seeking Facial Rejuvenation Surgery and Effects of Aging

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The authors have previously described a classification system for earlobe ptosis and have established a criterion for earlobe pseudoptosis. Earlobe heights were characterized based on anatomic landmarks, including the intertragal notch, the otobasion inferius (the most caudal anterior attachment of the earlobe to the cheek skin), and the subaurale (the most caudal extension of the earlobe free margin). The classification system was derived from earlobe height preferences as determined by a survey of North American Caucasians, and it identified the ideal free caudal lobule height range to measure 1 to 5 mm from otobasion inferius to subaurale (grade I ptosis). Also, earlobe pseudoptosis was defined by the attached cephalic lobule height measuring an intertragal notch to otobasion inferius distance greater than 15 mm. In this study, the preoperative earlobe height measurements of 44 patients seeking facial rejuvenation were evaluated. The average attached cephalic segment (intertragal notch to otobasion inferius distance) of patient earlobes measured 11.10 ± 0.46 mm, and the average free caudal segment (otobasion inferius to subaurale distance) of patient earlobes measured 7.15 ± 0.49 mm. Assessment of patient groups based on single-decade age differences demonstrated an increase in the free caudal segment (otobasion inferius to subaurale distance) with increasing age ($p = 0.003$). Assessment of patient groups based on single-decade age differences demonstrated no increase in the attached cephalic segment (intertragal notch to otobasion inferius distances) with increasing age ($p = 0.281$). When evaluating for the ideal otobasion inferius to subaurale distance, only 22.2 percent of earlobes demonstrated an ideal free caudal earlobe height (grade I ptosis). Moreover, pseudoptosis was detected in 12.3 percent of earlobes. Finally, a majority of earlobes demonstrated intrapatient variability, with only 16.2 percent of patients demonstrating identical attached cephalic segment (intertragal notch to otobasion inferius distances) and 37.8 percent demonstrating identical free caudal segment (otobasion inferius to subaurale distances) when compared with their contralateral ear. Plastic surgeons should be aware that a significant number of patients (77.8 percent of earlobes) may not possess an ideal free caudal segment and that 12.3 percent of earlobes may present with pseudoptosis. Therefore, earlobe height assessment should be an essential aspect of evaluation in patients desiring facial rejuvenation surgery. Evaluation of both ears should be performed independently due to intrapatient earlobe height variations. Finally, patients should be counseled with regard to the ideal earlobe parameters and aging patterns (stable attached cephalic segment versus increasing free caudal segment). With the natural progression of both facial rhytides and caudal segment earlobe ptosis (increasing free lobule segment) with increasing age, independent and accurate assessment of earlobe height is indicated so that the aging ear may be addressed concurrently with the aging face. (*Plast. Reconstr. Surg.* 113: 712, 2004.)

Though guidelines for ear size and orientation have been studied, minimal attention has been directed to the ear lobule.[1–3] As early as 1972, Loeb[4] recognized the potential need for earlobe reduction in certain individuals as a supplement to rhytidectomy. He described the intertragal notch to the otobasion inferius (the anterior implantation of the earlobe to the cheek skin) distance as a parameter requiring evaluation. In his observations, he noted a range of 1 to 2.5 cm intertragal notch to otobasion inferius distance (attached cephalic segment) and advocated correction when this distance exceeded 2.0 cm preoperatively. Additionally, he presented a surgical design for the reduction of earlobes, which he performed in 271 of 667 face lifts with satisfactory results.[4] Despite appropriate attention to the need for earlobe reduction, Loeb's indications for earlobe reduction were based on subjective observations. Furthermore, he did not take into account the entire earlobe height (intertragal

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notch to subaurale distance), thus forgoing attention to the important free caudal lobule component (otobasion inferius to subaurale distance).

A complete assessment of earlobe height requires accounting for the entire lobule length as designated by its two components, the attached cephalic segment (the intertragal notch to otobasion inferius distance as described by Loeb), as well as its free caudal segment (otobasion inferius to subaurale distance) (Fig. 1). A survey of North American Caucasian adults (59 male subjects and 72 female subjects) determined specific lobule length preferences, which led to a new classification system for earlobe ptosis.[5] Subjects were asked to rank preferences of various earlobe heights from life-size scaled sketched male and female profiles. The attached cephalic segment (intertragal notch to otobasion inferius distance range, 5 to 20 mm) and free caudal segment (otobasion inferius to subaurale distance range, 0 to 20 mm) were varied, while all other facial and ear anthropometric measurements were held constant (Figs. 2 and 3). Each of the rank orders completed by the female and male subjects of the female and male facial profile demonstrated statistical significance as demonstrated by one-way analysis of variance of ranks

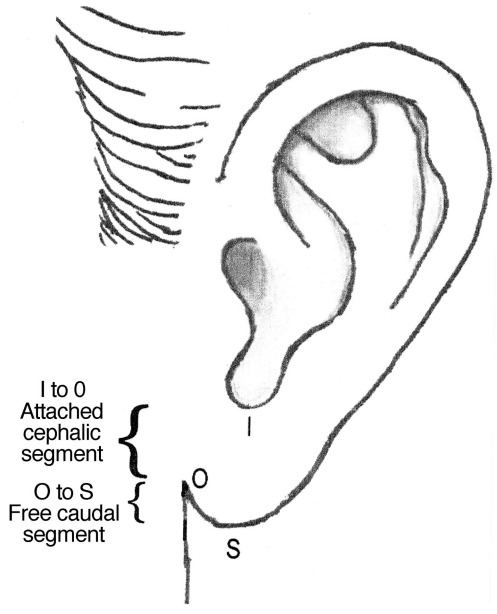

FIG. 1. The anatomical landmarks of the intertragal notch (*I*), otobasion inferius (*O*), and subaurale (*S*) are illustrated. Earlobe height parameters were defined with respect to the attached cephalic segment (intertragal notch to otobasion inferius distance) and the free caudal segment (otobasion inferius to subaurale distance).

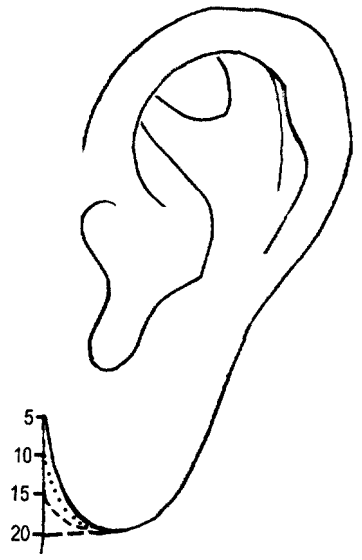

FIG. 2. Evaluators were previously asked to rank in order most desired to least desired ear shape using life-size scaled female and male sketched profiles in which the attached cephalic segment (intertragal notch to otobasion inferius distance) was altered. The intertragal notch to otobasion inferius distance ranged from 5 to 20 mm.

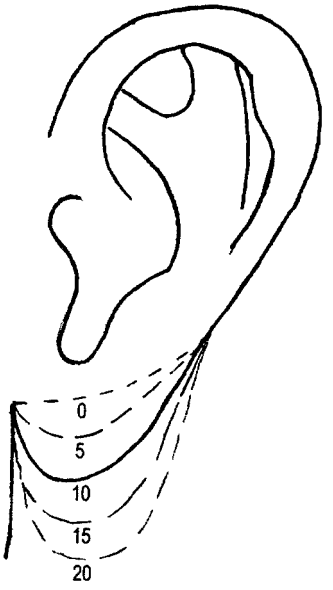

FIG. 3. Evaluators were previously asked to rank in order of most desired to least desired ear shape from life-size scaled female and male sketched profiles in which the free caudal segment (otobasion inferius to subaurale distance) was altered. The otobasion inferius to subaurale distance ranged from 0 to 20 mm.

($p < 0.001$ for all four groups). Both the female and male earlobe attached cephalic segments (intertragal notch to otobasion inferius distances) were preferred at 5, 10, and 15 mm versus 20 mm ($p < 0.05$ for all female and male comparisons), thereby indicating that an at-

tached cephalic segment intertragal notch to otobasion inferius distance greater than 15 mm (pseudoptosis) is least desirable. Furthermore, both the female and male earlobe caudal segments (otobasion inferius to subaurale distances) were preferred in descending order at 5 mm, greater than 10 mm, greater than 0 mm, greater than 15 mm, and greater than 20 mm ($p < 0.05$ for all female and male comparisons), revealing excess ptosis as undesirable. Based on the findings of this survey, the first classification of earlobe ptosis was derived based on the free caudal segment height (otobasion inferius to subaurale distance). The survey also revealed the ideal earlobe free caudal segment (otobasion inferius to subaurale distance) range of 1 to 5 mm (grade I ptosis; Table I).[5] Additionally, the criterion for earlobe pseudoptosis was defined by an attached cephalic segment (intertragal notch to otobasion inferius distance) greater than 15 mm.[5] These findings suggest a role for independent assessment of the lobule length with respect to its attached cephalic segment (intertragal notch to otobasion inferius distance) as well as its free caudal segment (otobasion inferius to subaurale distance).

In this study, we applied our classification system for earlobe ptosis and criterion for earlobe pseudoptosis to life-sized patient photographs obtained during preoperative rhytidectomy consultations with the senior author. We hoped to characterize the incidence of earlobe ptosis and pseudoptosis in the Caucasian patient population desiring facial rejuvenation procedures at our institution.

TABLE I

Classification of Earlobe Ptosis and Designation of Pseudoptosis Based on Analysis of Preferred Otobasion Inferius to Subaurale and Intertragal Notch to Otobasion Inferius Distances

Ptosis Grade	Free Caudal Segment (otobasion inferius to subaurale distance, mm)
O	0
I	1–5
II	6–10
III	11–15
IV	16–20
V	>20
Pseudoptosis	**Attached Cephalic Segment (intertragal notch to otobasion inferius distance, mm)**
Abnormal	>15 mm
Normal	≤15 mm

METHODS

Life-size scaled profile photographs of 44 North American Caucasian patients seeking rhytidectomy consultation with the senior author were evaluated. All photographs were obtained by our staff photographer with a 105-mm lens and taken with accord to the Frankfort-horizontal plane. Facial heights were standardized based on prior anthropometric measurements establishing glabella to gnathion heights in North American Caucasians (females, 103.6 mm; males, 116.7 mm).[6,7] Earlobe height was measured, including the attached cephalic segment (intertragal notch to otobasion inferius distance) as well as the free caudal segment (otobasion inferius to subaurale distance) (Fig. 4). Photographs were excluded if earrings were present or if the patient's hairstyle prevented visualization of all three landmarks (intertragal notch, otobasion inferius, and subaurale).

Earlobe-attached cephalic and free caudal segments (intertragal notch to otobasion inferius and otobasion inferius to subaurale distances, respectively) averages and standard error of means were calculated for bilateral ears in each patient when possible. This data allowed for determination of the incidence of pseudoptosis, an attached cephalic segment (intertragal notch to otobasion inferius distance) greater than 15 mm, as well as the incidence of various ptosis grades between patients grouped by age differences. The *t* test was used to compare variations between contralateral ears ($n = 44$) to evaluate for intrapatient variability (SigmaStat; SPSS, Inc., Chicago, Ill.). Finally, patient profiles were used to assess earlobe height measurements in single-decade age groups, which included patients in the age groups of 40 to 49, 50 to 59, 60 to 69, and 70 to 79 years. One-way analysis of variance and post hoc Tukey tests were completed to detect any significant trends in the free caudal segment and attached cephalic segment heights when correlated with increasing age.

RESULTS

In this study, we evaluated the preoperative earlobe height measurements of 44 patients desiring face lift operations. Patient profiles demonstrated an age range from 40 to 79 years old (average, 58 years) and sex allocation of 41 women and three men. The average attached cephalic segment (intertragal notch to otobasion inferius distance) of patient earlobes measured

TABLE II
Incidence of Ptosis and Pseudoptosis in 44 Patients Seeking Consultation for Facial Rejuvenation Operations

Ptosis Grade	Free Segment (otobasion to subaurale distance, mm)	Incidence of Earlobe Heights (%)
O	0 mm	12.3
I	1–5	22.2
II	6–10	38.3
III	11–15	27.2
IV	16–20	0
V	>20	0
Pseudoptosis	**Attached Segment (intertragal notch to otobasion inferius distance, mm)**	**Incidence of Earlobe Heights (%)**
	>15	12.3
	≤15	87.7

TABLE III
Average Free Caudal Segment of 44 Patients Seeking Facial Rejuvenation Operations

Age Group* (years)	Percentage of Patients	Free Caudal Segment (otobasion inferius to subaurale distance, mm)†
40 to 49	25.9	5.71 ± 0.79
50 to 59	29.6	5.58 ± 0.95
60 to 69	25.9	8.29 ± 0.95
70 to 79	18.6	10.07 ± 0.86‡

* Groups based one single-decade age differences.
† One way analysis of variance demonstrated a statistically significant difference for the group as a whole ($p = 0.003$).
‡ Post hoc Tukey test demonstrated significant increase in free caudal segment (otobasion inferius to subaurale) for patients aged 70 to 79 years of age when compared with those of 40 to 49 years of age or 50 to 59 years of age ($p < 0.05$).

11.10 ± 0.46 mm, and the free caudal segment (otobasion inferius to subaurale distance) of patient earlobes measured 7.15 ± 0.49 mm. No significant difference was noted between contralateral earlobe heights measuring: (1) attached cephalic segment (intertragal notch to otobasion inferius distance), 10.73 ± 0.65 mm on the left and 11.27 ± 0.59 mm on the right ($p = 0.539$); and (2) free caudal segment (otobasion inferius to subaurale distance), 7.65 ± 0.70 mm on the left and 7.08 ± 0.74 mm on the right ($p = 0.577$). Despite this, when comparing contralateral earlobes, only 16.2 percent of attached cephalic segments (intertragal notch to otobasion inferius) and 37.8 percent of free caudal segments (otobasion inferius to subaurale) were identical (within 1 mm intertragal notch to otobasion inferius or otobasion inferius to subaurale height difference) in any single patient. When evaluating for an ideal earlobe height range, only 22.2 percent of free caudal segment lobules measured between 1 and 5 mm (grade I ptosis) (Fig. 4, *left* and *center*, and Table II). In evaluations for incidence of pseudoptosis, 12.3 percent of earlobes demonstrated an attached cephalic segment (intertragal notch to otobasion inferius distance) greater than 15 mm (Fig. 4, *right*, and Table II). Assessment of patients per groups based on single-decade age differences demonstrated a significant increase in the free caudal segment (otobasion inferius to subaurale distance) with increasing age ($p = 0.003$; Table III). Assessment of patients per groups based on single-decade age differences demonstrated no increase in the free caudal segment (intertragal notch to otobasion inferius distance) with increasing age ($p = 0.281$; Table IV).

DISCUSSION

By surveying North American Caucasians, significant preferences were previously demonstrated for the attached cephalic segment (intertragal notch to otobasion inferius) as well as

FIG. 4. In these patients desiring facial rejuvenation operations, earlobe height parameters were defined with respect to the attached cephalic segment (intertragal notch to otobasion inferius distance) and the free caudal segment (otobasion inferius to subaurale distance). (*Left*) This patient's profile demonstrates an earlobe with ideal earlobe height parameters: attached cephalic segment (intertragal notch to otobasion inferius distance) of 7 mm and free caudal segment (otobasion inferius to subaurale distance) of 5 mm. (*Center*) This patient's lateral profile demonstrates an earlobe with significant ptosis (grade III): attached cephalic segment (intertragal notch to otobasion inferius distance) of 7 mm and free caudal segment (otobasion inferius to subaurale distance) of 11 mm. (*Right*) This patient's earlobe demonstrates an earlobe with pseudoptosis: an attached cephalic segment (intertragal notch to otobasion inferius distance) of 16 mm and a free caudal segment (otobasion inferius to subaurale distance) of 9 mm.

TABLE IV
Average Attached Cephalic Segment Earlobe Distance of 44 Patients Seeking Facial Rejuvenation Operations

Age Group* (years)	Percentage of Patients	Attached Cephalic Segment (intertragal notch to otobasion inferius, mm)†
40 to 49	25.9	11.38 ± 0.85
50 to 59	29.6	11.96 ± 0.88
60 to 69	25.9	10.86 ± 0.72
70 to 79	18.6	9.67 ± 0.57

* Groups based on single-decade age differences.
† One-way analysis of variance demonstrated no statistically significant difference for the groups as a whole ($p = 0.281$).

free caudal segment (otobasion inferius to subaurale) distances. After consideration of these preferences, a classification system for earlobe ptosis using the free caudal segment (otobasion inferius to subaurale distance) was devised (Table I). Furthermore, the criterion for pseudoptosis was designated by an attached cephalic segment (intertragal notch to otobasion inferius distance) greater than 15 mm. This classification for earlobe ptosis provides a more precise, quantifiable approach to aesthetic earlobe evaluation.

In the present study, we utilized life-size scaled lateral-profile photographs to determine the incidence of ideal ptosis and pseudoptosis in patients seeking facial rejuvenation operations. Plastic surgeons should be aware that 77.8 percent of earlobes may not possess an ideal otobasion inferius to subaurale distance and that 12.3 percent of earlobes may demonstrate pseudoptosis (Table II). Therefore, earlobe height assessment should be an essential aspect of evaluation in patients desiring facial rejuvenation operations. Evaluation of both ears should be performed independently, due to intrapatient earlobe height variations. Furthermore, patients should be counseled with regard to the ideal earlobe parameters and aging patterns (stable intertragal notch to otobasion inferius distance versus increasing otobasion inferius to subaurale distance with age; Tables III and IV).

McKinney et al.[8] studied 100 predominantly Caucasian subjects ranging in age from 19 to 79 years (average age, 39 years), with an equal number of female and male patients, and found a lobule height average of 18 mm (range, 13 to 25 mm) based on the intertragal notch to subaurale distance. The average ear length of 65 mm (range, 56 to 81 mm) resulted in the average lobule length ratio (length of lobule to long axis of ear) equal to 28 percent (range, 23 to 34 percent). He concluded that the lobule height should be corrected when exceeding 33 percent. He recommended a simple anterior stair-step excision of the lobule as a supplementary procedure during rhytidectomy.[8] Unfortunately, this study did not delineate between the two components of earlobe height, intertragal notch to otobasion inferius and otobasion inferius to subaurale. Due to age-related lobe ptosis, as observed in this study, it is conceivable that surgical reduction procedures may have to be designed to differentially reduce the intertragal notch to otobasion inferius and/or otobasion inferius to subaurale earlobe heights based on individual patient earlobe measurements.

An acquired deformity resulting from aging involves the elongation or ptosis of the earlobe that has been attributed to loss of elastic fibers and gravitational pull.[9] To date, there has been a paucity of reports quantifying lobule elongation (i.e., ptosis).[4,8] Comparison of differing age groups in this study confirmed the elongation of the caudal lobule segment (otobasion inferius to subaurale), while the cephalad lobule segment (intertragal notch to otobasion inferius) remains essentially stable over time. Bearing in mind that both the female and male earlobe intertragal notch to otobasion inferius distances are not aesthetically pleasing when greater than 15 mm (pseudoptosis),[5] and both the female and male earlobe otobasion inferius to subaurale distances are less desirable with increasing ptosis,[5] it becomes increasingly evident that the earlobe should be addressed in prospective rhytidectomy patients.

Conclusion

The application of our previously presented ptosis classification and pseudoptosis designation to life-size scaled profile photographs of patients seeking facial rejuvenation operations reiterates the need for independent and accurate assessment of earlobe height so that the aging ear may be addressed concurrently with the aging face.

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