

survey were male (65% vs 35% female), with the majority of participants (61%) ranging in age from 36 to 55 years. Notably, most of those responding were in the field of dermatology and dermatologic surgery (46%), the greater proportion of whom were female. In contrast, the remaining specialties were composed mainly of male surgeons.

Our results indicate that a large subset of the physicians participating in this study have been injected with either neurotoxin or fillers. An impressive 70% confirmed that they have been injected with botulinum toxin, whereas a lesser proportion (40%) have been injected with fillers. Remarkably, roughly half (46%) of the physicians who have been injected with botulinum toxin and a fifth of those injected with fillers (21%) have actually injected themselves (Figure 1).

Of the 102 participants who confirmed self-injection with fillers, 96 attested to which types of fillers they would inject themselves with. Responders seemed to be least averse to hyaluronic acid as 81% of those responding would self-inject with this type of filler; 45% would use calcium hydroxylapatite, and 43% would use polymethylmethacrylate, whereas only 30% would use poly-L-lactic acid (Figure 2).

Those injected by another practitioner were asked to reveal which type of colleague they would elect to perform their injection for either botulinum toxin or fillers. Not surprisingly, for the application of botulinum toxin, 65% would prefer a physician colleague; 27% reported treatment by a certified physician assistant (PA), certified registered nurse anesthetist (CRNA), or registered nurse (RN); and 8% would choose another type of medical assistant or aesthetician. When dealing with facial fillers, it seems as though a larger percentage (76%) would prefer injection by a physician colleague, whereas 22% have opted for injection by a certified PA, CRNA, or RN, and only 2% would permit a medical assistant or aesthetician to perform the procedure. The allotted free text responses suggest that the participants in this study for the most part prefer to be injected by colleagues in the same field.

**Comment.** This brief survey reveals notable support for the injection of neurotoxins and facial fillers both by and to aesthetic physicians from the 4 core specialties. Amazingly, almost half of those responding have gone further by actually injecting themselves with botulinum toxin, whereas 21% of respondents have reported self-injection with fillers. Of those physicians who chose others to inject them, two-thirds trusted a physician colleague, and 27% a PA, CRNA, or RN. Eight percent were injected by lesser credentialed individuals. Fillers commanded a higher level of injector: 76% of physicians trusted a fellow physician; 21% chose a PA, CRNA, or RN; and only 2% allowed injection by other, non-medically credentialed individuals.

Physicians trusting botulinum toxin from all aspects leave no other conclusion than that the public can be assured that we overwhelmingly endorse this product's use. The rate of use of fillers approached a healthy 40% of physicians getting injections. Clearly, most physicians prefer physicians to inject their botulinum toxin and even more so

for fillers. A small percentage actually had individuals who were not physicians, PAs, or RNs inject them, a practice not legally accepted in most states. Finally, respondents who do not self-inject preferred to be treated by another physician within their own subspecialty.

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## The Effect of Rhinoplasty on Perceived Age

The aging nose tends to undergo characteristic changes. With increasing age, there is weakening of the major and minor nasal tip support mechanisms leading to nasal tip deprojection and development of the so-called dorsal pseudohump. Furthermore, ligamentous laxity leads to lobular descent, causing nasal lengthening and counterrotation.<sup>1</sup> Posterior-superior remodeling of the premaxillary bony skeleton, which acts as the platform for the nasal base (ie, midface retrusion), also contributes to a more acute nasolabial angle (NLA).<sup>2-4</sup>

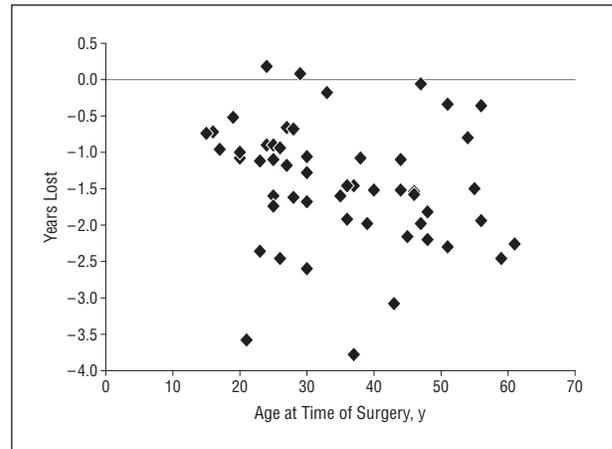
The goal of rhinoplasty is to effect changes that result in a nose that is more harmonious and balanced with overall facial proportions. These changes often include correction of nasal attributes that are also characteristic of the senile nose. The philosophy of Stupak and Johnson<sup>1</sup> is to include rhinoplasty in the armamentarium of procedures that rejuvenate the face; they argue that, in selected patients, this approach produces a more harmonious result. Similarly, Cochran et al<sup>3</sup> discuss their technique of restorative rhinoplasty, in contradistinction to transformative rhinoplasty. However, to date, the rejuvenating properties of rhinoplasty have yet to be proven or quantified. Therefore, the aim of this study is to determine if rhinoplasty, in addition to beautifying the face, also rejuvenates it. Another aim of this study is to determine if patient age, hump reduction, and nasal tip rotation are independently predictive of greater rejuvenation obtained with rhinoplasty.

**Methods.** The study took place at a private facial plastic surgery practice in a major metropolitan area with a focus on rhinoplasty. The medical charts of the last 53 consecutive rhinoplasty patients (of the senior author, P.A.A.) with preoperative pictures and 1-year postoperative pictures were retrospectively reviewed. The data gathered included age and sex. The preoperative frontal and right lateral images were paired. The postoperative frontal and right lateral images were also paired. Of note, as a routine practice of the senior author, the pictures were standardized through the use of the same camera, room lighting, and distance, and there were no changes made in the study period. Fifty laypersons (observers) were asked to evaluate and rate the age of the patient appearing in the frontal and right lateral images. The ratings of the preoperative and postoperative images of a given patient by an observer took place on 2 separate days, at least 1 month apart: half of the observers (25) evaluated the preoperative images first and then the postoperative images 1 month later; the other half of the observers (25) evaluated the postoperative images first and then the preoperative images 1 month later. The average difference in age between the before and after photographs was calculated for each patient based on the perceptions of the 50 observers. The variables in this study were patient age, presence or absence of a dorsal hump, NLA, and rhinoplasty. The outcome measure was change in perceived age, referred to as “years lost” and defined as  $\text{age}_{\text{after}} - \text{age}_{\text{before}} - 1$ .  $\text{Age}_{\text{after}}$  was assessed at 1 year after surgery.

The preoperative and postoperative right lateral images were reviewed for the presence or absence of a dorsal hump. The NLA was measured on the preoperative and postoperative right lateral images using Adobe Photoshop (Adobe Systems Inc, San Jose, California). These determinations and measurements were performed by the same author (A.S.) on the preoperative and postoperative images.

The statistical significance of the results was evaluated by the Fisher exact test, Wilcoxon signed rank test, and linear regression analysis (to eliminate any possible confounding interactions of the variables).

**Results.** The demographic information was as follows: the patients’ mean age was 35 years (range, 15-61 years).



**Figure 1.** The relationship between years lost and patient age at surgery. The horizontal line shows no change in perceived age from before to after surgery.

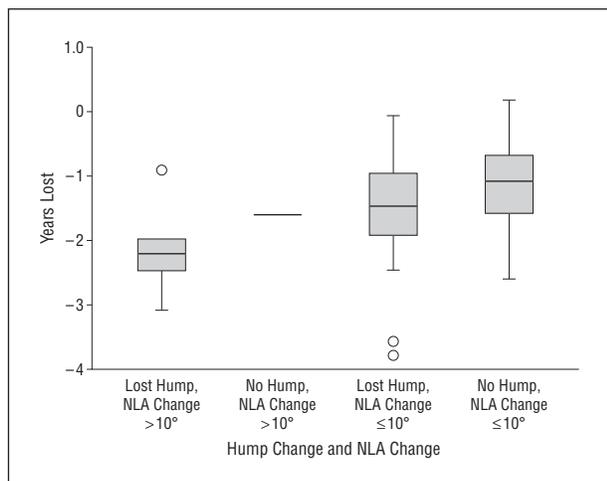
Forty-one (77%) were female, and 12 (22%) were male. On average, the patients looked 1.5 years younger after rhinoplasty ( $P < .001$ ).

Subgroup analysis was performed to determine if dorsal hump reduction, nasal tip rotation, or age had any effect on the number of years lost after rhinoplasty. The effect of dorsal hump reduction on years lost was evaluated. Nineteen patients never had a dorsal hump. Thirty-two patients underwent a dorsal hump reduction. Patients who underwent hump reduction looked, on average, 1.6 years younger following surgery, whereas patients who never had a dorsal hump looked on average 1.1 years younger ( $P = .05$ ).

The effect of the patient’s actual age on years lost was evaluated. **Figure 1** demonstrates that while almost all patients looked younger following surgery, older patients tended to enjoy a greater degree of rejuvenation, with more years lost compared with the younger cohort. Three age groups (<20 years, 20-40 years, and >40 years) were compared, and there was no statistically significant difference in the years lost among groups ( $P = .15$ ).

Change in the NLA was defined as  $\text{NLA}_{\text{postop}} - \text{NLA}_{\text{preop}}$ , where postop and preop indicate postoperative and preoperative, respectively. Therefore, a positive change in the NLA (increased NLA) reflects nasal tip rotation. Eight patients had nasal tip rotation greater than  $10^\circ$ . These patients looked on average 2.0 years younger. The 45 patients who had nasal tip rotation of  $10^\circ$  or less looked 1.3 years younger ( $P = .04$ ).

The greatest years lost was seen in the subgroup of 6 patients who underwent dorsal hump reduction and more than  $10^\circ$  tip rotation (-2.14). This difference from the other subgroups was statistically significant (**Figure 2**). The subgroup of 2 patients who did not undergo dorsal hump reduction but had more than  $10^\circ$  nasal tip rotation looked 1.6 years younger. The subgroup of 26 patients who underwent dorsal hump reduction but had nasal tip rotation of  $10^\circ$  or less looked 1.5 years younger. The subgroup of 17 patients who did not undergo dorsal hump reduction and had nasal tip rotation of  $10^\circ$  or less looked 1.1 years younger.



**Figure 2.** Comparison of years lost between the 4 subgroup combinations of presence or absence of dorsal hump reduction and nasal tip rotation of more than 10° or 10° or less. NLA indicates nasolabial angle. The error bars indicate standard deviations.

**Comment.** Patients who undergo rhinoplasty can expect, on average, a 1.5-year decrease in apparent age. Subgroup analysis demonstrated that patients who underwent dorsal hump reduction had more years lost than patients who never had a dorsal hump (1.6 vs 1.1;  $P = .05$ ). Therefore, dorsal hump reduction is an important predictor of increased years lost after rhinoplasty and a greater rejuvenation effect.

The variable of change in the NLA was evaluated as a predictor of a greater decrease in apparent age. The cohort was divided into 2 subgroups: those undergoing nasal tip rotation of more than 10°, and those undergoing nasal tip rotation of 10° or less. Subgroup analysis demonstrated that patients who had a change of NLA of more than 10° had more years lost than patients who had a change of NLA of 10° or less (2.0 vs 1.3;  $P = .04$ ). Therefore, a change of NLA greater than 10° is an important predictor of increased years lost after rhinoplasty and a greater rejuvenation effect.

Subgroup analysis demonstrated that patients who had a combination of dorsal hump reduction and nasal tip rotation greater than 10° together had more years lost than either procedure alone or neither procedure. Therefore, a combination of both variables together is an important predictor of even more years lost after rhinoplasty and an even greater rejuvenation effect.

**Conclusions.** To our knowledge, this is the first study to demonstrate a statistically significant decrease in apparent age after rhinoplasty. This decrease in apparent age is an extra positive benefit of rhinoplasty, in addition to an increase in the harmony of facial features and the improvement of overall facial aesthetics. Thus, this finding can pleasantly surprise patients presenting for rhinoplasty. Regardless of age, those patients with dorsal humps and/or with acute NLAs can expect even stronger rejuvenating effects of rhinoplasty. The rejuvenating effect of rhinoplasty can now objectively be listed as one of the benefits of undergoing this procedure.

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