

# When Is Teenage Plastic Surgery versus Cosmetic Surgery Okay? Reality versus Hype: A Systematic Review

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**Summary:** Plastic surgery in teenagers has become popular in past decades because of an increase in self-awareness and desire to “fit in” with their peers. In 2016, over 229,551 cosmetic procedures were performed in patients who are younger than 19 years. The trend of plastic surgery in adolescents is increasing, and it is important for plastic surgeons to perform safe and appropriate procedures in this group. To this date, there is a myriad of literature on the psychological and ethical issues concerning plastic surgery in teenagers. However, studies regarding the safety of performing plastic surgery in this population are scarce. The rationale for this article is to study this issue in depth by means of a systematic review. The authors discuss the current indications, safety, patient satisfaction, and ethical considerations of teenage plastic surgery and make recommendations for future studies on this important area. (*Plast. Reconstr. Surg.* 142: 293e, 2018.)

**S**ocial media, the Internet, and the use of smartphones have changed everything for the teenager.<sup>1</sup> No longer is anything truly personal or private anymore. It has become very easy to post photographs of oneself, see the photographs of others, and compare one’s body image through various means (e.g., Twitter, Instagram, Facebook). Therefore, this generation of adolescents is more exposed to peer appearance-related feedback from their social media use than the previous generation.<sup>2,3</sup> It is well established that body image is strongly associated with self-esteem and psychological functioning.<sup>4,5</sup> This generation of adolescents is more vulnerable to being bullied or teased, which are critical factors in desiring cosmetic surgery.<sup>5–8</sup> The average millennial takes over 25,000 selfies in his or her lifetime, which is astronomical and one of the major reasons for the self-esteem issues in this age group.<sup>5,9</sup> The studies show that selfies can lead to overvaluation of shape and weight, dietary restraint, body dissatisfaction, and internalization of the thin ideal in adolescent girls.<sup>10,11</sup> Moreover, the standard selfies

have exaggerated lower facial features such as nasal or lip or chin problems, leading to increased interest in this age group for cosmetic medicine and cosmetic surgery.

According to the 2016 American Society of Plastic Surgeons database, the number of adolescents undergoing cosmetic surgery has increased.<sup>12</sup> It is estimated that approximately 229,551 cosmetic procedures have been performed in adolescents (age, 13 to 19 years) during 2016 (Figs. 1 and 2). Of these procedures, rhinoplasty is the most commonly performed procedure (31,255 patients), followed by breast augmentation (8076 patients), and breast reduction in men (7099 patients).<sup>12</sup> Currently, this group of patients accounts for 4 percent of surgical procedures performed in the United States.<sup>12</sup> In addition, the number of nonsurgical procedures in this group is rapidly growing. They account for 1 percent of total nonsurgical procedures, and the top three nonsurgical procedures are laser hair

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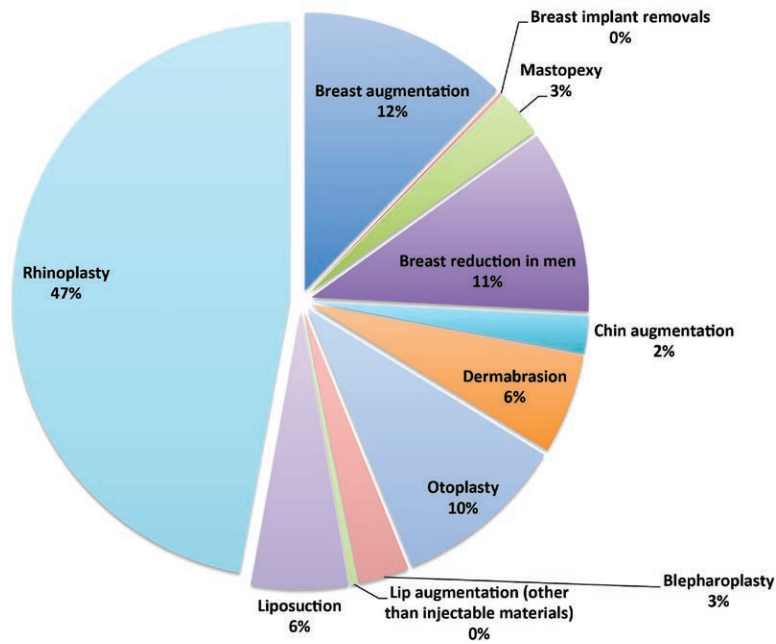
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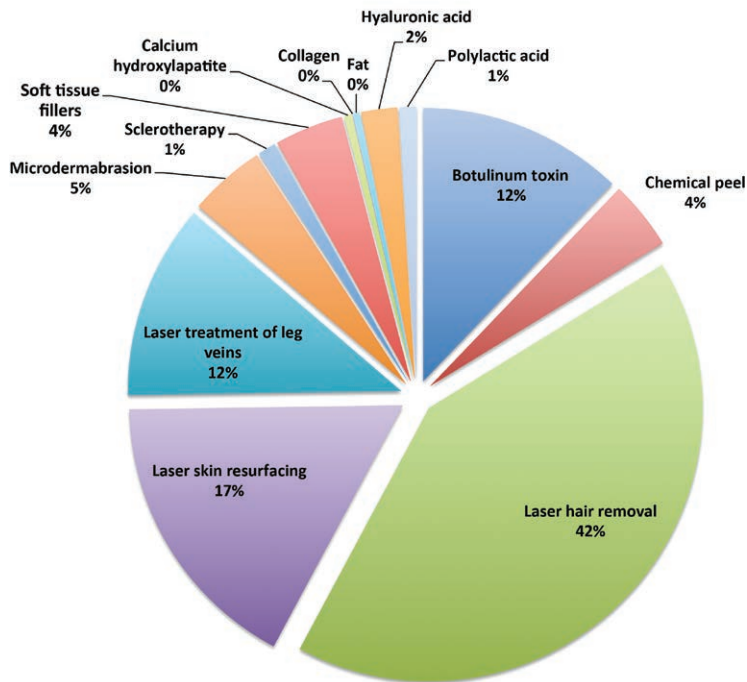
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**2016 Surgical Procedures**



**Fig. 1.** 2016 Cosmetic surgical procedures for those aged 13 to 19 years. (Statistics courtesy of the American Society of Plastic Surgeons.<sup>12</sup>)

**2016 Non-surgical Procedures**



**Fig. 2.** 2016 Cosmetic nonsurgical procedures for those aged 13 to 19 years. (Statistics courtesy of the American Society of Plastic Surgeons.<sup>12</sup>)

removal, laser skin resurfacing, and botulinum toxin type A injections.

Although there are numerous proven benefits such as improved body image and appearance satisfaction, meticulous preoperative evaluation is required in this group, as there are limited studies on the safety and outcomes of performing elective plastic surgery in this group.<sup>3,4,7,13-15</sup> In this review, we discuss the safety of performing plastic surgery versus cosmetic surgery, and the role of cosmetic medicine such as botulinum toxin type A and fillers in adolescents.

## PREOPERATIVE CONSIDERATIONS

### Surgical Procedures

#### Rhinoplasty

Rhinoplasty is the most commonly performed surgical procedure according to the American Society of Plastic Surgeons database.<sup>12</sup> In contrast to adults, there are several important factors to take into consideration. The first is the age of the patient. Typically, the nose grows rapidly during the first 2 years of life and puberty.<sup>16</sup> It is estimated that nasal growth ends at age 15 to 18 years for boys and age 12 to 16 years for girls.<sup>17-19</sup> Therefore, performing rhinoplasty in young patients involves the risk of inhibiting the growth of nose and mid-face secondary to scarring. Many surgeons defer performing rhinoplasty until 16 to 18 years of age for boys and 15 to 16 years of age for girls.<sup>19,20</sup>

Although plastic surgeons must carefully consider the age of the patient when considering cosmetic rhinoplasty, there are a few exceptions to this rule. Currently, there are several absolute indications for septoplasty: septal hematoma, septal abscess, severe deformity secondary to cleft lip, nasal fracture, acute nasal fracture, and subsequent traumatic nasal deformity and nasal dermoid cysts.<sup>20</sup> Of these, the most relevant indication for plastic surgeons is rhinoplasty for cleft lip patients. It is commonplace to perform primary rhinoplasty in these patients at the time of cleft lip repair to prevent further asymmetry secondary to growth. This practice has provided improved symmetry and decreased revision surgery in this population.<sup>21,22</sup> There is a growing body of knowledge that teenagers with significant cosmetic nasal deformities undergo a lot of psychological trauma and bullying.<sup>14</sup>

#### Otoplasty

Otoplasty is also a commonly performed procedure in patients younger than 18 years. It is estimated that the ears reach 90 percent of adult

size by the age of 3, and otoplasty is typically performed in patients older than 5 years in the United States and the United Kingdom.<sup>23-25</sup> According to Gosain et al., American plastic surgeons decide on the age limit based on multiple factors: preventing the child from getting teased before the start of schooling, traditional teaching of performing otoplasty at the age of 5, anesthetic risks, and possible impairment of ear growth.<sup>23</sup>

Currently, there are two schools of thought regarding the age limit. Some believe that teasing can start as early as preschool, and early surgery has benefits of more malleable cartilage without resurgence of ear cartilage growth.<sup>23,26,27</sup> Others believe that the surgery should be deferred until the child can become aware of the appearance of the ears, and participate in the decision-making.<sup>28</sup> The senior author (R.J.R.) strongly feels that early otoplasty intervention is much more appealing and beneficial to this age group because of online and peer bullying at school and other peer events.<sup>14</sup>

Despite the controversy, it is well studied that this patient population benefits from surgery. Children with prominent ears or ear deformities have lower self-confidence and are dissatisfied with their appearance, and they experience an improvement in self-esteem, happiness, and social experiences after surgery.<sup>29,30</sup> The decision to operate in this population is dictated mostly by the parents' anticipation of future psychosocial impact and possible bullying. Hong et al. found that these parents can experience significant decisional conflict preoperatively and few regrets after the procedure.<sup>28</sup> Therefore, plastic surgeons must carefully consider the outcome before performing otoplasty in the pediatric population.

#### Reduction Mammoplasty

Reduction mammoplasty is another commonly performed procedure in adolescents. The indication for surgery is similar to that for adult breast reduction: back pain, neck pain, shoulder groove, and dermatitis. However, the impact of surgery on young breasts is completely different given that the patients complete their breast development at different ages (mean, 15 years; range, 11.8 to 18.9 years).<sup>31</sup>

Adolescent patients can experience regrowth of breast tissue even after the procedure, leading to symptom recurrence. In the study by McMahan et al., 72 percent of patients reported regrowth of breast tissue postoperatively, and some patients experienced recurrent symptoms during their pregnancy, leading to repeated

reduction.<sup>32</sup> In addition to the recurrence of symptoms, the effect of surgery on postoperative lactation needs to be discussed with the patient. Many studies have been performed on this subject. It is estimated that 91 percent of patients can lactate and 65 to 69 percent of patients have successfully breastfed.<sup>33–35</sup>

### **Breast Augmentation and Liposuction**

In contrast to the procedures discussed earlier, breast augmentation and liposuction in teenagers are controversial.<sup>36</sup> Currently, the U.S. Food and Drug Administration has approved saline implants for women aged 18 years and older and silicone implants for women aged 22 years and older.<sup>37</sup> In addition, the American Society of Plastic Surgeons recommends that cosmetic breast augmentation should be performed in patients who are at least 18 years old.<sup>38</sup>

Teenage breast augmentation has been performed in patients who have suffered congenital or acquired breast asymmetry secondary to Poland syndrome, thoracic hypoplasia, or burn.<sup>39,40</sup> These patients typically undergo tissue expansion of the affected breast with or without latissimus dorsi flap for soft-tissue coverage.<sup>39,40</sup> In the second stage, an implant is placed to achieve unilateral breast reconstruction for symmetry. Although this is a widely accepted indication for teenage breast augmentation, cosmetic breast augmentation in this age group is not recommended because of psychological and emotional immaturity.<sup>36</sup>

Similar to breast augmentation, teenage liposuction receives similar criticisms of performing cosmetic surgery in adolescents.<sup>36</sup> Liposuction is rarely indicated in adolescents except in gynecomastia.<sup>36</sup> Approximately 65 percent of adolescent boys experience gynecomastia during puberty because of a relative excess of estradiol compared with testosterone.<sup>41–43</sup> Similar to girls, adolescent male patients complete their puberty at different ages (range, 13 to 17 years).<sup>44</sup> The majority of pubertal gynecomastia is a self-limited condition unless its duration is greater than 12 months.<sup>43</sup> In these patients, liposuction with or without excision of tissue can be performed.

### **Nonsurgical Procedures**

According to American Society of Plastic Surgeons 2016 database, teenage nonsurgical procedures accounted for 1 percent of the total nonsurgical population.<sup>12</sup> Of these procedures, laser hair removal was the most commonly performed procedure (70,763), followed by laser

skin resurfacing (28,799), and botulinum toxin type A injection (20,676).<sup>12</sup> The popularity of these procedures has been steadily increasing given the accessibility and demand for a “quick fix” for “female mustache,” “hairy back,” and acne scarring.<sup>45</sup> Although these procedures are frequently performed in adults with minimal side effects, performing them in adolescents should be approached with caution.

Currently, there is no established guideline on the suitable patient age for these procedures. Hair grows rapidly during puberty because of hormone changes, and it is generally recommended to defer the treatment until hormones stabilize.<sup>46</sup> For the acne treatment, topical retinoids are routinely used.<sup>47,48</sup> The safety of this drug is well documented, and the U.S. Food and Drug Administration–approved age is 12 years. Given that acne can occur earlier than age 12, the majority of the drugs are given to children younger than 12 years as an off-label use unless tretinoin gel 0.05% (Atralin; Valeant Pharmaceuticals, Bridgewater Township, N.J.) is used (approved for 10 years old).<sup>48</sup> In addition to early acne treatment, acne scarring treatment using microdermabrasion and erbium:yttrium-aluminum-garnet laser has become popular as well, because of short postprocedure downtime and improved skin appearance. Erbium:yttrium-aluminum-garnet resurfacing has been shown to achieve good results for ice-pick and shallow boxcar scars, and these procedures are being sought.<sup>49</sup>

### **Injectables and Skin Care Products**

In comparison to the 2015 American Society of Plastic Surgeons database, the number of injectables has increased by 5 percent in 2016.<sup>12</sup> Of these, the use of hyaluronic acid has increased by 4 percent. This phenomenon is most likely secondary to a surge in “prerejuvenation” and celebrity worship in teenagers.<sup>50</sup> Teenagers now believe that botulinum toxin type A can prevent wrinkles, and would like to “prevent aging” despite a lack of dynamic and static rhytides.<sup>51</sup> This belief is widely propagated among adolescents without any scientific validation.<sup>51</sup> Current U.S. Food and Drug Administration approval for botulinum toxin type A in teenagers includes treatment for blepharospasm/strabismus in patients older than 12 years.<sup>52</sup> However, the majority of botulinum toxin type A is used off-label, and approximately 20,676 botulinum toxin type A injections were performed in 2016.<sup>53</sup>

In addition to botulinum toxin type A, adolescents are receiving hyaluronic acids to the cheek and lips.<sup>54</sup> This number has increased dramatically in the past year, which can be secondary to celebrity worship.<sup>1,50</sup> There is an increased number of photographs of celebrities with augmented cheeks and lips shown on television, social media, and magazines, and this phenomenon could have led to increased celebrity worship.

For skin care products, there is no consensus for at what age adolescents should start wearing them, and there is a lack of literature on this topic.<sup>55</sup> However, the majority of public health recommendations support early sunscreen use with a sun protection factor of 15 or higher to minimize sunburns.<sup>56,57</sup> Currently, approximately 14 percent of boys and 20 percent of teenage girls routinely use sunscreen.<sup>58</sup>

### Safety of Teenage Plastic Surgery

Despite the increased popularity, there is a paucity of literature on the safety of teenage plastic surgery. Therefore, we have performed a computerized search of the MEDLINE database by means of OVID using the following search terms:

- Rhinoplasty
- Otoplasty
- Reduction mammoplasty: reduction mammoplasty, breast reduction
- Breast augmentation

- Liposuction
- Noninvasive procedures: laser, chemical peel, microdermabrasion, botulinum toxin type A, hyaluronic acid

The following limits were applied for each search term:

- Age groups: all children (0 to 18 years)
- Language: English

The computerized search was performed in May of 2017. A total of 1195 articles were identified from the initial search: rhinoplasty,  $n = 54$ ; reduction mammoplasty,  $n = 219$ ; otoplasty,  $n = 191$ ; breast augmentation,  $n = 150$ ; liposuction,  $n = 206$ ; laser,  $n = 323$ ; chemical peel,  $n = 9$ ; microdermabrasion,  $n = 12$ ; botulinum toxin type A,  $n = 11$ ; and hyaluronic acid,  $n = 20$ . The abstracts of each article were reviewed and 107 studies of potential relevance remained: rhinoplasty,  $n = 14$ ; reduction mammoplasty,  $n = 21$ ; otoplasty,  $n = 62$ ; breast augmentation,  $n = 0$ ; liposuction,  $n = 2$ ; laser,  $n = 4$ ; chemical peel,  $n = 2$ ; microdermabrasion,  $n = 2$ ; botulinum toxin type A,  $n = 0$ ; and hyaluronic acid,  $n = 0$ . Then, each article was reviewed, and the final 40 studies were selected: rhinoplasty,  $n = 5$ ; reduction mammoplasty,  $n = 5$ ; otoplasty,  $n = 20$ ; breast augmentation,  $n = 0$ ; liposuction,  $n = 2$ ; laser,  $n = 4$ ; chemical peel,  $n = 2$ ; microdermabrasion,  $n = 2$ ; botulinum toxin type A,  $n = 0$ ; and

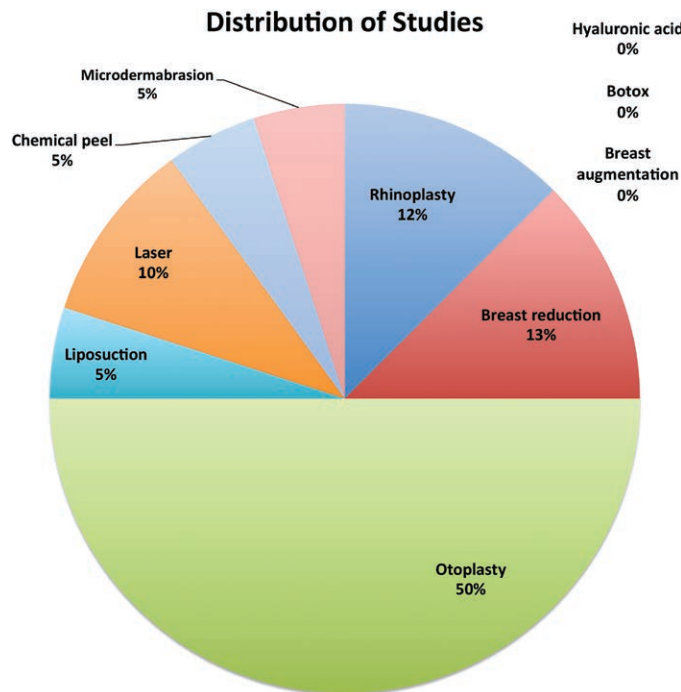


Fig. 3. Distribution of studies.

hyaluronic acid,  $n = 0$  (Fig. 3). All studies were reviewed by one of the authors (M.J.C.).

**Rhinoplasty**

Of the 14 studies, only five discussed the complications and risks associated with teenagers. A total of 168 patients were studied in these five studies, and they experienced poor aesthetic results (9.5 percent), bleeding (0.6 percent), recurrence (3.6 percent), pain (1.2 percent), nasal obstruction (4.8 percent), deviation (3.6 percent), and no complications (26.2 percent). Interestingly, the most common complication was poor aesthetic results, which included wide dorsum, tip depression, short nose, hanging columella, nostril asymmetry, and pincushioning (Table 1).

**Otoplasty**

The otoplasty category had the most studies reviewing their postoperative outcomes (Table 1).

Of the 20 studies, the most common complication was pain (7.8 percent), followed by suture-related problems (7.2 percent), recurrence (2.5 percent), asymmetry (2.5 percent), wound complications (2.3 percent), sensory problems (2.2 percent), poor aesthetic results (1.6 percent), infection (1.2 percent), revision (0.6 percent), scarring (0.5 percent), and other complications (0.4 percent).

**Reduction Mammoplasty**

Of the 21 studies selected for detailed review, five studies (2064 patients, age 12 to <20 years old) discussed their complications (Table 1). The most common complication was scarring (2 percent), followed by poor aesthetic result (0.8 percent), sensory loss (0.8 percent), bleeding (0.7 percent), infection (0.2 percent), seroma (0.2 percent), cardiorespiratory (0.2 percent), pain (0.1 percent), inability to breastfeed (0.1 percent), and nipple loss (0.1 percent).

**Breast Augmentation and Liposuction**

Of the 150 studies regarding breast augmentation, there were no retrospective or prospective studies on breast augmentation in adolescents. Of the 206 studies regarding liposuction, there were two studies regarding its use in gynecomastia and lipodystrophy secondary to congenital deformity (Table 1). The most common complication was revision (14.9 percent), followed by recurrence (6 percent), nipple retraction (3 percent), residual lipodystrophy (3 percent), hypertrophic scar (1.5 percent), and asymmetry (1.5 percent).

**Noninvasive Procedures**

The literature review of common noninvasive procedures revealed four studies regarding laser, two studies regarding chemical peel, and two studies regarding microdermabrasion (Table 2). For laser use, three studies used the laser for a burn scar contracture, and one study used it for hair removal. The majority of studies reported a

**Table 1. Surgical Procedure Complications**

Complication	No. of Patients (%)
Otoplasty ( $n = 687$ )	
Asymmetry	17 (2.5)
Infection	8 (1.2)
Miscellaneous	3 (0.4)
Pain	54 (7.8)
Poor aesthetic outcome	11 (1.6)
Recurrence	17 (2.5)
Revision	4 (0.6)
Scarring	3 (0.5)
Sensory problems	15 (2.2)
Suture-related problems	49 (7.2)
Wound problem	16 (2.3)
Rhinoplasty ( $n = 168$ )	
Bleeding	1 (0.6)
Deviation	6 (3.6)
No complication	44 (26.2)
Obstruction	8 (4.8)
Pain	2 (1.2)
Poor aesthetic result	16 (9.5)
Recurrence	6 (3.6)
Breast reduction ( $n = 2064$ )	
Complication	
Bleeding	15 (0.7)
Cardiorespiratory	5 (0.2)
Inability to breast feed	2 (0.1)
Infection	6 (0.3)
Nipple loss	1 (0.0)
Pain	2 (0.1)
Poor aesthetic result	17 (0.8)
Scarring	42 (2.0)
Sensory loss	17 (0.8)
Seroma	5 (0.2)
Wound dehiscence	27 (1.3)
Liposuction ( $n = 67$ )	
Hypertrophic scar	1 (1.5)
Nipple retraction	2 (3.0)
Recurrence	4 (6.0)
Asymmetry	1 (1.5)
Residual lipodystrophy	2 (3.0)
Revision	10 (14.9)

**Table 2. Nonsurgical Procedure Complications**

Complication	No. of Patients (%)
Microdermabrasion ( $n = 84$ )	
No complication	24 (28.6)
Burning sensation	18 (21.4)
Chemical peel ( $n = 37$ )	
No complication	36 (97.3)
No response	1 (2.7)
Laser ( $n = 106$ )	
Discoloration	6 (5.7)
Erythema	28 (26.4)
Sensitization	2 (1.9)
Overgrowth	6 (5.7)
No pigmentation change	0 (0.0)
No complication	35 (33.0)

no-complication rate of 33 percent, followed by erythema (26.4 percent), discoloration (5.7 percent), overgrowth (6 percent), and sensitization (2 percent).

For the chemical peel use, two studies evaluated its role in congenital melanocytic nevi. There were no reported complications except no response to the treatment (2.7 percent). There were two studies evaluating microdermabrasion in adolescents for vitiligo and acne scarring. The studies revealed that the majority of patients did not experience any complications, and the most common complication was burning sensation (21.4 percent).

### **Injectables**

The search of the OVID database for botulinum toxin type A and hyaluronic acid in adolescents showed that there are no retrospective or prospective studies on their use. There was a case report on using botulinum toxin type A for blepharospasm in Schwartz-Jampel syndrome without complication data.

## **DISCUSSION**

As the saying goes, “Just because you can doesn’t mean you should,” reflects the current dilemma presented to plastic surgeons. The demand for plastic surgery in adolescents has increased dramatically, despite the controversy over performing plastic surgery procedures in this population. In contrast to previous generations, this adolescent generation is particularly more exposed to social media influence and peer-related feedback.<sup>5,50</sup> They instantly receive external feedback regarding their body image from friends, peers, and unknown social media users, and they also follow celebrities on a daily basis.

This paradigm change in adolescent behaviors is evident in the rise of plastic surgery procedures performed in this group. According to the American Society of Plastic Surgeons, teenagers now constitute 4 percent of surgical patients and 1 percent of nonsurgical patients in the United States.<sup>12</sup> Given the demand and popularity, the question of whether plastic surgery procedures in this group are indicated, safe, and ethical needs to be answered.

As discussed earlier, there are few indicated plastic surgery procedures for adolescents: rhinoplasty for cleft lip patients, breast reduction for symptomatic macromastia, otoplasty for prominent ears, and breast augmentation for congenital breast absence or severe asymmetry.<sup>16,29,30,32</sup> These procedures are extensively studied in the

literature, and the benefits of performing them during teenage years are evident. However, there is a limited number of studies evaluating other indications for teenage plastic surgery.

Our study shows that the plastic surgical procedures in teenagers are safe, but there is a very limited number of studies on nonsurgical procedures. Our systematic review revealed that there were only eight studies evaluating laser, chemical peel, and microdermabrasion use in adolescents. Moreover, there were no outcomes studies on injectable use despite its increased popularity. For the surgical procedures, our study shows that the majority of complications were minor, such as poor aesthetic outcomes, recurrence of the deformity, and scarring. The most common complication for rhinoplasty, otoplasty, and reduction mammoplasty was poor aesthetic results (9.5 percent), pain (7.8 percent), and scarring (2 percent), respectively. Furthermore, there were no major complications such as death or venous thromboembolism. Our finding is in agreement with the complication and outcome study of adolescent plastic surgery using the CosmetAssure database.<sup>13</sup> They reviewed surgeon-reported major complications in the database such as hematoma, venous thromboembolism, cardiac/pulmonary complications, and wound problems. In their review of 3519 adolescent patients, they had lower overall complications rates, and the most common complication was hematoma (0.34 percent), followed by infection (0.28 percent).

Collectively, our review of the literature suggests a lack of guidelines, outcome studies, and consensus on teenage plastic surgery despite its widespread popularity. Currently, the American Society of Plastic Surgeons recommends parental consent for all plastic surgery procedures performed on teens younger than 18 years and advises parents to evaluate the teenager’s physical and emotional maturity.<sup>38</sup> After review of our findings, we recommend the following when considering plastic surgery procedures in adolescents (Table 3). First, we recommend age 5 to 7 years for otoplasty. For cosmetic rhinoplasty, we recommend age 16 to 18 years for male patients and age 15 to 17 years for female patients if there is significant peer ridicule. We recommend age older than 18 years for cosmetic breast augmentation, breast reduction, and liposuction if the patient is unresponsive to diet and exercise. Similarly, we recommend age older than 18 years for chemical peels and cosmetic laser and injectables (botulinum toxin type A and fillers) unless the patient has early tear troughs, small lips, weak cheeks, and

**Table 3. Recommended Ages for Surgical and Nonsurgical Procedures\***

Procedure	Recommended Age (yr)
Cosmetic rhinoplasty	
Female	15–17
Male	16–18
Breast augmentation	≥18
Breast reduction	≥18
Liposuction	≥18†
Otoplasty	5–7
Skin care	Start 16–18
Sun screen	Start 5–6
Retin A	16–18
Lasers for acne scars	16–18
Chemical peels	≥18
Laser for cosmetic reasons	≥18
Botulinum toxin type A and filler	≥18‡

\*In this table, we present our recommended age range for cosmetic surgical procedures. We recommend that readers use this table as a reference but not as a guideline, given that there are varied patient goals, indications, and characteristics.

†If unresponsive to diet and exercise.

‡Except early tear trough, small lips, weak cheeks, and premature frown lines.

premature frown lines. Lastly, we recommend age 5 to 6 years to start sunscreen, age 16 to 18 years to start skin care, and age 16 to 18 years for Retin A (Ortho Pharmaceutical Corp., Raritan, N.J.).

In addition, we advise plastic surgeons to carefully evaluate the emotional and physical maturity of adolescents preoperatively. We recommend following recommendations for the American Society of Plastic Surgeons statement when evaluating adolescents: (1) the teenager initiates the request; (2) the teenager has realistic goals; and (3) the teenager has sufficient maturity.<sup>38</sup> Plastic surgeons must discuss realistic goals and expectations with both the patient and his or her parents. As discussed earlier, teenagers may be misinformed on the effects of certain injectables, have ulterior motives for seeking plastic surgery such as celebrity worship, are being victimized by peers, or just want to “fit in.”<sup>6,14,50,51</sup> Moreover, studies show that the decision-making competence of adolescents (sixth, eighth, tenth, and twelfth graders) lags behind that of adults in consideration of options, risks, benefits, and long-term consequences of their actions.<sup>59,60</sup> Therefore, an extensive preoperative visit is required to discuss the desire, goals, risks, expected postoperative course, limitations, and complications of the procedure. If teenagers are not mature enough to understand or accept both the risks and benefits of the procedure, we encourage applying “wait and see” to allow for additional maturity.

The limit of our study is the number of studies. To determine the safety of performing plastic surgery in adolescent patients, we specifically did not

include studies with a mixture of adults and adolescents because of the infeasibility of separating patient outcomes. Many studies have presented their experience and patient outcomes in both adult and adolescent patients, but it was impossible to separate the two populations. In addition, most studies evaluated a mixture of children and adolescent patients, not a specifically dedicated group of adolescents.

## CONCLUSIONS

The trend of teenage plastic surgery is increasing, and it is important for plastic surgeons to perform safe, ethical, and indicated procedures in this group. Despite the increasing trend, the safety of performing plastic surgery in this group is not well studied. Our study shows that there are many outcome studies on surgical procedures but that there is a very limited number of studies on nonsurgical procedures despite their popularity. We recommend that plastic surgeons perform an extensive preoperative visit to determine the physical and emotional maturity of the patient, and to discuss the desire, goals, risks, expected postoperative course, limitations, and complications of the procedure. We believe appropriate patient selection based on age, indication, and patient profile can lead to safe plastic surgery procedures in adolescents; however, further outcomes studies specifically focused on this population are needed.

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