Patient Satisfaction and Patients' Family or Significant Other Perceptions After OnabotulinumtoxinA Treatment: A Prospective Cross-Sectional Study

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BACKGROUND OnabotulinumtoxinA treatment is associated with improved emotional well-being in patients.

OBJECTIVE This study aimed to determine satisfaction with onabotulinumtoxinA treatment in patients naive to neurotoxin treatment and patients with previous experience with the procedure and evaluate treatment impact on patients' partners, "significant others," or close family members.

MATERIALS AND METHODS Patients' satisfaction and their family's/significant other's perception to treatment outcome were assessed in a prospective, cross-sectional study using standardized questionnaires.

RESULTS OnabotulinumtoxinA treatment was associated with high patient satisfaction ranging from 80% to 100%. Study patients (61 patients) reported that their faces appeared to be more balanced and symmetrical (mean difference, 1.05) and that they looked much better in photographs (mean difference, 1.43), with their significant others also noting the improvement in appearance. Overall, 98% of patients expressed that they would undergo retreatment, and 100% expressed that they would recommend the procedure to others. The main obstacle for treatment repetition was economic constraints (26%).

CONCLUSION OnabotulinumtoxinA treatment is one of the most precise and predictable cosmetic treatments available, with high patient satisfaction (97%). A positive outcome of onabotulinumtoxinA treatment, as expressed by patients surveyed using standardized questionnaires, was the appreciation and acceptance by those in close contact with them.

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Botox (onabotulinumtoxinA) previously showed a positive effect in patients treated for glabellar frown lines. Studies show that patients receiving an onabotulinumtoxinA injection in the glabellar region reported a reduction in negative emotions.[1] Furthermore, onabotulinumtoxinA treatment is associated with improved emotional well-being.[2] Charles Finn and colleagues[3] reported a significantly improved internal mood and decreased stress levels after onabotulinumtoxinA treatment or cosmetic surgery. Wollmer and colleagues[4] reported that a single onabotulinumtoxinA injection in the glabellar region effectively alleviated depression in patients with an inadequate response to previous neuropsychiatric drug therapy. OnabotulinumtoxinA injection in the glabellar region has been proposed as a safe and sustainable treatment for major depressive disorder.[5–7]

Four weeks after onabotulinumtoxinA treatment for mild-to-moderate glabellar lines, patients reported a statistically significant improvement in self-perception

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of age.[8] This study aimed to determine patient satisfaction using the standardized FACE-Q (satisfaction with facial appearance scale) questionnaire, focusing on physical appearance after a facial onabotulinumtoxinA injection. Moreover, the impact of patients' treatment on their partners, "significant others," or close family members was also evaluated. To our knowledge, this is the first study evaluating the perception of onabotulinumtoxinA treatment on a patient's partner or close family member.

Methods

Study Design

This was a prospective, cross-sectional study, conducted from January 2015 to April 2015, assessing patients' satisfaction regarding their facial appearance before and after 2 weeks of onabotulinumtoxinA treatment using the FACE-Q questionnaire. This study was reviewed and approved by the institutional review board (IRB) of University of Puerto Rico Medical Science Campus (B0520315) and conducted according to the ethical guidelines of the 1975 Declaration of Helsinki. All patients provided informed consent. The study design measured immediate improvement in facial appearance.

Treatment

A 4-mL normal saline solution with a preservative to reconstitute a 100-unit vial of onabotulinumtoxinA was used. Figure 1 shows the standard pattern of injections and dosage per site; mean dosage for the injection was 50 units for full-face treatment. Figure 2 shows a patient with active rosacea flare at the time of injection and 2 weeks after treatment.

Patients

Patients receiving onabotulinumtoxinA treatment for the first time or 2 or more times within a year were included without any financial compensation. Patients younger than 21 years and patients electing to have another injectable, such as a filler, during the study period were excluded. A sample size of 45 patients was estimated to be sufficient to detect comparable effect with 80% power at a significance level of $p < .005$.

End Points and Assessments

The Jablonski and Zachary[9] questionnaire (Table 1) comprising questions about perception of treatment and patient appearance was used to evaluate the impression of a significant other or family member toward a patient's treatment outcome approximately 2 weeks after treatment. A pilot study was conducted to validate this questionnaire with perspectives of the significant other at 2 different time points. The questionnaire was validated using 11 patients with their significant others. The population of the pilot study consisted of 11 female patients, 2 of whom were first-time users. Their education level ranged from high school to postgraduation; 1 patient had a high school diploma, 3 patients had an undergraduate degree, 5 patients had a graduate degree, and 2 patients had a postgraduate degree. Most of the patients (8/11) selected their husband/partner to answer the survey, 1 patient selected her parent, and 2 patients selected their sister. The test and retest administration were separated by a 2-week time interval. Internal consistency of the scales was calculated using Cronbach's alpha coefficient with Statistical Package for the Social Sciences (SPSS) software, version 21. A reliability analysis resulted in a Cronbach's alpha of 0.949 for this questionnaire.

The FACE-Q Satisfaction with Facial Appearance Scale and Age Appraisal Visual Analog Scale, created by Pusic and colleagues,[10] measures the experience and outcomes of aesthetic facial procedures from the patient's perspective, giving insight into their satisfaction with the treatment. This questionnaire comprises questions on symmetry, balance, proportion, freshness, and face look and responses on a Likert-type scale ranging from 1 (very dissatisfied) to 4 (very satisfied). Questions about satisfaction with overall facial appearance and aging appearance appraisal were asked before treatment to assess baseline values. Subsequent follow-up data were obtained using the same standardized questionnaires 2 weeks after treatment. Although the FACE-Q is a validated questionnaire, a reliability analysis was performed and resulted in a Cronbach's alpha of 0.814. Patients included in the pilot study were not part of this study.

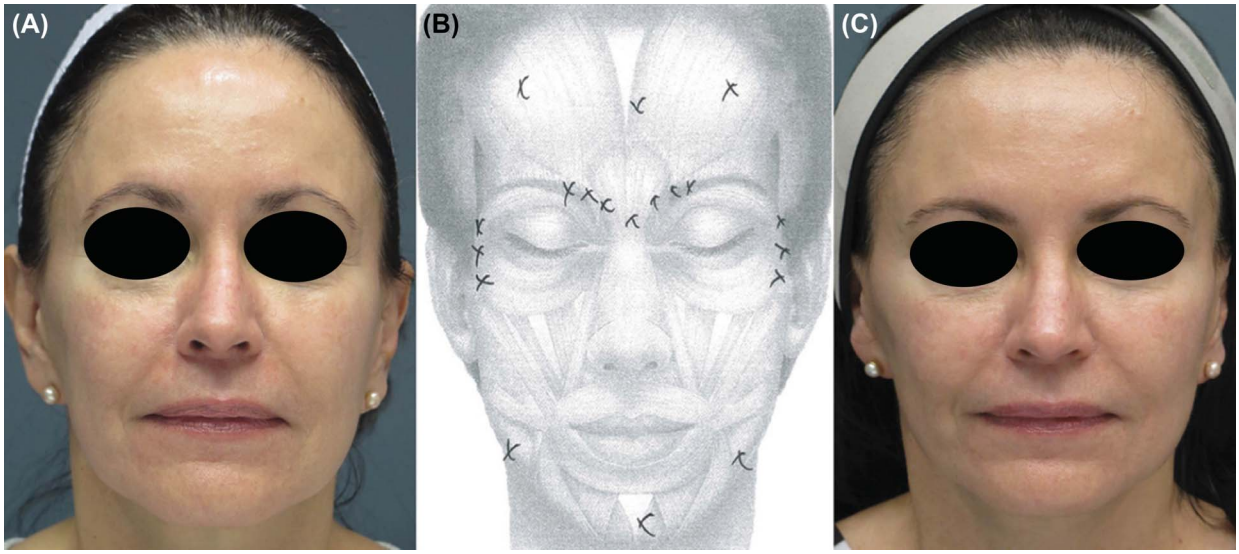

Figure 1. Multiple-time user: pattern of injections. Injection at each marking: 2.5 units (19 × 2.5); total units injected: 47.5 units. Improvement on eyebrows shape and mouth corners. (A) Before treatment, (B) markings, and (C) after treatment.

Statistical Analysis

A digital questionnaire format was created in Adobe Acrobat XI Pro to gather information from the questionnaires. A descriptive analysis of demographic, satisfaction, appearance, and perception data was performed using SPSS software, version 21, to assess frequency, central tendency, and dispersion. The difference between first-time and multiple-time users (2 or more onabotulinumtoxinA treatments within a year) was assessed using Fisher's exact test. The *t*-test was used to evaluate the difference in patients' perception of satisfaction on the FACE-Q satisfaction questionnaire before (T1) and 2 to 3 weeks (T2) after treatment.

Results

Demographics and Baseline Characteristics

Sixty-one patients (female, 95%; mean age, 54 years) who completed the follow-up questionnaire and provided a completed significant other perception questionnaire were included; most had graduate (44%) or postgraduate degrees (43%). Approximately 34% of multiple-time users had received more than 3 onabotulinumtoxinA treatments in the past, with 20% of them having experience with other injectors. Overall, 46% of patients had undergone cosmetic surgery previously.

Perception of Significant Others

Most patients in both groups chose a spouse or partner to complete the family and significant other perception questionnaire (Table 1). Overall, 93% of first-time users' and 85% of multiple-time users' significant others responded that there was a noticeable difference in the appearance of the patients' skin after onabotulinumtoxinA treatment. The same percentage (64%) of each group's significant others reported that the treatment positively changed the patient's mood (Table 1).

Furthermore, 67% of first-time users' and 36% of multiple-time users' significant others indicated that the treatment lessened the severity of expressions, and only 2 of 28 (7%) first-time users' significant others reported that their partner's face looked unnatural after treatment (Table 1).

Most significant others answered that onabotulinumtoxinA did not make it more difficult to read the patient's facial expression (first-time users, 76%; multiple-time users, 82%). Similarly, a very high number of significant others agreed that the patient's ability to communicate emotion was not affected (first-time users, 96%; multiple-time users, 100%; Table 1).

Of note, for the patient with a rosacea flare, the significant other specifically mentioned an improvement

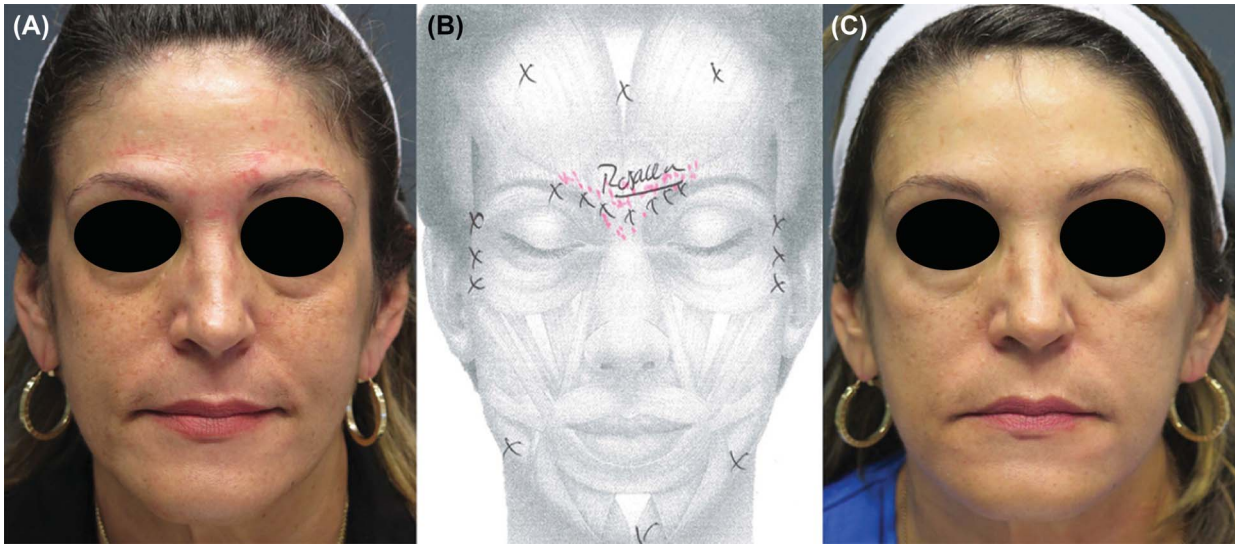

Figure 2. First-time user: pattern of injections. Rosacea injection at each marking: 2.5 units (19 × 2.5); total units injected: 47.5 units. Significant skin texture improvements and rosacea flare resolved at glabellar area 2 weeks after onabotulinumtoxinA treatment. An active rosacea flare was observed in this patient before the injection (A), which resolved 2 weeks after treatment (C). (A) Before treatment, (B) markings, and (C) after treatment.

in skin texture accompanied with a "glow" 2 weeks after onabotulinumtoxinA injection (Figure 2).

Patient-Reported Satisfaction

Before treatment, the FACE-Q questionnaire showed that 63% of first-time users and 74% of multiple-time users believed they looked older than they wished in recent photographs. Patients were more satisfied with their appearance after (28.54 ± 0.63) versus before (20.72 ± 0.63; difference, 7.82; $p < .0005$) onabotulinumtoxinA treatment.

A statistically significant improvement in patient satisfaction was observed before versus after onabotulinumtoxinA treatment, with the most significant improvement in patient satisfaction being for appearance in photographs before and after treatment (mean difference, 1.42; $p < .001$; Figure 3). The patients' degree of satisfaction after onabotulinumtoxinA treatment on a scale of 1 to 10 (1 being the lowest and 10, the highest) ranged from 8 to 10 (Figure 4).

All first-time and 94% of multiple-time users were satisfied after onabotulinumtoxinA treatment. When asked if patients noticed a difference in their skin after treatment, the responses were (1) "improved appearance of skin" (first-time users, 79%; multiple-time users, 55%) and (2) "others noticed an improvement in the appearance of their skin after treatment" (first-time users, 61%; multiple-time users, 70%). The primary factor motivating first-time and multiple-time users to receive onabotulinumtoxinA treatment was to reduce the appearance of wrinkles (46% and 64%, respectively; Table 2).

Furthermore, 79% of first-time users responded that they would consider subsequent treatment and were not concerned that the treatment might prevent them from expressing some emotion. These questions were asked after treatment during follow-up (Table 3).

Overall, 29% of patients treated only in this study reported that they experienced an improvement in facial expressions or emotions after treatment, with 33% affirming that they looked happier. Moreover, 33% reported that when irritated, they looked less angry, and 33% mentioned that after treatment they looked less worried. Only 8% of patients who had experience with other injectors reported such facial emotional changes (Table 4).

After the follow-up visit, 98% of patients expressed that they would undergo retreatment, and 100% said that they would recommend it to others. The main obstacles preventing patients from undergoing this

TABLE 1. Family and Significant Others' Perception

Question	Answer	User (%) First-Time (n = 28)	User (%) Multiple-Time (n = 33)	p
What was your relationship to the person who received treatment with onabotulinumtoxinA?	Brother	4	6	.342
	Child*	26	12	
	Close friend	15	30	
	Husband/wife/partner	33	38	
	Other†	—	3	
	Parent	7	3	
	Sister	19	6	
Did you notice any difference in the appearance of the skin after the person's treatment with onabotulinumtoxinA?	No	7	15	.437
	Yes	93	85	
Did the treatment seem to change the person's mood?	No	36	36	.100
	Yes, positively	64	64	
Do you have any concerns or worries about the person receiving treatment with onabotulinumtoxinA?	No	82	91	.615
	Not sure	7	3	
	Yes	11	6	
Have you noticed any difference in the facial expression of the person who received the treatment?	No	14	33	.251
	Not sure	11	9	
	Yes	75	58	
What kind of difference did the treatment seem to make?	Lessened the severity of expressions	67	36	.080
	Made the face look unnatural	7	36	
	Prevented some expressions from being made	24	27	
Did you feel that the treatments with onabotulinumtoxinA have made it more difficult to read the facial expression?	No	76	82	.574
	Not sure	—	5	
	Yes	24	14	
Do you feel that treatments with onabotulinumtoxinA affect the person's ability to communicate about emotional topics with you?	No	96	100	.467
	Not sure	4	—	

*All significant others listed as "child" were adults.

†All significant others listed as "others" were individuals who had a close relationship with the patient and spent time with them on a daily basis.

treatment previously or undergoing retreatment were "unawareness" (21% and 15%, respectively) and economic constraints (18% and 26%, respectively). Overall, 54% of patients reported no obstacles to retreatment (Table 5).

Conclusion

Since the Food and Drug Administration's approval for a cosmetic indication, onabotulinumtoxinA remains the number one cosmetic treatment in the world for men and women.[11] Moreover, during the past 20 years, off-label use and indications of onabotulinumtoxinA have expanded to treatments for the whole face and neck.

Studies in aesthetic literature about patient satisfaction after onabotulinumtoxinA treatment have consistently reported high satisfaction levels.[2,12] This study, using a multiple facial zone treatment and, when indicated, a whole-face treatment, demonstrated a similarly high level of patient satisfaction. Most patients (88%) underwent a full upper face injection treatment: glabella, crow's feet, and forehead. Approximately one-third (33%) of all patients

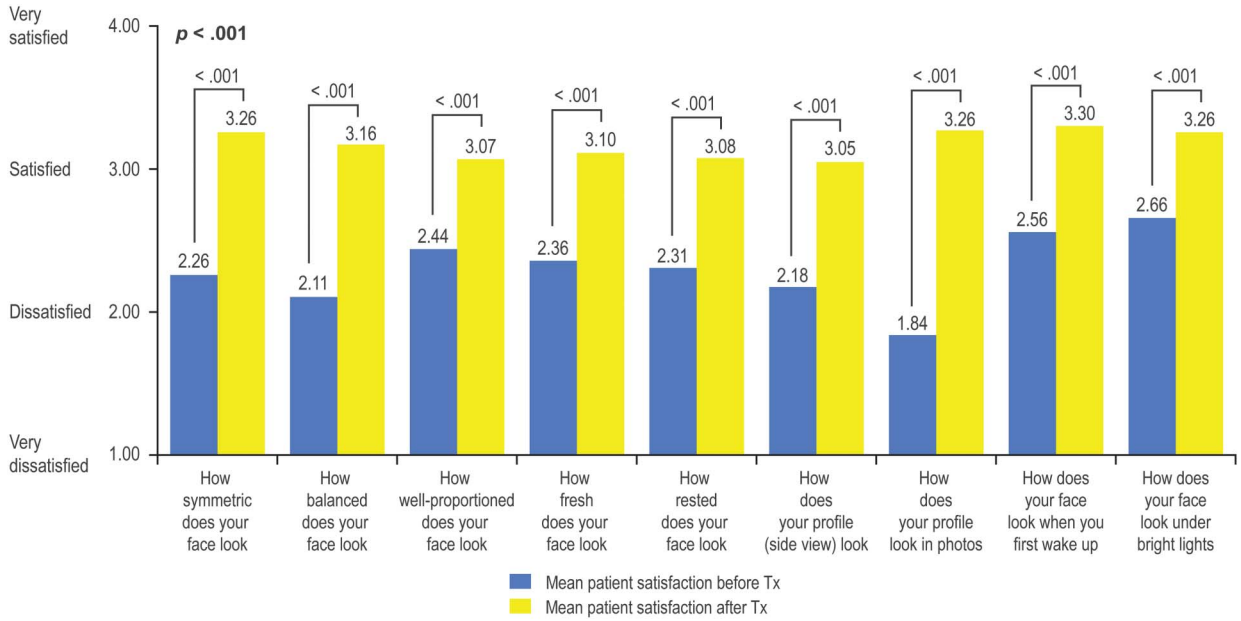

Figure 3. Paired samples test: satisfaction before and after treatment. Tx, treatment.

underwent full-face treatment injection including the full upper face, depressor anguli oris, and mentalis muscle.

In addition to assessing patient perception in terms of facial appearance and age appraisal using Pusic's FACE-Q questionnaire,[10] to our knowledge, this study is the first to assess perception of facial improvement by significant others at approximately 2 weeks after onabotulinumtoxinA administration.

Photography seems to act as a catalyst for patients who are contemplating a cosmetic procedure; 63% of first-time users and 74% of multiple-time users in the study expressed that they seemed to appear older than they wanted to in photographs. Readily available digital cameras, social media, and "selfies," as previously reported by the American Academy of Facial Plastic and Reconstructive Surgery,[13] are influencing patients' decisions toward cosmetic procedures. This study revealed that the single most common factor

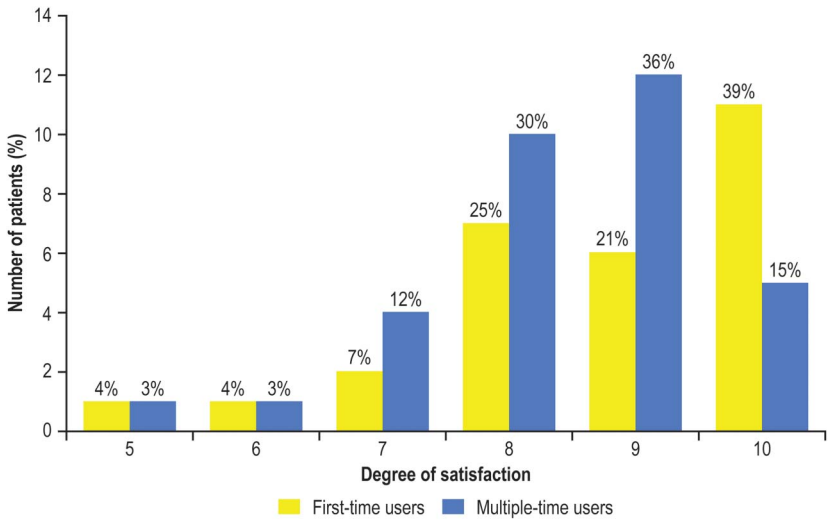

Figure 4. Degree of satisfaction after onabotulinumtoxinA treatment.

TABLE 2. OnabotulinumtoxinA Treatment Experience: First-Time and Multiple-Time Users

Question	Answer	User, %			
		First-Time (n = 28)	Multiple-Time (n = 33)	Total, % (N = 61)	p
How do you feel about the cosmetic treatment performed with onabotulinumtoxinA?	Not at all satisfied	—	6	3	.497
	Satisfied	100	94	97	
Have you noticed any difference in your skin after the treatment with the toxin?	No	14	46	31	.010*
	Yes, it improved	79	55	66	
	Yes, it worsened	7	—	3	
What did others notice in your skin after the toxin injection?	Improvement of appearance	61	70	66	.834
	Not mentioned	32	24	28	
	Worsening of appearance	7	6	7	
What is the primary factor that motivated you to have an onabotulinumtoxinA treatment?	Prevent wrinkles from forming	11	12	12	.323
	Reduce the appearance of wrinkles	46	64	56	
	Reduce the severity of some facial expressions	43	24	33	
What is the secondary factor that motivated you, if any?	Prevent wrinkles from forming	21	33	28	.582
	Reduce the appearance of wrinkles	32	30	31	
	Reduce the severity of some facial expressions	46	36	41	

*p was statistically significant.

contributing to a high satisfaction treatment outcome was how the patient looked in photographs before and after treatment (Figure 3).

Patients in this study reported a high degree of satisfaction after treatment, consistent with the findings of Fagien and Carruthers[12] who observed that most studies reported patient satisfaction typically between 65% and 90%. Most patients in this study (56%) were between 90% and 100% satisfied with the experience (Figure 4). Fagien and Carruthers[12] also suggested that patient satisfaction may improve when multiple facial areas rather than a single area are treated. This may explain the high patient satisfaction in the current study because a multiple facial zone or whole face treatment approach was used.

A notably positive outcome of this study was that 64% of significant others considered that the patient's mood was positively affected after treatment. Furthermore, 75% of first-time users' significant others noticed a difference in facial expressions. They believed that treatment lessened the severity of the patient's expression, without affecting the patient's ability to communicate (96% and 100% first-time and multiple-time users, respectively) and without making facial expressions difficult to read (76% and 82% first-time and multiple-time users, respectively; Table 1).

Skin texture improvement is usually an overlooked effect after onabotulinumtoxinA treatment, as previously documented by Wu[14]. It should be noted that the technique of multiple-site injections with smaller units may have a similar effect as Wu's Botox microdroplet technique, in which skin texture improved because of sebaceous gland regulation and subsequent skin pore-size reduction. In our experience, patients

TABLE 3. OnabotulinumtoxinA Treatment Experience: First-Time Users (*n* = 28)

Question	*Answer*	*Frequency, %*
Would you consider having subsequent treatments with onabotulinumtoxinA?	Not sure	21
	Yes	79
Are you worried that treatment with onabotulinumtoxinA might prevent you from expressing some emotion in your face?	No	79
	Not sure	11
	Yes	11

with a rosacea flare after onabotulinumtoxinA treatment show significant improvement (Figure 2). The association between improvement in skin texture and rosacea was previously reported by Dayan and colleagues.[15] In general, 93% of first-time users' and 85% of multiple-time users' significant others noticed improvement in the appearance of their partner's skin. Future comparative research could help establish whether other injection techniques would achieve similar results with respect to satisfaction.

This study supports a previously discussed finding correlating a positive physical change after onabotulinumtoxinA treatment with mood improvement,[1] albeit from the patients' significant others' perspective. This beneficial "side effect" (mood improvement) has been studied in patients with major depressive disorder.[16] Charles Finn and colleagues[3] reported that the true goal of any cosmetic treatment is not the elimination of imperfection but patient's happiness. Improvement in facial appearance has been linked with confidence and improved self-esteem, most likely making patients happier,[17] and as reported by Dayan and colleagues,[18] the "shift" in physical appearance and mood does indeed influence first impression.

TABLE 4. Multiple-Time Users: Comparison of OnabotulinumtoxinA Experience by Injector (*n* = 33)

		Experience by Injector, %		
Question	*Answer*	*With the Author (n = 21)*	*With Another Injector (n = 12)*	p
What is your primary reason for coming back to receive more treatments with onabotulinumtoxinA?	Makes my face look younger	52	67	.546
	Prevents me from getting more or deeper wrinkles	24	25	
	Prevents me from looking too serious, scowling, or angry when I do not want to	24	8	
What was the secondary reason for coming back to receive more treatment with onabotulinumtoxinA?	Makes my face look younger	38	42	1.000
	Prevents me from getting more or deeper wrinkles	38	42	
	Prevents me from looking too serious, scowling, or angry when I do not want to	24	17	
Do you feel that treatment with onabotulinumtoxinA affects the way you express emotion through your face?	No	67	75	.262
	Not sure	5	17	
	Yes	29	8	
If answered yes to the previous question, how do you think it affects (express emotion)?	It has made me look happier	33	100	.429
	It has made me look less angry when irritated	33	—	
	It has made me look less worried	33	—	

TABLE 5. Follow-up Appointment Experience

Question	Answer	User, %			
		First-Time (n = 28)	*Multiple-Time (n = 33)*	*Total, % (N = 61)*	p
Would you undergo the treatment again?	Yes	96	100	98	—
	Missing	4		2	
Would you recommend the treatment to someone?	Yes	100	100	100	—
Which was the main obstacle that prevented you from undergoing this treatment before?	Economic	17	18	18	.752
	Fear	18	12	15	
	Feel no need for it	7	6	7	
	Health condition	—	3	2	
	None	25	39	33	
	Scheduling	4	6	5	
	Unawareness	29	15	21	
What would be the main obstacle for not undergoing this treatment?	Economic	18	33	26	.265
	Health condition	—	2	2	
	None	64	46	54	
	Scheduling	—	6	3	
	Unawareness	18	12	15	

Heckmann and colleagues[19] studied the perception by "others" after denervation of frown muscles using patients' photographs before and after onabotulinumtoxinA injections. Viewers were not related to treated patients, and this study concluded that happiness was the least expressed emotion on untreated faces but the most expressed on treated faces.[19] Yet, another study demonstrated that treatment of dynamic facial lines by onabotulinumtoxinA significantly improved self-esteem and general life satisfaction as well as self-perceived attractiveness and attractiveness rated by others.[20] However, in this study too, the "others" were raters unknown to the patient. By contrast, in our study, the "others" were people closely related to the patients and spent time with the patient on a daily basis, such as the patient's spouse, partner, family member, or friend who could evaluate the dynamic facial expressions of the patient in real-world situations before and after treatment. Although this study has demonstrated the positive perception of significant others to a patient's treatment, it must be noted that there are several confounding variables related to significant others that have not been considered. Further research is required to explore how this may translate into changes in interpersonal relationships and into occupational or dating success.

Evaluation of facial appearance satisfaction before and after treatment demonstrated a mean change of 7.82, which reflected the best outcome possible. Within this group, 79% of first-time users expressed that they were not concerned about losing facial expressions and would consider subsequent treatments when needed (Table 3).

These positive results are consistent with a previously published study about cosmetic injectable trends in Latino patient populations,[21] wherein onabotulinumtoxinA was the most popular treatment. Outcomes of this study have helped solidify a purely cosmetic practice with a very high return rate of patients.

Forty-six percent of patients had cosmetic surgery before enrolling in this study, and satisfaction change

was measured from T1 to T2, a very specific window of 2 to 3 weeks. Moreover, the question of a past procedure being responsible for the observed result arises since we measured change in satisfaction from before treatment to 2 weeks after treatment. However, it should be noted that any recent cosmetic procedure or surgery would have reflected benefits at first consultation before treatment. Nevertheless, for those 7 patients who had blepharoplasty within 6 months before onabotulinumtoxinA treatment, it cannot be concluded that the positive change in satisfaction–perception was related to the neurotoxin treatment alone, as the synergistic combination of surgery and injections may have contributed to the overall satisfaction after treatment.

One of the most relevant findings of this study was the markedly high change in satisfaction with facial appearance before versus after treatment. There were other factors associated with the treatment, such as the injector's approach and personality as perceived by the patient, which may have affected the findings, and the satisfaction benefit was perhaps influenced by the injector's optimism. During the initial interview, the author discussed the benefits of onabotulinumtoxinA in shifting facial expressions from a sad-to-happy and tired-to-rested look with the patients. Hence, patients were expecting an improvement possibly leading to the perception of an actual improvement. This may explain why a higher proportion of patients receiving injections from the author felt that the treatment altered their facial expressions versus those who received them from other injectors (29% vs 8%; Table 4). This may represent one of the limitations of this study because the cohort of patients injected with onabotulinumtoxinA was not compared with a placebo-injected group. Nevertheless, the injector in this study was never in contact with the patients' significant others; thus, they were not exposed to the injector's expectation or motivation. Despite not being "motivated" to report a difference, patients' significant others expressed that after treatment, the patient's mood changed positively (64%) and communication ability was unaffected (96%–100%; Table 1).

In conclusion, this study demonstrates positive perception by the patients' significant others and patient-reported satisfaction after facial aesthetic treatment using onabotulinumtoxinA.

Acknowledgments Patients provided written consent for the use of their images.

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