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Impact of Minimally Invasive Aesthetic Procedures on the Psychological and Social Dimensions of Health

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Background: The impact on psychosocial health of injectable facial treatments such as hyaluronic acid fillers and botulinum toxin type A remains poorly defined. The aim of this study was to measure changes in psychosocial health following aesthetic intervention with injectables in routine clinical practice using the validated FACE-Q patient-reported outcome measure.

Methods: This was a prospective assessment of patients presenting at a single center for the first time for aesthetic treatment of the face with injectables in February 2020. Participants completed 3 FACE-Q scales at the baseline and again 2 weeks posttreatment: Psychological Function; Social Function; and Appearance-related Psychosocial Distress.

Results: Complete data were available for 35 individuals (n = 32 women [91%]; mean age: 45.9 ± 13.8 years). Twenty-nine (83%) were treated with hyaluronic acid filler (mean: 2.3 ± 1.3 syringes), and 12 (34%) received onabotulinumtoxinA (mean: 2.0 ± 0.7 areas of the upper face). There were significant improvements on each FACE-Q scale posttreatment: mean change in Psychological Function score was +12.4 [95% CI: 7.9, 16.9; $P < 0.001$; standardized effect size by Cohen's d: 0.93]; mean change in Social Function score was +7.9 (95% CI: 3.3, 12.5; $P = 0.001$; effect size: 0.50); and mean change in Appearance-related Psychosocial Distress score was –20.9 (95% CI: –27.4, –14.3; $P < 0.001$; effect size: 1.27).

Conclusions: Aesthetic treatment with injectables was associated with significant improvements in patient-reported psychological and social functioning and reductions in appearance-related distress. This change underlines the value of these therapies for improving psychosocial health in well-selected patients. *(Plast Reconstr Surg Glob Open 2021;9:e3578; doi: 10.1097/GOX.0000000000003578; Published online 28 April 2021.)*

INTRODUCTION

The practice of aesthetic medicine continues to grow year by year.[1] As the specialty expands, and more patients are treated by an ever-widening range of practitioners, the potential for complications increases simultaneously. With injectable products, such as botulinum toxin type A (BoNTA) and hyaluronic acid (HA) fillers, the broad perception is that they have benign adverse event profiles.[2,3] Undoubtedly, these minimally invasive therapies are typically associated with fewer major complications than surgical treatments. However, there remains a small but significant risk of serious complications, such as vascular compromise and loss of vision,[4,5] even in the most skilled and experienced hands. These events can be life-changing when they occur.

As physicians, we justify the risk of complications with injectable treatments because we perceive that these risks are outweighed by the benefits of treatment, particularly with respect to positive effects on social health and psychological wellbeing. Indeed, the importance of patient psychology is written into the aesthetic indications for all of the major BoNTA products (onabotulinumtoxinA, abobotulinumtoxinA, and incobotulinumtoxinA), which should be reserved for the treatment of facial lines when their severity "has an important psychological impact" on the patient.[6–8]

There is substantial evidence to show that surgical cosmetic procedures improve the confidence, self-esteem, and quality of life of treated patients.[9] However, the effects on mental health and psychosocial wellbeing of minimally invasive, injectable treatments such as BoNTA and HA fillers—which have been introduced more recently—are less well-defined, from a scientific perspective. In a qualitative interview study of patients seeking minimally invasive cosmetic procedures, the main reasons for requesting

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treatment were to improve physical and psychosocial wellbeing; the desire for cosmetic improvement was only a small component of their motivation.[10] Several studies have shown that patient satisfaction with their appearance improves following minimally invasive procedures.[11–13] In recent years, new data have begun to indicate that this translates further into improvements in the psychosocial dimensions of health. For example, a study of facial filling using autologous fat and platelet-rich plasma demonstrated enhanced social and psychological functioning following treatment.[14] Similarly, an analysis of injectable HA for restoring the mandible showed an improvement in psychological function.[15] Another recent study found improvements in both psychological and social function following a variety of neuromodulator and soft-tissue augmentation procedures performed within the context of a resident clinic.[16]

The FACE-Q Aesthetics module is a validated psychometric instrument comprising a suite of independently functioning, simple-to-use scales for assessing patient-reported outcomes in facial aesthetics.[17–19] The tools have been independently validated,[18,20,21] and are endorsed by the Royal College of Surgeons (London).[22] FACE-Q scales are organized into 3 overarching domains: facial appearance; quality of life; and adverse effects. Within the quality-of-life domain, there are 3 questionnaires of specific interest, measuring "Psychological Function," "Social Function," and "Appearance-related Psychosocial Distress."[19] Broadly, these questionnaires respectively assess how the patient feels within themselves (eg, positive, happy); how well they function socially (eg, meeting new people, walking into room full of people); and the emotions they feel (eg, anxious, unhappy) in relation to their appearance. The purpose of the present study was to measure the impact of aesthetic interventions across these 3 concepts in contemporary, routine clinical practice.

PATIENTS AND METHODS

Study Design

This was a prospective assessment of consecutive eligible adult patients presenting for the first time at a single center for minimally invasive, injectable treatment of the face for aesthetic purposes during the month of February 2020. The study was conducted in accordance with the Declaration of Helsinki.

Patients aged ≥ 18 years who were prescribed injectable treatment were eligible to participate. Those receiving other forms of treatment (eg, laser or surgical treatments), either alone or in combination with injectables, were excluded because that could confound the results, making it difficult to attribute effects to injectable versus non-injectable treatments.

Techniques

Treatment plans were developed in consultation with patients based on their individual preferences and needs. All included patients were treated with injectable HA fillers from the Vycross range [VYC-17.5, VYC-20, or VYC-25 (Allergan, Dublin, Ireland)] or the Hylacross range [Juvéderm Ultra 3 (Allergan)] and/or with BoNTA [onabotulinumtoxinA (Allergan)].

For every treatment, the skin was first cleansed thoroughly and prepared with chlorhexidine, which was left to dry before commencing the procedure. Subsequent entry sites all underwent additional chlorhexidine cleansing before skin puncture.

Filler injections were performed using either a sharp needle or blunt microcannula according to the indication. When a supraperiosteal bolus was required (eg, frontal bone, temple, zygomatic arch, nose, and mandible), a sharp 27G or 30G needle was used, with a pause for aspiration before injection. Augmentation of subcutaneous fat compartments requiring more diffuse augmentation (eg, the sub-orbicularis oculi fat or deep medial cheek fat) proceeded using a blunt 25G cannula and a fanning technique. Superficial rhytids requiring intradermal product deposition were injected using a 4-mm sharp 30G needle.

OnabotulinumtoxinA was reconstituted using normal saline solution in accordance with the manufacturer's recommendations. Specifically, a 100-unit vial was reconstituted with 2.5 mL of saline to create a solution containing 40 units/mL. In most cases, the standard licensed doses were used (glabella, 20 units; lateral canthal lines, 24 units; forehead, 20 units), although this was sometimes modified based on individual patient needs.

Assessments

Baseline demographic data were collected for all patients, as well as details of the injectable treatments given. Participants completed 3 short, independently functioning questionnaires. All came from the "Quality of Life" domain of the FACE-Q tool: Psychological Function (eg, assessing whether patients feel positive, comfortable and accepting about themselves, and their overall happiness and confidence); Social Function (eg, assessing levels of confidence and comfort when meeting new people, and in social or group situations); and Appearance-related Psychosocial Distress (eg, assessing levels of unhappiness and stress about how they look, worries about looking ugly or abnormal, and social avoidance). These were completed in person in the waiting room before treatment and again at a follow-up visit scheduled for 2 weeks after treatment.

In all 3 questionnaires, respondents rated their agreement with 8 separate statements (Social Function; Appearance-related Psychosocial Distress) or 10 separate statements (Psychological Function) on a 4-point scale: 1, definitely disagree; 2, somewhat disagree; 3, somewhat agree; and 4, definitely agree. Sum scores were calculated as totals out of 32 or 40. These were then converted into "Rasch" scores out of 100, as per the instructions on the questionnaires.

Statistical Analyses

Descriptive statistics are provided throughout, including mean and SD for continuous variables, and frequency and percentage for categorical variables. Baseline demographics and baseline FACE-Q scores were compared between included patients and those who were excluded from the analysis using Fisher's exact test (categorical variables) or the independent samples *t*-test (continuous

variables). Changes in FACE-Q questionnaire Rasch scores among included patients were assessed using the paired *t*-test and presented as mean change [95% confidence interval (CI); *P* value]. Statistical significance was determined based on $P < 0.05$.

To interpret changes in FACE-Q questionnaire scores, standardized effect sizes were quantified using Cohen's *d*, calculated as the mean change in score divided by the SD of pretreatment scores. Cohen's criteria were used to qualify the effect size: 0.20–0.49 (small); 0.50–0.79 (medium); ≥0.8 (large).[23]

RESULTS

Participants

In total, 55 patients presented to the clinic for the first time during February 2020 and were prescribed injectable procedures. One individual refused to participate, and 2 lived overseas and hence were not scheduled for a follow-up visit. Thus, 52 patients (95%) completed the pretreatment questionnaire. With regard to the posttreatment follow-up appointment, 11 patients did not return and failed to complete the posttreatment survey despite repeated telephone reminders. These individuals were considered lost to follow up; this period overlapped with the start of COVID-19 restrictions and hence some patients were reluctant to attend for routine review. A further 6 patients were excluded from the final analysis because they did not complete the FACE-Q questionnaires properly at either the pre- or posttreatment visit (eg, missed out some questions or circled more than 1 answer for a given question).

Thus, complete data were available for 35 individuals, of whom 32 (91%) were women and 3 (9%) were men (Table 1). The mean age was 45.9 ± 13.8 years (range: 20–71). All were presenting for the first time at our center, although 14 (40%) had received previous treatment with injectables at other facilities. The remaining 21 (60%) were treatment naive. Among the 35 included patients, 29 (83%) were treated with HA fillers in the face, using a mean of 2.3 ± 1.3 (range: 1–6) syringes of product. In addition, 12 patients (34%) were injected with onabotulinumtoxinA in a mean of 2.0 ± 0.7 (range: 1–3) areas of the upper face (glabella, lateral canthal lines, and/or forehead). Overall, 23 patients received HA filler only, 6 were treated with onabotulinumtoxinA only, and 6 received both.

A comparison of baseline demographics (age and sex) was made between the 35 patients included in the analysis and the 20 patients excluded, and comparisons were also made of both baseline demographics and baseline FACE-Q scores between the 35 included patients and the 11 patients lost to follow up. These analyses found no significance differences in profile between groups.

Patient-reported Outcomes

After treatment, there were significant improvements on all 3 FACE-Q scales relative to pretreatment results (Fig. 1). Mean Psychological Function score increased from 57.1 ± 13.3 to 69.5 ± 16.5, with a mean change of +12.4 (95% CI: 7.9, 16.9; $P < 0.001$) and a standardized effect size of 0.93 (large). Mean Social Function score increased from 59.8 ± 15.8 to 67.7 ± 13.0; the mean change was +7.9 (95% CI: 3.3, 12.5; $P = 0.001$) and the standardized effect size was 0.50 (medium). Finally, the mean Appearance-related Psychosocial Distress score decreased from 36.3 ± 16.4 to 15.5 ± 18.5, equivalent to a mean change of –20.9 (95% CI: –27.4, –14.3; $P < 0.001$), with a standardized effect size of 1.27 (large).

Table 1. Patient Characteristics and Treatments

Characteristic	Patients (N = 35)
Gender, n (%)	
Women	32 (91)
Men	3 (9)
Age, y, mean ± SD (range)	45.9 ± 13.8 (20–71)
Injectable treatment history, n (%)	
Previously treated elsewhere	14 (40)
Treatment naive	21 (60)
Treatments given, n (%)	
HA filler only	23 (66)
OnabotulinumtoxinA only	6 (17)
HA filler and onabotulinumtoxinA	6 (17)

Changes from baseline in FACE-Q scores were also analyzed according to whether patients underwent combined treatment with both an HA filler and onabotulinumtoxinA (n = 6) or received one modality only (either HA filler or onabotulinumtoxinA; n = 29). Mean changes appeared to be greater with combined versus single-modality treatment: Psychological Function, 19.8 versus 10.8, respectively; Social Function, 14.5 versus 6.6; Appearance-related Psychosocial Distress, –25.2 versus –20.0.

DISCUSSION

This study demonstrates that aesthetic treatment using injectable therapies (HA fillers and/or BoNTA) in routine practice is associated with significant improvements in patients' social and psychological wellbeing and reductions in appearance-related distress. Assessments were made using validated FACE-Q quality-of-life psychometric tools.[17–19]

Few previous studies have attempted to define the impact of injectable therapies on social and psychological wellbeing using FACE-Q tools. Where they have done so, studies have tended to be based on treatment of a single area of the face[15,24] or were undertaken within a training model with patients receiving treatment free of charge[16] (which could affect the magnitude of perceived benefit). The present analysis included patients treated across various indications in the context of normal practice.

The benefits of treatment appeared to be the greatest with regard to appearance-related distress [mean change: –20.9; standardized effect size: 1.27 (large)] compared with psychological function [mean change: +12.4; standardized effect size: 0.93 (large)] and social function [mean change: +7.9; standardized effect size: 0.50 (medium)]. This is not surprising, given that the FACE-Q Appearance-related Psychosocial Distress questionnaire specifically focuses on patients' feelings of stress and unhappiness about how they look and on resulting

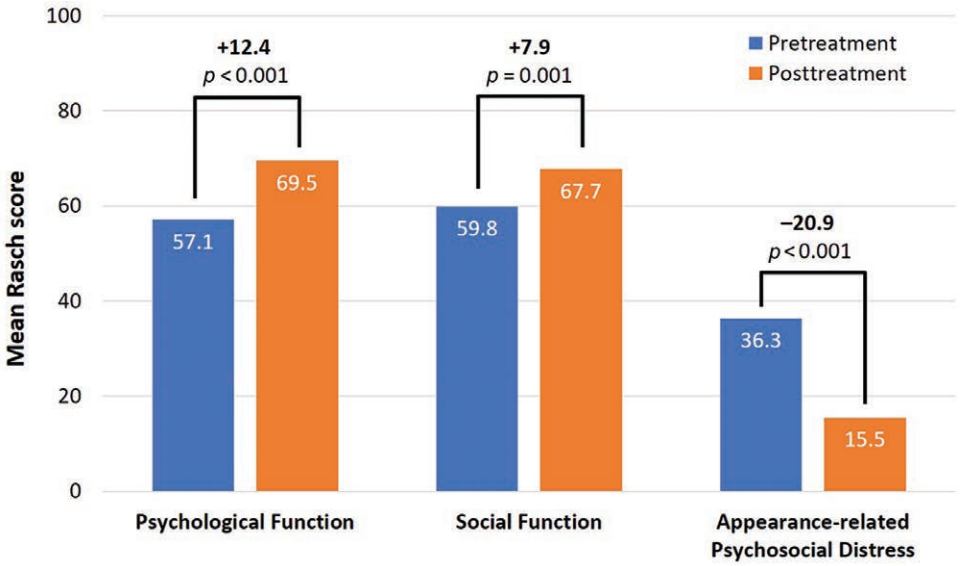

Fig. 1. FACE-Q quality-of-life questionnaire scores (N = 35).

social avoidance behaviors. Nonetheless, it is reassuring that there were improvements in the more multifaceted dimensions of psychological function (eg, feelings of positivity, confidence and acceptance about themselves) and social function (eg, greater ease in meeting new people or in facing group situations).

Indirect comparison of results between studies is always fraught with difficulty. However, broadly speaking, the mean changes measured on each of the three FACE-Q tools were somewhat lower than those recorded previously following facial plastic surgery (eg, rhinoplasty[25] or orthognathic surgery[26]). This is as expected, given that more subtle improvements are typically achieved using small quantities of HA filler and onabotulinumtoxinA compared with surgical techniques.

Interestingly, the improvements on all 3 FACE-Q tools in the present study appeared to be greater among patients undergoing combined treatment with both an HA filler and onabotulinumtoxinA compared with those receiving a single modality. Only a small number of patients receiving combined treatment (n = 6), and hence the data should be interpreted with caution. Nonetheless, this finding makes logical sense and further studies are warranted.

There are 4 key principles that are widely recognized as the ethical basis for contemporary medical practice: respect for autonomy, non-malfeasance, beneficence, and justice.[27,28] Of these, "non-malfeasance" and "beneficence" are particularly pertinent to the present work. The principle of non-malfeasance mandates that practitioners must never act in a way that could harm the patient. Meanwhile, the principle of beneficence requires practitioners to act according to the patient's best interests—which means not only avoiding harm, but actively seeking to maximize benefits.[27]

Thus, it is ethically accepted good medical practice that physicians must always consider the balance of benefit versus risk before prescribing treatment for a patient, and this applies to aesthetic medicine in the same way as it applies to every other branch of medicine. However, in aesthetic practice, the concept of benefit is not always as clear-cut as in other medical specialties where outcomes can be measured in morbidity and mortality.[27] Indeed, the concept of benefit in aesthetic medicine revolves less around physical improvements and more around improving patients' mental state, including self-confidence, appearance-related distress, and wider ability to function in society.

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[29] The practice of aesthetic medicine improves the health of patients by improving the mental and social dimensions that are central to this definition.

Most aesthetic practitioners will feel confident that their treatments have positive effects on the mental and social dimensions of health based on feedback from their patients. We regularly hear patients in our clinics describe their psychological motivations for seeking treatment—for example, lost self-confidence and social avoidance resulting from deterioration of their facial appearance, or embarrassment owing to disproportionate facial features, such as a nasal dorsal hump or a hypoplastic mandible. Qualitative data also suggest that psychosocial wellbeing is a key motivator for undergoing minimally invasive aesthetic procedures.[10] Following successful treatment, patients tell us that their self-confidence has improved and social avoidance reduced. However, until recently, this has been poorly defined in the scientific literature.

The present work provides further evidence in demonstrating the link between aesthetic treatment with injectables and the true health benefits to patients. Understanding how the use of injectables translates into

improved psychological and social functioning is central to maximizing the "mental and social well-being" that underpins the World Health Organization definition of health.[29]

It should not be assumed that any given person would necessarily achieve these benefits from treatment. Patients included in this study consulted with an experienced physician before treatment was prescribed, with the aim of first understanding their motivations and assessing their suitability for aesthetic intervention. Given the small but significant associated risks, it remains ethically questionable to offer such procedures simply because someone says that they want them; patient selection is essential, and refusal to treat must be an option. In particular, it is imperative that practitioners take time with new patients to understand not only what they want to change, but why they want to change it and what their goals are from treatment. In general, results may be better among individuals with internal motivators (eg, improving self-confidence) compared with those motivated by secondary gains (eg, improving relationships).[30] Another profile to be wary of is patients who have been excessively influenced by modern celebrity culture. In our practice, we have seen a substantial rise in individuals requesting treatment with the objective of emulating their idols. Many of the images that inspire these patients are heavily manipulated, and hence they represent an unrealistic perception of what can be achieved with aesthetic intervention. Such patients are likely to be disappointed with the results, and practitioners would be wise to think twice about offering treatment in these cases. Indeed, the ethical principles of nonmalfeasance and beneficence require that we may need to decline treating patients with unrealistic expectations because the risks might outweigh the potential benefits in these individuals.[27]

By contrast, as we have demonstrated here, the psychological benefits of aesthetic interventions in well-selected patients can be statistically—and clinically—significant. Most patients who present for aesthetic consultation are physically healthy men and women who have begun to suffer a loss of self-confidence as their facial appearance deteriorates. When other bodily organs deteriorate, it is normal medical practice to intervene to slow or reverse the decline. There is no reason to believe that the face should be any different.

We should acknowledge the limitations of this work. First, posttreatment FACE-Q questionnaires were completed 2 weeks after injection. The treatments evaluated have a temporary physical effect and it is likely that the health benefits will also be temporary. It would be interesting to track the impact of injectables on psychological function over a longer time period and indeed with repeat treatment. Second, the cohort within the present study was relatively small and came from a single center. It would be valuable to repeat the assessment with a larger group of patients, although this would be demanding in the context of normal practice. Nonetheless, the impact of treatment was highly significant even in the small cohort assessed here. Third, it was a noncomparative, single-arm study and a placebo effect could have been a factor in the improvements observed. Randomized, controlled trials would be welcome. Fourth, 20 patients were excluded from the analysis for various reasons. The COVID-19 outbreak may have played a role in that. There were no differences in baseline demographics or FACE-Q scores between those included and those excluded, and telephone feedback from patients who did not return to the clinic was positive. Hence, there is no reason to believe that any bias was introduced into the data, and we consider that the final cohort was representative. However, the possibility of attrition bias cannot be entirely ruled out.

CONCLUSIONS

Aesthetic treatment with injectables was associated with significant improvements in patient-reported psychological and social functioning and reductions in appearance-related distress. This emphasizes the value of these treatments as a means of improving overall health—which has important mental and social dimensions in addition to the obvious physical components.[29] However, to maximize these benefits and offset them positively against associated risks, it is important that patient selection is optimized and that a high standard of technical skill is maintained.

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