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Analysis of Chest Masculinization Surgery Results in Female-to-Male Transgender Patients: Demonstrating High Satisfaction beyond Aesthetic Outcomes Using Advanced Linguistic Analyzer Technology and Social Media

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Background: Satisfaction rates are reported as high after subcutaneous mastectomy for chest masculinization. We examined patient satisfaction based on linguistic analysis of social media posts showing postoperative results and compared them to aesthetic quality ratings from plastic surgeons.

Methods: Fifty publicly available images of subcutaneous mastectomy postoperative results of female-to-male gender transition patients were selected from Instagram. The photograph's corresponding post and comments were then analyzed for sentiment through the IBM Watson tone analyzer, which rated the presence of joy on a continuous scale from 0 to 1. Three plastic surgeons rated aesthetic quality on an ordinal scale of 1 to 10. Results of both analyses were then compared.

Results: Joy was rated as a mean value of 0.74 (±0.13) in posts and 0.81 (±0.13) in comments. The mean ratings of results were found to be chest contour 6.1 of 10 (±1.7), scar position 5.3 of 10 (±1.8), scar quality 4.8 of 10 (±1.9), nipple position 5.2 of 10 (±1.9), and nipple quality 5.1 of 10 (±2.0). A positive relationship was found between post joy and nipple quality ($r = 0.33$, $P = 0.0169$). There were no other associations detected between level of joy and the ratings of results by plastic surgeons ($P > 0.05$).

Conclusions: Despite wide variety in surgical appearance, there is a high level of satisfaction and community support. This is in contrast to the low-quality ratings by plastic surgeons. The results demonstrate the strong psychological and functional underpinnings chest masculinization has for patients. However, surgical results can be improved through a variety of techniques such that patients have both excellent surgical results and high satisfaction. *(Plast Reconstr Surg Glob Open 2020;8:e2356; doi: 10.1097/GOX.0000000000002356; Published online 24 January 2020.)*

INTRODUCTION

Gender dysphoria, also known as gender identity disorder, transgender, or transsexuality, refers to a patient's incongruence between their gender at birth and their gender identity.[1] The incidence of self-reported transgender identity is 0.5% to 1.3% in the United States.[2] Many patients with gender dysphoria turn to medical therapy to help them transition to the sex that is most congruent with how they feel. Examples include endocrine therapy or plastic surgery.

Subcutaneous mastectomy, or chest masculinization, is an option of patients undergoing the female-to-male gender transition to further masculinize their physique. Medical necessity criteria are based upon Standards of Care for the Health of Transsexual, Transgender, and Gender-Nonconforming People, published by the World Professional Association for Transgender Health.[3] Criteria for mastectomy and masculinization of the chest in female-to-male patients according to World Professional Association for Transgender Health include (1) persistent, well-documented gender dysphoria; (2) capacity to make a fully informed decision and to consent for treatment; (3) age of majority in a given country; and (4) if significant

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medical or mental health concerns are present, they must be reasonably well controlled. Hormone therapy is not a prerequisite. Patients should always be evaluated by a mental health professional before undergoing the procedure. The evaluation includes, at a minimum, assessment of the gender identity and gender dysphoria, history and development of gender dysphoric feelings, the impact of societal stigma on psychosocial adjustment, and the patient's available support system.[3] The mental health professional is required to make reasonably sure that the gender dysphoria is not secondary to another mental health condition.

The goals of the subcutaneous mastectomy procedure are removal of the female breast contour, obliteration of the inframammary fold, excess skin removal, and proper reduction and positioning of the nipple–areolar complex (NAC).[4,5] The ideal surgical result is a masculinized chest with minimal scarring and proper nipple positioning. Satisfaction rates for subcutaneous mastectomy are currently reported to be approximately 88%.[6] Significant improvements in body image, feelings of attractiveness, and self-confidence were also found in various studies.[7–10] However, note that body image in transgender individuals does not only relate to sexual characteristics but also includes psychosocial and factors associated with stigmatization and discrimination in society.[11]

Patient-reported outcome measures specific to the transgender patient are sparse.[12,13] In evaluating chest masculinization, studies have examined satisfaction with scar and nipple position, with little emphasis in the overall satisfaction and quality of life.[14] These measures are vital in qualifying and quantifying surgical interventions in the trans patient and should be further explored. The emerging applications of social media represent an avenue to obtain such data.[15] Previous studies have examined the utility of social media as a means of assessing patient satisfaction after rhinoplasty and other forms of aesthetic plastic surgery using rating websites.[16,17] We propose another method of assessing satisfaction on social media—using computerized linguistic analysis to determine postoperative satisfaction within social media posts. There exist powerful analytic tools utilizing artificial intelligence can analyze sentiment such as joy contained within written human language.[18]

We hypothesize that chest masculinization in the female-to-male transgender population transcends the aesthetic appearance of sexual characteristics but strongly correlates with the psychosocial and psychological functioning of the patient. To qualify the aesthetic appearance, we surveyed plastic surgeons on the quality of operative outcomes. To best quantify the psychosocial and psychological functioning of the patient, we used a linguistic tone analyzer to rate the level of joy present in both the posts and subsequent comments made by their peers. The results of both analyses were then compared.

METHODS

Social Media Assessment

Instagram (Facebook, Inc., Menlo Park, Calif.) was queried for 50 images of subcutaneous mastectomy postoperative results in individuals undergoing a female-to-male transition. Only publicly available images were used, with implied consent. No attempt was made at extracting private photos. All photographs were stored in an encrypted password-protected folder. Hashtags used included #topsurgery, #transisbeautiful, #transispowerful, #transqueer, #transman, and #transgender. Photos were selected in order from latest to oldest Instagram post based on ability to assess nipple position and scar quality until 50 total were found. Images including identifying tattoos or piercings were excluded. Faces were omitted from analysis to protect privacy. Only surgical results were displayed. The photograph's corresponding post and responding comments were then analyzed through the IBM Watson Linguistic "Tone Analyzer" (IBM, Armonk, N.Y.).[18] No information such as username, geotagging, or other digitally identifiable information was included. The IBM Watson tool uses linguistic analysis to detect emotional and language tones in written text. This allows us to analyze text to further understand its concepts, emotion, sentiment, etc. The "view JSON" setting was selected so that the joy analysis was rated on a continuous scale. The rating of joy produced by the IBM Watson Tone Linguistic Analyzer is quantified on a continuous scale between 0 and 1. The linguistic tone analyzer was then used to measure the level of joy of the patients' Instagram posts and subsequent comments. The levels of joy were then described by means and SDs. The linguistic analyzer also produced ratings of sadness, anger, and confidence. However, these tones were rarely detected by the posts and were therefore not able to be used in the study design or statistical analysis.

Plastic Surgeon Assessment

Three board-certified plastic surgeons were provided with the same images found through the aforementioned method and were surveyed to assess surgical and aesthetic quality. The surgeons were asked to rate the quality of chest contour, scar position, scar quality, nipple position, and nipple quality. Images were evaluated with an ordinal scale of 1 to 10, with 1 being lowest quality with 10 being highest quality. Quality ratings by plastic surgeons were then described by means and SDs. Ratings by plastic surgeons provided on a Likert scale were performed for statistical analysis.

Statistical Analysis

We then analyzed the statistical relationship between the level of joy in the posts and comments and the mean quality ratings by plastic surgeons using Pearson's Correlation and Linear Regression. All statistical analyses were performed using SAS (SAS Institute, Cary, N.C.).

RESULTS

Fifty social media posts and corresponding comments of subcutaneous mastectomy postoperative results were evaluated with a linguistic analyzer. The tone of joy was analyzed in posts and responding comments, separately, on a scale of 0 to 1. Joy was rated as a mean value of 0.74

(±0.13; range, 0.55–1.0) in posts and 0.81 (±0.13; range, 0.58–0.99) in comment clusters (Table 1). The level of joy in posts and comments was found to have a medium strength (r value between 0.3 and 0.5) of relationship (Pearson's Correlation Coefficient $r = 0.32$, $P = 0.0254$).

All images associated with the social media posts were evaluated by 3 board-certified plastic surgeons with experience in performing gender affirmation procedures. The images of subcutaneous mastectomy postoperative results were analyzed for chest contour, scar position, scar quality, nipple position, and nipple quality. The ratings scale was between 1 and 10. The mean overall quality rating of the postoperative results by plastic surgeons was found to be 5.3 (±1.7; range, 2.8–8.5) (Table 2). The individual quality ratings were found to be chest contour 6.1 (±1.7; range, 3.3–8.7), scar position 5.3 (±1.8; range, 2.0–8.7), scar quality 4.8 (±1.9; range, 1.3–8.7), nipple position 5.2 (±1.9; range, 1.0–9.0), and nipple quality 5.1 (±2.0; range, 1.0–8.7). There was no association between the level of joy detected in the posts and comments and the quality ratings of plastic surgeons ($P > 0.05$), except between the post's joy and nipple quality. The post's joy was significantly positively associated with nipple quality ratings by plastic surgeons (Pearson's correlation coefficient $r = 0.33$, $P = 0.0169$). To further explore the direct relationship found between these 2 variables via Pearson's correlation, we performed a linear regression analysis. For a unit increase in the post's joy score (x value), there was a 5.4 unit increase in nipple quality (y value) (linear regression $\beta = 5.4$). Therefore, this further supports and quantifies the presence of a direct relationship between the post's joy and nipple quality.

DISCUSSION

Despite the wide variety of surgical results and relatively poor aesthetic quality, there was a high level of satisfaction after subcutaneous mastectomy. The plastic surgeons rated the surgical results with mostly subpar to mediocre scores with a mean rating score of 5.3 out of 10. However, even in the setting of heterogeneous scars and nipple positioning results, the patients in this study were overwhelmingly satisfied with the results with a mean joy rating of 0.74 in posts. Additionally, no relationship was found between overall quality ratings and all but one comparison, further highlighting that patients are pleased with the results of the procedure regardless of technical finesse. The one comparison that had a statistically significant relationship was between post joy and nipple quality, suggesting that this component of the aesthetic result may be most important for chest masculinization patients.

The surgical results ratings by board-certified plastic surgeons are relatively low with a mean overall quality rating of 5.3 of 10. Scar quality was rated lowest at 4.8 of 10, and chest contour was rated highest at 6.1 of 10. Some of the less desirable results may be attributed to poor skin quality or due to individual patient skin characteristics or a history of breast binding.[19] However, it is also clear that there may be room for technical improvement to better improve surgical outcomes and provide better patient care. The surgeons rated the images relatively low because many showed only the removal of the breast mound instead of evidence that all 4 goals of the subcutaneous mastectomy procedure were fulfilled: removal of the female breast contour, obliteration of the inframammary fold, excess skin removal, and proper reduction and positioning of the NAC.[4,5]

Even though it appears that transgender patients are overwhelmingly pleased with their chest masculinization results regardless of technical quality, we must strive toward perfecting the procedure to best serve this vulnerable subset of patients. Ways that we can attain this goal would be to focus on enhancing nipple placement and quality, especially because higher post joy was associated with improved nipple quality ratings. Namely, the NAC should be adequately reduced to a male rather than female nipple size. Based on a recent and largest-to-date 150 patient study with individuals from various ages and ethnicities, the average male nipple size has recently been described as an areolar diameter of 26.6 mm and nipple diameter of 6.9 mm.[20] We use a similar approach and aim for an oval-shaped nipple with a diameter of 22–28 mm. NAC position appears best approximately 2 to 3 cm above the lower border of the pectoralis major; however, placement must be judged on an individual basis.[19] The nipple position is based on anthropomorphic measurements of body habitus and arm position and soft tissue landmarks rather than an arbitrary measurement that can be skewed. Ultimately, the plastic surgeon determines this position based on aesthetic intuition to achieve the best surgical result. The inter-nipple distance is more eye-catching and aesthetically important than the vertical location of the

Table 1. Joy Detection of Social Media Posts and Comments

	(n = 50)	
	Mean ± SD	**Range**
Post	0.74 ± 0.13	0.55–1.0
Comments	0.81 ± 0.13	0.58–0.99

Fifty social media posts and comments were scored by a linguistic analyzer for the detection of joy. The joy rating scale is on a continuous scale between 0 and 1.

Table 2. Aesthetic Quality as Rated by Plastic Surgeons

	Overall Average	Chest Contour	Scar Position	Scar Quality	Nipple Position	Nipple Quality
Average	5.3	6.1	5.3	4.8	5.2	5.1
SD	±1.7	±1.7	±1.8	±1.9	±1.9	±2.0
Range	2.8–8.5	3.3–8.7	2.0–8.7	1.3–8.7	1.0–9.0	1.0–8.7

Three board-certified plastic surgeons rated the 50 social media images on an ordinal scale of 1 to 10 for chest contour, scar position, scar quality, nipple position, and nipple quality.

nipple. Additionally, careful attention must be paid to minimizing scars by utilizing various techniques depending on the patient's breast characteristics. For instance, in the small-breasted patient, the surgeon can use the semicircular technique where the scar is confined to the lower half of the periphery of the areola.[19,21] Another method in small- and also in medium-sized breasts, especially if the patient has poor skin elasticity, is to use a concentric incision such that it reduces the areola and removes excess skin. The resulting scar will be confined to the circumference of the areola. Scar reduction is more difficult in larger breasts and often unavoidable. Larger breasts are most commonly reconstructed using the free nipple graft technique, and a long incision is required to address excess skin and tissue. Fundamental plastic surgery techniques such as following Langer lines, wound-edge eversion during skin closure, placement of sutures that are not excessively tight, and prompt suture removal within 7 days are the best approach in this setting.

As a technical note, it is important for plastic surgeons to focus on nipple aesthetics, including the periareolar scar and the nipple position. It is important to maintain the suture line to hold the graft in the superficial dermal layer and avoid the "baseball" type of suture that can result in hypertrophic and circular scarring. Plastic surgeons should also include patients in the decision making for nipple position as this can be an individual choice. With the use of electrodes or tape, nipple position can be tailored in the preoperative area and patients should be included in the decision making of the final nipple position.

The high patient satisfaction results reinforce our hypothesis that this procedure has not only aesthetic but strong psychosocial impact. The experience of having a physical body that is in contrast to one's gender identity can be a source of chronic distress.[9,22] Studies suggest that the physical body itself is the primary source of dissatisfaction and suffering in these patients.[9,23,24] Psychosocial and quality of life components appear to elevate the patients' views of the results because the surgery allowed them to achieve a body closer to the patient's self-identified gender.

Resilience may be another factor in the high degree of postoperative satisfaction. Transgender patients must face stigma and discrimination in society. Some studies suggest that transgender individuals develop a high degree of resilience in the face of this adversity.[25,26] The higher level of resilience in this population may therefore predispose them to higher postoperative satisfaction even in the face of less desirable results.

Additionally, social media may also serve as a form of social support group. Peer support with other transgender individuals has been shown to be a stress reducer in individuals with gender identity disorder.[27] This may serve as a buffer to reduce negative perceptions of surgical results. The presence of a social support group can be evidenced from our data. The average joy rating of the comments was 0.81, which was higher than the joy ratings of the posts. This finding is suggestive of possible effort of the commenters to elevate and support the user's sense of happiness in regard to the surgical result. Regardless of the high level of satisfaction, plastic surgeons must strive for improved results to provide the best care for patients.

A limitation of this study is selection bias—patients are more likely to post their surgical results if they are satisfied. Despite the selection bias, there was a wide range of aesthetic quality and, yet, a high percentage of satisfaction with the surgery. The mean overall quality rating of the postoperative results by plastic surgeons was found to be 5.3 out of 10 with a large range between 2.8 to 8.5 out of 10. Furthermore, there was a wide variability between individual surgeons rating the same Instagram images, suggesting disagreement within our cohort of surgeon raters. One senior surgeon had a large experience in transgender surgery, whereas 2 junior attendings were trained on techniques during residency. However, it can still be said that despite the wide variability between even how individual surgeons rated the results, patient satisfaction was still high with relatively small variability. Future study should be performed with a larger number of surgeons with extensive experience in transgender care. It should also be noted that the linguistic tone analyzer used to assess satisfaction underestimated the amount of joy present in the posts because it was unable to analyze the positive emoticons in many of the posts. Furthermore, surgical techniques are variable based on individual patient factors, such as breast size, body mass index, and scarring. Our study is limited in that we do not unable to discern preoperative body habitus and surgical technique. Another limitation is that this is a cross-sectional study design, and, therefore, patients were not followed over time. Additionally, the study did not evaluate quality of life outcomes, thereby preventing comprehensive ratings of the results. Patient characteristics such as sexual orientation were unable to be assessed, which may have confounded results because sexual orientation is known to have an effect on body image.[9]

The results of this study show that postsubcutaneous mastectomy satisfaction and social support are high regardless of surgeon ratings of aesthetic quality. This demonstrates the strong psychological and functional underpinnings that chest masculinization has for patients. The prospect of a tone analyzer as a form of assessing patient satisfaction is a source of further research. Future studies are also required to compare patient quality of life with existing psychosocial measures to accurately assess the benefits of surgery. It is clear that, as our techniques evolve, we need questionnaires tailored to this population. These questionnaires should examine different domains, including psychosocial functioning, sexual outcome, and satisfaction with the surgical outcome. This approach will allow us to further elucidate subtleties in outcomes.

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