Quality of Life and Psychosocial Functioning 2 Years Following Facial Transplantation

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Background: Face transplantation is a novel option for patients with severe facial disfigurement. Quality of life (QoL) outcomes of face transplantation remain poorly understood. Objectives: We sought to evaluate psychosocial functioning among 6 patients undergoing facial transplantation. Methods: We prospectively assessed depressive symptoms, health status, mental and physical QoL, and self-esteem at 3-month intervals for 2 years. Social desirability was assessed pretransplant. Results: On average, before transplantation, patients generally reported minimal to subthreshold depressive symptoms, normal to high health status, normal mental-health QoL, and normal to high self-esteem. Most endorsed high social desirability. As patients recovered from surgery, hospitalization, and immunosuppression induction, physical-health QoL generally deteriorated 3 months posttransplantation. Posttransplant trajectories show that perceived health state improved; health status and mental and physical health-related QoL slightly improved; self-esteem remained stable and high; and overall depressive symptoms remained stable but 3 patients experienced a depressive episode. Conclusions: Pretransplant ceiling effects may render improvements difficult to quantify. Future research should use mixed methods including population-specific measures with demonstrated sensitivity to change.

Key words: Transplantation, Quality of life, Depression, Mental health, Rehabilitative, Longitudinal.

INTRODUCTION

Allograft face transplantation allows for the esthetic and functional restoration of severe facial disfigurement in one, complex operation. The face is not only pivotal to our physical identity but it enables the connection between our internal state and social interactions. Compromising its structural, functional, and social complexities, as is common with traumatic facial injuries, can have inescapable ramifications on quality of life (QoL) and psychosocial functioning.
Since the first face transplantation was completed in France in 2005, 38 full and partial transplants have been completed worldwide, highlighting the need for systematic evaluations of recipients’ subsequent QoL and psychosocial status. Assessing postoperative QoL and psychosocial status can offer important insights into this distinctly ethically and socially-charged procedure. Unlike its solid organ counterpart, face transplantation brings about overtly visible changes in its patients, which can greatly impact social interactions and self-esteem. 

Furthermore, face transplantation is an exclusively elective procedure that is seen as life-changing rather than life-saving. Because the issues of risks and benefits are different in face transplantation, increased emphasis must be placed on transplant outcomes relative to their associated intraoperative and postoperative risks.

Detailed analysis of patients’ QoL and psychosocial status on validated assessments is growing but remains limited. Quantitative analyses of QoL and psychosocial outcomes have been published on 11 face transplant recipients. The team behind the first US transplant systematically collected measures at regular intervals over 3 years. The patient experienced an improvement in QoL, including decreased pain, depression, and body image anxiety and vast improvement in social reintegration. Additional research has corroborated these initial findings, demonstrating positive psychological and functional outcomes throughout the postoperative course.

An earlier prospective study analyzed psychosocial and QoL changes using psychometrically-validated measures and found significant improvements on physical and mental health QoL from pretransplant to 6 months postsurgery. However, long-term attainment of QoL improvement and function are the ultimate goals. Accordingly, this article presents the trajectory of QoL and psychosocial outcomes over 2 years among the same cohort, now numbering 6 patients. Our study aims to characterize the patients undergoing facial transplantation, and evaluate changes in QoL through 2 years posttransplant, and evaluate the impact of visual impairment on QoL.

**METHODS**

The allograft facial transplantation research protocol was approved by the Partners Human Research Committee. Patients completed an initial diagnostic interview with a designated transplant psychiatrist as part of the clinical screening for eligibility/candidacy. Because of the significant ethical considerations, each candidate had a second assessment with another psychiatrist to evaluate competency to consent and appreciation of the risks and benefits.

Patients then completed self-report assessments as part of the research study. Measures were administered by a licensed clinical psychologist who was separate from the clinical/surgical provider team.

**MEASURES**

(1) Depression: The Center for Epidemiologic Studies Depression Scale (CES-D) measures depressive symptomatology, as defined by DSM-IV. It consists of 20 symptoms, rated according to past week prevalence. The total score indicates the sum prevalence of depressive symptoms and corresponds with high sensitivity and specificity to risk of clinical depression. A score greater than 16 indicates a depressive episode and the range is 0–60.

(2) Health status and perceived health state: The EuroQuol Group 5 dimension scale (EQ-5D) assesses today’s health status along 5 dimensions (mobility, self-care, usual activities, pain and discomfort, and anxiety and depression). A summary index score is calculated based on all 5 dimensions, with 1 representing the best health state and 0.827 is the US norm. The range is from −0.11 to 1.00. It includes a visual analogue scale to rate perceived health state from 0 (“worst imaginable health state”) to 100 (“best imaginable health state”). Reliability is good among a range of clinical populations and demonstrates strong construct validity in patients with severe skin injuries.

(3) Physical and mental health-related QoL: The Medical Outcomes Survey-Short Form-12 (SF-12) assesses mental and physical health-related QoL over the past 4 weeks producing a mental health and physical health summary score. The physical and mental health summary scores range from 0 (worst health) to 100 (best health) with a US national mean...
of 50 (standard deviation = 10). Its validity and reliability is well-established in clinical populations.17

(4) Self esteem: Rosenberg’s self-esteem scale is a 10-item scale with a range of 10–40. Higher scores indicate greater self-esteem. The normal range is considered to be 25–35, and U.S. norms = 32.18,19 The scale has good internal consistency specifically among patients with disfiguring injuries.20,21

(5) Social desirability: The Marlowe Crowne social desirability (MCSD) scale is designed to evaluate one’s inclination to provide socially-desirable responses.22 The 33-item assessment has a fixed-choice true/false format with a range of 0–33. Respondents scoring 20 or greater are considered in the “high range” with great concern for social approval. The MCSD is widely used in research relying on self-report measurement to measure and control for social desirability bias and demonstrates acceptable reliability and validity.23–25

The MCSD was only administered at baseline, before transplant. Patients completed follow-up evaluations at 3, 6, 9, 12, 18, and 24 months posttransplantation, which included the CES-D, EQ-5D, SF-12, self-esteem scale.

DATA ANALYTIC PLAN

Data were analyzed using SPSS version 22.0. A case series analysis of 6 patients who underwent facial transplantation is presented using descriptive statistics. Inferential statistics were not conducted due to the small sample size.

RESULTS

Description of Patients Before Transplant

Six patients (female n = 2; 100% white; 33% employed; 50% single) were evaluated by a multidisciplinary team at an academic teaching hospital and underwent facial transplantation. Two patients’ injuries were result of a self-inflicted gunshot wound and the remaining 4 patients sustained accidental or unintended injuries. Mean age at time of transplantation was 38 years (range: 25–57 y) and mean duration of time between injury and undergoing transplant was 6 years (range: 2–15 y). Median values of baseline self-report measures are listed in the Table. At pretransplant, 83% of the sample (5 out of 6) endorsed high social desirability (MCSD >20) with 4 of the 6 patients scoring above the 97% percentile. No patient was considered to have a depressive episode according to CES-D cutoff scores. On average, our sample endorsed normative self-esteem and current health status comparable to US norms.

INFLUENCE OF VISION IMPAIRMENT

Pretransplant, there was no difference in perceived health state between blind patients (n = 3) and sighted patients (n = 3). However, blind patients reported lower depressive symptom severity (Mdn = 3 in blind vs 11 in sighted), better mental health QoL (Mdn = 56.4 in blind vs 49.2 in sighted), higher self-esteem (Mdn = 37 in blind vs 31), lower health status (Mdn = 0.81 in blind vs 1), and lower physical health QoL (Mdn = 49.5 vs 53.1 in sighted patients). One year posttransplant, depression scores increased among blind patients (Mdn = 6), whereas sighted patients remained elevated and

<table>
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CES-D = Center for Epidemiologic Studies Depression Scale; EQVAS = EuroQual Group Visual Analogue Scale; EQ5D = EuroQual Group 5 Dimension Scale; SF-12 = Medical Outcomes Survey-Short Form-12, SES = Self-Esteem Scale.
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comparable to their baseline (Mdn = 12). Two years
after transplant, when the visual appearance of
the transplanted tissue normalizes, the difference in depre-
sive symptoms between blind and sighted patients is
almost nonexistent, with a marked 33% decrease
of depressive symptoms among sighted patients (Mdn = 4)
vs stable symptoms in blind patients (Mdn = 5.5).
Before transplant, there was a 7.1 difference in mental
health QoL scores between sighted and blind patients.
At 1 year, blind patients endorsed comparable mental
health QoL (Mdn = 51.7) to sighted patients (Mdn = 51.4).
Two years after transplant, blind patients con-
tinued to report better mental health QoL (Mdn = 58.1)
than sighted patients (Mdn = 54.4). The difference in
self-esteem held through 1-year posttransplant, with
lower self-esteem endorsed by sighted patients (Mdn = 28 vs 34 in blind patients). Two years posttransplant,
although this difference between groups was reduced by
half, sighted patients continued to experience lower self-
esteeem (Mdn = 31 vs 34 in blind patients).

INDIVIDUAL TRAJECTORIES

Patient 1 was referred after sustaining facial trauma
resulting in blindness, with transplant surgery within 1
year of initial evaluation (Figures 1–6). Before surgery,
patient reported minimal depressive symptoms, normal
health status, very high perceived health state (95 of 100
in the scale), physical and mental health QoL slightly
above national norms, high self-esteem, and high social
desirability (MCSD = 27). Depressive symptoms
remained mild to moderate through 1-year until 18
months when depressive symptoms worsened in conjunc-
tion with an adverse life-event unrelated to the trans-
plant, and was above the clinical cutoff score for depres-
sion. Similarly, the patient’s perceived health state
steadily declined from 95 of 100 at baseline to 40 of 100
at 18 months posttransplant. Health status remained sta-
ble over time and on par with US norms. Mental health
QoL remained above the national norm, with transient
improvement at 3–6 months before returning to baseline
by 9-month follow up. Physical health QoL deteriorated
at 3 months then recovered to baseline level through 18
months followed by a second wave of deterioration to
below baseline and national norms at 2 years. The
patient consistently endorsed normal-to-high self-esteem.

Patient 2 was referred 9 years after a vision-sparing
injury that resulted in 17% total body surface area
burns, with subsequent transplant within 1 year of ini-
tial evaluation. Patient 2 missed the 18-month assess-
ment. Before surgery, the patient endorsed mild
depressive symptoms, normal health status, high per-
ceived health state, below national norms on mental
and physical health QoL, high self-esteem, and the high-
est social desirability of this sample (MCSD = 31). Fol-
lowing transplantation, depressive symptoms increased
to meet criteria for a depressive episode at 3 months
(CESD = 20), then remitted to minimal symptoms at 6
months and remained stable through 2-year follow up.
Health status remained normal to high, reaching “best
health state” at 1 year posttransplant. Perceived health
status improved substantially and remained high
through 2 years. Mental health QoL evidenced a steady
and stable improvement. Physical health QoL deterio-
rated at 3 months then improved substantially above
baseline. Self-esteem remained in normal to high range.

FIGURE 1. Individual Changes in Depression Symptoms.
Patient 3 suffered an injury resulting in blindness and underwent transplantation 11 months after the initial evaluation. Before surgery, the patient reported no depressive symptoms, a high perceived health state, health status markedly below the norm, mental health QoL above the national norm, but physical health QoL markedly below the national norm (i.e., 32.5 vs 50, where 50 is national norm), and high social desirability (MCSD = 27). Posttransplantation, depressive symptoms transiently increased at 3 months before returning to 0 at 6 months and remained minimal through 2-year follow ups. Patient 3 never scored above the clinical threshold for depression on the CES-D. Health status fluctuated greatly, more than any other patient in this sample, and was poorer than all other patients at every time point except 9 months. Three months following transplantation, perceived health state declined followed by stable improvement resulting in an overall 10-point improvement at 2 years. Mental health QoL was consistently above the national norm, improving beyond baseline between 6 and 9 months and again at 18 months. Physical health QoL was consistently below the US norm but improved to above-baseline levels by 6 months and remained stable. Self-esteem was consistently high through 2 years.

Patient 4 was referred after an injury that resulted in blindness and 80% total body surface area burns, with subsequent transplant within 1.5 years of initial evaluation. Patient 4 missed the 3-month assessment. Before surgery, the patient endorsed minimal depressive symptoms, normal health status, high perceived health state, mental health QoL slightly above the national norm, high self-esteem, high social desirability (MCSD = 21), and physical health QoL slightly below the national norm. Following transplantation, depressive symptoms remained minimal to mild at all time points. Highest depressive symptom severity was coincident with the patient’s reported difficulty with prescription.
opioid dependency for pain management and subsequently resolved with a successful medication taper 9 months posttransplant. Health status remained stable at or above baseline through 2 years. Perceived health state decreased at 6 months then became stable and improved through 2 years posttransplant. Mental health QoL remained stable around US norms until 1 year posttransplant. Between 1 year and 18 months, mental-health QoL worsened (decreasing by 7 points with respect to baseline) and then improved to slightly above baseline at 2 years. Physical health QoL improved overall from 9 months to 2 years. The patient endorsed consistently normal-to-high self-esteem at all time points.

Patient 5 incurred injuries from a self-inflicted vision-sparing gunshot wound and underwent transplantation 20 months after initial evaluation. Before surgery, the patient reported elevated yet below clinical cutoff depressive symptoms (CESD = 11), perfect health status, normal perceived health state (the lowest in our sample), above average mental and physical health QoL, normal self-esteem, and high social desirability (MCSD = 25). Following surgery, depressive symptoms were decreasing and remained below baseline at all time points, except for a marked increase in symptom severity at 12–18 months that met the clinical cutoff for a depressive episode, coincident with an immunosuppressant-related infection requiring hospitalization. Depressive symptoms returned to minimal levels by the 2-year follow-up assessment. Similarly, health status fell below national norm at 1 year, otherwise remaining high to excellent. Perceived health state improved markedly 3 months posttransplant, remaining above baseline through 9 months, worsened substantially at 1 year and then recovered at 18 months and subsequently improved at 2 years. Mental health QoL remained stable and above the US average from baseline to 6 months but then experienced a period of decline between 9 and 12 months coincident with afore-
mentioned complicated hospitalization. Physical health QoL remained stable within 10 points of baseline, except at 12 months when there was a marked decrease. At 18 and 24 months, mental health QoL improved but remained below baseline. In contrast, physical health QoL improved back to baseline (above the US norm) and remained stable 2 years posttransplant. The patient’s self-esteem improved at 3 months posttransplant, then steadily decreased through 12 months before recovering to baseline 2 years posttransplant.

Patient 6 sought evaluation after incurring injuries from a self-inflicted vision-sparing gunshot wound, with subsequent transplantation approximately 11 months after the initial evaluation. At pretransplant, the patient endorsed elevated but subthreshold depressive symptoms (CES-D = 15), perfect health status, high perceived health state, physical and mental health QoL comparable to US norms, below normal self-esteem, and average social desirability (MCSD = 11). After transplantation, depressive symptoms decreased by half at 3 months before worsening again through 18 months—at which time the patient was above the clinical threshold for a depressive episode (CES-D = 17)—before normalizing 2 years posttransplant (CES-D = 9). Health status remained at the highest possible level through 6 months before decreasing slightly and remaining stable (and higher than US norms) through 2 years. Perceived health state improved, with all EQ visual analogue scale median scores equal to or better than pretransplant, except for a slight decrease at 18 months. Mental health QoL also improved from 6–24 months (Mdn = 4) compared to pretransplant (Mdn = 7). During this time, there was a notable worsening at 18 months when 3 patients endorsed clinical depression. Health status remained relatively stable with a slight improvement from 6–24 months (Mdn = 0.827) compared to pretransplant (Mdn = 0.819). Perceived health state improved, with all EQ visual analogue scale median scores equal to or better than pretransplant, except for a slight decrease at 18 months. Mental health QoL also improved from 6–24 months (Mdn = 57.42) relative to pretransplant (Mdn = 54.20) and remained above national norms at every follow up, except 18 months. Physical health QoL decreased (Mdn = 42.28) relative to pretransplant (Mdn = 49.50). Self-esteem remained in the normal to high range despite a decrease from 6–24 months (Mdn = 31) relative to baseline (Mdn = 36.5).

**CHANGES IN QUALITY OF LIFE 2 YEARS POSTTRANSPLANTATION**

When examining changes in median values 3 months after transplantation (Table), depressive symptoms and mental health QoL improved; perceived health state and self-esteem remained virtually the same; and health status and physical health QoL deteriorated.

To evaluate change outside of the immediate 3-month window postsurgery, posttransplant changes are presented via median change from 6 through 24 months. Depressive symptoms improved from 6–24 months (Mdn = 4) compared to pretransplant (Mdn = 7). During this time, there was a notable worsening at 18 months when 3 patients endorsed clinical depression. Health status remained relatively stable with a slight improvement from 6–24 months (Mdn = 0.827) compared to pretransplant (Mdn = 0.819). Perceived health state improved, with all EQ visual analogue scale median scores equal to or better than pretransplant, except for a slight decrease at 18 months. Mental health QoL also improved from 6–24 months (Mdn = 57.42) relative to pretransplant (Mdn = 54.20) and remained above national norms at every follow up, except 18 months. Physical health QoL decreased (Mdn = 42.28) relative to pretransplant (Mdn = 49.50). Self-esteem remained in the normal to high range despite a decrease from 6–24 months (Mdn = 31) relative to baseline (Mdn = 36.5).
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DISCUSSION

Patients receiving face transplantation at one US medical site reported on average high social desirability, sub-threshold depressive symptoms, QoL comparable to US norms, and normative to high self-esteem before transplant. Mental health QoL was slightly higher than the US general population, whereas physical health QoL was slightly lower. In relation to other transplantation types (solid organ and stem cell), our sample endorsed lower rates of depression, better health status, and higher self-esteem before transplantation. In comparison to other populations with facial disfigurement, our sample again endorsed fewer depressive symptoms than patients with systemic sclerosis and a sample with head and neck cancer in remission. Regarding self-esteem, our sample was slightly higher than patients with acquired facial deformity and almost equivalent to patients with congenital craniofacial abnormalities and.

Before transplant, patients with intact vision endorsed poorer status on mental health-related measures. By 2 years after transplantation, the differences between the 2 groups on depression and self-esteem decrease, driven respectively by an improvement of depressive symptoms among sighted patients and by a decrease in self-esteem among blind patients; whereas the discrepancy in mental health-QoL increases marginally. Although one interpretation of this finding may be that ability to see one’s facial disfigurement and others’ reactions would result in poorer psychological and QoL outcomes, this is not supported empirically. Upon further examination, 2 of the 3 sighted patients sustained facial injuries via self-inflicted gunshot wounds associated with the highest presurgery depressive symptoms. Given the significant relationship between depressive illness and suicide attempts, this may well be a contributing factor for the observed differences in vision status.

The overall ceiling effects across psychosocial and QoL domains before surgery left little room for improvement following facial transplantation. The high level of functioning at the time of seeking face transplantation may be accounted for by impact bias. That is, healthy people overestimate how much an illness or disability will negatively impact their lives. Generally, people expect a greater deterioration in QoL as a result of a disability than what is endorsed by patients who are actually living with that disability. This impact bias extends to patients also overestimating the magnitude of QoL improvements after a successful medical procedure. Alternatively, this self-selected sample may indeed be well-adjusted and resilient as demonstrated by engaging in the lengthy transplant evaluation process.

Another explanation for the ceiling effects is the prevalence of high social desirability. Notably, 4 of the 6 patients scored above the 97% percentile on the MCSD. Only 1 transplanted patient endorsed average social desirability before surgery. Typically, about 1 respondent in 6 scores 20 or greater. In this sample, 5 out of 6 endorsed 20 or greater. Social desirability is strongly related to presenting oneself favorably and garnering social approval. An inverse relationship has been observed between social desirability and psychological distress among heart and lung transplant candidates and patients seeking surgery for dentofacial disharmony. Thus, social desirability may have influenced patients’ reporting to minimize distress, particularly in regard to psychosocial and mental health domains making the true degree of improvement difficult to discern. Administering the MCSD at posttransplant may uncover trends towards normative social desirability after receiving the transplant.

Consistent with findings in the literature, a temporary deterioration in physical health QoL was observed 3 months after transplantation. This early posttransplant period may be a particularly difficult time, as one health state is exchanged for another (e.g., lethargy and immunosuppressive therapy side effects). Outside of this temporary decline, generally depressive symptoms remained minimal and improved slightly. Yet, 50% of the sample crossed the clinical threshold for depression at 18 months posttransplant. There may be a bi-phasic variation around 18 months as a similar pattern is present in perceived health state which also worsened at 18 months. Beyond this dip, perceived health improved consistently 2 years following transplantation. Interesting findings emerge within individual patient trajectories. The 2 patients with self-inflicted gunshot wounds demonstrated similar patterns of elevated depressive symptoms at baseline and rapid improvement in self-esteem and depressive symptoms 3 months posttransplant. Moreover, these were the only patients to endorse below-normal self-esteem at any assessment point. This is not surprising given the nature of their injuries and likelihood of accompanying stigma and shame.

LIMITATIONS AND FUTURE DIRECTIONS

Limitations of this case series analysis include the small sample size, the variation in injury type and an entirely
white sample, all of which constrain the representativeness of the findings. This is highlighted by the differences in patient trajectories suggesting causes of injuries raise idiosyncratic psychological issues and produce different patterns in psychosocial outcomes. Length of time after trauma/injury may play a role in how patients adapt, habituate, and restructure their lives to accommodate changes in their health state. There was a broad range of time between pretransplant assessment and the transplant surgery date (11–20 mo). Because QoL and psychosocial functioning can naturally change over time, it is important to standardize assessments to be re-administered immediately before surgery. Finally, though validated questionnaires were used, no assessments were adapted and validated for this specific patient population. Thus, it is unknown if individuals seeking and undergoing face transplantation are atypical in subtle ways that are not captured by these self-report quantitative measures. Future efforts should prioritize comparative analyses of QoL outcomes of face transplantation relative to those of conventional reconstructive surgery for comparable facial defects. 

Although the current study included some qualitative information helping frame psychosocial changes during 2 years postsurgery, qualitative research collecting data via systematic interviews would further our understanding of the subjective experience following this transformative procedure. Such an understanding might help to typify the ideal face transplant candidate who is best situated for beneficial outcomes. Furthermore, it may inform development of an assessment adapted to the setting of face transplantation with improved precision, predictive validity, and clinical utility for promoting adaptation and resiliency.

Due to the low number of face transplants to date and the abundant media coverage challenging the anonymity of the results presented, confidentiality was discussed individually with each patient of our cohort. The patients have all consented to the scientific publication of their results.

References


Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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Conflict of interest: Marie-Christine Nizzi, Ph.D., Jenny Zinser, B.Sc, Marvee Turk, B.A., Ericka Bueno, Ph.D., Russell Epstein, B.S., David Gitlin, M.D., and Bohdan Pomahac, M.D. declare no conflict of interest. Since the completion of this study, Megan Oser, PhD has been an employee and shareholder of Thrive Network, Inc. Dr. Oser conducted the entirety of this research while employed as a faculty member at Brigham and Women’s Hospital and received partial salary support from United States Department of Defense Grant, #W911QY-09-c-0216.
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