Psychological and Psychosocial Aspects of Face Transplantation

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Introduction

In 2005, the first partial face transplant was done, illuminating ethical and psychological issues that were only conjectured prior to that time [1].

Siemionov proposed the concept of the face as an organ with key functions, including communication, consumption of food, and conveying emotion [2]. Furr et al. noted that the face also contributed social information (age, ethnicity, gender identity, and biological sex) [3].

After traditional reconstructive techniques have failed to restore function and more normal appearance, face transplantation (FT) is considered a last resort intervention, not only for cosmetic purposes alone but also for restoration of function, sensation, and movement of important structures, such as the lips. Due to concerns about how much the recipient would resemble the donor, potentially upsetting to the donor family, appearance transfer was studied using cadavers [4] and computer simulation [5]. In these studies, the recipient looked like a blend of the donor and recipient as the donor face is applied over the recipient's bone structure.

Prevalence of Facial Disfigurement and Facial Transplantation

An estimated 10% of the US population has some degree of facial disfigurement that severely impacts their ability to lead a normal life [6].

The support group Changing Faces views the terms *disfigurement* or *deformity* as harsh and stigmatizing and has suggested using the terms *visible difference* or *visible distinction*. This group estimated those affected by visible difference in the United Kingdom at 400,000 in 2001 [7]. The etiologies of visible difference include acquired (disease and trauma) and congenital conditions [8, 9].

Since 2005 and to date, there have been 39 transplants in 8 countries, including Belgium (1), China (1), France (10), Spain (4), Turkey (7), and the United States (13). The median age of FT recipients was around 35 years old, ranging from 19 to 59 years old. Face transplantation has been done overwhelmingly for male patients, with 79.5% of FT recipients being male. Candidates may have a high rate of alcohol and opioid use disorders (60% in Cleveland Clinic series) and suicide attempts via gunshot wounds (GSW) (40% in Cleveland Clinic series). Worldwide mortality has been 6 out of 39 individuals, equaling 15.4% through May 2017, with the last 2 recipients less than 1 year post-transplant (Table 34.1).

The indications for face transplant have included:

- Animal attacks – 3
- Arteriovenous malformation – 1
- Ballistic injuries – 17
- Blunt trauma – 2
- Burn injuries – 10

Table 34.1 Indication for transplant, cause of death, and survival of patients who died after FT

Patient	Location	Indication	Cause of death	Survival
1[a]	France	Dog bite	Small-cell lung cancer	10 year 5 month
2	China	Bear bite	Nonadherence, sepsis	2 year 3 month
6	France	Burn injury	Sepsis	2 month
9[b]	Spain	Cancer	Cancer	3 year 11 month
16	France	Gunshot wound	Suicide	3 year
29	Turkey	Gunshot wound	Lymphoma, respiratory failure	1 year

[a]60.56
[b]Cavadas [60]

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- Cancer – 1
- Neurofibromatosis – 4
- Vascular tumor – 1

Facial Disfigurement and Psychological Comorbidity

Depending on the cause, duration, and age of onset of the facial disfigurement, the psychological comorbidities in these patients may differ. There is a broad spectrum of adaptation to facial reconstruction in adulthood [10].

Facial trauma in urban centers tends to be more prevalent in single unemployed young males in their 30s, with high levels of anxiety, depression, hostility, poor impulse control, and substance use disorders [11]. Determinants of post-traumatic stress disorder (PTSD) symptoms in the year following an injury include the level of stress the year before the injury, severity of pain, poor social supports, and previous trauma history. About 23% of patients will have PTSD symptoms 1 year after injury [12]. Other factors predisposing to PTSD after facial injury include older age and female sex [13, 14].

Factors predicting better adjustment in facial burn patients include less avoidant coping, lower functional disability in men, more involvement in recreational activities, more reliance on problem-solving for women, and higher levels of social support [15].

Patients with facial disfigurement from head and neck cancers typically have low levels of depression and report high levels of life happiness with positive feelings of well-being. Women show more depression and less happiness, but social support buffered the impact of disfigurement [15]. Quality of life (QOL) is not necessarily lower in these patients as compared to normal populations [16, 17].

After facial surgery, dysfunction may manifest as either denial or obsession with the defect, depression, nonadherence with follow-up visits, and social isolation. Dropkin observed that effective coping preoperatively predicted coping well postoperatively. Successful reintegration of body image was indicated by reduced anxiety, attending to self-care, and resuming socialization [18, 19].

Newell and Marks observed more psychological disturbance in those with facial disfigurement than the general population, as measured by the General Health Questionnaire and the Hospital Anxiety and Depression Scale [20]. Disfiguring conditions may result in more addiction, anxiety, altered body image, depressed mood, marital stress, PTSD, social anxiety and withdrawal, and worse quality of life [21, 22]. However, extent, severity, or type of facial disfigurement may not predict adjustment [23–26].

The impact of facial disfigurement may vary with the patient's developmental stage in life [26]. Bonding with parents may be altered by congenital facial disfigurement, especially if facial expression is affected [27, 28] as in Moebius syndrome (i.e., a rare congenital neurological disorder affecting muscles that control facial expression and eye movement) or if language development is affected. Behavioral problems in children may result from craniofacial conditions; these challenges include aggression, hyperactivity, learning disorders, oppositional defiant disorder, or social inhibition, with anxiety and depression continuing into adulthood [29, 30].

Teasing about facial differences may happen at any age but is more typical in the 4- to 12-year-old cohort. Adults with craniofacial conditions have experienced discrimination, may have interpersonal problems and marry later, and may have panic attacks [31–35]. Leaving familiar surroundings for new schools, jobs, or neighborhoods is more difficult for those with facial differences and may require developing new coping strategies for interacting with people that are unfamiliar with them [36, 37]. Rumsey and Harcourt have written in detail about treatment of developmental issues in children with visible differences and their families [9].

Psychiatrists should also be aware of trephine syndrome, once thought to be psychological, seen in some patients with traumatic midface injury resulting in a large craniectomy. In 1939, Grant proposed that the sense of vulnerability due to lack of an intact skull resulted in apprehension and insecurity, depressed mood, discomfort at the site of the defect, dizziness, fatigability, and intolerance to vibration [38]. Clues to the diagnosis of this syndrome include arrest of rehabilitation or acute deterioration, with aphasia, behavioral or cognitive deficits, paresis, and tremor [39]. Symptoms may include focal weakness, headache, neuropsychiatric disturbance, midbrain syndromes [40], and parkinsonian symptoms [41]. Other presenting symptoms may include altered level of consciousness, cranial nerve deficits, psychosomatic disturbance, and seizures. Cognitive deficits may include decreased attention, problems with executive function, and memory impairment. Headache may be positional, exacerbated by sitting up and relieved by the horizontal position. These symptoms may occur on average 5 months after craniectomy, with rapid improvement after cranioplasty in approximately 4 days. Roughly 55% of patients recover independence with activities of daily living within 3–6 months of rehabilitation [42]. Although verbal fluency may return within days to weeks, the spasticity in gait and weakness may persist in some patients requiring prolonged rehabilitation. The deficits in executive functioning and memory may delay the ability of the patient to retain information on facial transplantation in order to have capacity to consent the procedure. This

syndrome has also been called *syndrome of the sunken skin* flap [43], *the motor trephined syndrome,* and "neurological susceptibility to a skull defect," which has been suggested as a neutral descriptive term [44].

Comparing Face Transplantation with Solid Organ Transplantation

In comparing FT with solid organ transplantation (SOT), there are similarities and differences. The differences include:

- Face transplant, like hand transplant, has not been shown to improve survival but is performed to enhance QOL [45].
- Patients with FT have higher mortality compared to some SOT, total 15.4% to date.
- Rejection may occur later in FT, as compared to SOT, between days 7 and 120.
- Patients potentially have prolonged, up to 6 months, hospital stays, much longer than most SOT, other than small bowel transplant recipients [46].
- There is an increased emphasis on informed consent for an experimental procedure that is not life-saving, but hopefully life-enhancing [47].
- A demanding speech therapy regimen is needed to enhance facial mobility and to clarify speech, so patients must be motivated.
- Long-standing tracheotomy care and percutaneous endoscopic gastrostomy (PEG) tube feeding may be needed pre- and post-FT.
- Potential substance use and chronic pain disorders can arise from injury and multiple facial surgeries.
- A rescue plan must be in place in case the face transplant fails; the recipient must have enough skin available to do another flap to cover the facial structures.
- An increased focus on societal reintegration after surgery is a measure of success.
- Media training and tight security postoperatively are helpful for recipients, due to intense interest of the media and public.

Course and Complications After Facial Transplantation

Facial transplantation surgery duration has ranged from 15 to 53 h, with as little as 500 milliliters of blood loss up to 27 units of pack red blood cells needed for transfusion for a patient with neurofibromatosis [46]. Facial sensation may return within 2–6 months, with motor function recovering by 1 year after the transplant [46, 48]. In terms of social functioning, Lantieri documented that four of seven recipients returned to work thus far [49]. The ethical issues relevant to FT have been addressed elsewhere at length and were considered at the Cleveland Clinic 5 years before the first face transplant was done [50–52].

Immunosuppression for FT resembles standard immunosuppression for solid organs. For facial transplantation, a target level of 12–15 ng/ml for tacrolimus is used for the first 3 months and 10–12 ng/ml thereafter, in combination with mycophenolate mofetil (MMF) and prednisone. Weekly biopsies are done on the skin and oral mucosa for 1 month, then biweekly for 2 months, and then monthly during the first 6 months. Mucosal biopsy may be more likely to show rejection than skin. Speech therapy may be daily for the first 6 weeks, including static and dynamic exercises, gentle massage, and sensory reeducation.

Patients must be educated about the potential risks inherent with transplantation, including infection, rejection, length of hospital stay and recuperation, surgical risks, and risk of cancers with long-term immunosuppression. In addition, there may be a need for revision procedures, averaging 2.6 per patient (range 0–5 procedures) [53]. Sosin and Rodrigues described at length the type and extent of revisions done by various teams, ranging from major to minor procedures [54] (Table 34.2).

In 2007 Vasilic et al. attempted to quantitate risks for FT based on 10-year data reported for kidney transplantation and 5-year data for hand transplantation using standard immunosuppression with tacrolimus, MMF, and corticosteroids. Estimates of risk for FT were as follows [58]:

- Acute rejection – 10–70% risk.
- Acute rejection reversibility – 100% with steroids alone.
- Chronic rejection – <10% over 5 years.
- Hypertension – 5–10%.
- Renal failure – <5%.
- Diabetes – 5–15%.

These predictions were fairly accurate; though there have been no cases of frank renal failure requiring dialysis, Lantieri reported decreased, but higher than 60 ml/min, glomerular filtration rate (GFR) in all recipients. He also reported hypertension in three out of seven patients, hypercholesterolemia in three out of seven patients, and hypertriglyceridemia in one recipient [49]. Diabetes has been reported in FT recipients [59, 60].

Acute rejection is nearly universal with worldwide teams reporting two to eight episodes of acute rejection per recipient

Table 34.2 Infections in facial transplant recipients [54–57]

Bacteria	*Pseudomonas*, *Staphylococcus*
Fungus	*Aspergillus*, *Candida*
Virus	CMV, EBV, HSV+, MCV+

[59, 60]. Two cases of chronic rejection have been reported as well [61]. With composite allografts, the skin is the primary target for rejection, and generally muscle and bone are spared. With FT rejection, mild rejection is seen only on biopsy, though with more severe rejection, this is readily apparent as the face appears sunburned. Topical tacrolimus has been used, but the efficacy has not yet been proven in FT [62].

Of note, the first FT recipient developed class II donor-specific antibodies, later had sentinel graft necrosis, and subsequently showed decreased flow in the right facial artery with C4d deposits on the endothelium of some dermal vessels in the graft. She was treated with plasmapheresis, three cycles of bortezomib, and rescue therapy with eculizumab. However, necrosis of the lips and perioral area developed, and surgical excision of the lower lip, labial commissures, and partial right cheek was needed [61].

To date, there are no reports of graft-versus-host disease with FT [63]. Infections transmitted to FT recipients from the donor include cytomegalovirus, oral herpes simplex virus, molluscum contagiosum, and treponema pallidum [46]. Fatigue due to CMV transmission may compromise QOL [64]. CMV resistant to current antiviral drugs has been seen in FT recipients [49]. Since face transplant is not a life-saving procedure, it may be prudent to require the donor to be CMV negative if the recipient is CMV negative, as is the case in hand transplantation [58]. However, requiring donors to be CMV negative for CMV negative recipients may unnecessarily prolong the waiting period.

Certain risks are difficult to quantitate for face transplantation, for example, neurological side effects with tacrolimus; osteonecrosis, cardiovascular risks, cataract, or glaucoma with corticosteroids; or gastrointestinal side effects and leukopenia from MMF. The experience with immunosuppression is still not sufficient to know whether minimizing protocols, with gradual steroid withdrawal and low levels of calcineurin inhibitors (CNIs), will be possible in FT recipients. There is some evidence with other grafts that mTor inhibitors may prevent chronic rejection. The risks of nonadherence to immunosuppression with grafts that are not life sustaining may be higher than with other organs, as evidenced by the high rates of acute rejection [61].

The risk of cancers postoperatively with hand transplant was estimated by extrapolation from kidney data and thought to be about 3%, with one third of these being skin cancers, some of which are preventable with good sunscreen prophylaxis [45]. To date, 10.3% of FT recipients have had cancer [54]. One patient, in particular, developed with EBV-related B-cell lymphoma 14 months after transplantation which recurred 9 months after treatment with rituximab [54]. After treatment with rituximab, cyclophosphamide, doxorubicin, prednisone, and vincristine, cancer went into remission. However, 3 months later, he was diagnosed with EBV-related smooth muscle cell tumor of the liver [54].

Another FT recipient was found to have a squamous cell carcinoma on his arm and 1 month later was diagnosed with stage III non-Hodgkin's lymphoma. After treatment with rituximab, cyclophosphamide, doxorubicin, prednisone, and vincristine, he developed aspergillus pneumonia that spread to the brain. His immunosuppression was discontinued, and the facial graft rejected 16 days later and was removed and replaced with an anterolateral thigh flap. A second episode of respiratory failure ensued after extubation, and he succumbed 11 months later to cardiac arrest [54].

Two other FT recipients developed cancer. One HIV-positive recipient had a relapse of squamous cell cancer, which he initially had 11 years prior to his FT [54]. Finally, the first FT recipient in France was found to have a small cell lung cancer during her reevaluation for re-transplant after diagnosis of chronic rejection and surgical excision of part of the graft. The lung cancer was resected, but the patient continued to smoke; the cancer recurred and led to patient's death in April 2016 [61].

EBV-mismatched transplants (donor+/recipient-) are thought to have a higher incidence of post-transplant lymphoproliferative disorder (PTLD) [65, 66]. To extrapolate from SOT, the incidence of non-Hodgkin's lymphoma is estimated at 0.3–0.4% in the first year post-transplant with SOT and 0.06–0.09% per year thereafter, but PTLD has been seen years after the original transplantation [65, 66]. Kaposi's sarcoma can occur in SOT recipients but is generally treatable by switching from CNI to sirolimus, which inhibits mTOR and has anticancer properties. There has been no increase in other common types of cancer seen among transplant recipients, such as breast, colon, lung, and prostate cancers [65, 66].

Assessment and Communication Strategies

Preoperative assessment of FT candidates may be hampered as many patients have severe speech impediments that impair communication if they lack midface structures such as the maxilla, upper and lower incisors, palate, nose, and lips. Surgical attachment of an artificial palate or using an obturator to close the gap in the palate can markedly improve intelligibility of speech. Writing boards may help but may be difficult to use post-transplant with visual impairment and tremor due to CNIs. A reading machine can be used for teaching about transplantation for patients that are legally blind but retain some vision. Cellular phone alarms and watch alarms can be set for the times medications are due. Visual impairment may result in some mistakes in adherence to the immunosuppression medication regimen. Total blindness was initially considered an absolute contraindication for FT, but totally blind patients have now been transplanted successfully despite the challenges [67, 68].

Eye Transplantation

Eye transplantation may one day remedy the dilemma of FT in totally blind patients. The ethical considerations were reviewed by Sivak et al. in 2016 [69]. Davidson et al. reported that surgical protocols are underway using the rat model, noting that the technical feasibility was established and that with advances in immunosuppression and new therapies in neuroregeneration, human surgical protocols are needed to promote momentum toward the goal of eye transplantation [70]. As novel as the idea of whole eye transplantation seems, the first report of an eye transplant in humans was in 1885 when Dr. Chibret replaced a girl's eye with a rabbit's eye which failed by postoperative day 15 due to lack of effective immunosuppression in that era [71]. Since that time, both cold-blooded animals (e.g., salamanders and frogs) and mammals (e.g., canine, rabbit, rat, sheep, and swine) have been used as models for eye transplantation [71].

Patient Selection and Psychiatric Evaluation of Face Transplant Surgery Candidates

The timing of evaluation for FT must allow for:

- Time to grieve losses and coming to grips with the injuries sustained,
- Treatment of PTSD and any depression,
- Rehabilitation.

Goals of psychiatric evaluation for FT include (1) selecting motivated patients, (2) deliberating options besides face transplant, (3) discussing risks and benefits of transplantation, (4) describing the success rate and rescue procedures, (5) providing education about immunosuppression regimen, (6) recognizing need for smoking or substance abuse rehabilitation, and (7) identifying psychiatric disorders requiring treatment for better outcomes.

In order to establish a registry of prospective face transplant candidates, a rating scale was developed, the Cleveland Clinic FACES score which is analogous to the MELD score for liver transplant candidates [72].

Psychiatric contraindications to face transplant surgery include [73, 74]:

- Active bulimia nervosa
- Active psychotic disorder
- Severe personality disorders
- Active substance use disorders
- Nonadherence to the medical regimen
- Mental retardation without adequate social support
- Suicide attempts or psychiatric admission within the past year

Many predictions were made before the first FT occurred, anticipating what personality traits and behaviors would typify the successful candidate [75]. The need for high levels of self-esteem based on factors other than physical appearance was thought to be necessary for successful FT [75]. In our two first recipients at Cleveland Clinic, the first had high self-esteem based on factors other than appearance. This patient continued to have fairly consistent high self-esteem after FT, with resumption of more social activities, and FT resulting in less teasing and verbal abuse in public. Our second recipient has not achieved his goal of resuming work with FT, namely, a corneal transplant. He also was more dependent on physical appearance for self-esteem, and his self-esteem initially diminished after transplantation, with poor satisfaction in social activities and strain in relationships. The FT did not lead to increased intimacy as he had hoped.

Taking an active approach to the comments made by the public about the patient's disfigurement is good preparation for handling the intense media attention and comments by the public after a face transplant [75]. Avoidant strategies can decrease anxiety but may delay the rehabilitation needed prior to successful FT.

Some predictions about FT were unrealistic. Patients who believe others judge them on appearance are accurately perceiving reality [76]. Studies show that opinions are formed within minutes of an introduction, and much of this assessment is based on appearance, involving encoding social information in the amygdala and posterior cingulate cortex [76].

Key to patient selection is the distinction between assertive coping strategies in handling the injury and social encounters and long-term avoidant strategies. Lazarus described this dilemma as the conflict between *protection of the self* versus *presentation of the self* [77]. Avoidant strategies may be used temporarily for some months to decrease anxiety and allow recovery; however, long-term passivity predicts poor adjustment after craniofacial injury [78].

Avoidant strategies include:

- Social withdrawal.
- Not talking about the extent of the injuries.
- Not mourning the losses due to the injuries.
- Not touching or looking at the facial injuries in the mirror.
- Covering the injuries habitually with makeup, masks, or hats.
- Excessive and repeated verbal denial that the injury occurred.
- Not confronting the functional losses (eating, drinking, speech, vision).

Assertive coping strategies include:

- Taking the initiative in social interactions.
- Educating others about facial disfigurement.

- Calmly confronting negative reactions from others.
- Use of social skills (firm handshake, good eye contact, smiling, and nodding).

Callahan describes the paradox that the injured bodily part is the same tool needed for reintegration of the sense of self [79].

Candidates may have some anxiety, depression, and social anxiety, especially if prior reconstructive surgeries have failed. Patients may have minor residual symptoms of PTSD that need to be treated to help patients tolerate interventions without severe exacerbation and to assist sleep. Depression or anxiety compromising functioning should be treated prior to listing for transplantation.

Patients often have undergone multiple surgical procedures in attempts to ameliorate disfigurement, and this is not necessarily a contraindication to FT. However, this may limit options for rescue procedures due to loss of skin suitable for grafting.

Girotto et al. noted many chronic sequelae after complex facial fractures, and these symptoms are often seen in face transplant candidates with facial disfigurement [80]. These include painful dentition, chronic headache, facial numbness or pain, shifting orofacial structures, diplopia or decreased vision, mastication problems or drooling, epiphora (uncontrolled watering eyes), anosmia or change in olfactory and gustatory sensation, chronic pain disorder related to the initial injury, and/or subsequent and reconstructive surgeries requiring large amounts of opioids for pain management.

At this time creating composite structures, such as the nose, eyelids, and lips, is beyond the scope of surgical interventions, though some envision applications of selective tissue engineering in vitro for craniofacial regeneration [81].

Lack of confidence in social situations may not be an absolute contraindication to face transplant. Social confidence may vary based on the time since injury and with the type of social situation. Patients with facial disfigurement often perceive reactions from the public ranging from avoidance, fear, revulsion, or staring to physical or verbal abuse [82–84].

We must be cautious about raising false hopes in potential candidates and continue to provide compassionate psychological support to those who are not deemed to be suitable candidates for FT [63]. Many candidates may be evaluated in order to find several that are suitable, ranging from 30% to 50% acceptance rate in adults, based on surgical, medical, and psychiatric factors [63, 85].

Pediatric Face Transplantation

A recent article by Marchac et al. raised the ethical issue of whether FT should be done in children [86]. Upon screening for inclusion criteria, including age under 18 years old and severe facial disfigurement due to burns, malformation, neurofibromatosis, trauma, or vascular malformation, 12 candidates were identified. Candidates that did not have complete destruction of the orbicularis oris muscle or orbicularis oculi, along with a large central facial defect, or who had poor parental support or insurance problems were excluded, leaving three potential candidates. These children had diagnoses including third-degree burn of the entire face, Sturge-Weber syndrome, and neurofibromatosis type 1 with problems with breathing, feeding, and speech. When screening was extended, only 7 of 25 candidates were deemed psychologically stable enough to proceed. Growth of the facial graft is a specific issue, though nerve growth is faster in children than adults. Adherence with immunosuppression is a potential area of concern in children, particularly with adolescents. No ethical barriers to FT in children were found by this team.

Psychological screening tools suggested for children and adolescents included:

- Coping Strategies Inventory
- Parent Medication Barrier Scale
- Adolescent Medication Barrier Scale
- Parental Coping Strategies Inventory
- Body Image Disturbance Questionnaire
- Perceived Stigmatization Questionnaire
- Youth Quality of Life-Facial Differences Model
- Multidimensional Scale of Perceived Social Support

The expectations of the child and parents must be realistic. The patient's issues regarding QOL, body image, coping, and adherence are important areas to explore. The parents must be aware of the need for adherence in preventing acute and chronic rejection and be educated to monitor the facial graft for signs of infection or rejection. Clearly parents must consent for the child, but the child's assent is necessary for continuing long-term cooperation, and chronological age may not reflect maturity. Considerations for the donor family are also addressed including making an acrylic mask molded from the donor's face for restoring the appearance of the donor [87]. Marchac et al. mention the future possibility of 3-D printing to make a donor face mask, as this was recently done in Finland for their first facial transplant [86].

Psychological Tasks in Adjusting to Face Transplantation

The face is intimately connected with our identity and sense of individuality. In an ancient Persian poem, Attar observed, "You can never see your own face, only a reflection, not the face itself" [88].

Contemporary authors surmised that "wearing another person's face may raise complex issues of identity." [89]

Having a new face restores the person's ability to move in society inconspicuously, without comments and questions from others about their visual difference. Symbolic interaction theory hypothesized that people form identity and self-esteem through interpreting how others behave toward them [90, 91]. This was observed to be true in our first Cleveland Clinic FT recipient who was legally blind. She learned that her appearance was now acceptable by the comments from her daughter, who thought they looked more alike after the FT [92].

Every organ transplant recipient has the psychological task of incorporating the new organ. Muslin theorized in the 1970s that the transplant recipient may go through several steps to incorporate the organ including:

1. Perceiving the organ as a foreign object.
2. Perceiving the organ and donor as transitional objects.
3. Perceiving the organ as a personal belonging.
4. Letting go of the donor as a transitional object.
5. Integrating the organ into the recipient's self-schema.

D.W. Winnicott's transitional model described the psychological process in childhood where the child adopts a transitional object for comfort when a parent is absent. Recipients sometimes idealize the donor as a protective parental or god-like rescuing figure, identify with or project onto the donor as in a twin-ship relationship (good or evil twin), or may view the donor as a persecutor if the patient has had conflictual relationships with family members. Patients may communicate with the donor through magical thinking via thought transference as a defense against fears. Goetzmann theorized if the recipient continues to use the donor or organ as transitional objects, this may delay social and professional reintegration [91].

The first partial FT recipient in France confirmed some of these ideas in interviews, indicating that incorporating the face of her donor was challenging. She grieved both the death of her donor and the loss of her former appearance. She stated, "I used to think of her every day and 'talk' to her." She noted the differences between her original face and her donor's face. She thought if she could watch the film of the donor's face being removed and grafted onto her own face, then she could say goodbye to her donor. She expressed identification with the donor as well, calling her "a twin sister" since her donor had committed suicide. She had expected to look more like she did before her injury. She felt guilty that she was given so much after having done a "stupid thing." She also observed after being kissed on the cheeks by a clerk who recognized her that she was no longer thought of "as a victim of the plague." [93]

What was not anticipated was that the adjustment for those with facial injuries from their normal visage to a disfigured face is a much greater adjustment than adjusting to a new face after transplantation. For those with congenital differences such as neurofibromatosis, this also appears to be true, as the FT allows them to pass unnoticed in society. As stated in a recent article, FT is "unlikely to make people 'beautiful'; rather it will make them look normal and forgettable." [94]

Tools for Psychological Assessment and Psychological Outcomes in Face Transplant Candidates

Many FT teams have not quantitatively investigated body image, mood changes, perception of teasing, QOL, self-esteem, or social reintegration. There is a significant void in rating scales and instruments specific for psychiatric assessment and applicability to FT. Several rating scales were modified specifically for FT, such as the Perception of Teasing-FACES and the Physical Appearance State and Trait Anxiety Scale (PASTAS).

In view of the etiologies of facial disfigurement, including ballistic injuries, burns, congenital issues, and cancer and the many facial surgeries done prior to FT evaluation, the incidence of PTSD disorder may be high in FT candidates. In anticipation of future candidates, a review of PTSD instruments may prove useful. Generally a trade-off must be made between the best instrument and the most practical and time-efficient instrument clinically.

For initial screening for the presence of PTSD, the 10-item Trauma Screening Questionnaire may be superior to several other screening measures, including the PTSD Checklist [95], the Posttraumatic Stress Diagnostic Scale [96], the Davidson Trauma Scale [97], the 4-item SPAN [98], and the BPTSD-6 [99].

For screening purposes, documenting severity of symptoms and tracking all the DSM-IV-based criteria in an efficient way, the self-rated Posttraumatic Stress Diagnostic Scale (PDS) may suffice. This 49-item scale can be administered in 10–15 minutes, correlates with the Beck Depression Inventory (BDI) and State-Trait Anxiety Inventory, and has good reliability and validity [96].

Another measure that assesses DSM-IV criteria for PTSD that can be used for tracking changes in symptom severity is the Davidson Trauma Scale, containing 17 items. This rating scale has good test-retest reliability, shows a high correlation with other PTSD measures, and is not confounded by extroversion/introversion personality traits [97].

The Clinician-Administered PTSD Scale (CAPS-1) takes about 45 min to administer, provides a multidimensional view of the severity of PTSD, corresponds to established DSM-IV diagnostic criteria, delineates both current and lifetime diagnostic time frames for those with history of

multiple traumatic events, has high sensitivity and specificity, and is a reliable and valid instrument [100].

Other instruments frequently used with PTSD patients include the Impact of Event Scale, the Mississippi Scale, and the Minnesota Multiphasic Personality Inventory PTSD Scale (MMPI-PTSD) – all of which may be used for screening for baseline symptoms, but none are diagnostic measures or useful for measuring treatment outcomes.

A recent review of quality of life after FT by Aycart et al. indicated that 11 of the 17 articles were descriptive, and only 4 centers reported data, with 1 study of 8 patients using prospective, systematic assessments with validated instruments [101]. The measures used to evaluate QOL and psychological variables greatly varied between the studies. Overall, of the 39 FT recipients, the quality of life outcomes have been published on only 14 patients in peer-reviewed literature. Considering that increasing the number of quality of life years is the rationale for FT, gathering more reliable quantitative data may be essential to determine the risk-benefit ratio for FT recipients [101].

Lantieri et al. published results of a prospective open study for six FT recipients, demonstrating that SF-36 scores were improved for all patients when comparing pre-transplant QOL to 2.5–8 years post-transplant for both physical and mental components [49]. However, patients with self-inflicted GSW reported less improvement than those with neurofibromatosis type 1. Lantieri et al. showed improvement in three patients on the Derriford Appearance Scale-59 and general improvement for these three patients on the University of Washington Head and Neck Disease-Specific questionnaire and Performance Status Scale for Head and Neck Cancer. Of the first five patients, data was omitted for two, as one died and the other decided to opt out of FT. One patient committed suicide by GSW at year 4 after FT [49]. This experience led the team to reconsider offering FT to patients with self-inflicted GSW.

Of note, although many surgeons may subscribe to the idea that all patients with self-inflicted GSW to the face will ultimately take their life in this way, evidence disputes this myth. Runeson et al. reviewed 48,649 patients treated for attempted suicide to see how many later successfully completed suicide and whether they used the same method [102]. Those who attempted via hanging were the most likely to commit suicide later by that method, 53.9% of men and 56.6% of women. Those who attempted suicide via firearm or explosive were less likely to complete suicide with that method later, 34.5% of men and 7.5% of women. Overall, only 11.8% of those that attempted suicide later completed suicide over 21–31 years follow-up [102].

To explore and demonstrate an example of the patient's psychological course post-FT, Coffman et al. did assessments every 3 months for 3 years, then every 6 months thereafter on the first FT recipient in Cleveland in 2008 [103]. The SF-36, Rosenberg Self-Esteem Scale and Spielberger State-Trait Anxiety Inventory did not show much change over time for the first FT recipient. Her scores on Psychosocial Adjustment to Illness Scale-self-rated showed steady improvement after transplant in social integration and psychological distress for the first 3 years. The FACES-Perception of Teasing Scale, a single-center-derived instrument based on the original Perception of Teasing Scale, showed that verbal abuse in public diminished to nearly nonexistent over the first 3 years and that she was less bothered by the reactions she received in public. The Physical Appearance State, Trait Anxiety Scale, and Facial Anxiety Scale-State showed an increase in concern over weight gain in the first 3 months due to steroids and less anxiety about the face.

The patient's BDI score declined from 16 to 6 by 3 months post-FT while on escitalopram [103]. At the end of 2009, the BDI score was 14, reflecting CMV infection and challenges at home. However, in 3 months, the patient did not report any symptoms of depression on escitalopram 40 mg daily. On the PAIS-SR, the patient rated changes in her appearance that made her less attractive before transplant as "extremely," while after transplant she rated this as "a little bit." PAIS-SR psychological distress rose at 3 months post-transplant, then fell markedly over the next 4 months, until CMV infection caused extreme fatigue. Once she received a new medication and fatigue lifted, the psychological distress improved again. Although the SF-36 and WHOQOL-BREF were utilized, the PAIS-SR was more useful in reflecting social reintegration and psychological distress and other domains such as sexual functioning and attitudes toward health care [103].

Chang and Pomahac assessed three FT recipients at baseline, 3 and 6 months post-transplant, noting that physical QOL declined during the first 3 months, then improved on the Short Form-12 [104]. Mental health of all three patients also improved on SF-12 at 6 months. Two patients reported high scores on EuroQoL five-dimension scale [EuroQoL-5D] physical function during the time period, but the third patient's physical functioning declined during the 6 months after FT. Two patients showed an improvement in their romantic relationships on the Dyadic Adjustment Scale, while the other was not in a partnered relationship [104].

For the two groups that used The Facial Disability Index, there was no preoperative data. Diaz-Siso reported steady improvement in scores over 2–3 years post-transplant, and Fischer had only one score at a single time point for one patient at 1 year, three patients at 2.5 years, and one patient at 5 years [105, 106].

Lemmens et al. used many rating scales and showed that the patient's health-related QOL improved after FT but then declined more than mental QOL at 15 months. The Mini-International Neuropsychiatric Interview at 15 months showed lifetime depressive disorder as before

the FT and no current depressive symptoms. This decline in physical QOL was attributed to medical complications that resulted from his medications. He showed improvement in resilience, affective responsiveness, and disease benefits, but his marital support and depth of the partnership bond decreased at 15 months [107].

Conclusions

Face transplantation offers a last resort intervention for patients with severe facial disfigurement. FT is not a life-saving but life-enhancing procedure, aimed at improving QOL and functionality. FT appears to decrease depression and verbal abuse patients experience in public and improve QOL and societal reintegration, though it may not alter anxiety, self-esteem, or sexual functioning. In terms of psychological monitoring, the PAIS-SR may have advantages over the SF-36 and WHOQOL-BREF rating scales for measuring psychological distress and social reintegration in this patient population. At present, UNOS is trying to collect SF-36 data from pre- and post-transplant on FT recipients to demonstrate QOL outcomes for this surgery motivated by improvement in quality of life. More systematic data should be collected to further examine whether the long-term physical and psychological outcomes of facial transplantation outweigh the risks of ongoing immunosuppression.

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