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FACIAL TRANSPLANTATION: A WORKING PARTY REPORT FROM THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

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BACKGROUND

At the winter meeting of the British Association of Plastic Surgeons in December 2002, Mr. Peter Butler presented a paper entitled "A Large Animal Model of Limb Transplantation without Long-Term Immunosuppression." This led to widespread comment in the media about the possibility of facial transplantation. Three months later, press speculation had extended to trying to identify the possible recipient of the world's first face transplant.

The charity Changing Faces wrote to the Royal College of Surgeons of England, issuing a press release in March 2003 that called on the College to "attempt to create a moratorium on further media coverage of the issue." This is something the College has never had the power to do. Both the College and the British Association of Plastic Surgeons, however, shared the concerns expressed by Changing Faces and others. Sensationalist coverage and a media hunt for the first patient could impinge on the privacy and well-being of any potential patients and their families. Any discussion of facial transplantation must also involve issues that are technical, psychologic, medical, and ethical. If such a procedure were to take place, it must be preceded by careful and open debate.

In response to these concerns, the College set up a small working party to examine all aspects of the proposed procedure. This met three times between April and September 2003 and was also in contact by e-mail and fax. The relevant literature, both experimental and human, was reviewed. Members also met with Mr. Peter Butler to discuss his research.

This article presents a review of the current situation in relation to facial transplantation as the working party members perceive it. It is published by the College to help inform and contribute to the ongoing debate about the ethics and practicalities of facial transplantation. The working party is interested in the opinions of the transplantation clinical community and therefore its reproduction as a special feature in this journal.

TECHNICAL ASPECTS

Transplantation to save and prolong life has become a regular part of medical and surgical practice. Most people are now familiar and comfortable with the transplantation of organs such as the heart, liver, or kidneys. In September 1998, the first human hand transplant was carried out in Lyon, France. Since then, 20 hand transplants, 9 abdominal wall transplants, and a laryngeal transplant have been performed. Most recently, in July this year, the world's first tongue transplant was reported. Such procedures are referred to as composite tissue allotransplantation (CTA) to distinguish them from organ transplantation. In most instances, the aim of CTA surgery is to improve the quality of life and not to cure disease or save life. No CTA has been carried out in the UK to date.

Principles of Tissue Transplantation

These principles form the basis of all modern plastic and reconstructive surgery. The patient's own (autologous) tissues in the form of flaps or grafts are transferred into defects created usually by trauma or ablative cancer surgery. A skin graft is a thin piece of skin, with no intrinsic blood supply, that relies on the ingrowth of vessels from the recipient bed (e.g., muscle). A flap has its own blood supply consisting of an arterial input and venous drainage (Fig. 1).

Transfer of a flap may involve division of that blood supply and reconnection or reanastomosis of the vessels at another site of the body, using what has become known as microsur-

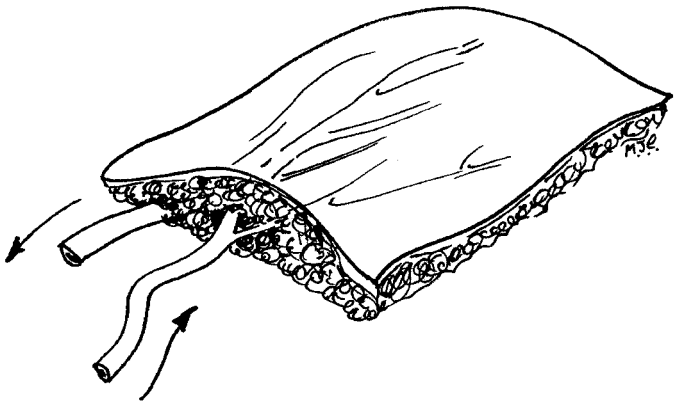

FIGURE 1.

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gical techniques. There is considerable experience in this type of surgery, and such flap transfer is known as a free-flap or free-tissue transfer. This is an autotransplant, and a similar flap transferred from one person to another person is an allotransplant.

Facial Transplantation

It is assumed that in the current discussions concerning facial transplantation that the potential recipients would be limited to those who have suffered severe burn injuries and have survived the initial treatment. Treatment of facial burns at present involves the use of flaps or grafts. The disadvantages of these methods mainly consist of an unacceptable cosmetic appearance and loss of function with tight scars and lack of facial expression. The aim of facial transplantation would be to replace unacceptable grafts and flaps with tissue that has the appearance of a normal face and allows mobility of the deeper structures.

Facial transplantation differs radically from the normal methods used at present, which involve autologous tissue. The face would be taken from a donor, and transplantation would involve using a large amount of tissue, requiring an arterial input and venous drainage as for a microvascular flap transfer (Fig. 2).

Although facial transplantation has not been carried out to date, there have been several replants of facial tissue involving replacement of parts such as the nose, ear, or scalp that have been torn or cut off (avulsed). In 1998, a patient's own face and scalp were replanted (*1*). The only incidence of tissue being used for facial or scalp reconstruction from another person was a report that described using tissue from an identical twin for scalp reconstruction (*2*). There is also considerable literature on experimental CTAs and indeed a description of a rodent model of facial transplantation (*3–5*).

Anatomic Considerations

Survival of the transplanted facial tissue will be dependent upon adequate arterial input and venous drainage. Venous drainage is more constant in position than the arterial supply, and recent studies (unpublished data presented to Facial Reconstruction Working Party, September 17, 2003, at Royal College of Surgeons of England, Butler P) have shown that the course of the superficial temporal artery is more constant than the facial artery. The generous anastomosis between the various arterial territories ensures the feasibility of restoring the blood supply of a transplanted face by microanastomosis of selected vessels. A microanastomosis of the facial artery and vein on each side would most probably be sufficient for facial viability, but other venous anastomoses would render the transplant safer and more likely to succeed (Fig. 3).

Several variations of tissue transfer may be considered, including the following:

- Skin and fat only used as a vascularized skin envelope;
- Skin and fat, but transfer includes some or all of the facial muscles, facial nerve, and the parotid gland;
- A subperiosteal facial transplant, which would include all of the soft tissues; or
- All of the above variations, but some of the bony architecture of the face would be included.

At present, only the first option from the above variations is envisaged. The transplant consisting of skin and subcutaneous tissue would be placed directly onto muscle. This would involve removing the recipient's scar tissue, including previous grafts or flaps.

Appearance of the Facial Transplantation

This is difficult to predict. Studies using computer modelling (unpublished data presented to Facial Reconstruction

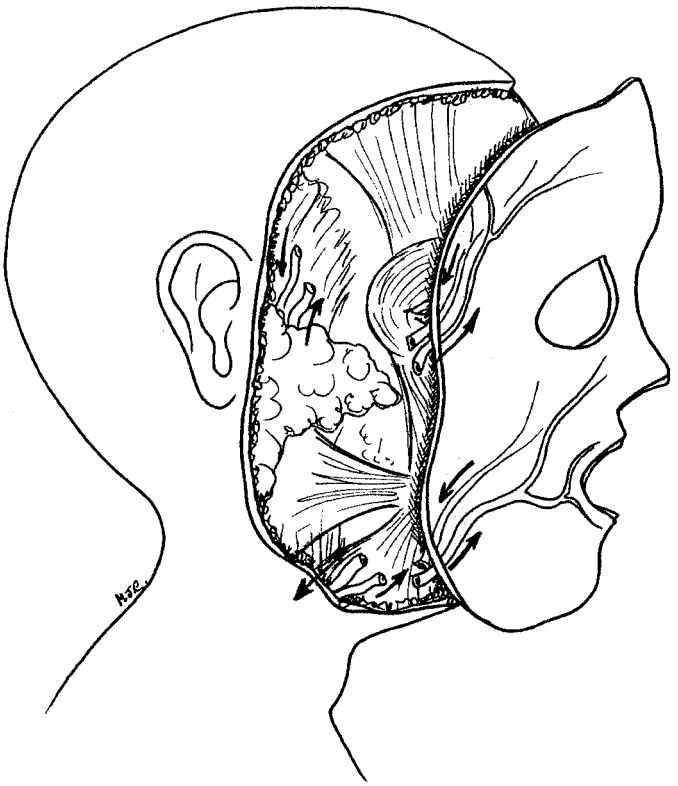

FIGURE 2.

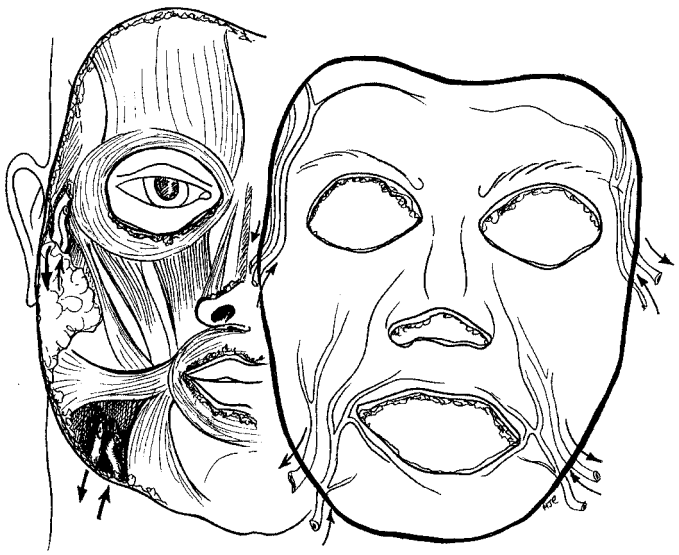

FIGURE 3.

Working Party, September 17, 2003, at Royal College of Surgeons of England, Butler P) suggest, however, that the face looks neither like the donor nor the recipient preinjury but would take on more of the characteristics of the skeleton of the recipient than the soft tissues of the donor. There is a reasonable expectation of mobile facial expression, which is dependent upon the depth of scarring before the operation. New mobile skin and subcutaneous tissue may indeed move better than the previously grafted face (Fig. 4).

Failure of the Facial Transplantation

As with any microsurgical procedure, there is the possibility of clotting of the arteries or veins that have been anastomosed. If this happened, it would be apparent within hours. If rapid diagnosis of the problem were made, the anastomosis might be salvageable by reexploration and reanastomosis of the vessels. If that salvage surgery failed, the transplant would have to be removed. This is unlikely to occur after the second day after the transplant. If it does happen, it is classified as a technical failure and is quite distinct from immunologic rejection. Acute rejection of the transplant would be apparent generally within days or weeks and, unless reversed by medications, would lead to necrosis of the transplant tissue.

In the event of either a technical failure or acute rejection, the transplant would have to be removed. Because previous skin grafts would have been removed before the transplantation, the patient would have to have further skin grafts of their own tissue to replace the failed rejected tissue, assuming that there were sufficient healthy donor skin sites. In this event, there is the possibility that there would be even more scarring than there was originally. The risk of free-tissue transfer failure for technical reasons in experienced units is considered to be less than 5%. The risk of failure of an allografted free-tissue transfer from acute rejection is unknown but might be approximately 10% with current immunosuppression.

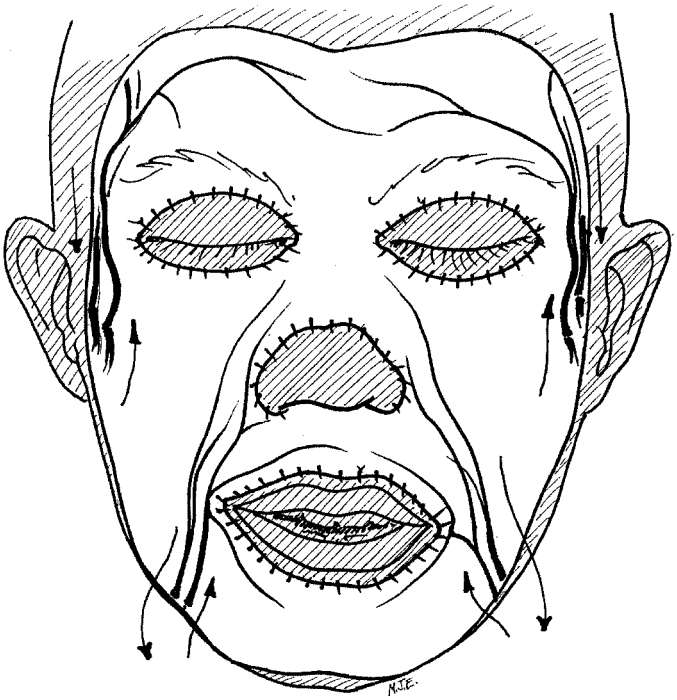

FIGURE 4.

IMMUNOLOGIC ASPECTS

Matching Donors. From an immunologic point of view, it would only be essential to ensure that the donor and recipient were compatible for the major (ABO) blood groups. Whether tissue matching, as currently performed for kidney transplantation, would confer a significant benefit on graft survival after facial transplantation is not known, but on the basis of experimental skin grafting in humans many years ago, it would be beneficial if achievable.

Graft Rejection. All patients who receive a transplant have to be treated with life-long immunosuppressive agents to prevent rejection and failure of the grafted organ or tissue. In the case of a facial transplantation, the skin is likely to be the main target of rejection. The skin is particularly susceptible to rejection, and this is one of the major obstacles to the success of human composite tissue transplantation.

Acute rejection of the skin has been reported in patients receiving immunosuppressive therapy after upper limb (*6*, *7*) and also after abdominal wall transplantation (*8*). It is usually easily recognized, allowing for prompt treatment with increased immunosuppressive therapy (steroids). In some cases, this reverses the rejection process (*8*), but in others, epidermal necrosis and graft loss occurs (*6*). The skin is also likely to be the principal target of chronic rejection. The progressive replacement of skin by fibrous tissue during chronic rejection will lead to loss of graft mobility and therefore functional failure. Although currently available immunosuppressive agents have markedly reduced organ allograft loss from acute rejection, they have had little effect in preventing chronic rejection, which is the major cause of organ-graft failure (*9*). It is not possible to accurately predict the likelihood of immunologic rejection after facial transplantation, but a graft loss of approximately 10% from acute rejection within the first year and significant loss of graft function from chronic rejection at approximately 30% to 50% of patients over the first 2 to 5 years might be a reasonable estimate.

Immunosuppression. Immunosuppressive therapy has well-known side effects and may itself give rise to conditions that shorten life. The incidence and severity of such side effects are well known, and this would allow an informed decision to be made as to whether these outweighed the potential benefit from facial transplantation. All of the currently available immunosuppressive agents give rise to agent-specific side effects that may include hypertension, renal toxicity, diabetes, and disturbances in blood lipid levels (*10*). Immunosuppression also increases the risk of infection and of malignancy. Graft recipients are particularly susceptible to viral infections such as cytomegalovirus and to fungal infections. Although these are not usually life threatening, they may cause significant morbidity. Careful monitoring and in some cases antibiotics are needed to reduce the risk. Immunosuppression also increases the risk of most types of malignancy, especially those where a viral cause is suspected (*11*). Squamous cell cancer of the skin is a particular problem, and approximately half of all patients receiving an organ transplant will eventually develop a squamous cell carcinoma. These can be recognized early and often treated effec-

tively by avoiding exposure to direct sunlight and by following appropriate screening programs. In some patients, however, they produce significant morbidity and mortality. A condition known as posttransplant lymphoproliferative disease, which ranges in severity from a glandular fever-type syndrome to a highly malignant lymphoma, affects approximately 2% of organ-transplant recipients (*12*). Treatment usually involves reduction of immunosuppressive therapy, and this often leads to graft loss from rejection.

Compliance with Immunosuppression. Noncompliance with immunosuppressive medication is well recognized after organ transplantation and was the cause of graft failure in the world's first hand transplant (*6*). An estimated 15% to 18% of organ-transplant recipients become noncompliant. The problem is highest in the young and in those from lower socioeconomic groups (*13*). Noncompliance invariably leads to graft failure and is difficult to manage because this behavior is usually unpredictable and may not have a clearly identifiable cause.

Induction of Immunologic Tolerance. A major aim of transplantation research has, for many years, been to develop clinically applicable strategies for inducing donor-specific immunologic tolerance against a graft (*14*). Giving some kind of short-term treatment to a potential graft recipient would allow them to accept a graft from a particular donor without the need for additional immunosuppressive drugs. Their immune system would be left intact to fight infection and malignancy. Transplant tolerance can be achieved quite readily in experimental mice and rats, but attempts to achieve tolerance in larger animals has proven very difficult indeed. At present, the only clinically applicable strategies for producing transplant tolerance involve radical preoperative treatment of the recipient accompanied by transplantation of bone marrow from the organ or tissue donor, which would be unacceptable in this context. However, there has been much recent progress in understanding the mechanisms underlying transplant tolerance, so there is reasonable hope that, one day, a way will be found to induce transplant tolerance in patients. Unfortunately, there is little prospect that this will be achieved within the next 5 years other than in a research setting. Clearly, if it did prove feasible to induce transplant tolerance, this would overcome all the immunologic disadvantages of facial transplantation. Many of the objections to proceeding with clinical evaluation of the procedure would be eliminated.

PSYCHOLOGIC AND SOCIETAL ISSUES

Psychologic Responses to Transplantation. The relative success of transplantation surgery has led to a recent increase in studies examining the psychologic responses of recipients. Researchers are becoming increasingly aware that organ transplantation may give rise to a particular set of stresses, psychosocial challenges, and adaptive demands (*15*). These include the following:

- Fears relating to the viability of the transplanted organ;
- Fear of the aftermath of possible rejection;
- Anxiety relating to the potential side effects of immunosuppressive medication, including increased risk of infection and malignancy;
- Feelings of personal responsibility for the success or failure of the graft, linked to the need to adhere to a drug regimen, the need to alter some behavior patterns such as diet and sun exposure, the monitoring of symptoms, and regular attendance at numerous out-patient appointments;
- Integration of the transplant into an existing body image and sense of identity; and
- Emotional responses to the experience of receiving a transplanted organ, including feelings of gratitude and guilt in relation to the donor and the donor's family. These can be affected by the reason for the transplant, such as life threat, as in the case of a heart transplant, versus improvements to function, as in a hand transplant.
- These psychologic effects may be magnified in the case of facial transplantation by certain factors as outlined below.

Issues of Identity and Communication. The face is central to our understanding of our own identity. Faces help us understand who we are and where we come from, with markers of genetic inheritance over many generations providing evidence of parentage, ancestry, and racial identity (*16*). Disruption to one's facial appearance, especially the inability to recognize oneself, represents a profound disruption of body image and may constitute a major life crisis (*17*). The response to a dramatic change in facial appearance can be akin to a bereavement reaction and can result in grieving followed by a slow process of adaptation. The issue surrounding the difficulties of integrating a donor hand into the recipient's body image has been discussed (*18*), and there has been speculation that these difficulties would be magnified considerably should facial transplantation ever occur.

Facial expressions, both conscious and unconscious, are crucial in our encounters with others. When we communicate in person, we do so through a stream of facial expressions. Two thirds of our communication with others takes place through the nonverbal channels of the face. Facial expressions depend on very complex coordinations of nerves and muscles in the face and are crucial in establishing and maintaining successful relationships.

Recent research indicates that the act of forming a facial expression has an impact on how we feel. Facial muscles feed information to our brains, so, for example, when the brain recognizes that we are smiling, it releases a hormonal response that accompanies a state of happiness (*19*). More research is needed before we can understand how mood is affected in those who are unable to form expressions in conventional ways. However, there are numerous reports of the difficulties experienced by those who are unable to use their faces to communicate effectively, whether through the absence of expression or miscommunication resulting from altered expressions (*19*). Preexisting difficulties may well play a part in motivating a potential recipient to seek a facial transplantation. Yet, if the ability of the recipient to communicate normally after the transplant is compromised, difficulties with social interaction are likely to persist.

Psychologic Vulnerability and Resilience. Contrary to popular opinion, a consistent finding in the research literature is that the extent of psychologic distress resulting from a visible difference is not well predicted by the extent or severity of the disfiguration (*20*). Some cope well with an extensive and very visible disfigurement, whereas others struggle to deal with a

relatively minor difference (*21*). Those who cope well have high levels of self-esteem and derive this from factors other than their physical appearance. They enjoy good quality social support from family and friends, have good communication skills, and have an optimistic outlook on life. Those who experience greater difficulties derive much of their self-esteem from their looks and believe others evaluate them largely on the basis of their physical appearance (*18*). They experience higher levels of anxiety and depression, lack confidence in social situations, and do not believe they can use other techniques to compensate for their appearance. It is generally this latter group, the more psychologically vulnerable, who seek appearance-enhancing treatment (*22*). They are also more prone to unrealistic expectations of change after surgical intervention (*23*). Paradoxically, the more vulnerable will be less well equipped to deal with the aftermath of complex transplant surgery, uncertain outcomes, and ongoing treatment regimens (*24*).

Motivation to Seek Treatment and Expectations of Outcome. The potential costs of undergoing a facial transplantation are considerable. These may include a long wait for a suitable donor, a major surgical procedure, an anxious postoperative wait to see whether the graft is successful, a demanding postoperative drug regimen with concomitant risks, and some associated lifestyle change, such as to diet and sun exposure. To justify these costs, expectations of outcome are likely to be considerable (*25*). This is likely to be especially true in the early days of this procedure before long-term outcomes have been evaluated. In relation to other appearance-enhancing surgeries, unrealistic preoperative expectations of outcome are more likely to be associated with poor postoperative psychologic adjustment (*26*).

It has been noted that when innovative surgery is proposed, potential patients tend to be more attuned to the benefits than the risks (*27*). If potential patients are desperate for a procedure, the question arises whether it is feasible for them to assess whether possible improvements in quality of life outweigh the potential morbidity and mortality caused by long-term immunosuppression (*27*).

Consequences of Transplant Failure. The potential psychosocial ramifications of a failure of a facial transplantation are considerable. In the case of a hand transplant, failure will mean a return to the state of not having that hand. In the case of a failed facial transplantation, further grafting would have to take place. The result of this grafting is likely to be hugely disappointing to someone who was hoping for a relatively normal appearance and a functioning face.

Keeping to Treatment Regimens. Posttransplant medical regimens are complex, and some degree of noncompliance is surprisingly common (*28*). Levels of adherence to drug regimens and levels of success in modifying risk behaviors, such as those concerning diet and sun exposure, in transplant recipients have been shown to relate to a complex interaction of factors. These include the personal characteristics, such as age and the educational level of the recipient, satisfaction with the outcome of the transplantation, beliefs about the consequences of nonadherence, side effects of the regimen, psychosocial status, and levels of practical and emotional support from family and friends (*28*). Some transplant centers have found it necessary to develop elaborate protocols to assess likely levels of posttransplant adherence.

Dealing with the Reactions of Others to Altered Appearance. Recipients will have to deal with the reactions of family and friends, both to their changed appearance and to any changes in previous patterns of nonverbal communication. There will be initial uncertainty concerning the reactions and behavior of others and the extent to which the recipient's new facial appearance will be accepted. There may be a mismatch between the recipient's preoperative expectations and how others actually respond.

In the case of strangers, the recipient will have to develop coping strategies to explain any visible signs of surgery or any deficits in nonverbal communication that may accompany the transplant. If the transplant is so successful that others do not notice any signs of surgery, the recipient will have to decide whether to disclose the existence of the transplant. If recipients have been the subject of any publicity, they may be recognized by strangers and will have to deal with unsolicited questioning and unwanted attention.

Alternative Interventions. Although cosmetic and reconstructive surgery is often reported by recipients to be beneficial in the short term, it is by no means a universal panacea for appearance-related problems. In the absence of studies involving long-term follow-up, the jury is still out on whether appearance-enhancing surgery produces lasting psychologic benefit.

Cognitive-behavioral interventions (i.e., interventions focused on producing changed thoughts and behaviors) have been shown to produce significant improvements in self-esteem, anxiety, depression, and social confidence for people with a variety of visible disfigurements (*22*, *29*). Reported benefits are maintained and, in some cases, enhanced at a 6-month follow-up. Because the most frequently experienced difficulties relate to problems with social interaction, interventions designed to enhance social interaction skills have also been developed. Results to date are promising (*30*, *31*). More research is needed, however, to identify which components of these interventions are the most effective.

THE RECIPIENT'S FAMILY

There has been relatively little research on the effects of transplantation in general on the recipient's family. At present, the main concerns center on the following:

- The pressure of increased responsibilities in relation to the maintenance of the health of the recipient posttransplant (e.g., reducing the risk of infection in the home environment and facilitating adherence to the postoperative drug regimen); and
- Worries about the recipient's future physical and psychologic well-being.

It has been reported that psychologic distress occurs well above normative levels in family members during the immediate postoperative period (*24*); levels appear, however, to decline gradually after that.

Facial transplantations are likely to result in complex issues relating to acceptance of the new appearance and the identity of the loved one. Family members will need to cope with the reactions of the recipient and will also have to deal with the reactions and questions of others. There are likely to be changes in preoperative patterns of social activity in response to the recipient's changed appearance.

SOCIETAL ISSUES

Experience gained after the introduction of other appearance-enhancing procedures suggests several subsequent scenarios:

- Recipients, their families, the donor's family, and the transplant surgeons will be the subject of invasive press interest and publicity. All parties will need to deal with the considerable challenge of media intrusion.
- The existence and inevitable publicity surrounding the procedure will fuel the notion that a good quality of life cannot be achieved by people with disfiguring conditions.
- The general public will develop unrealistic expectations of the postoperative benefits and risks of facial transplantation.
- The very existence of appearance-enhancing procedures increases the desire in those who are dissatisfied with their appearance to seek surgical intervention.
- Once a treatment exists, increasing numbers of people try to track it down. In the case of facial transplantation, the example of the aging rich seeking to look more youthful has been cited (*32*).

ETHICAL AND LEGAL PROBLEMS CONCERNING FACIAL TRANSPLANTATION

Any form of surgery entails some level of risk of harm. Nonclinicians who use knives to inflict wounds on others with the intent to harm may be found guilty of criminal charges. Surgeons who do so will not be so charged. This is for two reasons. They do not intend such harm, and any wounds they administer are done for the purpose of therapeutic benefit and with the consent of the competent patient, including consent to the known risks of the procedure (*33*).

As regards consent, it is therefore the patient and not the surgeon who is responsible for the occurrence of whatever surgery that is agreed upon and the acceptance of any harm that accrues, provided that the surgery was properly performed, the harm was unavoidable, and the patient was properly informed about the risk of it. The surgeon is responsible for carrying out the procedure in a fashion that conforms to acceptable professional standards. Ideally, therefore, the professional relationship between the patient and surgeon should be one of partnership (*34*).

Even when surgical procedures entail a high risk, patients may still wish for them to go ahead. Organ transplantation entails the risks of both acute and chronic immunologic rejection, together with the risks of complications related to the immunosuppressant drugs. Many patients accept such hazards because of the quality or duration of their life without the transplant when compared with the known risks of having it. This risk-benefit ratio must also be professionally acceptable to surgeons. They will not be obligated to perform surgery unless they too believe that the risks to which they are putting the patient are proportional to the potential benefit that therapy might offer. This means that any decision to proceed with surgery should follow from the concurrent choices of both patients and surgeons.

These choices may sometimes conflict. Patients may refuse surgery that surgeons deem appropriate and demand surgery that surgeons do not believe merits the risk. As regards the former, patients may refuse because they are unwilling to proceed in light of the projected risks. Concerning the latter, patients may want to proceed with surgery whatever the risks, perhaps because of their otherwise low life expectancy or poor quality of life. Yet, whatever the patient may wish, surgeons may still refuse because they believe that in the circumstances of the particular patient, surgery will pose even greater risks of death or may further compromise quality of life (*35*). In such circumstances, patients may seek a second opinion, but if this produces the same result, there will be no option but to accept professional consensus. If so, appropriate counseling becomes just as much a part of the duty of care as is the provision of surgical intervention itself.

This potential conflict, between respecting the choices of patients and exercising the professional duty to act in the patient's best interest, is of particular relevance to the prospect of facial transplantation. The devastating psychologic impact of severe facial disfigurement has already been outlined. The desire of some people affected in this way for facial transplantation is understandable, including their willingness to incur high risks for the chance of a better quality of life. Yet, even if facial transplantation were a standard surgical procedure, analogous, say, to other forms of transplantation, there would still be circumstances where it would not be offered because of the surgeon's perception of the poor risk-benefit ratio. So, whatever the risks, there will always be the potential for conflict with patients who wish to proceed regardless of them. This potential is highlighted in light of the fact that no donor facial transplantation has yet been attempted, and there is good reason to believe that it may be very hazardous. Indeed, such transplantation is so experimental it is unclear how patients could be reliably informed about these high risks or surgeons could properly evaluate them without further research. Because this uncertainty poses problems for both patients and surgeons, it is useful to outline the moral and legal boundaries of good practice as regards consent to surgical care and research.

What is valid consent?. For consent to surgical treatment to be professionally and legally acceptable, it must be adequately informed, noncoerced, and competently given (*36*).

Information. The adequacy of information can best be thought to depend upon whether or not the information is sufficient for a reasonable or prudent person in the position of the patient to protect what he or she defines as their personal interest (*37*). Surgeons should explain what they are proposing to do and why and what are the common side effects and potentially worrying hazards. They should also provide information, where relevant, about other surgical or nonsurgical options. Surgeons must decide how much information to disclose. Decisions are arrived at through asking themselves what their patients should know to make informed choices about their personal future.

Noncoercion. Even if an adequate amount of information is disclosed to patients, their consent to surgery will be invalid if anyone has pressured them into choosing as they do. Surgeons have to be especially careful about coercion because their patients are so dependent on them. There is also a high potential for coercion by relatives for the same reason. The potential for coercion can be difficult for surgeons. On the one hand, most accept that the final choice for surgery should be left to the patient. On the other hand, surgeons want what they believe to be best for their patients. Therefore, there is ample room for unintentional coercion through selecting in-

formation for disclosure that overly reinforces the surgeon's beliefs. Aside from the professional exercise of self-control, various processes exist to minimize the danger. Where research is concerned, perhaps the most important factor is to ensure that the clinician who obtains consent is someone other than the clinical researcher.

Competence. Appropriate information may be noncoercively disclosed to patients in relation to proposed surgery. The consent of patients will remain invalid unless they are competent to provide it. There are four criteria for the assessment of competence. These are the capacity of patients to understand disclosed information, to remember this information, to weigh up or reason out the choices that the information poses, and to believe that the information actually applies to them (*38*). Note that all of these criteria must be present, but that their satisfaction does not mean that patients will agree with surgical recommendations. For example, patients may have the capacity to believe their surgeons but still not do so.

The right to refuse treatment. Provided that patients are competent, they have an absolute right to refuse surgery, whatever the consequences (*39*). It should be noted that the right of a competent patient to refuse treatment may be stressful for surgeons who strongly believe that therapeutic benefit can be derived from this surgical intervention. This is particularly the case with patients who do refuse, appearing to have understood or accepted the risk-benefit ratio described to them in the course of obtaining consent. Equally, the duty of surgeons to respect the right of a competent patient to refuse treatment does not entail their right to demand it. As has been noted, patients cannot force surgeons to operate on them if surgeons believe that the risk-benefit ratio is unacceptable and that surgery will not be in the patient's best clinical interests.

How Might Surgeons Break the Laws of Consent?

Battery. This is unlawful touching. To be touched lawfully, patients should agree to surgery on the basis of appropriate information about what the surgeon is going to do and why. Arguably, in the context of surgery, such disclosure should also include information about alternatives where available.

Negligence. As has been noted, surgeons also have a professional duty to reveal appropriate information about side effects and potential hazards, especially those that might impinge on the personal interests of patients. The availability of accurate information about such risks will be important for the purposes of such communication. It should be understood that the legal standard for disclosure in the UK is being progressively strengthened through changes in case law. This is why some professional organizations, such as the British Medical Association, advocate the application of the standard of disclosure of the reasonable patient outlined above.

The Experimental Character of Facial Transplantation. If surgeons do not know the risks of proposed interventions, then they cannot provide adequate information to patients about these risks to conform to their professional duty to do so. This is why it is important for surgeons to be able to differentiate between standard care for which such information is available and surgical research where it is not (*40*). Facial transplantation has not been performed before, and we do not know the risks. What we do know is that the risks of long-term rejection in some standard forms of transplantation are high, between 30% and 50% over a period of 2 to 5 years, along with other serious risks associated with immunosuppression, such as infection and cancer. It follows that any surgeon contemplating performing facial transplantation should regard the procedure as experimental and subject it to the ethical evaluation of an independent committee (*41*).

The role of research ethics committees. The committees created for the purposes of independent evaluation are called research ethics committees (RECs). Such committees have the task of ensuring that proposals for research studies comply with recognized ethical standards. They do so by reviewing the proposed study and only agreeing to it if the dignity, rights, safety, and well being of all actual or potential research participants are protected. In the National Health Service, REC approval is required for all research involving patients (*42*) (further information on RECs is available at http://www.corec.org.uk/index.htm). RECs have a responsibility to ensure that competent patients should only participate in clinical research when they have had the opportunity to give acceptable informed consent to do so (*43*). Informed consent should be gained from the parents of children and informed assent from the next of kin of incompetent adults. As regards facial transplantation, the focus is clearly on competent adults. The potential vulnerability of some patients may unduly influence their willingness to consent to research posing high risks. This might be because of the nature of their illness or their dependence on their clinicians, who also happen to be researchers. For example, committees will want to check that researchers do not overestimate the potential success of the experiment or understate its risks. Equally, committees also have a duty to ensure that the risk-benefit ratio of participating in research is reasonable. This is to guard against the possibility that patients are not subject to proposals by clinicians—who may also be their physician and surgeon—that are unacceptably hazardous, despite the desire of both clinician and patient to proceed.

These evaluations are often uncertain. However, such uncertainty is mitigated by the fact that good RECs include members with a range of professional and lay expertise. This should minimize the uncertainty as much as is reasonably possible. Sometimes, both clinicians and patients will disagree with the decisions of RECs not to allow some clinical research to proceed. One thing is clear. It will not be allowed if such committees do not accept that proper consent can be obtained from potential participants or that an appropriate risk-benefit ratio can be achieved in the proposed research.

Valid consent in the context of research. The legal propriety of any consent given for surgical research must conform to the same rules of valid consent for treatment as outlined above. However, it should do so with even more explicit rigor than might be legally or professionally acceptable for assessing consent to a standard surgical procedure. One reason for this is because of the unknown risks in surgical research (*44*). Extra diligence is required so that patients have a good understanding of what will be done to them, why, and with what potential hazards. It is for this reason that RECs will pay particular attention to information sheets attached to consent forms, along with the clarity of the information that the sheets provide about risks.

The role of RECs in protecting patients from themselves. We have seen that RECs also have a responsibility to ensure that patients are not subjected to unreasonable risks that are disproportionate to the potential benefit of the treatment that they may receive. To do so, RECs rigorously scrutinize animal studies and any other relevant data that will enable them to calculate, to the best of their ability, relevant cost-benefit ratios. To the degree that this calculation cannot be performed appropriately, it is unethical to allow an experiment to continue, even when the patient desires it. Of course, the boundaries of this calculation will also be judged by the consequences of no treatment. If the consequence of no treatment, for example, is death or more severe or permanent disability than the patient already experiences, much more flexibility will be shown in making this judgement (*43*).

The Moral Questionability of Facial Transplantation. In the preceding analysis of physical and psychologic risks of facial transplantation, three things emerged. First, the procedure itself remains highly experimental. It has not been performed before, and projections of applicability to the individual characteristics of potential patients remain highly theoretical. Second, the procedure appears physically to be very hazardous. This judgement is based on other analogous examples of transplant surgery involving risks of acute rejection and rejection through a failure of immunosuppression, along with the other known risks of immunotherapy. These risks are made all the more profound by the need or potential for further skin grafts should the initial transplant fail, which might in turn also fail. Third, the psychologic risks for potential applicants are even less understood. On the one hand, the personal hardship created by severe facial disfigurement should not be underestimated. On the other hand, patients facing such disability can adapt remarkably well to their disfigurement. Where a degree of such adaptation has occurred, the psychologic consequences of graft rejection would be immense. Even where it has not, this failure must be weighed along side the high risk of future graft failure that would even further compromise the appearance of the patient and their ability to adjust. Therefore, there are good reasons for arguing that facial transplantation should not at present be allowed to proceed without further research into how to improve the prospects for rejection.

The Risks

The problem of physical safety. There are insufficient reliable data to estimate risks to physical safety. This means that RECs cannot yet adequately judge the hazards of facial transplantation, and patients will not be able to choose it in an appropriately informed way. The moral and legal implications of not obtaining such consent have been noted. The implications of the highly experimental character of facial transplantation cannot be overestimated. Analogies with the data on other types of transplantation are too poor to use this evidence as a base for judging the risks of facial transplantation. The most important of these risks is that of rejection. There seems little way at present to estimate the likelihood of rejection for any individual, given the volume of tissue being grafted, the relative lack of developed and explored animal models, and continued uncertainty about the risks of immunosuppression. The general presumption can only, therefore, be that such risks are very high. For this reason, obtaining adequate informed consent to incurring these physical risks appears impossible. There seems no way of coherently aggregating these risks for the purposes of informed decision-making in such a way that the duty to respect autonomy overrides the duty to protect patients from unacceptable or unknown levels of potential harm.

The problem of psychologic safety. There are also insufficient reliable data to estimate risks to psychologic safety. There is little evidence of the potential psychologic impact on patients of a failed transplantation. The potential loss of their old appearance, however disfigured, could be incalculable. Indeed, even were the graft to be a technical success, patients may still be highly distressed by their new appearance, especially as regards to its impact among the social networks developed against the background of their old appearance.

How to weigh the potential for such new distress against the already existing psychologic burden of disfigurement is unclear, especially in light of the uncertainty surrounding possible rejection on technical or immunologic grounds. Therefore, again, RECs are not in a position to judge the appropriateness of these psychologic risks; nor are potential transplant recipients able to provide adequate consent to participate in this research.

CONCLUSIONS

To the reconstructive surgeon, facial transplantation would constitute a major breakthrough in restoration of a quality of life to those whose faces have been destroyed by accident or tumor. It is therefore worthy of study.

The microsurgical skills and anatomic knowledge required for this procedure are already well established and well known. However, at present, this is not only a question of technical achievement. The immunosuppression needed, the psychologic impact on the recipient and on the donor family, and the ethical concerns are the issues which must be considered. The need for lifetime immunosuppression carries considerable long-term risks that appear to outweigh any premature attempt to open the gates to facial transplantation. It remains unclear how acceptable and valid consent can be obtained from potential recipients, given the uncertainties about the risks and benefits that accompany the highly experimental character of the procedure.

The working party believes that until there is further research and the prospect of better control of these complications, it would be unwise to proceed with human facial transplantation. Equally, this conclusion does not underestimate the suffering of those patients who might be tempted by the prospect of facial transplantation. This conclusion is not adverse to facial transplantation. Indeed, it acknowledges the need to recognize it as a possible future treatment. It simply means that the work should take a much more incremental approach rather than some of the current hype surrounding it has suggested. The working party has only considered the question of facial transplantation and has not considered any other transplant surgery to improve quality of life, for example, hand transplantation. Such surgery would itself be subject to detailed consideration and REC approval.

The College would welcome comments on the report but is not in a position to reply to individual enquiries. Comments received by March 31, 2004 will be considered by the Chairman and members of the working party with a view to pro-

ducing a further statement in due course. Comments should be sent to the following address:

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