

Operation Frankenstein: Ethical Reflections of Human Head Transplantation

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Abstract

Practically every human organ is commonly transplanted providing temporary or permanent relief from a pathologic condition. Although organ transplantation can prolong life, the question arises as to whether it is ethical for any organ of the human body to be transplanted, particularly that of the human head. Plans have recently been announced to perform the first human head transplantation within the next few years; however, the ethics of human head transplantation have not been formally addressed. Here, we present several ethical concerns of a human head transplantation procedure, focusing on bioethical considerations, psychological consequences, and reproductive implications.

Keywords: Transplantation ethics; Neuroethics; Neurosurgery; Neurology; Neuroscience

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Introduction

Nearly every organ of the human body is frequently transplanted providing transient or permanent relief from a pathologic condition. Although organ transplantation can prolong life, the question arises as to whether it is ethical for any organ of the human body to be transplanted, especially that of the human head. Plans have recently been announced to perform the first human head transplantation within the next few years. A brief description of the proposed neurosurgical procedure entails removing the head of an individual suffering from a debilitating disease and attaching it to a donated cadaveric body. For this discussion, we will assume the technical aspects of such a procedure to be feasible. Although the neurosurgical protocol has been outlined, to our knowledge, the ethics of human head transplantation have not been formally addressed [1, 2]. Here, we present several ethical concerns of a human head transplantation procedure, focusing on bioethical considerations, psychological consequences, and reproductive implications.

Bioethical Considerations

From the historic axiom of bioethics, 'Primum non nocere: first, do no harm', the principle of nonmaleficence may be the most applicable principle of medical ethics to human head transplantation. Several questions can be raised concerning this principle in addition to the principles of beneficence, justice, and autonomy. The procedure of head transplantation should be considered as a last resort for individuals suffering from debilitating whole body diseases such as amyotrophic lateral sclerosis (ALS). Although no pharmacologic therapies or cures

currently exist for these diseases, it is important to consider emerging therapies of the near future prior to implementing head transplantation protocols. For example, Zhang et al recently demonstrated a potential molecular basis of ALS that may be targetable by pharmacotherapeutic intervention [3]. Should the medical community consider head transplantation prior to exhausting our efforts in terms of pharmacotherapeutic cures for ALS and similar debilitating diseases? The proper allocation of research funding and resources should be maintained in the view of guiding research towards the scientific goal of best outcomes. Furthermore, the scientific community should consider the ramifications of reallocating treatment monies from potential pharmacotherapeutic interventions for ALS to head transplantation research.

Currently, there is a sparsity of basic science research in the literature demonstrating a successful head transplantation protocol in animal models. Results of pre-clinical animal experimentation would be beneficial prior to human surgery. Adequate pre-clinical animal experimentation may be considered as specimen exhibiting 'normal' behavior or behavior closely resembling the behavior observed prior to the procedure, post-operative homeostatic physiological functioning, as well

as specimen death resulting from natural causes (i.e., not from procedural complications nor from the head immunologically rejecting the body or the body immunologically rejecting the head). Recovery time is another important issue that should be addressed in an animal model. Although currently unknown, spinal cord recanalization may require a substantial amount of time for full recovery. However, even with promising animal model experimentation data, the first human head transplantation may exhibit a plethora of unknowns that may not be recognized or addressed until after such a surgery has taken place. For example, it may be difficult to account for the mental issues a human may encounter post-transplant within an animal model. At best, an animal model may account for mental stability by analyzing normal social behaviors (e.g., a dog recognizing its owner, displaying affection, and responding to commands); nevertheless, subconscious issues cannot be accounted for within an animal model. Every procedure has a first; however, these unique unknowns present a predicament for the frontrunners of head transplantation. Supposing that patient consent is acquired, is it ethical for a physician to subject a patient to arguably one of the most complex human surgeries with an overabundance of unknown variables and factors awaiting the surgeons in the operating room?

Ethics of organ donation may also be applicable with regard to the near 100,000 individuals on waiting lists for organ transplants in the United States [4]. The procedure of head transplantation requires a cadaveric donation in its entirety with the hope of increasing the quality of life of an individual suffering from a debilitating disease; nevertheless, how many individuals may die with one less donor to provide them with a heart, lung, kidney, *et cetera*? Transplantation ethics encourages the medical community to consider the most good being done with the limited resource of tissue donation such that the ethicality of human head transplantation ought to be considered in the context of utilitarianism.

Psychological Consequences

The procedure of human head transplantation dangerously presupposes that transplanting an individual's head will also transplant an individual's mind including consciousness, personality, and memories. On the contrary, cognitive sciences have suggested that human cognition does not solely originate within the brain parenchyma; rather, humans exhibit an embodied cognition where our body participates in the formation of self. Psychologist Eleanor Rosch has described embodied cognition as cognition that first is dependent on types of experience that derive from having a body with a variety of sensorimotor capabilities, and second, that such sensorimotor capabilities are intrinsically a part of a more comprehensive biological, psychological, as well as cultural context [5]. Therefore, an individual undergoing a head transplantation procedure may confront substantial psychological difficulty in adjusting to the new body provided to them. This adjustment is something that cannot be tested or experienced before the procedure and, thus, represents another significant unknown factor in transplant. Furthermore, the individual's personality and memories may be dramatically altered. Thus, the procedure of human head transplantation may potentially

serve as an exchange of a debilitating disease for psychological confusion and instability, which may lead to serious psychological complications, such as mood disorders, suicidal tendencies, or psychosis.

Reproductive Implications

The procedure of resecting a living head of an individual with a debilitating disease and relocating it on a cadaveric donor body will provide the recipient the donor's body including their reproductive organs. For the sake of this discussion, we will consider the head as the definition of human identification or personhood. Thus, we define the 'recipient' as the individual whose head is being transplanted and the 'donor' as the individual who is donating their body. Several ethical issues arise with an individual receiving a donor's reproductive organs. First, the recipient can never truly reproduce; rather, the donor body will reproduce upon the recipient's will to do so. Should the recipient be able to give the donor children even though the donor is technically deceased? A difficult conversation would be informing a recipient's 'child' that their biological father or mother was deceased long before they were conceived. If human head transplantation is to be deemed as ethical then the medical community ought to comprehensively inform the donor of the reproductive implications with body donation as well as the familial ramifications of recipient 'reproduction'.

Supposing that recipient 'reproduction' is deemed ethical, the age gap between a recipient and donor may need to be addressed. A younger recipient (e.g., 30 years old) receiving an older donor body (e.g., 90 years old) may now become infertile due to the transplantation procedure. Moreover, the opposite may hold true: an older recipient receiving a younger donor body may now become fertile. Furthermore, such age gaps between head and body may contribute to the potential psychological distress a recipient may exhibit post-head transplantation; nevertheless, an older recipient receiving a younger donor body may give the recipient the best chance of long term survival. Although it may not be ideal for the recipient, donor body sterilization prior to head transplantation may help to solve some of the ethical predicaments of reproduction in human head transplantation.

Furthermore, the medical community should consider the implications of such a procedure being subject to slippery slope argumentation. Currently, same-sex human head transplantation seems to be a challenging surgical procedure in and of itself. However, if such a surgery becomes common practice in the future wouldn't the logical progression of this surgery bring us to opposite-sex human head transplantation protocols? Gender reassignment head transplantation surgery may sound absurd today but we should consider the ethical ramifications of such a procedure if it becomes available in the future. Although improbable from a neurochemical standpoint, opposite-sex human head transplantation could theoretically allow an individual to transition to the opposite sex and participate in the reproductive activities associated with this new sex. Moreover, contingent upon the first successful head transplant procedure, what can prevent a demand for designer bodies or a desire to utilize this procedure to prolong one's natural life?

Conclusions

Human head transplantation may be a novel treatment in the near future for individuals suffering from debilitating diseases; nevertheless, there are numerous ethical issues concerning this procedure that should first be considered. We have discussed the ethical prerequisites to this procedure in addressing bioethical considerations. Frontrunners of this procedure may need to demonstrate that this operation is absolutely necessary for individuals with debilitating diseases, show favorable pre-clinical data in animal models, indicate that the benefits outweigh the plethora of unknowns of this procedure, and justify the denial

of transplantable organs to many individuals in trade for an entire cadaveric body donation for one individual. Further ethical ramifications will exist for a recipient and a deceased donor post-transplantation. Embodied cognition demonstrates that head transplantation may result in a variety of psychological consequences for the recipient, especially if there is a significant age gap between the recipient and donor. Reproductive ethics becomes pertinent as this procedure can provide the capacity of a recipient to 'reproduce' with a deceased donor's reproductive organs. Indeed, these quandaries are difficult to answer; nonetheless, determining the ethicality of a human head transplantation procedure is dependent upon them.

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