

Commentary on “The Utility of Hand Transplantation in Hand Amputee Patients”

Now that 16 years have passed since the first hand transplantation in the modern era, it is clear that hand transplantation *can* be performed. However, the question remains in what scenarios *should* hand transplantation be performed. The answer to that question lies in the changing balance of gains in quality of life as a result of the transplantation and reduction in quality and quantity of life as a result of life-long immunosuppression. Decision analysis is the best tool available to continually evaluate and quantify that balance in a meaningful way. Because of the complexity of hand transplantation, associated morbidity, and impact on quality of life, the assumptions that are required for creation of decision analysis models will not be applicable across the entire spectrum of patients and centers with varying preferences, protocols, and complication rates. However, the power in decision analysis lies in the ability to change assumptions (eg, complication rates, variation of personal preferences for treatments, and life expectancy) and recognize the impact that each assumption has on overall quality of life compared with alternative options. With future research directed at improving motor control and sensory feedback in upper extremity prostheses¹ and reducing morbidity associated with life-long immunosuppression required for hand transplantation,² decision models will need to be reevaluated with changing technology to quantify the risk/benefit balance with hand transplantation compared with competing options.

The current study (“The Utility of Hand Transplantation in Hand Amputee Patients”) and previous decision analysis studies^{3,4} have helped to highlight aspects of hand transplantation that require improvement before transplantation can be recommended in a variety of scenarios. These studies also raise current and future questions that must be evaluated in patients undergoing hand transplantation. Through the present study, the reduction in life expectancy anticipated with immunosuppression was found to have a profound impact on estimated quality-adjusted life years (QALYs) associated with hand transplantation. Hand transplantation had greater utility than living with an amputation when assessed in the study’s sample of hand amputees, meaning hand transplantation treatment was preferred. However, when QALYs for the

2 options was calculated (utility multiplied by remaining years of life), hand transplantation had fewer QALYs than living with an amputation owing to anticipated reduction in life expectancy associated with immunosuppression. It appears that improvement in function after hand transplantation does not outweigh the risks of immunosuppression in single-hand transplantation. Whether the same conclusion would be realized in double amputee patients is unknown when considering reduction in life expectancy. In addition, the added costs per QALY gained with double-hand transplantation compared with prosthesis use is estimated to be more than \$300,000 with an anticipated life expectancy of 75 years.³ This degree of resource utilization is unsustainable in the current health care environment. If reduction in life expectancy were also considered, the incremental costs per QALY gained for double-hand transplantation would be even greater. The impact of immunosuppression-related complications, reduction in life expectancy, and noteworthy lifetime costs prevent the widespread adoption of hand transplantation in its current state. Decision analysis is a powerful method to highlight aspects of hand transplantation that must be improved upon by transplant centers and researchers.

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