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IDEAS AND INNOVATIONS

Hand/Peripheral Nerve

Use of Video Clips to Assess the Outcomes of Bilateral Hand Transplantation

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Summary: Given the initial success of hand transplantation, there has been increased interest in determining functional independence and activities of daily living after hand transplantation. However, the metrics and methodologies used to study these outcomes have not yet been standardized. The goal of this article was to assess the role of video clips in assessing the outcomes of bilateral hand transplantation. We have performed 3 bilateral hand transplantations at our institution. Video clips were taken at standardized time points on our index bilateral hand transplantation patient, and the patient sent multiple home-video clips demonstrating new aspects of function when these improvements have occurred. The index patient demonstrated functional independence and activity of daily living performance without assistance in video clips ranging from 9 months to 2.5 years posttransplantation. He completed the 9-hole peg test with his left hand at 9 months follow-up and with both the hands by 1.5 years. His own video clips demonstrated his ability to perform spontaneous tasks including lawn mowing, driving and swimming. In our experience, the video tools aid in assessing outcomes of hand transplantation and may be incorporated along with multiple objective scoring tests. They can also be used to generate additional standardized tests for functional assessment and may allow retrospective grading as new scoring systems are developed. *(Plast Reconstr Surg Glob Open 2015;3:e553; doi: 10.1097/GOX.0000000000000539; Published online 5 November 2015.)*

Since the first successful hand transplantation in 1998, at least 72 patients have received unilateral/bilateral hand transplants across 13 countries.[1,2] Given the initial success of hand transplantation, there is increased interest in determining functional independence and activities of daily living (ADLs) after hand transplantation.[3,4] However, the metrics and methodologies used to study these outcomes have not yet been standardized.[3,4] Furthermore, validated metrics developed before the advent of transplantation may not capture the subtle changes or critical aspects of function necessary for ADLs after transplantation. We have found that videotaping patients' performance of functional tests allows us to compare between time points and individuals and may allow retrospective grading as new scoring systems are developed.

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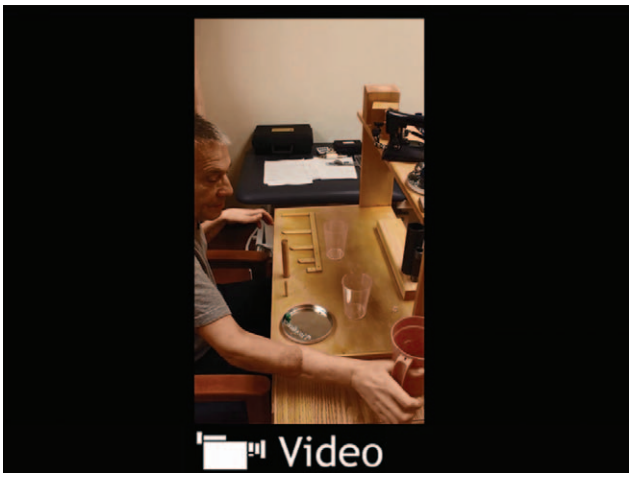


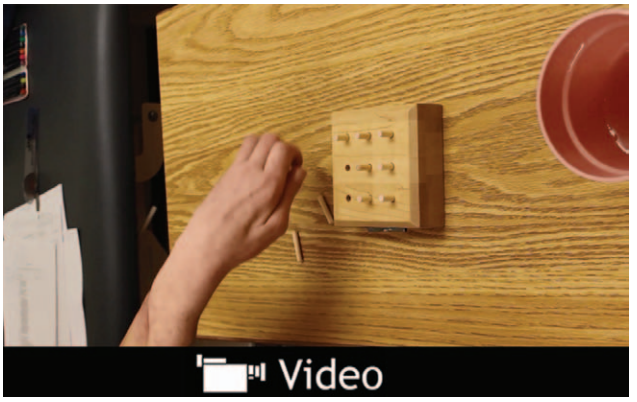
Video Graphic 1. See video, Supplemental Digital Content 1, which displays a 68-year-old bilateral hand transplantation recipient at the mid-forearm level: transfer of water into a glass from a container 1 year postoperatively. http://links.lww.com/PRSGO/A145.

METHODS

We have performed 3 bilateral hand transplantations at our institution. Our index patient, a 68-year-old formerly left-hand dominant man, lost all 4 limbs in 2002 because of sepsis. He underwent bilateral hand transplantation at the mid-forearm level on October 5, 2011. He has been followed closely for 3.5 years. Video clips have been taken at standardized time points, and the patient sends multiple home-video clips demonstrating new aspects of function when these improvements occur.

RESULTS

The patient demonstrates functional independence and ADL performance without assistance in



Video Graphic 2. See video, Supplemental Digital Content 2, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: completion of 9-hole peg test in 21.96 seconds 2.5 years postoperatively. http://links.lww.com/PRSGO/A146.

Video Graphic 3. See video, Supplemental Digital Content 3, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: lawn mowing using both hands 9 months postoperatively. http://links.lww.com/PRSGO/A147.

video clips ranging from 9 months to 2.5 years post-transplantation. (See video 1, Supplemental Digital Content 1, which display a 68-year-old bilateral hand transplantation recipient at the mid-forearm level: transfer of water into a glass from a container 1 year postoperatively, http://links.lww.com/PRSGO/A145; see video 2, Supplemental Digital Content 2, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: completion of 9-hole peg test in 21.96 seconds 2.5 years postoperatively, http://links.lww.com/PRSGO/A146; see video 3, Supplemental Digital Content 3, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: lawn mowing using both hands 9 months postoperatively, http://links.lww.com/PRSGO/A147; see video 4, Supplemental Digital Content 4, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: driving the car and swimming using both

Video Graphic 4. See video, Supplemental Digital Content 4 which displays a 68-year-old bilateral hand transplant at the mid-forearm level: driving the car and swimming using both hands 9 months postoperatively. http://links.lww.com/PRSGO/A148.

hands 9 months postoperatively, http://links.lww.com/PRSGO/A148.)

In the clinic, the patient transferred water into a glass from a container and from one glass to another with both of his transplanted hands as a part of his 1-year Carroll test. (See video 1, Supplemental Digital Content 1, which display a 68-year-old bilateral hand transplantation recipient at the mid-forearm level: transfer of water into a glass from a container 1 year postoperatively, http://links.lww.com/PRSGO/A145.) He completed the 9-hole peg test with his left hand at 9 months follow-up and with both the hands by 1.5 years. His speed and efficiency increased the over next year, and he completed it in 21.96 seconds with the left hand at 2.5 years follow-up. (See video 2, Supplemental Digital Content 2, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: completion of 9-hole peg test in 21.96 seconds 2.5 years postoperatively, http://links.lww.com/PRSGO/A146.) He was formerly left-handed, but hand dominance has not yet been confirmed posttransplant. His own video clips show his ability to perform spontaneous tasks including lawn mowing (see video 3, Supplemental Digital Content 3, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: lawn mowing using both hands 9 months postoperatively, http://links.lww.com/PRSGO/A147), driving, and swimming (see video 4, Supplemental Digital Content 4, which displays a 68-year-old bilateral hand transplant at the mid-forearm level: driving the car and swimming using both hands 9 months postoperatively, http://links.lww.com/PRSGO/A148). He resumed these activities in 9 months postoperatively.

DISCUSSION

Although individual goals vary, a key goal of hand transplantation is to achieve functional independence. Because of the lack of an ideal testing metric and the many subtle but important contributors to function, we have found video clips to be a useful and reliable way to document progress. In a study of 703 healthy adults, Oxford Grice et al[5] reported the timing of 9-hole peg test, for a 66-to-70-year-old man, to be 21.23 seconds for the dominant hand and 22.29 seconds for the nondominant hand. Our patient's result at 2.5 years is close to this "normal" value. Video clips sent to us also help document the patient's ability to undertake routine ADLs and the key aspects of recovery that make these possible. The sample size and the number of the videos in this manuscript are small, and this form of assessment will be further validated and standardized as the number of cases grows. The goal of this manuscript was to evaluate the role of video clips in assessing outcomes of hand transplantation and discuss the assessment so that it could be used uniformly across different centers. As the outcomes measurements of hand transplantation using video clips evolve, standardized guidelines should be established to generate a video to ensure that the recordings are comparable and record the necessary information. They can also be used to generate additional standardized tests for functional assessment. In our experience, the video tools aid in assessing outcomes of hand transplantation and should be incorporated along with multiple objective scoring tests.

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