

Principles of Rehabilitation after Bilateral Hand Allotransplantation

Marina Ninkovic

Abstract

Background: The previous experimental results with long-term survival of animal limb allograft and positive results of single hand transplantation encouraged us to plan (January 1999) and perform first (March 2000) and a second (May 2006) bilateral hand transplantation as well as first (February 2003) bilateral forearm transplantation.

Method: Comprehensive evaluations of all recipients (first male patient lost both hands in carpal level after a blast explosion accident, second male patient with bilateral proximal forearm amputation after a high-voltage burn accident and the third patient with bilateral amputation at the distal forearm after a blast explosion accident) and search for adequate donor according to the sex, size, skin colour and texture were done preoperatively. Three surgical teams worked simultaneously and independently. The immunosuppressive therapy was started intraoperative. At the first day after successful surgery the intensive programme of rehabilitation was introduced. This protocol was designed based on early protective motion program and on specific cognitive exercise program after Perfetti. Specific tests to assess sensory and motor recovery were performed each month for the first 12 months and then every 3 months thereafter.

Results: There were no intraoperative or early postoperative complications. Sensory and motor recovery increased gradually and cortical reorganisation were shown. Clinical examination and electromyography evaluated recovery of the intrinsic muscles of the hand. Judging from the Tinel sign and Semmes-Weinstein Monofilamententest advancement, nerve recovery appeared to be ahead of schedule as compared with comparable replant patients. Ten months after surgery the first patient was able to return to his job and he is complete independent in the activities of daily living., as well as our second patient. The third patient is still in rehabilitation's program showing adequate motor and sensitivity recovery concerning the level of the amputation.

Conclusion: Limited experience of hand transplantation confirmed importance of adequate patient selection, recipient donor matching, minimal cold ischemia time, as well as appropriate simultaneous surgery, immunosuppressive therapy and early intensive and long-lasting rehabilitation. These prerequisites can lead to effective and save hand transplantation with very promising functional and andaesthetic results.