

First bilateral hand transplant performed at the Hospital of the University of Pennsylvania

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For the first time in the Delaware Valley Region, a patient has undergone a complex and intricate bilateral hand transplant that could significantly enhance the quality-of-life for persons with multiple limb loss. The procedure was performed by Penn's Hand Transplant Program which operates under the leadership of the Penn Transplant Institute and in collaboration with Gift of Life Donor Program, the nonprofit organ and tissue donor program which serves the eastern half of Pennsylvania, southern New Jersey and Delaware. The highly-trained team's first bilateral hand transplant was performed in September. At this time, the patient is progressing well and both the patient and donor family wish to remain anonymous.

Working closely with their partners at Gift of Life Donor Program, a team of 30 members - 12 surgeons, three anesthesiologists and 15 nurses - performed the 11-and-one-half hour procedure which is Penn's first venture into the emerging field of Vascularized Composite Allotransplantation (VCA). The team included experts in solid [organ transplantation](#), orthopaedic surgery, plastic surgery, reconstructive [microsurgery](#), and anesthesia.

"At Penn, we have the level of surgical and academic expertise required to not only offer complicated VCA procedures, but also the capabilities to help establish the standards for this emerging field," said L. Scott Levin, MD, FACS, director of the Penn Hand Transplant Program,

chairman of the Department of Orthopaedic Surgery, the Paul. B. Magnuson Professor of Bone and Joint Surgery, Professor of Surgery (Division of Plastic Surgery).

"As a top academic medical center, we have the range of expertise required to perform these complex procedures involving multiple, interacting structures and systems in the body," added Benjamin Chang, MD, co-director of Penn's Hand Transplant Program, program director and associate chief of the Division of Plastic Surgery and associate professor of Clinical Surgery. "We will continue our three-pronged mission of striving for clinical, educational and research excellence in VCA which will help many amputees."

Double hand transplantation is a complex procedure that involves surgical and non-surgical components. First, the proposed recipient must undergo extensive medical screenings and evaluations before surgery. During the surgery, the hands and forearms from a donor are attached which includes connecting bone, blood vessels, nerves, muscles, tendons and skin. First, the forearm bones - the radius and ulna - are connected with steel plates and screws. Next, the arteries and veins are attached via delicate microvascular surgical techniques. Once blood flow is established through the re-connected blood vessels, surgeons repair each muscle individually and rejoin tendons and tendons to muscles, one-by-one. After the muscles and tendons are completed, surgeons reattach nerves before the final careful closing of the skin occurs.

After surgery, hand transplant patients are prescribed daily immunosuppressant medications to prevent their bodies from rejecting the new limbs, which is then followed-up by months, perhaps years of rigorous physical therapy to regain hand function and use. Physicians expect that patients compliant with follow-up care will see significant improvement in function within the first year after the initial surgery.

In contrast to the requirements of identifying a solid organ donor, selecting a donor for hand transplants involved additional matching criteria such as gender, ethnicity, race, skin color and tone, and size. These procedures raise difficult and novel ethical challenges. Respect for donors and their families and careful selection of recipients along with commitment to informed consent are essential.

"For 37 years, Gift of Life Donor Program has partnered with the transplant centers throughout this region to bring innovative transplant procedures to patients in need," stated Richard Hasz, vice president of Clinical Services for Gift of Life. "As with all types of transplant, surgeries such as this one could not take place without the generosity of a donor and a donor family. We thank them for their selflessness and for their gift that made this surgery possible."

"Reconstructive VCA surgeries are the new frontier of surgical transplantation and the results are very promising," said Abraham Shaked, MD, PhD, director of Penn's Transplant Institute, vice chairman of the Department of Surgery, and the Eldridge L. Eliason Professor of [Surgery](#). "Our decades of experience in solid organ transplantation can successfully be applied to Vascularized Composite Allotransplantation and we're prepared to continue moving ahead with the major advancement in the care of patients in need of limb transplantation."

For now, the Penn [Hand Transplant](#) Program will only perform bilateral transplants, particularly treating quadramembral amputees. "Someone who has had both arms and legs amputated is completely and totally dependent," said Dr. Levin. The most basic functions of life are virtually impossible to perform such as locomotion, eating, personal grooming and hygiene. It's our goal at Penn Medicine for our multi-disciplinary team to work seamlessly together in the field of VCA so we can successfully treat these patients - from victims of trauma or infection, to war veterans - and give them their lives back."

Provided by University of Pennsylvania School of Medicine

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