MEDICAL CASE STUDY

# Hand Reattachment

*The patient severed his left hand across the palm.*

## INITIAL CONTACT

A 29-year-old male patient presented to a hospital in Texarkana, Arkansas, with his left hand severed across the palm from a sawmill accident.

UAMS has a hand surgeon on call 24/7 and is the tertiary referral for the region for hand trauma. John Stephenson, M.D., provided a telemedicine consult to the Texarkana hospital and advised that the patient be transported to UAMS.

The patient's coworkers had placed the amputated hand on ice immediately after the accident, and it had been professionally iced and gauzed by staff at the Texarkana hospital.

He arrived at UAMS about six hours after the accident, within the ideal window for a hand reattachment, which is 12 hours.

## ASSESSMENT

UAMS hand trauma surgeons Stephenson; John Bracey, M.D.; and Mark Tait, M.D., assessed the trans-metacarpal amputation and determined that the patient was an excellent candidate for replantation.

With many of the hand trauma cases that the team encounters, the tissue has been crushed or stretched in a way that prevents replantation. But in this case, the type of blade had not ripped or stretched the skin. The cuts to the bones were clean, almost surgical in nature.

The team discussed the options with the patient: the replantation attempt, or a proximal amputation. While he was an ideal candidate for replantation, it was important to the surgeons that the patient understood that the reattached hand would never function at 100 percent. It would never be "normal" again, but it would likely regain some function and sensation and be able to serve as a helper hand. It would also likely be easier and more intuitive for him to learn to work with than a prosthetic hand.

The patient agreed to the replantation surgery.

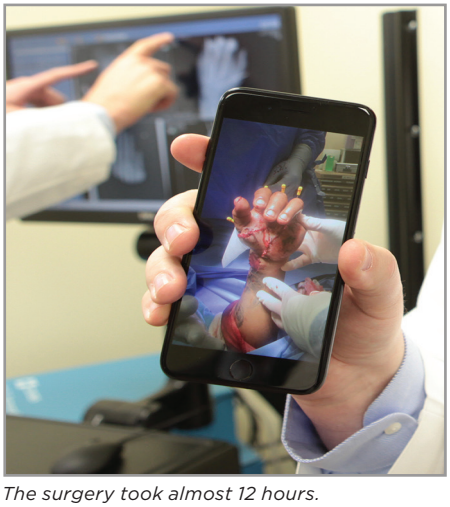
## PROCEDURES

Bracey, Tait and Stephenson spent almost 12 hours on the surgery. They reattached bones and tendons, microscopically repaired vessels to return blood flow, and completed nerve grafts to restore feeling.

They worked in shifts, with two surgeons under the microscope at any given time. The surgery cannot be completed alone because of the exhaustive detail work involved and the duration of the procedure. Before UAMS was able to recruit the minimum number of hand surgeons necessary to offer this procedure on call, such patients were sent to hospitals in St. Louis, Missouri, and Louisville, Kentucky.

The surgery began with sterilization of both the hand and the residual stump to decrease the risk of infection. To establish stability, the surgeons wired the bones into place. Then their priority was to restore some blood flow to the hand. They reattached some of the arteries before moving on to tendons, veins and nerves.

The case presented some ideal conditions and some challenges. Because of the clean nature of the cut, the quality of the tissues on each side was good, and the team did not have to resect back or remove healthy tissue. The nerves had received minimal damage, and what damage there was, they patched with nerve tube. Despite the relatively clean cut, the team did encounter some vessels that were stretched, so they had to creatively plan different vessels to anastomose to the distal vessels.



*The surgery took almost 12 hours.*

They amputated the little finger. The saw cut was at an angle and went through the bottom edge of the small finger, causing it to be particularly at risk of becoming stiff and unusable after replantation. The surgeons fashioned that side to resemble the natural outer curve of the hand, so

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*The team examines the patient about seven months after the surgery.*

the missing finger would be less obvious at first glance.

While the patient was an ideal candidate for the surgery in many ways, the location of the cut caused it to be one of the most challenging and time-consuming of hand replantation surgeries. The amputation severed the palmar arch, where many blood vessels branch off to take blood supply to the fingers, which increases the number of individual reattachments that are necessary. Compared to other amputation locations, where, for example, only two arteries have been severed, the location of this amputation multiplied the amount of detail work to be done many times over.

The patient did very well during surgery and during the immediate post-operative three days in intensive care on blood thinners and under close observation.

## FOLLOW-UPS

Initially, the team monitored blood flow and saw the patient often after he was released from the hospital. The team moved slowly and cautiously to re-introduce motion, careful not to stress or rupture the blood vessels. The vessels stabilized after a few weeks, and the team re-introduced light motion. At six weeks, the X-rays reassured them that the bones were healing, and they started being more aggressive with the re-introduction of motion. At six weeks, the tendons are also in a good position to support more motion.

Since that time, the patient has been working aggressively in occupational therapy, with the surgeons monitoring. The priorities shifted from blood flow to motion, then strength and sensation.

Seven months after the surgery, the patient was able to move his fingers, grasp a pen and scribble on a piece of paper. Since then, the main gains he has made have been in sensation, with the return of some protective sensation: the ability to differentiate between hot and cold, sharp and dull. Nerve recovery is the longest part of the process, and will continue to improve over time – on a scale of years rather than months or weeks. He will also be able to work on refining his movements to manipulate increasingly smaller objects.

***For consult or transfer, call 501-686-6080. To make a referral, call 501-526-1046.*** ■

***Mark Tait, M.D.***
Assistant professor
Department of Orthopaedic Surgery
UAMS College of Medicine

**Education**
Medical Degree, University of Missouri

**Residency**
Orthopaedic surgery, UAMS

**Fellowship**
Hand and microsurgery, OrthoCarolina in Charlotte, North Carolina
Brachial plexus and nerve injury traveling fellowship with Christophe Oberlin, M.D., Paris

***John W. Bracey Jr., M.D.***
Assistant professor
Department of Orthopaedic Surgery
UAMS College of Medicine

**Education**
Medical Degree, UAMS

**Residency**
Orthopaedic surgery, UAMS

**Fellowship**
Hand and upper extremity, OrthoCarolina in Charlotte, North Carolina
Brachial plexus surgery training with Jayme A. Bertelli, M.D., Brazil

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