Orthopaedic Surgery news

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

spring 2009
VOLUME 9 NUMBER 1

Restoring form and function to upper extremities

In the fall of 2007, AG, a 36-year-old East Bay musician, was driving home with his wife when they rolled their 10-year-old sedan. AG's left arm was extended through the driver's side window, and as the car rolled, his elbow slammed against the pavement and ripped open. The impact cracked off a large piece of his ulna, damaged his ulnar nerve and left a large, soft tissue defect.

After emergency room physicians at an East Bay hospital stabilized AG, they transferred him to UCSF Medical Center, where a team of surgeons – including orthopaedic surgeon Lisa Lattanza, MD, chief of the Hand and Upper Extremity Service, and plastic surgeons David S. Chang, MD, and David M. Young, MD – reconstructed AG's severely damaged elbow. CONTINUED ON PAGE 6

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Message from the chair

Thomas Parker Vail, MD

Bringing together specialty teams in one central, state-of-the-art and readily accessible location will better meet your needs – and those of your patients. That is the thinking behind the August 2009 opening of our new Orthopaedic Institute at Mission Bay. This issue of *Orthopaedic Surgery News* highlights one of the services you will find there: the Division of Hand and Upper Extremity Surgery.

As practicing physicians, you know well that rare congenital conditions and more common injuries of the hands and upper extremities negatively affect quality of life in both adults and children. Simple solutions performed by experts and complex reconstructions – often a combination of skeletal, muscle, nerve, tendon and ligament procedures – can be the only way to restore proper motion to fingers, wrists, elbows or shoulders. Specialized surgical skills and techniques offer new hope to children born with conditions such as missing fingers, cerebral palsy or brachial plexus injuries.

As with so much in medicine, having a readily available team of expert, experienced physicians is essential, and this is what our Division of Hand and Upper Extremity Surgery offers. Led by orthopaedic surgeon Lisa Lattanza, MD, we work closely with colleagues in plastic surgery, neurology and neurological surgery at UCSF to provide a full range of expertise for complex conditions in both adults and children.

The accomplishments and collaborations that make up the hand and upper extremity group are a source of great pride for our department. Please enjoy this issue of *Orthopaedic Surgery News*, and call on us if we can help you to better serve the patients we share. OSN

Thomas Parker Vail, MD
Professor and Chair
Department of Orthopaedic Surgery

Changing children's grasp on their lives

Left: Right hand of child born with a congenitally absent thumb. Right: To create a functional thumb, surgical pollicization shortens and repositions the child's index finger on its vascular pedicle. Muscles and tendons have been transferred.

"Conditions such as hypoplastic thumb, syndactyly, polydactyly of the thumb, missing digits, amniotic bands and other conditions – such as cerebral palsy, spinal cord injury, brachial plexus injury and trauma – can cause significant functional challenges for children," says orthopaedic surgeon Lisa Lattanza, MD, chief of the Hand and Upper Extremity Service at UCSF Medical Center. "So it's enormously gratifying that we can now treat many of these conditions to improve these children's quality of life."

Family first

Long before children with congenital deformities or traumatic injuries get to the operating room, says Lattanza, surgeons must work closely and sensitively with parents. These adults are often frightened and struggling to understand what they can expect from a surgical intervention on their child.

"One of the first questions I hear from the parents is, 'What did I do wrong?' There is grieving, and the surgeon has to understand the issues that parents are dealing with in order to get their buy-in and appropriately treat the child," says Lattanza. "All parents want normalcy. It's the surgeon's job to help them understand what's possible."

Congenital deformities of the hand

Once that understanding is reached, experienced surgeons have a variety of surgical techniques available to restore function. In the case of reconstruction of a congenitally malformed hand, some of the techniques include syndactyly releases, excision of duplicated digits, postexcision reconstruction, pollicization, and in rare cases, transfer of toes to replace missing fingers.

"For example," says Lattanza, "a child born without a thumb would have two reconstructive options to restore thumb function: an index finger pollicization or a toe-to-thumb transfer."

Lattanza and plastic surgeon Scott Hansen, MD, both perform all of these procedures. Hansen has particular expertise in toe transfers to replace missing digits. "Because children come in so many shapes and sizes, one of the keys to a successful transfer is an evaluation by an experienced surgeon," says Hansen. "The team approach is also critical because while one team is harvesting the toe, the other is prepping the hand for microsurgical transfer."

Palsies and traumas

For conditions like cerebral palsy, Lattanza notes that she often achieves good results by working with neurologists to combine neurotoxin treatments with precise surgical techniques that address tendon and muscle length.

As for trauma, Lattanza points out that because children are still growing, the surgeon can face some difficult challenges if growth centers are damaged. If the damage is caught early, interventions such as epiphyseodesis can prevent angular deformity when part of the growth center is disrupted.

"But if the deformity has already manifested, which is commonly seen after elbow trauma, the deformity can be corrected later with osteotomy," says Lattanza. She adds that there are also numerous potential surgical solutions for the many other types of trauma that affect children's bones, joints or tendons.

Brachial plexus palsies – which can occur at birth – are another area where surgery can play a role. "In the case of birth palsy, ideally we follow these children from infancy," says Lattanza. "If within three to six months they don't show any nerve recovery, we may recommend a brachial plexus exploration in conjunction with a neurosurgeon to remove scar tissue or graft nerves."

More typically, Lattanza and her team will follow these children closely and frequently evaluate them for potential surgical interventions, such as tendon transfers, that can improve function. **OSN**

Lisa Lattanza can be contacted at (415) 353-7584.

Photo of a child similar to the one above, one year after index finger pollicization, demonstrating the ability to pinch and grasp with the "new" thumb.

Left: Before surgery, the child cannot raise her arm overhead or rotate her shoulder. Right: Two years after surgery, the child has nearly normal function.

Case study: A child finds the power in raising her arm

Brachial plexus birth palsies are among the most challenging orthopaedic issues in children. These traumas often leave a child with a spectrum of weaknesses and loss of function, the most common being the inability to raise the arm overhead, due to a lack of muscle and damaged nerves. Such was the case with MP, who arrived at Shriners Hospital for Children Northern California when she was 5 years old.

Since 2001, Lisa Lattanza, MD, chief of the Hand and Upper Extremity Service at UCSF Medical Center, has been attending once a week at the Shriners Hospital Northern California in Sacramento. Working in partnership with Shriners Chief of Orthopaedic Surgery Michelle James, MD – and with a team of pediatricians, rehabilitation specialists, and occupational and physical therapists – Lattanza spends time in both the clinic and the operating room.

When MP arrived, Lattanza's first step was to assess what was possible. "Success in these cases depends on experience in performing the procedure and patient selection," she says. "Sometimes, in more severe cases, the child may not have enough muscle to justify a procedure. This, of course, can be very hard for parents to understand."

In MP's case, however, while the child could not raise her arm enough to be fully functional, Lattanza was convinced that an external rotation tendon transfer held a good chance for success. She led a surgical team that transferred an unaffected muscle from MP's back and moved it to her shoulder, so it could do the job of the damaged muscles and tendons.

"This type of surgery at the shoulder works better in children than adults, and involves meticulous dissection around many delicate nerves and blood vessels," says Lattanza. "Ultimately, function is predicated on selecting the appropriate new site for insertion and on intensive occupational and physical therapy with therapists expert in treating children."

As the above photos demonstrate, MP has made dramatic gains in function in the two years since her surgery. OSN

Lisa Lattanza can be contacted at (415) 353-7584.

"Success in these cases depends on experience in performing the procedure and patient selection."

Amirtharajah brings wide range of expertise

During her residency at the University of Iowa, Mohana Amirtharajah, MD, got a powerful introduction to reconstructive wrist surgery. At a huge tertiary care hospital that serves vast stretches of the Midwest, Amirtharajah found herself performing a steady stream of traumatic wrist reconstructions and follow-up care for patients who had suffered severe farm injuries and motor vehicle accidents.

"We did a lot of bony reconstruction, soft tissue coverage and functional tendon transfer," says Amirtharajah, the latest addition to the UCSF Medical Center team for hands and upper extremities. "Often in these cases, the key is the diagnosis: understanding what's working – that we can spare – and what is gone."

After her residency, Amirtharajah returned to New York City – she'd attended medical school at New York University – to do a fellowship at the Hospital for Special Surgery. It was more than a change of locale; the type of surgery changed dramatically as well. "There was less trauma and the bulk of cases were osteoarthritis, chronic degenerative conditions, tumors and sports injuries of high-level athletes," says Amirtharajah.

She brings all of that experience to her practice at UCSF Medical Center – including the latest techniques learned while working with renowned surgeons Brian Adams, MD, in Iowa and Robert Hotchkiss, MD, Andrew Weiland, MD, and Scott Wolfe, MD, in New York City.

Understanding the options

For example, when surgery becomes necessary to treat osteoarthritis in the wrist, Amirtharajah relies on her training and experience to match symptoms with X-rays, so she can tailor a proper treatment. Most surgeons know that diffuse arthritis might require a fusion or proximal row carpectomy, or that a scapholunate advanced collapse with mild symptoms on the radial side might require a radial styloidectomy. But, says Amirtharajah, the devil is in the details.

"Whether you do a small procedure or a large reconstruction or fusion depends on multiple factors, including age, lifestyle and other health factors," she says.

For severe injuries like the mangled and crushed hands she saw frequently in Iowa, Amirtharajah notes that working on a team that includes an experienced plastic surgeon makes a tremendous difference. "Without a plastic surgeon available, we often wouldn't use a free flap," she says. "But going without a flap doesn't allow for the coverage that helps prevent infection and aids healing. At UCSF, I can fix an unstable fracture and [plastic surgeon] Scott Hansen can do the soft tissue part."

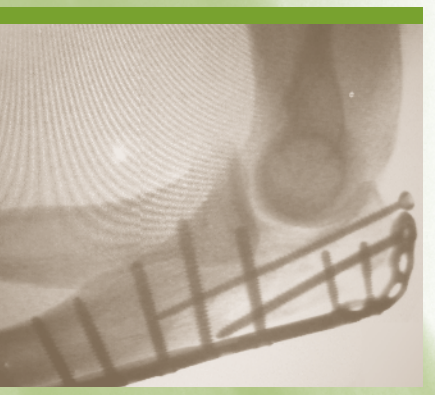
"Bringing in someone with Dr. Amirtharajah's extensive and up-to-date training significantly expands our ability to address complex surgical cases," says Lisa Lattanza, MD, chief of the Hand and Upper Extremity Service. **OSN**

Mohana Amirtharajah can be contacted at (415) 353-7200.

Mohana Amirtharajah, MD

Restoring form and function to upper extremities

CONTINUED FROM FRONT COVER



Postoperative radiograph demonstrating surgical fixation of the olecranon fracture and large bone graft.

Lattanza began the process with an open reduction and internal fixation that required a large tricortical iliac crest graft. As she worked through that phase of the operation, other members of the team harvested a sural nerve from the leg and a free flap from the rectus abdominis. The team then performed the microvascular surgery required to complete a nerve graft and to connect the blood vessels from the free flap to those in the arm.

Today, AG is healing well and has begun playing music again. "It's been very rewarding to see him regain strength and range of motion," says Lattanza.

Addressing a spectrum of concerns

AG's case clearly illustrates the many factors necessary for successful reconstructive surgery of the upper extremities. One factor is having a full surgical team available with all of the necessary expertise. "Without a full team of surgeons who have complementary skill sets, the surgery would have taken much longer and involved more risk," says Lattanza.

For example, at UCSF Medical Center, Lattanza and her new colleague Mohana Amirtharajah, MD, typically handle the large, bony defects, while plastic surgeon Scott Hansen, MD, often works on the soft tissue portion of these cases. All three are trained to handle nerve injuries, although in complex cases they often call in neurosurgeon Nicholas Barbaro, MD, who leads the UCSF Nerve Injury Clinic, where Lattanza consults as part of a multidisciplinary team.

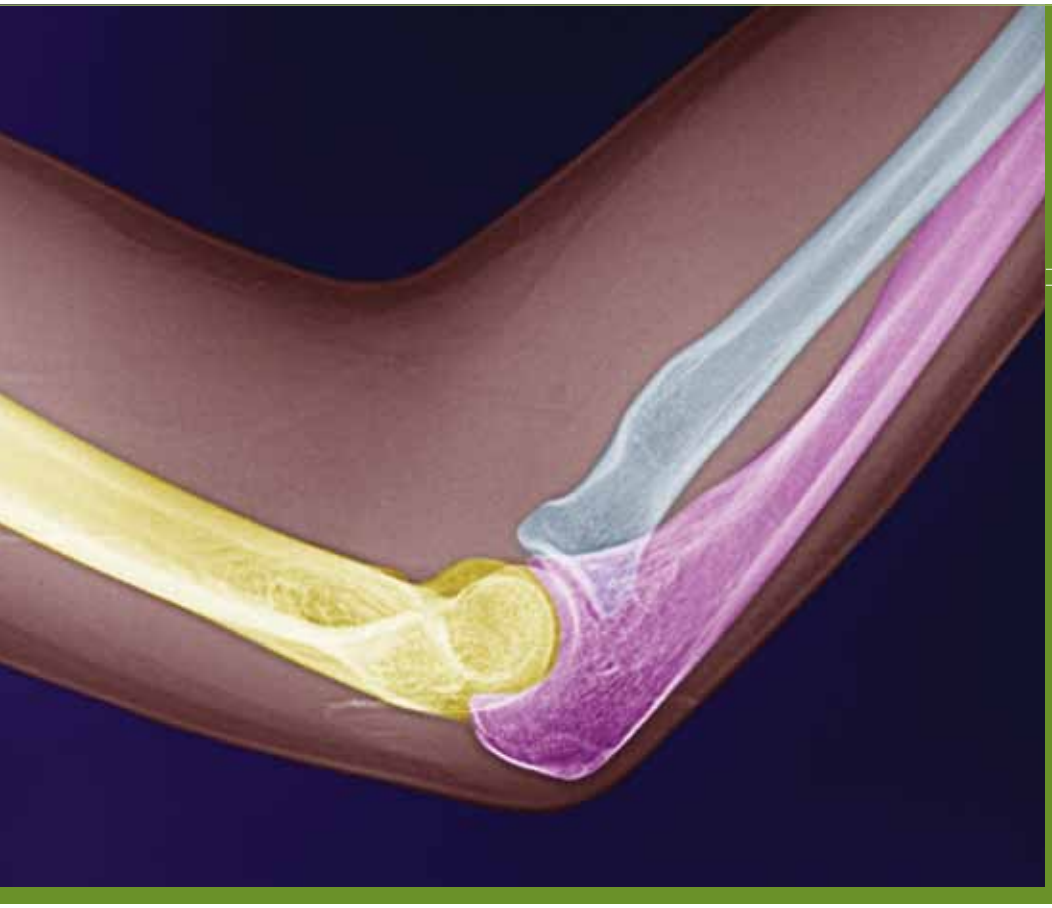
The Hand and Upper Extremity Service team also includes hand surgeon Mathias Masem, MD, and Bryan Werner, MD, a physiatrist specializing in nonoperative treatment of upper extremity problems.

Experience also is essential for addressing the overlapping concerns that characterize complex reconstructions. "As one example, with a very large bone graft you need to have enough experience to correctly assess what needs to be restored, how to shape the bone to fit, and when there is extensive joint destruction, how to complete an interposition arthroplasty," says Lattanza.

In addition, in many cases, restoring motion can pose a difficult challenge, depending on the specific nerve and tissue damage. Lattanza describes the case of a man who suffered a work-related crush injury that left him with a soft tissue defect, a broken radius and nerve damage in his forearm.

After initial treatment at San Francisco General Hospital for the severe trauma, the patient came to Lattanza, hoping to regain motion that had been lost due to post-traumatic synostosis of the radius and ulna, as well as to severe muscle loss. Lattanza removed the extra bone growth from the synostosis and then reconstructed the biceps, which restored active elbow and forearm motion.

"Volume is the difference in these complex cases," says Hansen. He notes, for example, that outcomes for gracilis free muscle transfers that restore finger movement tend to be better when surgeons have extensive microsurgery experience. "In the last year, the division has done over



WHAT ARE THE MOST COMMON INDICATORS FOR CONSIDERING COMPLEX RECONSTRUCTIVE SURGERY?

- Any injury of the hand and upper extremity that combines bone loss, soft tissue loss, nerve defect or a combination of these factors
- Acute and chronic elbow instability
- Post-traumatic contracted elbow
- Nerve injuries of the upper extremity requiring repair, graft or tendon transfers
- Complex congenital anomalies of the upper extremity
- Arthritic conditions of the upper extremity requiring joint replacement or resurfacing
- Tendon repair and reconstruction

100 free tissue transfers, and my job is often to provide healthy, well-vascularized soft tissue coverage while minimizing donor site morbidity."

One newer technique that Hansen sometimes employs is perforator flap reconstruction. "We use magnification to dissect perforating vessels and preserve the muscle," says Hansen. "It can be a tedious and time-consuming procedure, but it's effective. We will even do very small free flaps – one millimeter and less."

Understanding the range of injury

Successful outcomes also can involve more than technique; they can require understanding the way upper extremity injuries play themselves out over the course of a lifetime.

For example, Lattanza's work with both children and adults helped her in the case of a patient who, as a young child, had suffered a traumatic radial head fracture and elbow dislocation. Unfortunately, the original procedure had failed to stabilize the elbow. When the young woman – a still active rugby player at age 25 – arrived in Lattanza's office, she presented with elbow pain and inability to rotate her forearm.

"The pain and lack of motion were limiting her daily activity and her ability to play her sport," says Lattanza. With a radial head implant, proper reconstruction of the elbow ligaments and a shortening of the ulna at the wrist, Lattanza was able to restore the normal relationships among the elbow, forearm and wrist.

Finally, a well-planned postsurgical rehabilitation is essential for optimal recovery. "Sometimes as early as postop day one, we will use continuous passive motion machines to keep the elbow from stiffening," says Lattanza. "The motion is sometimes limited by the flap – and operative reconstruction needs to render the parts stable so motion can resume – but early movement helps control edema, restore function and prevent scar formation." OSN

Lisa Lattanza can be contacted at (415) 353-7584.

Scott Hansen, MD, Mohana Amirtharajah, MD, and Lisa Lattanza, MD

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June 24, 2009	**Stuart Weinstein, MD** University of Iowa

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Written and designed by UCSF Public Affairs

Photos: Elisabeth Fall, pp. 2, 5, 7

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New additions to the UCSF Department of Orthopaedic Surgery

New faculty, left to right: Eric Meinberg, MD; Bryan Werner, MD; Mohana Amirtharajah, MD; Aenor Sawyer, MD; Steven Takemoto, PhD. Not pictured: Celine Colnot, PhD.