A Publication of the American Association for Hand Surgery

Summer 2003

HAND SURGERY QUARTERLY

HARD THERAPY AND AFFILIATES' CORNER

2002 AAHS Vargas Hand Therapy Fellowship

Veronica Fernandez, PT

From Caracas, Venezuela to hand therapy centers in Jackson, MS, San Antonio, TX, Pittsburgh, PA and Philadelphia, PA

August 26 – September 22, 2002

Veronica Fernandez PT (left) observes a patient with posterior interosseus nerve lesion perform functional activities with supportive glove.

A Venezuelan in the USA

The AAHS was honored to sponsor Veronica Fernandez PT from Caracas, Venezuela, during her travels, in the United States as the 2002 recipient of the AAHS Vargas Hand Therapy Fellowship. Ms. Fernandez, as a founding member of the Venezuelan Hand Therapy Society, was chosen to receive this award as an extension of the Association's mission to foster international dialogue and growth in hand therapy and surgery. Veronica's first contact with the AAHS occurred when Dr. Alan Freeland and Lynn Bassini, MA, OTR, CHT, as Vargas Award recipients, traveled to Venezuela in 1998. Since that contact, she has endeavored to expand hand therapy services in Caracas hospitals and throughout Venezuela. In this role, Veronica has invited several members of the AAHS to participate in the annual Venezuelan Hand Therapy Society meeting.

Language barriers, which should preclude meaningful communication, were swiftly overcome when Veronica arrived at the St. Dominic Hand Management Center in Jackson, Mississippi, on August 26th. Her enthusiasm for hand therapy and love of patient contact became an effective mode of translation. Maureen Hardy PT, CHT, Director of the Center, noted that the staff 's Spanish improved in parallel to Veronica's English. During her stay, Veronica observed diverse therapy programs for upper extremity

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Veronica Fernandez (left) and Maureen Hardy on the Mississippi River in picturesque Natchez, MS.

Patient with TFCC repair demonstrates wrist strengthening exercises to Veronica (center) and Maureen Hardy PT, CHT (right).

Advocating for the Advocate

PETER C. AMADIO, MD

By the time you read this, AAHS should have been accepted into the AMA House of Delegates. I have the privilege of being AAHS's first AMA Delegate. Nick Vedder is our Alternate. We each will serve for two years, after which we will be eligible for reappointment (or replacement; if any of you are interested in getting active in the AMA as a delegate or in any other capacity, PLEASE let me know). AAHS will gain many benefits from sitting at the AMA table, as the many of you who are AMA members already know. Less than half of AAHS members belong to AMA, though; it is to you that the remainder of this editorial is directed.

Why should you join AMA? Well, for starters, in these days of crisis in health care, participation in organized medicine is more important than ever before. And AMA is working harder than ever before to earn that participation. That harder work is yielding results.

The American Medical Association, working together with state and specialty societies, relentlessly pushed for legislation to reverse the downward spiral of medicare reimbursement. These efforts have had results. Because of them, physicians will now receive a 1.6 percent increase in 2003, rather than a 4.4 percent cut. The average increase per year in Medicare payments per physician is estimated to be over $3,000, far less than the amount of AMA dues, which currently stand at just $420. This financial benefit does not take into account increases that are expected to occur because of the impact on other payers whose reimbursement rates are influenced by, or tied to, Medicare rates. This has been a long, hard battle, made more difficult by the fact that not all physicians support organized medicine. It is well known that less than a third of practicing physicians in the US belong to AMA. Our power depends on our membership numbers. Imagine what could be accomplished if all physicians belonged.

AMA is also working hard to enact legislation on tort reform, to roll back the obscene increases in professional liability insurance we have all faced in recent years. Again, numbers matter. Remember, all physicians benefit from AMA activities. Don't be a deadbeat!

There are also non-economic benefits that accrue to us through AMA. This is because AMA can also advocate for doctors on the many matters of great importance to physicians where money is not at stake, but our profession and our patients are, such as for issues relating to public health (smoking, immunizations, family violence, DUI, etc), state Boards and physician disciplinary actions, preserving physician autonomy from interference by health plans or legislation (gag rules, hospital lengths of stay, etc), the privacy and confidentiality of medical information, the role of and independence of other medical professionals (nurses, therapists, optometrists, psychologists, etc) in the provision of medical care, and medical ethics, among many others. Through the AMA, we also have direct input into the policies of the Joint Commission, Residency Review Committees for every specialty, the ACGME, ACCME, and every specialty Board, because AMA appoints members to each of those bodies.

I encourage you to join the AMA now, given the impact that our collective efforts have had, and can have in the future. Those of us in AMA need you who are not currently members to stand with us. Great things are possible, but only if you help!

Thanks,
Peter C. Amadio, MD

PEOPLE IN THE NEWS

This past spring, Kevin Plancher MD, was awarded the Richard Casperi Award, in New Zealand, for his innovation in arthroscopy of the spinoglenoid ligament.

People in the News is dedicated to recognizing the accomplishments of AAHS members and their families. Submissions should be sent to the AAHS Central Office at vetter@isms.org, and will be included on a space available basis.

HAND SURGERY QUARTERLY

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Hand Surgery Quarterly is a publication of The American Association for Hand Surgery and is published strictly for the members of AAHS. This publication is designed as a forum for open discussion and debate among the AAHS membership. Opinions discussed are those of the authors or speakers and are not necessarily the position, posture or stance of the Association.

Information Dissemination

Change is an interesting word. By adding two different suffixes the meaning of change is dramatically altered and both meanings apply to out Association. The AAHS is changeable and has improved because of changes made since its originator Dr. Posch started the organization over thirty years ago. At the same time AAHS is changeless, always focusing on education and the dissemination of new and useful information to its members. That knowledge is then used to dispense high quality compassionate care to those that entrust us with their lives.

The chronology of information dissemination reveals a distinct pattern of acceleration. Early critical information was passed from person to person verbally. A slow process but the knowledge database was also much smaller in 10,000 BC. Archiving knowledge eventually occurred but it's difficult to copy and disseminate a cave wall or scroll so the dissemination of information was limited. The art of duplicate printing began in the 1400s initiated the ability to disseminate knowledge to communities and eventually globally because of transportation's evolution. The ability to incorporate photograph into the print medium became a sentinel event for hand surgery. The chronicled changes in concepts, anatomy, philosophy, theories, and technology in journals and texts seemed daunting and keeping up with the written information a non-stop marathon. The ability to disseminate information was paralleled by the demand for more information by a more educated elite public. The duplication of information was also accompanied by the incredible speed of information's distribution. Distribution by Pony Express in 1860 to overnight Federal Express to almost anywhere overnight occurred within a century. Storing printed information requires large expensive archiving facilities now called libraries. Finding the information one wanted required visiting the library or paying someone to find the information needed. That process seemed so unique even awesome a decade ago and now it seems almost like black and white TV.

What happened, and what is likely to happen with the dissemination of information? Are you ready for information delivered at the speed of light to your home? Information that is detailed, current, and portrayed with graphic and video images that clarify technique or portrays pitfalls.

ARE YOU READY FOR INFORMATION DELIVERED AT THE SPEED OF LIGHT TO YOUR HOME?

Recently a document containing about 500 pages of information and pictures was forwarded to me. The computer told me the file was approximately 8 mega bytes of information. My slow modem took one hour and 15 minutes to obtain the 500 pages of information. Information. Sometime later the information was changed and I had to repeat the download. When I down loaded the information using a broadband fast cable modem it took only three minutes to obtain the same volume of information. The document was then opened using software and I was able to search within the document for the specific information required. Once identified what pages contained the information reviewing the text and even printing the information was quick and easy.

The instantaneous Dissemination of large amounts of stored and current information at the speed of light is changing the way we are educated and how we access information. The textbook of three years back with information that is five years old may not be as acceptable in the future. The accelerate trends of disseminating information is producing a more expectant patient. Our patients have access to the same information we do. They are already presenting downloaded illustration, information and outcomes to their physicians along with questions for clarification.

ALLEN L. VAN BEEK, MD

As the AAHS continue to foster affordable excellence in education for both members and our patients it will be necessary for us to communicate even more effectively. The method of the past as telephone, conference calls, and fax are becoming obsolete. They are being replaced by high speed, broadband communications devices. These devices allow instant access to the national library medicine, our journals, public web sites, and even informational web sites like handsurgery.org. Web casting, web chatting and web based e-learning are available we just aren't using them. To participate in the emerging trends in information dissemination it is necessary for our members to become web savvy and to have broadband web access as provided by cable modems, DSL, T-1 lines preferably within the next 12-24 months. Don't miss the informational boat.

By the way you want to think of something provocative? Imagine the reversed scenario information accumulation! Perhaps in the next column H

Dealing with Internet Access at Home and Work

SCOTT H. KOZIN, MD

In addition to the major issues of access to healthcare, the relatively minor issue of internet access remains a complicated dilemma. The confusion encompasses our work and home situation. For those of us employed by a large company or university, internet assess at work is dictated by our employer. This same scenario does not apply to our home situation. This predicament is confounded by the competition for "air time" both at the dinner table and at the computer. Spouses and children both want and need their time, respectively. Children have homework designed for the internet and no longer know the existence of or use an "encyclopedia." The days of the modem are passe as homework and / or surfing would take entirely too long. Furthermore, the concept that only a single computer be designated to the net is gone.

Broadband high speed internet access is here to stay. The question remains as to what format will provide the best service with regards to speed, reliability and longevity. This inquest is more difficult each day as new avenues to the internet are being developed rapidly. Nonetheless, we must make a decision! Who ever thought our kids would say, "hey, dad, what is a record?" Here are my current suggestions, although they may change by the time this tidbit comes to print.

Broadband access is most available in two forms, either via cable or a DSL. Both are similarly priced and provide adequate speed of1.5 megabytes per second. Each has its own quirks that deserve mention. The flow of cable information may vary with the use of cable within the neighborhood, usually not noticeable. DSL is designated for the information super highway, but the speed in (downstream) may be different than the speed out (upstream) (asynchronous DSL), resulting in slower service than expected.

Once the internet enters the house, the next obstacle is distribution. The cable or DSL can certainly run into one tethered computer, but that will not serve the needs of a busy family. The solution resides in routing of the internet throughout the household to multiple computers. This can be accomplished by routing the internet access. One option is splitting the internet

access, and running lines to different computers (speed of 100 megabytes per second), similar to running cable to multiple televisions. The bottleneck for information, however, is the internet connection. Another more modern method involves wireless connections through a wireless router. Standard wireless speed is 11 megabytes per second, although faster speeds are currently available. This tactic allows multiple computers in different locations to simultaneously use the internet. Typical wireless distance is 300 feet with decreased signal toward end range. May also vary with construction of walls and floors, plaster walls can decrease signal 10-20% at the extremes. If a problem, can add a booster to router at the tethered computer. The computers can be desktops are even laptops, so you can enjoy the internet away from you children and on your favorite couch. Each computer must have wireless capability, which is standard in most new computers. Older laptops may require a pcmcia card for wireless access.

The other advantage of wireless connection is the formation of a central hub and consolidation of resources. All computers can use the same printer and fax, which are now available as a single unit. The only problem is that after you print, you actually have to remove yourself from your favorite couch to fetch the papers!

Additional information

Linksys is number 1 wireless home router
Protocols:
802-11B, runs at 11 mb/s @ 2.4 GHz
802-11A, runs at 54 mb/s @ 5.0 GHz
802-11G, runs at 55 mb/s @ 2.4 GHz (newest)

Word of caution, phone and/or microwave can interfere with wireless connection. H

TREASURER'S REPORT

The landscape of the practice of medicine continues to change, presenting the Association with numerous opportunities and challenges. Despite the volatility of the economy in 2002, the association's financial position remained stable.

The assets on December 31, 2002 totaled $895,594. While the Association did not experience a favorable year-end, the Annual Meeting in Cancun showed a profit of almost $30,000.

Dues income was down again this year. The variance can be attributed to an increase in the number of retired/emeritus members as well as a larger than usual number of individuals who declined to renew their membership—definitely a result of the uncertain economy.

Table 1

Income	2001	2002
Dues	$196,985	$188,077
Annual Meeting	$272,093	$250,557
Net Annual Meeting	$80,000	$29,679
Investment Profit (Loss)	($29,448)	($91,327)

Expenses for the 2002 fiscal period remained true to the budget as approved by the board of directors. The Annual Meeting did exceed projections due to the international venue of the meeting, but other under expenditures offset the variance. Publication expenses continued to grow in 2002 as a result of the website initiatives. We expect this trend to continue as we rely more on electronic communication. Administration expenses rose as a result of the need to distribute materials in multiple ways. It is our hope that with increased electronic communication, these expenses will begin to decrease.

Table 2

Expenses	2001	2002
Publications	$31,999	$44,096
Annual Meeting	$182,243	$220,878
Board/Committee	$80,842	$57,539
Administration	$129,280	$152,513

Our investment portfolio is under the direction of Salomon Smith Barney. While we did not make money in 2002, we actually did outperform our comparative indices and our net assets did grow.

N. BRADLY MELAND, MD

In closing, I would encourage your continued support of the Hand Surgery Endowment. The Endowment is facing difficult financial times and we need your support. If each AAHS member would commit to make a $1,000 contribution for five years, the Endowment would grow to almost one million dollars. Those funds could then be used to fund research, provide education and reduce the overall expenses of the organization.

Dues, as always, are slow in coming in. Please check your records and if you have not paid them, contact the Central Office. Our Association needs dues paid promptly to continue our work.

Table 3

	2001	2002
TOTAL INCOME	$475,253	$415,522
TOTAL EXPENSES	$424,364	$474,003
NET INCOME	$50,889	($58,481)
NET ASSETS	$890,101	$895,993

Thank you all for the opportunity of serving as your treasurer.

N. Bradly Meland, MD
AAHS Treasurer H

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patients, participated in clinics with physicians at the University of Mississippi Medical Center and at Plastic & Hand Surgery Associates, and attended two seminars: one therapy presentation on Scar Biology and a resident lecture on Surgical Approaches to Nerve Repair.

After all this academic stimulation, we escaped to Natchez, MS where Veronica could see the mighty Mississippi River, tour antebellum plantations, and dine in the oldest restaurant on the river

Cathy Sanders PT CHT (left) and Veronica discuss treatment options to mobilize a stiff finger.

(reputed to be haunted, and we did hear footsteps!). Our staff benefited from the daily cultural and professional exchanges that occurred and thank Dr. Alan Freeland, Past-President, for his commitment to this international venue.

On September 3rd, Veronica flew to San Antonio,Texas, where Sylvia Davila PT, CHT, and Miguel Saldana MD, both fluent in Spanish, hosted her stay in their clinics. During her visit she observed a wide range of hand cases, from trauma to CTD to RA reconstruction. Veronica noted similarities between her native country and the USA in the role insurance coverage has on health care delivery. However, she did comment that in this country the volume of paper work is intimidating. While PT & OT skills remain very separate in Venezuela, Veronica was impressed with the "cross-training" of hand therapists in the USA that allows one therapist to fabricate splints, design exercise programs, apply modalities, and simulate functional activities on work simulator equipment. Sylvia Davila and Veronica both agreed that communication between hand surgeons and hand therapists is the key for effective management of hand patients. They also agreed that the best shopping is along Riverwalk, where they enjoyed the historic and outdoor ambiance of this intercity refuge.

Front row, left to right: Terri Wolfe OTR/L, CHT, Pam Steelman CRNP, PT, CHT, Sue Michlovitz PhD, CHT, Veronica Fernandez PT, and Georgette Fogg OTR/L. Back row, l to r: John Lubahn MD, Mark Baratz MD and John Taras, MD.

Next, Veronica flew to Pittsburgh, Pennsylvania, to visit Paul Brach PT, CHT, at the Centers for Rehab Services at Allegheny General Hospital. Her time was divided between observing in the clinic with Paul and in the operating room with Dr. Mark Baratz. One of the highlights of her trip, besides getting lost on the downtown streets of Pittsburgh, was attending Dr. Baratz's annual hand conference at Allegheny General Hospital. This 2-day conference focused on trauma of the upper extremity and ended with Dr. Baratz's famous "finger bowl tournament" in which teams play jeopardy-style to answer challenging questions. Veronica was showered with Pittsburgh memorabilia and gifts to commemorate her visit.

Veronica (center) in the Dr. Baratz' OR.

Aviva L. Wolff, OT, CHT

Personal: I grew up in Rockland County, NY, and spent several years in Israel as a child. I returned as an adult with my husband who was doing research there. While in Israel, with the help of Jeanne Melvin, I devoted time to educate both physicians and therapists in appropriate rehabilitation techniques for scleroderma. I also treated a large number of congenital hand injuries (in both the Palestinian and Israeli populations). I currently reside in Paramus, NJ, with my husband, Danny, and our three daughters.

Education: BS in Occupational Therapy from SUNY Downstate; graduated cum laude. Certified Hand Therapist since 1997.

Employer: Senior Hand Therapist, the Hospital for Special Surgery. I have been employed at Kessler Institute in NJ, Connecticut Hand Surgery Center, Kupat Cholim in Jerusalem, Accelerated Hand Therapy in NJ, and The Hospital for Special Surgery in NYC.

AAHS Involvement: Became an affiliate member of AAHS this year. Presented a poster on the unstable elbow at the 2002 meeting in Cancun. Presented a talk at the Hand Therapy Specialty Day at the 2003 meeting in Kauai on PIP fracture dislocations. I have volunteered to join the program and education committees.

Best Part of My Job: Working alongside the most skilled and competent surgeons and therapists.

Major Accomplishments: Published in *Orthopedic Physical Therapy Clinics* ("Elbow Fractures and Rehabilitation"), and *Techniques in Hand and Upper Extremity Surgery (*"Therapeutic Management of Total Elbow Replacement"). Co-researcher on "Easy Surgical Correction of Dynamic Digital Swan Neck Deformity in Cerebral Palsy," presented at ASSH 56th Annual Meeting 2001. Won the Best Scientific / Clinical Poster Award for "Early Postoperative Management of the Unstable Elbow" at the ASHT 23rd Annual Meeting. Instructed an orthotic and prosthetics course at Touro College's graduate program in occupational therapy, and guest lectured at various PT and OT programs on topics including splinting, elbow injuries, sports injuries of the hand and wrist, and scleroderma.

AVIVA L. WOLFF, OT, CHT

Clinical Specialties: Elbow injuries, the pediatric hand, and scleroderma.

Greatest Challenge: Balancing work and professional activities with my family life. I believe that being a good mother to my children and good friend to my husband makes me a better therapist to my patients. My goal is to be there for my family, my friends, my patients, and my co-workers.

Three Words That Describe Me: In the words of Anna Quindlen: "I show up, I listen, I try to laugh." H

Veronica concluded her US visit in Philadelphia, "the city of brotherly love", with Sue Michlovitz PT, PhD, CHT. Veronica audited Sue's course on Evidence Based Practice in Orthopedic PT at Temple University, (what was her grade Dr. Michlovitz?). Scott Kozin MD graciously hosted Veronica at the Shriners Hospital for Children where Veronica observed the evaluation and treatment planning that is crucial in developing treatment strategies for the pediatric population. Dr. Kozin and Ms. Fernandez both recognized that the pediatric population offers a unique challenge in individualizing intervention. Veronica was exposed to the full Philly flavor of hoagies, pretzels, the Liberty Bell and "break-the-fast-dinner" of Yom Kippur. Veronica's schedule also included an impromptu visit to the Venezuela Consulate in New York to replace lost travel documents; what a great excuse to visit the Big Apple!

In summary, those of us who had the opportunity to meet Veronica Fernandez wish to express our extreme gratitude to the AAHS and Venezuela for this extraordinary cultural exchange. She is a valuable, intelligent therapist who is a credit to her country. The Association's mission statement, to foster growth of hand surgery and therapy around the world through the Vargas Hand Therapy International Teaching Award and Vargas Hand Therapy Fellowship, was realized in this one rewarding experience. We applaud this initial venture and anticipate future international pursuits. H

Written by Maureen Hardy PT, CHT, with contributions by Paul Brach PT, CHT, and Sue Michlovitz, PT, PhD, CHT.

Flexor Tendon Injuries

LEON S. BENSON, MD

This issue of the Coding Corner deals with flexor tendon injuries. We will organize and review codes relevant to injuries occuring in the wrist and forearm as well as those in the hand and fingers.

Codes for procedures which relate to flexor tendon reconstructive and salvage will also be reviewed.

Eleven codes deal with repairing flexor tendons that have been lacerated. Three of these are for injuries at the wrist or forearm level, and eight codes deal with the hand. Codes 25260, 25263, and 25265 are used for repairing flexor tendons in the forearm or wrist area. Code 25260 is used for the most common scenario in which a forearm or wrist flexor tendon is primarily repaired. Codes 25263 is for secondary (delayed) flexor tendon repair, and 25265 is used for secondary repair which also requires use of a free tendon graft.

Eight codes are describe flexor tendon repair in the hand. The first two are for flexor repairs not performed in zone 2 of the digital pulley system. Codes 26350 and 26352 are for non-zone 2 repairs, done without or with a free tendon graft, respectively . The next sequence of flexor tendon repair codes are for digital flexors repaired within zone 2 ("no-man's land"). Codes 26356 is for primary repair in zone 2, and code 26357 is for zone 2 repairs performed on a secondary basis. Code 26358 is for a secondary zone 2 flexor tendon repair which requires use of a tendon graft. The last three codes of this family are for repairing the profundus tendon when the sublimus is intact. Code 26370 is for the primary profundus repair (with intact sublimus). Code 26372 is for profundus only repair done on a secondary basis using a free tendon graft, and codes 26373 is for a secondary repair of just the profundus when a free tendon graft is not utilized.

Four codes relate to reconstructive flexor tendon procedures performed at the wrist or forearm level. Code 25280 is used for a flex-

TABLE 1: Flexor Repair in the Forearm or Wrist	
25260	Repair, tendon or muscle, flexor, forearm and/or wrist, primary, single, each
25263	Repair tendon or muscle, flexor forearm and/or wrist, secondary, single, each
25265	Repair tendon or muscle, flexor forearm and/or wrist, secondary, with free graft (includes obtaining graft), each

Table 2: Flexor Repair in the Hand or Finger	
26350	Repair or advancement, flexor tendon, not in zone 2, primary or secondary, each
26352	Repair or advancement, flexor tendon, not in zone 2, secondary with free graft, each (includes obtaining graft)
26356	Repair or advancement, flexor tendon, in zone 2, primary, without free graft, each
26357	Repair or advancement, flexor tendon, in zone 2, secondary
26358	Repair or advancement, flexor tendon, in zone 2, secondary, with free graft (includes obtaining graft)
26370	Repair or advancement of profundus tendon, with intact sublimus, primary, each
26372	Repair or advancement of profundus tendon, with intact sublimus, secondary, with free graft, each
26373	Repair or advancement of profundus tendon, with intact sublimus, secondary, without free graft, each

Table 3: Reconstructive Flexor Tendon Surgery in the Forearm or Wrist	
25280	Lengthening or shortening of flexor or extensor tendon, forearm and/or wrist, single, each tendon
25290	Tenotomy, open, flexor or extensor tendon, forearm and/or wrist, single, each tendon
25295	Tenolysis, open, flexor or extensor tendon, forearm and/or wrist, single, each tendon
25300	Tenodesis at wrsit, flexors of fingers

Table 4: Reconstructive Flexor Tendon Surgery in the Hand or Finger	
26390	Excision flexor tendon, with implantation of synthetic rod for delayed tendon graft, hand or finger, each rod
26392	Removal of synthetic rod and insertion of flexor tendon graft, hand or finger (includes obtaining graft), each rod
26440	Tenolysis, flexor tendon, palm OR finger, each tendon
26442	Tenolysis, flexor tendon, palm AND finger, each tendon
26450	Tenotomy, flexor, palm, open ,each tendon
26455	Tenotomy, flexor, finger, open , each tendon
26478	Lengthening of tendon, flexor, hand or finger, each tendon
26479	Shortening of tendon, flexor, hand or finger, each tendon

or tendon shortening or lengthening; code 25290 describes a flexor tendon tenotomy. Flexor tenolysis at the forearm or wrist level is coded with 25295. Code 25300 applies to flexor tenodesis at the wrist.

The last eight codes for this topic relate to reconstructive flexor tendon surgery performed in the hand. Code 26390 describes excision of a flexor tendon with implantation of a synthetic rod. Code 26392 is used whne the synthetic rod is subsequently removed and a tendon graft is inserted. Two codes relate to flexor tenolysis in the hand. Codes 26440 is for flexor tenolysis in the palm or finger; codes 26442 is used for flexor tenolysis when performed in the palm and finger. Flexor tenotomy in the palm corresponds to code 26450; flexor tenotomy in the finger corresponds to code 26455. The last two codes describe lengthening or shortening of flexors in the hand or fingers; 26478 is for lengthening, and 26479 is for shortening.

You Code It

A woman accidentally cuts herself while slicing open a bagel. Although she notices that she cannot bend the tip of her left long finger, she doesn't seek medical evaluation until two months after the incident. At the time of operative exploration, it is noted that the sublimus is intact and that the long finger profundus was completely severed. It is too contracted to allow direct repair, however, and a free palmaris longus graft is required to make up length.

Solution:

26372 Repair or advancement of profundus tendon, with intact sublimus, secondary with free graft (includes obtaining graft), each tendon. H

Flexor Tendon Injuries

*This issue's topic is moderated by **Steven Moran, MD,** Assistant Professor of Surgery, Division of Plastic and Hand Surgery, Division of Hand Surgery, The Mayo Clinic, Rochester, MN. He is joined in the discussion by **Kevin Chung, MD,** Associate Professor of Surgery, Section of Plastic Surgery, The University of Michigan, Ann Arbor, MI, **Amit Gupta, MD,** Assistant Clinical Professor of Hand Surgery, University of Louisville, and Director, Christine M. Kleinert Institute for Hand & Microsurgery, Louisville, KY, **Peter M. Murray, MD,** Associate Professor, Division of Hand and Microvascular Surgery, Department of Hand Surgery, The Mayo Clinic, Jacksonville, FL, **Thomas Trumble, MD,** Dept. of Orthopaedics and Sports Medicine, University of Washington Medical Center, and Professor and Chief of the University of Washington Hand Institute, Seattle, WA, and **Gail Groth, MHS, OTR, CHT,** Department of Industry and Manufacturing Engineering, University of Wisconsin-Milwaukee, Watertown, WI.*

I USE A MODIFIED PENNINGTON SUTURE, WITH A LOCKING AND GRASPING CORE SUTURE AUGMENTED WITH A CENTRAL SIMPLE HORIZONTAL MATTRESS, FOLLOWED BY A LOCKING EPITENDINOUS SUTURE.

STEVEN MORAN, MD

Dr. Moran: Dr. Chung, what is your current method of tendon repair?

Dr. Chung: I use the Dr. Strickland repair technique, which is a four-strand repair. I put in an outer core suture using a modified Kessler 3-0 or 4-0 Ethibond suture and the inner core using the Horizontal mattress suture for the four-strand repair. This repair is augmented by an epitendinous suture using 6-0 locking Prolene.

Dr. Moran: Dr. Gupta?

Dr. Gupta: In the past I used the modified Kessler with epitendinous sutures but I've changed now since Tsu Min Tsai, one of my partners described his new suture technique. It's actually a modification of the Tsuge suture. So now we use Supramid® (S. Jackson Inc. Alexandria, Va.), which is a polyamide nylon suture. We use a 3-0 or a 4-0 suture and basically do a six strand stitch with a 6-0 prolene epitendinous suture.

Dr. Moran: Dr. Murray?

Dr. Murray: I use a four strand technique with a modified Kessler and then a central horizontal mattress suture. I'll often do an epitendinous first technique where I'll put in the epitendinous stitch first and then tie the knot outside the tenorrhaphy site. I typically use 4-0 braided suture for the core stitch.

Dr. Moran: Dr. Gupta, what is your technique for epitendinous repair?

Dr. Gupta: I use a locking suture.

Dr. Chung: I also use a locking suture. The way I do it is very similar to Dr. Murray's method. After the tendons are secured using a Keith needle, I repair the dorsal portion of the tendon first using the epitendinous 6-0 prolene in a locking fashion. I then put in the four-strand core sutures. After tying the knots, I complete the volar 6-0 prolene locking epitendinous stitches.

Dr. Moran: I use a modified Pennington suture, with a locking and grasping core suture augmented with a central simple horizontal mattress, followed by a locking epitendinous suture. Moving on to the next question, what type of rehabilitation protocol do you utilize? It is active or passive?

Dr. Chung: I still adhere to the passive motion protocol described by Drs. Duran and Kleinert. Some studies have shown that the four-strand technique may allow an active protocol involving earlier place and hold exercises.

Dr. Gupta: I use a modified Kleinert protocol. We put our patients in a brace with dorsal block splint with the wrist in a near neutral position. I try and block the MP as much as possible to flex the MP down and then I use the PFT (postoperative flexor tendon) brace described by one of our orthotists Steve Chesher. It is basically rubber band traction with a spring loaded device for optimal band traction and DIP flexion. We use a combination of passive, that's a Kleinert protocol, as well as passive push through and place and hold. So we start place and hold pretty early because we use a six strand suture now.

Dr. Moran: And Dr. Murray?

Dr. Murray: I likewise use a passive motion protocol as described by Duran but I do modify it somewhat in that I start active motion at about three weeks and place and hold as early as two weeks. I'll also utilize the wrist tenodesis splint sometime around three weeks to facilitate passive wrist extension and active MP joint flexion and then tenodesis of the digits with wrist flexion to augment flexor tendon excursion.

Dr. Moran: Ms. Groth, do you want to comment on what the doctors use in your area and what you recommend?

Ms. Groth: I prefer to use place and hold exercises within the first week, as well as the subsequent goniometric measures, with any of the popular regimens to quantify the appropriate exercise (force applica-

tion) for the patient. The exercise program is individually decided and is the critical factor in a successful outcome. Splint choices, such as static, rubberband traction to one or four digits, moveable wrist, night-strapping options, are decided separately and I have found them to be equally useful. It's been my experience that a tailored regimen of this sort has the greatest likelihood of success because it can capture the outliers—patients whose physiologic response falls outside the norm, for example, excessive or insufficient collagen formation.

Dr. Moran: I would agree with that. Our therapists will often ask how good a repair we achieved in the operating room and that many times will determine whether or not the patient is able to start place and hold. But for the most part, we utilize a passive rehabilitation protocol. Dr. Chung when will you usually begin motion on your patients?

Dr. Chung: Typically we start the patient at the second or third day postoperative day. Most of our patients live far away and finding certified hand therapists to treat them may be difficult. But typically hand therapy is initiated within the first week after tendon repair.

Dr. Gupta: I would do exactly the same thing. Typically the patient comes to the first available office day typically within the first week.

Dr. Murray: I try to start motion within five days.

Dr. Moran: Dr Chung, does a concomitant nerve injury influence the time that you begin motion?

Dr. Chung: I will delay therapy until the fourth or fifth day after repairs, but there is no data to support this approach. Recent cadaver studies have shown the nerve repairs do stay intact when the fingers are moved immediately. As long as there is no tension on the nerve repair, I will modify my current approach and will start therapy on the second or third day after repairs.

Dr. Gupta: I would say that it doesn't have any effect on the range of motion. We start at the same time.

Dr. Murray: I would agree. If there's any question about the neurorrhaphy not being sustainable with the Duran protocol then we'll do a nerve graft or whatever it takes to have adequate length.

Dr. Moran: I would perform a nerve graft if there was any tension on the neurorrhaphy. Another option, which avoids a nerve donor site, is to use a neurogen nerve tube. Taking tension off the nerve repair will allow you to start therapy sooner.

Ms. Groth: I think there's some hesitation in the therapy community to perform full passive protected digital extension whenever there's a nerve repair. If the surgeon has communicated that the length is good, then it is important to strive for full PIP joint extension. If, on the other hand, the surgeon communicates that length is insufficient, then a lesser degree of extension would be appropriate.

Dr. Moran: What do you do if the finger does not move well passively in the first two weeks?

Dr. Chung: If the finger does not move well passively after the first two weeks and assuming there is no technical problems with the repair, the first thing I would do is to communicate with my therapist because we do work with a number of hand therapists and their approaches may be quite different from our therapists at the University. If a patient does not move well passively in the first two weeks, I like to find out why. For example, I want to know whether the patient has been noncompliant or whether he or she needs to be pushed a bit more during the therapy sessions. Finding the reasons early will prevent future problems.

Dr. Gupta: Usually our office therapists see the patients before I see them so they'll pick up on any of the problems. If there are any problems, the therapist will tell me and they will make sure that the patients go to their own therapists more often, like Dr. Chung said, especially patient's who live far away. Our therapists will communicate with the local therapists to make the program a little bit more aggressive.

Dr. Murray: Assuming that the therapists are following closely their therapy regimen and assuming that there aren't any delays in the therapy regimen, one of the things that I sort of have become concerned about if I don't see passive motion is that with these larger repairs, the four and the six strand repairs, there may not be a good fit of the tenorrhaphy through the digital pulley system and sometimes I'll be concerned that there's a tendon actually getting hung up. On one recent occasion, I've re-explored the repair, finding that the tenorrhaphy was just too large to fit through the A2 pulley.

I THINK THERE'S SOME HESITATION IN THE THERAPY COMMUNITY TO PERFORM FULL PASSIVE PROTECTED DIGITAL EXTENSION WHENEVER THERE'S A NERVE REPAIR.

GAIL GROTH, MHS, OTR, CHT

Dr. Gupta: Can I comment on that? I think that's absolutely right. I see these problems with the six strand suture techniques in zone two. The tendons will be very tight if you use these stronger sutures and then try to repair the whole pulley system. I have certainly gone away from that and now do some "pulley and sheath venting" as David Elliott from England likes to call it. I would take out some of the segment of the pulleys so that it allows for a good free motion of the tendon in the OR.

Dr. Murray: If I might clarify, Dr. Gupta, what would you advocate if you did have a problem with fit after you've done the tenorrhaphy

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and let's say it's the A2 pulley? Would you take down a portion of the pulley?

Dr. Gupta: I would take out part of the A2. Not a large segment certainly but I would take out some small segment of the A2 and certainly take down A3.

THE TENDONS WILL BE VERY TIGHT IF YOU USE THESE STRONGER SUTURES AND THEN TRY TO REPAIR THE WHOLE PULLEY SYSTEM.

AMIT GUPTA, MD

Dr. Moran: Do you ever find that you have to sacrifice the superficiales repair in such a case?

Dr. Gupta: No, not really unless of course there is a crush injury or some other reason I decide not to repair the FDS. But as a general rule I would go ahead and repair the FDS.

Dr. Moran: Ms. Groth, if the patient comes in without any or minimal passive motion at two weeks is there any special modality that you might add?

Ms. Groth: This is a critical issue at this juncture in time, and it lies squarely with the therapist. If a patient presented with minimal passive ROM, I generally see this as an issue of fear (of pain) and is most effectively dealt with in those terms. If there were a moderate loss of passive flexion despite perceived compliance on the part of the patient, I would begin intermittent flexion taping within the larger protective device. But a larger problem would be the loss of passive PIP and / or DIP joint extension. Loss of passive motion extension translates into a loss of tendon excursion, potentially compromising the outcome. Careful review of compliance behavior and the speed of exercise repetitions might lead me into recommending intermittent extension strapping of the digit to the protective device. In extreme cases I have strapped the digit to an apparatus fashioned out of 1" Alumafoam that slips into the protective device and hyperflexes the MP joint.

Dr. Moran: What if the patient has no active motion but passive motion at two weeks?

Dr. Chung: If the patient does not have active motion, one of the things I would consider is whether the tendon repair is still intact and one can look at the finger posture and determine that quite readily. If the tendon repair is still intact, then perhaps more aggressive therapy involving earlier active motion may loosen the scar tissue. I will often solicit the opinion of the therapist and modify the therapy protocol.

Dr. Gupta: I agree. I think tendon rupture would be the key factor. Tendon adhesion or gapping would be other things to consider at that point. And I would examine for any of these things and then what I'd try to increase the MP block and see if that will encourage the patient to get some more active movement.

Dr. Murray: Similarly I'll go through those same thought processes. If it's getting longer out, say four to six weeks, I might consider something such as electrical stimulation just to see if we can stimulate any motion. However, I would also be concerned about a rupture although

not as much as I used to be now that I am using the four strand technique and the epitendinous repair. But I continue to be concerned about the formation of adhesions.

Dr. Moran: Ms. Groth, any comments?

Ms. Groth: A loss of active motion indicates that the amount of force that's been applied to the tendon has been insufficient in overcoming the resistance to motion stress and adhesions are limiting tendon excursion. The course of action is to methodically increase the amount of force applied to the tendon. If the patient had only been doing passive exercise, I would add place and hold. If they were already doing place and hold I would add active composite fisting, etc. We have a series of specific exercises that apply increasing amounts of force. However I do think that sometimes these therapy exercises get a little fussy. In some cases I have found it useful to simply recommend increased functional hand use in activities of daily living. This can work to simplify the rehabilitation program, increases the patient's sense of ownership of the issue, and might free the patient from the worry of compliance.

Dr. Moran: And in following along on those lines, when would you move to perform a tenolysis in a patient?

Dr. Chung: I share the traditional approach of waiting for six months before performing tenolysis. The main impediment of doing tenolysis earlier was the exuberant amount of scar tissue in the finger prior to that period. In addition, the patient really needs to have supple, fully mobile joints if the tenolysis procedure is to be successful.

Dr. Gupta: I would agree. I would follow the traditional six months rule for tenolysis. I am surprised many times with the motion gain that can happen with time and good therapy.

Dr. Murray: It depends on the type of injury. If it's a straightforward, sharp laceration, I will wait up to six months. If it's a crush injury with a significant amount of soft tissue damage then I'll do it as early as four months. By four months, you can usually see which direction rehab is going after a crush-type injury.

I SHARE THE TRADITIONAL APPROACH OF WAITING FOR SIX MONTHS BEFORE PERFORMING TENOLYSIS.

KEVIN CHUNG, MD

Dr. Moran: I would strongly agree with that. I've had two occasions recently where patients with traumatic wounds actually improved rather substantially from a tenolysis early on as opposed to waiting the full six months. Ms. Groth, do you have any comments?

Ms. Groth: If a tenolysis is being considered I would suggest that some effort be expended to get in contact with the patient's old therapist. This could give some insight into the patient's motivation level or compliance behavior and the likelihood of successful post-op management.

Dr. Moran: That's an excellent point.

Dr. Chung: My additional point is tenolysis is sometimes considered as a straightforward operation. However, I believe in some cases, tenolysis may be rather complicated because of unexpected intraoperative findings, such as unsuspected tendon ruptures or attenuated

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repairs, that may not be amenable to tenolysis. I usually have a long discussion with the patients to point out all possible outcomes. If tenolysis is not possible, one may need to proceed with a primary tendon grafting or Hunter rod placement. Before undergoing any kind of tenolysis procedures, the patient really needs to understand the advantages and disadvantages of another intervention going into it. If the patient has acceptable range of motion with over 180 degrees of active motion, they may not want to undertake the risk of potential tendon rupture or adhesion after tenolysis.

I HAVE THREE CONTRA-INDICATIONS FOR A ONE-STAGE TENDON GRAFT. INADEQUATE PASSIVE MOTION, A DEFICIENT PULLEY SYSTEM, AND A POOR MOTOR TO THE TENDONS.

PETER MURRAY, MD

Dr. Moran: What would be your indications for moving to a one or two stage tendon graft?

Dr. Chung: Primary tendon grafting really has not been performed much anymore with the advantages of primary tendon repairs. Tendon grafting is usually performed as a secondary procedure, either for tendon ruptures or for damaged flexor tendon system. If the joints are supple, the soft tissue is not too scarred, and pulley reconstruction is not needed, I would proceed with primary tendon grafting. Otherwise, I will perform a 2-stage reconstruction with Hunter rod placement and tendon grafting.

Dr. Gupta: I typically do tendon grafts for late ruptures or when the tendon ends are frayed. I do a one stage tendon graft if the scar is supple, if there are good pulley systems and the joints are supple. Depending on how the wound looks, I would be happy to do a one stage tendon graft. If there is a concomitant fracture, associated injuries, scarring, or I have to do pulley reconstruction then I would do a two stage tendon reconstruction.

Dr. Murray: I have three contra-indications for a one-stage tendon graft. Inadequate passive motion, a deficient pulley system, and a poor motor to the tendons. So in the absence of those three things I've been pretty pleased with one stage tendon grafts.

Dr. Moran: Dr. Trumble? We were talking about what the indications would be for a one stage or a two stage tendon graft.

2004 Application for Research Grants

The AAHS Research Grant Awards were established to further the purpose of the Association as stated in its Bylaws and to foster creativity and innovation in basic and/or clinical research in all areas pertinent to hand surgery.

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Dr. Trumble: I guess the other comments were pretty much in line. One stage is the one that you have some attritional rupture or some injury that still hasn't scarred the tendon sheet. Or in a two stage is somebody who has had prior surgery or prior injury that has created too much scar tissue in a tendon sheet to have a successful tendon graft. It's a very big undertaking for the patient of a two stage graft because the two stage graft is probably a bit of a misnomer. It's probably more often a three stage graft. It commits the patient to a long rehabilitation course.

Dr. Moran: In a manual laborer with a zone two tendon laceration when will you let that patient go back to work? And let's start with Dr. Chung again.

Dr. Chung: Typically, patients would finish with the Duran or Kleinert protocol at the end of three months and I think that's a reasonable time for going back to manual labor.

Dr. Gupta: I actually talk to the patients, and, if it's a workman's compensation, we discuss it with the rehab nurse and our work comp coordinator. And if they want to, I let them go for strictly one handed work right off the bat and then progress on to some sort of work about eight weeks. I allow them to go on to full active work at three months.

Dr. Murray: I used to go back and forth with the case managers and the employers about limited duty and so on. Now I just have taken a position that they're going to be completely out of work for three months and if the employers or the case manager want to approach me about going back to limited duty I ask them to provide me with a list of essential job tasks and then I'll decide on a case by case basis whether I think that patient, given all the circumstances considered, will be able to do that, whether it be limited or full, partial.

Dr. Trumble: I agree with Dr. Murray regarding heavy labor. There is essentially no light duty unless there's a really motivated employer and so it really takes three months before you get the strength back. Even then, if it's a single finger, they probably can do pretty well, but if it's multiple digits, they probably need another two weeks.

Ms. Groth: I would add that I don't include hand strengthening or conditioning as a routine part of flexor tendon rehabilitation. Patients generally regain sufficient hand strength to perform their ADLs within 12 weeks post-op. If, however, the patient's subjective hand strength has not fully returned at that point, or their job tasks exceed their capabilities, I would initiate a work-conditioning program at that point.

Dr. Chung: I use a strict three month rule, but with some exceptions. Some working environment are rather adaptable and can truly accommodate a one-handed job. I think the case manager is a tremendous ally for the patient in this situation and also for the physician. Quite often the patient may be asked to perform duties in an unsympathetic workplace, that are not prescribed, which will jeopardize the patient's recovery. Having the case manager perform a job-site review will provide a better transition to return to work because most of us will not have the opportunity to assess the appropriateness of the work environment.

Dr. Moran: That's a very good point. Does anyone use any type of supplemental material to reduce postoperative adhesions, either primarily during their initial repair, or secondarily during the tenolysis? And that can include silicone gel sheeting or any type of scar reducing agent.

Dr. Chung: There are many different products out in the market and none of them have shown conclusively that they help decrease tendon adhesion. At this point, I have not used any of these products.

Dr. Gupta: Likewise. I don't use any of the supplementary materials.

Dr. Murray: I don't use any either.

Dr. Trumble: No, I don't use. I used ADCON in the early phases but I wasn't impressed with the result and we actually tested in a laboratory both ADCON and this new product from pHisoMed. And the active histology is kind of concerning because there seems to be more autoblast migration with these foreign products. Sometimes there are areas of less scar formation but in the early histology, in the three to four week period, we saw more mobilization from the material and it was kind of surprising to us. So we have held off. For example, in extensor tendons I've had some luck with elastic sheets because it's a broad surface and you can apply it between the bone and then the tendon. But in kind of a limited uncontrolled study, it didn't seem to have a big effect and occasionally the material extruded from the wound through a small gap in the sutures. And so we have not found anything successful. We'd like to have something but nothing has come forward as a convincing product.

IT'S A VERY BIG UNDERTAKING FOR THE PATIENT OF A TWO STAGE GRAFT BECAUSE THE TWO STAGE GRAFT IS PROBABLY A BIT OF A MISNOMER.

THOMAS TRUMBLE, MD

Dr. Moran: Any final comments?

Ms. Groth: Injuries vary in severity as much as the patients psyche, the therapist's attentiveness, and the surgeon's capabilities. We therapists appreciate a referral that includes as much surgical detail as possible, as well as a patient who has been well prepared to commit to the rigors of rehabilitation. We, in turn, must thoughtfully and carefully guide the patient without aggressiveness and in full communication with the surgeon.

Dr. Moran: That wraps our discussion for tonight. Thank you very much for participating. H

American Association for Hand Surgery Calendar

2003

July 18–20, 2003
Mid Year Board of Directors Meeting
Casa Del Mar
Santa Monica, CA

September 17–19, 2003
American Society for Surgery of the Hand – 58th Annual Meeting
Chicago, IL

2004

January 14–17, 2004
34th Annual Meeting
Westin Mission Hills
Palm Springs, CA

March 10-14, 2004
American Academy of Orthopaedic Surgeons – Annual Meeting
San Francisco, CA

May 21–23, 2004
Work Related Disorders of the Upper Extremity
Wyndham Chicago

June 8–11, 2004
Mid-Year Board of Directors Meeting
St. Regis Monarch Beach Resort
Dana Point, CA

September 9–11, 2004
American Society for Surgery of the Hand – 59th Annual Meeting
New York, NY

2005

January 12–15, 2005
35th Annual Meeting
Sanibel Harbor Resort
Sanibel Island, FL

September 22-24, 2005
American Society for Surgery of the Hand – 60th Annual Meeting
San Antonio, TX

2006

January 11–14, 2006
36th Annual Meeting
Loews Ventana Canyon Resort
Tucson, AZ

September 7–9, 2006
American Society for Surgery of the Hand – 61st Annual Meeting
Washington, DC

2007

January 10–13, 2007
37th Annual Meeting
The Westin Rio Mar Beach Resort
Rio Grande, Puerto Rico

2008

January 9-12, 2008
38th Annual Meeting
The Westin Century Plaza Hotel & Spa
Beverly Hills, CA

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