A Publication of the American Association for Hand Surgery

Autumn 2006

HAND SURGERY QUARTERLY

FROM THE PRESIDENT

Mid-Year Report

RONALD E. PALMER, MD

In January, I was inducted as President of the American Association for Hand Surgery. Since my induction, I am astounded as to how quickly time has passed. As I have told you in earlier newsletters, this has certainly been an active and productive year. We recently returned from our mid-year Board of Directors' meeting. Your Board of Directors is working hard to keep the organization running smoothly and to present the best educational experiences possible.

Dr. Freeland updated the Board on the goals of the Hand Surgery Endowment as well as a summary of this year's Endowment fund raising efforts. There was a great deal of discussion on how the Endowment can manage the organization to control overhead to get maximum return of funds to the organization and you. AAHS and the HSE are working together to try to control the overhead of the Endowment.

Dr. Rick Brown ably presented the proposed 2007 operating budget and fielded a number of questions. One of the issues discussed was regarding this very newsletter distribution. There was a question whether the Association should continue the mailing or change to electronic distribution. Central Office was asked to go about obtaining information from our membership regarding your opinion.

Coming in January! The AAHS 2007 Annual Meeting will be in Rio Grande, Puerto Rico, where sights like these are commonplace. For a peek at the 2007 program, turn to pages 5-7.

Our annual meeting was discussed throughout and a review of a report submitted by Laura Downes Leeper regarding the outline of the financial relationship between AAHS, ASRM, and ASPN. This we believe has been a mutually productive relationship for each organization.

There was a good deal of discussion regarding our new hand journal. Dr. Elvin Zook and I have been in communication with one another regarding the journal as well as appointment of associate editors.

I reviewed with the Board the National Orthopedic Leadership meeting that I attended in Washington, D.C. and the "Board of Specialties" meeting. Their fall meeting will be in Albuquerque, New Mexico in October, which I plan on attending.

Both ASPS and AAOS offer Pathways To Leadership for young members of specialty organizations. Our Board discussed these programs and discussed potential young members of our organization who would be interested and qualify for these valuable meetings. It was noted that this does require some commitment from the individuals.

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FROM THE EDITOR'S DESK

It's that Time Again

PETER C. AMADIO MD

Summer's over. Back to work and school, what the French call la rentrée (the reentrance). Also, every two years, the kickoff for the more important, shorter half of the political season, when more attention focuses on the upcoming elections (the first, longer half, of course, begins as soon as the previous election is over). So, once again, I will remind readers of HSQ what is at stake this election season: everything.

What is your issue? The War? The Medicare fee schedule? Social Security? Reimbursement for hand therapy services? All 435 Representatives are up for election, as well as a third of the Senate. What about malpractice reform? Certificates of need for your surgicenter? Scope of practice issues? There are elections in every state, including 36 governor races. Whether you think it's time for a change or no time to change horses in mid stream, now is the time for you to make your voice heard.

What can you do? At the very least, register to vote, and then vote. But, as professionals, we can, and should, do more. AAHS does not have a political action committee (PAC), but the national orthopaedic, plastic surgery, and therapy societies do. Contributions to a PAC support the agenda of those organizations. For example, the number one issue for the orthopaedic PAC is malpractice reform. If that's your biggest issue, then a donation to the orthopaedic PAC can support many candidates across the country with a single check. In addition, state professional societies have their own PAC's. In my state of Minnesota, smoke free workplaces is the number one issue for the Minnesota Medical Association (malpractice reform is second).

PAC's not your cup of tea? Then contribute to specific candidates. That's a good way to get on the radar screen of your local legislators, who notice such things, especially if they need to file a report because your donation crosses a reporting threshold ($200 for federal candidates, usually $100 at the state level). Of course, you get on everyone else's radar screen as well; just go to www.opensecrets.org to find out who, in your community, is supporting which federal candidates. In Minnesota, you can check www.cfboard.state.mn.us to find donors to local candidates. Most states have similar databases, although the state databases are more likely to reflect the last election cycle, while the federal data is contemporary. I suspect that these thresholds are affordable by all members of AAHS, yet I would be surprised if more than 20% of our members actually gave, ever, at that level.

The most effective method, of course, is to work for a specific candidate, especially to help raise money from your friends and associates. Such "rainmakers" (the rain, in this case, being made of greenbacks) attract the most attention (and gratitude) of candidates. But you can also walk the neighborhood, join phone banks to get out the vote, or simply host a lawn sign.

The worst thing you could do is to do nothing. No one can promise that your participation will guarantee that your positions will carry the day. But, whether you are hard left, hard right, or somewhere in between, one thing is certain: if you don't make your opinions known, they will be ignored. So, please, get in there, and make our country, make your community, a better place. H

FROM THE PRESIDENT

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Finally, I am looking forward to seeing everyone in Puerto Rico, January 10th through the 13th for our annual meeting. Again, Dr. Lee Osterman and Jorge Orbay are the co-program directors and have put together an impressive and challenging program. There will be a good deal of social activities and I have put together a number of exciting opportunities for our invited lecturers. Bob Beckenbaugh will be the J. Joseph Danyo Presidential Invited Lecturer. His title is “Is It Fun Anymore?”. Questions have arisen with regard to ethics and morality of a number of the changes that have occurred in the business of medicine and the business of patient care. I am personally looking forward to Dr.

HAND SURGERY QUARTERLY

President
Ronald E. Palmer, MD

Editor
Peter C. Amadio, MD

Executive Director
Laura Downes Leeper, CAE

Managing Editor
Anne B. Behrens

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.

Beckenbaugh's thoughts, as I know they will be enlightening and entertaining.

The keynote speaker happens to be my brother-in-law, Bob Jamieson. Bob Jamieson is the senior ABC news correspondent for Nightly News based out of New York City. The topic of his discussion is "Covering Medicine, Wars, and Politics". The address will focus on ABC's unique way of covering medicine. It will also go into detail about covering the Middle East and the issues that impact everyday life in the United States. I think everyone will look forward to Bob's enlightening talk and certainly he will be available to take questions after the address.

Again, we have a great meeting in store for Puerto Rico. Please begin to make your plans. We will see you then and share the "Treasures of the Caribbean." H

AAHS and Springer partner to publish new journal, HAND

The American Association for Hand Surgery has selected Springer as the publisher of the association's new journal, *HAND*. The first issue is slated for summer 2006. *Hand* is a peer reviewed journal featuring articles written by clinicians worldwide presenting current research and clinical work in the field of hand surgery. As a center of excellence in research and an invaluable source for medical expertise, AAHS is dedicated to advancing the science of hand surgery, and committed to continuing the education of professionals who work in all disciplines related to hand surgery. Instructions for manuscript submission can be obtained from the Central Office. H

A Warm Welcome to the Canadians

The AAHS would like to join other member organizations of La Federacion de Mano in welcoming the Canadian Society of Hand Therapists (CSHT) to active membership in La Federacion. The President of the CSHT, Wendy Tilley, has been designated as a delegate. Please learn more about La Federacion by visiting the web site at www.demano.org. H

AAHS Mentoring Program Offers a Tremendous Opportunity

A new program was introduced at the end of last year, featuring AAHS members who have offered to teach their expertise in specific areas. Please take advantage of their academic generosity (see listing below). It is designed to let our members continue to learn the way we were taught, as residents and fellows, in the clinic and operating room with a surgical mentor. For more information, including to register as a mentor, please contact the AAHS Central Office.

AAHS Mentor Volunteers

NAME	EMAIL OR PHONE	PROCEDURE(S)
R. D. Beckenbaugh, MD	beckenbaugh.robert@mayo.edu	Technique of pyrocarbon arthroplasty of the thumb carpometacarpal and metacarpophalangeal and PIP joints of the digits
Richard Berger, MD, PhD	berger.richard@mayo.edu	Wrist surgery
Allen Bishop, MD	Mayo Clinic 507-284-4149	Brachial plexus reconstruction, carpal vascularized bone grafts and microvascular free tissue transfers
James Chang, MD	changhand@aol.com	Dupuytren's; thumb reconstruction; flexor tendon surgery; trapezial excision arthroplasty; and medial epicondylectomy
Kevin Chung, MD	kecchung@med.umich.edu	Rheumatoid and congenital
E. Gene Deune, MD	egdeune@jhmi.edu	Congenital hand anomalies and upper and lower extremity reconstruction for deficits due to trauma, cancer resecation or neurological disorders (i.e. brachial plexus)
Scott H. Kozin, MD	SKOZIN@shrinenet.org	Pediatrics
Don Lalonde, MD	drdonlalonde@nb.aibn.com	Wide awake approach to hand surgery
W. P. Andrew Lee, MD	leewp@upmc.edu	Post traumatic hand reconstruction; mini incision carpal tunnel release
William Lineaweaver, MD	wlineaweaver@surgeryumsmed.edu	Business practices
Susan Mackinnon, MD	mackinnons@wustl.edu	Ulnar nerve surgery
Nash Naam, MD	drnaam@handdocs.com	SLAC wrist reconstruction; vascularized bone graft in treating scaphoid nonunions; ulnar shortening & radial shortening; PIP & MP joint arthroplasty; LRTI; arthroscopy of the CMC joint of the thumb
Daniel J. Nagle, MD	OOGIEN@aol.com	Wrist arthroscopy and endoscopic carpal tunnel release
Michael Neumeister, MD	mneumeister@siumed.edu	Basilar joint arthroplasty; peripheral nerve decompression
Jorge Orbay, MD	jlorbay@aol.com	Wrist fractures mentorship
A. Lee Osterman, MD	loster51@bellatlantic.net	Advanced wrist arthroscopy and small joint arthroscopy. Can also mentor a topic such as DRUJ problems, or wrist fracture.
Julian J. Pribaz, MD	Harvard Medical School 617-732-6390	Soft tissue reconstruction; microsurgical reconstruction; spare parts surgery and extremity reconstruction
Michael Raab, MD	mikeraab1@earthlink.net	Corrective osteotomy (volar or dorsal) of distal radius malunion with iliac crest bone grafting
Jaiyoung Ryu	jryu@adelphia.net	Wrist reconstruction; distal radius fracture; and scaphoid fracture/nonunion
David Slutsky, MD	d-slutsky@msn.com	Wrist arthroscopy and arthroscopic repair of dorsal radiocarpal ligament tears; intra-articular distal radius fractures
Thomas Tung, MD	tungt@wustl.edu	Brachial plexus
Joseph Upton, MD	jupton3@earthlink.net	Congenital hand surgery
Elvin Zook, MD	ezook@siumed.edu	

Mark your Calendars for the Specialty Day Program at the AAHS 2007 Annual Meeting in Puerto Rico

The theme of Specialty Day is "Rapid Recovery – The Fast Track" and promises to be an excellent educational experience. Experts will present the latest techniques to treat and rehabilitate your patient for fastest recovery following hand and wrist injuries. Hear how to get your athlete, work injured patient, or family friend back to work and play as quick as possible using new surgical and rehabilitation methods. Relative risks compared to more "traditional" methods will also be discussed. And, don't forget to join us for a little side show of golf – test your skills and win a prize.

AAHS Specialty Day Program

"Rapid Recovery–The Fast Track"

Wednesday, January 10, 2007

7:30–7:35am **President's Welcome**
Ronald Palmer, MD

7:35–7:45am **Overview – "When Can Recovery be Rapid?"**
Program Chairs:
Brian Adams, MD
Aviva Wolff, OTR/L, CHT

7:45–8:00am **Outcomes – How Do We Measure Rapid Recovery?**
Joy MacDermid, PT, PhD, CHT

8:00–9:10am **Wrist Injuries – "The Express Line"**
Moderator: Christine Novak, PT

8:00–8:10am Scaphoid Fractures
Randall Culp, MD

8:10–8:20am Distal Radial Fractures
Jorge Orbay, MD

8:20–8:35am Recovery after Wrist Fractures
Dorit H. Aaron, MA, OTR/L, CHT

8:35–8:55am Ligament Injuries
Richard Berger, MD, PhD
Julianne W Howell, OTR/L,CHT

8:55–9:10am Panel / Discussion

9:10–10:45am **Digital Injuries – "Hold Fast"**
Moderator: Brian Adams, MD

9:10–9:30am Metacarpal and Phalangeal Fractures
Michael Bednar, MD
Terri Skirven, MS, OTR/L, CHT

9:30–9:50am PIP Fracture Dislocations
Joseph Slade , MD
Paul Brach, MS, PT, CHT

9:50–10:10am Extensor Tendon Injuries
Brian Adams, MD
Julianne W. Howell, MS, PT, CHT

10:10–10:30am Flexor Tendon Injuries
Peter Amadio, MD
Rebecca von der Heyde, MS, OTR, CHT

10:30–10:45am Panel / Discussion

10:45–11:00am **Break**

Pediatric Injuries – "What Can We Learn From Kids?"

11:00–11:20am **Upper Extremity Fractures: Hand, Wrist and Forearm**
Scott Kozin, MD
Dorit H. Aaron, MA, OTR/L, CHT

11:20–12:10pm **Sports Injuries – "How the Athletes Do It In a NY Minute"**
Moderator: Susan Michlovitz, PT, PhD, CHT

11:20–11:30am Surgical Treatment – When to Fix, When to Wait
Andrew Weiland, MD

11:30–11:40am Protective Gear – Rules, Regulations, Requirements
Michelle Carlson, MD

11:40–11:50am Methods of Protection – Splints, Padding…
Coleen Gately, MS, PT, DPT

11:50–12:00pm Casting Techniques for Sports Activities
Ronald Palmer, MD

12:00-12:10pm The Injured Golfer
Aviva Wolff, OTR/L, CHT

12:10–1:00pm **Case Presentations – When Rapid Is Not So Rapid**

12:10-12:20pm My Experience with Firefighters
Joy MacDermid, PT, PhD, CHT

12:20-12:30pm My Experience with the Not-So-Healthy Worker
Susan Michlovitz, PT, PhD, CHT

12:30-12:40pm Rapid Recovery and Nerve Injury, an Oxymoron?
Christine Novak, PT, MS, PhD(c)

12:40-1:00pm Panel / Discussion

1:00-1:30pm **Rate Your Golf Swing Against the Pro**

1:30pm **Adjourn**

AAHS 37th Annual Meeting
Program at a Glance

January 10-13, 2007

Westin Rio Mar Beach Resort, Rio Grande, Puerto Rico

AAHS
Wednesday, January 10, 2007

6:30–7:30am Continental Breakfast with Exhibitors

7:30am–1:00pm **Specialty Day Program: Rapid Recovery–The Fast Track**
Brian Adams, MD, Program Co-Chair
Aviva Wolff, OTR/L, CHT, Program Co-Chair

[Full program listing in Hand Therapy and Affiliate's Corner, on page 5 of this issue]

1:00–5:00pm **La Federacion del Mano Inaugural Meeting**
Eduardo Zancolli, III, MD

Course is complimentary but pre-registration is required.

3:30–5:30pm **Bioskills Workshops**

BW-I Current Techniques for PyroCarbonMCP/PIP/CMC Arthroplasty

BW-2 Current Techniques for DRUJ Disorder

6:00–7:00pm **AAHS Welcome Reception**

AAHS
Thursday, January 11, 2007

6:30–7:30am **Financial Instructional Course 101**

Cost-Effective and Tax-Efficient Managed Money for Physicians
Patrick Donnelly, Smith Barney Consulting Group
Jeff Palmer, Smith Barney Consulting Group

7:00–8:00am **Continental Breakfast with Exhibitors**

7:30–8:30am **Instructional Courses**

102 The Treatment of Basal Joint Arthritis: More than Just Trapeziectomy
Matthew M. Tomaino, MD, Moderator
Alejandro Badia, MD
Randall W. Culp, MD
Eduardo Zancolli, III, MD

103 Treating Scapholunate Instability: A Gap Can Get You into Trouble
Mel Rossenwasser, MD, Moderator
William Geissler, MD

104 Emerging Concepts in the Treatment of Common Tendonopathies
Wyndell Merritt, MD, Moderator
Julianne Howell, PT MS CHT
Nash Naam, MD

105 Solving the Failed Carpal/Cubital Tunnel Decompression
Susan Mackinnon, MD, Moderator
Christine Novak, PT MS
Dean Sotereanos, MD
John Taras, MD

106 Improving the Outcome of Flexor Tendon Repair
Nicholas Vedder, MD, Moderator
Peter Amadio, MD
Randipsingh Bindra, MD
Michael Neumeister, MD

107 I Read It In The Journal. Should I Change My Practice?
Susan Michlovitz, PT, PhD, CHT, Moderator
Joy MacDermid, PhD, PT
Allen Van Beek, MD
Paul Velleman, PhD

8:30–8:40am **President/Program Chair Welcome**
Ronald Palmer, MD, AAHS President
A. Lee Osterman, MD, AAHS Program Chair
Jorge L. Orbay, MD, AAHS Program Co-Chair

8:40–8:45am **ASSH Presidential Welcome**
David M. Lichtman, MD

8:45–9:45am **Throwing Darts on the Back Nine: What Every Hand Surgeon Should Know about Evolution and the Skilled Human Hand**
Amy Ladd, MD
Mary Marzke, PhD
Frank Wilson, MD

9:45–10:15am **Wrist and Hand Joint Replacement: A Prosthetic Update**
Richard A. Berger, MD, PhD

10:15–10:25am **Presentation of 2006 Vargas Trip to Romania**
Donna Pendleton, MS, PT, CHT
Lorna Ramos, MA, OTR

10:25–10:55pm **Break with Exhibitors**

10:55am–12:15pm **Concurrent Scientific Paper Session 1A**

10:55am–12:15pm **Concurrent Scientific Paper Session 1B**

12:15–1:00pm **Keynote Speaker: Bob Jamieson**

"Covering Medicine, Wars and Politics"

1:00–1:30pm **Lunch with Exhibitors**

1:30–2:30pm **Instructional Courses**

108 Advances In Extensor Tendon Repair and Rehabilitation: From Mallets to Motion
John D. Lubahn, MD, Moderator
Stephanie Sweet, MD

109 Distal Radius Malunion: Prevention and Correction
Jorge L. Orbay, MD, Moderator
David Bozentka, MD

110 Wide Awake Approach To Hand Surgery
Donald H. Lalonde, MD, Moderator
N. Bradly Meland, MD

111 Reconstruction of the Burned Hand in Adults and Children
Roger Simpson, MD, Moderator
Bruce Brewer, MD

112 Surviving and Salvaging PIPJ Injuries
Alan Freeland, MD, Moderator
Robert Beckenbaugh, MD
Mark R. Belsky, MD

113 Ulnar Wrist Pain: Understanding the Snaps, Clicks & Clunks
John M. Bednar, MD, Moderator
Scott G. Edwards, MD
Mark Rekant, MD
Teri Skirven, OTR/L, CHT

2:40–3:40pm **Coding Alerts to Maximize the Work Unit Value**

AAHS

Friday, January 12, 2007

6:30–7:30am **Financial Instructional Course for Non-Members**

114 Financial Planning for the Newly Established Surgeon

7:00–7:30am **Annual Business Meeting Breakfast**

7:30–8:30am **Instructional Courses**

115 Resurrection of Dead Bone: Solving Kienboch's and Avascular Non-Unions
T. Greg Sommerkamp, MD, Moderator
Kyle Bickel, MD, FACS
Steven L. Moran, MD

116 Pediatric Brachial Plexus Injury
Scott Kozin, MD, Moderator
Allan J. Belzberg, MD
Howard M. Clarke, MD

117 Adult Elbow Fractures
Mark Baratz, MD
Michael R. Hausman, MD
David Ring, MD

118 New Concepts in Total Wrist Replacement
William Cooney, III, MD, Moderator
Brian Adams, MD
Luis Scheker, MD

119 Innovations in Scaphoid Care
Alexander Shin, MD
Joseph Slade, III, MD

120 Post Traumatic Hand Reconstruction
W. P. Andrew Lee, MD, Moderator
Richard E. Brown, MD
Alexandru Georgescu, MD
L. Scott Levin, MD, FACS

8:35–9:20am **Panel: Problem Solving in Distal Radius Fracture**
David Ring, MGH, Moderator
William Geissler, MD
Amy Ladd, MD
Jorge L. Orbay, MD
Matthew Puttnam, MD
Jaiyoung Ryu, MD

9:00–11:00am **ASRM Strategic Planning Session**

9:20–9:50am **Presidential Address**
Ronald Palmer, MD

9:50–10:25am **J. Joseph Danyo Presidential Invited Lecturer: Robert D. Beckenbaugh, MD**

"Is It Fun Anymore?"

10:25–10:55am **Break with Exhibitors**

10:55am–12:30pm **Concurrent Scientific Paper Session 2A**

10:55am–12:30pm **Concurrent Scientific Paper Session 2B**

11:00am–1:00pm **ASRM Council Meeting**

12:30–1:00pm **Hand Federacion Presentation: Contributions and Influences of Argentina to Hand Surgery**
Eduardo Zancolli III, MD

1:00–6:15pm **Comprehensive Hand Surgery Review Course**
Peter M. Murray, MD, Chairman
Randy Bindra, MD, Co-Chairman

Course is complimentary, but pre-registration is required. Box lunch will be provided.

1:00–1:15pm Tendonopathies and Dupuytrens Contracture

1:15–1:35pm Compressive Neuropathies & CRPS
Daniel Nagle, MD

1:35–2:00pm Thumb Basal Joint Arthritis, Wrist Arthritis, Kienbock's Disease
Matthew Tomaino, MD

2:00–2:25pm Inflammatory Arthritis of the Hand and Wrist
Brian Adams, MD

2:25–2:45pm Distal Radius Fractures

2:45–2:55pm Distal Radioulnar Joint
Brian Adams, MD

2:55–3:10pm Scaphoid Fractures and Non-Unions
Peter J. L. Jebson, MD

3:10–3:30pm Carpal Instability

3:30–3:45pm Fractures of the Metacarpals and Phalanges
Stephen D. Trigg, MD

3:45–4:00pm Flexor & Extensor Tendon Injuries
Kevin J. Renfree, MD

4:15–4:30pm Infections of the Hand
Kevin D. Plancher, MD, MS, FACS, FAAOS

4:30–4:55pm Congenital Hand Differences
Scott H. Kozin, MD

4:55–5:15pm Tumors of the Hand and Wrist
Edward A. Athanasian, MD

5:15–5:35pm Soft Tissue Coverage in the Hands
William C. Pederson, MD

5:35–5:50pm Tendon Transfers for the Hand X
Randipsingh Bindra, MD

5:50–6:05pm Vascular Disorders of the Hand / Reimplantation
Peter M. Murray, MD

6:05–6:15pm Questions / Adjourn

3:00–5:30pm **ASPN Council Meeting**

6:00–7:30pm **AAHS Invited Speaker: Richard Kogan, MD**

"Music and Medicine: George Gershwin"

7:30–11:00pm **AAHS Reception & Awards Dinner Dance**

AAHS/ASPN/ASRM

Saturday, January13, 2007

6:30–7:30am **Continental Breakfast**

7:00–8:00am **Panel: Upper Extremity Injuries in Modern Warfare**

8:00–8:10am **AAHS/ASRM/ASPN Presidents Welcome**
Ronald Palmer, MD, AAHS President
L. Scott Levin, MD, FACS, ASRM President
Rajiv Midha, MD, ASPN President

ASPS Presidential Remarks

8:10–9:10am **AAHS/ASRM/ASPN Presidents Invited Lecture: Richard H. Gelberman, MD**

"Identifying Targets for Clinical and Research Excellence in 2007"

9:10–9:30am **Break with Exhibitors**

9:30–10:30am **AAHS/ASRM/ASPN Outstanding Nerve Paper Presentations**

10:30–11:30am **Panel: Brachial Plexus Surgery 2007**

12:30pm Shot Gun **11th Annual Day at the Links**

Tendonopathies and Dupuytrens Contracture
Peter M. Murray, MD

Compression Neuropathies & CRPS
Daniel J. Nagle, MD

Thumb Basal Joint Arthritis, Wrist Arthritis, Kienbock's Disease
Matthew M. Tomaino, MD, MBA

Inflammatory Arthritis of the Hand and Wrist
Brian D. Adams, MD

Distal Radius Fractures
Peter J. L. Jebson, MD

Distal Radio-Ulnar Joint
Brian D. Adams, MD

Scaphoid Fractures and Non-Unions
Peter J. L. Jebson, MD

Carpal Instability
Richard A. Berger, MD, PhD

Metacarpal and Phalangeal Fractures
Stephen D. Trigg, MD

Extensor Tendon Injuries
Kevin J. Renfree, MD

Flexor Tendon Injuries
Kevin J. Renfree, MD

Infections of the Hand
Kevin D. Plancher, MD, MS, FACS, FAAOS

Congenital Hand Differences
Scott H. Kozin, MD

Tumors of the Hand and Wrist
Edward A. Athanasian, MD

Peripheral Nerve Injury and Reconstruction
Michael B. Wood, MD

Tendon Transfers
Michael B. Wood, MD

Soft Tissue Coverage of the Hand
William C. Pederson, MD

Vascular Disorders of the Hand/Reimplantation
Peter M. Murray, MD

DVD

A must have resource.

Purchase this special limited edition DVD and put the entire 2006 Comprehensive Hand Surgery Review Course at your fingertips. This invaluable resource includes faculty presentations of 18 topics covered on board examinations, the hand surgery certification examination and resident in-training examinations. Recorded during the AAHS 2006 Annual Meeting, it's a resource you'll turn to over and over again.

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Brachial Plexus

*This issue's topic is moderated by **Allen T. Bishop, MD**, Chair, Division of Hand Surgery, Mayo Clinic; Professor of Orthopedic Surgery, Mayo Clinic College of Medicine, Rochester, MN. Joining in the discussion are **Scott Kozin, MD**, Associate Professor of Orthopaedic Surgery, Shriners Hospitals for Children, Philadelphia, PA; **Robert Spinner, MD**, Associate Professor of Neurologic Surgery, Orthopedics and Anatomy, Mayo Clinic College of Medicine, Rochester, MN; **Scott Wolfe, MD**, Chief, Hand and Upper Extremity Service, Professor of Orthopedic Srugery, Hospital for Special Surgery/Cornell-Weill Medical Center, New York, NY; and **Denise Kinlaw, PT, CHT**, Mayo Clinic, Rochester, MN.*

Dr. Bishop: Let's start our discussion with how brachial plexus injuries occur. Dr. Wolfe, would you comment about adult brachial plexus etiology and patterns?

Dr. Wolfe: Certainly adult plexus injuries are high-energy injuries, and are frequently seen in high-speed motor vehicle accidents such as occur from motorcycles, cars and various all-terrain and off-road vehicles. Sports injuries, including high-speed skiing collisions, football and rugby collisions, hang gliding and the like, can also be responsible for traction injuries to the plexus. The common denominator is a distraction of the head from the shoulder, and so for that reason the nerve roots are stretched to rupture, or avulsed form the spinal cord. This same mechanism commonly produces several other serious injuries about the shoulder.

Dr. Bishop: Dr. Kozin, what factors are implicated in plexus injury at birth?

Dr. Kozin: I tell patients and families the same events that lead to an adult plexus injury can lead to a brachial plexus birth palsy. In other words, when the newborn descends into the birth canal the distance between the clavicle and head is increases, which results in stretching of the nerves. This event often occurs with shoulder distocia, such that when the shoulder gets stuck and the head turns the other way tension is applied across the plexus.

Dr. Bishop: What associated injuries should we be looking for in children?

Dr. Kozin: In children we initially look for fractures and / or dislocations. Specifically, clavicle or humerus fractures on the involved side or the contralateral extremity. With regards to dislocation, the shoulder is always examined. Even children who don't have active shoulder, should have full passive range motion. Lack of passive motion should raise concern about dislocation and requires further evaluation.

Dr. Bishop: Dr. Wolfe, what about associated injuries in adults?

Dr. Wolfe: In traction injuries of the plexus, we see serious shoulder girdle injuries, including scapulo-thoracic dissociation, clavicular fractures, shoulder dislocation, fracture-dislocation, and long bone fractures of the upper extremity. Vascular injuries such as subclavian or axillary arterial injuries are seen in up to 10-15% of high energy plexus injuries., In penetrating injuries such as knife or gunshot wounds, vascular, pulmonary and spinal cord injuries are also seen.

Dr. Bishop: Dr. Spinner, after examination determines that a plexus injury is present, when is the appropriate time to begin formal evaluation, and what examinations are helpful?

Dr. Spinner: For a closed stretch injury in an adult observation for a certain amount of time is in order. A one-month wait for the first electrodiagnostic study is typical. Earlier evaluation is not helpful, but a one-month baseline study allows comparison with subsequent testing, and is useful in formulating a surgical decision.

Open injuries are different, in that associated injuries such as arterial problems need to take precedence. If urgent surgery is performed in an open injury, there may be a role for an initial assessment of the plexus. Sharp injuries, such as lacerations, should be treated emergently, typically best by 3 days.

MYELOGRAPHY IS CERTAINLY A MAINSTAY IN OUR PRACTICE.

ALLEN T. BISHOP, MD

Dr. Bishop: Dr. Kozin, neonates can be very difficult to objectively examine. Can you give us some hints about how you approach their evaluation?

Dr. Kozin: We have found that EMG and nerve conduction studies are unreliable in the infant. In contrast, they have been helpful in adolescents and adults. So our entire premise regarding surgery is based upon the physical examination. For C5 and C6, we use primarily shoul-

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der and elbow movement. For C7 we use triceps, pronation and digital extension. For C8 and T1, we use hand grasp. Basically we initially divide the injuries into one of three types, either a C5/6 injury (a.k.a Erb's palsy), a C5/6/7 injury (a.k.a. extended Erb's palsy), or a C5/6/7/8/and T1 injury (a.ka. global palsy). Isolated C8/T1 injuries (a.k.a. Klumpke palsy) are rare in birth injuries. We also place the infant on the fluoroscopy machine. As you can imagine, they usually cry. Subsequently, we watch the diaphragm move up and down to assess for phrenic nerve involvement. We routinely assess for phrenic nerve injury only in global palsies.

THE PARENT WILL BE THE MAJOR CARE GIVER AND NEEDS TO KNOW HOW TO EXERCISE THE LIMB FOR THE INFANT.

DENISE KINLAW, PT, CHT

Dr. Wolfe: One controversial point is very early intervention for what's presumed to be a complete avulsion injury. With the limited number of available nerve transfers in this situation, and the long regeneration distances, the earlier that you can repair these individuals, the better. Having said that, I rarely get the chance to see and operate on an avulsion injury much before 3 months.

Dr. Bishop: Dr. Spinner, what are the examination or other findings that might suggest one or more nerve root avulsions? That is, what clues leads you to consider a myelogram and possible earlier intervention?

Dr. Spinner: Assessment of pre-ganglionic lesions requires inspection of proximal innervated muscles first. The presence of the Horner Syndrome is good for lower trunk or C8-T1 palsy, and a chest x-ray is helpful to assess the hemidiaphragm and phrenic nerve dysfunction, all of which would be suggestive of a pre-ganglionic injury. Don't forget about possible associated spinal cord injury; this requires checking for a Babinski sign and other abnormal reflexes as well as motor and sensory changes in other limbs. The absence of a Tinel's sign (percussion tenderness) would be suggestive of a preganglionic injury. EMG/NCS and imaging studies (i.e., CT-myelography or MRI) can provide additional useful information about whether an injury is pre- or post-ganglionic.

Dr. Kozin: We have evaluated about a dozen children who sustained a spinal cord injury during the birthing process. The clinical signs are similar in adults and children. Remember bilateral birth palsies are rare and should always arouse suspicion of a spinal cord injury.

Dr. Wolfe: Another tip off to a preganglionic lesion is the presence of de-afferentation pain, a deep, burning and radiating pain that is typically poorly responsive to narcotics, and very characteristic for single or multilevel avulsion injuries.

Dr. Bishop: Ms. Kinlaw, what is the role of therapy in the newborn with a typical Erb's obstetrical palsy?

Ms. Kinlaw: The parent will be the major care giver and needs to know how to exercise the limb for the infant. If the infant is left alone and exercises are not done, the infant will develop contractures. It is important to stretch the shoulder. The shoulder will tend to go into internal rotation and adduction. If the glenohumeral joint is tight, the scapulothoracic joint must be stabilized. There is a risk of stretching out the scapulothoracic joint, because it is mainly muscular. The glenohumeral joint has other types of soft tissues that are more difficult to stretch out such as the capsule and ligaments. It is very important to stabilize the scapula while attempting to stretch the glenohumeral joint. The rest of the joints of the upper extremity must be moved passively in order to maintain the normal range of motion. The child has a better chance of having a decent range of motion if they have return of function after the birth palsy.

Dr. Bishop: How do you stabilize the scapula?

Ms. Kinlaw: Just with the other hand, making sure that the scapula remains blocked. I do this with adults as well, because there is a real problem with the scapulothoracic joint being muscular and easily stretched out and the capsular and ligamentous structures that are a lot harder to stretch out in the glenohumeral joint. Then the glenohumeral joint is taken it to its end range, being sure to minimize any movement of the scapula.

Dr. Kozin: Ms. Kinlaw do you stabilize the scapula by capturing against the thorax or do you actually take your hand and grab the coracoid and scapula?

Ms. Kinlaw: I do it both ways, but mainly by grabbing a hold of the acromion and the inferior angle of the scapula in the infant and also in the adult, if I can.

Dr. Bishop: Now that we have evaluated our patient, when are we going to operate? Timing of intervention is perhaps most controversial in birth-related injury. What are your guidelines, Dr. Kozin?

Dr. Kozin: I think for a global brachial plexus palsy, earlier is better. At least it is within the first 3 to 4 months of life. The reasoning is based upon the long nerve regeneration time to achieve some reinnervation of the hand after reconstruction of the lower trunk. The upper trunk +/- middle trunk injury is more controversial. Gilbert and others advocate microsurgery by 3 months of age. In contrast, others surgeons like Peter Waters and Howard Clarke have shown that we can probably wait until 5 or 6 months of age or even 9 months of age. In an upper trunk, the motor end plates are much closer so the urgency is less. We tend to operate between 5 or 6 months of age with

no substantial anti-gravity return of biceps to 90-degrees being the key determinant.

Dr. Bishop: Dr. Kozin, what findings dictate the need for surgery versus observation in a 5-month-old child?

Dr. Kozin: For an upper trunk it's biceps or elbow flexion against gravity; if by 6 months they can't bend their elbow enough to bring it close to the mouth, then we tend to operate. It is difficult for a parent to understand when there is a little motion, but we tell them that we're in this situation for the long haul and the goal is to end up with a better shoulder and elbow than the child has currently, versus watching and waiting.

Dr. Bishop: Dr. Spinner, what are the factors that you use for judging when surgery should be done in adults?

Dr. Spinner: The timing issue is much more important with complete brachial plexus lesions in adults, most especially when a preganglionic lesion is suspected. While some including Rolfe Birch and Simon Kay advocate immediate exploration, most American plexus surgeons prefer to wait at least 2 months to evaluate for spontaneous recovery before performing surgery. When injury is incomplete or there is little concern about preganglionic lesions, we would wait 3 to 4 months. When serial physical examinations and electrophysiologic studies demonstrate some recovery, we might wait as long as 6 months. Unfortunately we see referrals for the first time not infrequently more than 6 months post-injury. While this certainly affects our ability to care for these patients, with new nerve transfer techniques one can get good results even in the 6 to 12 month category. The use of functioning free muscle transfer permits some functional reconstruction even in longstanding paralysis treated beyond one year.

Dr. Bishop: The most severe form of plexus injury is the global palsy, resulting in a completely flail, insensate limb. What is your treatment strategy for these injuries in children, Dr. Kozin? Do you try to reconstruct grasp as well as shoulder and elbow function?

Dr. Kozin: Children are certainly different than adults and we will try to direct viable axons or grafts toward the lower trunk to achieve hand function. We do not try this technique in adults or late adolescents.

Dr. Bishop: What is the most usual finding when evaluating the nerve roots of a child with a global palsy? Are all avulsed, or would you expect to find some usable ruptured elements?

Dr. Kozin: It is unlikely that all roots are avulsed. We've had seen just a few cases of total avulsion over the over the last 6 years. There are usually one or two viable axons at C5 and/or C6. We will use these axons to feed the distal segments with interposed sural nerve grafts.

Dr. Bishop: Do you have a particular pattern of grafting that you have found to be most fruitful?

Dr. Kozin: No. It depends on the status of the viable axons, which is the prime factor. In addition, there is controversy as to how many axons you think are there versus how many axons are actually present. Sometimes at surgery, even with all the clinical findings of avulsion, such as a positive Horners syndrome and no return of grasp, when you visualize the lower trunk there's no discrete evidence that it's an extra-foramen rupture.

Dr. Bishop: Do you make use of extraplexal sources of nerve input?

Dr. Kozin: Absolutely. When we operate on a global palsy, the first step of the operation is isolation of the spinal accessory nerve using the technique by Doi. This requires dissection in front of the trapezius and takes relatively minimal time.

Dr. Bishop: Is there a role for intercostals nerves or contralateral C7 transfers in babies?

Dr. Kozin: I think the role for intercostals in babies is limited, because of case reports of respiratory distress. As for contralateral C7, I have not used this source in infants.

Dr. Bishop: Scott Wolfe, how would you approach a complete flail limb in an adult?

Dr. Wolfe: I'll use the CT myelogram as part of my imaging work up. CT myelography has an advantage over MRI because of its ability to demonstrate not only the pseudomeningocoeles at the nerve root level but also the exiting rootlets themselves. In our hands this gives has a higher specificity in predicting nerve root avulsions. CT myelography is generally performed at 3-4 weeks following injury to allow dural tears to seal. If I visualize what appears to be a five level avulsion injury, that's going to lead me towards earlier intervention. The other circumstance that would encourage earlier intervention would be distal recovery that precedes proximal recovery, particularly in the patients with multilevel injuries.. If recovery begins at the elbow level and beyond, but the deltoid and biceps have failed to recover, I think we can assume that a more complete injury has occurred at the upper trunk level, particularly with an EMG at 2 months or so that isn't showing functioning motor units. These are two situations that might push me to intervene before the 3 month mark. The situation that you may find yourself faced with if you operate before the 3 month interval is the neuroma in continuity – despite the use of intraoperative electrodiagnostics, it may be very challenging to assess whether there are sufficient intact or recovering axons or whether you need to

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REMEMBER, BILATERAL BIRTH PALSIES ARE RARE AND SHOULD ALWAYS AROUSE SUSPICION OF A SPINAL CORD INJURY.

SCOTT KOZIN, MD

An invitation to all members and invited guests, their partners and families to the

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remove the neuroma and graft through it. If by 3 to 4 months you have absolutely no intraoperative electrical activity along that nerve, you can feel safe in removing it.

Dr. Bishop: I think that's an important point and myelography is certainly a mainstay in our practice. Dr. Kozin, is there a rule for myelography in the infant?

Dr. Kozin: We don't use it. And I don't think the sensitivity and specificity is as great as it is in adults. Scott Wolfe, what is the false positive and false negative rate in CT myelography in adults?

Dr. Wolfe: In a series we published in 1996, we demonstrated 95% sensitivity and 98% specificity with CT myelography, when compared with intra-operative inspection of the injured roots. With today's high-speed scanners and the increased resolution there is potential for even greater accuracy. In single or two level injuries or an inconclusive study, though, I would still like to explore those roots and confirm with intraoperative nerve testing that they are in fact avulsed because they're important sources of axons which could otherwise be overlooked.

Dr. Spinner: I think it's very important to explore the plexus in patients with complete lesions because in many series C5 avulsion is rare. For example, Dr. David Kline has published that only 10% of global palsy cases have an avulsion affecting the C5 root. As C5 is such an important source of axons if available, exploration is indicated. Even though in our experience a C5 avulsion is likely in global palsy, we do, on occasion, find a viable root confirmed by intraoperative evoked potential monitoring, even when the myelogram shows some rootlet level injury, with or without a pseudomeningocele.

Dr. Wolfe: I agree with you that C5 is an important root to examine. However, in our experience, in five level injuries you'll often find such a high extraforminal or even intraforaminal injury that the root, though not avulsed, is severely fibrosed with limited axonal availability, and electric stimulation shows very little SSEP conductivity

Dr. Bishop: Why are EMGs so misleading in a newborn?

Dr. Spinner: I think a lot of it is technique-oriented. Rolf Birch has published a very nice series on his experience showing the utility and validity of EMG in children. Unfortunately we have been unable to reproduce that at our center.

Dr. Kozin: Our electrophysiology guru is very good in adolescents. He can provide detailed information regarding the possibility of rupture versus avulsion. But he is unable to provide the same information in children. I think some of difficulty may be related to persistent neonatal innervation after birth and the difficulties encountered when examining and infant.

Dr. Bishop: Let's assume that we have now explored the C5 root in a patient with a flail limb, and confirmed that all 5 nerve roots have been avulsed. Dr. Wolfe, what are your goals, and what approaches do you take to achieve them?

Dr. Wolfe: You need to take inventory of your available donors: first, do you have extra-plexal donors available, as sometimes with these C5 through T1 complete injuries, C3, C4 and occasionally, spinal accessory nerve can be injured as well. Second, many of these patients are multiply- injured, including thoracic injuries that necessitated placement of chest tubes so that one or more of their intercostal nerves may be unavailable. In order of preference, as Scott Kozin said earlier, spinal accessory nerve, a major source of axons, will likely be transferred to reinnervate the shoulder. Intercostal nerves, and I've taken as many as C3 through T7, can yield 5 or 6 donors and I'll use them to reinnervate musculocutaneous and the sensory portion of the median nerve. With sufficient available donors, dual innervation of elbow flexion and shoulder abduction/external rotation is preferred. With complete injuries, you need to consider taking the phrenic nerve as well. Although Gu's experience has shown vanishingly few patients with limited pulmonary compromise following phrenic and intercostal harvest, I have not as yet taken them simultaneously.

Dr. Bishop: Is grasp something we can achieve or should be trying to achieve?

Dr. Wolfe: Songcharoen and others have shown that in approximately25% of individuals you can get functional grasp back with different techniques that we're going to talk about, including crossed C7 transfer, free vascularized muscle transfer, etc. But with strictly extraplexal nerve transfer, we cannot achieve grasp with any kind of frequency in adults.

Dr. Bishop: Dr. Spinner, what is your feeling about grasp reconstruction with all roots avulsed?

Dr. Spinner: There are 3 proven ways of obtaining grasp in a complete plexus injury. The first of these is the contralateral C7 nerve transfer to the median nerve, using an interposed vascularized ulnar nerve graft. The data from Panupan Songcharoen in Thailand demonstrates some useful grasp in 1 of 3 such patients, in addition to recovery of some sensation in half of the patients.

The second method would be to use functioning free muscle transfer to animate grasp, either as a one or two stage procedure. While we used to perform the two stage double free muscle operation described by Doi, at present we're opting to do a single stage reconstruction using a free muscle for combined elbow flexion and finger flexion, along with nerve transfers for triceps, biceps and shoulder girdle function. This method does not restore active wrist or finger extension possible with Doi's procedure, and requires a wrist arthrodesis at a later date.

The third possibility for hand function is the extended phrenic nerve transfer that Gu has recently described, harvesting the nerve thoroscopically to allow transfer to the posterior fascicular group of the median nerve in the distal arm with a short intervening graft. Our results with use of phrenic nerve harvested thoracoscopically have thus far been disappointing, but we haven't used the median nerve as its target, as Gu has championed.

Given these 3 ways to try to achieve prehension, the question that remains is whether or not one should use the limited resources available in complete avulsions for this purpose. That is, is it better to use them to reconstruct functions that are more reliably accomplished, such as, to improve the results for elbow flexion or shoulder stability. This remains a difficult question.

THE COMMON DENOMINATOR IS A DISTRACTION OF THE HEAD FROM THE SHOULDER.

SCOTT WOLFE, MD

Dr. Bishop: Why don't we switch for a moment to isolated injury of the upper trunk or C5/6 roots pattern. Dr. Kozin, this is the most common pattern of plexus injury at birth. What would you expect to find at surgery and what would be your usual reconstructive method?

Dr. Kozin: We would expect to find a rupture at C5, C6 with scarring at C7 and either one or both of C5 and C6 is usually intact with adequate viable axons to allow for primary nerve grafting. And in those cases we would not use the spinal accessory but rely on the large number of axons from either C5 and/or C6.

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Dr. Bishop: Do you graft to specific distal motor nerves, or do you prefer to direct your grafts to more proximal structures such as divisions?

Dr. Kozin: For me it depends where the distal level of the injury ends. So if, it usually ends right where the divisions are so there's a posterior division, an anterior division and supra scapular nerve. So the distal nerve construct has 3 limbs, one that's suprascapular nerve, second one to posterior division, and the third one to the anterior division. And then the proximal limb, depending on whether there's 1 or 2, will either be from C5 and/or C6.

A MULTIDISCIPLINARY APPROACH IS NECESSARY TO OFFER THE MOST TO ANY GIVEN PATIENT.

ROBERT SPINNER, MD

Dr. Bishop: Do you use any method to orient grafts from C5 and C6 to improve results and prevent co-contraction of antagonist muscles?

Dr. Kozin: I don't think there's a great way but we try to put more C5 viable axons into the shoulder girdle and more C6 into the elbow flexors because there is some C7 recovery then hopefully they get enough wrist extension from C7 and they don't need the additional C6.

Dr. Spinner, what about the adult with the C5/6 or C5/6/7 injury? I think some recent publications regarding nerve transfer have added an interesting twist to how one might approach their treatment.

Dr. Spinner: Well I think you've summed up the controversy. Many people now are not even exploring the brachial plexus because there have been such good reports of successful reinnervation with new nerve transfers, especially when they're done to provide dual innervation for elbow flexion and shoulder function. My own preference is to explore the brachial plexus because I think there are still cases where there is value in measuring nerve action potentials to assess for ongoing clinical recovery. In those cases where there is no recovery then I think the real question is, is whether or not to use a stump that is viable or to go to nerve transfers. For an Erb's palsy pattern, we typically opt to use C5, when it is available, as a donor stump for axillary and suprascapular nerve. In general, we prefer not to use a damaged C5 nerve which only improves at an intraforaminal level , given so many other options for shoulder reconstruction using nerve transfers.

If there has been no recovery at 9 months or so, I would recommend proceeding with nerve transfers rather than grafting. For the shoulder, we would transfer the spinal accessory nerve to the suprascapular nerve, and use a triceps branch to the anterior division of the axillary nerve through a separate posterior approach. At this period, whether or not C6 is available, we would use the Oberlin 2 nerve transfer, which provides dual innervation of elbow flexors by transfer of ulnar nerve fascicles to biceps, and median nerve fascicles to the brachialis muscle.

Dr. Bishop: Dr. Wolfe, how do you handle the adult Erb's palsy pattern?

Dr. Wolfe: I agree with Dr. Spinner that its very important to look at your C5, test it, cut it, I usually send a piece of it off to our lab and I'll actually go down and look at it under the microscope with our pathologist to identify its available fascicular groups. Because as has been said, if we can transfer 2 donors to both shoulder and elbow, our chances of functional restoration are vastly improved. With C5 available as an additional motor, concomitant graft and nerve transfers can be a very potent combination. It is important to know, however, that even Oberlin himself reports up to a 20% failure rate even in well-done, well-timed nerve transfers. And it's difficult to explain these failures. So, every avenue has to be explored. I will use C5 directly to axillary or the musculocutaneous nerve, assuming it has good axon potential and strong somatosensory evoked potentials. The transfer of spinal accessory to suprascapular, ulnar and median to biceps and brachialis as stated, are very powerful. These are my go-to's for a C5-6 or C5-7 lesion

Dr. Spinner, can you just comment further on your use of nerve axon potentials and, do you use them adults and kids? And at what level of nerve axon potential do you decide that the neuroma in-continuity is good enough not to remove?

Dr. Spinner: We have a large experience with adults, and always use nerve action potentials (NAP). For pre-ganglionic injuries we also use somatosensory evoked potentials (SSEP) and motor evoked potentials (MEP). For lesions in-continuity we always use nerve action potentials, based upon Dr. David Kline's findings. These data demonstrate that any response in adults after neurolysis predicts a 92% chance of some useful recovery. Such a result is better than anything we can do with nerve graft or transfer, without any risk. Unfortunately in children those data have not been born out in the same magnitude.

Dr. Wolfe: And Dr. Spinner, when you have a nerve action potential that conducts, how many functioning axons are there in that neuroma in-continuity?

Dr. Spinner: Experimental data from primates demonstrate that several thousand axons must be functioning to detect a NAP. For evoked potentials, a positive response can be seen with only several hundred intact axons. For this reason, we

currently perform NAP's in addition to SSEPs and MEPs.

Dr. Wolfe: If your amplitude is quite low I think it's safe to assume that you have a very few number of axons actually conducting. And I think if all other signs point to absence of recovery at 3-4 months post injury, unless I had a good strong, greater than 50% amplitude nerve action potential, I'm still going to lean towards grafting through that defect.

Dr. Kozin: And I think that's a good approach for children. I think in adults though, the data still supports the fact that a larger number of axons go through the neuroma. So while the full set of data is not available to make complete decisions on any of this, I think the degree of amplitude modulation that we all talk about with babies hasn't been born out in adults.

Dr. Bishop: Let's talk a little bit about the recovering patient. Ms. Kinlaw, what kind of things do you see as a therapist as some recovery of say, biceps is beginning?

Ms. Kinlaw: What I see initially is a flicker of muscle activity. And the patient will say that it just spontaneously happened. One day they were able to cause the muscle to flicker, but no movement of the joint or anything like that. For those who are really lucky and get that early return you'll also see movement in the joint with gravity eliminated.

Dr. Bishop: Does anyone else ever make use of a squeeze test for a reinnervating muscle?

Dr. Wolfe: We use the squeeze test to identify early evidence of recovery after intercostal nerve transfer: the biceps muscle belly is simply squeezed in the examiner's hand – a positive test elicits an uncomfortable neurogenic sensation in the intercostal distribution of the thorax.

Dr. Bishop: Electrophysiologic testing would of course confirm some voluntary motor unit potentials. Ms. Kinlaw, how do you help patients learn how to activate and strengthen their muscles?

Ms. Kinlaw: I think most importantly we have to teach them how to reeducate the muscle based on what type of surgery was done. So if we're talking about elbow function, if there was an Oberlin or if there was a free muscle transfer, what we'll try to teach them to use the trigger. If intercostal nerves were used, we'll work on breathing techniques or coughing or even Valsalva to try to get them to activate the muscle. Sometimes they'll even yawn and all of a sudden you'll see something happening there.

For all recovering muscles, we try to start active motion in a gravity-eliminated or at least a 'gravity-minimized' position. For weak muscles, we will further reduce fric-

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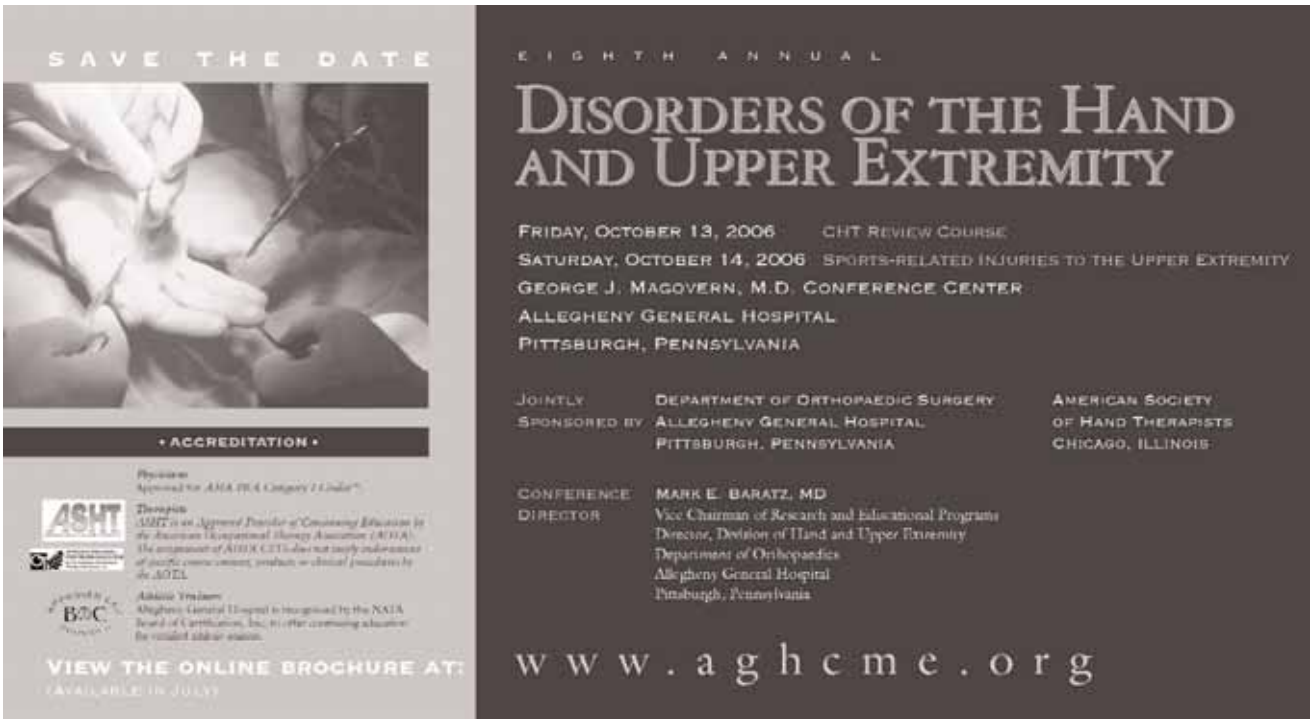

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tion by placing the arm on a towel on very smooth surface, or even use a skateboard. As activation improves, we may work with them using isometric-type contractions in selected positions. We then work on trying to get smooth, full active range or full available range of motion. Such range of motion activity is begun without weights, then with added weights as they get stronger. When strong enough, motion against gravity becomes possible, with subsequent addition of more weight thereafter.

Dr. Bishop: Is there a role for techniques such as biofeedback or for functional stimulation in muscles?

Ms. Kinlaw: As the muscle is waiting to be reinnervated, direct current electrical stimulation may be done to help maintain the contractility of the muscle. When the muscle becomes reinnervated, FES may be started if the muscle has a chronaxie close to the pulse duration of the FES unit. With biofeedback they get an idea, they see the activity going on, maybe a light bar going up or an increase in sound and that gives them the idea that they are doing something and then that reinforces what they're doing and they're able to do it a little bit better. So we like using biofeedback on those patients.

Dr. Bishop: Can dual channel biofeedback can help with co-contraction issues?

Ms. Kinlaw: If that's available, yes. But the patient has to be highly supervised. If they don't have a therapist that's working with them that's knowledgeable about reeducation, then they still end up with a co-contraction pattern.

Dr. Bishop: Maybe I can ask both you and Dr. Kozin about children. A child may be unable to use such a structured approach described above. Do they just recover their function on their own, or are there other methods used that may be helpful?

Dr. Kozin: Our therapists are talented in trying to get the kid to insight one action versus the other action but there's no doubt that some get this mass innervation of certain muscles. We have started to use Botox to weaken the triceps and allow the biceps some time to fire, and then hopefully for the brain to reorganize. There's just so little data to support the concept, but at least it makes sense.

Ms. Kinlaw: I'm also at a loss to say what's going to work best for little kids. Many times we're just trying to encourage them to use the extremity in play activities. We may also try patterning, and see if that helps, but it's very difficult.

Dr. Kozin: I think that explains why we look at secondary tendon transfers after brachial plexus birth

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2007 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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Grants will be made for a one year period to up to three investigators. Grants are available to all AAHS members. One of the investigators must be an active or affiliate member of the association.

Grant Application

Applications may be obtained from the AAHS website at www.handsurgery.org, or, you can call 312-236-3307 to request a copy. Applications (an original plus seven copies) must be received by the committee chair no later than Monday, November 6, 2006, in order for the judging to be completed in time and the recipients to be announced at the Annual Meeting.

The AAHS and the Research Committee are required by the IRS to document disbursement of grant funds. Award recipients will be required to sign a letter of acceptance and submit a progress report once each year. The AAHS must be acknowledged as the source of funding in any presentation or publication. A final report must be submitted at the completion of the study. It is expected that the results of the funded research be submitted for presentation at an Annual Meeting within two years of the receipt of the award.

Funds must be returned to the AAHS if the study is not undertaken within twelve months of the receipt of the award.

Failure to follow these guidelines will disqualify the recipient from any further grant opportunities and from presenting any papers at the AAHS Annual Meeting for a period of three years following such default.

Mail Grant Proposals to

Michael Neumeister, MD
American Association for Hand Surgery
20 North Michigan, Suite 700
Chicago, IL 60602

Brachial Plexus

The topic for this issue's Coding Corner is brachial plexus surgery. In general, the codes used for these procedures are examples of nerve surgery, typcially either direct repair or nerve grafting. Recently, synthetic nerve tubes have become available and are being used more frequently as substitutes for autogenous cable grafts. Unfortunately, there are not yet specific codes that reflect use of a synthetic nerve tube. Until these new codes are created, use of the "neurorrhaphy with nerve graft" family of codes most closely approximates the procedure when a nerve tube is used and consequently is the best way to code for such work.

Also note that when the operating microscope is used, the code 69990 may be added to reflect use of this equipment. This code applies specifically to use of the microscope and is not appropriate if only loupe magnification is employed. It should not be listed with a -51 modifier and it can be listed as an additional code for every distinct procedure that requires its usage.

Brachial Plexus Surgery	
69990	Use of an operating microscope
64861	Repair, brachial plexus
64713	Neuroplasty, brachial plexus
64872	Suture of nerve requiring secondary or delayed closure; list in addition to code for primary procedure
64874	Suture of nerve requiring extensive mobilization or transposition or nerve; list in addition to code for primary procedure
64876	Suture of nerve requiring shortening of bone of extremity; list in addition to code for primary procedure
23480	Osteotomy, clavicle, with or without internal fixation

For brachial plexus repair procedures, the code 64861 applies. Note that some additional codes may be relevant, given that brachial plexus surgery is often complicated. Specifically, 64872 refers to suture of nerves requiring secondary or delayed closure (listed separatley in addition ot the code for the primary repair). The code 64874 corresponds to nerve repair requiring extensive mobilization or transposition of the nerve (also to be listed separately in addition to the code for the primary repair). Code 6876 applies when shortening of a bone is required (also listed separately). Note that brachial plexus surgery may require cutting through the clavicle for exposure, and in this case, code 23480 is appropriate.

In cases where the brachial plexus is exposed for the purpose of a neurolysis or decompression, code 64713 is appropriate.

LEON S. BENSON, MD

Use of an interpositional nerve graft for the brachial plexus area involves the family of codes from 64892 through 64907. Codes are organized accorded to whether the graft is greater or less than four centimeters in length and also according to where the nerve repair is located. Additionally, a distinction is made according to whether a single cable graft is required or whether multiple strands or used. The specific codes are also summarized in the table below.

Note that if a nerve pedicle transfer is performed, code 64905 applies. For a second stage procedure of a nerve pedicle transfer; code 64907 is appropriate.

The last code of the nerve repair group is 64999, which is listed as "unlisted procedure, nervous system." While it might be tempting to use this code for use of a nerve tube or any of the more complicated procedures above, it is always better to try to match the operation you have performed as closely as possible with a specific code that already exists. Insurance companies frequently pay very little for the "unlisted procedure" code. Furthermore, if payment is forthcoming for an "xx999" code, exces-

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Neurorrhaphy Using Nerve Grafts (for the brachial plexus)	
64892	Nerve graft (includes obtaining graft); single strand; arm or leg; up to 4 cm in length
64893	Same as above (64892) except graft is more than 4 cm in length
64897	Nerve graft (includes obtaining graft), multiple strands (cable), arm or leg, up to 4 cm in length
64898	Same as above (64897) except graft is more than 4 cm in length
64901	Nerve graft, each additional nerve; single strand; list in addition to code for primary procedure
64902	Nerve graft, each additional nerve; multiple strands; list in addition to code for primary procedure
64905	Nerve pedicle transfer; first stage
64907	Nerve pedicle transfer; second stage
64999	Unlisted procedure, nervous system

CODING CORNER

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sive documentation is usually necessary which, at the least, will greatly delay reimbursement.

You Code It

A 26-year-old male presents to with a stab wound to the axilla. While undergoing emergency vascular repair, you are consulted to assesss the brachial plexus injury. The plexus is lacerated but is the nerve ends are directly amenable to repair and you proceed with neurorrhaphy after getting better exposure by resecting part of the clavicle.

Solution:

64861	Repair, brachial plexus
23480-51	Osteotomy, clavicle, with or without internal fixation
69990	Use of operating microscope

H

AROUND THE TABLE

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palsies. Often the results are suboptimal and I think it's not because the surgical technique is any different, but rather they are unable to isolate that particular muscle that was reinnervated after the nerve graft or nerve transfer.

Ms. Kinlaw: You may block certain movements to see if you can encourage them to do that. By getting them to play with things and doing lots of repetition with the repetitive activity, you can at least try to build a new neuro pathway so that they can actually do a particular function. But it is very difficult, because the child really wants to do the specific motions, but may not be able to figure out how to do it.

Dr. Bishop: At this point, I'd like to give everyone an opportunity to make any further points not covered in our previous discussion.

Dr. Kozin: I think what's important about birth palsies is that we have tons to learn. We don't understand whether nerve transfers or nerve grafts are better in children. We certainly have a long way to go with regard to preventive measures. So we see less and less of this problem. And I think it's encouraging with the addition of neuro regeneration, such as what we use with spinal cord injury. I think the concept of spinal cord injury and brachial plexus birth palsies will eventually overlap so we'll have a better way to help these children.

Dr. Spinner: Anyone who is interested in seriously doing brachial plexus reconstruction should make a concerted effort to keep up with the new techniques that are being popularized, such as the latest nerve transfer methods. The use of intradural techniques for repair of nerve root avulsion is currently a ripe topic for research. Whether or not these methods will ever really become a useful clinical method remains to be seen. A multidisciplinary approach is necessary to offer the most to any given patient.

Dr. Wolfe: The Holy Grail of plexus reinnervation is to gain function below the elbow and that's particularly challenging in the complete plexus injury. All of the exciting techniques that Dr. Spinner and others have alluded to in terms of crossed muscle transfer, contralateral C7 transfer, etc. are terrific, though as yet we're still seeing success rates in the 20 to 30% range. There's a huge role for biologics in terms of accelerating the rate of nerve recovery and I think that's where we need to concentrate our research efforts. Biologic acceleration of nerve recovery may help us to win the race to reinnervate denervated muscle before either the end plates fibrose or the muscle fibers themselves atrophy beyond recovery. I believe that's going to be the challenge to come. One aspect of this challenge is the role

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that the denervated distal nerve stump plays in delaying recovery, as perhaps we can influence the denervated Schwann cells themselves to be more receptive and conducive to regenerating axons. Whether we can improve the distal stump, whether we need to bypass that entirely with the use of graft or whether there are other ways of keeping that denervated nerve and distal muscle receptive are exciting areas of future research.

Dr. Bishop: Ms. Kinlaw, anything else you'd like to add?

Ms. Kinlaw: It's important that therapists realize that this is a long term process and that they can't just do a month of therapy for the patient and consider it done. Because of the nature of the problem, there's got to be the long term follow up. Unfortunately, we have insurance companies that limit that ability. But we need to work as hard as we can to advocate for our patients to be able to work with them for a long period of time. Lastly, it is important to communicate closely with the surgeons, be knowledgeable about the reeducation techniques that may be used with the surgeries, and understand that the patient needs a lot of encouragement during this time.

Dr. Bishop: And the one thing I'd like to add as a point of emphasis as we depart, is the importance of timely referral to brachial plexus centers that have expertise. There is a time limit for optimal results, and that time limit is probably somewhere between 3 and 6 months in a traumatic plexus injury and somewhat longer in birth related palsies. An early referral permits sequential evaluation, and improved results.

Thank you all for your time and for your contribution. H

HAND THERAPY PROFILE

Lorna E. Ramos, MA, OTR/L, ABDA

Lorna E. Ramos, MA, OTR/L, ABDA

Personal: I grew up in the Philippines and came to New York to join the rest of my family in 1976. I come from a big family consisting of 4 brothers and 4 sisters. My passion is traveling, cooking, history and meeting people.

Education: B.S. in Occupational Therapy from York College of the City University of New York, 1983. MA (Advanced Master's Program) in Occupational Therapy from New York University, 1993.

Employer: Clinical Specialist at Miami Children's Hospital in Florida.

AAHS Involvement: I became an affiliate member in January 2006 but have attended numerous annual AAHS conferences. Being a co-recipient of the 2006 Vargas International Hand Therapy Teaching Award, I am deeply committed in doing my best to represent AAHS in Cluj-Napoca, Romania in September 2006.

Best Part of My Job: Being in a nurturing working environment. Most importantly, having an excellent mentor, Dr. John A.I. Grossman, who has been a strong guiding force in my professional growth and developement.

Major Accomplishments: Being the co-recipient of the Miguel Vargas Memorial Teaching Award for 2006. Sharing information through lectures and seminars regarding brachial plexus injury and other upper extremity conditions. Having published articles on brachial plexus rehabilitation and life care planning.

Clinical Specialties: Brachial plexus injury for the past 17 years; hand and extremity rehabilitation.

Greatest Challenge: An infant who presents with a global obstetrical brachial plexus palsy. Working with this age population, it is important to work closely with the parents/caregivers. While it is crucial to address the clinical/functional problems of the infant, it is equally important to educate and provide emotional support for the caregivers.

Three Words That Describe Me: Tenacious, hardworking and caring. H

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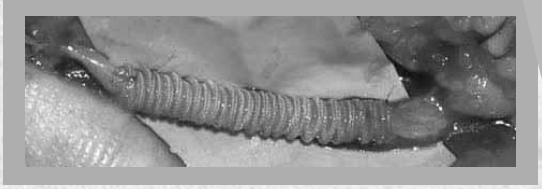

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The Hand Surgery Endowment (HSE) Underwrites Volunteer Humanitarian Outreach Services

Volunteer outreach has become the foundation of the HSE's current fund raising efforts. We will coordinate with the American Association for Hand Surgery (AAHS) and especially with Scott Kozin and his Volunteer Services Committee. Treating underserved children, particularly those with congenital anomalies, will be the cornerstone of our efforts. We also hope to repair, reconstruct, and rehabilitate adult hands to restore these patients to gainful employment, care-taking, independent living, and recreation activities.

We plan to coordinate with and support established programs such as the AAHS Vargas International Traveling Fellowship Program, Guatemalan Healing Hands Foundation, and Hand Surgery Oversea. We are negotiating to become "The Hand Surgery Caboose" (congenital hands) on "The Smile Train" (cleft lip and palate repair). We hope to establish a dialogue to renew AAHS participation at the Navaho Reservation in Chinle, AZ.

Hand surgeons from the American Society for Surgery of the Hand (ASSH), La Federation de la Mano, and AO North and Latin America and have expressed a strong interest. We would be delighted to coordinate our efforts with these surgeons, societies, and others with the goals of making our efforts more effective, efficient, and inclusive.

The HSE has met and surpassed its goal of $100,000 in contributions for 2005-2006. This is our best year ever, a cause for celebration as the HSE celebrates its 10th Anniversary. This issue of *Hand Surgery Quarterly (HSQ)* recognizes and thanks our generous donors. We hope for continued support and future participation in volunteer services from the AAHS membership.

Thank you,
Alan Freeland, MD
President, HSE

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Martin Skie, MD
Joesph Slade, MD
Paul Slater, MD
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Dell Parker Smith, MD
Raymond Smith, MD
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Raymond Takahashi, MD
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Howard Tepper, MD
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Robert Waterhouse, MD
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Paul Zidel, MD
Richard Zienowicz, MD
Elvin Zook, MD

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American Association for Hand Surgery Calendar

2007

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

April 20-21, 2007
7th Bi-Annual Difficult Problems in Hand Surgery
Naples Beach Hotel and Golf Club
Naples, FL
Sponsored by Medical Surgical Specialists (formerly Cleveland Clinic Florida)
Course Director Ronaldo Carneiro, MD
www.medical-surgical.org

July 12-14, 2007
Mid-Year Board of Directors' Meeting
Silverado Resort
Napa, CA

2008

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

2009

January 7-10, 2009
39th Annual Meeting
Grand Wailea Resort
Wailea, Maui, HI

2010

January 6-9, 2010
40th Annual Meeting
Boca Raton Resort & Beach Club
Boca Raton, FL

2011

January 12-15, 2011
41st Annual Meeting
Ritz Carlton Cancu
Cancun Mexico

For information contact:
AAHS Central Office at 312-236-3307 or www.handsurgery.org

HAND SURGERY QUARTERLY

www.handsurgery.org
20 North Michigan, Suite 700
Chicago, IL 60602

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