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CONNECTING OUR GLOBAL HAND SURGERY FAMILY

Executive news

Member society updates

Upcoming events

Update on Hand Surgery in Tetraplegia

A COHORT STUDY EXAMPLE ON THE SWING TRACTION METHOD FOR COMPLEX INTRA-ARTICULAR PIP FRACTURES

THE ROLE OF NERVE TRANSFERS IN THE TREATMENT OF NEONATAL BRACHIAL PLEXUS PALSY

Contents

IFSSH Support for Worldwide Hand Surgery Education Programmes

The improved financial position of the IFSSH has allowed the distribution of financial assistance to hand surgery education programmes throughout the world, particularly for those countries and participants who are financially disadvantaged. This is one of the major roles of the Federation.

The Committee for Educational Sponsorship (CES) was formed by the Executive Committee with the Secretary-General Elect as Chair and incorporating two other members - the Chair of the host committee for the next IFSSH Congress and the Nominating Committee Member-at-Large. Therefore, the make-up of this committee changes three yearly at the time of the triennial congress. Marc Garcia-Elias chaired the first committee with the support of Raja Sabapathy (host of the 2013 Delhi Congress) and Goo Hyun Baek (Nominating Committee Member-at-Large). Currently the CES is chaired by Dan Nagle, the current IFSSH Secretary-General Elect, who is joined by Eduardo Zancolli (host of the 2016 Buenos Aires Congress) and Moroe Beppu (Nominating Committee Member-at-Large).

Details of the responsibilities of the CES and its aims and the IFSSH Educational Sponsorship Guidelines may be found on the IFSSH website (www.ifssh.info). The application processes are well detailed. There are four main groups of educational activities which may qualify for IFSSH financial assistance although applications which appear to fall outside the following descriptions may also be considered. The four categories are:

1. IFSSH Congress Assistance Grants: These are intended for surgeons who would be unable to attend an IFSSH Congress without financial support. Allocation of grants is limited to a total sum of US$20,000, the distribution of which is determined by the chair of the Organising Committee of the IFSSH Congress. It remains the responsibility of the Organising Committee Chair to distribute this money to worthy applicants. Assistance was provided to 18 surgeons to attend the Delhi congress in 2013. A further US$4500 was distributed to the International Federation of Societies for Hand Therapy (IFSHT) to sponsor the attendance of therapists at the Delhi congress - three from Argentina, two from India, one from the US, one from the UK, one from Canada and one from the Netherlands.

2. IFSSH Bursaries and Grants: These are intended to assist the educational programmes of societies and society individuals, as well as those activities of our allied colleagues such as the European Federation of Societies for Surgery of the Hand (FESSH), the Asian Pacific Federation of Societies for Surgery of the Hand (APFSSH), the South American Federation for Surgery of the Hand (FSCM), Wrist and Biomechanics International (HWBI) and the IFSHT.

The criteria both of application and selection are broad. In 2012, the IFSHT was awarded $4,500 to support the educational activities of six therapists in underdeveloped countries as part of the IFSHT-IFSSH International Hand Therapy Teaching Grant.

An individual application, supported by the Polish Society, provided $2,000 for Dr Piotr Czarnecki to attend educational programmes in the United States. The awarding of such grants is contentious and the CES has indicated that any further support for these activities would need to be strongly supported by the appropriate society and should return benefits to that society. A similar application was supported by the American Association for Hand Surgery (AAHS) to assist the travel of two Mongolian hand surgeons to the United States. Those surgeons attended the annual meetings of the AAHS and the American Society for Reconstructive Surgery and visited a number of US centres including the Mayo Clinic. The intent was to benefit Mongolian hand surgeons through the expertise gained from the exposure within the United States. A grant of $12,000 was provided for this purpose.

3. Regional Courses in Hand Surgery: These are designed to promote hand surgery education in developing countries with limited economic resources. The IFSSH will not take responsibility for the conduct of such courses, nor for the full funding, but will provide, according to need and availability, up to a maximum of $20,000 for each course. This money may be used to provide reduced registration for worthy registrants, to fund faculty or to fund the structural costs of conducting the course.

A number of successful courses have received IFSSH funding. The first was a course supporting the registration costs of disadvantaged surgeons from Eastern Europe to attend a hand surgery trauma course in Hungary in 2012. A number of IFSSH members acted as lecturers and tutors in this course, providing their own funding.

A further Eastern European course is planned for 2015. This course is to be organised in Eastern Hungary as a collaboration between Daniel Herren from Switzerland, Kevin Chung from the United States and Zsolt Szabo from Hungary. The theme of the course is Hand Reconstruction in Trauma and Rheumatoid Arthritis, and the organisers have accumulated an impressive faculty. Assistance in funding is intended to allow registration of 30-50 registrants at no cost. All faculty members will be self-funded or receive a minimal amount for travelling. The CES is currently assessing this application.

In August 2014, the IFSSH supported the Australian Hand Surgery Society and Orthopaedic Outreach Group in an upper limb mission which was undertaken in Phnom Penh, Cambodia. The visiting team consisted of surgeons from Australia, the United States and Thailand and hand therapists from Australia. Teaching programmes were undertaken in two afternoons with lectures at the University of Health Sciences, teaching the national cohort of surgeons in training. Tutorials and patient care evaluations were undertaken by the therapists. Over 100 patients with varying hand conditions were evaluated, 35 of whom underwent operations during the week in conjunction with the Cambodian surgeons. This is an ongoing programme of regular visits to Cambodia with the aim of developing hand surgery services in that country. For this mission, the IFSSH provided $19,350 in funding.

The CES has agreed to support the IFSSH - South Asian Regional Course in Hand Surgery to be held in Coimbatore, India, in July 2015. This is a three day workshop consisting of lectures and operative demonstrations with $20,000 of IFSSH funding supporting the organising committee's financial commitments - faculty costs and structure of the course. The registration fees for over 100 surgeons from the region will be kept to a minimum.

4. IFSSH Harold Kleinert Visiting Professorship: This award honours the contribution of Dr Harold Kleinert to the distribution of hand surgery knowledge throughout the world. It is designed to fund a Visiting Professor to an educational hand surgery course organised by an IFSSH member society. The society should provide details of the course and programme and nominate three surgeons. The CES will select the Visiting Professor from

IFSSH ezine editorial team:
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Deputy Editor: Professor Michael Tonkin (President of the IFSSH)
Publication coordinator: Marita Kritzinger (Apex ezines)
Graphic Designer: Andy Garside
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these three nominations and provide the invitation through the organising society. We would encourage all societies to consider an application to receive a Visiting Professor.

The involvement of the IFSSH in educational programmes is expanding. Of course, all applications must fulfil the criteria that have been outlined in the guidelines, specifically those relating to our aim of providing financial support to those in underdeveloped countries to improve the teaching and development of hand surgery within those countries. Of course, funds remain limited and, therefore, the applications are of necessity assessed on a competitive basis. Nevertheless, we encourage all societies and their members to consider how best to use IFSSH funds for the distribution of hand surgery knowledge throughout the world.

Michael Tonkin
President : IFSSH
Deputy Editor: IFSSHezine

Surgical reticence and balanced advice

I spoke at a friend's funeral recently; a lady who was well respected in our community. She was wise and kind and calm, but also had that highly sought after virtue, reticence. The dictionaries define reticence as a disposition to say little, a person who is reserved and disinclined to speak freely (or perhaps over freely). It is a trait in life, in general, that is under considerable pressure as a consequence of social media which allows friends, or anyone, to share their thoughts however trivial and mundane they may be. To date society has been slow to recognise the risks of imprudent messaging; perhaps with time society will adjust and reticence will once again be appreciated as a virtue.

Is there a role for medical reticence? I think there is. I have just read Atul Gawande's excellent book 'Being Mortal' on the care of the terminally ill. It describes the art of finding out what the principal fears and desires of each patient might be and moulding treatment to meet those needs. I have had the opportunity to see hospice care in hospital and in our home recently and was enormously impressed by what can be done.

I do not doubt there is value in the toxic treatments (radiotherapy and chemotherapy) available in developed countries to deal with terminal cancer, but I wonder whether doctors are striking the right balance between risk and benefit. Perhaps at present such treatment is offered simply because it is available and might help, when it simply blights the remaining time for the patient with a minimal chance of benefit. Care of the terminally ill could well be an area where therapeutic reticence with toxic interventions should be encouraged.

But what of hand surgery? Does every trained surgeon, launched onto an unsuspecting public, have the necessary judgement to know when not to operate; I fear not. I should imagine we may all be able to think of examples of surgeons, not always young, whose threshold for 'trying' surgery as an option is disturbingly low. There will always be a role for innovative and, rarely, speculative surgery, but these would be uncommon. Any surgical intervention comes with a finite risk. It is one of the perverse benefits of a long hospital waiting list for elective surgery that patients with speculative operations are rarely booked; there are too many other cases with more obvious surgical justification.

In my practice it was not uncommon to see patients in their sixties with an elective hand condition who were desperate to remain at work for another two or three years so they could get their full pension. An obvious and common example would be someone with symptomatic osteoarthritis to the basal thumb joint. There is of course a whole spectrum of non-operative interventions, including for us, acupuncture, which would be offered before surgery. We will assume that all non-operative treatments have been exhausted and the surgeon might be considering trapezial denervation or trapezial excision. For the purposes of this discussion I will leave trapezial replacement out of the argument.

"Any surgical intervention comes with a finite risk."

The dilemma for the hand surgeon is not so different from the oncologist; identifying the patients greatest worries and needs. In this case it would be 'not to be made redundant', and to work the final three years to retirement. Trapezial denervation, even if it produced no benefit, would be unlikely to force a worker into retirement, but a trapezial excision quite possibly would. If a trapezial excision is being contemplated, how likely is it that the worker will achieve his primary objective of continuing employment if his duties at work are demanding on the basal thumb joint? If the chances are low the patient needs to know the surgeon will be unlikely to deliver his primary objective and he may be better soldiering on without surgery until retirement. I wonder how often my interventions lead to a patient never returning to work; there are bound to be some, but I hope there have not been too many. I regret that I never audited my outcomes in this way.

Surgery always needs to be applied carefully with the patient's very specific desires and fears catered for. 'I do trapezial excision for OA base of thumb' does not necessarily cover a patient's needs. The therapeutic dilemma for oncologists is currently widely discussed, but in some areas of hand surgery perhaps we have similar challenges.

Frank Burke
Derby, United Kingdom

Living Textbook of Hand Surgery

The Living Textbook of Hand Surgery is online with the first chapter covering the topic of Dupuytren´s Disease. Hand surgeons from around the world have already seen the website, with over 16 000 visits logged since January.

What is new in 2015?

We expect to include three more chapters to the book within the next months. In Milan at the FESSH Congress, the next authors meeting is planned for Friday, 19 June 2015. Everybody interested to take part is cordially invited to attend. Details of the venue and time will be announced on the website www.hand-ww.de or can be requested by email to richarda.boettcher@hand-ww.de

A first update of the website is expected for September 2015. It will include the optimised reviewer process, responsive design including availability for e-book readers and implementation of social media are planned for the second update.

Visit the website at handbookhand.com

Richarda Boettcher
Handchirurgie Weltweit e.V.
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A view of the book: The chapter concerning Percutaneous Needle Fasciotomy by Paul Werker includes numerous videos. Note the citation note with separate Doi and the direct PubMed research.

executive news

Message from the Secretary-General: Marc Garcia-Elias

Dear friends

As the organisation of another annual Delegates' Council meeting commences, it is timely to list opportunities that your society might be interested in pursuing. Please consider these, discuss with your society's executive and members, and contact the IFSSH secretariat if you require more information.

We look forward to receiving applications and meeting again in Seattle.

2015 IFSSH Delegates' Council Meeting

This year's annual IFSSH Delegates' Council Meeting will be conducted in Seattle in September, in conjunction with the annual meeting of the American Society for Surgery of the Hand. Further details will be provided in the next newsletter.

IFSSH Membership

The IFSSH currently consists of 55 member societies. We welcome applications from hand surgery societies to join the IFSSH. The requirements for membership are:

1. The applying society must be a bona fide organisation whose individual members have a major interest in surgery of the hand,
2. The applicant society shall have been in existence for at least two years,
3. The society shall submit a list of officers and members, its constitution (or Bylaws) and the requirements for admission of members,
4. Each applicant society shall be sponsored by three Council delegates.

Applications are considered by the IFSSH Executive Committee and Delegates' Council at the annual meeting. In 2015, this meeting will be held in Seattle in September. Societies interested in applying for membership should contact the IFSSH secretariat: administration@ifssh.info.

2022 IFSSH Congress Host Society

The IFSSH Executive Committee has recommended that member societies from the European region* be invited to host the 2022 triennial congress. This main scientific event of the IFSSH will be celebrated every three years in a member society country that is in good standing with the IFSSH, including payment of their annual dues.

The society hosting the event will be selected from applications six years before at the annual Delegates' Council meeting. Those societies from countries which also have a hand therapy association/society should discuss the possibility of hosting a combined meeting. The societies which are applicants must submit a formal petition to the Secretary General at least three months ahead of the Council meeting. The same documentation should be sent to each member country delegate and IFSHT representative for evaluation at least three months before the Council Meeting.

Therefore, any European member society that is interested in hosting the 2022 IFSSH Congress should inform the IFSSH Executive of their intentions and ensure that the full bid is forwarded, as detailed in the instructions above, by July 24th 2016, for consideration at the Buenos Aires meeting.

Information regarding the application process is on the IFSSH website: http://ifssh.info/guidelines.html

*The IFSSH member societies have been geographically grouped according to United Nations data. The IFSSH "European" region consists of: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

For the purposes of the IFSSH congress rotation system, the two IFSSH member nations that lie within the African region - Egypt and South Africa - have been aligned with the European region and are therefore also able to bid for the 2022 Congress.

Pioneers of Hand Surgery

The IFSSH awards "Pioneer of Hand Surgery" status to a person who excels exceptionally, beyond what is normally expected, in the field of hand surgery. These honours are awarded at each IFSSH triennial congress.

A call for nominations will be sent to the delegate of each IFSSH society in January 2016.

The nomination must come from a member society, not an individual, and should be reserved for those with outstanding achievements. Details of the criteria and nomination process are available on the IFSSH website: http://ifssh.info/pioneers.html

The deadline for submitting nominations for the Buenos Aires congress is April 24th, 2016.

Educational Sponsorship / IFSSH Harold Kleinert Visiting Professor

The IFSSH invites applications for funding assistance of educational projects. These may be worthy education projects of any description and are awarded funding on a competitive basis, after assessment by the IFSSH Committee for Educational Sponsorship.

In addition to the general funding available, specific grants are also available to:

- provide financial assistance to the organisation of Hand Surgery regional education courses;
- assist hand surgeons from poor or developing communities to attend an IFSSH triennial Congress through the provision of IFSSH Congress Assistance Grants; and
- promote the international exchange of hand surgery knowledge by sponsoring an IFSSH Harold Kleinert Visiting Professor to an appropriate hand surgery education programme.

General applications can be submitted for assessment at any time throughout the year, but should be received at least three months in advance of when the funding is required. Full details of the application process, and further information regarding the specific grant categories, are on the IFSSH website: http://ifssh.info/fellowship-grants.html

Future Meetings

A detailed list of national and regional hand surgery meetings is available on the IFSSH website.

The triennial IFSSH Congresses are as follows:

XIIIth IFSSH – Xth IFSHT Congress
Buenos Aires, Argentina
October 24-28, 2016
www.ifssh-ifsht2016.com

XIVth IFSSH – XIth IFSHT Congress
Berlin, Germany
May, 2019

Marc Garcia-Elias
Secretary-General, IFSSH
Email: secretary@ifssh.info

member society updates

Member society updates

American Association for Hand Surgeryn

In 2013, the American Association for Hand Surgery adopted a new mission statement: Working together to advance global hand care and education. Since then, the Hand Association has made a concerted effort to fulfill its mission through focus on its existing programs and developing new initiatives geared towards an international audience. Some of the ways the AAHS is working to advance global hand care and education include:

- Granting the Miguel Vargas International Hand Therapy Teaching Award each year to a therapist who travels to an underserved country to care for patients and educate the host country on hand care.
- Energising the Association's Hand Surgery Endowment through the HANDS AT WORK capitol campaign so that the Endowment can regularly provide international volunteer grants and scholarships to hand surgeons, therapists and ancillary medical staff.
- Collaborating with affiliated societies, such as the Brazilian Society for Surgery of the Hand (SBCM), Argentine Society for Surgery of the Hand (AACM), and the British Society for Surgery of the Hand (BSSH), on the Hand Association's journal, HAND, coordinating joint programming at AAHS annual meetings, and hosting courses at affiliate society meetings.
- Developing a new FREE webinar series focused on providing education online to improve hand care, globally. 3 webinars have been held to date with another scheduled for the spring of 2015. To access archived webinars, visit http://handsurgery.org/education/webinar.cgi

The Hand Association continues to work to advance global hand care and education through partnerships and collaboration, and looks forward to sharing news on additional programs it adds to its repertoire with the international hand community in the near future.

For more information on the AAHS, please visit http://handsurgery.org/

British Society for Surgery of the Hand

The British Society for Surgery of the Hand (BSSH) continues to make important contributions to the field of hand surgery through research and in training. BSSH hold twice yearly congresses with prestigious international guest speakers. Each meeting is attended by 200 -300 delegates.

BSSH is one of the founder members of the Healing Foundation, a national fundraising charity championing the cause of people living with disfigurement and visible loss of function, by funding research into pioneering surgical and psychological healing techniques. This month sees the advertisement of a Clinical Associate Professor in Hand Surgery, based in Nottingham and intending to take a leading role in setting up a Centre for Evidence Based Hand Surgery Research. The post is funded by BSSH and will be managed by the Healing Foundation.

BSSH is developing a national research network to facilitate the conduct of national multi-center clinical trials. Several of these, coordinated by BSSH, are in progress, which will hopefully shed light on some of the common dilemmas in hand surgery.

The Journal of Hand Surgery (European Volume) is the official journal of the Society and continues to flourish. Initially linked to the American Journal of the same name and more recently adopted as the official European journal, it has long been established as one of the foremost publications on the subject. The Journal is run through a committee with European and wider international representation and is also the official journal of FESSH.

The "Instructional Courses in Hand Surgery" continue to run in Manchester over a constantly updated 3- year cycle. These provide advanced teaching at a senior trainee or consultant level in hand surgery, with authorities in their specialist fields invited from all continents. The entire spectrum of hand surgery is covered over the period and the courses are open to trainees and consultants across the world.

BSSH in collaboration with the University of Manchester has, since 2007, established a Diploma in Hand Surgery, using the content of the courses as the basis for a syllabus. Surgeons in the fellowship programme take a modular course of face-to-face tuition with tutorials and projects with workplace assessments and a final external examination. This year also sees the commencement of an MSc course in Hand Surgery, recently approved by the University of Manchester.

From 1992 BSSH instituted a national system of Interface Fellowships in Hand Surgery, taken after training in one of the two parent specialties. Each post provides training in both orthopaedic and plastic surgery elements of hand surgery. To date over 200 surgeons have completed this programme.

BSSH has developed a national web-based hand surgery audit tool and employs a full-time database administrator to undertake most of the data collection and entry. This allows surgeons to audit their outcomes and compare their own results with the aggregated results from all BSSH members. Surgeons can use their outcome data to inform their own appraisal and continuing professional development.

The Society has been funding visits of hand surgery teams to developing countries to undertake programs of work in Sierra Leone and Nepal. In Sierra Leone this has been done in collaboration with ReSurge Africa, which is sponsoring the training of local surgeons. The ultimate aim of the project is self-sustainability.

Next year sees the 60th anniversary of the "2nd Hand Club", founded by Guy Pulvertaft and Graham Stack, which evolved into the BSSH. Celebratory events are planned to mark this.

Finally, our bid to host IFSSH in London 2022 will be submitted in Buenos Aires in 2016. The pedigree of the BSSH in the field of hand surgery and our track record in organizing successful meetings puts us in a strong position to host this.

We call on the rest of the world to lend us your support!

David Shewring
BSSH Delegate to IFSSH

PS: The University of Nottingham is seeking to appoint a Clinical Associate Professor in Hand Surgery with accreditation in either Trauma and Orthopaedic or Plastic Surgery to play a leading role in setting up a Centre for Evidence Based Hand Surgery Research in Nottingham in conjunction with the British Society for Surgery of the Hand (BSSH). The post comes with substantial start-up funding from the BSSH which is managed by the Healing Foundation.

The post holder will be based within Academic Orthopaedics, Trauma and Sports Medicine and the Nottingham Clinical Trials Unit, University of Nottingham. The post has 5 PAs of University time. Clinical work (5PAs and 1 APA) will be at Nottingham University Hospitals NHS Trust.

For full details: http://www.nottingham.ac.uk/jobs/currentvacancies/ref/MED064515

member society updates

Swedish Society for Surgery of the Hand

The Swedish Society for Surgery of the Hand was founded in 1973 and has approximately 150 members. The society is a section of the Swedish Society of Medicine and the Swedish Medical Association and a member of the Federation of European Societies for the Surgery of the Hand (FESSH) as well as the Scandinavian Society for Surgery of the Hand.

Hand Surgery has been an autonomous speciality in Sweden since 1969. To our regret, in 2006 the Swedish National Board of Health and Welfare decided to give Hand Surgery the status as a branch speciality to Orthopaedics, with the consequence of prolonged time of education for specialised hand surgeons and an impaired possibility to the interchange of knowledge with Plastic Surgery. After many years of dialogue, the Swedish National Board of Health and Welfare, finally decided to re-establish Hand Surgery as an autonomous speciality as from May 1st 2015. The board of the Swedish Society for Surgery of the Hand therefore recently established new guidelines for the specialist training in hand surgery. In cooperation with the departments of Hand Surgery at the University hospitals in Sweden, we have started a series of instructional courses in hand surgery, covering the entire spectrum of surgery of the hand and upper limb.

National quality registers are common in Swedish health care. On the initiative of the Swedish Society for Surgery of the Hand, in 2010 a national quality register for hand surgery (www.HAKIR.se) was started. The aim with the register is to collect of data that can provide a basis for continuous improvement of care and research. Through standardised and continuous follow-up, including patient reported outcomes as well as functional outcomes, this quality register can promote standardisation of hand surgical methods and postoperative treatments, which can help to optimise hand surgical care. Since 2014 all seven specialised hand surgery departments in Sweden are reporting to the register and so far more than 40,000 procedures have been registered.

Anna Gerber Ekblom MD, PhD
Chair of The Swedish Society for Surgery of the Hand

The Venezuelan Society for Surgery of the Hand

The Venezuelan Society for Surgery of the Hand (SVCM) was founded in Caracas in 1974 as a medical, scientific, and trade union organisation, whose main objective is the study and diffusion of the knowledge of Hand Surgery and reconstruction of the upper limb. Dr Ricardo Sánchez Beaujon established the groundwork for building a society that today brings together all the specialists in Hand and Reconstructive Upper Limb Surgery in our country.

In 1981 the Venezuelan Medical Federation (FMV) recognised Hand Surgery as a specialty and our society expanded in to the field of the study of diseases of the hand and upper limb.

In 1983 the SVCM was welcomed in to the International Federation of Societies for Surgery of the Hand (IFSSH), and in 1996 the SVCM joined the South American Federation of Societies for Surgery of the Hand (FSSCM).

During the past 40 years, numerous Presidents - Doctors Rodolfo Contreras, Antonio De Santolo (Honourary Pioneer, 11th International Congress: Seoul, Korea, 2010), José Camarillo, Fiesky Nuñez, Nelson Socorro, Maggali Torrealba, Rafael Brunicardi, José Guerrero, Alberto Urquiola, Miguel Guédez, Ramiro Morales, Magally Ortiz, Ricardo Tobio, Álvaro Aguilar, Leonardo Briceño and currently José Vicari - have worked hard to create a new generation of Venezuelan hand surgeons with three years of postgraduate studies and approval of the postgraduate programme by our principals, universities and government. Currently in Venezuela we have seven hospitals dictating postgraduate studies: UCV, LUZ, MPPS and IVSSS.

We have organised and participated in many academic activities over the past years. In 2015, we will hold the XXXI Conference (10-12 June, in Caracas, Venezuela) in honour of Dr Rodolfo Contreras Gamboa.

Delegate IFSSH-SVCM:
Dr Igor Indriago
President SVCM: Dr José Vicari

XXX Meeting SVCM, November 2014
***First row:** left to right; MDs Magally Ortiz (past president SVCM), Rosa Torrealba, Leslie Medina, MD Rodolfo Contreras Gamboa (Founder and Past President SVCM), MD Antonio De Santolo Ricciardelli (Founder and Past President SVCM and Honorary pioneer in surgery of the hand IFSSH 2010), and MDs Aloha Isea (General Secretary SVCM), Himilse Mendez. Second row: left to right; MD Gaetano De Santolo (Secretary of Sectional SVCM), MD Jochen Gerstner (Guest Colombia), MD Carlos Zaidenberg (guest Argentina).*

XXX Meeting SVCM, November 2014
First row: left to right;
MD Jochen Gerstner (Guest Colombia), MD Nelson Socorro (Past President SVCM), MD Alberto Urquiola (Past President SVCM), MD Ramiro Morales (Past President SVCM) and other participants.

Spanish Society for Hand Surgery

1. New Board of the SECMA: The new board of the Spanish Society will be constituted during the national meeting in Murcia in May 2015. The new President will be Dr Angel Ferreres and the General Secretary will be Dr Luis Aguilella. The rest of the Council members will be elected by the general assembly.

2. SECMA & RICMA (The Ibero-American Journal of Hand Surgery). The new online version of the "Revista Iberoamericana de Cirugía de la Mano (RICMA)", the Ibero-American Journal of Hand Surgery, has contracted Elsevier to be the new Editorial company. A new editorial manager website will help the authors to submit their manuscripts to RICMA. The editors, Dr Fernando Corella and Dr Pedro J. Delgado, have carried out tremendous work on this project. http://revistaiberoamericanamano.org/

3. SECMA & FESSH. The Spanish Society participated in the FESSH foundation in Konstanz, December 2014. The foundation of FESSH took place on 11th December 2014 in St. Gallen at the Bachman Notary Office with three members representing FESSH. National Societies joined FESSH in signing the foundation document. SECMA was represented by its international delegate Dr R S Rosales.

4. SECMA AND OTHER HAND SURGERY SOCIETIES. The American Society for Surgery of the Hand has selected the Spanish Society of Hand Surgery (Sociedad Española de Cirugía de la Mano "SECMA") as the 2015 International Guest Hand Society at the 70th ASSH Annual Meeting (September 10-12 2015 in Seattle, Washington, USA). The Spanish Society will collaborate in the scientific program with two instructional courses and poster presenters at the international guest society poster section.

On behalf of the SECMA, I thank the IFSSH for the opportunity to present this updated news report of our society.

R S Rosales, MD, PhD
International Delegate of the SECMA

The Swiss Hand Surgery Society

Schweizerische Gesellschaft für Handchirurgie SGH
Société Suisse de Chirurgie de la Main SSCM
Società Svizzera di Chirurgia della Mano SSCM

The Swiss Hand Surgery Society grew in 2015 to now include 225 ordinary and extraordinary members. The council changed for 2015/16, with a new President (Michaël Papaloïzos, Geneva) and Vice President (Mario Bonaccio, Frauenfeld) and Claudia Meuli-Simmen (Aarau) as the past president. The annual Congress is to be held in Fribourg on November 5-6, including the main topics of joint fusions and CRPS alongside many other activities and free papers (http://de.sgh-sghr-kongresse.ch/zukunftige-kongresse).

The main work of the council (www.swisshandsurgery.ch) in 2014/15 involved the change of our training program. As of January 1st 2015, Hand Surgery is a fully acknowledged specialty by the Swiss Medical Association (FMH). Trainees who complete the structured und verified postgraduate training may carry the title "Handchirurgie FMH" - a title which is recognised in most European countries. The council, in accordance with the FMH, has the responsibility to support all training centers to adapt to the new training program and its regulations.

As mentioned in earlier news updates, the new official training starts with a common trunk of two years of General Surgery that is completed by an examination of surgical basics. After passing this exam the trainee can enter the specialised training in Hand Surgery and in Surgery of Peripheral Nerves. This training takes four years in at least two different institutions. There are different training centers in three categories (5 University Hospitals: Basel, Bern, Lausanne, Geneva, Zurich; 2 Center Hospitals: Aarau, St.Gallen; 10 smaller Hospitals or Clinics: Geneva, Sierre, Chur, Bruderholz, Liestal, Luzern, Münsterlingen/Frauenfeld, Solothurn/Olten, Schulthess Zurich, Winterthur; 5 private practices: Biel, Fribourg, Geneva-Meyrin, Nyon, Rüti).

The training finishes with an oral and written examination. With the new programme we will share the written and oral examination with the FESSH, obtaining the FESSH Diploma as the "Swiss Hand Diploma". After passing this exam and fulfilling a defined logbook, the trainee receives the Swiss Hand Diploma (FMH certificate) at the end of six years of training.

Taiwan Society for Surgery of the Hand

Prof. Tang-Kuei Liu was one of the pioneers who started the hand surgeries in Taiwan. He was the Founding President of the Society for Surgery of the Hand Taiwan ROC in 1990. The Society was renamed as "Taiwan Society for Surgery of the Hand" (TSSH) in 2009. The Society was mainly comprised of orthopaedic and plastic surgeons, and the President was elected from the two societies alternating every second year. Prof. Ming-Ting Chen, one of the pioneers in plastic surgery, was the second President of TSSH (1992-1994).

TSSH joined the IFSSH when Prof. Sheng-Mou Hou was the President of TSSH (1994 and 1996), and also became one of the founding societies of APFSSH. The subsequent Presidents, including Fu-Chan Wei (1996-1998), Der-Yang Wu (1998-2000), Hung-Chi Chen (2000-2002), Gau-Tyan Lin (2002-2004), Hsian-Jenn Wang (2004-2006), Yuan-Kun Tu (2006-2008), David Chwei-Ching Chuang (2008-2010), Alvin Chao-Yu Chen (2010-2012), and Chih-Hung Lin (2012-2014), devoted themselves in the services, investigations, and educations of TSSH. The current President, Chih-Hao Chang, continues the missions, leading the hand surgeons in Taiwan and connecting to the world societies.

Several senior TSSH hand surgeons have completed their fellowship periods abroad and were inspired by the masters from different centers. Their hard work made them outstanding in the fields of toe transfers, brachial plexus and peripheral nerve reconstructions, congenital hand reconstructions, microsurgical reconstructions for the mutilated upper extremities, and minimally invasive surgeries. After they became the masters, they continued contributing to the hand society in Taiwan and the international societies, providing lectures in continuing medical educations and instructional courses to pass on their experiences.

Live surgery courses during international conferences also impressed the participants. Cadaver dissection courses and arthroscopy courses were introduced to TSSH by Ircad Taiwan, established in 2008. These workshops provided a more lively form of education to the younger generations. Advanced shoulder, elbow, and wrist reconstructions can be performed by this generation. Innervated toe and vascularised joint transfers are developing in this country.

Hand surgeons in Taiwan take part in and support international activities. Prof. Yuan-Kun Tu hosted the 8th APFSSH in Kaoshiung, Taiwan, when Prof. Chuang was the President of TSSH. More than 500 participants joined this conference in 2009. Prof. Tu is currently the President of APFSSH. With this enthusiasm and friendship, TSSH will continue to participate in the international societies.

The Turkish Society of Hand and Upper Extremity Surgery

The Turkish Society of Hand and Upper Extremity Surgery was founded in 1977 by the Honorary President, Prof. Ridvan Ege. The society is a member of IFSSH and FESSH and has 255 active members.

The 2001 IFSSH triennial congress and the 2013 FESSH meeting were organised by the society and held in Turkey. The Turkish Hand Society also organises national basic and advanced hand courses every year in different cities of Turkey. Between these, the dedicated course of Prof Dr. Ridvan Ege is traditionally very important for our Society.

The IX. Prof Dr. Ridvan Ege basic course of traumatic hand and upper extremity surgery, was successfully held at the Congress Centre of the Gulhane Military Hospital in Ankara on 3-4th of April 2015 organised by Turkish Hand Society. The course commenced with the attendance of Dr. Ege. Basic knowledge of the traumatic hand was given to participants by the faculty, with 100 participants in attendance from different cities of Turkey.

We would like to thank to Prof. Ridvan Ege for his great contribution to Turkish Hand Surgery.

Turkish Hand Society
Sadan Ay, M.D. Assoc Prof
Delegate of IFSSH

IFSSH Scientific Committee on Neonatal Brachial Plexus Palsy

Chair: Howard Clarke (Canada)
Committee: Raymond Tse (USA), Martijn Malessy (The Netherlands), Scott Kozin (USA)

Report submitted August 2014

The Role of Nerve Transfers in the Treatment of Neonatal Brachial Plexus Palsy

Abstract

Nerve transfers have gained popularity in the treatment of adult brachial plexus palsies, however, their role in the treatment of neonatal brachial plexus palsies remains unclear. The purpose of this article is to critically review the current literature surrounding the use of nerve transfers for neonatal brachial plexus palsy.

The relative merit of nerve transfers as a primary strategy for nerve reconstruction for Erb palsy is still unclear. In the cases of extended Erb palsy and more severe palsies, the current complement of nerve transfers is inadequate to satisfy all target muscles. Given implications of denervation on limb function, growth, and the possibilities for secondary musculoskeletal reconstruction, maximal re-innervation should remain the primary goal of reconstruction.

Without direct comparative studies and given the lack of consensus in methods of reporting results, future studies should consider using a well established outcome measure and should clearly define how outcomes are assessed.

Introduction

Neonatal brachial plexus palsy (NBPP) occurs in 1 in 1000 newborn infants[1,2]. Although most infants recover satisfactory function spontaneously, 10-30% benefit from surgery[3-6].

Interposition nerve grafting has been the mainstay of surgical treatment [4,5,7-9]. In the case of nerve root avulsion(s), distal targets are prioritized in the following order: hand (if affected), elbow flexion, and shoulder [3].

Nerve transfers take functioning donor nerves/branches/fascicles to innervate non-functioning distal targets. The donor may be part of the brachial plexus on the affected side (intraplexus) or may originate outside of the affected brachial plexus (extraplexus); it may be motor, sensory, or mixed motor and sensory.

Nerve transfers have gained popularity in the treatment of adult brachial plexus palsy[10] and many have been applied to NBPP (Table 1). For example, the combination of median and/or ulnar to biceps and/or brachialis (M/U-Bi/Br), radial triceps branch to axillary anterior deltoid branch (Tri-Del), and spinal accessory to suprascapular nerve (SAN-SSN) can be used to treat upper trunk palsy[11-14]. Although a recent systematic review suggests that nerve transfer may produce superior outcomes to nerve grafting in adults[15], treatment of NBPP differs greatly: the mechanisms, patterns, severity, extent of injury, and scar tissue formation are disparate; infants have a much greater potential for recovery; and the influences of a shorter limb (with shorter distances for axons to reach targets), growth, and development (with potential for central nervous system adaptation) must be considered. The purpose of this report is to review the current literature and evidence surrounding the use of nerve transfers for the treatment of NBPP. This review will focus primarily on re-innervation of distal motor targets.

We performed a Medline Search for literature documenting results of nerve grafting, nerve transfer, or both in the treatment of NBPP.

Outcome measures

Given the variations in reporting motor function, we tabulated outcomes according to common validated

Table 1: Commonly described nerve transfers for NBPP

Donor nerve	Nerve type		Abbreviation
Intraplexus	Motor	Median and/or ulnar to biceps and/or brachialis	M/U-Bi/Br
	Motor	Radial triceps branch to axillary anterior deltoid branch	Tri-Del
	Motor	Medial pectoral nerve to musculocutaneous	MPN-MSC
	Mixed Motor and Sensory	Ipsilateral C7	iC7
Extraplexus	Motor	Spinal accessory to suprascapular nerve	SAN-SSN
	Mixed Motor and Sensory	Intercostals to musculocutaneous	ICN-MSC
	Mixed Motor and Sensory	Contralateral C7	cC7

systems including MRC scale, Active Movement Scale (AMS) [16], and Mallet score[17]. Some authors have simplified reporting their results by using the percentage of patients achieving "useful function" defined as an AMS score of 6 or more[18-20]. When a modified MRC scale was used, we examined whether it allowed a similar definition to be assumed.

The available literature

Only two studies directly compare the results of nerve transfer to nerve grafting for NBPP in a robust side-by side manner[21,22]. All other studies are case series and reports that vary greatly in patient age, palsy type, surgical indications, adjunctive/concomitant procedures, and follow-up duration (Table 2). In addition, we found variations in surgical technique that may have significant implications: results of M/U-Bi/Br may be better when performed as a double fascicular transfer compared to single fascicular transfer[19]; posterior approach for SAN-SSN decompresses the nerve through the suprascapular notch whereas the anterior approach does not[23]; the donor for Tri-Del may be the nerve branch to any of the 3 muscular heads and potential denervation of the donor was not universally investigated[24,25]. Given the inconsistencies in clinical circumstances, findings from one study are difficult to compare to another.

The differentiation of Erb/Type 1 from Extended Erb/Type 2 palsy is of specific interest in the setting of nerve transfers given that the triceps nerve branch may be abnormal for the Tri-Del transfer. However, only a few studies provided enough description to make this distinction possible[5,25-28]. Table 2 summarises the available data for elbow flexion with presentation

> **"The relative merit of nerve transfers as a primary strategy for nerve reconstruction for Erb palsy is still unclear"**

grossly divided between "Upper palsy" (C5-6 +/- C7) and "Total palsy" (C5-8 +/- T1)[29].

Outcomes

1. Primary reconstruction of Erb palsy

Although there are no studies that directly compare results of nerve transfers to nerve grafting (Table 2), two studies describe outcomes using each approach in patients with similar clinical circumstances. Lin reported results of nerve grafting in a group of 48 patients with Erb palsy who were evaluated according to the algorithm developed in Toronto[4], that includes the Cookie test administered at 9 months of age[18]. Ladak reported results of nerve transfers (M/U-Bi/Br, Tri-Del, and SAN-SSN) in a similar group of 10[25]. Although the durations of follow-up varied, mean AMS scores for shoulder abduction, shoulder external rotation, elbow flexion, and forearm supination were similar (Table 2).

Given that, in most of the other studies, the available outcomes are contained in case series and reports with widely varying circumstances,

committee reports

TABLE 2: RESULTS OF NERVE GRAFT AND NERVE TRANSFER FOR ELBOW FLEXION

					Reported outcome								
					% functional (AMS≥6 or equivalent)		Mean AMS Score		MRC Score		Mallet (hand to mouth) or other		
Approach/Author	**Palsy**	**N**	**Clinical situation/Indications**	**Average age (range) (months)**	**Pre-op**	**Post-op**	**Pre-op**	**Post-op**	**Pre-op**	**Post-op**	**Post-op**	**Follow up (Years)**	**Donor morbidity**
NERVE GRAFTING													
Lin 2009	U	48	Toronto algorithm	9.4 ± 2.1 (SD)	12.5	100	3.6	6.6	-	-	-	4	
Lin 2009	T	44	Toronto algorithm	6.1 ± 2.3 (SD)	0	86.3	0.7	6	-	-	-	4	
El-Gammal 2010	T	18	Pan plexus at 3 months	10.8 (3-60)	0	72	-	-	-	-	-	4.2 (2.5-7.3)	
Boome 1988	U	22	No C5/6 recovery at 3 months	5.3 (3-20)	-	-	-	-	N/A	78% MRC≥3	-	N/A	
Waters 1999	U, T	6	No biceps function at 6 months	N/A (N/A)	-	-	-	-	-	-	33% Mallet 2, 33% Mallet 3, 33% Mallet 4	3.8	
NERVE TRANSFER													
Intraplexus - Pure motor transfer													
M/U-Bi/Br													
Ladak 2014	U	10	Failed "Cookie Test"	N/A (10-18)	-	-	3.7	6.3	-	-	-	2	No changes in wrist flexion
Little 2014	U	31	Late presentation, dissociative recovery, avulsions, or failed reconstruction	8.4 (3-20)	0	87	1 (0 to 3)*	6 (5-7)*	-	-	-	1.5	3% transient AIN palsy
Al-Qattan 2014	U	10	Late presentation	16 (13-19)	0	90	0.8	6.2	-	-	-	1.5	No detectable donor deficits
Siqueira 2012	U, T	17	Late presentation, avulsios, or failed reconstruction	12.9 (4-26)	N/A	65	-	-	-	-	-	2.6 (1.6-5.4)	No changes (hand x-ray or Al-Qattan hand score)
Noaman 2004	U	7	Late presentation	15.4 (9-24)	-	-	-	-	N/A	71% MRC≥3	-	1.6 (1.1 to 2.5)	Not specified
Al-Qattan 2002	U	2	Dissociateive recovery	13 (12-14)	0	100	0	7	-	-	-	0.4	Not specified
Estrella 2012	U	1	No elbow and shoulder flexion	10 (N/A)	0	100	0	7	0	MRC 5	-	5	No finger or wrist weakness
Al-Qattan 2010	U	1	Dissociateive recovery	12 (N/A)	0	100	0	7	-	-	-	1.5	None
Shigematsu 2006	U	1	No elbow flexion and shoulder abduction	8 (N/A)	0	100	-	-	0	MRC 5	-	3.3	None
MPN-MSC													
Wellons 2009	N/A	20	Not Specified	7 (5-10)	-	-	-	-	-	-	80% had ability to bring hand to mouth	1.8 (0.8-7)	None
Blaauw 2003	U	25	Not Specified	5.28 (3-10)	-	-	-	-	-	68% MRC≥3	8% Mallet 2, 16% Mallet 3, 72% Mallet 4	5.8 (SD 2.9)	Not specified
Pondaag 2012	U	25	Pan plexus at 3 months or poor shoulder and biceps at 4-6 months	5.8 (3-11)**	-	-	-	-	-	92% MRC≥3	-	3.7 (0.9-8.2)**	None
Intraplexus													

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TABLE 2 (CONTINUED): RESULTS OF NERVE GRAFT AND NERVE TRANSFER FOR ELBOW FLEXION

					Reported outcome								
					% functional (AMS≥6 or equivalent)		Mean AMS Score		MRC Score		Mallet (hand to mouth) or other		
Approach/Author	**Palsy**	**N**	**Clinical situation/Indications**	**Average age (range) (months)**	**Pre-op**	**Post-op**	**Pre-op**	**Post-op**	**Pre-op**	**Post-op**	**Post-op**	**Follow up (Years)**	**Donor morbidity**
MIXED MOTOR AND SENSORY TRANSFER													
iC7													
Romana 2014	U	1	Not Specified	5 (N/A)	N/A	100	N/A	7	-	-	-	8	Not specified
EXTRAPLEXUS													
- Mixed motor and sensory transfer													
ICN-MSC													
Pondaag 2012	U, T	17	Pan plexus at 3 months or poor shoulder and biceps at 4-6 months	5.8 (3-11)**	-	-	-	-	N/A	82% MRC≥3	-	3.7 (0.9-8.2)**	No donor deformity noted
Kawabata 2001	U	30	No biceps at 3 months and avulsions on exploration	5.8 (3-14)	-	-	-	-	0	93% MRC≥3	-	5.2	No donor deformity or dysfunction
El-Gammal 2008	U, T	31	Not specified	14 (4-24)**	N/A	93.5	-	-	-	-	-	4 (1-7.2)**	100% atelectasis; 4.3% pneumonia
Luo 2011	U, T	12	Avulsions or dissociative recovery	5.7 (3-11)	N/A	100***	-	-	-	100% MRC≥3	-	4.3 (3-5.5)	
cC7													
Lin 2011	U	15	Avulsions	7.5 (3-15)	N/A	73***	-	-	-	60% MRC≥3	-	3.9 (3-5.2)	80% synchronous contralateral movement
Lin 2010	T	9	Avulsions (≥4)	4 (3-6)	N/A	78***	-	-	-	78% MRC≥3	-	4.2 (3.7-5.2)	66% synchronous contralateral movement; 11% transient loss of abduction
Chen 2007	T	4	Avulsions (≥4)	9.75 (6-14)	N/A	75***	-	-	-	75% MRC≥3	-	3.8 (3.2-4.6)	100% synchronous contralateral movement; 25% transient loss of abduction

N/A = Not Available or Not Specified, U = Upper, T = Total

** Expressed as median*

***Age and follow-up are for the entire study group*

**** Assumes author defined MRC 2+ (Lin 2011, Lin 2010, Chen 2007) or MRC 3 (Luo 2011, Little 2014) is equivalent to AMS 6 or greater* these are summarised below according to target movements.

1. a) Elbow flexion

There are no direct comparisons of nerve grafting to nerve transfers and all studies are in the form of case series or report (Table 2).

Nerve grafting

Few studies report the results of nerve grafting in isolation and in a manner that specifically assesses elbow flexion. Lin found 86% of patients with total plexus palsy and 100% of patients with upper plexus palsy attained AMS≥6[18].

Nerve transfers: Extraplexus donors

Intercostal nerve transfer (ICN) is most often used as an adjunct in the setting of nerve root avulsions[30-32]. The percentage of patients obtaining functional elbow flexion (AMS >6 or equivalent) has been reported at 82 to 100%. ICN transfers can be undertaken safely in infants if the ipsilateral phrenic nerve is functioning normally. The sacrifice of ICNs risks alterations in chest growth and breast development. In addition to potential pneumothorax, El-Gammel reported atelectasis in all patients and pneumonia in 4.3%[33].

Transfer of the contralateral C7 (cC7) via a vascularised ulnar nerve graft has been described for pan plexus palsy with 4 or more avulsions. Lin and Chen respectively report 78% (N=9) and 75% (N=4) achieving active movement against gravity (>½ range)[34,35]. Lin also reported using cC7 transfers via sural nerve grafts to the upper trunk for Erb palsy with C5-6 or C5-7 avulsions with similar outcomes for elbow flexion[36]. Voluntary control

"The role of nerve transfers as a sole strategy for primary reconstruction of brachial plexus palsy is unclear given the lack of comparative studies with nerve grafting."

was not specifically assessed, however, transient decreases of donor limb shoulder abduction were reported[34,35] and most to all patients had some degree of synchronous contralateral movements[34-36].

Nerve transfers: Intraplexus donors

Medial pectoral nerve to musculocutaneous nerve (MPN-MSC) has been used as an adjunct for more extensive brachial plexus reconstruction[30,37] or as a sole strategy for recovery of elbow flexion[38]. Pondaag reports 92% with MRC≥3[30] while Blaauw reports that 68% had flexion against gravity[37].

More contemporary strategies of intraplexus nerve transfer have involved fascicles of ulnar nerve, median nerve, or both with either the biceps branch (single fascicular transfer) or both biceps and brachialis branches (double fascicular transfer) of the musculocutaneous nerve as recipient(s). Results of single fascicular transfer were reported by Ladak in a homogeneous group of patients failing the Cookie test at 9 months with a mean AMS improvement of 3.7 to 6.3[25]. Other reports using this transfer have been in the setting of late presentation[19,28,39,40], isolated deficit[19,28], root avulsions[19,40], or failed primary nerve graft reconstruction[19,40].

Siqueira reported the lowest percentage attaining functional elbow flexion (AMS ≥6) at 65%, however 30% of patients had a previously failed primary nerve graft reconstruction portending to a lower chance of success[40]. In contrast, Little included only 2 patients (6%) with failed primary nerve graft reconstruction and had 87% patients attain functional elbow flexion[19].

Al-Qattan reported on a group of 10 patients who presented late, without prior reconstruction, and underwent median fascicle to biceps branch transfer at 13 to 19 months of age[39]. No other procedures were noted and 90% attained functional elbow flexion (AMS ≥6). Given that age at nerve reconstruction is thought to be an important factor in treatment success, Al-Qattan's results suggest that nerve transfer is a good option for patients presenting late. Results of nerve grafting at a similar age are not available for comparison.

Patients with "isolated" deficits of elbow flexion may be at a relative functional advantage given that motor control of the rest of the extremity may be intact or mostly intact. This group of patients with "dissociative" recovery may have other motors, such as brachioradialis that contribute to elbow flexion. The merits of isolated nerve transfer in this situation are difficult to determine.

In the instance of C5 and C6 avulsions, nerve transfer is the only option. Siqueria and Little report on 5 and 10 patients respectively who underwent M/U-Bi/Br transfer for elbow flexion in the case of root avulsions[19,40]. All patients in Little's study achieved functional elbow flexion[19] suggesting that this is an ideal indication for this transfer.

1. b) Forearm supination

Few studies report outcomes of forearm supination and there are no direct comparisons of nerve grafting with nerve transfers.

The mean AMS scores reported by Ladak following M/U-Bi/Br were similar to those reported by Lin following nerve grafting for primary reconstruction of Erb palsy.

1. c) Shoulder abduction

There are no direct comparisons of nerve grafting with nerve transfers and all studies are in the form of case series or report. Given the many confounders and paucity of data, inferences on relative merit of each approach are limited.

1. d): External rotation

Comparison of suprascapular nerve reconstruction with either nerve grafting from C5 or SAN-SSN transfer has been reported[21,22]. Although each study looked at different outcome parameters, both studies found no significant difference in outcome with nerve grafting or transfer.

2. Primary reconstruction of Type 2/3/4 NBPP

Several authors have reported nerve transfers for extended Erb palsy (Type 2), however, only motor outcomes related to the specific transfers performed were described and function of the unaddressed targets was not described[19,27,39].

Nerve transfers for pan plexus palsy have been described in the setting of 4 or 5 avulsions where proximal nerve roots are limited or unavailable for nerve grafting[34,35]. A vascularised ulnar nerve was used in cases of cC7 transfer, however, sacrifice of the ulnar nerve precludes any intrinsic hand function, one of the primary goals of reconstruction in these situations.

Discussion

The role of nerve transfers as a sole strategy for primary reconstruction of brachial plexus palsy is unclear given the lack of comparative studies with nerve grafting.

Nerve transfers do have an important role to play in specific circumstances including inadequate proximal roots (ie. multiple avulsions), failed primary reconstruction, late presentation, and isolated deficits.

Surgeons who commit to care of infants with NBPP need to avoid an over-reliance on nerve transfers and should have the capability and inclination for brachial plexus exploration and nerve graft reconstruction. While multiple nerve transfers (M/U-Bi/Br, Tri-Del, and SAN-SSN) can be used to address all of the targets of isolated Erb/Type 1 palsy, in the case of more severe palsies (Type 2 or greater), they leave targets unsatisfied. This not only leaves persistent deficits, it limits motors available for secondary musculoskeletal reconstruction and may have implications on growth. Maximal re-innervation may involve both nerve grafting and nerve transfers.

In spite of the advantages of nerve transfers, the associated morbidity is not clear. Direct donor dysfunction, in an already compromised limb, has significant implications and the effect of partial denervation on musculoskeletal growth is unknown. Although few adverse outcomes have been reported (Table 2), few studies have examined morbidity rigorously and long-term effects on growth are not available.

"Surgeons who commit to care of infants with NBPP need to avoid an over-reliance on nerve transfers and should have the capability and inclination for brachial plexus exploration and nerve graft reconstruction."

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Update on Hand Surgery in Tetraplegia

ABSTRACT

Patients with cervical spinal cord injury (SCI) suffer from paralysis of all four extremities (tetraplegia). Their foremost goal is to regain autonomy and mobility. Surgical restoration of key functions, such as elbow and wrist extension or hand grip control has tremendous potential to restore critical abilities, e. g. eating, personal care and self-catheterisation and productive work in at least 70% of tetraplegic patients. Tendon and nerve transfers, tenodeses and joint stabilisations are time-proven and reliably provide improved arm and hand usability, reduce muscle imbalance and pain in spasticity and prevent joint contractures. Recently, innovative concepts such as single-stage combined procedures have derived from basic scientific research and clinical studies and have been proven to offer considerable advantages over traditional approaches. A combination of seven operations, termed the Alphabet procedure, provides simultaneous active key pinch and global finger grasp, together with passive hand opening and intrinsic function. Immediate activation of transferred muscles is necessary to reduce the risk of adhesions after this extensive surgery, facilitates relearning, and avoids the adverse effects of immobilisation on functional recovery. Transfers of redundant fascicles taken from the axillary, musculocutaneous and radial nerves from above the SCI level have been effective and are a promising option to enhance motor outcome and sensory protection after SCI, especially in groups with very limited resources. Further research should be directed at combining traditional algorithms with these new approaches. Improved communication between the medical disciplines caring for these patients, their relatives, and their therapists, should in future help so that more patients can benefit from these advances and could enable many thousands of tetraplegic individuals "to take life into their own hands" and live more independently again.

Key words: Spinal cord injury – tetraplegia – tendon transfer – novel concepts – immediate activation – combined procedure – nerve transfer

PART I: PRINCIPLES

BACKGROUND

Incidence of tetraplegia

The global incidence of spinal cord injury has been estimated between 10 and 80 new cases per million annually. This means that 250-500,000 people worldwide become newly paralysed every year [1]. The patient population represents mostly young, healthy, and active individuals in their productive years between the 2nd and 4th decades of life. More than 50% of all SCIs occur at the cervical level leading to tetraplegia [2]. The causes of injury differ between countries but the most common aetiologies of traumatic SCI worldwide are motor vehicle accidents, falls, violence and sports and leisure activities. Besides, many SCI occur due to non-traumatic causes, e.g. neoplastic tumours, infection, degenerative or vascular disorders – it can happen to every one of us any day [3,4]!

committee reports

Tetraplegia hand surgery

Although spinal cord injury remains incurable, surgical rehabilitation of the arm and hand in tetraplegia is a powerful tool to restore upper extremity functions, e.g. the ability to groom, self-feed, self-catheterise, lift objects, write, swim, and drive. Reconstruction of elbow extension improves reaching capabilities and stabilises the elbow, allowing for further reconstruction of grasping [3, 5-8]. Restoration of hand function can eliminate the need for adaptive equipment, allow patients to regain meaningful roles and productive work, markedly improve autonomy and spontaneity and thus enhance self-esteem for persons with tetraplegia [9-11].

Clinical outcomes

Clinical results have been reported as very positive. In several recent studies, patient perceived outcomes demonstrated major improvement of both satisfaction and performance of preoperatively prioritised daily-activity goals [12-15]. A meta-analysis of the literature from over 500 cases in 14 studies was recently presented and revealed a mean increase of Medical Research Council score for elbow extension from 0 to 3.3 after reconstruction and a mean postoperative pinch strength of 2 kg, which markedly improved upper extremity usability [16].

> **"Although spinal cord injury remains incurable, surgical rehabilitation of the arm and hand in tetraplegia is a powerful tool to restore upper extremity functions, e.g. the ability to groom, self-feed, self-catheterise, lift objects, write, swim, and drive."**

Table 1: Muscle function according to British Research Council system

Muscle Strength Grade	Muscle Function
M0	No active range of motion, no palpable muscle contraction
M1	No active range of motion, palpable muscle contraction only
M2	Reduced active range of motion – not against gravity, no muscle resistance
M3	Full active range of motion, no muscle resistance
M4	Full active range of motion, reduced muscle resistance
M5	Full active range of motion, normal muscle resistance

Current utilisation

Regrettably, this kind of hand surgery is profoundly underutilised, although outcomes are rated overwhelmingly positive. For example, in the United States with a population of over 100,000 citizens living with tetraplegia, fewer than 400 upper extremity reconstructive procedures are performed per year, indicating that less than 10% of appropriate candidates receive optimal treatment of their upper extremities [17]. The reasons for this underutilisation of proven surgical techniques are varied and complex. Many patients are lacking adequate information about the possibility of upper extremity reconstruction [18]. After patients shift from acute care into long-term non-surgical care, our fractionated health care system is poor at transferring them back into the surgical realm for non-acute conditions. It was suggested that "the biggest barrier to increased use of these procedures is the inadequate referral network between surgeons and physiatrists" [19].

OBJECTIVE

This paper summarises the key elements of surgical restoration of arm and hand function in tetraplegia.

1. PATIENT EVALUATION - Anatomy and Clinical Examination

Table 2: International Classification of Surgery of the Hand in Tetraplegia – with addition of sources for nerve transfers

Group	Spinal Cord Segment	Possible Muscle Transfers	Possible Axon Sources for Nerve Transfers
0	≥ C5	No transferable muscle below elbow	Musculocutaneous nerve branches to coracobrachialis and brachialis muscle
1	C5	Brachioradialis (BR)	Axillary nerve branches to deltoid and teres minor muscles
2	C6	+ Extensor carpi radialis longus (ECRL)	Radial nerve branches to supinator muscle
3	C6	+ Extensor carpi radialis brevis (ECRB)	
4	C6	+ Pronator teres (PT)	
5	C7	+ Flexor carpi radialis (FCR)	
6	C7	+ Extensor digitorum	
7	C7	+ Extensor pollicis longus	
8	C8	+ Flexor digitorum	
9		Lacks intrinsics only	
10 (X)		Exceptions	

a. Muscle Testing: Surgical planning depends on preoperative sensory and motor evaluation of the upper extremity and includes muscle strength tests according to British Research Council system and International Classification of Surgery of the Hand in Tetraplegia (ICSHT) [20] (Tables 1 and 2). The donor muscle must be healthy and of adequate strength (M4), preferably not injured or re-innervated. With limited available donor muscles, a weaker muscle (M3) may be considered for transfer. Optimally, it should be similar in architecture, synergistic and have an adequate soft tissue bed along the route of transfer [21, 22].

b. Joint Range of Motion: Passive joint motion, above all in the key joints - shoulder, elbow, wrist, MCP and PIP - is a prerequisite for reconstruction. A tenodesis effect during wrist extension (hand closure) and flexion (hand opening) and joint stability (primarily the thumb CMC joint) is preferable but not required for reconstruction.

c. Sensibility Testing: Sensory examination focuses on cutaneous afferents of the hands with a 2-point discrimination, which should be 10 mm or better in the thumb for cutaneous control (Cu). Otherwise ocular control (O) is required [10, 20].

d. Special aspects: Other aspects of neuromuscular examination include identification of brachial plexus lesions and entrapment neuropathies, paralytic spine deformity, thoraco-scapular stability, spasticity, contractures, stiffness and instability of joints [23, 24]. Pain and swelling are relative contraindications to surgery and need to be treated before reconstruction.

e. General goals of tetraplegia surgery: To take better advantage of remaining shoulder, arm and hand functions, various philosophies have evolved. Reconstruction of upper limb motor functions in tetraplegia involve multiple surgeries (Tables 3 and 4) but it is always necessary to keep in mind the goals of the surgeries i.e., to provide the individual with a better ability to perform activities in daily life [3, 13, 14].

2. PLANNING OF RECONSTRUCTION

The main goals of reconstruction are to provide:

1. Elbow extension,
2. Grip function (flexion phase),
3. Opening of the hand (extension phase) and
4. Intrinsic hand function.

The most frequently used procedures to achieve patients' ability goals and algorithm for surgical reconstruction based on International Classification are presented in Tables 3-5.

Prerequisites

In tetraplegia, the following requirements must be met before starting functional operations:

1. Neurological functional plateau – no further recovery expected
2. Emotional Stability - accepting the consequences of injuries
3. No open wounds or pressure sores (decubitus), no infections (e.g. bladder)
4. Motivation and ability of the patient to take active part in after-treatment
5. Treatment plan based on clinical examination and counselling of the patient
6. Available donor muscles (muscle strength grade ≥ M4)
7. Free passive joint mobility [3, 8, 10, 25]

Table 3: **Summary of possible surgical procedures (excluding nerve transfers) to achieve patients' ability goals**

Ability goal	Functional goal	Procedure	Rehabilitation
Stabilizing elbow in space, reaching overhead objects, pushing wheelchair, stabilizing trunk	Elbow extension	**Reconstruction of Triceps Function**	4 weeks cylinder cast with elbow fully extended
		Posterior Deltoid-Triceps	4 week orthosis
		Biceps-Triceps	
Use of utensils, hand writing, pushing wheelchair	Grip	**Reconstruction of grip**	
		Reconstruction of passive key grip	4 weeks arm in cast with flexed thumb and wrist
		BR-ECRB	4-10 weeks active exercise
		FPL-Radius	
		CMC 1 arthrodesis	
		Reconstruction of active key grip	4 weeks in orthosis with active key pinch but restriction of wrist extension
		BR-FPL	
		CMC I arthrodesis	
		Split FPL-EPL tenodesis	
Reaching for objects e. g. cup or glass positioning of thumb and fingers for improved grasp control	Opening of the hand	**Reconstruction of thumb and finger extensors**	
		Passive opening	4 weeks wrist and thumb in cast
		CMC I arthrodesis	
		EPL to extensor retinaculum attachment	
		Active opening	4 weeks wrist, fingers and thumb in cast
		PT-EDC and EPL/APL	
		Thumb stabilization	6 weeks splint for IP / CMC 1 joint with free thumb tip
		ELK procedure, CMC 1 arthrodesis	
		Reconstruction of intrinsics	4 weeks of immobilization in intrinsic plus position Thumb actively exercised 1st postop day
		Zancolli-Lasso tenodesis	
		House tenodesis	
		EDM-APB	

Time management

The above-mentioned conditions are usually achieved only after completing the first rehabilitation, yet a strict time rule (e.g. no operations before one year since injury) is not appropriate. Some patients achieve a stable neurological level after 3-6 months, especially in cases of complete tetraplegia. Early hand rehabilitation has many advantages, such as faster reintegration. Often, however, financial, family or work-related problems must be solved first. In incomplete tetraplegia, functional recovery may occur even a long time after the injury (about two years). On the other hand, a reconstruction using tendon

Table 4: **Surgery according to International Classification (IC) – excluding nerve transfers**

IC group	Recommended surgical procedure
0	• Abducted shoulder (anterior deltoid muscle transfer) • Flexion contracture of the elbow (biceps tendon Z-tenotomy) • Supinated but not contracted forearm (Zancolli biceps rerouting - check presence of supinator muscle!) • Fixed supination contracture - osteotomy of radius
1	• BR-to-ECRB for active wrist extension • Moberg's key pinch procedure • ELK procedure
2	• BR-to-FPL (active key pinch) • CMC 1 fusion • ELK procedure • EPL tenodesis to dorsal forearm fascia
3	• BR-to-FPL • ECRL-to-FDP 2-4 • ELK procedure • House intrinsic procedure • CMC 1 fusion • EPL-tenodesis
4	• BR-to-FPL • ECRL-to-FDP 2-4 • ELK procedure • House intrinsic procedure • CMC 1 fusion • EPL-tenodesis
5	• BR-to-FPL • ECRL-to-FDP 2-4 • ELK procedure • House intrinsic procedure • CMC 1 fusion • EPL-tenodesis
6	• BR-to-FPL • ECRL-to-FDP 2-4 • ELK procedure • House intrinsic procedure • EDM-to-APB transfer • EDC-to-EPL
7	• BR-to-FPL • ECRL-to-FDP II-IV • ELK procedure (if required) • House intrinsic procedure • EDM-to-APB or EIP-to-APB
8	• BR-to-FPL • ECRB activated ADPB • Opponens plasty (EIP, EDM, FCU) • Active Zancolli lasso procedure (ECU) • House intrinsic procedure
9	• House intrinsic procedure
10	• Pathological postures (MP joints fixed in hyperextension, lack of any functioning intrinsic muscles, wrist fixed either in flexion or extension etc.) • Release of contracted muscles, joint capsules, tendon lengthenings

Table 5: Surgical management of spasticity in the tetraplegic upper extremity

Spasticity	Affected muscles	Surgical procedure	Function
Forearm	Pronator teres	Release	Supination possible
Wrist	FCR, FCU	Tendon lengthening	Wrist extension possible
Thumb	FPL, AdP	Tendon lengthening	Thumb extension and opening of 1st web space possible
Fingers	FDS / FDP	Tendon lengthening	Hand opening
Fingers	Interossei	Release	Reduction of intrinsic tightness, better grip

transfers may remain meaningful even decades after the spinal cord injury. Predictability is reduced in incomplete SCI with asymmetry and spasticity, so that a treatment plan should be developed only after nerve regeneration is complete and spasticity is under control [26].

Nerve transfers require a different perspective. Paralysed muscles in SCI can be categorised into 1. functional muscles innervated by the supralesional segment and still under voluntary control, [2]. muscles innervated by neurons at the lesion level with damaged anterior horn cells resulting in a lower motor neuron denervation 3. muscles innervated by infralesional segment which are paralysed. Preservation of the anterior horn cells results in an upper motor neuron paralysis of these muscles. The nerves to the first group of muscles represent potential donor nerves, the nerves to the latter two groups are potential recipients for nerve transfer surgery. Early surgery (optimally within a year) is critical regarding the denervated muscle group as neuromuscular end plate degeneration will make the muscle refractory to eventual reanimation. If a muscle is paralysed by an upper motoneuron lesion, neuromuscular degeneration will likely be slowed and this may extend the time limit for successful reanimation with nerve transfers [27, 28].

PART II: OPERATIVE TECHNIQUES

1. Reconstruction of Elbow Extension

Elbow extension is critical for overhead activities, weight shifting and transfers, greatly improves wheelchair propulsion and increases the workspace of the hand in space. Elbow reconstruction should precede grip reconstruction because

- Use of a hand that cannot reach out is very limited.
- Elbow extension helps to stabilise the patient's trunk in the wheel chair
- Stability itself is a factor for more controlled use of the hand
- Function of distal tendon transfers are improved, e.g. brachioradialis muscle function (as a donor) requires a counteracting and stabilising action from its antagonist i.e. elbow extension.

Two surgical options are advocated to restore active elbow extension

a. Muscle transfer by

- Posterior deltoid-to-triceps transfer [9, 29-31] or
- Biceps-to-triceps transfer [32]

Posterior deltoid-to-triceps transfer reliably restores lost elbow extension in patients with C5/6 tetraplegia. Patient candidates for biceps-to-triceps transfer usually demonstrate intact and functional brachialis and supinator muscles, biceps activity and an

Figure 1: C5-C6 tetraplegic patient demonstrates her elbow extension after bilateral posterior deltoid to triceps reconstructions.

Figure 2: C6 tetraplegic patient holding knife 4 weeks post grip reconstruction by transferring the BR to the ECRB and FPL tenodesis to the radius (Moberg procedure)

elbow flexion contracture exceeding approximately 20°. Both techniques are time-proven and provide the tetraplegic with improved arm control for many daily activities [31-32] (Fig. 1).

b. Nerve transfer using axons from the axillary nerve

Alternatively, triceps reanimation is possible by nerve transfer. Possible donors are nerve branches of the posterior portion of the axillary nerve (to posterior portion of deltoid or teres minor muscle) or the brachialis branch of the musculocutaneous nerve 33-35.

2. Reconstruction of Forearm Pronation

A supination contracture can be defined as an inability to stabilise the hand in pronation due to an imbalance between the functional supinator muscles, mainly the biceps brachii and supinator, and the hypotonic or paralysed pronators. Initially a supination contracture can be reduced with abduction and internal rotation of the shoulder, but over time it becomes permanent as the biceps brachii and the interosseous membrane contract. Apart from looking 'odd', a supination contracture seriously impairs hand function, which albeit rudimentary, is very important to the tetraplegic patient. A supination deformity increases the risk of developing a gravity-induced extension contracture of the wrist. Correction of the supination deformity enhances the usefulness of any remaining functional muscles by enabling key-pinch. It is generally agreed that functional surgery should aim to restore the pronated position of the forearm and surgical options include: [36]

a. Distal Transposition of Biceps Tendon (rerouting), if necessary with interosseous membrane release .

b. Dorsal Transposition of the Brachioradialis during BR-to-FPL transfer to achieve simultaneous thumb flexion and forearm pronation [37, 38].

c. Derotation Osteotomy of the Radius [36].

3. Reconstruction of Wrist Extension

a. Tendon Transfer (BR-to-ECRB):

Reconstruction of active wrist extension is of utmost importance due to the wrist-related tenodesis effect. If wrist extension is absent (IC groups 0 and 1), the brachioradialis (only IC group 1) can be transferred for wrist extension to the ECRB to obtain a wrist extension without radial deviation, and stable wrist-extension-driven key pinch can be provided by FPL tenodesis to the radius (Moberg procedure) (Fig. 2) [39, 40].

b. Nerve transposition from above the elbow: Active wrist motion enabling a tenodesis grip is a key function in high level tetraplegia. However, antigravity wrist extension is absent in C5 tetraplegia and this renders inability to perform even the simplest activity of grip, sensory functions and human contact. The basic passive key pinch cannot be restored by traditional transfers in patients with no available donor muscles below the level of elbow. A tenodesis grip can be restored by the transfer of the brachialis motor nerve to the ECRL motor nerve, combined with tenodesis of the FPL to the radius[41]. This group forms a relatively large proportion of the overall tetraplegia population. In larger series, IC groups 0 and 1 are relatively frequent and correspond to 28% of 222 patients from our center [42].

4. Positioning and stabilisation of the thumb

Flexion of more than 60° in the interphalangeal (IP) joint significantly disturbs thumb function in patients who have preserved or reconstructed extrinsic flexor function (by flexor pollicis longus muscle), but have paralysis of antagonistic intrinsic or extrinsic thumb muscles due to peripheral nerve lesions, spinal cord injury or neuromuscular diseases.

The preferred operation is currently the EPL knot (ELK) procedure[43] which is a duplication of the EPL tendon at the level of the IP joint to prevent hyperflexion. A V-shaped incision is made over the extensor hood, the EPL tendon is elevated with a hook and a loop is formed and anchored with two sutures at its basis. The loop is then folded proximally on the EPL tendon and fixed with sutures along its three sides while IP joint is extended.

5. Reconstruction of Grip Function

Tetraplegic patients usually have a spontaneous weak pinch between the thumb and index finger, depending on the presence of a wrist extension – tenodesis grip. To produce a useful grip, preoperative planning must be based on the patient's goals and wishes and thorough testing of muscle function, sensibility and spasticity of the hand. In IC group 2 patients, active extension of the wrist depends only on the ECRL muscle, therefore this muscle must not be used for a transfer in this group of patients. In IC groups 3 and higher, where active extension is provided by both the ECRL and ECRB, the ECRL can be used for active transfers [3, 42].

a. Reconstruction of Key Pinch - Lateral pinch, termed key grip, is based upon the fact that hand opens by passive or active wrist flexion and closes by wrist extension, whereby the thumb pulp ideally should meet the radial side of the middle phalanx of index finger. Prerequisites for passive key grip are wrist extension, minimum strength grade 3, forearm pronation and an acceptable relationship between thumb and index/long finger. Stabilising procedures are the ELK distal thumb tenodesis and CMC I arthrodesis. Active key pinch is preferably achieved by a BR-FPL tendon transfer [44].

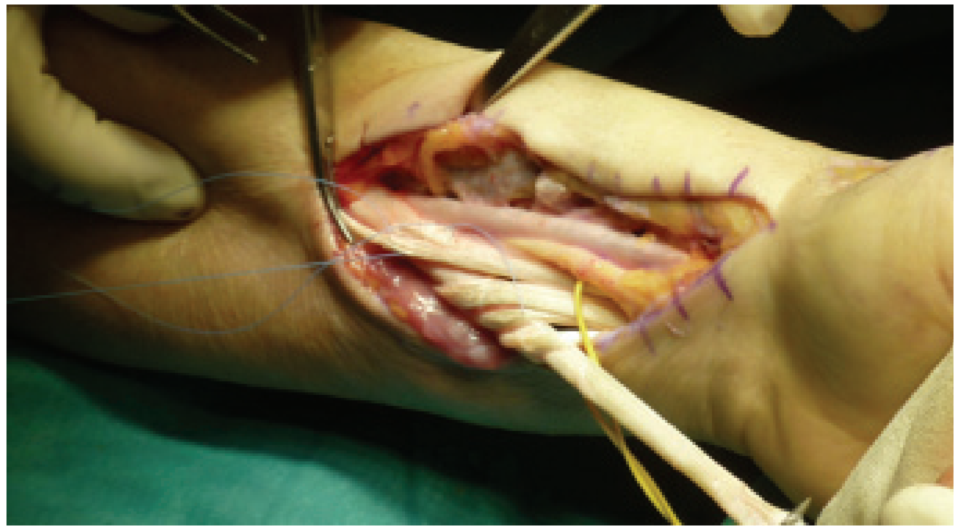

Figure 3: Intraoperative view of ECRL-to-FDP tendon transfer for restoration of finger flexion.

b. Reconstruction of Power Grip - ECRL-to-FDP tendon transfer - Active whole hand closure is powered by an ECRL tendon transfer to the deep finger flexors of index, middle and ring fingers, excluding the little finger to prevent hyperflexion (Fig. 3) [44].

c. Nerve transfer to Restore Interosseous Anterior Nerve Function - Transferring the brachialis motor branch of the musculocutaneous branch to the anterior interosseous branch of the median nerve can be used to reanimate finger and thumb flexion [45, 46].

6. Reconstruction of Intrinsics

The purpose of interossei/lumbrical reconstruction is to obtain MCP joint flexion and PIP and DIP joint extension. Key pinch can be achieved by positioning the index finger so that it is sufficiently flexed to meet the thumb and is also supported by digits 3-5. Secondly, extension of the PIP joints is essential for grasp and release and provides a more normal opening of the hand than reconstruction of EDC function which gives an intrinsic minus manner of opening. The House procedure has proven superior to the formerly used Zancolli lasso plasty in our experimental and clinical experience [47, 48].

a. Passive Interossei Function of the Fingers using Passive Tenodesis by Tendon Grafts in the Lumbrical Canals – House procedure [49].

b. Reconstruction of Active Interossei Function by Tendon Transfer, e.g. FDS 4 with 4 Tendon

Slips in the Lumbrical Canal – Brand Procedure

Active intrinsic hand function may be reconstructed by using a motor muscle with 4 tendon slips inserted into the lumbrical canals as developed by Brand, primarily for leprosy patients with combined median and ulnar nerve palsy.

c. Restoration of Palmar Abduction of the Thumb

Thumb palmar abduction can be restored by transferring extensor digiti minimi (EDM) to the insertion of abductor pollicis brevis (APB). Notably, for this reconstruction M3 power of the EDM is usually sufficient to increase first web space opening and to position the thumb optimally alongside the index finger [50].

7. Reconstruction of Hand Opening (Extensor Phase)

Reconstruction of hand opening is necessary to facilitate the ability of the fingers to surround an object in order to grasp (Table 3). Many of the tetraplegic patients do not have this Rewrite as "ability from the tenodesis grip which occurs with wrist extension, due to adhesions of the finger flexors and insufficient extension of the fingers even with good passive wrist flexion. Improvement of the opening of the hand is particularly necessary in patients with finger flexor spasticity where gravity or remaining finger extension strength cannot overpower the finger flexion spasticity [51].

a. Passive Opening of the 1st Commissure by EPL tenodesis to extensor retinaculum or forearm fascia (powered by active or passive wrist flexion).

"If a muscle is paralysed by an upper motoneuron lesion, neuromuscular degeneration will likely be slowed and this may extend the time limit for successful reanimation with nerve transfers."

b. Active Opening by Tendon Transfer by transferring PT to EPL, APL and EDC

c. Nerve Transfer of the Supinator Motor Branches (C6) to the Posterior Interosseous Nerve (C7-8) – Bertelli S-PIN Procedure - Bertelli described the possibility of using the fact that supinator is always C6-innervated and is redundant when biceps is intact, while the fibers of the posterior interosseous nerve roots are C7-8-innervated. By transferring the expendable supinator motor branches to the posterior interosseous nerve, finger and thumb extension as well as ECU function can be reinnervated [34, 52].

8. Alignment of wrist position by ECU tenodesis

Often there is a radial deviation of the wrist due to the limited active flexion and extension and lack of ulnar deviators, especially in groups 0 and 1, in which only the ECRL is strongly present. By suturing of a tendon loop onto the ECU tendon itself, the gripping force, in comparison with an unbalanced hand with the same motion, doubles. Because of ergonomic hand function, the shoulder does not externally rotate when the wrist is radially deviated. This can reduce the shoulder pain that occurs often in quadriplegics [53].

9. Additional Procedures to Reduce Spasticity

A common observation over the past years is the increasing number of incomplete tetraplegics. These patients present a somewhat new configuration and a more complex functional loss than that of those patients with complete tetraplegia, and often demonstrate various degrees of spasticity and muscle-joint deformities [51]. Muscle stiffness, imbalance and deformity can frequently be corrected by muscle release and/or tendon lengthening procedures (Table 5) [51, 54].

Mild deformities in the hand primarily affect the PIP and DIP joints while the MCP joints are usually spared. Severe deformities may affect all finger joints. Certain surgical techniques have proven successful in treating spasticity:

a. Littler Release - In many cases a partial resection of the oblique part of the extensor aponeurosis is enough. The insertion of the interossei on the proximal phalanx remains. The operation time is short and this produces an immediate result [55].

Table 6: Advanced Balancing Combined Digital Extension Flexion Grip (ABCDEFG) Reconstruction

Order	Procedure	Type	Motor	Function	Effect
1	ELK procedure	Tenodesis	Active 1	Stabilize IP joint	Prevent hyperflexion of IP joint,
Increase contact surface to index					
2	Free tendon transplant (FDS4, PL, Plantaris) extensor hood digits 2-3 and 4-5	Tenodesis	Passive 2	Interossei 3	Opening hand
3	CMC 1 joint stabilisation	Arthrodesis	N/A	Fusion of base of the thumb and correct deformity	Secure thumb's approach against index during key pinch
4	BR-to-FPL	Tendon Transfer	Active	Thumb flexion	Key pinch
5	ECRL-to-FDP 2-4	Tendon Transfer	Active	Finger flexion	Power grasp
6	EPL-to-dorsal forearm fascia	Tenodesis	Passive 2	Extend thumb	Opening hand
7	ECU-to-ulnar head	Tenodesis	Passive	Prevent radial deviation of wrist	Balance hand position at all types of grips

1 powered by BR-to-FPL, 2 powered by wrist flexion, 3 MCP joint flexion, PIP / DIP joint extension

b. Tendon Lengthening of the Extrinsic Finger Flexors (FDS/FDP) - Tenotomies of the flexors are performed about 5 cm proximal to the carpal canal using a step-cut incision of 6-8 cm in length. This allows a parallel sliding of both tendon stumps and subsequent prolongation of 2-3 cm [51].

c. Additional Procedures - In some cases other procedures may be required, such as releases of muscle insertions, e.g. the adductor pollicis or pronator teres or a teno-myotomy of the wrist flexors.

INNOVATIVE CONCEPTS

1. Combined Procedures - Active Flexor and Passive Extensor Phase with Intrinsic Reconstruction [56]

Traditionally, operations for flexors and extensors were separated, yet we have successfully combined procedures for active key pinch and finger flexion together with passive opening of the hand as a one-stage operation. This reconstruction includes 7 individual operations performed in the following order: 1) Split FPL-EPL distal thumb tenodesis, 2) Reconstruction of passive interosseous function, 3) thumb CMCJ arthrodesis 4) BR-FPL tendon transfer, 5) ECRL-FDP tendon transfer, 6) EPL tenodesis, 7) ECU tenodesis. This reconstruction is termed the Alphabet or ABCDEFG procedure, abbreviation for Advanced Balanced Combined Digital Extensor Flexor Grip reconstruction (Table 6).

To reduce the risk of adhesions after this extensive surgery and to facilitate relearning, the activation of transferred muscles with new functions requires early active postoperative training. One-stage reconstruction can reliably provide grip, grasp and release function in persons with C6 tetraplegia (Fig. 4). Patient compliance and satisfaction is high. Overall, this simultaneous reconstruction saves time, limits the need for immobilisation and the effort of patient and caregivers are less compared to the standard 2-stage reconstructions. The incidence of complications is comparable with other published treatment methods [57].

Figure 4: Patient with C6 tetraplegia shows hand-writing technique before (left) and 4 weeks after (right) one-stage complete grip reconstruction (Alphabet procedure [56,57]).

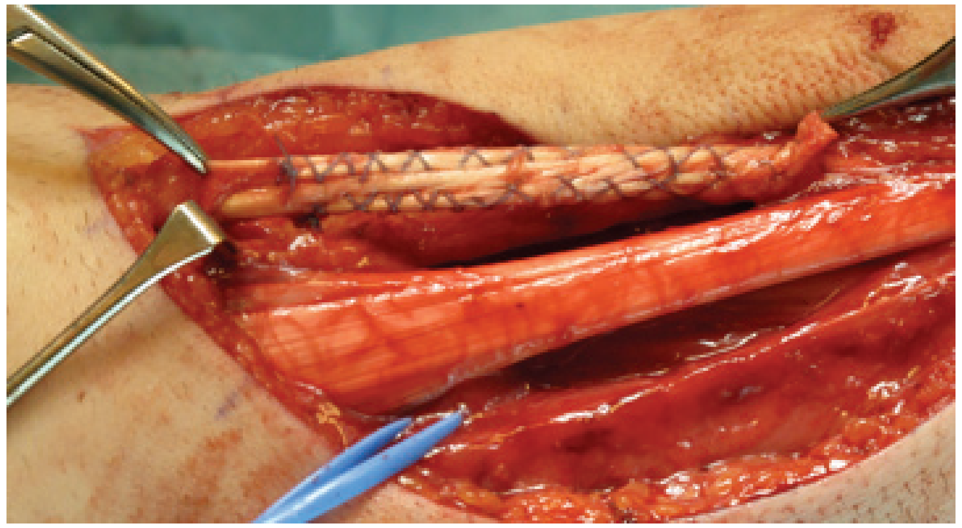

Figure 5: BR-to-FPL tendon attachment site using double-sided running sutures back and forth with 5 cm overlap.

2. Immediate Activation of Transferred Tendons

The most remarkable and effective strategy of improving function has been the consistent and immediate activation of transferred muscles after surgery. Early active training of new motors not only prevents the formation of adhesions but facilitates the voluntary recruitment of motors powering new functions, before swelling and immobilisation-induced stiffness restrain muscle contractions. Additionally, the patient will experience an early, spectacular and inspiring effect of the reconstruction, which will help motivate training during the demanding and sometimes painful initial postoperative period[58]. Early activation of the transferred muscles requires reliable tendon-to-tendon attachments. We have accumulated experience of hundreds of side-to-side attachments using running sutures back and forth along both sides and with a minimum of 5 cm overlap (Fig. 5) [59].

This technique has proven extremely safe for allowing early active training, even in cases of donor and recipient tendon mismatch, and is now standard in our unit [3,60]. Tendon force measurements have confirmed the assertion that the elbow joint need not be immobilised when the BR is used as a donor muscle in tendon transfer to the FPL, as the maximum passive tendon tension was only about 20 N in our cadaveric model and the failure strength of this specific repair was over 200 N [59]. We suggest that it is possible to perform multiple tendon transfers in a single stage, avoiding the adverse effect of immobilisation. Briefly, the day after surgery a removable splint replaces the cast and intermittent exercises commence. Training emphasises the activation of donor muscles with slight external resistance.

3. Nerve transfers

Additional reconstructive options could be achieved by nerve transfers, i.e. extra-anatomical short-circuit between expendable donor nerve fascicles from above the level of the spinal cord injury and the motor branch of a paralysed muscle below it. Nerve transfers have been established in recent years, especially in brachial plexus lesions, but are rarely applied in tetraplegia [61-63]. Ideally, the coaptation of an expendable pure motor axon donor with the recipient branch should be over the shortest possible distance [41]. Theoretically, suitable donor nerves include:

- Axillary nerve (C5/6) branches to the posterior deltoid and teres minor to restore elbow extension [34, 52]
- Radial nerve branches to the supinator (C6) or ECRB (C7) [46, 47] for thumb or finger extension
- Musculocutaneous nerve branches to coracobrachialis or brachialis muscles for elbow extension, wrist extension or finger and thumb flexion [41, 45, 46, 60]
- Superficial radial nerve (C6) or lateral antebrachii cutaneous nerve (C5/6) for sensory restoration of the median nerve (1st web space) in patients categorised as 0 (ocular control) [63]

Theoretically, nerve transfers in SCI may even be more effective compared to peripheral nerve injury because recipient muscles with intact lower motor neurons preserve reflex arcs. They should not become refractory to reinnervation / external stimulation

committee reports

after 18-24 months as occurs after peripheral palsy. Axon transfer from the intact donor nerve may allow highly selective neurotisation by intraoperative fascicle stimulation of the intact recipient nerve, minimising the distance between donor and recipient and, therefore, regeneration time. Furthermore, natural biomechanics, the force and excursion of the original muscle are preserved, and scar-induced motion restrictions are prevented without the need for extended immobilisation – a primary factor why appropriate candidates refuse muscle transfers. Axon transfers may provide options for patients not amenable to conventional tendon transfers, including IC group 0 [3, 41, 45, 46].

Combining tendon transfers and nerve transfers

Further research should be directed at combining traditional algorithms with these new approaches, such as in the case reported by Bertelli and Ghizoni [64], restoring elbow extension, finger extension (MCP joint), thumb extension and pinch, which is a fine example of the potential restoration of upper limb function that can achieved by combining tendon and nerve transfers in one surgery. Both techniques, muscle and nerve transfer, need to be carefully considered and individualised according to their advantages [65]. For example, the Bertelli S-PIN procedure (supinator to posterior interosseous nerve transfer) may achieve better hand opening compared to pronator to EDC tendon transfer. This nerve transfer reanimates not only the finger extensors, as does the tendon transfer, but also allows independent thumb extension and abduction and first web opening by reinnervating the APL, and wrist centralisation by also reinnervating the ECU muscle. On the other hand, the classical BR-to-FPL tendon transfer almost immediately provides strong pinch, which may exceed the power achieved by a nerve transfer to restore anterior interosseous nerve function after a lengthy regeneration period.

"Many patients who undergo tendon transfer procedures have sustained devastating, life-changing injuries and they should be considered full members of the rehabilitation team. Their input is required in the preoperative planning so the patient understands operative options and alternatives, and appreciates the commitment required for successful rehabilitation."

TEAM APPROACH

Tendon transfer procedures are optimally undertaken with a team approach, using the assistance of an occupational and a hand physiotherapist as well as a surgical nurse. The essential hand therapist performs the "other half" of the surgical procedure, rehabilitation and retraining of the transferred tendons. The hand therapist promotes functional restoration, assists with oedema control, contracture prevention, and muscle activation and strengthening. Many patients who undergo tendon transfer procedures have sustained devastating, life-changing injuries and they should be considered full members of the rehabilitation team. Their input is required in the preoperative planning so the patient understands operative options and alternatives, and appreciates the commitment required for successful rehabilitation [3].

CONCLUSION

Every person who sustains a cervical spinal cord injury with tetraplegia should be examined, assessed and informed concerning the options of possible reconstruction of motor function of the hands and arms. It is of course a long way before this ambitious goal can be achieved but the resolution put forward by the leading experts in this field certainly stresses the necessity of increasing the awareness and improving the infrastructure to meet patients' demands of informed discussions of options for improvement of hand function. Many patients are now better informed about the benefits of surgery probably because of easy access to comprehensive web pages on the Internet, a trend that will likely increase the demands for more surgical reconstructions in the future. The overall goal of treatment is to improve motor functions in order to achieve a higher degree of independence for the individual with tetraplegia. Individuals with stable non-traumatic SCI, though differing from traumatic SCI regarding demography and injury patterns, can benefit similarly from surgical rehabilitation of their upper extremities.

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ABBREVIATIONS

APB	Abductor Pollicis Brevis
APL	Abductor Pollicis Longus
BR	Brachioradialis
CMC	Carpo-Metacarpal
DIP	Distal Inter-Phalangeal
ECU	Extensor Carpi Ulnaris
EDC	Extensor Digitorum Communis
EDM	Extensor Digiti Minimi
ECRB	Extensor Carpi Radialis Brevis
ECRL	Extensor Carpi Radialis Longus
EPL	Extensor Pollicis Longus
FDP	Flexor Digitorum Profundus
FDS	Flexor Digitorum Superficialis
FPL	Flexor Pollicis Longus
MCP	Meta-Carpo-Phalangeal
PIP	Proximal Inter-Phalangeal
PNI	Peripheral Nerve Injury
PT	Pronator Teres
SCI	Spinal Cord Injury

A cohort study example on the swing traction method for complex intra-articular PIP fractures

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Ideally, a study comparing two interventions would be conducted as a randomised controlled trial (RCT), the most scientifically rigorous research methodology. The main advantage of this design is that random assignment tends to make the groups comparable both in terms of measured characteristics and characteristics that were not (or could not) be measured.[1] If groups are comparable at baseline, we can be confident that differences in outcomes after intervention reflect the true effects of the intervention. A major disadvantage of RCTs is the ethical issue associated with conducting an experiment where patients do not get to choose their preferred treatment. Trials are also resource-intensive, costly, and time consuming. They can also be difficult to implement when practitioners have strong preferences for a particular intervention.

When it is not ethical or feasible to conduct an experiment (e.g. the intervention is possibly risky, the condition is rare, or outcomes take a long time to become evident) it is possible to directly compare the results of different treatment regimens using a cohort study.[2] This is referred to as comparative effectiveness research (CER).[3] Whilst these observational studies lack the statistical purity of randomised controlled trials, results can be both scientifically rigorous and more relevant to clinicians than a standard clinical trial providing key variables in comparison groups are either matched at baseline or controlled for in analysis. Cohort studies also have the advantage of being able to examine multiple outcomes from exposure to the same treatment or risk.

To give an example, our research unit recently completed a multi-centre cohort study to compare long-term outcomes in two groups with similar characteristics and injury types (complex intra-articular Proximal Inter-Phalangeal (PIP) fractures of 2nd-4th digits).[4] We hypothesised that there is no long-term (i.e. > 12 month) difference between swing traction and no-traction (with or without surgical fixation) in terms of motion, pain, function, patient satisfaction, or treatment cost. Adults with a history of complex PIP fractures affecting ≥ 30% of articular surface injury at least 12 months prior were identified from database searches at three public hospitals and a private clinic and invited to participate. X-rays (see Figure 1 for example) taken at the time of injury were graded by two blinded assessors (hand surgery registrars) and participants attended a clinic for measurement of range of motion (ROM) and self-reported function, pain, and satisfaction by a trained assessor who had not treated the patient.

hand therapy

Participant data were then grouped by treatment provided. One group (N=17) was treated with swing traction with a forearm based orthosis – either the volar design by Kadelbach[5] or the dorsal design by Murray and McIntyre[6] and the other group (N=14) had no-traction, with or without surgical fixation.

The volar design is shown in Figures 2 and 3. A single K-wire is placed perpendicularly through the bone distal to the injured joint, and rubber bands or springs are attached from the K-wire to a frame to provide a distraction force. The orthosis has a forearm component for counterbalance and to prevent distal slippage of the device, which is then worn for up to six weeks. The benefits of the swing design, according to its creators, is that it is smaller than arcuate designs (such as the Banjo or Schenck) thus minimally impacting on daily routine, allowing

"Whilst these observational studies lack the statistical purity of randomised controlled trials, results can be both scientifically rigorous and more relevant to clinicians than a standard clinical trial providing key variables in comparison groups are either matched at baseline or controlled for in analysis."

for easy compliance and pain-free rehabilitation. This assumption was, however, challenged in a qualitative study of twelve people who had undergone the traction protocol,[7] most of whom reported very high levels of pain on commencement of motion.

RCT methodology was considered unfeasible given the rarity of the injury and strong surgeon and therapist preferences for particular treatment protocols at the respective centres. We chose an observational cohort study in which treatment was provided at the individual's own centre, however we ensured that assessors not involved in the treatment measured the outcomes. This allowed us to conduct a measure of individual effectiveness in a method similar to that used in studies of treatments for other rare injuries or diseases.[8] This comparison is "unbiased if the groups have the same prognosis

Figure 1 example of patient X-ray

Figure 2 Patient with volar swing design traction orthosis, with PIP in flexion

Figure 3 Patient with volar swing design traction orthosis, with PIP in extension

at baseline and are treated similarly during follow-up (except for differences that are a direct consequence of whether the patient started regimen A or B)" [9,p372]

Results

In our study, the primary outcome was combined motion of the PIP and distal inter-phalangeal (DIP) joints, expressed as Total Active Motion (TAM). Strickland's original system for classifying finger movement was then used to categorise the range of movement outcome.[10] This simplification of the TAM system was originally designed to evaluate outcomes post flexor tendon injuries, but has been used for intra-articular PIP fractures.[11] It does not include motion of the metacarpo-phalangeal joints, as this is usually not affected in PIP fractures and could therefore bias the measurement of the functional result. In this system, the total flexion minus the extension deficit (calculated as above) is then compared with a theoretical finger in which this value would be 175°. Results are classified (from a percentage score compared with 175°) into four categories: excellent (85-100%) good (70-84%) fair (50-69%) and poor (≤49%). Strickland's system is useful as it provides comparison with a norm, and the availability of a normal contralateral finger is not a prerequisite for the measurement.[12]

Secondary outcomes were physical function and symptoms as measured by the Disabilities of Arm, Shoulder and Hand (DASH), patient satisfaction, pain, complication rates, and cost of treatment (based on mean resource consumption per group). Mean time since injury was 32.6 months in the swing traction group and 39.7 months in the no-traction group.

The mean combined range of motion of the PIP and DIP in the swing traction group was 141.9°; in the no-traction group it was 100.8° (mean difference= 41.1° 95% CI 11.28;70.92; p=0.008) and clinically important as it was double the mean CID of 20°. Strickland score means were 80.1% (categorised as a good result) for the swing traction group and 57.6% (categorised as fair) for the no-traction group (mean difference=22.5% 95% CI 6.56;38.48; p=0.007). There were no differences in DASH scores, pain or satisfaction. Complications (swan-neck deformity, cold sensitivity, malunion, infection, or adhesions) occurred in over half of both groups. During the treatment phase, the swing traction group attended hand therapy an average of 13.3 times, and the no-traction group attended 11.7 times. Average costs for swing traction were less than for surgical fixation with no-traction.

As with all non-randomised studies, however, the major disadvantage of our design was the inability to ensure that groups were equal at baseline on variables not measured, and that all treatment variables (other than the presence of swing traction) were strictly controlled. In the no-traction group especially, there was a variety of surgical treatment provided compared to the traction group.

In summary, the cohort study methodology allowed us to complete the study without the complications and expense associated with random allocation to treatment, including difficulties imposing non-preferred treatment on surgeons, therapists and patients.

It was completed on a modest budget, thanks to small grant funding from Victorian Occupational Therapy Trust.

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Re-repair of ruptured primary flexor tendon repairs in Zones I and II of the fingers in children

Saudi Arabia

A paper published in the European Journal of Hand Surgery by Professor M Al-Qattan from the Division of Plastic Surgery, King Saud University in Riyadh, looked at the aetiology, management, and results of acute rupture of primary flexor tendon repairs in Zones I and II of the fingers in children. The study reported on a personal series of 10 children treated over a period of 13 years.

Professor Al-Qattan was prompted to conduct this particular study due to the fact that re-repair of ruptured primary flexor tendon repairs in Zones I and II of the fingers had not been previously investigated in children. Previous reports only focused on adults.

Al-Qattan highlighted the three most important points about his study and its results:

1. The aetiology of tendon rupture is different when compared to adults: children less than 5 years of age usually rupture their primary repairs whilst the hand is completely immobilised in a cast; while teenagers usually rupture their tendons when falling down while playing

2. Direct re-repair is possible without lengthening at the musculo-tendinous junction if the re-repair is done within 3 weeks of the primary repair

3. Do not expect excellent results

"The study revealed that the results were worse than other paediatric series of primary flexor tendon repairs. Since the results are not excellent, the findings of my study raises the question regarding the most appropriate management particularly in those with significant tension across the re-repair since two-stage tendon reconstruction in children is known to yield excellent or good results in the majority of cases," he added.

In terms of future research on this topic, Al-Qattan and his team are working on a prospective multi-center study comparing the results of re-repair versus two-stage tendon reconstruction.

> **"Children less than 5 years of age usually rupture their primary repairs whilst the hand is completely immobilised in a cast; while teenagers usually rupture their tendons when falling down while playing"**

JOURNAL REFERENCE

J Hand Surg Eur Vol March 2015
vol. 40 no. 3 271-275
http://jhs.sagepub.com/content/40/3/271.abstract

research roundup

The non-operative management of hand fractures

UK

Professor Grey Giddins from the Royal United Hospital, Bath, UK, recently undertook a review that was published in the European Volume of the Journal of Hand Surgery, with the aim to establish which hand fracture injuries are unlikely to be improved with surgery. The intention was to prevent unnecessary surgery, concentrate work on finding the sub-groups that may benefit from surgery and to establish which injuries do so well with non-operative treatment that the only valuable clinical research in future will be large cohort studies of non-operative treatment or randomised controlled trials comparing operative and non-operative treatments.

The optimal treatment of many fractures, such as proximal interphalangeal joint fracture subluxations or spiral phalangeal fractures, is unclear. Other relevant fractures are spiral metacarpal fractures, transverse metacarpal shaft and neck (boxer's) fractures, base of proximal phalanx avulsion fractures, thumb metacarpophalangeal joint ulnar and radial collateral ligament injuries and bony mallet injuries. For the majority of these injuries, current knowledge suggests that the outcome of non-operative treatment cannot reliably be improved upon with surgery.

"I think that most hand fractures are not operated on by most hand surgeons, but there is a cohort of cases where I would not operate and others would. There will be a range of reasons for this, some better than others. For some surgeons their practice will be different with the patients perhaps being less likely or able to come for follow-up and therefore may be better suited to surgical stabilisation. There may be specific instances of people needing to return to work or sport more quickly, in which case surgery may be of value. There are times when as surgeons we treat the radiographs (x-rays) perhaps more than we treat the patient and we worry about getting perfect 'bone alignment' rather than recovery of function, which can often be achieved non-operatively. I think there is also a particular problem of subset bias. Thus many, if not most of us, are influenced by one or two cases we have seen where one line of treatment has not worked and we have been discouraged by it; that may be because for some injuries which generally do well with a particular treatment, there is be a subset which do not do well. I suspect we have not identified those as we have either not looked carefully or cleverly enough at the cases we have seen.

There will also be cultural aspects with some patients 'demanding' surgery and then there may be greater financial rewards for surgeons who operate. I do not believe it is my role to try to judge what surgeons do. Rather I wanted to identify some of the common injuries we treat where surgery is often recommended in the literature, but a careful review of published work suggests that non-operative treatment gives very reliable results so there is at most only a very limited role for surgery," Professor Giddins explained.

When asked what should all hand surgeons and therapists reading the article understand about this study and its results, Giddins said:

"The first message is the same as given by our predecessors that most closed hand injuries can be treated successfully non-operatively. I want to stress that we need to be clear about the natural history of any injury, i.e. how will it do with appropriate non-operative treatment. Only then can we decide whether it is likely that surgery might help. With these data we will also establish a baseline from which to assess any surgical intervention. If, as shown with some of these injuries, the outcome is typically very good with non-operative treatment, then the chances of surgery reliably improving on that are so small that surgery will rarely be indicated.

That does not mean that in the future new, hopefully better techniques, will not be developed and it may be that these will give even more superior results. Given the good results that are achieved with the non-operative treatment of the majority of these injuries however, this is probably not the best area to research new techniques; rather we should look for subgroups which respond differently to our expectations and at the treatment of those conditions which do less well non-operatively than operatively."

In terms of continued research in this area, Giddins is undertaking a number of studies, including further systematic reviews of the outcome of treatment of common injuries, as well as further studies looking at the natural history of non-operative treatment of various conditions.

"I think there is a rich vein of opportunity in trying to identify subsets of various injuries. Our research in the past has been hampered by mixing up injuries that were not the same. Thus a fracture subluxation of the PIP joint is different to a pilon fracture. It may present in a similar way, the treatment options may be similar, but these are two different injuries and should be assessed separately. By collecting larger series of cases with detailed observations, I think we will start identifying subsets of conditions which do less well (or better). We may identify which subsets of a particular problem need surgical treatment. This could explain much of the variability in practice whereby some surgeons are looking at one end of the telescope, e.g. seeing that the majority of perhaps thumb metacarpo-phalangeal joint ulnar collateral ligament bony avulsions do well non-operatively and so they treat them all non-operatively, accepting occasional poor results. Other surgeons may be looking at the other end of the telescope and have recognised that there are some patients with ulnar collateral ligament bony avulsions who do poorly and therefore they tend to treat all of them surgically to avoid those poor results. Unfortunately in the latter group many patients will have unnecessary surgery. If we could identify the important subsets of any one condition we would hopefully become better at identifying which ones need surgery and which do not," he concluded.

"most closed hand injuries can be treated successfully non-operatively"

JOURNAL REFERENCE

J Hand Surg Eur Vol January 2015
vol. 40 no. 1 33-41
http://jhs.sagepub.com/content/40/1/33.abstract

Pioneer profiles

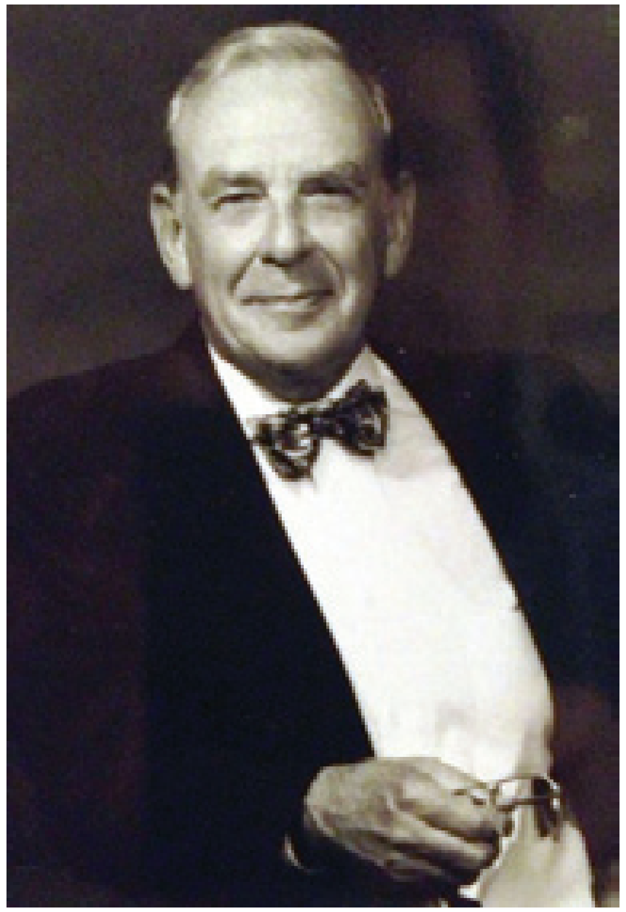
Ridvan Ege, MD

Dr Ridvan Ege received his medical degree and general surgery training at Gülhane Medical School in Ankara, Turkey and was Board certified in 1955. From 1956 to 1959, he trained under Dr David Bosworth in orthopaedic surgery in Boston and received his Board Certification in 1960. In 1961, he established the first Department of Orthopaedic Surgery and Traumatology in Turkey at Gülhane Military Medical School and was appointed Director. He was also Associate Professor at the University of Ankara. Dr Ege later returned to the United States and worked as a Fellow with Dr Green at the Children's Hospital Department of Orthopaedic Surgery in Boston and with Drs Stinchfield and Carroll at the Columbia Presbyterian Hospital in New York City. He was then promoted to Professor and Chairman of the Department of Orthopaedic Surgery and Traumatology of the Ankara University, a position which he held until 1993. He also founded the Ankara University School of Nursing and acted as Director for eight years. Dr Ege received a Fulbright Scholarship (1967-68) and completed his hand surgery training with Dr Carroll in New York, Dr Flatt in Iowa and Dr Boyes in California.

In 1959, there were nine Board Certified Orthopaedists in Turkey and thirty in 1969. Dr Ege established the Turkish Society for Orthopaedic Surgery and Traumatology in 1970 and has served as President for many years. Due to his organised efforts, Turkey has now 1 600 trained orthopaedists and he is considered the 'father of modern orthopaedics' in his country. Dr Ege established the Mediterranean and Middle-Eastern Society of Orthopaedics and Traumatology in 1970 and was President for 12 years during which time he organised seven congresses. He organised the first Hand Injury Symposium in 1970 in Ankara where Drs Carroll, Brooks, Ege, Fahmy, Omer and Swanson were lecturers. That symposium stimulated many colleagues to receive hand surgery training in USA, France, Germany and Italy in addition to 70 trained in Turkey. He established the Turkish Society for Surgery of the Hand in 1977 and has been its President for 18 years.

Dr Ege established the Turkish Journal of Bone and Joint and Hand Surgery and served as its first Editor. He has published upwards of 300 articles and more than 100 books on Traumatology, Spine, Hip and Hand Surgery. He is also a member of 16 International Societies. The Ufuk University Doctor R Ege Hospital is named in honour of his immense contributions. Dr Ege was the organiser of the 8th IFSSH Congress in Istanbul, Turkey, in 2001. In July 1995, at the 6th Congress of the IFSSH (Helsinki , Finland), he was honoured as a Pioneer of Hand Surgery.

James M Hunter, MD



Dr Hunter was born in Merchantville, New Jersey in 1924. His college education was interrupted by service in the US Army during World War II. He first served in the Field Artillery. While caring for the wounded as operating room Staff Sergeant at the 1st General Hospital in Paris, France, he saw medicine as his future career. He returned to Dickinson College and later graduated from Jefferson Medical College in Philadelphia. His interest in hand surgery developed during his orthopaedic residency at Jefferson's under Dr Anthony DePalma. He became Dr Robert Carroll's first Hand Fellow at Columbia-Presbyterian Hospital in New York in 1958. He returned to Jefferson and established a Division of Hand Surgery in Dr De Palma's Orthopaedic Department. During his 25 years as Chief of Hand Surgery, he trained 109 hand surgery fellows.

Dr Hunter introduced his concept of an artificial tendon at the Tendon Symposium organised by Ramsay Straub in New York in 1964. His work was proclaimed a major breakthrough in tendon reconstruction by Leo Mayer and Guy Pulvertaft.

Dr Hunter has been honoured by membership in the Hand Societies of countries throughout the world. His many clinical appointments include consultant in Hand Surgery to the Philadelphia Naval Hospital during the Korean War, to the Valley Forge General Hospital during the Vietnam War and the State Hospital for Crippled Children in Elizabethtown for 25 years.

Dr Hunter's vision of the importance of the surgeon, therapist and patient working as a team to get ideal results was the impetus for the yearly Hand Rehabilitation Symposium held in Philadelphia since the early 70's and attended by more than fifteen thousand therapists and surgeons from around the world. The textbook, "Rehabilitation of the Hand: Surgery and Therapy", has had numerous editions. He has also published numerous articles and lectured at meetings worldwide.

Dr Hunter served as Professor Emeritus of Orthopaedic Surgery, Division of hand Surgery, at the Jefferson Medical College and was named "Distinguished Professor in Orthopaedic Surgery" in 1990. He was active in developing new techniques to manage complications following peripheral nerve and brachial plexus injuries. Dr Hunter's enthusiasm for teaching has won him the respect of his many colleagues, fellows, residents and students.

On 29 January 2013, James M Hunter passed away at the age of 88 years. He was bestowed the title of Pioneer of Hand Surgery by the IFSSH at the 6th Congress of the Federation at Helsinki in July 1995.

journal highlights

Journal Highlights

Below is a selection of contents pages from the latest issues of the following leading hand surgery journals. Hover your mouse over each article heading and click to go to the original abstract page of the article.

Journal of Hand Surgery (European Volume)

February 2015 J Hand Surg Eur Vol 40, Issue 2

- Collagenase clostridium histolyticum in patients with Dupuytren's contracture: results from POINT X, an open-label study of clinical and patient-reported outcomes
- Early outcomes of a sequential series of 144 patients with Dupuytren's contracture treated by collagenase injection using an increased dose, multi-cord technique
- Safety and tolerability of collagenase Clostridium histolyticum and fasciectomy for Dupuytren's contracture
- What patients want from the treatment of Dupuytren's disease — is the Unité Rhumatologique des Affections de la Main (URAM) scale relevant?
- A review of the classification of Dupuytren's disease
- Dynamism in Dupuytren's contractures
- Genetic and environmental influences in Dupuytren's disease: A study of 30,330 Danish twin pairs
- Commentary on Larson et al. Genetic and environmental influences in Dupuytren's disease: A study of 30,330 Danish twin pairs
- Single versus repetitive injection of lignocaine in the management of carpal tunnel syndrome – a randomized controlled trial
- Commentary on Akarsu et al. Single versus repetitive injection of lignocaine in the management of carpal tunnel syndrome – a randomized controlled trial
- Outcome of carpal tunnel release – Correlation with wrist and wrist–palm anthropomorphic measurements
- Supraretinacular endoscopic carpal tunnel release: surgical technique with prospective case series
- Commentary on Ecker et al. Supraretinacular endoscopic carpal tunnel release: surgical technique with prospective case series
- The Korean version of the Carpal Tunnel Questionnaire. Cross cultural adaptation, reliability, validity and responsiveness
- Stuck on me – Dupuytren's disease of the finger presenting as complete synechium of the finger to the palm
- The value of different inflammatory markers in distinguishing deep closed hand infections from non-infective causes
- Surgical rehabilitation for correction of severe flexion contracture of the proximal interphalangeal joint by modified Ilizarov method
- Anatomic course of the medial antebrachial cutaneous nerve: a cadaveric study with proposed clinical application in failed cubital tunnel release
- Multiple subungual glomus tumours associated with neurofibromatosis type 1
- Finger tourniquets: a review of National Patient Safety Agency recommendations, available devices and current practice
- Avoiding extensor tendon rupture after the use of palmar locking plates for distal radial fractures
- Objective results of median nerve decompression and tenosynovectomy for carpal tunnel syndrome in patients with mucopolysaccharidoses Types I and II
- Intraoperative migration of a foreign body within the tendon sheath of the flexor pollicis longus
- Involvement of hand surgeons in research on the genetics and pathogenesis of congenital upper limb anomalies

Hand **Volume 9 – Issue 4, December 2014**

- An open-label comparison of local anesthesia with or without sedation for minor hand surgery
- Distal humeral hemiarthroplasty: indications, results, and complications. A systematic review
- A quantitative study of vibration injury to peripheral nerves—introducing a new longitudinal section analysis
- Non-surgical treatment of lateral epicondylitis: a systematic review of randomized controlled trials
- Postapproval clinical experience in the treatment of Dupuytren's contracture with collagenase clostridium histolyticum (CCH): the first 1,000 days
- The incidence of postoperative flare reaction and tissue complications in Dupuytren's disease using tension-free immobilization
- Median nerve compression at the fibrous arch of the flexor digitorum superficialis: an anatomic study of the pronator syndrome
- Surgical management of the wrist in children with cerebral palsy and traumatic brain injury
- Long-term follow-up of first metacarpal extension osteotomy for early CMC arthritis
- Anomalous first thoracic rib as a cause of thoracic outlet syndrome with upper trunk symptoms: a case report
- Radiographic interpretation of distal radius fractures: visual estimations versus digital measuring techniques
- Evidence for safe tourniquet use in 500 consecutive upper extremity procedures
- The Meniscus Arrow® as a fixation device for the treatment of mallet fractures: results of 50 cases
- Differences in response rates between mail, e-mail, and telephone follow-up in hand surgery research
- Intraoperative evaluation of dorsal screw prominence after polyaxial volar plate fixation of distal radius fractures utilizing the Hoya view: a cadaveric study
- Volar locking plate fixation of distal radius fractures: use of an intra-operative 'carpal shoot through' view to identify dorsal compartment and distal radioulnar joint screw penetration
- Curvatures of the DIP joints of the hand
- Treatment preferences for trigger digit by members of the American Association for Hand Surgery
- The treatment of extensor lag of the middle finger following crushing–penetrating injuries of the metacarpophalangeal joint: case series
- Integra® dermal regenerative template application on exposed tendon
- Upper Extremity Orthoses Use in Amyotrophic Lateral Sclerosis/Motor Neuron Disease: Three Case Reports
- Anomalous muscles within the first dorsal extensor compartment of the wrist
- Carpal tunnel syndrome secondary to an accessory flexor digitorum superficialis muscle belly: case report and review of the literature

Journal of Wrist Surgery **Issue 03 Volume 04 · November 2014**

- Carpal Tunnel Syndrome Pathophysiology: Role of Subsynovial Connective Tissue
- Biomechanical Role of the Transverse Carpal Ligament in Carpal Tunnel Compliance
- The Transverse Carpal Ligament: Anatomy and Clinical Implications
- Carpal Tunnel Release: Do We Understand the Biomechanical Consequences?
- Routine Imaging after Operatively Repaired Distal Radius and Scaphoid Fractures: A Survey of Hand Surgeons
- The Utility of the Fluoroscopic Skyline View During Volar Locking Plate Fixation of Distal Radius Fractures
- Proximal Migration of Hardware in Patients Undergoing Midcarpal Fusion with Headless Compression Screws
- Intraneural Ganglion in Superficial Radial Nerve Mimics de Quervain Tenosynovitis
- Ligamentous Radiocarpal Fracture-Dislocation Treated with Wrist-Spanning Plate and Volar Ligament Repair
- Avascular Necrosis of the Hamate: Three Cases and Review of the Literature

journal highlights

Hand Surgery: Asia Pacific

Volume 20, Number 1

- Triangular Fibrocartilage Complex Tears
- A2 Pulley Integrity And The Strength Of Flexor Tendon Repair: A Biomechanical Study In A Chicken Model
- Influence Of Different Length Of Core Suture Purchase Among Suture Row On The Strength Of 6-Strand Tendon Repairs
- Cross-Cultural Adaptation, Validation, And Reliability Of The Michigan Hand Outcomes Questionnaire Among Persian Population
- The Greek Version Of The Hand20 Questionnaire: Crosscultural Translation, Reliability And Construct Validity
- Neuropathic Pain In Brachial Plexus Injury
- Impact Of Phrenic Nerve Paralysis On The Surgical Outcome Of Intercostal Nerve Transfer
- The Tricipital Aponeurosis — A Reliable Soft Tissue Landmark For Humeral Plating
- Clinical Radiographic Features Of The Wrist Without Osteoarthritis And Its Relations To Age And Sex In Japanese
- Radial Nerve Lacerations — The Outcome Of End-To-End Repairs In Penetrating Trauma
- Biphasic Motion Of The Median Nerve In The Normal Asian Population
- Patient Related Functional Outcome After Total Wrist Arthroplasty: A Single Center Study Of 206 Cases
- Hand And Wrist Injuries In Professional County Cricket
- Delineation Of Extensor Tendon Of The Hand By Mri: Usefulness Of "Soap-Bubble" Mip Processing Technique
- Surgical Outcomes Of Fifth Metacarpal Neck Fractures — A Comparative Analysis Of Dorsal Plating Versus Tension Band Wiring
- Factors Affecting The Functional Results Of Open Reduction And Internal Fixation For Fracture-Dislocations Of The Proximal Interphalangeal Joint
- Hemi-Hamate Arthroplasty Versus Transarticular Kirschner Wire Fixation For Unstable Dorsal Fracture-Dislocation Of The Proximal Interphalangeal Joint In The Hand
- Amniotic Constriction Bands: A Case Series And Proposed New Classification System
- A Retrospective Review Of Troubled Replantations
- Postoperative Voluminal Flap Reduction After Fingertip Reconstruction Using The Reverse Digital Artery Island Flap
- A Case Report Of Acute Cubital Tunnel Syndrome Caused By Venous Thrombosis
- Complete Closed Brachioradialis Tendon Rupture: A Case Report
- Closed Traumatic Rupture Of The Flexor Pollicis Longus Tendon In Zone T I: A Case Report
- Closed Traumatic Rupture Of The Flexor Pollicis Longus Tendon In Zone T I: A Case Report
- Irreducible Volar Subluxation Of The Proximal Interphalangeal Joint Due To Radial Collateral Ligament Interposition: Case Report And Review Of Literature
- A Rare Case Of Multiple Subungual Glomus Tumours In A Neurofibromatosis Type 1 Patient
- Surgical Correction Of Ulnar Deviation Deformity Of The Wrist In Patients With Birth Brachial Plexus Palsy Sequelae
- The Use Of Bmp-2 And Screw Exchange In The Treatment Of Scaphoid Fracture Non-Union
- New Technique "Graft Reposition On Flap" In Allen Type Iv Amputation: A Report Of Six Cases
- Total Proximal Interphalangeal Joint Arthroplasty For Osteoarthritis Versus Rheumatoid Arthritis — A Systematic Review
- Current Management Of Hand Enchondroma: A Review

Journal of Hand Surgery: American volume

Volume 40, Issue 2, (February 2015)

- Force Variations in the Distal Radius and Ulna: Effect of Ulnar Variance and Forearm Motion
- Load Transfer at the Distal Ulna Following Simulated Distal Radius Fracture Malalignment
- Long-Term Functional Outcomes After Bilateral Total Wrist Arthrodesis
- Biomechanical Evaluation of 4-Strand Flexor Tendon Repair Techniques, Including a Combined Kessler–Tsuge Approach
- Longitudinal Split Tear of the Extensor Pollicis Brevis Tendon: Report of 2 Cases
- Anatomy of the Flexor Digitorum Profundus Insertion
- Computed Tomography Arthrography Using a Radial Plane View for the Detection of Triangular Fibrocartilage Complex Foveal Tears
- Functionality After Arthroscopic Debridement of Central Triangular Fibrocartilage Tears With Central Perforations
- Temperature in and Around the Scapholunate Ligament During Radiofrequency Shrinkage: A Cadaver Study
- Functional Outcomes of Replantation Following Radiocarpal Amputation
- Incipient Malunion of an Isolated Humeral Trochlea Fracture Treated With an Elbow Hemiarthroplasty: Case Report
- The Effect of Using a Cement Gun With a Narrow Nozzle on Cement Penetration for Total Elbow Arthroplasty: A Cadaveric Study
- The Effect of Prosthetic Radial Head Geometry on the Distribution and Magnitude of Radiocapitellar Joint Contact Pressures
- In Vivo Kinematics of the Trapeziometacarpal Joint During Thumb Extension-Flexion and Abduction-Adduction
- Dual Mini TightRope Suspensionplasty for Thumb Basilar Joint Arthritis: A Case Series
- The Effect of Humerus Diaphyseal Shortening on Brachial Plexus Tension: A Cadaver Study
- A Systematic Review of Outcomes Reporting for Brachial Plexus Reconstruction
- Short-Term Electrical Stimulation to Promote Nerve Repair and Functional Recovery in a Rat Model
- Transfer of the Radial Nerve Branch to the Extensor Carpi Radialis Brevis to the Anterior Interosseous Nerve to Reconstruct Thumb and Finger Flexion
- Biomechanical Characteristics of Hemi-Hamate Reconstruction Versus Volar Plate Arthroplasty in the Treatment of Dorsal Fracture Dislocations of the Proximal Interphalangeal Joint
- A Modular Surface Gliding Implant (CapFlex-PIP) for Proximal Interphalangeal Joint Osteoarthritis: A Prospective Case Series
- The Effect of an Educational Program on Opioid Prescription Patterns in Hand Surgery: A Quality Improvement Program
- Dorsal Distraction Plating for Highly Comminuted Distal Radius Fractures
- Pullout Wire Fixation Together With Distal Interphalangeal Joint Kirschner Wire Stabilization for Acute Combined Tendon and Bone (Double Level) Mallet Finger Injury
- Nuts and Bolts: Dimensions of Commonly Utilized Screws in Upper Extremity Surgery

Upcoming events

International Dissection Course On Peripheral Nerve Surgery & Tendon Transfers

8-10 June 2015
Alicante, Spain
http://www.studioprogress.it/en/convegni/6th-international-dissection-course-reconstructive-microsurgery

This course is aimed at Plastic Surgeons, Neurosurgeons, Orthopaedic Surgeons and Hand Surgeons who want to improve their technical skills in peripheral nerve surgery and palliative tendon transfers on the upper and lower limb. The course consists in discussion time on clinical anatomy, dissection techniques and lectures delivered by experts in the field, followed by practical sessions with cadaver dissection performed directly by the participants.

Hand and Wrist Biomechanics International (HWBI) Symposium

16-17 June 2015
Milan, Italy
www.hwbi.org/2015.html

In conjunction with 20th Congress of Federation of European Societies for Surgery of the Hand (FESSH 2015) and the 2nd International Thumb Osteoarthritis Workshop (ITOW 2015), the Symposium Chairs are Marc Garcia-Elias, MD, Insitut Kaplan, Spain and Frederick W. Werner, MME, SUNY Upstate Medical University, USA.

The main topics are wrist, carpal tunnel, thumb, finger mechanics, DRUJ, distal radius, ligaments, tendons and biomaterials.

XX FESSH Congress

17-20 June 2015
Milan, Italy
fessh2015.org

In 2015, Federation of European Societies for Surgery of the Hand (FESSH) is organising the Annual FESSH Congress in the beautiful city of Milan in Italy. The congress will explore all aspects of hand surgery and its impacts. Surgical technology development, biomechanical tools, ethical, legal, social and financial topics, individualised medical aspects, diagnostic and therapeutic issues, advanced technologies, and many other related topics will be presented and discussed by professionals in their fields. We encourage delegates to use this congress as a meeting place to assemble their clinical and academic

interest-groups. FESSH 2015 will be an intellectually broad and exciting event at which ideas and researchers from Europe and around the world interact.

XV South American Congress on Hand Surgery

6-8 August 2015
Chile
www.schot.cl

IX International Symposium On Spinal Cord Injuries

3-5 December 2015
Brescia, Italy
www.midollospinale.com

Symposium Main Topics and Events include:

- Honorary Lecture by Nobel Laureate A. Yonath
- Basic and applied research in experimental Spinal Cord repair and regeneration
- Experimental studies and clinical use of stem cells and neurotrophic factors
- Robotics and Telemedicine
- Young Neuroscientist supported by Dompè Investigator Award
- The 4th "Brunelli Club Meeting" dedicated to the most advanced surgical and neuro- rehabilitation techniques in the treatment of the flaccid and spastic palsies of upper limbs, including case reports.

World Congress of Brachial Plexus and Peripheral Nerve Surgery

New Delhi, India
4-7 February 2016
www.wcns2016.com

The ISPNS is a 100 member strong young Indian Society of Brachial Plexus and Peripheral Nerve Surgeons, which is committed to the spread of education regarding the brachial plexus and peripheral nerves to young surgeons from the country and abroad.

The event will be the 5th Annual meeting of Indian Society of Peripheral Nerve Surgery (ISPNS) and will feature a one-day Pre-conference cadaveric Hands-On workshop on 4th February 2016, at Cadaveric Training and Research Facility, All India Institute of Medical Sciences, New Delhi; followed by 3 day long CME (5-7th February 2016) by expert faculty from all around the globe. The meeting is expected to be attended by numerous delegates from across the country, and abroad, including neurosurgeons, hand surgeons, orthopaedic surgeons and plastic surgeons. A number of national and international faculty are expected to attend this event.

Australian Hand Surgery Society & American Society for Surgery of the Hand 2016 Combined Meeting

ASSH

Wednesday 30 March - Saturday 02 April 2016

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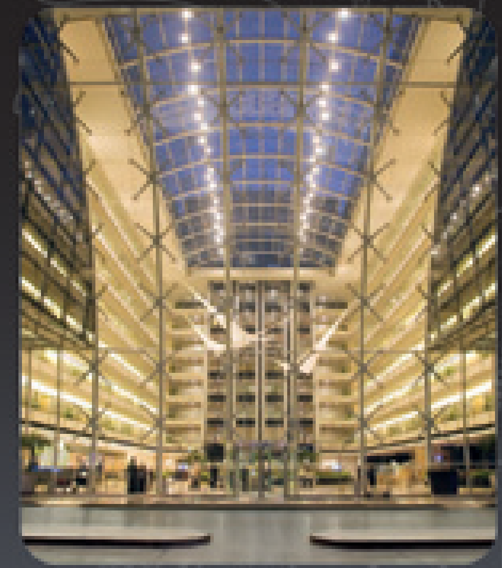

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