Paper Reference	Last Name	First Name	Speakers Paper Title	Speakers Theme Description	Session Description
TFP01	Schreuders	Ton	The Use of Mirror Therapy in Patients with Complex Regional Pain Syndrome - Type II After Peripheral Nerve Injury	Therapy - Complex Regional Pain Syndrome	Complex Regional Pain Syndrome
TFP02	Zyluk	Andrzej	Complex Regional Pain Syndrome Type 1 after Fractures of the Distal Radius: an Analysis of the Predisposing Factors	Therapy - Complex Regional Pain Syndrome	Complex Regional Pain Syndrome
TFP03	Ewald	Sarah	A Brief History of CRPS	Therapy - Complex Regional Pain Syndrome	Complex Regional Pain Syndrome
TFP04	Caragianis	Suzanne	Orthosphere CMC Joint Arthroplasty Versus FCR Tendon Interposition Arthroplasty: A Prospective Clinical Study	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP05	Berthe	Alain	Evaluation of Present Carpometacarpal Joint Assessment Techniques. A Proposal for a Standardized Evaluation Form	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP06	Van Veldhoven	Griet	MP Thumb Stabilisationsplint for (Hand) Therapists.	Therapy - Splinting The PIP Joint	Arthritis and Joint Replacements
TFP07	Artzberger	Sandra	Scleroderma Case Study Demonstrating Impact On Outcomes Of Combining Manual Edema Mobilization With Traditional Hand Therapy Treatment	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP08	Formsma	Sippie Annemarie	Innovative Splint Therapy in Early Rheumatoid Arthritis: An Exploratory Study	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP09	Saunders	Rebecca	The Effect on Wrist Flexion Strength of Thumb Carpometacarpal Joint Arthroplasty Using the Entire Flexor Carpi Radialis Tendon	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP10	Walsh	Wilma	Outcomes Following PIP Joint Pyrocarbon Joint Replacement Utilising a Short Arc Range of Motion Treatment Protocol	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP11	Wijk	Ulrika	Rehabilitation, Occupational Performance And Hand Function After Ascension® PIP Prosthesis	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP12	Schreuders	Ton	Learning From Experience In Hand Therapy With Pyrocarbon Surface Replacement Implants For The MCP And PIP Finger Joints	Therapy - Arthritis And Joint Replacement	Arthritis and Joint Replacements
TFP13	Atkinson	Jo-An	A Randomized, Controlled Trial to Determine the Efficacy of Paper Tape in Preventing Hypertrophic Scar Formation in Surgical Incisions that Traverse Langer's Skin Tension Lines	Therapy - Scar Management	Scar Management & Paediatrics
TFP14	Leong	Annette	The Effectiveness of Hand Therapy Interventions for Scar Management: A Systematic Review	Therapy - Scar Management	Scar Management & Paediatrics
TFP15	Aarons	Jane	Iontophoretic Delivery of Dexamethasone in Treatment of Volar Hand Scars	Therapy - Scar Management	Scar Management & Paediatrics
TFP16	Formsma	Sippie Annemarie	Postoperative Hand Treatment in Children with Recessive Dystrophic Epidermolysis Bullosa.	Therapy - Scar Management	Scar Management & Paediatrics
TFP17	DOMINIQUE	THOMAS	Burn and Frostbite Injuries in Mongolia, A Report	Therapy - Scar Management	Scar Management & Paediatrics
TFP18	Overton	Rosemary	Dupuytren's Disease - Do We Really Know What We Are Doing? - Process and Surgical and Post-Operative Management	Therapy - Outcome Measurements	Scar Management & Paediatrics
TFP20	Eissens	Melanie	Guided Active Therapy After Tendon Transfers in Children with Cerebral Palsy	Therapy - Therapy For Tendon Repairs	Scar Management & Paediatrics
TFP21	Aarts	Pauline	Development And Reliability Of A Video-Observational Tool To Measure Duration And Frequency Of Spontaneous Use Of The Impaired Arm And Hand In Children With Cerebral Palsy(CP) That Suffer From An Asymmetric Impairment In Upper Limbs Function.	Therapy - Outcome Measurements	Scar Management & Paediatrics
TFP22	Ewald	Sarah	Treatment of Paediatric Stenosing Tenosynovitis	Therapy - Therapy For Tendon Repairs	Scar Management & Paediatrics

TFP23	Duncan	Josie	Camptodactyly: Investigation of Outcomes of Splinting for Children of Non-Traumatic PIP Joint Contracture	Therapy - Splinting The PIP Joint	Scar Management & Paediatrics
TFP24	Clift	Zoe	Non-surgical Management of Midcarpal Instability - A Single Case Study Describing the Use of a Specific Graded Exercise Programme	Therapy - Wrist Instability	Wrist Instabilities
TFP25	Taylor	Alison	ECU Subluxation in the Professional Golfer	Therapy - Wrist Instability	Wrist Instabilities
TFP26	Harwood	Christina	Dynamic Splinting To Improve Forearm Rotation	Therapy - Wrist Instability	Wrist Instabilities
TFP28	Bialocerkowski	Andrea	Functional Ability of Individuals Following Limited Wrist Fusion	Therapy - Wrist Instability	Wrist Instabilities
TFP29	Oskay	Deran	Long Term Results of Poperative Early Rehabilitation Program in Kienböck's Disease	Therapy - Wrist Instability	Wrist Instabilities
TFP30	Fairplay	Tracy	Neuromuscular And Proprioceptive Rehabilitation Of The Hand And Wrist After TFCC Triangular Fibrocartilage Complex Reconstruction	Therapy - Wrist Instability	Wrist Instabilities
TFP31	Suzuki	Tomoto	Muscle strength of the hand in college baseball players	Therapy - Outcome Measurements	Elbow & Sports Injuries
TFP33	Kitamura	Takashi	Joint Destruction Patterns in the Rheumatoid Elbow: A Radiographic Assessment of 386 Elbows	Therapy - Elbow Disorders	Elbow & Sports Injuries
TFP34	Coon	Beth	The Effect of Asymmetric Positioning in Student Violinists Result in Focal Upper Quadrant Pain and Weakness	Therapy - Occupational & Musicians Injuries	Occupational And Musicians Injuries
TFP35	Akel	Semin	Are Musicians Aware of Their Capacities?	Therapy - Occupational & Musicians Injuries	Occupational And Musicians Injuries
TFP36	Akel	Semin	Case Report: Submuscular transposition of ulnar nerve in a string player	Therapy - Occupational & Musicians Injuries	Occupational And Musicians Injuries
TFP37	McMahon	Margaret	An Investigation of the Prevalence of Thumb Problems in Australian Physiotherapists	Therapy - Occupational & Musicians Injuries	Occupational And Musicians Injuries
TFP38	Teo	Sing Hwee	Evaluating The Effectiveness Of Neoprene Soft Splinting As An Alternative To Conventional Thermoplastic Splinting In Clients With DeQuervain's Tenosynovitis.	Therapy - Splinting The PIP Joint	Occupational And Musicians Injuries
TFP39	Gabel	Philip	Injury Screening Measurement and Monitoring (ISMAM) - Clinical Validation in an Upper Limb patient population	Therapy - Outcome Measurements	Occupational And Musicians Injuries
TFP40	Rose	Robyn-Lee	Work Related Upper Limb Disorder (WRULD): Pain and Functional Capacity Assessment Before and After Treatment in Keyboard and Mouse Users Who Remain at Work	Therapy - Occupational & Musicians Injuries	Occupational And Musicians Injuries
TFP42	Chinchalkar	Shrikant	The Contribution of the Ulnar Digits to Grip Strength	Therapy - Outcome Measurements	Outcomes
TFP43	Rath	Santosh	Development of an Ulnar Nerve Paralysis Specific Quality of Life Questionnaire	Therapy - Outcome Measurements	Outcomes
TFP44	Fitinghoff	Hélène	Evaluation of Body Function, Activity and Participation and Their Correlation After a Hand Injury: A Longitudinal Study	Therapy - Outcome Measurements	Outcomes
TFP45	Dubert	Thierry	Sifting Through the Results. A Proposal for a New Concept of Outcome Measurement.	Therapy - Outcome Measurements	Outcomes
TFP46	Gabel	Philip	What is the Most Accurate Outcome Tool for Hand Surgery and Therapy	Therapy - Outcome Measurements	Outcomes
TFP47	Oksuz	Cigdem	Turkish Version of the Disability of the Arm, Shoulder and Hand (Dash) Questionnaire. Test-Retest Reliability and Validity	Therapy - Outcome Measurements	Outcomes
TFP48	Niklasson	Johan	Self Rated Activity Limitation in Patients with Carpal Tunnel Syndrome. A Comparison Between Three Measures.	Therapy - Outcome Measurements	Outcomes
TFP49	Myers	Emilie	A Model of Care for the Management of Tetraplegic Hand Patients	Therapy - Nerve Injuries	Outcomes
TFP50	Chu	Angela	The Use of the Canadian Occupational Performance Measure (COPM) as an Outcome Measure in Upper Limb Tendon Transfer Surgery in Tetraplegia	Therapy - Outcome Measurements	Outcomes

TFP50A	Cunningham	Ben	Hand Therapy-led Screening Clinic: Reprioritising Elective Surgery Waiting Lists	Therapy - Outcome Measurements	Outcomes
TFP51	Coppieters	Michel	Toward Better Nerve Gliding Exercises for Carpal Tunnel Syndrome. Longitudinal Excursion and Strain in the Median Nerve During Different Types of Exercises.	Therapy - Nerve Injuries	Nerve Injuries
TFP52	Schwartz	Deborah	Contrast Baths: New Thinking About an Old Modality A Study of the Effects of Contrast Baths in Pre and Post Operative Carpal Tunnel Patients	Therapy - Outcome Measurements	Nerve Injuries
TFP53	Breger Stanton	Donna	Contrast Baths: What is the Evidence? Why do we use them?	Therapy - Outcome Measurements	Nerve Injuries
TFP54	Jerosch-Herold	Christina	A Study of the Intra-Tester Reliability and Discriminant Validity of a Standardised Locognosia Test	Therapy - Nerve Injuries	Nerve Injuries
TFP55	Vipond	Nicole	Post-operative Splinting for Digital Nerve Injuries in the Hand	Therapy - Nerve Injuries	Nerve Injuries
TFP56	Klingvall	Ulrika	The Use of Sensory Glove System on Patients with Nerve Repairs One Year Ago or More - A Pilot Study of Three Patients.	Therapy - Nerve Injuries	Nerve Injuries
TFP57	MacDermid	Joy	Measurement Of Cold Intolerance In Nerve Pathology: Reliability And Relation To Symptoms	Therapy - Nerve Injuries	Nerve Injuries
TFP58	Carlsson	Ingela	Cold Sensitivity after Traumatic Hand-Injury, Vibration Induced Problems and in a Normal Population.	Therapy - Nerve Injuries	Nerve Injuries
TFP59	Videler	Annemieke Josette	Determinants of Impaired Manual Dexterity in Charcot-Marie-Tooth Disease 1A.	Therapy - Nerve Injuries	Nerve Injuries
TFP60	Li	Zong-Ming	Carpal Tunnel Expansion by Stretching the Transverse Carpal Ligament	Therapy - Nerve Injuries	Nerve Injuries
TFP62	Anderson	Hamish	Comparison of Functional Outcomes After Single Finger Microsurgical Replantation Versus Amputation	Therapy - Major Trauma	Major Trauma
TFP64	Leicht	Pernille	Functional Importance of Cosmetic Prostheses for Upper-limb Amputees	Therapy - Major Trauma	Major Trauma
TFP65	Neumann	Ann-Kristin	Hand Function and Life Satisfaction After Replantation in the Wrist-The Patient Perspective	Therapy - Outcome Measurements	Major Trauma
TFP66	Geach	Amy	Presence of Depression, Anxiety and Stress in Patients following Hand Trauma: The Influence of Injury Severity and Patient's Living Location	Therapy - Major Trauma	Major Trauma
TFP67	Roesler	Michelle Louise	Recovery from Traumatic Hand Injury	Therapy - Major Trauma	Major Trauma
TFP67A	Tay Siew Ling	Celine	Rehabilitation After Transfer of Fascicles from the Ulnar Nerve to the Nerve to the Biceps (Oberlin's Procedure) in the Treatment of Patients with C5-C6 Brachial Plexus Injury	Therapy - Nerve Injuries	Major Trauma
TFP68	Saravanan	Balaji	Functional Out-Come of Major Upper Limb Replantation	Therapy - Major Trauma	Major Trauma
TFP69	Bexon	Carole	Valuing Occupation and Purposeful Activity in Hand Therapy	Therapy - Major Trauma	Major Trauma
TFP70	Boettcher	Craig	Shoulder Muscle Activity During Maximal Isometric Contractions.	Therapy - Shoulder Pathology	Shoulder
TFP71	Trevithick	Beverley	Shoulder Muscle Recruitment Patterns During A Kayak Stroke Performed on Paddling Ergometer. An EMG Study.	Therapy - Shoulder Pathology	Shoulder
TFP72	Whiteley	Rod	Humeral Torsion- an Ultrasound Assisted Clinical Measure and Implications for Physiotherapy Management of Throwing Athletes	Therapy - Shoulder Pathology	Shoulder
TFP73	Kubo	Sachi	A New Rehabilitation Protocol for the Massive Rotator Cuff Repair - The use of a Sling with 30 Degrees Abduction Pillow and Very Early Exercises	Therapy - Shoulder Pathology	Shoulder
TFP74	Gabel	Philip	The Upper Limb Functional Index (ULFI) - Validation with Improved Psychometric and Practical Characteristics using a 3 point Likert Scale	Therapy - Shoulder Pathology	Shoulder
TFP75	Walmsley	Sarah	Establishing Consensus on Diagnostic Criteria of Stage One Idiopathic Adhesive Capsulitis Using the Delphi Technique: A Pilot Study	Therapy - Shoulder Pathology	Shoulder
TFP76	Hunt	Judith	Should the Index Finger be Protected From Use Following FPL Repair in the Presence of Lindburg-Comstock Syndrome?	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery

TFP77	Thomas	Catherine	Patient Compliance to Home Exercise Protocols and Spontaneous Movements after a Flexor Tendon Repair	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP78	Layeghi	Fereydoun	Assesment of Time of 'Surgery' and Rehabilitation' on Outcomes of Flexor Tendon Repairs in Zone2	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP79	O'Brien	Lisa	Custom-Made vs Off-The-Shelf Splinting for Mallet Finger Injuries - Which Is Best?	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP80	Hall	Barbara	A Multi-Centre Randomised Clinical Trial Comparing Two Post Operative Treatment Techniques After Extensor Tendon Repair In Zones 3-4.	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP81	Hall	Barbara	A Multi-Centre Randomised Clinical Trial Comparing Three Post Operative Treatment Techniques After Extensor Tendon Repair In Zones 5-8.	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP82	Mee	Sarah	An Early Active Mobilisation Programme Following Repair of Extensor Pollicis Longus Tendons in Zone III - VIII: A Retrospective Study	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP83	Rath	Santosh	Is Immobilization Necessary Following Tendon Transfers? A Trial of immediate Active Mobilization For Common Tendon Transfers to The Hand	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP84	Higgins	Amanda	Teaching the Patient about Tendon Repair/Reconstruction Begins During Surgery	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP84A	Saravanan	Balaji	Extensor Carpi Radialis Longus (ECRL) Tendon Transfer for Restoration of Finger Flexion in Patients with Flexor Muscle Loss after Direct Trauma	Therapy - Therapy For Tendon Repairs	Therapy Following Tendon Surgery
TFP86	Yeo	Jenni	Innovative Service Delivery for Hand Therapy	Therapy - Outcome Measurements	Free Papers
TFP87	Schwartz	Deborah	Continuous Passive Motion (CPM) Following Tenolysis in Hand Therapy Patients: A Retrospective Study	Therapy - Therapy For Tendon Repairs	Free Papers
TFP88	Morrin	Judith	Extensor Overpull - Its Significance Following Acute Hand Trauma	Therapy - Splinting The PIP Joint	Free Papers
TFP89	Glasgow	Celeste	Predictors of Outcome with Mobilizing Splinting Post Hand Trauma	Therapy - Splinting The PIP Joint	Free Papers
TFP90	OCTAVIAN DAVID	OLARIU	The Use of Plaster of Paris a Neverending Story in Hand Therapy	Therapy - Major Trauma	Free Papers
TFP92	Li	Zong-Ming	Thumb Joint Coordination during Opposition	Therapy - Outcome Measurements	Free Papers
TFP93	Sandford	Fiona	Implications of the Interphalangeal Thumb Tilt for Fusion and Joint Replacement	Therapy - Arthritis And Joint Replacement	Free Papers
TFP94	Li	Zong-Ming	A Cadaveric Study of Thumb Kinematics Produced by Extrinsic Muscles	Therapy - Occupational & Musicians Injuries	Free Papers
TFP95	Feehan	Lynne	Early Controlled Passive Motion Influences Mineralized Tissue Distribution in a 28-day Closed Fracture Callus: A pQCT Study in Rabbits.	Therapy - Outcome Measurements	Free Papers
TFP96	Oskay	Deran	Restoration of Function on Bilateral Absence of Extensor Pollicis Longus and Brevis: A Case Report	Therapy - Wrist Instability	Free Papers
TFP97	Thomson	Suzanne	Upper Limb Functioning Following Extended Latissimus Dorsi Flap	Therapy - Outcome Measurements	Free Papers

TFP01

The use of mirror therapy in patients with complex regional pain syndrome - Type II after peripheral nerve injury

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Over the last years, the use of mirror therapy has been reported in a number of studies. Some of these studies have focused on the use of mirror therapy in patients with pain-syndromes, such as phantom limb pain after amputation and complex regional pain syndrome (CRPS) type I. Other studies have focused on the use of mirror therapy for motor training after stroke.

CRPS-type II is often the result of a neuroma and is generally associated with the scarring and altered sensation of the injured nerve, at the end of which a bulbous swelling may form. Because of the severe pain that is sometimes associated with a neuroma, patients may be significantly disabled. In a review, Vernadakis (Clin Plast Surg. 2003) concluded that although approximately 150-200 techniques have been proposed for the treatment and prevention, neuroma related causalgia is still very difficult to treat.

In this study, we describe the successful use of mirror therapy in two patients with CRPS-type II after traumatic nerve injuries. To our knowledge, this study is the first to report on the successful use of mirror therapy in patients with CRPS-type II in the hand after peripheral nerve injury. In one patient a strong reduction in pain was found during mirror therapy as well as immediately after mirror therapy. In a second patient with severe pain due to CRPS-type II that had been present for several years without substantial positive effects of surgical and rehabilitation interventions, we found that repeated mirror therapy decreased the pain to such a level that the patients considered herself free of pain.

TFP02

Complex regional pain syndrome type 1 after fractures of the distal radius: An analysis of the predisposing factors

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Objective: Complex Regional Pain Syndrome Type 1 (CRPS Type 1, formerly

RSD, algodystrophy) is considered a serious complication in patients with fractures of the distal radius. Little is known about the factors which predispose to CRPS Type 1. The objective of this study was to investigate the role of selected factors: severity of the fracture, age and gender of the patients, as well as their psychological profile and level of depression on the development of CRPS Type 1.

Patients and methods: Fifty patients (32 women, 18 men, mean age of 56 years) with displaced fractures of the distal radius were operated on by closed reduction and percutaneous fixation with K-wires. A battery of standardized psychological tests (EPQ-R, Adjective Checklist, Beck Depression Inventory, Deriatric Depression Scale) was employed a day after the operation to assess psychological pattern and symptoms of depression. Severity of the fracture was scored according to AO classification. All the patients were reassessed at 2 months for symptoms and signs of CRPS Type 1, and the diagnosis of this condition was made on clinical grounds.

Results: Nine patients (18%), 8 women and 1 man, were diagnosed as having CRPS Type 1. There were no significant differences in scores on any of personality and depression scales between CRPS Type 1 and non-CRPS Type 1 patients. There were no significant differences in occurrence of more and less severe fractures according to AO classification between CRPS Type 1 and non-CRPS Type 1 patients. A statistically significant correlation between female gender and older age of the patients and development of the CRPS Type 1 was noted.

Conclusion: Of 5 analyzed factors, two: female gender and older age of the patients had significant influence on the development of CRPS Type 1 after fractures of the distal radius.

TFP03

A brief history of CRPS

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In 1864 Silas Weir Mitchell identified CRPS as complication of war injuries; he called it "erythromelalgia". He and other surgeons of the time noted it was from partial rather than complete nerve injuries and that it could affect surrounding joints. He renamed it Causalgia in 1867. Today this is known as CRPS Type II. In 1900, just five years after the discovery of the X-ray, Dr. Paul Sudeck, in Germany, published a paper describing demineralization of bone in two cases with minor or no apparent injuries to the wrist but with significant pain and swelling. As these two cases did not have demonstrated nerve damage, no link was made to causalgia. This became known in the German speaking world as Sudecks' Atrophy, today this is known as CRPS Type I. In 1940 Homans, J differentiated between the two types of CRPS and identified them as Major Causalgia, with concurrent nerve damage and Minor Causalgia no peripheral nerve damage.

By 1944 Causalgia and Sudeck's Atrophy were firmly linked as associated phenomenon in the medical world. Sterling Bunnell, in "Surgery of the Hand" (1944) devoted two pages to these perplexing cases. Livingston, WK (1943) contributed to the knowledge base about CRPS when he described the pathogenic phenomenon of the "Vicious Circle" as the mechanism for development of causalgia secondary to disuse and inactivity.

In 1947 Evans, JA, coined the term, reflex sympathetic dystrophy and Steinbrocker, D (1947), coined the term shoulder hand syndrome, both terms that would be widely used until, 1994 when the International Association for the Study of Pain would rename and reclassify it as Complex Regional Pain Syndrome I and II in an attempt to bring clarity to the diagnosis and separate it from the sympathetic nervous system.

TFP04

Orthosphere CMC joint arthroplasty versus FCR tendon interposition arthroplasty: A prospective clinical study

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Osteoarthritis is the leading cause of pain and disability in the elderly. 5% of women and 7% of men over the age of 30 have grades 2, 3 or 4 osteoarthritis of the CMC joint of the thumb (March and Bagga, 2004). A prospective clinical study was designed to compare the outcomes of the established soft tissue Interposition Arthroplasty using FCR, with the bioceramic Orthosphere CMC Joint Arthroplasty.

Method: Outcomes were obtained from a convenience sample of seven FCR Tendon interposition arthroplasty patients, and seventeen Orthosphere CMC joint arthroplasty patients over eighteen months. All patients had Stage 2 or 3 OA of the first CMC joint.

Patients were assessed using the Michigan Hand Questionnaire, AROM, Grip and Pinch strength, and the Visual Analogue Scale. Assessments were performed pre surgery, three, six, twelve and eighteen months post surgery. RTW dates were recorded. Both groups were similar in all outcomes at baseline.

Results: Both groups showed significant reduction in pain at eighteen months, however the orthosphere group showed an earlier recovery. At eighteen months, the orthosphere group showed a 29% improvement in grip strength, compared to an 8% improvement in the suspension arthroplasty group. At the same stage, the orthosphere group had a 38% improvement in lateral pinch strength, compared to a 1% decrease in the soft tissue interposition group. The Orthosphere group averaged 8.6 weeks return to work, and the suspension arthroplasty group averaged 11.7 weeks. Michigan scores were improved in both groups, with the orthosphere group outscoring the suspension arthroplasty group in reported ADL capacity and satisfaction, and vice versa for function and ability to work.

Conclusion: Overall, early results are positive in the outcome measures identified above for both the FCR Tendon Interposition Arthroplasty, and the Orthosphere CMC Joint Arthroplasty surgical techniques for thumb CMC OA.

TFP05

Evaluation of present carpometacarpal joint assessment techniques. A proposal for a standardized evaluation form

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Outcomes and results of carpometacarpal (CMC) joint surgical procedures presented by various authors are often documented by personal and evidence based evaluation techniques.

Far from refuting these results, a consensus on evaluation should be found. It should suit all therapists and enable a reproducible and faithfull assessment.

The rationale for the proposed evaluation form is based on:

- objective goniometric measures of CMC range of motion following anatomical rather than theoritical planes.
- subjective assessment : a specific questionnaire for this pathology. An adapted DASH and patient satisfaction

A standardized evaluation form is proposed.

TFP06

MP Thumb stabilisation splint for (Hand) therapists

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Painful hyperextension of the MP joint of the thumb is a well known problem for both PT's and OT's during their clinical work. This hyperextension in "healthy" therapists is mostly due to laxity of the volar plate.

Splints are advised for those where surgical intervention is not indicated. The big disadvantage of the existing splints is that they are covering a big part of the tactile area of the thumb and hand, thus interfering with the manual contact between therapist and patient. The splint hinders the therapist during there clinical work. Most splints are made in low temperature plastic and cord board band. They are difficult to wash thorough between each patient contact, thus reducing hygiene.

We will present a MP I stabilisation splint specially designed for therapists. The splint is made in Sterling Silver, has a small contact area on the palmar side of the thumb and doesn't interfere with the tactile contact between therapist and patient. There are no fixationstraps, the splint can stay in place when washing the hands.

The splint is individually made and looks like a jewel which becomes a part of the hand.

Most patients don't even notice that the therapist is wearing a splint.

TFP07

Scleroderma case study demonstrating the outcomes of the utilization of manual edema mobilization and traditional therapy on the upper extremities and face

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Purpose: did Manual Edema Mobilization (MEM) have an effect on the softening of UE and face tissue to increase ROM and function on a 45 year old female diagnosed 10/03 with diffuse cutaneous Scleroderma, hand therapy begun 3/04 Design: a three year case study utilizing traditional hand therapy treatment methods for Scleroderma [1] with the addition of MEM. Except for the final 6 months, patient was receiving prescribed medications.

Rationale: Scleroderma is a disease that causes fibrosis of tissue and organs. MEM stimulates the lymphatic system to uptake from the interstitium plasma proteins that research [2] has shown can lead to fibrosis.

Outcomes: initially bilateral forearm and hand tissue was hypo and hyper pigmented, leathery, streaked with scar lines, non pinch-able. After 27 months of self management guided by 9 therapy visits per year following initial 17 treatments; tissue could be lifted one inch from forearm, muscles palpated, pigmentation normalizing, scars faded. All dorsal tissue of hand/digits mobile, only dorsal distal phalange tissue couldn't be pinched. Total active ROM increased 15% for the left hand and 36 % for the right hand. As tissue softened, ROM and function increased. After two months of no medication, daily MEM self management program to face tissue was begun. Six weeks later patient was able to open mouth wide enough to fully bite into an apple, breathe 50% of the time from her nose, cheek tissue visibly lightened and was mobile. At time of writing abstract, MEM has been discontinued during 2 month stem cell study. Follow-up will be presented.

Conclusion: more in depth research into the use of MEM for the scleroderma population is needed.

[1]Melvin, J. 2002 *Rehabilitation of the Hand and Upper Extremity* Vol. 5
[2]Casley-Smith, RJ, Gaffney RM. *J Pathol,* 1981.

TFP08

Innovative splint therapy in early rheumatoid arthritis: An exploratory study

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Introduction: One of the problems in the rheumatic hand is the so-called 'intrinsic plus phenomenon'. Pain, (peri) tendinitis, destruction or stretching of the soft tissues around the joints leads to domination of the intrinsic muscles over the extrinsic muscles. Over time, the central and terminal slip and the lateral bands of the extensor-hood shorten because of the limited use of range of motion of the pip and dip joints. As a result, the patient only bends the fingers in the mcp joints, while the pip and dip joints are straight.

Objective: Evaluation of the effect of a newly developed splint combined with exercises, aimed at regaining strength, manipulative skills and a normal pattern of movement of the hand in patients with rheumatoid arthritis (RA) and the intrinsic plus phenomenon.

Methods: All patients were measured three times: before start of the therapy, after finishing the therapy and at three months follow up. Outcome measures were grip strength (Jamar dynamometer and pinch meter), range of motion (goniometer) and dexterity (sequential occupational dexterity assessment (SODA), experienced functioning in daily life (Michigan Hand Outcome Questionnaire (MHQ), and Disability of Arm Shoulder and Hand questionnaire (DASH)).

Results: The hands treated improved significantly on both total SODA score as well as on the pain score of the SODA. This means that the dexterity improved over time. No significant changes were found on the other outcome measures.

Conclusion: This study indicates that early intervention on the function of the hands in patients with RA who present an intrinsic plus phenomenon improve significantly on dexterity measured by the SODA.

TFP09

The effect on wrist flexion strength of thumb carpometacarpal joint arthroplasty using the entire flexor carpi radialis tendon

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Introduction: Thumb carpometacarpal (CMC) joint arthroplasty with ligament reconstruction is a well established procedure for painful arthrosis of the thumb carpometacarpal joint. Many surgeons utilize the entire flexor carpi radialis (FCR) tendon for ligament reconstruction, while some prefer preserving part of the tendon's normal insertion onto the second metacarpal base.

Purpose: The study was undertaken to determine if harvesting the full FCR tendon effects postoperative wrist flexion strength.

Methods: A prospective study of 17 patients was performed. The patients underwent thumb CMC arthroplasty with ligament reconstruction using the entire FCR tendon. All patients underwent isometric testing of wrist strength and motion preoperatively and at three and six months postoperative utilizing the Dexter Hand Therapy System automated testing device for strength testing. Testing and range of motion measurements were performed by one certified hand therapist.

Results: The data was analyzed using paired t tests. There was no statistically significant difference in the wrist flexion strength between preoperative and final postoperative values (6 months). Average wrist flexion strength, measured in inch-pounds, was 36.7 preoperatively and 37.8 at six months postoperative ($p=0.71$). There was also no significant difference in final wrist flexion range of motion. Average wrist flexion preoperatively was 78.9° and at 6 months was 77.0° ($p=0.51$).

Conclusion: Utilizing the entire FCR tendon for thumb CMC arthroplasty with ligament reconstruction does not adversely effect eventual wrist flexion strength or the range of wrist flexion.

TFP10

Outcomes following PIP joint pyrocarbon joint replacement utilising a short arc range of motion treatment protocol

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There is a limited body of evidence to guide clinical practice in relation to the management of proximal interphalangeal joint (PIPJ) pyrocarbon joint replacements. This study investigates the outcomes of pyrocarbon PIP joint implant utilizing a short arc early active mobilisation regime (SAROM).

A prospective analysis was undertaken on 20 individuals treated consecutively at a Brisbane private practice following surgery. Patients were evaluated at six and twelve weeks utilising standardized outcome measures and any complications noted. Descriptive statistical analysis of the data will be completed with comparison to existing published research.

Numerous prosthetic implants have been designed for the replacement of the PIP joint. Recent evidence suggests the use of pyrocarbon joint replacements may be indicated for younger, active patients with post-traumatic injuries and OA. However, there are a limited number of high-level studies investigating the post-operative rehabilitation of this technique (Schulz et al., 2005; Stutz et al., 2005). The use of SAROM is well recognized for the management of extensor tendon injuries however has not been investigated in depth in relation to arthroplasties.

Preliminary results suggest there is evidence to justify the application of this technique in the rehabilitation of pyrocarbon PIP joint replacements.

TFP11

Rehabilitation, occupational performance and hand function after ascension® PIP prosthesis

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PIP-arthroplasty has previously been used in osteoarthritis with varying results regarding ROM and without consistency over time. We use a new prosthetic concept with a detailed rehabilitation program and report the results after a minimum of 1 year.

Methods: In total 35 patients have been operated with the Ascension® pyrocarbon PIP-prosthesis since the start in 2001. In 2003 we developed a structured rehabilitation program to permit early controlled motion and added an evaluation protocol of the occupational performance and hand function. At present 15 patients (19 joints) have been included.5 days postoperatively the mobilization starts in a hand based, one finger-isolated dynamic splint, with a hyperextension stop over the PIP-joint (15 degrees), which is used until the 6th week after surgery. During the nights a circular finger splint with extended PIP-joints is used for 3-6 months. Assessments were made preoperatively, at 3 months and 1 year postoperatively. Occupational performance and satisfaction were assessed with COPM and DASH. Hand function was assessed for ROM, grip strength (Jamar) and pain (VAS).

Results: The identified occupational performance problems were distributed in self-care, productivity and leisure. One year after surgery, COPM had improved from 4 (SD 2) to 9 (SD 0.5) for mean performance and from 3 (SD 1) to 9 (SD 0.5) for satisfaction. Also the DASH-scores improved from 42 (SD 20) preoperatively to 28 (SD 16) after one year. The average ROM in the PIP-joint increased from 46 (SD 22) to 62 (SD 25). Nearly all patients were pain free at rest and had moderate pain in activity. The grip strength increased and remained stable over time.

Conclusion: After PIP arthroplasty early motion can be initiated in a standardized rehabilitation program. The patients are satisfied, with improved occupational performance and good ROM.

TFP12

Learning from experience in hand therapy with pyrocarbon surface replacement implants for the MCP and PIP finger joints

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Outcomes of pyrocarbon surface replacement implants for the MCP (n=8) and PIP (n=11, including 1 revision procedure) finger joints on several aspects of hand function and activities of daily life were retrospectively studied in sixteen patients (age mean 54 yrs, range 24-77 yrs).

Methods: Patients were assessed at a minimum of 12 months after surgery for mobility, pain, grip strength, ADL and function. The Michigan Outcome Questionnaire (MOQ) was used to evaluate subjective opinion about the function and pain. Finally, patient satisfaction with the outcome of surgery was evaluated with a specific questionnaire.

Results: Mobility; Mean AROM, for the PIP joints was 37° (range 0°-80°, SD 34°). Four patients had developed swannecks at the PIP joint. For the MCP joint the mean AROM was 28° (range 0°-75°, SD 22.7°). Pain; Not all patients had good pain relief (four patients scored 5 on a scale of 0 to 5 of the MOQ). Function; 12 were satisfied with the movement of the new joints. Four patients felt that surgery had not improved their hand function in ADL. The majority (13/16) would undergo the same procedure again, whilst eight patients had nonetheless expected more improvement of function after surgery.

Conclusion: Some patients gained an excellent mobility, yet on average the AROM was less than expected. Evaluating the long-term effects provided us with important information concerning treatment protocols (i.e. swanneck prevention) and helped to improve patient education and patient selection.

TFP13

A randomized, controlled trial to determine the efficacy of paper tape in preventing hypertrophic scar formation in surgical incisions that traverse langer's skin tension lines

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Introduction: How a scar is managed postoperatively influences its cosmetic outcome (Reiffel, 1995). After sutures are removed, scars are susceptible to skin tension forces acting on them, which may be the trigger for hypertrophic scarring (Langer, 1978; Sommerlad & Creasey, 1978). The use of paper tape to support the scar may reduce multi-directional forces and prevent hypertrophic scarring.

Method: Seventy patients who had undergone cesarean section at the Royal Brisbane & Women's Hospital were randomized to treatment and control groups. Patients in the control group received no post-operative intervention. Patients in the treatment group applied paper tape to their scars for 12 weeks. Scars were assessed at 6 weeks, 12 weeks and 6 months post-surgery using ultrasound to measure intra-dermal scar volume. Scars were also assessed using the International Clinical Recommendations (2002).

Results: Paper tape significantly decreased scar volume by a mean of 0.16 cm 3, (95% CI: 0.004, 0.29 cm 3). At 12 weeks post-surgery 41% of the control group developed hypertrophic scars compared to 0% in the treatment group (Exact test, p = .003). In the treatment group, one patient developed a hypertrophic scar and four developed stretched scars only after the tape was removed. The odds of developing a hypertrophic scar were 13.6 times greater in the control than the treatment group.

Conclusion: The development of hypertrophic and stretched scars in the treatment group only after the tape was removed suggests that tension acting on a scar is the trigger for hypertrophic scarring. Paper tape is likely to be an effective modality for the prevention of hypertrophic scarring through its ability to eliminate scar tension.

TFP14

The effectiveness of hand therapy interventions for scar management: A systematic review

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Scar formation is a normal physiological process that occurs during wound healing, after accidental or surgical disruption of tissue. Resulting hypertrophic scars and contractures occur when there is an over accumulation of collagen, from an imbalance between collagen synthesis and lyses. The therapist role in scar remodeling is vital in influencing scar cosmesis, soft tissue and joint mobility, and function of the upper limb. Combinations of scar management techniques, including compression, range of motion exercises, massage, splinting, use of silicon products and therapeutic heat, are widely used. With the need to select approaches that are efficient and effective, as well as justifying the intervention approaches to clients, funding bodies, and other stakeholders, clinicians need a more credible evidence base to support their treatment approaches. Systematic analysis of the available evidence relating to scar management interventions is therefore indicated. The objective of this presentation is to report the results of a systematic review that focuses on the effectiveness of therapeutic interventions in the management of upper limb scars. A search for articles up to and including June 2006 was completed using seven electronic databases. A hand search was conducted for the Journal of Hand Therapy and the British Journal of Hand Therapy, as well as reference lists for all retrieved articles. Grey literature was explored through relevant research registers. Articles were selected based on predetermined inclusion criteria for further analysis by two independent reviewers, following the Cochrane critical appraisal guidelines and Sackett's Level of Evidence. The results of this systematic review will be presented, recommendations will be made and implications for clinical practice will be highlighted. Whilst the literature suggests that there are many options for the management of upper limb scars, the documented evidence pertaining to this topic is limited, indicating a clear need for further well designed research.

TFP15

Iontophoresis with dexamethasone in volar hands scars

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Palmar scars after hand surgery are frequently indurated, tender and at times limit finger movement. We have found iontophoresis with Dexamethasone a useful adjunctive therapy in addressing these issues.

We present a series of 52 patients with scars involving volar finger or palmar skin after hand surgery. All patients had firm, inflexible scars resistant to manual pressure and/or contracture. Thirty-two patients underwent six treatments over 2 weeks with iontophoretic delivery of Dexamethasone (6mg in 1.5ml) at 40mA-Min per treatment. All other treatments in the form of electro or thermal modalities were discontinued. Twenty patients, acting as controls, continued to receive other forms of conventional scar management.

The scars were assessed pre-treatment, after the third and sixth treatments and two weeks post treatment. The scars were assessed using the Vancouver scale for vascularity (0 = normal to 3 = purple), pliability (0 = normal to 5 = contracture), pain, itch, range of movement and tenderness. Scars were classified as early (<3 months post operatively) or late (>3months post operatively).

Pre treatment mean pliability score was 3.17 which reduced to 2.19 by 2 weeks and continued to improve even once treatment had ceased, reducing to 1.5 by 4 weeks. Vascularity improved rapidly initially from a mean score of 1.63 to 0.79 at 2 weeks and 0.76 by 4 weeks. Scar tenderness also rapidly improved in the treatment group. In the control groups, especially with vascularity, little improvement was noted in the first 2 weeks but by four weeks, they had improved as well.

Late scars, which had not shown any improvement for many months, improved their pliability and vascularity by over 45% within the month.

Conclusion: This study showed that Iontophoretic treatment of scars despite their age will more rapidly mature a scar and therefore minimize the unpleasant consequences of hypertrophic scar.

TFP16

Postoperative hand treatment in children with recessive dystrophic epidermolysis bullosa .

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Introduction: Recessive dystrophic epidermolysis bullosa (RDEB) is a rare hereditary blistering skin condition, which leads to severe hand deformities; adduction contracture of the thumb, obliteration of the first web space, flexion contracture of the fingers in the interphalangeal and metacarpophalangeal joints and loss of interdigital spaces (pseudosyndactyly). The aim of surgical intervention is to temporarily increase hand function and delay the recurrence of deformation.

Postoperative treatment: The aim of postoperative treatment is to maintain optimal range of motion of the wrist, fingers and thumb and to delay recurrence of deformity in order to enlarge the possibilities of hand function. It is very important for the child to regain trust in using the hands for securing normal development. In literature, there are mainly two postoperative treatment programs described; a program with static splinting and a program with dynamic splinting. Both splinting programs include exercises.

Treatment protocol: Based upon literature and empirical evidence a postoperative treatment program for this group was developed which includes dynamic splinting, followed by static splinting in combination with exercises.

Considerations: Surgery and the postoperative treatment of the hand are time-consuming and constrained and have a great impact on the live of both the children and their parents or caregivers. The decision if and when surgery should take place should take into account the possibilities of the child and his or her environment. Besides hand problems, the child with RDEB is at risk of a great deal of other physical problems.

TFP17

Burn and frostbite injuries in Mongolia, A report

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This presentation is not a scientific paper; rather it is a "medical tourism" report on the current frostbites and burns injuries medical/surgical health care management in Mongolia and of the endeavors to upgrade it to international standards by a team composed of plastic/hand surgeons and therapists supported by the non governmental organisation " Doctors of the world".

Mongolia is known for its nomadic way of life, for Genghis khan who was named the man of the millennium and who in the 1200's created the biggest land empire ever to exist.

Under the last 70 years Mongolia was under Sovietic rule. Mongolia is independent since 1992. Mongolia ranks among the world' poorest countries. Due to the way of life in "GER" (tent) and of the climate, burns and frostbite injuries are frequent. Over the last 3 years we went 6 times to Ullaan Baatar Burns Hospital. From our first visit we realized that health care management dated back to the 1950's. We noticed that sequels were common and serious due to: primarily a lack of knowledge of basic principles and secondly to a lack of economic means. Patient were left in an antalgic "comfort" position in narrow beds, in overcrowded bedrooms. Priority was given to skin healing. No active or passive range of motion was performed. Splinting was unknown. Mongol "Rehabitation nurses" have an excellent formation in osteopathy, massage, acupuncture but had not been acquainted to rehabitation, active and passive exercise and splinting. We are impressed by the speed at which what we brought has been assimilated and put into practise.

TFP18

Dupuytren's disease – Do we really know what we are doing? - Process and surgical and post-operative management

Rosemary Overton

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This paper will discuss the post surgical management approaches to Dupuytren's Disease and will provide evidence to show that there is inconsistency in: the type or design of splint which is manufactured; mass produced and purchased splints; the type of material used to construct the splint; the period of time for which the splint is worn; the regime under which the splint is worn during that period of time; therapists systems of protocols.

Dupuytren's Disease is a common ailment within our society, yet it seems to receive limited research. Practices seem to be passed between therapists, yet do we know whether we are achieving adequate results with our current practices?

This paper will discuss the efficacy of management of Dupuytren's Disease because;

- There seems to be limited evidence to show which type of splint is effective
- There seems to be a large variety of post-op regimes all of which do not include therapy
- There it is difficult to discriminate between common practice or individual approaches to the therapy management.

I argue that there has been limited time and resources applied to this disease process and the surgical level and the post-operative management. I will describe the correlation between what is available in research and how this is applied to the common practice currently being used in hand therapy.

TFP20

Guided active therapy after tendon transfers in children with cerebral palsy

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Introduction: Rehabilitation after tendon transfer in the upper extremity in children with cerebral palsy is relatively uncharted territory. In the meantime the number of tendon transfers in this patient category is increasing. The aim of this clinical massage is to illustrate the importance of *prolonged guided active therapy* after tendon transfers.

Methods: A postoperative therapy guideline and their fundamentals, based on literature and expert practise, are introduced.

Results: From literature and clinical experience it appeared that the limited cortical representation in children with cerebral palsy (Hadders-Algra 2002) combined with the wound healing process requires a specific approach in postoperative treatment after tendon transfers.

Children with cerebral palsy are known with poor postural control, reflex activity and limited movement possibilities. Tendon transfers make 'new' movements possible which the child has never been able to perform before.

Due to the limited cortical representation the learning process takes a long time and due to spasticity early mobilisation is risky. To make sure the 'new born' movements become unconsciously generalised in daily life, the therapy should aim at guided active functional movements and activities, repeatedly exercised, in a high frequency of therapeutical sessions and for a period of at least six months. This underscores the importance of *prolonged active guided therapy*.

Conclusion: The necessity of *prolonged guided active therapy* after tendon transfers in children with spasticity is based on intrinsic and extrinsic tendon healing, neurological development and motor possibilities. A postoperative treatment guideline is introduced.

TFP21

Development and reliability of a video-observational tool to measure duration and frequency of spontaneous use of the impaired arm and hand in children with Cerebral Palsy (CP) that suffer from an asymmetric impairment in upper limbs function

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Objective: To develop a video-observational tool for children with Cerebral Palsy (CP) to measure frequency and duration of use of the impaired arm and hand during play and daily activities and evaluate the child's typical performance of developmental disuse.

Introduction: Several authors (Fedrizzi et al, 2003; Taub et al, 2004; Crocker et al, 1997) assessed the use of the affected hand by video-taping during bilateral manipulation. Since the applied instruments were not easily available and psychometric properties not properly investigated, their practical use was limited.The VOAA* comprises applications to evaluate treatment outcome at the level of activities, defined according to the International Classification of Functioning, Disability and Health standards.

Method: VOAA was designed in collaboration with occupational (OT) and physical therapists (PT), researchers and a software designer. Aspects of validity and reliability of VOAA-application "use of the impaired arm/hand" (VOAA-UIAH) were evaluated by an expert group of 32 OT's and PT's. They were asked for their opinion about 16 items related to the content of VOAA concerning duration and frequency of use of the impaired arm and hand and the description of several motor performances that could be scored. Reliability of the duration score was tested among four groups of four therapists using the video registrations of eight children (age 4-10).

Results: For all items the Content Validity Index (CVI) was above 0.78. Repeated measurements showed no significant differences in intra-rater reliability or inter-rater reliability for the duration score.

Conclusion: VOAA works well in clinical practice. The VOAA-UIAH is a valid and reliable instrument for duration scores. It is a useful tool for evaluation of interventions such as forced use treatment and hand surgery in children with CP and developmental disuse of their arms and hands. * VOAA = Video Observation Aarts and Aarts

* Video Observation Aarts and Aarts

TFP22

Treatment of paediatric stenosing tenosynovitis

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Trigger finger or thumb is rare among children. Some authors report the incidence among children to be 2% of all congenital anomalies of the upper extremity (Flatt,AE, 1977; Ger, E, Kupcha, P & Ger, D, 1991). The aetiology of stenosing tenosynovitis is unclear, Buchman, MT, Gibson, TW, McCallum, D, Cuda, DD and Ramos, AG (1999) tested tissue samples of the A-1 pulley and the nodule on the flexor pollicis longus from children operated on for trigger thumb and report that there were no inflammatory cells present. The question arises is this really an "itis"? Herdem, M et al. (2003) suggests this should be renamed developmental trigger thumb.

The treatment of these thumbs and fingers is not without controversy. Tan, AH, Lam, KS & Lee, EH (2002) reported a success rate of 66% following conservative treatment of children with trigger thumb. Herdem, M et al. (2003) recommends surgical release for children with stenosing tenosynovitis of the thumb. Mulpruek,P & Prichasuk, S (1998) report that spontaneous recovery occurred in 23% and Dunsmuir, RA & Sherlock, DA (2000) report a spontaneous recovery in 49% of the cases of paediatric trigger thumbs that were seen in their clinics.

One case of a ten month old child with stenosing tenosynovitis of the thumb and index finger that successfully resolved with conservative treatment, consisting primarily of splinting, is presented. At follow up, three years later, the patient remains symptom free.

Sugimoto, Y (1991) identified five types of paediatric trigger digits. Based on these five types, a model for evidence based decision making regarding the treatment of paediatric trigger digits is presented.

TFP23

Camptodactyly: Investigation of outcomes of splinting for children with non-traumatic PIP joint contracture

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Purpose: The purpose of this practice-based research project was to extract retrospective data to examine the effectiveness of splinting to reduce the contracture associated with camptodactyly. Camptodactyly is a non-traumatic flexion deformity of the proximal interphalangeal (PIP) joint of one or more fingers. Treatment of camptodactyly may be by surgery or splinting with surgery indicated for contractures which fail to respond to splinting (Smith & Grobbelaar 1998). However studies have demonstrated some very poor results from surgery. Studies investigating the effectiveness of splinting have shown that splinting can result in varying but generally positive outcomes with recommendations that individuals are treated as early as possible. No data have been presented to support these statements.

Method: This study extracted retrospective data from the medical records of children who presented with camptodactyly to one tertiary care facility between January 1990 and June 2006. Fifty five children with 78 PIP joint contractures were splinted by one experienced paediatric occupational therapist using a thermoplastic, static hand-based splint. Results will be presented related to amount of contracture reduction achieved and the variables that predicted good outcome including age at presentation, severity of contracture and time taken for contracture reduction.

Conclusion: Camptodactyly is not a highly prevalent disorder and the mechanisms that cause the flexion deformity are not well understood. Given the frequent poor outcomes related to surgical intervention, having clearly documented empirical outcomes from splinting intervention is very important. Dissemination of the findings of this study, generated from a tertiary care facility that has a relatively large cohort of children with the condition, will be important to guide the practice of therapists and surgeons who may see very few children with the condition.

TFP24

Non-surgical management of midcarpal instability – A single case study describing the use of a specific graded exercise programme

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Presentation of a single case study of midcarpal instability (secondary to Marfan Syndrome) and the use of a new specific exercise programme to relieve pain, provide full and stable wrist range of movement (ROM), full muscle power and full function without the use of splints or surgical intervention.

Brief Method: Following identification of abnormal movement patterns at the wrist and digits (over use of extensor digitorum communis on wrist extension as one example) the following specific exercise programme was commenced.

1. Isometri c pronation and supination
2. Eccentric supination
3. Loaded pronation and supination

Patient Rated Wrist Evaluation (MacDermid, et al 2003) scores, wrist ROM, and grip strength taken on initial assessment and at discharge 4 months later.

Summary of Data: Initial/discharge PRWE scores = 128/7

Initial/discharge grip strength = 2.5kg/43kg

A short video of initial and discharge movement patterns will also be shown.

Conclusion: This case study presents a new method of treating midcarpal instability without the potentially negative consequences of surgery or long term splinting. Initial ideas for this specific programme were based upon widely reported kinetic control and core stability techniques for the lumbar spine.

TFP25

ECU Subluxation in the professional golfer

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The purpose of this paper is to address wrist instability which has limited a Collegiate level golfer from progressing to the professional level. A splint was designed to limit ECU subluxation and pain. This splint can also be considered innovative for wrist pain due to TFCC or other wrist instabilities.

This is case study about a golfer who had Chronic ECU subluxation which has limited and hindered her effort to enter into the professional golf scene. Since Leading surgeons advised against surgery It has been a challenge to create a splint which would allow her to play golf with minimal pain and optimal functional ability. What has made this case so interesting was that the pt had attempted to prevent this pain by taping around her wrist and taped too aggressively which resulted in constriction. She developed Wartenburg's Syndrome and ultimately damaged her Radial Sensory Nerve. The challenge was to create a splint which would not apply pressure to the radial side of her hand but apply optimum compression to the ulna head of the wrist. This occurred with multiple trials which had resulted in a splint which would reduce pain in pts who experience ulna sided wrist pain either due to wrist fractures, TFCC tears or wrist instability due to carpal instabilities.

This paper will present a description of the anatomy of the ECU and basic wrist instabilities. It will also demonstrate the splint and its fabrication to relieve pain related to wrist instability. After wearing this splint the pt was able to play and was ultimately accepted into the LPGA tour. The splint allows this pt to adjust the tension while putting and tighten during the club impact phase where she gets the most pain.

This splint is a testament to a CHT profession and its innovative background. It was created from listening to the pt and has allowed her to successfully continue her career whereas surgery may have ended it.

TFP26

Dynamic splinting to improve forearm rotation

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The aim of this study was to determine the splint most effective in regaining supination of the forearm.

Some form of dynamic splinting has been used for many years to assist in regaining forearm rotation, the first of which was described by Bunnell in 1944. Since then, many variations of this splint have been developed. While the literature supports the use of dynamic rotation splinting, there is little specific evidence on the advantages of any one splint in particular.

The initial phase of this research involved a survey analyzing splint preferences and use patterns of accredited hand therapists across Australia. I undertook a summary of frequency of use, splint preference, reasons for splint selection and stages of use.

The second phase of research was a clinical trial designed to compare and assess the effectiveness of the three most commonly reported dynamic forearm splints - the colello, the Rolyan pronation/supination kit, and the low profile supination splint. Subjects with deficits in supination trialled these three different splints over the course of their treatment. Each patient completed a splint diary and patient satisfaction form. This study was a balanced cross-over clinical trial. Subjects were allocated to a randomly generated ordering of the treatments to allow for variables in effectiveness, impact on time since surgery, and ensure equal numbers in each group.

The results presented will assist therapists' clinical reasoning and support the financial expenditure and time involved in fabricating these complex splints.

TFP28

Functional ability of individuals following limited wrist fusion

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Introduction: Limited wrist fusions are frequently performed on individuals who report pain and limited function due to chronic wrist instability. Little is know about the functional consequences of this procedure. Thus, we documented the functional ability of individuals one year following limited wrist fusion.

Method: Functional ability was evaluated by the Wrist Outcomes Questionnaire, which assesses an individual's perceived performance on activities that are difficult and important to them 1. It has acceptable validity and reliability in patients with unilateral, musculoskeletal wrist disorders 2. Prior to documenting function in patients following limited wrist fusion, intra-rater reliability of the questionnaire was determined in this population. The questionnaire was administered on two occasions, two weeks apart, to patients who had undergone a limited wrist fusion at least one year previously. Intraclass Correlation Coefficients (ICC) were calculated for both sections of questionnaire. When they were at least > 0.8, the functional ability of the sample was summarized descriptively, based on the results of questionnaire.

Results: 73 individuals were sent the questionnaire of which 25 participated in the study. On average participants completed the questionnaire 4.2 (SD=2.7) years post-operatively. ICCs were high (>0.95). More than half the sample reported difficulties with recreational activities and work. Lifting activities, putting weight through their wrist, opening a door, unscrewing a lid of a jar and turning on a tap with their affected hand, were problematic for almost half the sample. Some individuals continued to avoid performing activities such as sweeping, and 84% of the sample reported using compensatory mechanisms to enable task performance.

Conclusions: Following limited wrist fusion, individuals continue to experience difficulty with a variety of functional tasks, which tend to be strength-related or involve forearm rotation. Most individuals used alternative strategies to compensate for these difficulties.

References: 1. Bialocerkowski et al (2002), 2. Bialocerkowski et al (2002)

TFP29

Long term results of poperative early rehabilitation program in Kienböck's disease

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Kienböck's disease is a disorder, in which different factors results in osteonecrosis of lunatum. The patients are usually complain of pain and stiffness in the wrist (Alexander H 1988, Lichtman DM 1987). The pain is activity related, motion is predictably diminished in the flexion/extension arch and grip strength is commonly decreased according to unaffected side (Bechenbauch RD 1980). One of the surgical treatments of Kienböck's disease is scapholunate fusion and capitate pole excision to reduce loading on lunatum by preventing proximal migration of capitate (Leblebicioglu G 2003). The rehabilitation aims to increase the overall function of the wrist after surgical procedures. The aim of this study is to discuss the post operative early rehabilitation program and its long term effects after scapholunate fusion and capitate pole excision in Kienböck's disease. In the study 7 wrists, 6 female patients with Kienböck's disease between the ages of 28-60, underwent surgical intervention. After the operation they attend to early rehabilitation program included cold application, ultrasound, 2-3-4 ray traction, friction massage on the scar, active and passive stretching and isometric resistive exercises in pain free range three times a week for eight weeks. Follow-up program included occupational tasks including stress loading. In the evaluation, pain with visual analog scale (VAS), functional status with Disability of Arm Shoulder and Hand Turkish Version (DASH-T), grip strength with JAMAR dynamometer, pinch strength with Pinch meter were assessed before surgery, during rehabilitation program, after the first and second year of the surgery. Long term results of early rehabilitation program show that, decrease in pain and DASH scores, increase in grip and pinch levels are significant. In the literature there is no rehabilitation protocol for postoperative treatment of Kienböck's disease. To take the effectiveness and long term results of this program, studies should be done on more patients and follow up should be continue for more years.

TFP30

Neuromuscular and proprioceptive rehabilitation of the hand and wrist after TFCC triangular fibrocartilage complex reconstruction

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Key words: TFCC reconstruction, proprioceptive exercises, scar management, splinting

Introduction: A common cause of wrist pain can be due to a tear or gradual degeneration of the TFCC Triangular Fibrocartilagenous Cartilage Complex. The TFCC main functions are to provides primary stability to the distal radioulnar joint (DRUJ) while holding the radius and ulna bones together and allowing the carpus to rotate with the radius around the ulna, as well as, it permits one third of an applied force to be transmitted from the hand across the wrist to the forearm. When the TFCC is torn or perforated the wrist inevitably becomes unstable and surgical repair is indicated when the patient presents with chronic ulnar sided wrist pain particularly when pronating or supinating the wrist. There are many new techniques that have been published in recent years regarding TFCC reconstruction but few, if any, publications have documented post surgical rehabilitation protocols.

Methods and Materials: This brief paper discusses the appropriate timing and insertion of splinting, scar management, range of motion exercises, progressive resistive exercises and proprioceptive wrist exercises during the post-operative TFCC rehabilitation program in relationship to the ligament's physiological healing time process. Specific neuromuscular potential training exercises and proprioceptive hand and wrist exercises are well described and methodically included in the rehabilitation program, in order to recuperate functional wrist range of motion in association with fine and gross motor prehensile strength without provoking wrist instability due to overstretching of the newly reconstructed ligament. The physical therapy program was followed for 8 weeks after removal of the wrist-elbow splint and all patients were treated by the same surgeon and physical therapist.

Results: Patient satisfaction has been evaluated using the PRWE (Patient Rated Wrist Evaluation) on 20 subjects who have undergone TFCC reconstruction and followed a specific rehabilitation protocol s/p surgery. Results demonstrated significant functional hand grasp strength improvement, a significant decrease in ulnar sided wrist pain with wrist loading and an overall improvement in completing activities of daily living without provoking constant wrist pain.

Conclusion : A rehabilitation protocol that includes not only muscle potential strengthening exercises but also proprioceptive wrist exercises in both weight and non-weight bearing postures are essential for obtaining a stable and functionally efficient wrist after TFCC reconstruction.

TFP31

Muscle strength of the hand in college baseball players

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Purpose: Little is known about the muscle strength of the hand in baseball player. The purpose of this study was to investigate the muscle strength of the hand in college baseball players.

Materials and methods: The subjects were fourteen college baseball players (mean age, 21.4 years). We measured the strength of pinch between thumb and index finger, flexion of each finger, elbow extension, elbow flexion, abductor pollicis brevis muscle, first dorsal interosseous muscle, and abductor digiti minimi muscle. We used MicroFet and pinchmeter for measurement. According to ball speed, the subjects were divided into two groups: group S1, maximum ball speed, $>$ 100km/hr or more; group S2, the speed $<$ 100km/hr. The subjects were also divided into two groups: group D1, maximum throwing distance $>$ 75m or more; group D2, the distance $<$ 75m. We analyzed the differences of the strength between throwing side and the opposite side, and differences in the strength between the two groups. Furthermore, we analyzed the relationship between the throwing performances and the personal data.

Results: First dorsal interosseous muscle was significantly stronger in the throwing side than in the opposite side. Pinch, elbow extension, and elbow flexion were significantly stronger in group S1 than in group S2. Pinch, and elbow flexion were stronger in group D1 than in group D2. In group S1, body height was taller, body weight was heavier, and career of baseball were longer than in group S2 with statistical significances. Body height was significantly taller than in group D1 than in group D2.

Conclusion: These data suggest that pinch strength can correlate to throwing performances.

TFP33

Joint destruction patterns in the rheumatoid elbow: A radiographic assessment of 386 elbows

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We carried out a large-scale radiographic study with the objective of elucidating the joint destruction pattern in rheumatoid elbows. From 2001 through 2003, we examined and took plain X-rays of both elbows of 193 rheumatoid arthritis (RA) patients (i.e., 386 elbows). Radiographic images of the elbow joints were used to classify the degree of bone loss in various zones on the elbow joint surface into four grades of severity, and joint destruction was compared between the left and right elbows. In addition, correlation in the extent of bone loss between each of the zones of the same elbow and differences in the extent of bone loss were analyzed statistically. The results showed direct correlations for destruction of the elbow joint surface among the zones for the left and right elbow joints and in the same elbow joint. However, more severe destruction was observed on the radial side of the humeral trochlea, and it was surmised that destruction of the elbow joint must begin at that site and gradually spread mediolaterally. In addition, in the same elbow joint, the correlation in the degree of bone loss between the trochlea of humerus and the trochlear notch was especially strong, indicating that the bone destruction at both sites represented mirror lesions. If we accept the validity of this pattern of destruction of the elbow joint, then when analyzing X-rays taken in the early stage of RA elbow joint damage, it should be possible to focus on the radial side of the humeral trochlea and determine whether joint destruction had already begun. We conclude that when performing radiographic diagnosis of the joint damage in the rheumatoid elbow, our findings will be useful for assessing whether there is joint destruction in the initial stage and for deciding the therapeutic approach.

TFP34

The effect of asymmetric positioning in student violinists result in focal upper quadrant pain and weakness

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Purpose: The purpose of this study is to show that asymmetric prolonged positioning in student violinists causes pain and weakness in the involved musculoskeletal structures associated with eccentric contracting musculature.

Methods: Seven violin students, age 16-23 years old, were evaluated using a comprehensive hand and upper extremity assessment tool. Each student's history of playing was recorded along with, extracurricular activities, musculoskeletal measurements, and pain assessment. DVD recordings were reviewed to further assess asymmetric positioning.

Results: Average playtime resulted in 2-3 hours per day. Extracurricular activities included bike riding, tennis, yoga, and running. All seven students presented with C7/T1-T5 palpable pain on the right spinous process with an average pain level of 6-7 on a pain scale of 0-10, 0 no pain, 10 severe pain. Upper trapezius and rhomboid muscle weakness were present with 3/5 strength on the right as opposed to 4+/5 on the left. Palpable right upper trapezius muscle pain was 7-8. Dorsal interossei on the left presented with an average of 4/5 as opposed to 5/5 strength on the right. Left volar interossei presented with 3/5 strength as opposed to 5/5 on the right.

Conclusion: Prolonged asymmetric positioning (approximately 2-3 hours of playing) of the bow (right) arm resulted in pain at the origin of the middle trapezius/rhomboid major musculature on the right along with palpable pain at the upper trapezius muscle, during eccentric contraction. Notable weakness and aching was present in the left (non-bow) hand involving the interossei. A strengthening program was not followed by any of the students. Student violinists may present with decreased pain by implementing a strengthening program involving the periscapular and interossei musculature, therefore providing symmetric strength of the upper quadrant prior to the playing the violin.

TFP35

Are musicians aware of their capacity?

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The musicians know that music-making doesn't just happen and that thousands of hours of practicing have gone into their "effortless" performance before they even get on the stage. But until they push themselves to the point of pain or loss of function, the musicians themselves often remain ignorant of the demands that playing makes upon their bodies (Fishbein et al and Fry, 1987) (Foxman,2006). In Turkey this is also a big problem but there are few studies investigating musician's problems.

60 string players who are students at Hacettepe University, State Conservatoire are taken to the study. Working capacity and risk factors affecting musicians are investigated by interview, static and dynamic posture analysis, Job Content Questionnaire, Fry overuse classification, McGill Pain Questionnaire, Fatigue Severity Index, DASH, hand strength measurement, lifting capacity assessment.

% 57 of the students had musculoskeletal problem related with playing. %85 of the students do not have any exercise habit and do not warm up before playing. They do not have a regular resting period. Pain is found to be increased through years. Fatigue is also found to be one of the major problems for these players. Viola players had pain mostly on left upper extremity and violoncello players had pain on both shoulders and left forearm and hand. Psychosocial factors were all related with pain and fatigue.

Musculoskeletal problems are also major risk threading musicians in Turkey. It is determined that musicians are not educated about musculoskeletal problems and they do not know how to prevent themselves. It is planned to organize a lesson at conservatory for preventing injuries. It is also mentioned that a health care professional must take place when selecting the students for conservatory education.

TFP36

A case report: Submuscular transposition of ulnar nerve in a string player

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High risk musculoskeletal activities that musicians are exposed to may result in playing-related musculoskeletal disorders like nerve entrapments (Kennedy et al, 2006). Each musician and instrument has its own special needs and the musician must be seen in the context of the instrument played. Surgery also must seen in this context (Winspur, 2003)

Our case is a 20 year old viola student at Hacettepe University Conservatoire. She came to our department after an operation at another clinic for cubital tunnel syndrome. She had anterior subcutaneous transposition of ulnar nerve 1 year ago. She had a relief for 1,5 months but her symptoms increased by time. After surgery she did not get any treatment and start playing 2 months later with mild pain. After a year she had severe symptoms affecting daily activities and playing. There were not hyposensitivity but had hypersensitivity around the elbow area. She had elbow joint laxity and affinity for cubitis valgus. After 1.5 month rehabilitation period at our department including nerve gliding exercises and preventive education, her symptoms was less in daily living but remained the same while playing. Her DASH score was %25 in daily living and %75 in playing. Her grip strength deficit was % 26. After rehabilitation with the support of EMG and her complaints, she had revision with submuscular transposition of ulnar nerve at Hacettepe University, Orthopaedics and Traumatology Department. Her DASH score is % 9.25 in general and % 12,5 in playing and grip strength deficit is % 11 after 1,5 month rehabilitation.

Our patient experienced more relief of symptoms with submuscular transposition of ulnar nerve. She did not had hypersensitivity and started playing painless. Even if subcutaneous transfer of ulnar nerve is more easy and recovery is fast , submuscular transposition of ulnar nerve can be chosen in musicians especially with hypermobility

(Biggs, 2006).

TFP37

An investigation of the prevalence of thumb problems in Australian physiotherapists

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As previous research indicates that thumb problems may be associated with working as a physiotherapist, a national survey was conducted to investigate the prevalence of thumb problems in Australian physiotherapists and the association between these thumb problems and various potential risk factors. A self-administered questionnaire, purpose designed for this study, was sent by mail to participating physiotherapists. The study sample comprised a randomly selected sample of 1,562 registered Australian physiotherapists, representing approximately 10 per cent of all registered Australian physiotherapists. A return rate of 70.6 per cent and a completion rate of 67.6 per cent was achieved. Of the 961 respondents, the current and lifetime prevalence of thumb problems was 41.0 per cent (394 respondents) and 65.3 per cent (628 respondents) respectively. The factors that most markedly increased the risk of thumb problems were working in the area of orthopaedic outpatients (odds ratio [OR] 3.2); working in the 'hands-on' activities of manual therapy (ORs 2.3 – 3.4), trigger point therapy (OR 2.3) and massage (OR 2.1); the presence of thumb joint hypermobility (ORs 2.2 – 2.6); and an inability to stabilise the joints of the thumb whilst performing physiotherapy techniques (OR 5.0). Of those respondents with thumb problems, one in five had changed their field of physiotherapy practice and 4.0 per cent had left the physiotherapy profession as a result of these problems. In conclusion, the prevalence of thumb problems in Australian physiotherapists appears to be high, related to some work practices and can be of sufficient intensity to impact on physiotherapists' careers. Further research to investigate if modifications to work practices or treatment techniques can prevent or reduce the prevalence of thumb problems in physiotherapists is warranted.

TFP38

Evaluating the effectiveness of neoprene soft splinting as an alternative to conventional thermoplastic splinting in clients with DeQuervain's tenosynovitis.

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Existing non-operative techniques have centred on the use of steroid injections into the first dorsal compartment of the wrist, immobilisation of the wrist and thumb in a splint, and a combination of both methods 3. Traditionally, a forearm-based thumb spica thermoplastic splint is applied to avoid movements that aggravate the condition 3. Other than thermoplastic splints, soft splints have gained popularity in recent years. They are known to interfere less with job performance, has individualised fit and cause minimal pressure areas 2. Previous research on soft versus thermoplastic hard resting splints in rheumatoid arthritis has shown clients prefer and comply with soft splint for pain relief 1. To date there are limited articles to compare the effectiveness of neoprene soft splinting to conventional thermoplastic splinting in clients with deQuervain's tenosynovitis. As such, this study attempts to ascertain this aspect. Altogether 18 subjects (soft splint=9, hard splint=9), age range between 18 to 69 years, pre-dominantly females, consisting of professionals, skilled workers and retirees, participated in the study from July 2004 to March 2006. Functional outcome measures including lateral pinch strength, tripod pinch strength, Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire and O'Connor tweezer dexterity test were administered as baseline and at 6 weeks post-treatment. The generalized estimating equation (GEE) with linear link, Gaussian distribution and unstructured correlation matrix was applied to ascertain the difference in functional outcome measures, analysed with Stata 9.1 at 5% level of significance. There was no significant difference in lateral pinch ($p=0.592$), tripod pinch ($p=0.634$), DASH score ($p=0.455$), DASH work module score ($p=0.881$), DASH sports/performing arts module score ($p=0.115$) and O'Connor tweezer dexterity test ($p=0.302$) for the two treatment groups. Neoprene soft splinting proves to be as effective as conventional thermoplastic splinting in clients with deQuervain's tenosynovitis.

TFP39

A pilot study of biopsychosocial screening for early identification of high risk workers compensation upper limb patients and prediction of their recovery time

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Purpose: To determine if the recently proposed model of Injury Screening with Measurement and Monitoring (ISMAM), that identifies potentially chronic patients, is applicable in an upper limb musculoskeletal work injured population. The ISMAM model uses a psychosocial yellow flag Generic Screening Tool (GST) on a 0-210 point scale to predict a quantifiable outcome on a newly proposed Global Assessment of Body And Limbs (GABAL) composite scale. The GABAL scale expresses status as a percentage of the pre-injury level.

Methods: A pilot validation study was performed with 56 workers-compensation patients with upper limb musculoskeletal disorders, average age 44.8 +/- 10.6 years with 36% female. The GST and GABAL scale were administered at baseline with the GABAL scale readministered at two week intervals till discharge. The primary outcome was the time (days) to achieve 80% of pre-injury status on the GABAL scale. The ability of the baseline GST score to predict those who achieved 80% pre-injury status within 30 days was then analysed.

Results : GST scores ranged from 31 - 161 and days to reach 80% GABAL scale pre-injury status ranged from 0 - 422. The GST score correlated strongly with the 'Log' of 'time to reach 80% of pre-injury status' (r = 0.736). A GST cut-off score of 110 showed the best ability to predict those who achieved 80% pre-injury status at 30 days with a sensitivity of 100%, a specificity of 84.4% and a positive Likelihood Ratio of 6.4. Progression charts were produced with individual clinical pathways of capacity and recovery time.

Conclusions: This model is appropriate to an upper limb workers compensation group and integrates screening for chronicity with global measurement. It demonstrates that the GST, a biopsychosocial screening questionniare, produces early identification of compensable patients with a high risk of chronicity and longer than expected recovery time. Further upper limb clinical research trials will be required to fully validate this ISMAM concept.

TFP40

Work related upper limb disorder (WRULD): Pain and functional capacity assessment before and after treatment in keyboard and mouse users who remainat work

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Background: The 'Typing Capacity Cycle' Test (first typing period + recovery time) for keyboard users was first developed as an assessment tool for predicting and re-evaluating functional work capacity in patients with both acute and chronic work-related pain with respect to the use of the keyboard only (Povlsen et al, 2004).

Objectives: This paper evaluates the results of the 'typing capacity cycle' tests of 11 keyboard and mouse users who remain at work, before and after rehabilitation, to determine it's effectiveness in assessing functional work capacity and to determine if the degree of mouse use has an influence on the treatment outcome.

Method: 11 patients were referred to a specialist hand and upper limb clinic because of the development of non-traumatic upper limb pain in relation to keyboard and mouse use. Each patient was assessed using the 'typing capacity cycle test' to establish the levels of pain related to keyboard use only as the test does not assess the effect the mouse has on pain. The duration of pain prior to treatment, the duration of treatment, type of work and the location of the pain was recorded for each patient. The results of the 'typing capacity cycle' tests were analysed to determine any improvements made following rehabilitation. One patient was excluded from the study due to pregnancy.

Results: On average patients presented with an 8-month history of work related pain prior to referral. 7/11 (63%) of the patients had lower resting pain scores and 8/11 (72%) of patients had less typing pain scores during their 'typing capacity cycle' test following rehabilitation. Each patient increased their relative typing speed, which accounts for rest periods. Averages of 5-11 treatment sessions were required over a period of 4 to 10 months. The least significant improvement in functional capacity occurred in patients that had pain for more than 1 year prior to referral. Degree of mouse use varied amongst all patients and therefore did not have an influence on the treatment outcome.

Conclusion: These results confirm the effectiveness of the 'typing capacity cycle' test as a representation of functional work capacity for keyboard and mouse users.

TFP42

The contribution of the ulnar digits to grip strength

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Purpose: The purpose of this study is to determine the contribution of the ulnar digits to overall grip strength.

Subjects: One hundred hands in 50 individuals (25 males and 25 females) with a mean age of 35.6 years (range, 19 to 62 years) were tested. Exclusion criteria included previous history of hand injuries, entrapment neuropathies and systemic diseases. **Methods:** Ethics approval for this project was granted prior to testing. A calibrated JAMAR dynamometer was used to test subjects in 3 configurations: (1) entire hand, (2) exclusion of small finger (3) exclusion of small and ring fingers using generic hand based finger splints. The order of testing was kept constant and subjects were tested 3 times on each hand for each configuration. The average of the 3 trials at each configuration was recorded. Subjects received approximately 1 minute of rest between each testing configuration. The data was analyzed using the statistical package for social sciences (SPSS).

Results: Average overall grip strength in the dominant hand ranged from 21.6kg – 66.0kg with a mean of 43.2kg. Configuration 2 dominant hand strength was a mean of 28.1kg (range, 11.3 to 46.0kg), a 35% decrease in strength. Configuration 3 dominant hand strength was a mean of 20.1kg (range, 10.0 to 36.7kg) a 53% decrease. Average overall grip strength in the non-dominant hand ranged from 21.3kg to 66.3kg with a mean of 40.5kg. Configuration 2 non-dominant hand strength was a mean of 27.6kg (range, 21.3 to 66.3kg), a 32% decrease in strength. Configuration 3 non-dominant hand strength was a mean of 18.5kg (range, 9.3 to 32.7kg) a 55% decrease in grip strength. A repeated measures ANOVA determined that all of these values were statistically significant ($p<0.01$). The multivariate tests and the paired t-tests also revealed a significant interaction effect between hand dominance and grip configuration 2 with the dominant hand experiencing a 3.1% greater decrease in overall grip strength.

Discussion: The results indicate a significant decrease in grip strength as fingers were excluded. Furthermore, exclusion of the small finger has differing effects on the grip strength of the dominant and non-dominant hands, as the dominant hand had a greater loss of strength with the small finger excluded than the non-dominant hand.

Conclusions: The ulnar 2 digits play a significant role in overall grip strength of the entire hand. In our study, exclusion of the ulnar 2 digits resulted in a range of 34% - 67% decrease in grip strength with a mean decrease of 55%. Based on our results the fifth digit alone is responsible for an average of 33% of overall grip strength and that the fourth digit is responsible for an average of 21% of overall grip strength. It is clear that limitation of one or both of the ulnar digits will adversely affect the strength of the hand.

TFP43

Development of an ulnar nerve paralysis specific quality of life questionnaire

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Purpose: To develop a reliable, valid and responsive quality of life assessment tool specific for patients with ulnar nerve paralysis.

Background: There is widespread recognition of the importance of patient-centred outcome measures. The patient's perspective of the impact of ulnar nerve palsy on quality of life and functional status may not be accurately assessed using general hand or upper limb outcome measures. There is a need for an ulnar nerve specific questionnaire focussing on the particular quality of life and functional problems commonly experienced by patients with ulnar nerve palsy.

Method: This study is the first phase in the process of developing an ulnar nerve specific questionnaire. An initial pilot study was carried out to identify the most common problems experienced by patients with ulnar nerve paralysis. 50 patients were asked to record their five main problems. Four problems with a prevalence of ≥ 50% were identified. A Pubmed search for existing upper limb questionnaires was carried out. The Mitchigan Hand Outcomes Questionnaires (MHQ) was chosen as a comprehensive hand specific outcome measure. An additional battery of open-ended questions that gave the patients an opportunity to describe and rate their problems with activities of daily living, work, hobbies and social activities was developed. The MHQ and this battery of questions will be administered to 100 patients with mobile claw hand. Results will be analysed to identify the most common problems experienced by these patients and a questionnaire addressing these problems will be designed. Phase III will test the reliability, validity and responsiveness of this questionnaire. Ultimately it is hoped that this questionnaire will be a useful and comprehensive tool to assess change over time and the effectiveness of therapeutic or surgical intervention from the individual's perspective.

Results:

Conclusion:

TFP44

Evaluation of body function, activity and participation and their correlation after a hand injury: A longitudinal study

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The aim of the study was to investigate how people with acute hand injury recover and further how measures of body function and body structure, activity and participation evolve over time and how these measures are correlated to each other at baseline, 3- and 12-months follow-up.

Twenty-three patients agreed to participate in the study (7 women and 16 men). The assessments used were: demographic data (Chan & Spencer 1999), Jamar dynamometer, goniometric use, the Disability of Arm, Shoulder and Hand Questionnaire (DASH) and the SF 36 Health Survey. The result show significant improvement at three months follow up concerning the mobility of joint functions and muscle power functions. A further improvement of mobility of joint functions was found at one year follow up. The Physical Health Score (PCS) of SF-36 was significantly improved at three months follow up as well as the overall DASH-score ($p < 0.001$) e.g. a lower degree of disability and symptoms related to the upper extremities. Few further improvements were seen at 12 month follow- up. At baseline the correlation analysis show that the higher degree of motion and strength the lower degree of difficulty in performing daily occupation and less severity of symptoms. At three month there is a high correlation ($r= -.90$) between the overall DASH score and the SF-36 Physical Health score e.g. a higher degree of experienced health the less difficulty in performing daily occupations and further higher pain ratings correlated to higher disability ratings. The conclusions are mainly that improvements are mainly seen up too 3-months follow up. Thirteen daily activities are improved at 3-months; however some recreation activities in which you take some force or impact through your arm, shoulder or hand needed longer time to improve. Correlations were shown between measures of body function, activity and participation.

TFP45

Sifting through the results. A proposal for a new concept of outcome measurement

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We present a new concept in outcome measurement. Each patient is evaluated by considering three groups of criteria. These three groups of values are defined in relation with the identity of the observer: the self-evaluation by the patients, the clinical examination by the physician and the return to work by the community. The originality of this "sifting" concept -initially described by U. Büchler- consists in sorting the global outcomes according to a principle of elimination. The total result is considered as "poor" if only one of the three groups is noted as having a poor result. This sifting principle represents an advance compared to existing evaluation forms, which do not independently consider these three points of view, and which provide a total score by means of arithmetic operations with arbitrary coefficients.

TFP46

What is the most accurate outcome tool for hand surgery and therapy

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Purpose: Surgery and therapy accuracy is dependent on outcome measurement. Six tools were prospectively investigated, the Disabilities Arm Shoulder and Hand (DASH), Quick (Q)-DASH, Q-DASH-10, Upper Extremity Functional Scale (UEFS), Upper Extremity Functional Index (UEFI) and Upper Limb Functional Index (ULFI), to ascertain psychometric properties and practical characteristics in order to recommend a preferred tool. Final comparison was made using the 'Measurement of Outcome Measures' scale.

Methods: Patients (n=229) completed the ULFI (responses: n R=495) to assess construct validity. Two subgroups concurrently completed: a) the Q-DASH and Q-DASH-10 and UEFI and b) the ULFI, DASH and UEFS for criterion validity plus test-retest reliability and responsiveness. Internal consistency, change scores, missing responses and practical characteristics were also assessed.

Results: Each tool demonstrated test-retest reliability (ICC, 2:1> 0.92) but questionnaire item redundancy (Cronbach's Alpha > 0.95) was present in the DASH (0.96) and UEFI (0.98). The psychometric properties of error, responsiveness and impairment range were assessed. Missing responses ranged from ULFI at 0% to the DASH at 34%. Combined patient and therapist scoring time ranged from 45 seconds for the UEFS to 120 seconds for ULFI. Use of the Measurement of Outcome measures methodology demonstrated the ULFI at 96%, Q-DASH-10 and Q-DASH at 88%, UEFI at 84% with the DASH and UEFS at 68%.

Conclusions: The balance of psychometric properties and practical characteristics of the ULFI show it to be the preferred tool. The Quick-DASH-10 was second with less sensitivity on error range. The UEFI and DASH were third with excessive internal consistency and item redundancy. The ULFI advantages are broader constructs from a higher item number with unchanged completion and scoring time; the Q-DASH 10 offers simplicity and speed but sacrifices construct diversity and sensitivity. Advantages are broader constructs offered by the higher item number with minimal increase in completion and scoring time whilst the Q-DASH 10 offers simplicity and speed but sacrifices construct diversity and sensitivity.

TFP47

Turkish version of the disability of the arm, shoulder and hand (DASH) questionnaire. Test-retest reliability and validity

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The objective of our study was to translate the DASH (Disabilities of the Arm Shoulder and Hand) into Turkish and to evaluate its test re-test reliability and validity for Turkish speaking patients with upper extremity complaint. Translation and back translation of the DASH were performed according to the published guidelines. Individuals were given the DASH and other scales (SF-36, Visual Analogue Scale (VAS) and the grip strength of the individuals have been evaluated on their first visit and seven days later. A total of 134 patients with upper extremity complaint have been assessed by DASH questionnaire. A sub-sample of 75 patients was used to assess retest reliability. Translation-back translation revealed no major difficulties. Test-retest reliability of DASH-FS was 0.910 and DASH-W was 0.793. The correlations were moderate in SF-36 Physical Functioning ($r = -0.531$, $p < 0.001$), and SF-36 Bodily Pain ($r = -0.594$, $p < 0.001$). The Turkish version of DASH questionnaire has an excellent test-retest reliability and validity and it is an adequate and useful instrument to measure functional disability in upper extremity complaint Turkish speaking patients.

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TFP48

Self rated activity limitation in patients with carpal tunnel syndrome. A comparison between three measures.

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Introductory: The purpose of this study was to compare correlation between three self rated activity limitation measures. Compared measures were Patient Specific Functional Scale (PSFS), Canadian Occupational Performance Measure (COPM) and Disabilities of the Arm, Shoulder and Hand questionnaire (DASH). PSFS and COPM are individual specific instruments while DASH is a region-specific outcome instrument and they have not been compared to each other before.

Methods: Patient activity limitations were measured on 50 patients that had open surgical carpal tunnel release. PSFS and DASH were measured preoperatively, three months, six months and one year postoperatively. COPM were measured preoperatively and one year postoperatively. Beside this, we compared the specific types of activity limitations that patients identified in the two instruments PSFS and COPM.

Summery of new and unpublished data: PSFS and COPM showed similar results, both in contents and measure rates. In comparison PSFS and COPM showed significantly higher rated activity limitations preoperatively compared to DASH, but postoperatively the three instruments showed almost identical low rated activity limitation.

Conclusion: This study shows that PSFS and COPM are equal to identify activity limitation. These instruments are also more sensitive to identify individual activity limitations than DASH.

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TFP49

A model of care for the management of tetraplegic hand patients

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A"Model of Care" computer database for tetraplegic hands was designed with the purpose of streamlining hand management from admission to discharge from the Prince of Wales Hospital (POWH) Spinal Service. POWH, with Royal North Shore Hospital, form the NSW Statewide Spinal service. In the Model, regular measures of hand and wrist range of motion, oedema, splint position and International Classification are assessed. This occurs weekly while the patient is acute (months 1-3 post injury), and then monthly in rehabilitaion, and as an outpatient (months 3-24).

Historically, the poor survival of tetraplegic patients precluded specific hand treatment (Leclercq, 2003). As tetraplegics have survived longer, care of their hands has become a higher priority (Snoek et al, 2004). At POWH, tetraplegic hands were managed by Occupational and Physiotherapy. With the Rehabilitation and Acute division of POWH combined in 2005, this changed. Hand Therapy now manage the caseload.

Splinting tetraplegic hands is an accepted practice, however there are no validating studies (Curtin, 1994). There are few published records of objective outcomes and splints used in this population (Krajnik et al, 1992). Therapist experience, and the individual patient needs dictate tetraplegic hand management in Australia (Harvey et al, 2001). A survey of the various splints used in this population was undertaken in 1999 (Harvey et al, 2001). An Australia wide, randomised controlled trial on splinting this population has been designed, but has yet to begin (McLean, 2004).

Use of the Model at POWH has regulated review of these patients. It has assisted in creating a rational approach to splinting based on changing objective measures. The database will serve as a useful tool to monitor overall objective change and specific splint intervention. It will also collect normative objective data and outcomes from tetraplegic hand patients in the first 2 years post injury .

TFP50

The use of the Canadian occupational performance measure (COPM) as an outcome measure in upper limb tendon transfer surgery in tetraplegia

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Cervical spinal cord injury (SCI) can result in either complete or partial paralysis of the upper and lower extremities. This can have a devastating effect upon a person's ability to perform everyday activities and participate in the life roles assumed prior to SCI (Bryden, Sinnott & Mulcahey, 2005). People with SCI are living longer in the presence of compromised function and an absence of cure.

Tendon transfer surgery is one method of improving upper limb function following SCI. A review of the literature reports a number of surgical procedures, along with the ensuing periods of immobilisation and the rehabilitation process. Studies in this area commonly follow a biomechanical model, with outcomes focused on physical aspects such as changes in range of motion and pinch/grip strength. But what do degrees, ounces and kilograms mean to a person with SCI in terms of function?

International consensus has yet to be reached about the most effective way of measuring the outcomes of this surgery. The sometimes-subtle changes in motion and strength do not always best reflect how these improvements affect function and impact upon health, well-being and quality of life. The Upper Limb Program (ULP) of the Victorian Spinal Cord Service (VSCS) currently completes approximately 12 - 16 surgeries of this kind per year. This pilot study aims to address the issue of outcome measures in this specific population by use of the Canadian Occupational Performance Measure (COPM) – a self-rated assessment that identifies goals, prioritises them and rates satisfaction. The results of this study are best described with case studies to reflect the individual nature of each scenario, including surgical procedures, goals and outcomes achieved.

TFP50a

Hand therapy-led screening clinics: Reprioritising elective surgery waiting lists

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A major challenge facing acute public tertiary hospital surgical services is how best to manage the increasing numbers of patients waiting for elective surgery. Demand for care at the Alfred Hospital has increased markedly over the past decade and one result has been an increase in the time patients wait for elective surgeries. Government targets have become difficult to meet. In 2004-05, the plastic surgery unit was failing to achieve the required target for up to 40% of category 2 patients. Furthermore, these patients were not reviewed again until admitted for their surgery.

Carpal tunnel syndrome (CTS) and trigger finger are two of the most common hand conditions treated in the plastic surgery unit at the Alfred hospital. In 2005, patients with these diagnoses made up more than 50% of patients on the elective plastic surgery waiting list. It is commonly believed that patients deteriorate while on surgical waiting lists but a review of the literature suggested that with targeted therapy, pain and disability can improve for some patients waiting for elective surgery.

A pilot of a therapy screening clinic for patients listed for Carpal Tunnel and trigger finger release was commenced in 2005-06 through funding from the Department of Human services. Following a review of the medical file and the waiting list, 54 patients were identified as potential candidates for hand therapy intervention. 74% of patients contacted had not trialed hand therapy and requested a review. Of that group 40% had a measured improvement in their symptoms. This paper outlines the success of the pilot program, its implementation into the plastic surgery unit and describes the many different factors that impact a patient on the elective surgery waiting list.

TFP51

Toward better nerve gliding exercises for carpal tunnel syndrome. Longitudinal excursion and strain in the median nerve during different types of exercises.

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Nerve and tendon gliding exercises are recommended in the conservative and postoperative management of carpal tunnel syndrome (CTS). However, traditionally advocated exercises induce nerve gliding by elongation of the nerve bed (the tract formed by the structures that surround the nerve). This elongation may be associated with deleterious strain in the median nerve with the risk of symptom exacerbation and reduced benefits from nerve gliding. This anatomical/biomechanical study aimed to evaluate various types of nerve gliding exercises, including a novel technique which aims to slide the nerve through the carpal tunnel while minimizing nerve strain ('*sliding technique*'). With a 'sliding technique', it is assumed that an increase in nerve strain due to nerve bed elongation at one joint (e.g., wrist extension) is counterbalanced by a simultaneous decrease in length of the nerve bed at an adjacent joint (e.g., elbow flexion). Excursion and strain in the median nerve were measured at the wrist with a digital caliper and miniature strain gauge in six human cadavers during six mobilisation techniques. Nerve gliding associated with wrist movements increased considerably by simultaneously moving neighboring joints: the 'sliding technique' resulted in an excursion of 12.4 mm which was 30% larger than any other technique (≤ 8.9 mm; $p \leq 0.0002$). Strain also differed between techniques ($p \leq 0.00001$), with the lowest values for the 'sliding technique'. This study revealed that different types of nerve gliding exercises have largely different mechanical effects on the median nerve. This may have important implications for the selection of effective and safe exercises in the treatment of CTS. The findings demonstrate that different types of nerve gliding techniques should not be regarded as a homogenous group of exercises. Furthermore, from a physiological point of view, a 'sliding technique' may be more biologically plausible than currently advocated exercises for CTS.

TFP52

Contrast baths: New thinking about an old modality: A study of the effects of contrast baths in pre and post operative carpal tunnel patients

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Purpose: The purpose of this study is to examine the effects of contrast baths on hand volume, grip and pinch strength, functional dexterity, range of motion and pain in pre and post operative carpal tunnel release patients.

Methods: A multi-group pretest- posttest control group study design was developed. Patients diagnosed with carpal tunnel syndrome who had elected to proceed with carpal tunnel release were considered for the study. Subjects were randomized to one of three treatment groups: contrast baths with exercise, contrast baths without exercise, and exercise alone. Data was collected for both hands on the following parameters before and after treatment: hand volume, functional dexterity, wrist range of motion, grip and pinch strength, and visual analog scale of pain. Testing was performed preoperatively, and post operatively at the time of suture removal. The authors performed all data collection and were blinded to the treatment received by the subject.

Results: Preliminary data were collected on a total of sixty-nine subjects. Forty-seven subjects were female and twenty-two were male. Ages ranged from 31 to 82 years, with the average age being 52 years old.

Statistical Analysis: The following statistical tests were performed: 1. A one-way multivariate analysis of covariance (MANCOVA) on pre-surgery differences between all three treatment groups 2. A second MANCOVA on post-surgery differences between groups. 3. A paired sample t-test for differences for each treatment group. Although no significant differences were found, a trend was indeed noted for increased hand volume after treatment, both before surgery and after surgery.

Conclusions: Contrast baths have traditionally been used in the clinic as a method of reducing edema. However, initial data analysis conducted thus far suggests that hand volume increases post treatment regardless of treatment group. Clinicians may want to consider this information when developing a treatment plan for their patients.

TFP53

Contrast baths: What is the evidence? Why do we use them?

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Contrast Baths are a modality that continue to be used based solely on anecdotal evidence. That is, we ask patients to use this modality because over time the response to their use has been positive in report to their therapist. We will present a systematic review to demonstrate more clearly just what evidence is available at this point in time. A summary of the multiple variables that tend to limit validating the repeatability of this modality will be discussed through the systematic review.

So far, studies have been done primarily with of patients who have rheumatoid arthritis or post carpal tunnel release. A review of the history has been published by Breger Stanton and Bear-Lehman, et and the intent is to cite the evidence, or lack thereof, more systematically. For example, varying parameters have been used, but few with consistency. The temperature range has not been consistently used, although of note in a few published studies reviewed, temperature range was set at relatively high levels.

Plans for a clinical study, by the authors, to bring about a level of evidence that supports, or conclusively does not support their use are in place. The outcome of the study may begin to define some of the parameters best used for contrast baths, and more specifically come to an agreement as to which level of temperature range may be most optimal without increasing edema. This study includes sampling of patients with diagnoses more limited to post trauma and post surgery.

Breger Stanton D, Bear-Lehman J, Graziano M, Ryan C (2003). Contrast baths: what do we know about their use? Journal of Hand Therapy, 16, 343-346.

TFP54

A study of the intra-tester reliability and discriminant validity of a standardised locognosia test

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Locognosia is an important aspect of functional sensibility. Mislocalisation of touch or 'referred' touch after nerve transection has been widely reported and results in poor tactile gnosis. The misdirection of regenerated nerve fibres is thought to account for this. Although these aberrant reinnervation patterns cannot be altered peripherally it has been shown that the somatotopic representation of the body's surface can be altered through sensory learning. The assessment of localization is therefore a necessary component of the evaluation of formal sensory re-learning programmes.

The test-retest reliability and discriminant validity was investigated in 39 patients with median or ulnar nerve injuries. A repeated measures design was used on a cohort of patients recruited from two hand surgery centers. Using a standardized protocol patients were assessed by the same tester on two occasions. Intra-class correlation coefficients were used to calculate the test-retest reliability. Discriminant validity was assessed by comparing the injured hand with the unaffected hand.

Excellent test-retest reliability was demonstrated for the ulnar injuries (ICC=0.859, 95% C.I. 0.693 to1.00) and the median nerve injuries (ICC=0.924, 95% C.I. 0.848 to 1.00). The magnitude of difference in scores between affected and unaffected hands demonstrated good discriminant validity. For the median nerve injuries the mean difference was 11.1 points which was statistically significant ($p<0.0001$, paired t-test) and for the ulnar nerve injuries the mean difference was 4.75 points which was statistically significant ($p<0.0001$, paired t-test).

The intra-tester reliability of this standardized method of assessing mislocalization is very high indicating that the locognosia test is suitable for use as a clinical and research instrument and should be considered for inclusion in outcome assessment of peripheral nerve injuries.

TFP55

Post-operative splinting for digital nerve injuries in the hand

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The purpose of this study was to determine the need for splinting after isolated digital nerve repair in a living sample and to establish comprehensive outcome data with respect to sensory return at 6 months after isolated digital nerve repair.

Digital nerve repairs have been routinely managed post-operatively by up to three weeks of splinting. Immobilisation can however result in joint stiffness, impaired tendon gliding and other negative sequelae. Literature is clear that excessive stretch afforded by early joint movement after neurorrhaphy has a detrimental effect on nerve regeneration. Recent evidence however suggests digital nerve repairs may not require post-operative splinting (Malczewski et al, 1995; Chao et al, 2001). Twenty-six subjects were randomly allocated to 'splint' or 'non-splint' groups on presentation to the Plastic, Maxillofacial and Burns Unit, Hutt Hospital, Lower Hutt, New Zealand over a two year period. The primary outcome measure was light –touch threshold perception assessed by Semmes-Weinstein Monofilaments (SWM). Static Two-Point Discrimination (S2PD), hyperaesthesia, cold intolerance and the subjects' overall estimation of recovery (GER) were also measured. There was a lower recruitment rate than expected and a high drop-out rate. No statistically significant difference was found between the two groups with respect to SWM using ANCOVA ($F(1/21) = 0.051$, $p = 0.824$). The average SWM outcome was 80.8%. Two subjects only recovered normal S2PD. Most subjects reported both moderate hyperaesthesia and cold intolerance, and the average GER was 22.6%

A multi-centre trial may be one way to improve subject numbers and study power and definitively state the need for splinting after digital neurorrhaphy.

TFP56

The use of sensory glove system on patients with nerve repairs one year ago or more – A pilot study of three patients.

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The use of the Sensory Glove System (SGS) has proved to be a successful treatment for adult patients with fresh nerve repairs (Göran Lundborg and Birgitta Rosén 2003). However, patients with old nerve repairs have in some cases been treated with a traditional re-education programme about three months post-operatively. These patients are usually left with poor and unsatsifactory results, causing difficulties in their daily lives. Could the use of the SGS have any positive effects for patients with old nerve repairs?

Three patients, 2 women (born 1949 and 1972) and 1 man (born 1983), started the treatment with the SGS. Their nerve repairs were performed 11, 3 and 1 year before the SGS treatment. We used a standard testprotocol for periferal nerve lesions. For overall function we used DASH, a self-administered region-specific outcome instrument, developed to measure upper extremity disability and symptoms. For assessment of the effect of the treatment in the persons' daily life, we used the Canadian Occupational Performance Measurement (COPM).

According to the test-protocol for periferal nerve lesions, the two patients that used the SGS for the whole period had positive results. In both cases, the COPM showed positive results for performance and satisfaction. The DASH score for dysfunction was better for one and worse for the other, but for sports the scores were better for both. The person with the nerve repair eleven years ago used the SGS for only half the treatment period but experienced some positive effects in the treated as well as in the non-treated hand.

This pilot study, although limited in size, indicates that the SGS has positive effects for patients with old nerve repairs. instructions.

TFP57

Measurement of cold intolerance in nerve pathology: Reliability and relation to symptoms

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Purpose: To assess the utility of a standardized objective test of cold intolerance (cold exposure/recovery) in healthy subjects and those with peripheral nerve pathology (PNP), and to compare these results with self-report measures of pain, functional disability, cold intolerance, and health-related quality of life.

Method: 4 participants (mean age=32.3) diagnosed with PNP and 20 healthy controls (mean age=29.3) were recruited. Subjects refrained from consuming caffeine or participating in vigorous exercise two hours prior to testing. All subjects completed the Patient-Rated Wrist Evaluation (PRWE), Short-Form-36 Medical Outcomes Questionnaire (SF-36), the McCabe Cold Symptom Severity Scale (CSSS), and the Blonde McIndoe Cold Intolerance Symptom Severity Scale (CISS). Temperature was recorded from the 2 nd and 5 th digits of the injured or dominant hand using an infrared skin thermometer for a 2-minute baseline period. Test hands were then immersed up to the wrist crease in cold water (12 degrees Celsius) for 5 minutes. Fingertip skin temperature was monitored at each minute for 20 minutes with the test hand resting at heart level. The subjects were tested again within 7 days. Correlations and test-retest reliability analyses were conducted on the data.

Results: The majority of temperature recovery occurred by the 10-minute point. The 2 nd digit's temperature recovery was significantly faster for the PNP subjects than for controls ($p<0.05$). The cold intolerance protocol showed poor test-retest reliability for both the 2 nd and 5 th digits at all time points (ICC= 0.20-0.36). The temperature measurement at baseline also had poor test-retest reliability. The CSSS and PRWE pain subscales were significantly correlated with the 2 nd digit (r=0.33-0.55), but only the PRWE pain subscale had a significant correlation with the 5 th digit (r=0.16). **Conclusions:** Subjects with nerve pathologies have a faster recovery of fingertip skin temperature when exposed to cold.

TFP58

Cold sensitivity after traumatic hand-injury, vibration induced problems and in a normal population.

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The aim of the study was to describe cold sensitivity in a patient group with hand-injury and in a normal population.

Cold sensitivity is a disabling consequence after hand trauma and affects abilities in daily life. Different symptoms may be elicited by exposure to cold but individual variations limit a symptom-based definition. Since no objective assessment clearly and completely reflect the mechanism causing cold sensitivity, reliable self-report questionnaires is of great importance to describe patients subjective problems. A comparison with a normal population would strengthen the validity of the instruments.

The Swedish version of two questionnaires (Cold Sensitivity Severity scale and Cold Sensitivity Severity score) was distributed to patients with amputations, nerve injuries and vibration induced problems, 122 patients replied giving a response rate at 77%. An equally sized random sample in a normative population was collected, with a response rate at 64%.

The results indicate that pain, ache, numbness, stiffness and change in skin colour are troublesome for the majority of patients and that weakness is the most problematic symptom. Cold sensitivity in the patient group vs the normal population will be discussed. Patients with vibration-induced problems reported significantly more problems.

In conclusion; traumatic hand-injuries such as nerve injuries and amputations as well as vibration-induced problems results in symptoms of cold sensitivity that limits abilities in daily activities, leisure and work ability.

TFP59

Determinants of impaired manual dexterity in Charcot-Marie-Tooth disease 1A.

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Charcot-Marie-Tooth (CMT) disease is the most common inherited peripheral neuropathy. Molecular genetic research has demonstrated that CMT type 1A is the most prevalent form. In the hand, it is characterized by slowly progressive intrinsic muscle weakness and sensory loss, often manifesting with a mild clawing position of the fingers. Although of great importance for our daily activities and individual independence, there is hardly any literature available on hand function and manual dexterity in subjects with CMT1A.

In a cross-sectional, observational study in 50 subjects with a DNA confirmed diagnosis of CMT1A, we evaluated manual dexterity and identified, on the level of body functions, its major determinants.

Manual dexterity, evaluated with the Sollerman hand function test was impaired. Ninety-three percent of subjects scored with the dominant hand below the normal performance value of 80 points. The Sollerman subtests that were the most difficult to perform (pick up coins and put into purse, open/close zip, pick up nuts and put on bolts, do up buttons, put paperclip on envelope, and pour water from cup) required finger grips like pulp, tripod and lateral pinch.

Multivariate linear regression analysis showed that from all potential determinants (age, sex, grip and pinch strength, joint motion, the ability to oppose the thumb, tactile sensation and tactile discrimination), only tripod pinch strength and the ability to oppose the thumb were independently associated with manual dexterity (adjusted R squared = 0.67).

The results of this study showed that impaired manual dexterity is common among subjects with CMT1A and should be recognized as an essential part of the functional evaluation and treatment. The finding that loss of opposition and tripod pinch strength are major determinants of impaired manual dexterity in CMT 1A, may help target intervention strategies aimed at the preservation or even enhancement of hand function.

TFP60

Carpal tunnel expansion by stretching the transverse carpal ligament

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The mechanical constraint of the transverse carpal ligament (TCL) predisposes the median nerve to compression. The detrimental mechanical limitation imposed by this ligament is exemplified by carpal tunnel release as a standard surgical treatment of carpal tunnel syndrome. The purpose of this study was to investigate the expansion of the carpal tunnel with force application from inside the carpal tunnel. Five fresh frozen cadaveric hands were dissected to expose the TCL by removing the skin, fascia, and fat while the ligament insertion sites to carpal bones were intact. The flexor tendons and median nerve were also removed to clear the carpal tunnel. The bony surface within the carpal tunnel was digitized to determine the cross-sectional area formed by carpal bones. The TCL was subsequently stretched by a palmarly directed force from within the carpal tunnel. The force application was achieved with a custom lever system. Eight constant force levels were applied to the TCL, ranging from 10 N to 200 N. The palmar surface of the TCL was digitized while the TCL was under individual loading conditions. The TCL formed an arch height that increased with increasing loading. The cross-sectional area was determined at the middle level between the hook of hamate and the pisiform. The area defined by the carpal bones without the TCL-formed arch was 128.2 ± 24.2 mm 2. With the TCL stretching and arch formation, the cross-sectional areas of the carpal tunnel were 165.0 ± 24.9 mm 2 at 10 N, and 194.3 ± 21.4 mm 2 at 200 N, representing increases of 28.7% and 51.6%, respectively. The TCL arch heights were 2.8 ± 0.3 mm at 10 N and 5.4 ± 0.4 mm at 200 N. The results of carpal tunnel expandability aid the development of alternative carpal tunnel syndrome treatments, such as manipulative procedures and balloon carpal tunnel plasty.

TFP62

Comparison of functional outcomes after single finger microsurgical replantation versus amputation

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Early studies on digital replantation were interested solely in the survival of the digit. Function of the replanted digit has lately become an additional factor in ascribing success to the procedure but has rarely been investigated objectively and thoroughly. A recent paper compared functional outcomes following fingertip replantation versus amputation in zones 1 and 2 only, and recommended attempting replantation for better function and appearance (Hattori, 2006).

Our study includes amputations and replantations at all levels of the finger, excluding the thumb. We felt that limiting the study to only consider fingertips would not demonstrate sufficient functional deficits in objective testing. We believe that the most important indication for replantation of an amputated digit should be an improvement in hand function over that which would occur if the digit were not replanted.

This paper compares the functional outcomes post microsurgical replantation of a single finger, to patients who had terminalisation of a finger at a similar level, and from a similar mechanism of amputation. It is a retrospective study. All patients have been managed through the Plastics Unit at St Vincent's Hospital, Melbourne, in the last 10 years. The study compared the groups using the standardized DASH and the Michigan Hand outcomes questionnaires. The Jebsen Test of Hand Function and measures of range of motion, grip and pinch strength, and sensation were also applied.

Preliminary results (n=14) indicate hand function following the two procedures is similar. There is a trend towards better self reported hand function in those patients who had undergone digital replantation, and strong agreement that replanting the finger was worthwhile, despite reporting more pain. Results are still being compiled, and the completed study will be presented.

TFP64

Functional importance of cosmetic prostheses for upper-limb amputees

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Purpose: Presentation of the results of a questionnaire to 100 patients treated with cosmetic upper-limb prostheses caused by congenital defects, traumatic amputations, illness and others.

Material and Method: A questionnaire was sending to patients provided with a variety of cosmetic prosthesis caused by amputation at shoulder level, upper arm, elbow, under arm, wrist, metacarpi, fingers and thumb at different levels. Focus of the questionnaire was on the functional quality of the prosthesis in addition to activities of daily living, the appearance and other importance's to the quality of life. The questionnaire was divided into three main groups: the use of the prosthesis in professional work, in instrumental activities of daily living (IADL) and in time of leisure.

Results: 82 % of the patients were satisfied with the cosmetic prosthetic and more than 70% of the patients use the cosmetic prosthetic in daily living because of the functional role.

Conclusion: Although the primary purpose of a cosmetic prosthesis is to provide aspects of normality in appearance and social situations, it also serves an important functional role.

TFP65

Hand function and life satisfaction after replantation in the wrist - The patient perspective

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The purpose of this study was to investigate the patient perspective of hand function and life satisfaction after replantation in the wrist level.

Methods: Five patients, who underwent replantation during the nineties in the Clinic of Hand Surgery, Sahlgrenska Hospital in Göteborg, Sweden, were interviewed according to the phenomenographic research tradition. The interviews were analysed and different patient perspectives were described in eight categories: ”want to do the same things as before in civil life, if necessary in a different way”, ”go back to the same working place for good or ill”, ”make a new choice of profession”, ”be forced to renounce things you did before”, ”to suffer”, ”to accept your handicap”, ”a need to tell about the accident over and over again” and ” be grateful for your hand”.

Conclusion: In spite of poor handfunction all patients experienced that they had a satisfactory life. They had developed new ways to cope with their vital necessities. The alternative to replantation is a myoelectrical prosthesis. None of the five patients would ever exchange his or her replanted hand for a prosthesis in spite of the inconveniences they experienced.

TFP66

Presence of depression, anxiety and stress in patients following hand trauma: The influence of injury severity and patient's living location

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Introduction: This study aims to provide data on the prevalence of stress, anxiety and depression amongst hand injured patients at Sydney Hospital. It aims to establish whether this is affected by the patient's injury severity, or whether patients reside in the city or rural areas.

Methodology: The study utilises a cohort study design, where patients are assessed via the DASS (Depression, Anxiety, and Stress Scale) over a period of 6 months following their injury. This is then compared with the patient's injury severity, using the Hand Injury Severity Score (HISS). Suburb and postcodes for each patient are classified according to the Rural, Remote and Metropolitan (RRMA) classification, and also compared to the patient's DASS score.

New and unpublished data: Data collection has commenced, and 250 patients have been invited to participate. Initial and 3 month data sets will be presented. Full data analysis will be completed in May 2007.

Conclusion: There have been some gaps identified in the literature to date that this project aims to address. Currently there is no published literature on the presence of psychological disorders in hand injury patients in Australia. The majority of the literature identifies the presence of psychological disturbances in severe or mutilating hand trauma patients, but little has described the need for patients with mild to moderate injuries. Finally, there is evidence to support the presence of psychological disturbance in rural patients travelling in Australia for cancer treatment, however there is no evidence to support similar characteristics in hand injured patients. Through this study, it is predicted that the current treatment practices may involve an increased acknowledgement of the presence of psychological issues in patients, and the possible development of appropriate referral policies, or on site support for patients in need.

TFP67

Recovery from traumatic hand injury

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A majority of injured workers recover from their hand injury and return to work within 20 days. A small sub-set develop chronic disability beyond 120 days. As expected, severe hand injuries are associated with delayed return to work. However, among workers with minor injuries there is a significant discrepancy in return to work times. Workers who have non-disabling injuries with a delayed return to work are the focus of this study. Such cases are extremely complex and disproportionately expensive.

The purpose of the study is the development and refinement of a screening instrument that can identify patients at risk for delayed recovery. Ideally, this would be administered within the hospital setting within 72 hours of a patient presenting with a traumatic hand injury. High-risk cases could then be streamlined for appropriate early intervention, before the problem becomes intractable. The screening instrument created for this study was based on a comprehensive multivariate conceptual model that uses a bio-psychosocial approach. It acknowledges that delayed recovery from hand injury reflects complex biomedical, psychological and social dynamics, triggered by the events of a hand injury. Both qualitative and quantitative data collection was undertaken. Patients (n = 300) presenting with a hand injury requiring surgical intervention were administered a questionnaire within 72 hours of presentation with a follow up questionnaire approximately 21 days later. In addition, the treating surgeon reported the level of injury severity (using the Hand Injury Severity Score) and the treating hand therapist recorded the patient's compliance and effort at hand therapy sessions. The number of days taken for the injured person to return to work was the outcome variable. The relationship between predictor variables and work absence was analysed resulting in a refined final predictive model and screening instrument.

TFP68

Functional out-come of major upper limb replantation

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Purpose: To assess the functional out-come after major upper limb replantation and analysis of hand therapy protocol which are responsible for achieving good result.

Methods: 22 major replantation with different level of injury were followed up for a period of 2-8 years. The results were analyzed using Chen's criteria. The therapy begins once the vascular repair is stable and extends upto 6 months. The rehabilitation protocol involves education of patient and relatives. Customized hand therapy everyday for four session 20 minutes each.After ten weeks, occupational rehabilitation starts. Patients are reviewed on weekly basis by a team comprising of surgeon, hand therapists and orthotist.

Result: Patients were assessed based on Chen's criteria after minimum 18 months of follow up.

Chen's Grade	**No. of cases**
Grade I	3 (Excellent)
Grade II	9 (Good)
Grade III	6 (Average)
Grade IV	2 (Poor)

All patients returned back to suitable job after occupational assessment and re-education

Conclusion: Replantation for major limb amputation gives a good long term functional result when compared to prosthesis at the same level. The results depend heavily on systematic and customized hand therapy protocol. Achieving a painless sensate hand with reasonable function enormously improves the capability of individual.

TFP69

Valuing occupation and purposeful activity in hand therapy

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The use of occupation and purposeful activity has declined in hand therapy despite the evidence that occupationally-embedded exercise can be more effective across a range of physical outcomes (Lin et al 1997).

Our rehabilitation unit maintains a strong tradition of intensive multidisciplinary treatment focusing on work rehabilitation, psychological and lifestyle issues. In all occupational therapy areas (light workshop, fully equipped industrial workshop with qualified technical staff and daily living bungalow) full use is made of occupations and purposeful activities (as defined by Golledge 1998) both as means and ends of intervention (Gray 1997). They are analysed, adapted and graded for individuals with hand injury and complex regional pain syndrome.

We have undertaken a detailed activity analysis and health and safety review, to ensure that professional and Trust standards are met and that activities achieve hand therapy goals. We aim through this evaluation to demonstrate the physical and psychological benefits of an occupational and vocational approach with hand trauma patients.

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TFP70

Shoulder muscle activity during maximal isometric contractions

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Introduction. The shoulder is a mobile joint that relies heavily on its surrounding muscles to maintain normal asymptomatic function. Muscle function at the shoulder may be examined using electromyography (EMG). An important process in EMG analysis is the process of normalization by which muscle activity within and between subjects and testing sessions may be compared. Normalisation is most commonly achieved by recording electrical activity during a maximal voluntary contraction (MVC) to which other recordings can then be compared. There are currently no standardized methods for generating MVCs for shoulder muscles making it difficult to compare results of research. As a consequence our understanding of shoulder function remains limited. The current study aimed to develop a set of standardized test positions that could be used uniformly in future EMG research at the shoulder. As well, the relative level of activation of each of the shoulder muscles has been examined during the isometric contraction performed to further improve our understanding of shoulder muscle function.

Methods. The dominant shoulder of 15 normal subjects between the ages of 18 and 50 years was examined. EMG activity was recorded from 13 shoulder muscles sites using a combination of surface and intramuscular electrodes, during isometric contractions in 15 shoulder positions.

Results. It was determined that isometric contractions in 4 test positions is adequate to reliably generate an MVC from all 12 muscles examined ($p<0.05$). As well, the relative level of activation in the rotator cuff, scapulothoracic and axio/scapulohumeral showed very high correlations: supraspinatus and infraspinatus ($R^2=0.76$), supraspinatus and lower trapezius ($R^2=0.86$), and supraspinatus and middle deltoid ($R^2=0.63$).

Conclusions. A set of tests to be used in future EMG studies of the shoulder was developed. The muscles of the shoulder work in very close synchrony to achieve normal function.

TFP71

Shoulder muscle recruitment patterns during a kayak stroke performed on paddling ergometer. An EMG study.

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Precise muscle co-ordination is required to maintain normal shoulder function and alterations in synchrony between shoulder muscles can result in loss of range of movement and pain. A major contribution to injuries in kayakers' shoulders is thought to be altered shoulder function. Electromyographic (EMG) studies have investigated normal and pathological shoulder function in many sports but there is little information is available on shoulder muscle recruitment in kayaking. The aim of this study was to investigate the normal recruitment pattern of shoulder muscles during the kayak stroke. If more was known about this pattern of activity it would contribute to understanding the muscle involvement in shoulder dysfunction and assist in determining rehabilitation and training programs. Nine recreational paddlers without shoulder pain were examined. EMG data from eight shoulder muscles were collected simultaneously with video data during simulated paddling on an ergometer. EMG data was normalized to time and peak amplitude. Intersubject consistency was evaluated using Pearson correlation analysis. The results of this study indicated a fair to high correlation in at least one phase of the kayak stroke in five of the muscles examined; upper trapezius, supraspinatus, latissimus dorsi, serratus anterior and rhomboid major. This normative data will enable comparisons with the shoulder muscle in recruitment patterns in kayakers with shoulder pain in order to determine the role of altered motor control in the painful kayaking shoulder.

TFP72

Humeral torsion- An ultrasound assisted clinical measure and implications for physiotherapy management of throwing athletes

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This study was in 2 parts: a reliability trial of an ultrasound assisted method of assessing humeral torsion, and measurement of side-to-side differences in populations of throwing athletes, swimmers, and non-athletic subjects.

Humeral torsion describes the amount of twisting about the long axis of the humerus. Treatment of subjects displaying a reduction in total rotational range of motion (internal + external rotation range) needs to account for alterations in humeral torsion, and cannot solely be based on the contralateral side. The reliability trial comprised a blinded examination of ultrasound assisted measurement of humeral torsion made by two examiners. Each examiner independently used the ultrasound to ascertain the vertical position of the bicipital groove at it's deepest with adjacent tubercles of the same height, while an assistant recorded the corresponding shoulder rotation angle from an inclinometer. Inter-rater reliability was high (ICC 2, 1) >0.93 for this simple, non-invasive, quick method which doesn't involve ionising radiation. Using this method, one examiner then assessed the humeral torsion in populations of: 150 throwing athletes (male, female, began throwing prior and subsequent to puberty, adult and adolescent); 30 adolescent male and female swimmers; and 16 non-athletic adult subjects. Almost every subject displayed a side-to-side torsional difference in their arms. The throwing athletes largely displayed greater retrotorsion in their dominant arm (with a maximum value of 50° side-to-side difference), as did the swimmers although not to as great an extent, whilst the non-athletic subjects displayed no systemic handedness effect. This method proved a simple, safe, and reliable solution to examining humeral torsion in a clinical setting.

TFP73

A new rehabilitation protocol for the massive rotator cuff repair - The use of a sling with 30 degrees abduction pillow and very early exercises

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We have been introduced to use an author's made sling with 30 degrees abduction pillow and perform early exercise for rehabilitation of acute massive rotator cuff tears. Mclaughlin's procedure with acromioplasty were underwent for all cases. Postoperatively, the affected arm was immediately placed in a sling 30 degrees abduction pillow. Simultaneously, the early exercises including passive and active assistive nearly full ROM were started under meticulous therapist's control.

Furthermore, as a preliminary stage of physical exercise, muscles and joints of the extremities and the trunk as the kinetic chain were tried to relax enough by stretching and massage, because of establishment of a stable base of shoulder muscles activation.

The passive and active ROM exercise in the plane of the scapula was performed on the supine position except the gravity effect. We began resistive ROM exercises after week 6, and continued scapular and glenohumeral functional exercises using proprioceptive input. Within 8 weeks, all patients could elevated their arms over 150 degrees in standing position. In our experience and review of recent reference, we would suggest that position of immobilization of the affected arm should be decided by the suture tension of the repaired rotator cuff and the abduction brace is not always necessary as a shoulder immobilizer. Also, the early exercise following the operation is very effective to regain normal range of motion and activity of daily life earlier.

Reference: Swanik, Journal of Shoulder and Elbow Surgery.

TFP74

The upper limb functional index (ULFI) - Validation with improved psychometric and practical characteristics using a three-point Likert scale

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Purpose : Current upper limb regional self report outcome measures (SROMs), including the Quick (Q)-DASH and Upper Extremity Functional Index (UEFI) have been criticized for poor clinical utility through scoring and missing responses and poor psychometric properties with item redundancy. The Upper Limb Functional Index (ULFI) was developed to address these concerns. Originally validated as a dichotomous tool, this study investigates the psychometric properties of the ULFI as a three-point Likert-Scale with the 11-item Q-DASH and the UEFI as criteria.
Methods: Patients from five Australian outpatient settings (n = 85) completed the ULFI (responses: n R = 285) to assess construct validity, with subgroups concurrently completing the Q-DASH (n= 41, n R=100) and UEFI (n =13, n R=35) for criterion validity, test-retest reliability (n=24) and responsiveness (n=31). Internal consistency, change scores and missing responses were also calculated and practical characteristics assessed.

Results: The ULFI correlated (95% CI) with the Q-DASH, r=0.87 and UEFI r=0.92 (the Q-DASH v UEFI r=0.81); demonstrated test-retest reliability (ICC, 2:1=0.98) and internal consistency (Cronbach's Alpha=0.92). The ULFI standard error of the measurement (SEM) was 2.3% and minimal detectable change (MDC) at the 90% CI was 3.9% or 1.0 ULFI-points. Responsiveness indices were standardized response mean (SRM) at 1.87 and effect size (ES) at 1.28. The ULFI had no missing responses, the Q-DASH=26%, UEFS=25%. The ULFI combined patient completion and therapist scoring time was < 2 minutes. Impairment range for the ULFI and Q-DASH was 0 - 100% compared to 0-95% for the UEFI.

Conclusions: Of the three instruments tested, t he ULFI demonstrated the preferred psychometric properties, practical characteristics and clinical utility without redundancy. These properties recommend the ULFI as the clinical outcome tool of choice for the determination of upper limb status and impairment.

TFP76

Should the index finger be protected from functional use following FPL repair in the presence of Lindburg-Comstock syndrome?

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Clinical observation of patients at Sydney Hospital following acute FPL (Flexor Pollicus Longus) repair identified 3 patients who appeared unable to independently flex their index finger DIP joint without simultaneously flexing their thumb IP joint. This paper explores the clinical relevance for patients who have undergone acute FPL repair and suggests modifications for the post-operative regime.

This syndrome was first described by Lindburg and Comstock in 1979. It has been identified as having a relatively high frequency (~ 20%) in the normal population. (Lindburg and Comstock 1979, Rennie W.R., 1998, Hamitouche K., 2000). The anatomy of this syndrome has been identified with MRI studies (Karalezi, 2006).

Following FPL repair, post-operative treatment at Sydney Hospital protects the thumb in a dorsal blocking splint in a position of slight wrist and thumb flexion, limiting thumb and wrist extension but allowing full active finger flexion/extension, leaving the fingers free to function. Patient interview found that this group of patients continued to use a flexed finger grasp for self care and functional activities.

In the post-operative management of flexor tendon repairs, early active motion protocols have demonstrated significant benefits when compared with early passive or immobilisation regimes. FPL has been noted to have a higher rupture rate with early active protocols (Elliot, 2005).

The presence of Lindburg-Comstock syndrome is suggested as a risk factor for post-repair rupture of FPL. Assessment for this syndrome is advocated and modifications to the post-operative regime are suggested.

TFP77

Patient Compliance to Home Exercise Protocols and Spontaneous Movements after a Flexor Tendon Repair

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Compliance to strict home exercise programs is understood to be a mainstay of post-surgicalDuring flexor tendon rehabilitation., patients are relied on to follow strict instructions for their home exercise program. Therapists recognise the potential of poor compliance (overuse or under-use of prescribed exercise) and spontaneous movements) during rehabilitation. Sand some therapists may suggest that compliance to specific exercise regimens and control of spontaneous or general movements are fundamentally important in optimising the rehabilitation outcomes and minimising the potential of adverse events. is is a significant prognostic factor for rehabilitation outcome and adverse events. Yet there is little objective data to document the actual levels of exercise or spontaneous finger movement performed outside the clinical setting. The purpose of this study was to document both diary and instrumented methods of reporting finger movement during a 48hr period.

FSubjects, following surgical repair of the flexor tendon, subjects attendinging a private hand therapy clinical provided consent and reported subjective diary (n=16) data of sets and repetitions of exercise for up to 6 weeks post-operatively.on 3 occasions during 6 weeks of rehabilitation. Nine subjects also had instrumented data logged on 3 occasions during the first 6 weeks of rehabilitation at the same time and were not fully aware of the purpose of the instrumentation.

All subjects were instructed to perform This research measured levels of compliance to a common flexor tendon rehabilitation protocol that prescribed 10 passive exercises followed by 10 active exercises every waking hour, for the first 6 weeks and were assessed onhad range of motion, DASH, pain and strength assessments performed concurrently. . It also considered the amount of spontaneous or non-compliant movement that was done beyond this.

Information was gathered from 16 patients via diary report and 9 of these patients additionally wore a proto-type data logger on their splint. The logger recorded the quantity and quality of movement that occurred over a 48 hour period for 3 episodes during the first 6 weeks port-operatively. The patients were not made aware of the true purpose of the logger to avoid biasing results.

Outcome measures such as the Disabilities of the Arm, Shoulder and Hand (DASH) assessment, visual analogue scale, range of motion and grip strength were used to determine any relationship between compliance levels and outcome.

Results showed demonstrated that patients reported, via their diaries, that they are on average 80% compliant. Parallel data logger information suggests that this figure is more likely to reflect 50% compliance. A significant ($p < .05$) increase in spontaneous movements in the last 2 weeks of the 6 week assessment period was detected.patients on average reported in their diary to do approximately 80% of their prescribed daily exercise while the logger results showed that in reality patients actually only did approximately 50%. Spontaneous movements were also shown to significantly increase over the initial 6 weeks period.

No significant correlation was able to be drawn between a patient's level of compliance or spontaneous movement and their outcome were detected.

TFP78

Assesment of time of "surgery and rehabilitation" on outcomes of flexor tendon repairs in zone2

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Objective: Early active motion after flexor tendon surgery is known as a standard and good method for flexor tendon repairs in zone II. The question is when, how much, how far stress must be applied. And time of surgery and referral for Rehabilitation How affect the outcomes.

Materials & Methods: This rehabilitation is done on fifty seven patients with flexor tendon II repair with 4-Strand Sutures, who was Presented to Iran hand Rehabilitation center.

All of the patients were treated by Early Acive Motion (E.A.M) by one therapist. At the end of 8th week they were assessed as Range of motion, total active motion, flexion contracture in PIP and flexion gap.

Results: With one way anova we found that Sex, age, injured finger and hand hadnot effect on Out comes. Time of Refer to hand therapist with Pvalues0/07 has positive effect on T.A.M and best T.A.M. was achieved in 48h- 5 th day referred patients. Delay of Surgery with P-Value = 0/05 has positive effect on T.A.M.

In delayed Surgery T.A.M. were low and rate of flexion Contracture in PIP were increased.

Conclusion: With primary Repair and early refer for Rehabilitation out comes of repair in Zone II can be better.

TFP79

Custom-made vs off-the-shelf splinting for mallet finger injuries – Which is best?

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Mallet finger (a loss of continuity of the distal insertion of the extensor tendon at the finger tip) is a common hand injury in ball sports but can also occur from minor incidents such as bed-making and falls. The injury results in a drooping of the distal inter-phalangeal joint, and is usually managed conservatively by splinting in extension or slight hyper-extension for 6 or more weeks. A review of the literature favoured conservative treatment over surgery in most cases, and a key factor in overall success is patient compliance with treatment. A recent Cochrane Systematic review (Handoll and Vaghela, 2005) found that there is insufficient evidence to establish the comparative effectiveness of different types of finger splints (either custom-made or off-the-shelf) due to methodological flaws in existing studies.

A single-blind randomized controlled trial was undertaken at The Alfred Hospital from May 2006. Patients who sustained closed mallet injuries to the fingers in the previous fortnight were randomized to receive either a perforated thermoplastic splint, an aluminium-foam "Mexican hat" splint (both custom-made), or a control (off-the-shelf "Stack splint"). All other aspects of treatment remained constant, and results were measured by a blinded assessor. The key outcome measure was degree of extensor lag, and secondary measures included development of complications, patient compliance, satisfaction with treatment, and pain.

As this trial is still in progress, key results and emerging themes are presented. Of particular interest is the relationship of splint type to patient compliance, and therefore successful outcome.

TFP80

A multi-centre randomised clinical trial comparing two postoperative treatment techniques after extensor tendon repair in zones 3-4.

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The purpose of this prospective randomised clinical trial was to compare the outcomes of two postoperative treatment techniques for extensor tendon repairs in zones 3 and 4.

Patients with simple and complex injuries to the extensor tendons in zone 3 and 4 were included from three major public hospitals in Western Australia. Only patients with partial and complete surgically repaired tendons were included. Patients were randomly assigned to one of two treatment groups.

The two treatment groups were Immobilisation and Early Active Motion. The Immobilisation Group were immobilised for 3 weeks followed by graded mobilisation and the Early Active Motion Group commenced treatment at day 1 to 5 and wore a static splint which they removed regularly for short arc movements within splint templates. This protocol was based on the post-operative regimes of Evans, using a Short Arc Motion program (Evans and Burkhalter, 1986 and Evans in Hunter, 1995). Outcomes were measured at week 3, 6 and 12 and included range of motion (and the Strickland scale), self-reports of pain and function, grip strength, return to work, number of treatment visits and the cost of intervention.

Twenty-four subjects were allocated to two treatment groups. The majority of the subjects were male with dominant hand injuries. The results for the two treatment groups will be presented.

TFP81

A multi-centre randomised clinical trial comparing three postoperative treatment techniques after extensor tendon repair in zones 5-8.

Barbara Hall 1 , Garry Allison 2, Ian Dowley, Heather Charles, Sally Flavel, Sara Boniwell, Nikki Gow, Amanda Curry, Helen Walsh, Brent Byrne, Nick Buttigeig. Christy Le May, Michelle Melang, David Harrison, Stacey Burr, Sharon Kerr, Kathryn Phillips, Matthew Barrett, Colleen O'Brien Malone, Tamala Ranson, Nicole Kingwell, Craig Wilson.

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The purpose of this prospective randomised clinical trial was to compare the outcomes of three postoperative treatment techniques for extensor tendon repairs in zones 5-8.

Patients with simple and complex injuries to the extensor tendons in zone 5-8 were included from three major public hospitals in Western Australia. Only patients with partial and complete surgically repaired tendons were included, and single tendon injuries to the index and little were excluded. Patients were randomly assigned to one of three treatment groups. The three treatment groups were immobilisation, early passive motion (dynamic splinting) and early active motion protocol. The Immobilisation Group had 3 weeks complete immobilisation, followed by a graded mobilisation program (based on the regimes on Evans, 1995). The Early Passive Motion Group commenced at day 1 to 5 and had a dynamic splint for passive extension and active flexion (based on the regimes on Evans, 1995). The Early Active Motion Group commenced treatment at day 1 to 5 and were wore a static splint combined with regular active exercise in the splint (based on the research of Khandwala, 2000).

Outcomes were measured at week 3, 6 and 12 and included range of motion, self report of pain and function, grip strength, return to work, number of treatment visits and the cost of intervention.

Thirty-one subjects were allocated to three treatment groups. The majority of the subjects were male with dominant hand injuries. The results for the three treatment groups will be presented.

TFP82

An early active mobilisation programme following repair of extensor pollicis longus tendons in zone III – VIII: A retrospective study

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At Chelsea and Westminster, we have used, for the past 3 years and in line with recent suture developments, an early active mobilisation programme for Extensor Pollicis Longus (EPL) tendon repairs in Zone III-VIII with a forearm based splint and designated active exercises with excellent/good results.

Retrospective data from 92 patients over a three year period was collated. The results are similar to those from other studies (Khandwala et al 2002, 2004, Hung et al 1990) with more than 85% good and excellent results. Outcomes were measured using range of motion and a Total Active Motion measure (TAM) and Buck-Gramko evaluation was completed. Complications such as ruptures or infections were recorded. The details of this patient group and these results will be discussed.

Most commonly, EPL (Zone III-VIII) repairs have been managed with either static immobilisation or dynamic extension splinting with a controlled exercise programme (Elliot and Southgate 2005, Khandwala et al 2002, 2004, Newport et al 1990). As suture techniques have improved and greater understanding of the benefits of movement with intrinsic healing gained, finger extensor tendons repairs are being more regularly managed with early active mobilisation. The early active regime used at Chelsea and Westminster has been shown to be effective, in comparison to similar papers, with very low complication rates. The early active regime complements anatomical and healing theory and encourages joint movement and tendon excursion as with many regimes for finger extensor tendon repairs. The splint is simple and quick to make and easy for the patient to wear. The benefits and limitations of the regime will be discussed in full in the presentation.

TFP83

Is immobilization necessary following tendon transfers? A trial of immediate active mobilization for common tendon transfers to the hand

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Purpose: Introduce the concept of immediate active mobilization of common tendon transfers to the hand and determine their advantages compared to immobilization.

Background: Immobilization of the part for 3-4 weeks is the common practice following tendon transfers. A hypothesis was proposed that 'immediate active mobilization of tendon transfers will achieve similar outcomes to the standard practice of immobilization in a cast'.

Material: In a prospective trial of 77 tendon transfers to the hand had immediate active mobilization of tendon transfers. There were 57 claw deformity corrections with Zancolli's "lasso" & 20 opposition transfers with FDS donor. Changes in the surgical techniques were made to increase the strength of tendon attachment .All transfers were actively mobilized 48 hours after surgery and daily documentation maintained to detect tendon pull-out of loss of tension. . Outcomes of claw correction was assed by (i) Deformity correction (ii) Integration of transfer (iii) digit flexion and (iv) sequence of flexion. Outcomes of opposition transfer were assessed by range of post-operative active abduction of the thumb , pattern of pinch & pinch strength . Results of immediate mobilization were compared with published reports of similar procedures with post-operative immobilization using identical outcome measures. Follow-up ranged for 30 months to 6 months (average 14 months).

Results: There was no incidence of tendon insertion pull-out. All opposition transfers following immediate active mobilization had good results. There was no difference in the late outcomes of opposition tendon transfers immobilized or actively mobilized after surgery. The morbidity time was reduced by 19 days with immediate mobilization and earlier return to work was as added advantage with reduced loss of work. Range of motion was restored earlier.

Conclusions: This study supports the hypothesis and suggests similar outcomes can be achieved in reduced time by immediate mobilization of oppositiontendon transfer.

TFP84

Teaching the patient about tendon repair/reconstruction begins during surgery

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Purpose: The wide awake approach to flexor tendon repair gives hand therapists the opportunity to start treatment during surgery as patients are coherent and pain-free.

Methods: We will show films of some of fifteen flexor tendon repair cases with patients receiving pure local anaesthesia and epinephrine and no tourniquet rather than general anaesthesia or sedation with tourniquet[1]. Both the surgeon and the hand therapist are present during the surgery to educate the patient on tendon repair strength, preservation or loss of pulleys, mechanism of tendon glide, and scar formation.

Results: In such cases, hand therapists ask the patient to actively flex and extend the digit to allow the surgeon, the therapist and the patient to see how the repaired tendon glides through sheath and pulley before the wound is closed. This provides the opportunity to ensure that the patient is able to perform full active flexion and extension of the finger and prevent limitations such as tendon gapping or cruciate pulleys decreasing range of motion before the skin is closed. The hand therapist has the opportunity to educate the patient on ROM protocols, early active tendon gliding to break down scar formation, and the rationale behind the use of a dorsal block splint to protect the repair. The hand therapist can also show the patient the tension difference on the repaired tendon when wrist and MP joints are flexed or extended.

Conclusion: Treatment of flexor tendon repairs can start during the surgery using the wide awake approach as the patient is alert, pain-free, and educated about tendon healing and prevention of tendon rupture.

[1]Lalonde D, Bell M, Sparkes G, et al. A multicenter prospective study of 3,110 consecutive cases of elective epinephrine use in the fingers and hand: the Dalhousie project clinical phase. J Hand Surg. 30:1061, 2005.

TFP84a

Extensor carpi radialis longus (ECRL) tendon transfer for restoration of finger flexion in patients with flexor muscle loss after direct trauma

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Purpose: The purpose of this study was to assess the functional outcome after extensor carpi radialis longus (ECRL) transfer for restoration of finger flexion in patients with flexor muscle loss after direct trauma.

Methods: We evaluated 8 patients who had ECRL transfer between 1995 and 2003. Flexion gained was assessed by measuring the digit-to-palm distance (DPD). The grip strength was compared with that of the opposite normal limb. The average follow-up period was 41 months. We compared the results obtained with other modalities of restoration of finger flexion, namely a pedicled latissimus dorsi muscle transfer or a free functioning muscle transfer (FFMT) using the series available in the literature.

Result: Four patients had a good result with a DPD of 0 cm in all fingers and average grip strength of 65% of the opposite hand. Two patients had an average result with a DPD of 1.5, 2, 1.7 and 1.5 cm for the index, middle, ring and small fingers, respectively, and an average grip strength of 58%; 2 patients had a poor result with a DPD of 5.0, 5.5, 5.0, and 3.0 cm for the index, middle, ring and small fingers, respectively, and with an average grip strength of 21% of the opposite hand.

Conclusion: The ECRL transfer yields good results if the intrinsic muscles of the hand are functioning, the extensor compartment is uninjured, and the lower third of the forearm where the tendon junction is performed is relatively unscarred. In such instances the range of movement and grip strength achieved are better than a latissimus dorsi muscle pedicle graft and are comparable with a FFMT. This is achieved earlier than the time taken for reinnervation of FFMT and without the attendant risk for flap failure.

TFP86

Innovative service delivery for hand therapy

Jenni Yeo

Jenni Yeo Occupational Therapy, Dunedoo, NSW, Australia

This presentation offers a different method of hand therapy service delivery that may have applications in other practices, ie: a hand therapy van.

Working as a sole therapist in private practice in rural and remote Australia has inherent complications with long distance travel plus finding rooms available intermittently for hand therapy in several districts. As I reside approximately 100 km from the two major centres, hand therapy was provided in two main locations, necessitating duplication of some equipment and considerable packing and unpacking of the rest. Room availability was another problem, as renting a room for one day a week in different centres was complicated, and while I had "slice and cake" rental at two venues, there were still problems with equipment storage, usage and double bookings.

The hand therapy van has solved all these problems. This insulated van has custom made fittings including drawers, bench, and shelving, water storage, and gas for heating water for splints. Separate self-recharging 12 volt power supplies lighting, refrigerator, laptop computer and printer, plus optional additional appliances. Client consultations and hand therapy, inclusive of splint fabrication all occur in the van, with the client seated at an adjustable height chair, and a mobile adjustable height table. The van stays permanently packed, hence I can leave home, stop in one place and work in a particular town, then leave with no loss of time. Clients who have seen me work in both old circumstances and new make unsolicited positive comments, and to date all complications have been easily solved. This hand therapy van offers a completely different method of service delivery that may be applied in other practices and is available as a "real-life" "in-the-flesh" oral presentation or poster.

TFP87

Continuous passive motion (CPM) following tenolysis in hand therapy patients: A retrospective study

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Purpose: The therapeutic management of two groups of patients who underwent digital tenolysis (and/ or capsulectomy) is evaluated. One group utilized CPM and the second group of patients did not. Primary diagnoses of patients included fractures, tendon lacerations, and/ or joint contractures. All patients elected to proceed with secondary surgical procedures in order to gain increased digital range of motion.

Method: Thirty–eight patient charts were reviewed and included in the study. 15 patients (with 22 involved digits) were issued a CPM following their surgery; 23 patients (with 26 involved digits) were issued standard hand therapy exercises for home.

Outcome measures included Total Active Motion (TAM) measurements of the involved digit before and after surgery and the total number of therapy visits. Results: Total active range of motion for patients utilizing CPM started at 136.63° (± 31.98°) and increased to 176.53° (± 38.22°). Total active range of motion for patients not utilizing CPM started at 151.92° (± 27.01°) and increased to 183.75° (± 24.10°). A comparison found no statistically significant difference in the mean change of range of motion of patients utilizing CPM (39.89°) and those not utilizing CPM treatment (31.83°). (See Table 4: Comparison in Total Active Motion Measurements)

A significant difference ($t = 4.72$, $p<0.05$) was present between CPM users and non CPM users in the number of therapy visits. The average number of therapy treatments of the patients in the CPM user groups was 25.74 visits, while those not utilizing CPM came for an average of 18.54 visits. Conclusions: The preliminary analysis from this study revealed that utilization of CPM did not contribute significantly to changes in total active range of motion. This study highlights the need for evidence based practice in the treatment techniques we utilize in the clinic. References: Adams, KM 1996, LeStayo, PC 2002, Dimick, MP 1990.

Conclusions: The preliminary analysis from this retrospective chart review revealed that utilization of CPM did not statistically significantly alter the change in total active range of motion at time of the patient's discharge from therapy treatment. This study highlights the need for evidence based practice in the treatment techniques we utilize in the clinic. References: Adams, KM 1996, LeStayo, PC 2002, Dimick, MP 1990.

TFP88

Extensor overpull – Its significance following acute hand trauma

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Extensor overpull is the term that has been used by Lee Osterman (1999) to describe dorsally based PIP joint pain that can be related to idiopathic triggering of the digital flexor tendons. This phenomenon has not been described in relation to dorsal PIP joint pain following acute hand trauma. In this instance, pain is variously ascribed to joint stiffness, extensor tightness or, in the case of the older patient, degenerative joint changes.

Extensor overpull following acute trauma can be a reliable indicator of problems relating to flexor tendon glide in the distal palm, i.e., at the level of the A1 pulley. Even mild post-traumatic oedema has the potential to impact on tendon glide; this is particularly the case where oedema persists into the fibroplastic phase of healing.

Extensor overpull results from an over-contraction of the extensor musculature as a protective, inhibitory manoeuvre against the pain associated with active IP joint flexion. The pain of extensor overpull will often precede pain at the site of the problem, i.e., the A1 pulley.

Extensor overpull manifests as pulling, tightness or pain over the dorsum of the affected digit(s) when the patient attempts active IP joint flexion. The discomfort follows the course of the extensor tendon. Whilst this tightness presents most commonly across the PIP joint, it can be felt segmentally anywhere along the digit and may extend proximally into the hand. Occasionally, pain will extend to the forearm extensor musculature. If the problem of extensor overpull is unrecognized and not addressed, a cycle of pain, stiffness and swelling can quickly ensue.

The aim of this paper is to outline the assessment protocol that differentiates the pain of extensor overpull from other causes of pain. It will also explore the various treatment strategies that can be employed to manage this clinical problem.

TFP89

Predictors of outcome with mobilizing splinting post hand trauma

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Splinting is accepted by many hand therapists, as the modality of choice for contracture resolution, following traumatic upper limb injury. 1-2 Many factors are believed to influence the success of mobilizing splinting in the hand, however there is a lack of available evidence to quantify relationships. 2 Previous research has left many unanswered questions, limiting the evidence from which therapists must make clinical decisions. This PhD project aims to address some of the current gaps in our knowledge base by;

1. Examining the relationship between contracture resolution with mobilizing splinting and ten key variables.
2. Comparing the reliability and prognostic value of three methods of measuring joint stiffness.
3. Exploring in further detail the relationship between TERT and contracture resolution.

This project is currently in the data collection phase with 35 participants having completed the splinting program from hand clinics at EKCO Occupational Services and the Princess Alexandra Hospital in Brisbane, Australia. This presentation will review the rationale for the study, as well as briefly describe the methodology and the analysis plan.

1 Fess, E. & McCollum, M. (1998). The influence of splinting on healing tissues. *Journal of Hand Therapy, 11(2),* 157-161
2. Wilton, J. D., TA. (1997). *Hand Splinting.* London, WB Saunders Company Ltd.

TFP90

The use of plaster of paris a neverending story in hand therapy

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This study would like to show the advantages of using plaster of Paris in hand therapy.

This is a 4 years long study performed in Clinical Hospital of Rehabilitation Cluj-Napoca Romania involving 500 patients with ages between 1-80 years old, admitted in Plastic and Reconstructive Surgery Department for minor and complex (70%) traumatic hand lesions. All the patients are primarily immobilized in functional position by using static splints and next time dynamic splits are used for minor and selected complex lesions.

In our department there is used 100% cotton tapes combined with cast powder applied in 6-12 layers depending on complexity of the lesion, localization, cooperation, and frequency of the fallow up. Immobilization using plaster of Paris is made after the surgeons perform a sterile bandage. It is used short set up time plaster without important exothermic process.

Despite of lack of well set national rehabilitation protocols, our Department adapted the strategy of very early rehabilitation without losing the time. Even though new materials replaced plaster of Paris all over the world, Romania has a long tradition in use of it. The weak points of plaster are well known but we consider that the advantages are more important regarding functional results and also, sometimes, the weak points could achieve a positive connotation. From our point of view, the most important advantages of using Plaster of Paris are: Strong and well fitted immobilization generated by its stiffness and its ability to conform, low cost so we can remove and adapt it whenever necessary, it does not need padding, Because of its porosity prevent skin maceration.

By combining plaster of Paris splinting with a specific type of early mobilization we can obtain good results in short time and with low prices for complex trauma of the hand.

TFP92

Thumb joint coordination during opposition

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Thumb opposition plays a vital role in hand function. Kinematically, thumb opposition results from composite movements from multiple joints moving in multiple directions. The purpose of this study was to examine the coordination of thumb joints during opposition tasks. Fifteen female subjects with asymptomatic hands were studied. Three-dimensional angular kinematics of the carpometacarpal, metacarpophalangeal, and interphalangeal joints were obtained by a marker-based motion analysis system. Euler angles were calculated to quantify flexion/extension, abduction/adduction, and axial rotation. The subjects thumb opposition, starting with the thumb with full extension, then moving the thumb tip to the proximal phalangeal crease of the little finger, and then returning to the starting position. Inter-joint coordination was analyzed across three joints in a specific rotation plane and intra-joint coordination was analyzed among the rotation planes within a specific joint. Principal component analysis was applied to analyze the overall joint coordination of all movement variables. Thumb opposition revealed coordination among joints in a specific direction (inter-joint coordination) and among different directions within a joint (intra-joint coordination). In particular, linear couplings existed between the flexion and pronation at the carpometacarpal joint, and between the flexion of the carpaometacarpal joint and flexion of the metacarpophalangeal joint. Principal component analysis showed that the first two principal components explained more than 95% of the total variance of the opposition data in seven movement directions. Our study illustrates the highly coordinated motion of the thumb among multiple joints in multiple directions during a functional task. The motion coordination results from synertistic factors of muscle activity, geometry of the articular contact surfaces, and ligament tension.

TFP93

Implications of the interphalangeal thumb tilt for fusion and joint replacement

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The thumb constitutes sixty percent of hand function, being the only digit which is truly opposable. The contribution of the Inter Phalangeal (IP) joint to opposition has not yet been fully examined.

Fusion or joint replacements of the IP joint are usually carried out as a result of trauma or degenerative disease which may render the movement of the remaining joints of the thumb also compromised. It is therefore paramount to retain optimal pure pulp and tripod pinch grips.

This observational study of 88 subjects indicates that the IP joint of the thumb tilts on flexion with a mean 4.3°for right IP joint tilt and 5.4° for the left. There was no correlation found between:

1. dominance and degree of tilt (p= 0.24)
2. age and IP joint tilt (p=0.42)
3. males and females (p=0.47).

Currently there is no specific replacement for the IP joint. Subsequently finger IP joint replacements are used which do not allow for this rotation or tilt component. Clinically it is noted that there is a higher failure rate associated with IP joint replacements in the thumb as compared to the digits. It is hypothesized that the degree of rotation contributes to this increase in failure rate. The development of a 'fit for purpose' replacement joint will be highlighted along with possible functional implications in pinch grips.

Similarly fusion of the IP joint the rotational element is not commonly taken into account. It is suggested that incorporating a degree of rotation equivalent to the unaffected hand might produce superior functional results.

TFP94

A cadaveric study of thumb kinematics produced by extrinsic muscles

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The thumb plays a critical role in hand function because of its unique anatomy and numerous associated muscles. The purpose of this study was to investigate thumb motion produced by individual extrinsic thumb muscles. Twelve fresh-frozen cadaveric arms were dissected to expose the musculoteninous junctions of the extrinsic thumb muscles, i.e., flexor pollicis longus (FPL), abductor pollicis longus (APL), extensor pollicis longus (EPL), and extensor pollicis brevis (EPB). Each muscle/tendon was loaded to 10% of its maximal force capability while three-dimensional angular kinematics of the carpometacarpal (CMC), metacarpophalangeal (MCP), and interphalangeal (IP) joints were obtained simultaneously. We found that each extrinsic muscle produced unique joint angular trajectories in multiple directions. The FPL mainly flexed the MCP and IP joints by 1 3. 0 degrees and 3 5.8 degrees, respectively . The APL mainly moved the CMC joint by a range of 25.9 degrees extension and 27.3 degrees supination. The EPL extended all three joints but the EPB only extended the CMC and MCP joints. The EPL was the only extrinsic muscle to produce CMC joint adduction with a range of 14.2 degrees. Joint motion did not necessarily correspond to the anatomically implied function of the actuating muscle . For example, the APL mainly generated extension and supination at the CMC joint, and hardly produced joint abduction. High inter-joint coordination was shown between the MCP joint flexion and IP joint flexion by FPL loading, as well as between the MCP joint extension and IP joint extension by EPL loading. High intra-joint coordination was observed between extension and supination at the CMC joint with the APL, EPL, and EPB loading. Our results provide novel insight into the biomechanical roles of thumb muscles.

TFP95

Early controlled passive motion influences mineralized tissue distribution in a 28-day closed fracture callus: A pQCT study in rabbits.

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Introduction: In a previous study using a closed, 3 rd metacarpal fracture in rabbits we found that Early Controlled Passive Motion (ECPM) lead to clinically (>25% diff.) and statistically ($p < 0.05$) significant improvements in an early fracture calluses ability to resist and bear a 4-pt bending load, and that these improvements were not due to the fracture laying down a bigger callus. 1 The purpose of this follow-up study was to investigate the effect of ECPM on 28 day post-fracture callus pQCT mineralized tissue distribution compared to fractures treated with immobilization (IM). **Methods:** 11 - ECPM and 10 - IM Calluses were scanned ex-vivo, in air, perpendicular to the fracture line. Resolution: .1 x .1x 2.2 mm. pQCT raw data files were analyzed with ImageJ Software (http://rsb.info.nih.gov/ij). Data was imported and calibrated. Unfiltered image analyses included 3 validated apparent density thresholds (0, 200 and 800 mg/cm*3) defining non-mineralized, new mineralized and residual cortical bone within the callus.

Outcome Variables: Area, Content, Distance from Centre and Distribution.

Results: Compared to IM calluses, ECPM calluses had 20% more residual cortical bone tissue (less cortical bone resorption) at the level of the fracture, distributed significantly further away ($p<0.03$, 26% further) from the anatomical centre (a structurally superior distribution). Although not statistically significant, the IM calluses also had more (10% more) lower density new mineralized tissue distributed further away (21% further) from the anatomical centre of the callus than did the ECPM calluses.

Conclusions: ECPM influenced the regional distribution of mineralized tissues within the callus at 28 days post-fracture. It appears that early closed fracture calluses may respond to early controlled physiologic stresses by depositing &/or maintaining more centrally located higher density mineralized tissue. These regional differences may also explain the structurally superior mechanical differences for ECPM calluses found at 28 days 1.

Ref: 1) Feehan, Tang, Oxland – ORS, Chicago, 2006.

TFP96

Restoration of function on bilateral absence of extensor pollicis longus and brevis: A case report

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Congenital anomalies like thumb hypoplasia among children are frequently referred to hand therapy. Many descriptions have been made about congenital absence of thenar muscles, thumb extrinsic and intrinsic muscles, and their management and rehabilitation as a part of radial deficiency (Su CT 1976). Since than, no cases with bilateral extensor pollicis longus (EPL) and brevis (EPB) absence and rehabilitation of thumb function in these cases has been reported in the literature. This case reports the restoration of thumb extention function on a child with bilateral congenital EPL and EPB absence. Case is a 5 years old girl. Bilateral lack of thumb interphalangial and carpometacarpal extention were diagnosed by orthopedician and supported by magnetic resonance imaging. Kromozomal analysis was result in 46XX, and renal ultrasound was in normal range. After restoration of thumb extension with extensor indicis proprious (EIP) muscle, she underwent immobilization for 6 weeks with a forearm cast. After removel of the cast, rehabilitation program was initiated with early dynamic motion protocol by forearm splint. And also ultrasound between 6th and 8th weeks and she continued activities of daily living with increasing stress loading between 8th and 12th weeks. And the allowed to return daily life 12 weeks after surgery. In the evaluation active range of motion (AROM), grip and pinch strength were measured with JAMAR dynamometer, pinchmeter and goniometer, hand disability level was assessed by Nine Hole Peg Test (NHPT), and functional status with PEDI questionnaire before surgery, 8 and 12 weeks after surgery. In this case increase in AROM, JAMAR and Pinchmeter scores and decrease PEDI and NHPT are significiant. Thumb has a key component in hand functions. Ability to put the hand in daily activity by restorating the thumb function in congenital anomalies will decrease the disability level in chronic stages.

TFP97

Upper limb functional status following extended latissimus dorsi myocutaneous flap

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Introduction: Latissimus dorsi donor sites are generally accepted to offer minimal impact on the upper limb function. After informal patient feed-back suggested functional limitations following extended latissimus dorsi flaps, we embarked upon a study to formally assess the patient's perception of change in upper limb functioning with extended latissimus dorsi flaps.

Methods: 25 consecutive patients with unilateral extended latissimus dorsi flap breast reconstructions and at least one year follow-up were included. An independent, comprehensive, standardised, telephone questionnaire was carried out recording details on numerous, specific personal, household, work, sport and leisure activities, comparing pre- to post-op. Patients were also asked to comment on limitations, score their satisfaction (with donor site) and if, with hindsight, they would undergo or recommend the procedure. Case-notes were reviewed retrospectively.

Independently, a hand therapist recorded pre- and interval post-op DASH scores.

Results: Questionnaire return was 100%. 8 of 25 had pre- and post-op DASH evaluations, the remainder had post-op evaluations. Mean post-op period was 22 months. 40% of patients perceived no limitation. Details of restrictions in 60% are presented. Activities limited generally required overhead extension, usually with lifting weights. Impact on activities was considered acceptable by the patients with all patients at least, very satisfied. Those who wished, returned to work (mean time 4.5 months).

Conclusion: Extended latissimus dorsi flaps do impact on patient perception of upper limb function in 60%, with donor site tightness or limitation in activities which involve overhead extension.