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Abstracts 2006

2006 THREE CAST TECHNIQUES FOR THE TREATMENT OF EXTRA-ARTICULAR METACARPAL FRACTURES - COMPARISON OF SHORT-TERM OUTCOMES AND FINAL FRACTURE ALIGNMENTS, Lieutenant

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Background: Most extra-articular metacarpal fractures can be managed nonoperatively. While the conventional wisdom is that the metacarpophalangeal joint should be immobilized in a position of flexion, alternative methods for cast immobilization have been described. The purpose of this study was to retrospectively evaluate three methods of closed treatment; specifically, we investigated whether the position of immobilization of the metacarpophalangeal joint or the absence of a range of motion of the interphalangeal joints affected the short-term outcome or fracture alignment.

Methods: Between November 2000 and April 2004, extra-articular metacarpal fractures were immobilized for five weeks in one of three ways: with the metacarpophalangeal joints in flexion and full interphalangeal joint motion permitted (Group 1); with the metacarpophalangeal joints in extension and full interphalangeal joint motion permitted (Group 2); and with the metacarpophalangeal joints in flexion, the interphalangeal joints in extension, and no interphalangeal joint motion permitted (Group 3). Radiographs and the range of motion were evaluated at five weeks after application of the cast, and the range of motion and grip strength were assessed at nine weeks.

Results: Two hundred and sixty-three patients met the inclusion criteria. At five weeks, there was no difference among the treatment methods with regard to the range of motion or the maintenance of fracture reduction. At nine weeks, there was no significant

difference with regard to the range of motion or grip strength.

Conclusions: When immobilization was discontinued by five weeks, the position of the metacarpophalangeal joints and the absence or presence of interphalangeal joint motion during the immobilization had little effect on motion, grip strength, or fracture alignment. This finding contradicts the conventional teaching that the metacarpophalangeal joint must be immobilized in flexion to prevent long-term loss of joint extension. Patient comfort, ease of application, and the surgeon's familiarity with the technique should influence the choice of immobilization.

2006 EARLY RADIOGRAPHIC RESULTS FOLLOWING TOTAL HIP ARTHROPLASTY UTILIZING A TAPERED, PROXIMALLY-COATED FEMORAL STEM WITH IMMEDIATE POSTOPERATIVE WEIGHT

BEARING, Christian P. Christensen, MD & Cale Jacobs, PhD, ATC, Lexington Clinic, Lexington, KY

Immediate weight-bearing following primary THA has become widely used to improve early function, and as part of DVT prophylactic protocols. Previous investigations of several implant designs have reported that early weight-bearing does not result in altered fixation of the femoral component. The purpose of this study was to evaluate early subsidence of a proximally-hydroxyapatite coated femoral component in patients allowed immediate postoperative weight-bearing. Over a two year period, a single surgeon performed primary THA on 138 patients (158 hips) with a femoral component with these design characteristics. Patients were, on average, 61.4 ± 11.5 years old at the time of surgery with an average BMI of 30.2 ± 7.1 . Implants with these design characteristics were used on all patients during the study period that were not wheelchair bound prior to surgery or on chronic oral prednisone > 5 mg/day. Patients undergoing THA for displaced femoral neck fractures were also excluded. Preoperatively, 138 of the 158 hips were diagnosed with osteoarthritis, 16 with avascular necrosis, and four with posttraumatic arthritis. Approximately two to six hours after surgery, patients began weight bearing as tolerated. Once discharged from the hospital, patients were allowed to progress from a walker to a cane to using no assistive devices as soon as they were comfortable. Radiographs were taken immediately post-operative and at the 6-week follow-up. Mean subsidence was 0.8 ± 2.3 mm and 6 of the 158 hips (3.8%) demonstrated subsidence > 3 mm. One patient underwent revision THA after presenting with 23 mm of subsidence at the 6-week follow-up. It appears that the use of an uncemented, tapered femoral stem with a proximal hydroxyapatite coating may not result in improved early subsidence when used in combination with immediate weight bearing protocols.

2006 INTRA-ARTICULAR INJECTIONS CONTAINING A CORTICOSTEROID DURING TOTAL KNEE ARTHROPLASTY, Christian P. Christensen, MD & Cale

Jacobs, PhD, ATC, Lexington Clinic, Lexington, KY The principles of minimally invasive surgery have had lead to changes in not only surgical technique, but perhaps

more importantly, to perioperative pain control. A multimodal approach to pain control including intra-articular injections of bupivacaine, morphine, and epinephrine has been demonstrated to be very effective during primary total knee arthroplasty. The purpose of this retrospective study was to compare pain, range of motion, narcotic consumption, and manipulation rates for patients receiving peri-articular injections either with or without the inclusion of a corticosteroid and antibiotic. Over a six month period, 50 primary, PCL-retaining TKAs (44 patients) were performed by a single surgeon. A retrospective chart review was performed to compare a group that received an peri-articular injection consisting of 80 mg marcaine, 4 mg morphine, 300 µg epinephrine, and 100 µg clonidine (NS, n = 30); and a group receiving the same injection with the addition of a corticosteroid (40 mg methylprednisolone or kenalog) and an antibiotic (750 mg Zinacef; S, n = 20). Patients were excluded from further analysis if they had documented preoperative narcotic use. The two groups were created as the surgeon gradually changed his practice from giving injections without a steroid, and then to the current practice of using a peri-articular injection with a steroid. The groups were not purely consecutive, with some mixing of the two groups. Pain scores were higher for the group that did not receive the steroid on postoperative day 1 and on the day of discharge; however, these differences did not reach statistical significance ($p = 0.13$). The length of hospital stay for the steroid group was significantly lower than the group that did not receive the steroid ($p = 0.03$). The amount of narcotic pain medication consumed did not differ between groups ($p = 0.89$). Three of 30 knees (10%) in the group that did not receive the steroid required manipulation under anesthesia, compared to 1 of 20 (5%) in the steroid group. At 6 week follow-up, no patients in either group suffered a postoperative infection or DVT. From these results, we conclude that the inclusion of a corticosteroid and antibiotic with a peri-articular injection of marcaine, epinephrine, clonidine, and morphine may improve early outcomes following primary total knee arthroplasty. Large prospective clinical trials are necessary to confirm improved early outcomes to determine if this treatment results in reduced health care costs associated with this procedure.

2006 RESULTS OF OPEN REDUCTION AND INTERNAL FIXATION OF THE SYMPTOMATIC TYPE II ACCESSORY NAVICULAR, Jonathan R. Saluta, MD and Mark E Easley, MD, Duke University Medical Center, Durham, NC

Introduction: Currently, the modified Kidner procedure is recommended to treat the symptomatic accessory navicular that fails nonoperative management. Based on anecdotal evidence, some foot and ankle specialists have cautioned that excision of the accessory navicular can lead to a progressive increase in pain and loss of the longitudinal arch. As a result, they have recommended open reduction and internal fixation (ORIF) of the symptomatic accessory navicular as a surgical alternative. To our knowledge, the only references to this surgical alternative in the orthopedic literature are two technique papers. To substantiate this technique, we conducted a prospective study of ORIF of the symptomatic type II accessory navicular.

Methods: Between 1999 and 2005, the senior investigator surgically managed 17 symptomatic type II accessory naviculars that failed nonoperative measures. The average

age was 25 years, range 10-59 years; the study cohort included 8 males and 9 females. A standard treatment algorithm was followed: (A) accessory naviculars of adequate size underwent an ORIF (10), and (B) accessory naviculars of smaller size underwent a modified Kidner procedure (7). The determination of adequate size to support screw fixation was made intraoperatively. Corrective osteotomies and/or soft-tissue procedures were performed concomitantly in nine patients to address pes planus. Pre- and postoperatively, patients were assessed radiographically with three standard weightbearing x-rays of the foot and an external oblique view. Preoperative MRI scans were available in 12/17 feet and were analyzed to see if there was any correlation between MRI findings and success of ORIF of the accessory navicular. Patients were evaluated with the AOFAS midfoot clinical rating system (maximum 100 points). Evaluation was by independent observer.

Results: In the patients treated with ORIF, average follow-up was 31 months (range 11-71). The average AOFAS midfoot score improved from 49 (range 0-62) to 89 (range 69-100) points. Radiographic analysis suggested an 80% union rate. However, only one patient out of ten (10%) undergoing ORIF with subsequent nonunion was symptomatic at the accessory navicular. Only one patient (10%) had painful hardware, and her pain resolved after screw removal. In the patients treated with excision, average followup was 48 months (range 24-68). The average AOFAS score improved from 45 (range 26-70) to 78 (range 26-93) points. Three of seven feet (43%) treated with accessory navicular excision had persistent midfoot pain at last followup with clinical and radiographic signs of progressive loss of the longitudinal arch. Twelve patients had a preoperative MRI of the foot with all showing edema suggesting an injury to the synchondrosis. We found no correlation between MRI findings and success of ORIF of the accessory navicular.

Discussion: As suggested by previous technique papers and this study, ORIF of the symptomatic type II accessory navicular may have merit. We anticipate that this study will prompt a comprehensive multicenter evaluation of this technique.

2006 REVISION TIBIOTALAR ARTHRODESIS USING RING EXTERNAL FIXATION, Mark Easley MD, Duke University Medical Center, Durham, NC

Background: Contemporary recommendations for primary and revision ankle arthrodesis favor internal compression techniques using screw and/or plate fixation, with satisfactory outcomes being reported for the majority of patients. In select patients, revision tibiotalar arthrodesis with internal fixation may be limited or even contraindicated given insufficient bone stock to adequately support implants, an abundance of avascular bone, or a history of osteomyelitis. Recently, comparable outcomes of primary and revision tibiotalar arthrodeses have been reported using external fixation, even in situations where limb salvage is questionable. We report our experience with ring external fixation for complex, revision ankle arthrodesis.

Methods: Twenty-two consecutive patients underwent revision tibiotalar arthrodesis using ring external fixation. All patients had at least one prior attempt at arthrodesis using internal fixation. The average number of surgeries prior to revision arthrodesis was 2 (range, 1 to 8). External fixation was maintained for an average of 15 weeks (range, 12

to 44 weeks). Union (time to removal of external fixation) was suggested by evidence for bridging trabeculation at the arthrodesis site in three standard radiographic views of the ankle. In cases where union could not be adequately determined on radiographic views or the arthrodesis site was obscured by the external fixator, a limited CT scan was obtained to assess union. All patients were encouraged to wear a brace for the first six months following external fixator removal. Pre-and post-operative AOFAS ankle-hindfoot scores were used to assess functional outcome.

Results: All 22 patients were available for followup at an average of 51 months (range, 15 to 62). The average AOFAS ankle-hindfoot score improved from 26 preoperatively (range, 0 to 45) to 64 points at final followup (range, 0 to 87 points). Tibiotalar fusion was achieved in 19/22 patients (86%). In the three patients with persistent nonunions, one had avascular necrosis of the talus and two had persistent osteomyelitis. Two of these patients underwent rerevision arthrodesis and one opted for amputation. Over the course of treatment with external fixation, 34 minor complications (pin tract infections (24), broken pins (3), cellulitis (7)) were managed effectively with local wound care, oral antibiotics, and/or pin removal in the clinic setting. Four major complications (deep infection (2), wound dehiscence (2)) were surgically addressed while maintaining compression at the arthrodesis site by external fixation. Three patients had symptomatic malunions: varus (2), equinus (1). Hindfoot motion was less than physiologic in all patients (compared to the contralateral extremity), despite the external fixator being constructed to protect the subtalar joint from concomitant compression.

Conclusion: Ring external fixation is not a panacea for revision ankle arthrodesis. However, our study suggests that union rates and results of revision ankle arthrodesis using ring external fixation are comparable to those reported for revision arthrodesis with internal compression. Furthermore, ring external fixation may facilitate clinically acceptable limb salvage in these complex cases when internal fixation methods are limited or even contraindicated.

2006 THE EARLY U.S. EXPERIENCE OF REVERSE SHOULDER ARTHROPLASTY: INDICATIONS, TECHNIQUE, AND RESULTS, Spero G. Karas MD, Emory Healthcare Sports Medicine Center, Atlanta, GA, spero.karas@emoryhealthcare.org

Introduction: To date, rotator cuff arthropathy (RCA) remains a difficult clinical entity with no uniformly excellent surgical option. The recent approval of reverse prosthetic technology offers a promising treatment modality for this difficult problem. We discuss technical considerations and early results of the first 462 consecutive patients treated with the Reverse Shoulder Prosthesis (Encore Medical, Austin, TX, USA).

Materials: From November 2002 through January 2005, 462 RSP procedures were performed for primary RCA or a failed prosthetic replacement with rotator cuff deficiency. The study was a multi-center, FDA approved Investigational Device Exemption clinical trial of the Reverse Shoulder Prosthesis. The device has since been FDA approved. Patients were assessed pre-operatively with pain and range of motion scores. Pre-operative pain as assessed on a 1-10 scale averaged 8.7 (Range= 6-10, SD=

1.41). Pre-operative forward elevation was 53.1 degrees. Patients were assessed for pain, range of motion, and by validated outcomes tools at 3, 6, 12, and 24 months post-operatively.

Results: One year follow-up was available for 312 patients. The mean pain score decreased to 3.2 from a pre-operative value of 8.7. Average forward elevation improved to 93° from a pre-operative value of 53°. The ASES score at one year was 70, compared to a pre-operative mean of 28. There were significant improvements in the pain, function, social, and emotional arms of the SF-36. The complication rate was 14.9% (69/462) which, in addition to problems related to the component, also included infection, hematoma, and unresolved pain. The most common cause of revision was instability of the components.

Discussion and Conclusions: The early results of reverse shoulder arthroplasty are encouraging, but not without complications. Longer follow-up is necessary to thoroughly evaluate the safety and efficacy of this procedure.

2006 LATISSIMUS DORSI TRANSFER FOR THE MANAGEMENT OF IRREPARABLE ROTATOR CUFF TEARS, Spero G Karas MD⁺, AW Pearsall MD*, Sudhakar Madanogopal MD*, +Emory Healthcare Sports Medicine Center, Atlanta, GA USA, *University of South Alabama Dept. of Orthopaedics, Mobile, AL

Introduction: Massive, irreparable tears of the rotator cuff present a unique set of reconstructive challenges to the orthopaedic surgeon. Numerous tendon transfers have been described for reconstruction of irreparable rotator cuff tears, including the trapezius, triceps, deltoid, and latissimus dorsi musculotendinous units. We present the indications, technique, and outcomes of latissimus dorsi transfer for the management of irreparable rotator cuff tears.

Methods: From 1999-2004, 12 patients were treated with latissimus dorsi transfer for massive, irreparable rotator cuff tears. All patients had failed previous attempts at rotator cuff repair. Short or thin latissimus tendons were augmented with autologous fascia lata. A minimum 12 month follow-up was available for 10 patients.

Results: Mean post-operative pain scores decreased to 3.6 from a pre-operative value of 9.1 ($p < .05$). The mean post-operative Constant-Murley score improved to 44 from a pre-operative value of 23 ($p < .05$). Forward elevation improved an average of 27 degrees across the study group. Four patients rated their results “good”, four rated themselves as “satisfactory”, and two rated their result as “poor”. There were three complications: two wound infections at the fascia lata harvest site and one infection at the rotator cuff repair site.

Conclusions: Latissimus transfer for irreparable rotator cuff tears provides improvement in pain, function, and range of motion. Appropriate patient selection and attention to surgical technique should optimize patient outcomes while limiting complications.

2006 A THREE DIMENSIONAL ANALYSIS OF SCAPULAR KINEMATICS IN PATIENTS WITH MULTIDIRECTIONAL SHOULDER INSTABILITY, Spero G. Karas MD+*, Charles A. Thigpen MS*, Darin A Padua PhD*, +Emory Healthcare Sports Medicine Center Atlanta, GA, *University of North Carolina Department of Exercise and Sports Science

Objective: Scapular muscle control is thought to play a vital role in shoulder stability. The purpose of this study was to evaluate and compare scapular kinematic differences in patients with and without multidirectional instability (MDI) of the shoulder.

Methods: A group of 24 recreationally active subjects were used for this study. All subjects in the study group (n=12) were diagnosed with symptomatic MDI by a fellowship trained shoulder specialist. All subjects in the control group (n=12) had asymptomatic shoulders. Subjects were matched for age, anthropometrics, activity level, and arm dominance. An electromagnetic tracking system assessed shoulder joint kinematics while subjects raised and lowered their humerus over an arc from 0 - 120° while holding a dumbbell equal to 5% bodyweight. We assessed 3-dimensional scapular motion for upward-downward rotation (U-D), internal-external rotation (IR-ER), and anterior-posterior tipping (A-P) over 30° motion arcs as the humerus was lowered from 120° to 30°. Scapular motion was compared across 3-arcs of forward flexion (120-90°, 89°-60 and 59°-30°). Separate two-way repeated measure ANOVAs were performed to compare scapular motion between the MDI and control groups across the 3-arcs of humeral motion.

Results: There was a significant main effect between groups (P=.001) for scapula IR-ER motion. The MDI group moved into scapular IR while the stable group moved into scapular ER as subjects lowered their arm (Figure 1). There was a significant group-by-motion arc interaction for scapula A-P tipping (P=.028). Tukey's post hoc procedures revealed greater scapular posterior tipping for the MDI group over the 120°- 90° motion arc in comparison to the stable group. There were no significant differences between the MDI and stable groups for scapula U-D rotation (P>.05).

Conclusions: Differences in scapular anterior-posterior tipping and internal-external rotation between the MDI and stable groups may represent a lack of dynamic control or a compensatory movement strategy in the MDI group. As the arm is lowered, scapular posterior tipping and internal rotation may increase bony congruency and compensate for the loss of static and dynamic glenohumeral constraints in subjects with MDI. Our observed differences in scapular kinematics help confirm clinical observations of scapular dyskinesis in patients with MDI.

2006 SURGICAL TREATMENT FOR THE CONGENITAL RETROFLEXIBLE THUMB DEFORMITY, Zhongyu Li, MD, PhD, L. Andrew Koman, MD, Wake Forest University School of Medicine, Winston-Salem, NC

Retroflexible thumb is an uncommon congenital anomaly. Patients often present with trigger thumb symptoms associated with a flexed thumb interphalangeal (IP) and a

hyperextendible thumb metacarpophalangeal (MP) deformities. Neither the pathology of the deformity nor the treatment protocol has been well defined. The purpose of this study is to describe a single technique for treating pediatric retroflexible thumbs and report our results in a consecutive series of patients.

Between 1994 and 2004, 7 patients seen at our institution were identified as having retroflexible thumb deformity after conducting a retrospective chart review. All patients were surgically treated with a release of the A1 pulley, proximal advancement of the MP volar plate using a pull-out button and pinning of the MP joint at 10-20° of flexion for 3.5 to 4 weeks.

There were 4 girls and 3 boys involving 3 right, 2 left and 2 bilateral thumbs. One patient had history of arthrogryposis. Five patients were noticed to have the deformity since birth. The mean age of surgery was 46 months (26 to 82 months). All patients had symptom of thumb triggering with a painless, palpable MP nodule. Thumb MP joints were able to be hyperextended to 60-90° passively. The mean follow-up was 64 months (12 month to 8 years). All thumbs were stable, there was no further triggering or recurrent hyperextension deformity. No postoperative complications were observed.

Retroflexible thumb can be safely treated with predictable results by releasing the A1 pulley, advancing the MP volar plate with a pullout button and pinning of MP joint in slight flexion.

2006 OUTCOMES IN PATIENTS WITH A HISTORY OF KNEE STIFFNESS UNDERGOING CONTRALATERAL PRIMARY TOTAL KNEE

ARTHROPLASTY, Jason E. Lang, M.D., Duke University Medical Center, Durham, NC

This study seeks to evaluate the clinical outcomes of a second primary total knee arthroplasty (TKA), in patients whose initial (contralateral) primary TKA was complicated by stiffness. We retrospectively compared the pre- and post-operative ROM and knee society scores (KSS) from a study group of 15 patients to an age-matched control group. Statistical analysis did not reveal a significant difference in final post-operative ROM, or KSS between the two groups. However, there was a statistically significant higher rate of closed manipulation in the study group. Therefore, while the study group did show a higher rate of early stiffness, eventual functional outcome was comparable to a non-stiffness control group.

Introduction: Stiffness following total knee arthroplasty (TKA) can cause poor functional results. Outcome following second primary TKA in patients whose contralateral primary arthroplasty was complicated by stiffness is evaluated in this study.

Methods: Between February 1994 and February 2005, 34 of 239 revision TKA's and 104 closed manipulations after primary TKA were performed for knee stiffness (range of motion (ROM) less or equal to 85 degrees). From this group, 15 patients underwent contralateral primary TKA. One-hundred nine contemporary primary TKA's served as the control. Analysis included statistical comparison of pre and post operative motion as well as Knee Society Scores (KSS) using unpaired student's t-test. Manipulation rates were compared using chi-square analysis. Minimum follow up was 2 years (range 2 years to 5 years).

Results: Four of 15 study patients developed arthrofibrosis requiring manipulation, achieving final ROM of greater or equal to 90 degrees. With minimum 2-year follow up, the study group did not show statistically different post operative flexion (p=0.119) nor total range of motion (p=0.187) compared to the control group. Additionally, with minimum 2-year follow up, there were no significant differences in Pain Score (p=0.383), Knee Score(p=0.42), or Functional Score (p=0.43) between the two groups. The study group had a higher rate of closed manipulation (p = <0.001).

Conclusion: Therefore, while the study group did show a higher rate of early stiffness, eventual functional outcome was comparable to a non-stiffness control group.

2006 PISOTRIQUETRAL ARTHRITIS FOLLOWING WRIST AND INTERCARPAL ARTHRODESIS

Gary M. Lourie, MD, The Hand and Upper Extremity Center of Georgia, Atlanta, GA A retrospective review identified nine patients with pisotriquetral arthritis requiring pisiform excision following wrist and intercarpal arthrodesis. The second part of the study utilized six cadaver wrists to assess the alteration in pressure and kinematics of the pisotriquetral joint following four-corner and wrist fusion. Nine patients (seven male, two female) with average age of 41.7, none with pre-operative pisotriquetral arthrosis, underwent four corner (six patients) or wrist fusion (three patients). At an average of fifteen months postoperative, patients presented with volar-ulnar wrist pain, which was resolved with pisiform excision. Cadaveric studies revealed maximum pisotriquetral joint pressure in full extension with progressive pressure decrease throughout flexion. The pressure across the pisotriquetral joint did not change with simulated fusion but fluoroscopy revealed diminished excursion of the pisiform across a smaller area following fusion. It is our premise that this constant loading of the joint contributes to the development of arthrosis. Patients undergoing intercarpal and/or wrist fusion should have the pisotriquetral joint assessed.

2006 COMPARISON OF EXTERNAL FIXATION AND VOLAR PLATE FIXATION FOR TREATMENT OF UNSTABLE INTRA-ARTICULAR DISTAL RADIUS FRACTURES

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Introduction Controversy exists with respect to the optimal treatment modality for unstable distal radius fractures. Various reports using locked volar plating have provided excellent results. We retrospectively compared the results of open reduction and internal fixation (ORIF) through a volar approach using a locking plate with standard external fixation and percutaneous pinning for the treatment of unstable distal radius fractures.

Methods The study included patients with similar unstable distal radius fractures treated by a single surgeon over a four year period, with a minimum two-year follow-up. The locked volar plate group included 41 patients with an average 29 months follow up. The external fixation, or control group, included 14 patients with an average follow up of 33 months. Average age at presentation was 45 years in the external fixation group

and 48 years in the ORIF group. The male/female ratios were 16/25 among the ORIF and 6/8 in the external fixation groups. The two groups were compared for range of motion, strength, and functional outcome measured by DASH score. Radiographic measurements were also evaluated between groups.

Results Final ranges of motion and grip strengths were similar between the two groups. However, at interim six week follow-up, the ORIF group had superior range-of-motion. The mean DASH score of the locked volar plate group was 12 compared to 23 for the external fixation group. Radiographically, volar tilt and radial length were significantly better in the patients treated with ORIF. The ORIF group required less therapy visits. No complications occurred in the locked volar plate group while two patients had a pin tract infection and one had prolonged finger stiffness required extensive therapy in the external fixation group.

Discussion and Conclusion The use of the locked volar plate for the treatment unstable radius fractures resulted in earlier recovery from surgical treatment of distal radius fractures. Improved DASH scores were noted in the ORIF group. In addition, the ORIF group had improved radial length and volar tilt on x-rays. Despite no significant difference between range-of-motion and grip strength long-term, locked volar plating compares favorably to external fixation and pinning for amenable fracture patterns.

2006 ABSOLUTE EMERGENCIES IN HAND SURGERY, Sigurd Sandzen, Vero Beach, FL

Absolute emergencies in hand surgery are those cases which must be treated immediately to maintain tissue viability, achieve the best functional result, or both.

These situations include:

1. Open wounds
2. Replantation of amputated or near amputated parts
3. Closed compartment syndrome
4. High pressure injection injuries
5. Human bite wounds

Contraindicated are delayed wound care or conservative initial care.

2006 RADIOFREQUENCY PROBE APPLICATIONS IN WRIST ARTHROSCOPY, Sotereanos D.G., Giannoulis F.S., Darlis N.A., Weiser R.W., Allegheny General Hospital, Department of Orthopaedics, Pittsburgh, PA

Purpose: The use of electrosurgical (radiofrequency) devices in arthroscopic surgery has gained increasing popularity in recent years as a tool for resection, ablation,

coagulation and soft tissue thermal shrinkage. Recently, the availability of radiofrequency (RF) probes for small joint arthroscopy has extended its use in the wrist joint. We present the initial results of triangular fibrocartilage complex (TFCC) tear debridement and scapholunate (SL) ligament thermal shrinkage using RF probes.

Methods: The results of 36 patients on which RF probes were used during wrist arthroscopy are presented. Sixteen patients (mean age 34 years) were treated for partial (Geissler grade 1 and II) SL interosseous ligament tears and 20 patients (mean age 44 years) had TFCC tear debridement. In the SL group no patient demonstrated radiologic signs of dissociation preoperatively (SL interval under 3.5mm, mean SL angle 49°). Fourteen partial tears and two redundant SL ligaments were treated with thermal shrinkage. In the TFCC group 18 central and two radial tears were debrided to a stable rim using the probe.

Results: All patients had a follow-up of at least 9 months (mean 19 months for the SL group and 22 months for the TFCC group). Fourteen of the 16 patients with partial SL tears experienced substantial pain relief whereas in two the pain remained unchanged. No patient exhibited radiologic signs of arthritis or static or dynamic instability postoperatively (SL interval remained under 3.5mm, mean SL angle 53°). In the modified Mayo wrist score here were 8 excellent, 6 good, 1 fair and 1 poor result. In the TFCC group seventeen patients experienced substantial pain relief whereas in three the pain was unchanged. Ten excellent, 7 good and 3 fair results were achieved. No complications were noted from the use of radiofrequency probes in either group.

Conclusions: The results of the two individual procedures that were studied compare favorably with the results using standard mechanized resectors. RF probes are small in size, easy to handle, precise and provide coagulation and a thermal shrinkage effect in treated tissues. No complications were noted from their use. Concerns over creep and reduced elasticity of tissues after thermal shrinkage have not been proven to be clinically significant in the wrist joint. Compared to lasers that have also been used in wrist arthroscopy, the risk of accidental damage to the hyaline cartilage is minimal and the overall cost is lower.

2006 SUPRASCAPULAR INTRANEURAL GANGLIA AND GLENOHUMERAL JOINT CONNECTIONS, Spinner RJ, Amrami KK, Kliot M, Johnston SP, Casañas J., Mayo Clinic, Rochester, MN

Object. Unlike the more commonly noted paralabral cysts (extraneural ganglia) which are well known to result in suprascapular nerve compression, only four cases of suprascapular intraneural ganglia have been reported. Because of their rarity, the pathogenesis of suprascapular intraneural ganglia has been poorly understood and a pathoanatomical explanation has not been provided. In view of the growing literature demonstrating strong associations between paralabral cysts and labral (capsular) pathology, joint connections and joint communications, the authors retrospectively reviewed the magnetic resonance (MR) imaging studies and postoperative results in the two featured patients to test a hypothesis that suprascapular intraneural ganglia would have analogous findings.

Methods. Two patients who presented with suprascapular neuropathy were found to have intraneural ganglia. Connections to the glenohumeral joint could be established in both patients through posterior labrocapsular complex tears. In neither patient was the joint connection identified preoperatively or intraoperatively, and cyst decompression was performed by itself without attention to the labral tear. The suprascapular intraneural ganglia extended from the glenohumeral joint as far proximally to the level of the nerves' origin from the upper trunk in the supraclavicular fossa. Although both patients experienced symptomatic improvement after operation, neurologic recovery was incomplete. In both cases, postoperative MR images revealed cyst persistence. In addition, unrecognized SLAP II lesions (tears of the superior labrum extending anterior to posterior and involving the biceps anchor at the labrum without actual extension into the tendon) were visualized. In one patient with a persistent cyst, MR arthrography was obtained and demonstrated a communication between the joint and the cyst.

Conclusions. The findings in these two patients would support the synovial theory for intraneural ganglia. Based on their experience with intraneural ganglia at other sites, the authors believe that suprascapular intraneural ganglia arise from the glenohumeral joint, egress through a superior (posterior) labral tear and dissect within the epineurium along an articular branch into the main nerve, following the path of least resistance. Furthermore, these two cases of intraneural ganglia with SLAP lesions are directly analogous to the many cases of paralabral cysts associated with these types of labral tears. By better understanding the origin of this unusual type of ganglia and drawing analogies to the more common extraneural cysts, surgical strategies can be formulated to address the underlying pathoanatomy, improve operative outcomes, and prevent recurrences. (*J Neurosurg* 104:551-557, 2006)

2006 T-PIN: A NEW DEVICE FOR DISTAL RADIUS FRACTURES, John S. Taras, M.D., The Philadelphia Hand Center, Philadelphia, PA

Abstract: Distal radius fractures are among the most common fractures treated by orthopaedic surgeons. Numerous techniques have been devised to address these fractures and the factors associated with these injuries. The T-Pin® (Union Surgical, LLC, Philadelphia, Pennsylvania) is a novel instrumentation designed to utilize standard percutaneous techniques in the treatment of extra-articular distal radius fractures. The T-Pin® allows for early active range of motion, as well as, earlier return to functional activities. This article discusses the instrumentation, the techniques of insertion and extraction, and post-operative care.

Indications/Contraindications: The indications for use of the T-Pin® include extraarticular dorsally displaced distal radius fractures (Fig. 2). This technique can be used in active patients because it is a relatively short procedure and allows for a quick return of function following a short immobilization period. The short nature of the procedure, especially the limited incisions for insertion of the pins, makes this procedure useful in the elderly and medically unstable populations because it can be performed under local anesthesia with intravenous sedation.

The contraindications to this procedure include intraarticular fractures having

displacement and/or severe comminution. Low-demand patients who have fractures amenable to immobilization would also not be considered candidates for this procedure.

Technique: Patients are placed supine on the operating table. Typical anesthesia used for the case is conscious sedation with a local field block. We use bupivacaine 0.5% without epinephrine. A tourniquet is then applied to the operative extremity and the extremity is prepped and draped in a sterile fashion. The limb is exsanguinated, and the tourniquet is inflated to 250 mm Hg. Typical tourniquet time is approximately 20 minutes.

Under fluoroscopic guidance, closed reduction of the fracture is performed. Two 0.5 cm longitudinal incisions are made: 1 at the distal aspect of the radial styloid between the first and second dorsal extensor compartment, dorsal to the abductor pollicis longus / extensor pollicis brevis tendons and the second at Lister's tubercle between the third and fourth dorsal extensor compartment. The soft tissues are bluntly dissected to bone for adequate placement of guide wires. Dissection is carried down to visualize the pin insertion site, and adjacent extensor tendons are protected by retraction or the use of the tissue protection guide. The fracture is initially stabilized with smooth 1 mm guide wires at the aforementioned insertional sites and placement is adjusted under fluoroscopic guidance (Fig. 3). A technical point to note is that the guide wire will deflect off the inner cortices and bend whereas the more rigid T-Pin® will not. Therefore, the guide wire insertion must stop when cortical contact is made (Fig. 4). A measuring guide is then applied along each guide wire indicating the length of the T-Pin® required (Fig. 5). The pin tray supplies pin lengths from 40 mm to 70 mm in 5 mm increments.

The cannulated T-Pin® and its tissue protector are loaded onto the power driver and inserted over the guide wire (Fig. 6). The T-Pin® is driven along the guide wire until the trailing threads are nearly flush to the bone. The tissue protector provided on the tray has the feature of opening up to allow removal for final seating of the pin without having to disengage the driver. The surgeon removes the power driver and guide wire, leaving only the T-Pin® in place. The break-off driving mechanism of the pin is easily removed by bending in hand.

Stability of the fixation is checked under fluoroscopy (Fig. 7). The tourniquet is deflated and the skin closed with nylon sutures (Fig. 8). The post-operative dressing includes sterile gauze and a volar splint.