DISTRACTIONS

The Newsletter of
The Limb Lengthening and Reconstruction Society: ASAMI North America

Volume 10, Number 3 June/July 2004

Fourteenth Annual Scientific Meeting of Limb Lengthening and Reconstruction Society

The final agenda is attached to the end of this newsletter (pages 9–13).

Kindly note that pre–registration is required to avoid additional fees.
This includes Society members and abstract authors.
Please print and complete the registration form at www.asaminorthamerica.org and fax to (512) 301–4751 as soon as possible.
Mail copy of form with payment to be received by July 9, 2004.

Make hotel reservation by **June 23, 2004** to receive discounted room rate.
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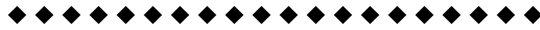

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Letter from the President

Dear LLRS Members and Friends,

I hope this newsletter finds you all well, and hopefully, finalizing plans to attend the 14th Annual Scientific Meeting in Toronto, Friday–Sunday, July 23–25th. The program is located elsewhere in this newsletter. We will have 46 scientific presentations, two guest speakers (Hiroyuki Tsuchiya and Captain Norman Baker), a symposium on bone graft substitutes and bone growth stimulation, a roundtable case presentation/discussion moderated by Paul Freudigman, and three "master's workshops" on the Taylor Spatial Frame, ISKD nail, and the Multi-Axial Clamp during this meeting. There is something for everyone, so don't miss out! Toronto is a great city to visit, and that particular weekend usually has the finest weather of the year for that part of the world. On top of all this, we have just confirmed a reduction in the convention room rates at the host hotel (the Delta Chelsea) to $179 CAN and up (that's approximately $130 US at current exchange rates, giving you some idea of the power of the US dollar across the border!). Thanks to Will Mackenzie (President Elect and program chair), Karen Syzdek (Society Manager), and all behind the scenes working to make this a great meeting. I look forward to greeting you all in Toronto, and having a great meeting.

I have just returned from a week in Istanbul attending the ASAMI International meeting held May 27–29th at the Istanbul Convention and Exhibition Center. The meeting hall was ultra-modern (making for an interesting contrast with ancient Istanbul) with all the latest in Ilizarov techniques being presented from around the world. Combine these facets with the idyllic setting of Europe–meets–Asia on the Bosphorus, and you can appreciate the components of an exceptional meeting. The Executive Committee of ASAMI International has decided to turn the international meeting into a biennial event. The next meeting is tentatively scheduled for Fall '06 in Japan, presided over by newly elected ASAMI International President, Dr. Y. Matsui. The '08 meeting is tentatively scheduled to be held in Russia, in honor of Professor Shetsov's 70th birthday. I have the honor of being elected Vice President of ASAMI International, and will endeavor to represent LLRS well in that capacity.

I look forward to seeing you in Toronto next month!

Sincerely,

John Birch

Abstracts in A Minute

The purpose of Abstracts in A Minute is to facilitate members' self–study. Because of the brevity, these abstracts are not intended to be an authoritative or critical review.

Deformity Correction

Birch JG, Samchukov ML. **Use of the Ilizarov method to correct lower limb deformities in children and adolescents.** *J Am Acad Orthop Surg* 2004; 12:144–154. Review of indications, frame mechanics, lower extremity lengthening and deformity correction, and complications.

Choi IH, Yoo JH, Chung CY, Cho TJ, Yoo WJ. **Congenital diastasis of the inferior tibiofibular joint: report of three additional cases treated by the Ilizarov method and literature review.** *J Pediatr Orthop* 2004; 24:304–311. Authors report results of Ilizarov reconstructive procedure for 3 cases of congenital diastasis of the inferior tibiofibular joint. Deformity components were talipes equinovarus, ankle diastasis, and leg–length inequality. Ages were 5+9, 20+3, and 8+2. Procedures included staged limb lengthening (3), first metatarsal lengthenings (2), Achilles tendon lengthening (2), derotation combined with tibial lengthening (2), foot deformity correction (3), fusion of distal tibiofibular joint (2), distal tibial and fibular epiphyseodeses (1), and partial resection of medial malleolus (1). Previous cases in the literature are reviewed. Ilizarov treatment resulted in plantigrade functional feet with normal sensation; patients were satisfied with the cosmetic and functional results.

El Barbary H, Abdel Ghani H, Hegazy M. **Correction of relapsed or neglected clubfoot using a simple Ilizarov frame.** *Int Orthop* 2004; Published online. Review of 66 feet in 52 patients with mean age 8.5 (range 4–14) years, treated with a simple Ilizarov frame. Fifty–eight were relapsed; eight were neglected with no previous surgery. Frames consisted of one or two tibial rings, a calcaneal ring, and metatarsal 5/8 ring. Goal of soft tissue stretching was slight over–correction, followed by frame retention for another 4–6 weeks, followed by a BK cast for 4 weeks. Night splints are continued until end of growth. At follow up, all feet were painless and plantigrade, with improvement in ankle dorsiflexion. There was no increased stiffness. During follow up, eight feet in seven patients showed some recurrence of the metatarsus adductus.

Kandemir U, Yazici M, Tokgozoglu AM, Alanay A. **Distraction osteogenesis (callotasis) for pelvic closure in bladder exstrophy.** *Clin Orthop* 2004; 418:231–236. Authors review 14 patients (mean age 3.1, range 1–6 years) with bladder exstrophy and pubic diastasis, treated with a two–component plate–rod combination designed to widen the pelvic ring using distraction osteogenesis. After a middiagonal iliac osteotomy, two components of the implant are connected with two bolts passing through the iliac bones. After 10 days the rods outside the skin are approximated gradually. When the pubic bones get close, they are fixed by heavy nonabsorbable sutures. Successful tension–free closure of the abdominal wall was achieved in all but one. Urogenital reconstruction was done in a second stage. This method widens the diameter of the pelvic ring and allows approximation of the pubic bones without tension. As with other surgical techniques, there was increasing pubic diastasis at follow up.

Deformity Correction continued

Houshian S, Schrøder, Weeth R. **Correction of Madelung's deformity by the Ilizarov technique.** ***JBJS Br*** **2004; 86:536–540.** Seven patients (eight forearms) with Madelung's deformity were treated by radial osteotomy with subsequent lengthening and angular correction by the Ilizarov technique. Frames consisted of three half–rings and 4mm threaded half pins. Hinges were at axis of proposed osteotomy, approximately 2cm proximal to radial articular surface. Lengthening was performed, followed by angular correction. All patients were pain–free at follow up, after a mean pre–op VAS score of 9. Supination improved by a mean of 34°; pronation improved by a mean of 9°; flexion improved by a mean of 15°. Authors avoided transfixion of the radioulnar and radiocarpal joints.

Infections

Calif E, Stein H, Lerner A. **The Ilizarov external fixation frame in compression arthrodesis of large, weight bearing joints.** *Acta Orthop Belg* 2004; 70:51–56. Twenty patients underwent Ilizarov compression to achieve fusion of the knee (6), tibiotalar (14), and subtalar (3) joints destroyed by infection. Seventeen achieved bony fusion. Two achieved stable fibrous union, and one was lost to follow up. Bone grafts were not used.

Gunes T, Sen C, Erdem M. **Knee arthrodesis using circular external fixator in the treatment of infected knee prosthesis: case report.** *Knee Surg Sports Traumatol Arthrosc* 2004. Case report of 68 y.o. male who underwent removal of a TKR due to infection, which progressed despite debridement, antibiotic therapy, and soft tissue reconstruction. An antibiotic spacer was inserted for 2 months, followed by a circular external fixator for 4 months. No bone graft or further soft tissue reconstruction was necessary.

Hashmi MA, Norman P, Saleh M. **The management of chronic osteomyelitis using the Lautenbach method.** *J Bone Joint Surg Br* 2004; 86: 269–275. Authors review 17 patients (18 segments) with chronic osteomyelitis treated with the Lautenbach procedure: debridement of dead and scarred soft tissue and bone, intramedullary reaming, and antegrade and retrograde insertion of intramedullary double–lumen 6mm tubes to deliver antibiotic, analyze cavity flora, and obliterate dead space. A third tube was inserted in the surrounding soft tissue in 4 cases. Tubes were removed when irrigate produced three consecutive clear cultures with improvement of blood indices and obliteration of cavity volume. Mean length of treatment was 27 (14–48) days. After treatment 11 had internal or external fixation or total joint replacement. Two underwent amputation, despite elimination of infection.

Sangkaew C. **Distraction osteogenesis with conventional external fixator for tibial bone loss.** *Int Orthop* 2004. Review of 21 patients with tibial bone loss due to open infected fractures (9) or infected nonunion (12), treated with AO external fixator for distraction osteogenesis. Mean healing index was 44.7 (range 17–86) days/cm. Wound infection resolved completely in 19/21. Nonunions healed in 11/12. Acceptable alignment and length were achieved in 18/21.

Conway JD, Mont MA, Bezwada HP. **Current concepts review: Arthrodesis of the knee.** Authors review indications, techniques, results, complications, and alternatives for knee arthrodesis. Common etiologies in previous studies have been dramatically reduced. Most common indication now is pain and instability in an unreconstructible knee following infection of a TKR site. Use of external fixation, with or without an intramedullary nail, and internal fixation is reviewed.

Lengthening

Dinah AF. **Predicting duration of Ilizarov frame treatment for tibial lengthening.** *Bone* 2004; 34:845–848. Author reviewed 27 cases of tibial lengthening (age 13.3–72.6 years) to develop method of predicting duration of Ilizarov frame treatment as a function of target length. Median distraction was 3.5 (range 1.0–7.2) cm. A positive linear relationship ($r = 0.7$) was demonstrated between the distraction length (x, in cm) and the frame duration (y, in days), according to the equation $y = 54x + 94$. A negative hyperbolic relationship was demonstrated between the rate of bone healing and distraction length ($r = 0.6$), with distractions > 3cm healing significantly faster than shorter ones.

El–Gammal TA, El–Sayed A, Kotb MM. **Telescoping vascularized fibular graft: a new method for treatment of congenital tibial pseudarthrosis with severe shortening.** *J Pediatr Orthop B* 2004; 13:48–56. Review of three children with dysplastic congenital pseudarthrosis of the tibia treated with en bloc resection at pseudarthrosis, insertion of the contralateral fibula into the medullary canal of the proximal and distal tibia fragments. The contralateral fibular graft was harvested as an osteoseptocutaneous flap with a skin paddle based on the septocutaneous perforators at the junction of the middle and lower thirds of the fibula. The fibula flap was trimmed to the length of the defect plus the amount of shortening plus an additional 4cm. An Ilizarov fixator was used to gradually distract the proximal and distal tibial segment. Results and complications are presented. Advantages include early weight bearing and avoidance of corticotomies in the affected extremity.

Parmaksizoglu F, Beyzadeoglu T. **[Lengthening of the phalanges by callus distraction in traumatic amputations of the fingers.]** *Acta Orthop Traumatol Turc* 2004; 38:60–66. Authors review 13 patients with traumatic amputation of digits, treated with callus distraction by unilateral external fixator at 1mm/day. Mean lengthening was 24 (range 18–26) mm and 21 (range 18–26) mm for thumbs and other fingers, respectively. Mean healing index was 1.7 (range 1.6–2.1) months/cm and 1.6 (range 1.4–1.9) months/cm for the thumb and other fingers, respectively. The achieved thumb length provided adequate depth and width of the first web space and allowed functional improvement in gripping and pulp–to–side and pulp–to–pulp pinching. Lengthening of fingers resulted in improved hand function. Callotasis of the proximal phalanx of the thumb is an effective reconstruction method to compensate for loss of the distal phalanx and to alleviate functional problems due to shortness.

Lengthening continued

Saldanha KA, Saleh M, Bell MJ, Fernandes JA. **Limb lengthening and correction of deformity in the lower limbs of children with osteogenesis imperfecta.** *J Bone Joint Surg Br* 2004; 86:259–265. This study reviews lengthening and deformity correction in 6 children (mean age 14.7, range 14–16 years) with OI. All 6 had femoral lengthening; 3 also had tibial lengthening. Monolateral fixators were used in 5 limbs; Ilizarov fixators were used in 4. Mean length achieved was 6.26 (range 3.8–8.5) cm. Angular deformities were also corrected with the fixator. Mean bone healing index was 33.25 (range 17.1–57.27) days/cm. There were no fractured regenerate or evidence of implant migration or loosening. There was one fracture through a pin site 14 days after pin removal. Authors recommend the circular fixator to the monolateral system, especially in severe OI cases where the bone is too thin to hold half pins and also when performing lengthening as well as correction of multiplanar angular deformities.

Unal VS, Derici O, Oken F, Turan S, Girgin O. **Fibular lengthening procedure: treatment for lateral instability of the ankle caused by fibular insufficiency in Melnick–Needles syndrome.** *J Pediatr Orthop B* 2004; 13–88–91. Case report of a monolateral fixator used to lengthen a short fibula 2 cm. The short fibula caused lateral ankle instability and inability to bear weight. Ankle stability and a plantigrade foot were achieved. Other orthopedic features of the Melnick–Needles syndrome include genu valgum, scoliosis, flexion contractures, and bowing of the long bones.

Wada A, Bensahel H, Takamura K, et al. **Metatarsal lengthening by callus distraction for brachymetatarsia. *J Pediatr Orthop B* 2004; 13:206–210.** Twelve metatarsal lengthenings by callus distraction in seven patients using an Orthofix lengthener. Bones were lengthened at 0.7 mm/day for a mean lengthening of 20 (range 15–30) mm. Mean percentage lengthening was 45 (36–61) percent of original length. Mean healing index was 73 (range 41–98) days/cm. One corrective shortening osteotomy was done for MTP dislocation. In 10 of the other 11 cases, there was joint stiffness, narrowing of the joint space, and some degree of plantar subluxation of the MTP joint during distraction, which did not require treatment.

Wu C–C, Lee Z–L. **One–stage lengthening using a locked nailing technique for distal femoral shaft nonunions associated with shortening.** *J Orthop Trauma* 2004; 18:75–80. See Nonunions.

Other

El–Gammal TA, El–Sayed A, Kotb MM. **Telescoping vascularized fibular graft: a new method for treatment of congenital tibial pseudarthrosis with severe shortening.** *J Pediatr Orthop B* 2004; 13:48–56. See Lengthening.

Gugenheim JJ, Jr. **External fixation in orthopedics.** *JAMA* 2004; 291:2122–2124. Review article about external fixation.

Henley N, Carlson DA, Kaehr DM, Clements B. **Air embolism associated with irrigation of external fixator pin sites with hydrogen peroxide.** A report of two cases. *J Bone Joint Surg Am* 2004; 86–A:821–822. Authors report two cases of air emboli, which occurred during debridement of pin sites under general anesthesia. Pin sites were irrigated with hydrogen peroxide in a syringe. Authors recommend avoiding the use of hydrogen peroxide for irrigation of open wounds, especially in closed spaces.

Hubley P. **Living with the Ilizarov frame was better than expected.** *Evid Based Nurs* 2004; 7:60.

Maxwell SL, Lappin KJ, Kealey WD, et al. **Arthrodiastasis in Perthes' disease. Preliminary results.** *J Bone Joint Surg Br* 2004; 86:244–250. Authors conducted prospective study of hip arthrodiastasis in Perthes' disease in boys over 8 years and girls over 7 years at onset of symptoms. All heads had no or minimal head collapse. Control group was derived from database of children at authors' institution, most treated conservatively with symptomatic treatment only. A hinged Orthofix fixator was applied. The hinge was placed approximately 5mm distal to the center of the head. The hip was distracted acutely and then at two–week intervals. The frame was removed at approximately 4 months. Arthrodiastasis appeared to prevent further femoral head collapse, especially the anterior epiphyseal column, better than controls. One hip showed loss of height of 50% or more of the lateral epiphyseal column on the AP view (Herring C). On a Lauenstein view, one hip showed a loss of at least 50% of the anterior epiphyseal column. These results were superior to the control group.

Segev E, Ezra E, Wientroub S, Yaniv M. **Treatment of severe late onset Perthes' disease with soft tissue release and articulated hip distraction: early results.** *J Pediatr Orthop B* 2004; 13:158–165. Sixteen children with Perthes disease were treated at average age of 12 years, 1 month (range 9 years, 4 months to 15 years) by soft tissue release and articulated hip distraction (Orthofix). Fifteen were Catterall IV and Herring C; one was Catterall III Herring B. Preop arthrogram showed a saddle–shaped head with hinge abduction and subluxation in 14. Distraction was discontinued when Shenton line was over–corrected. Fixation lasted 4–5 months until lateral pillar reossification appears. Mean follow up was 2 years, 7 months (range 1–5 years). Pain score dropped from 7.0 to 1.6 at last follow up. Hip arthrograms at removal of the fixator showed disappearance of the saddle–shaped deformity in 10 out of 14 patients.

Watts J. China's cosmetic surgery craze. **Leg–lengthening operations to fight height prejudice can leave patients crippled.** *Lancet* 2004; 363:958. Article discusses increase in cosmetic surgery in China for both men and women, including lower extremity lengthening. Height has long been socially important in China and is often listed among the criteria required for jobs, including foreign ministries, where men must be at least 5 ft, 7 in, and women must be at least 5 ft, 3 in. For US $4000, doctors are offering to make patients up to 10cm taller.

Nonunions

Wu C–C, Lee Z–L. **One–stage lengthening using a locked nailing technique for distal femoral shaft nonunions associated with shortening.** *J Orthop Trauma* 2004; 18:75–80. Thirty–six distal femoral nonunions with 1.5–5 cm of shortening were treated with one–stage lengthening. Indications included aseptic or quiescent infected nonunions and a level suitable for the insertion of two distal locking screws. Technique consisted of skeletal traction using the femoral condyle, local debridement, lengthening by ≤ 4 cm aided by a lamina spreader, insertion of a static locked nail, and grafting with corticocancellous bone. Thirty–two cases were followed at least one year. Twenty–nine fractures healed. Average lengthening was 2.5 (range 1.5–3.5) cm. Strict protected weight bearing until fracture has healed is important.

Research

Bouletreau P, Longaker MT. **[The molecular biology of distraction osteogenesis].** *Rev Stomatol Chir Maxillofac* 2004; 105:23–25. This article describes a rat mandibular distraction model to study molecular mechanisms mediating distraction osteogenesis. Understanding the gene regulation of numerous cytokines (TGF–β, BMPs, IGF–1, FGF–2) may ultimately guide the development of targeted strategies to accelerate bony healing.

Carvalho RS, Einhorn TA, Lehmann W, et al. **The role of angiogenesis in a murine tibial model of distraction osteogenesis.** *Bone* 2004; 34:849–861. Mouse tibias underwent distraction osteogenesis with a monolateral fixator. Distraction osteogenesis promoted new bone formation primarily through an intramembranous process during the active distraction phase. Dense cortical bone formed during the consolidation phase. Vascular endothelial growth factor (VEG–A) and neuropilin, angiopoietin 1 and 2, and angiopoietin Tie2 were the critical angiogenic factors during distraction osteogenesis. Hypoxia–induced factor 1 alpha (Hif–1α), the FGF binding protein pleiotropin/OSF1, and multiple MMPs were also induced during the distraction phase. The angiogenic factors Hif–1α Nrpl, and VEGF–A were all cyclically induced after each increment of distraction. These results suggest that these factors are early mediators produced by distraction. These factors may be important in the relationship between angiogenesis and osteogenesis during distraction osteogenesis.

Forster H, Marotta JS, Heseltine K, et al. **Bactericidal activity of antimicrobial coated polyurethane sleeves for external fixation pins.** *J Orthop Res* 2004; 22:671–677. Authors assess the in vitro elution of gentamycin from gentamycin–impregnated polyurethane sleeves to be fitted over external fixation pins and wires. The antibiotic was released up to 26 weeks at MIC levels for common pin tract pathogens. Authors concluded that the level of gentamycin exceeded that which could be achieved with oral or intravenous administration; these sleeves could substantially reduce the incidence of pin tract infections and improve the overall outcome and cost effectiveness of external fixation fracture management.

Roberts CS, Antoci V, Antoci V, Jr., Voor MJ. **The accuracy of fine wire tensioners: a comparison of five tensioners used in hybrid and ring external fixation.** *J Orthop Trauma* 2004; 18:158–162. This study compared the accuracy and ease of use of 5 wire tensioners in a laboratory setting. The EBI was the most accurate (–0.17% to 0.09% error) but the most difficult to use. The DuPuy was the least accurate (–36.76% to –30.92%). The Smith and Nephew, Synthes, and Howmedica all undertensioned compared to their calibration markings. The new and used Ilizarov tensioners and new and used Synthes tensioners showed no considerable difference due to prior usage. The Howmedica tensioner was the easiest to use.

Seebach C, Skripitz R, Andreassen TT, Aspenberg P**. Intermittent parathyroid hormone (1–34) enhances mechanical strength and density of new bone after distraction osteogenesis in rats.** *J Orthop Res* 2004; 22:472–478. Authors investigated whether intermittent parathyroid hormone (PTH (1–34)) could accelerate the consolidation of new bone formed by distraction osteogenesis in rats. A dose of 60 mcg of human PTH (1–34)/kg body weight was given by injection every second day beginning 30 days before sacrifice. The consolidation period was either 20 or 40 days after completion of 10 days of distraction at 0.25 mm/day. The 20 day consolidation group had increased ultimate load, stiffness, total regenerate callus volume, callus BMC, and histologic bone density compared to controls. The 40 day consolidation group had increased ultimate load, stiffness, callus BMC, and histologic bone density compared to controls, but total regenerate callus volume was unchanged. PTH (1–34) might become useful to shorten the consolidation time after distraction osteogenesis in humans.

Sommers MB, Fitzpatrick DC, Kahn KM, et al. **Hinged external fixation of the knee: intrinsic factors influencing passive joint motion.** *J Orthop Trauma* 2004; 18:163–169. Authors applied articulated external fixators to fresh cadaver knee specimens along the previously described knee flexion–extension axis and 16 "off–axis" fixator hinge configurations. Knee ROM and energy required to impart motion were measured. The on–axis aligned hinge reduced the ROM by 35% to 79°. The 5mm posteriorly translated hinge was the only alignment that showed a larger ROM than the on–axis hinge (86°). All other hinge positions resulted in a significant decrease in knee ROM. Authors concluded that the complex kinematics of the knee cannot be duplicated using a single axis hinge over the entire ROM.

Song HR, Oh CW, Kyung HS, et al. **Injected calcium sulfate for consolidation of distraction osteogenesis in rabbit tibia.** *J Pediatr Orthop B* 2004; 13:170–175. Three groups of 8 rabbits underwent tibial lengthening with a monolateral external fixator. Latent period was 4 days, 8 mm of lengthening was performed in 4 days. Group I underwent injection of $CaSO_4$ in carboxymethylcellulose (CMC) medium at the distraction gap. Group II had CMC injection. Group II had no injection. Bone mineral density studies were performed using dual energy x–ray absorptiometry at week 3 and week 6. The animals were sacrificed at 6 weeks for histologic exam of the distraction gap. Group I had earlier appearance of callus, higher BMD, and earlier appearance of bone on histologic exam of the distraction gap compared to controls.

Vora AM, Haddad SL, Kadakia A, Lazarus ML, Merk BR. **Extracapsular placement of distal tibial transfixation wires.** *J Bone Joint Surg Am* 2004; 86:988–993. Study investigated placement of distal tibia wires to minimize risk of intraarticular placement. Subjects included twelve fresh–frozen cadaveric ankles and three living human volunteers, who underwent pressurized distention of the ankle with gadolinium and high–resolution MRI. The cadaver ankles were also sectioned to locate capsular synovial reflections. The anterolateral capsule (most proximal corner of ankle joint) was 12.2 mm from the tibiotalar joint line and 3.8 mm proximal to the physeal scar. The distal tibiofibular joint, which communicated with the ankle joint, demonstrated a maximum reflection 20.6 mm from the tibiotalar joint line and 11.2 mm proximal to the physeal scar. Stabilization with distal tibiofibular wires should be proximal to the reflected joint capsule and should avoid penetration of the distal tibiofibular joint to minimize risk of septic arthritis of the ankle.

Trauma – Lower Extremities

Bobroff GD, Gold S, Zinar D. **Ten year experience with use of Ilizarov bone transport for tibial defects.** *Bull Hosp Jt Dis* 2003; 61:101–107. Review of 12 patients with tibial defects treated with Ilizarov bone transport. Initial mean defect was 9.45 (range 4–20) cm. Mean external fixation time was 16.7 months, with a mean external fixator index of 2.0 months/cm. Overall bone results were good or excellent in 9 patients. Overall functional results were good or excellent in 8 patients. Ten patients achieved union. Treatment time may be lengthy. Complications may occur.

Demiralp B, Kurklu M, Bek D, et al. **[The treatment of comminuted midfoot fractures with distraction osteogenesis].** *Acta Orthop Traumatol Turc* 2004; 38:130–135. Retrospective review of 4 cases of comminuted midfoot fractures due to high energy trauma, treated with Ilizarov fixator for a mean of 3 (range 2.5–4) months. Mean distraction was 10.5 (range 9–13) mm at the fracture zone. At follow up (mean 58 months, range 33–81 months), mean AOFAS score was 70.5 (range 50–89). Authors conclude that the Ilizarov circular fixator may be an alternative for comminuted foot fractures, where no other modality is likely to provide an anatomic reduction.

El Hayek T, Daher AA, Meouchy W, et al. **External fixators in the treatment of fractures in children.** *J Pediatr Orthop B* 2004; 13:103–109. Retrospective review of 21 children with lower extremity fractures treated with 28 Orthofix fixators. Mean age was 13.1 (range 2.3–16.4) years. 17/21 had open fractures. All had open fractures, polytrauma, or polyfractures. Advantages of external fixation and need for dynamization are discussed.

Endres T, Grass R, Biewener A, et al. **[Advantages of minimally invasive reposition, retention, and hybrid Ilizarov fixation for tibial pilon fractures with particular emphasis on C2/C3 fractures].** *Unfallchirurg* 2004; 107:273–284. Sixty–two tibial pilon fractures in 59 patients were reviewed an average of 28 months after injury. Group I was treated with Ilizarov technique plus minimally invasive internal fixation. Group II was treated with internal fixation with a plate or screws or other forms of external fixation. Despite more severe soft tissue injury and comminution, there were no cases of chronic infection or pseudarthrosis in Group I. Group II had infection in 5%, delayed union in 2.5% and necessity of arthrodesis in 8%. More than 87% of Group I and only 38% of group II had a good or very good score. Pin tract infections necessitated surgical debridement of pin sites in 18%.

Leung F, Kwok HY, Pun TS, Chow SP. **Limited open reduction and Ilizarov external fixation in the treatment of distal tibial fractures.** *Injury* 2004; 35:278–283. Authors reviewed 31 distal tibia fractures (including 16 involving the tibial plafond) treated with the Ilizarov external fixator. Results were comparable to previous studies using ORIF. The most important complication was pin tract infection, which occurred in 29%.

Sen C, Kocaoglu M, Eralp L, et al. **Bifocal compression–distraction in the acute treatment of grade III open tibia fractures with bone and soft–tissue loss: a report of 24 cases.** *J Orthop Trauma* 2004; 18:150–157. Twenty–four patients with 14 grade IIIA and 10 grade IIIB open tibia fractures with bone and soft tissue loss were treated with Ilizarov bifocal compression–distraction. Acute shortening at the fracture site was done for bone defects up to 3 cm. Acute shortening was monitored with intraoperative Doppler ultrasound of the DP and PT pulses. Gradual shortening of 2 mm/day was done for defects greater than 3 cm. Lengthening was performed simultaneously proximal or distal to fracture site. Mean time in the fixator was 7.1 (range 3–10) months. Mean external fixator index was 1.4 months/cm. Mean bone healing time was 7.5 (range 4–11) months. Although there were problems, obstacles, and complications, authors believe avoidance of bone grafting at the docking site and high percentage of excellent and good results support the use of this technique.

Su EP, Westrich GH, Rana AJ, et al. **Operative treatment of tibia plateau fractures in patients older than 55 years.** *Clin Orthop* 2004; 421:240–248. Authors retrospectively reviewed 39 tibial plateau fractures in patients 55 years or older, treated operatively. Indications for surgery included open fractures, polytrauma, instability to varus or valgus stress, any medial condyle displacement, and lateral condyle displacement $\geq$ 3 mm. Results were assessed with clinical and radiologic scoring techniques, Short Musculoskeletal Function Assessment, and Short–Form 36 instruments. Poorer results correlated with increasing age and use of external fixation. However, external fixation was used for only 3 tibias and authors attribute this finding to the use of external fixation for highly comminuted fractures. Short–Form 36 indices were not significantly worse for study patients, but Short Musculoskeletal Function Assessment scores indicated poorer function than a normative group. Twenty–five percent of patients were lost to follow up; only 66% completed the self–assessment questionnaires.

Trauma – Upper Extremity

Moroni A, Vannini F, Faldini C, et al. **Cast vs external fixation: a comparative study in elderly osteoporotic distal radial fracture patients.** *Scand J Surg* 2004; 93:64–67. This prospective study compared 20 elderly female patients with wrist fractures and osteoporosis treated with an external fixator to an equal number treated with a plaster cast. Bone mineral density T–score of less than –2.5 was the criterion for diagnosis of osteoporosis. The external fixation group had significantly superior results, with fewer redisplacements, better volar angle and radial angle, and higher Horesh scores. Authors conclude external fixation improves stability in elderly osteoporotic wrist fracture patients.

Educational Opportunities

July 23–25, 2004
14th Annual Scientific Meeting of LLRS
Toronto, Ontario, Canada
www.asaminorthamerica.org
ksyzdek@assocconvspec.com

August 4–8, 2004
Ilizarov and Taylor Spatial Frame Meeting
Beaver Creek, CO
monica.dolbi@smithnephew.com

September 5–9, 2004
14th Annual Baltimore Limb Deformity Course
Baltimore, MD
www.deformitycourse.com
mbacon@lifebridgehealth.org

November 24–25, 2004
Trauma & Orthopedics Course
Verona, Italy
reneeyttredahl@orthofix.com

AAOS Annual Meeting
February 23–27, 2005
www.aaos.org

LLRS Specialty Day
February 26, 2005
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Register for 2004 Annual Meeting
July 23–25
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Fourteenth Annual Scientific Meeting
July 23–25, 2004
Agenda

Friday, July 23, 2004

7:00 a.m.–4:00 p.m. Registration Open

7:30–8:00 a.m. Light Continental Breakfast

8:00–8:05 a.m. Welcome, Goal Setting, Disclosure – *William Mackenzie, MD*

8:05–8:10 a.m. President's Remarks – *John G. Birch, MD*

Papers #1–11
8:10–9:50 a.m.

Research

8:10–8:15 a.m. Blood Flow in Bone Transport: A Comparison of Results Using Tc–99m MDP and Radiolabeled Blood Cell Bone Scans *Edward Abraham, MD*

8:16–8:21 a.m. Microscopic Evaluation of Single Muscle Fibers After Distraction *Marina Makarov, MD*

8:22–8:27 a.m. The Effect of Gradual Stretching on Histomorphometry of Skeletal Muscle Fibers – *John G. Birch, MD*

8:27–8:36 a.m. Discussion

8:36–8:41 a.m. Serum Angiogenic Activity in Uncomplicated Limb Lengthening *Grzegorz Benke, MD, PhD*

8:42–8:47 a.m. Mechanisms of Muscle Adaptation to Limb Lengthening: Gene Expression Profiling – *Mikhail Samchukov, MD*

8:48–8:53 a.m. The Effects of Limb Lengthening on Nerve Recovery and Gene Expression – *Jeffrey S. Shilt, MD*

8:53–9:02 a.m. Discussion

9:02–9:07 a.m. Local Application of BMP–7 (OP–1) Early in Distraction Osteogenesis, Upregulates the Expression of Numerous Osteogenic Factors – *Reggie C. Hamdy, MD*

9:08–9:13 a.m. Cell Implantation in Distraction Epiphyseolysis – *Robert A. Erdin, MD*

9:14–9:19 a.m. Anti–infection Coating Prevents Bacterial Biofilm Formation on External Fixation Pins – *Steven M. Scott, MD*

9:19–9:28 a.m. Discussion

9:28–9:33 a.m. Planning Software for the Taylor Spatial Frame Application and Semiautomatic Deformity Analysis – *Zeev Glozman*

9:34–9:39 a.m. Reconciliation of CORA and Origin/Corresponding Point Methods of Deformity Characterization – *J. Charles Taylor, MD*

9:40–9:50 a.m. Discussion

9:50–10:20 a.m.	Break

Papers # 12–16
10:20–11:15 a.m.

Trauma

10:20–10:25 a.m.	The Taylor Spatial Frame for Acute Tibial Fractures *Chris Whately, BSc, MD*
10:26–10:31 a.m.	Treatment of Nonunions and Bone Defects of the Tibia with the Ilizarov/Taylor Spatial Frame – *S. Robert Rozbruch, MD*
10:32–10:37 a.m.	The Salvage of Nonunion, Malunion & Infection in Pilon Fractures: Does the Method of Initial Fixation Compromise the Outcome of Reconstruction? – *James J. Hutson, Jr., MD*
10:37–10:50 a.m.	Discussion
10:50–10:55 a.m.	Early Results of Osteogenic Protein–1 (Bone Morphogenic Protein–7) and Taylor Spatial Frame Fixation in Recalcitrant Atrophic Tibial Nonunions – *Mark T. Dahl, MD*
10:56–11:01 a.m.	Bone Transport and Knee Arthrodesis in Severe Knee Injuries by Trauma or Infection – *Leon H. Mora, MD*
11:01–11:10 a.m.	Discussion
11:10 a.m.–12:10 p.m.	Alessandro Codivilla Lecture – Biological Developments in Tumor Reconstruction Using Distraction Osteogenesis – *Hiroyuki Tsuchiya, MD*
12:10–1:15 p.m.	Lunch
1:15–2:45 p.m.	Symposium: Bone Graft Substitutes and Bone Growth Stimulation Moderator: *C. Reggie Hamdy, MD* Panel: *David Little, Mike McKee, Ben Alman, C. Reggie Hamdy. MD*
2:45–3: 15 p.m.	Break
3:15–5:00 p.m.	Master's Demonstration I: Taylor Spatial Frame–Use and Modifications *S. Robert Rozbruch, MD*
5:00 p.m.	Adjourn
5:30–7:00 p.m.	President's Reception – *light hors d'oeuvres and beverages will be served*

Saturday, July 24, 2004

7:00 a.m.–4:00 p.m.	Registration Open
7:30–8:00 a.m.	Light Continental Breakfast

Papers #17–28
8:00–9:45 a.m.

General Topics

8:00–8:05 a.m.	Role of Ilizarov External Fixator in the Management of Pediatric Femur Fractures – *Sanjeev Sabharwal, MD*
8:06–8:11 a.m.	A New Method for Management of Type III Complete Acromio–clavicular Dislocation – *Yasser Elbatrawy, MD*
8:12–8:17 a.m.	Treatment of Calcaneal Fractures by Ilizarov External Fixator Experience with 12 Fractures – *Haim Shtarker, MD*
8:18–8:23 a.m.	Experience with the KCI Wound in Orthopaedic Infections *Janet Conway, MD*
8:23–8:35 a.m.	Discussion
8:35–8:40 a.m.	One Stage Treatment of Congenital Dislocation of Hip in Older Children: A New Surgical Technique with Ilizarov External Fixator *Muharrem Inan*
8:41–8:46 a.m.	Acetabular Changes in Patients with Coxa Vara – *James McCarthy, MD*
8:46–8:52 a.m.	Discussion
8:52–8:57 a.m.	Biomechanical Analysis of the Ilizarov Pelvic Support Osteotomy *Chris Whately, MD*
8:58–9:03 a.m.	Pelvic Support Osteotomy Using Taylor Spatial Frame *Chris Whately, MD*
9:04–9:08 a.m.	A New Pelvic Osteotomy for Fixed Hip Dislocation Lengthens the Abductor Muscles – *Muharrem Inan*
9:08–9:18 a.m.	Discussion

Arthritis and Joint Arthroplasty

9:18–9:23 a.m.	Use of an Ilizarov/Taylor Spatial Frame in Patients with Total Joint Replacement – *S. Robert Rozbruch, MD*
9:24–9:29 a.m.	Distraction and Deformity Correction for Acute Arthritis *Douglas Beaman, MD*
9:30–9:35 a.m.	Elevation of the Medial Tibial Plateau for Severe Tibia Vara: Indications and Surgical Technique – *Joao O. Tavares, MD*
9:35–9:45 a.m.	Discussion
9:45–10:15 a.m.	Break

Papers #29–33
10:15–11:00 a.m.

Realignment

10:15–10:20 a.m.	Lower Limb Malalignment and its Surgical Management in Ellis Van Creveld Syndrome (EVC) – *William G. Mackenzie, MD*
10:21–10:26 a.m.	Efficacy of Pichkhadze's Apparatus for Monopolar and Polypolar Fixating Bone Fragments of Long Bones and Pelvic Bones *M. Pichkhadze, PhD, MD*
10:27–10:32 a.m.	Correction of Tibial Deformity Using the Ilizarov/Taylor Spatial Frame *S. Robert Rozbruch, MD*
10:32–10:41 a.m.	Discussion
10:41–10:46 a.m.	The MAC (Multi Axial Correcting) System: A New Multi Axial and Rotation Monolateral Correcting Fixation System *Richard S. Davidson, MD*
10:47–10:52 a.m.	A Simple Formula for Centering a Rotation Arc or Ring on a Bone *Richard S. Davidson, MD*
10:52–11:00 a.m.	Discussion
11:00–11:15 a.m.	History and Politics of Limb Lengthening: Dror Paley
11:15–12:15 p.m.	Presidential Guest Lecture: *Captain Norman Baker*
12:15–1:15 p.m.	Lunch **Visit Corporate Partners/Posters**
1:15–3:00 p.m.	Case Presentations I: Trauma and Adult Reconstruction Cases Moderator: *Paul T. Freudigman, Jr., MD* Panel: TBD
3:00–3:30 p.m.	Break
3:30–4:30 p.m.	Master's Demonstration II: ISKD Nail – *John E. Herzenberg, MD*
4:30–5:30 p.m.	Master's Demonstration III: Multi–Axial Clamp – *Richard S. Davidson, MD*
5:30 p.m.	Adjourn

Sunday, July 25, 2004

7:00 a.m.–12:00 p.m.	Registration Open
7:00–7:30 a.m.	Member Light Continental Breakfast
7:30–8:30 a.m.	Society Business Meeting – *all members please attend*
8:00–8:45 a.m.	Nonmember Light Continental Breakfast

Papers #34–46
8:45–10:45 a.m.

Limb Lengthening

8:45–8:50 a.m.	Lengthening of the Free Fibular Graft After Sarcoma Resection of the Humerus: A Case Report – *Svetlana Ilizarov, MD* Lengthening
8:51–8:56 a.m.	Multiplier Method for Prediction of Adult Height in Patients with Achondroplasia – *Dror Paley, MD*
8:57–9:02 a.m.	Reconstruction Surgery for Treatment of Fibular Hemimelia *Dror Paley, MD*
9:02–9:15 a.m.	Discussion
9:15–9:20 a.m.	Comparison of the Complications Between Primary and Secondary (repeated) Lengthening in the Same Limb – *James McCarthy, MD*
9:21–9:26 a.m.	Progressive Frame Destabilization to Lower Fracture Rate Following Limb Lengthening with the Ilizarov External Fixator in Children *Kenneth L.B. Brown, MD, MSc*
9:27–9:32 a.m.	Interobserver and Intraobserver Reliability of Radiographic Evidence of Bone Healing at Osteotomy Sites – *David S. Feldman, MD*
9:33–9:38 a.m.	Pain Control for Limb Lengthening and Reconstruction Surgery *Philip J. Wagner, MD*
9:38–9:50 a.m.	Discussion
9:50–10:00 a.m.	Lengthening Through Accidental Fractures in Children *John E. Herzenberg, MD*
10:01–10:06 a.m.	Treatment of Bone Defects and Limb Length Discrepancies in Children by Lengthening Followed by a Free Vascularized Fibular Graft *Kenneth L.B. Brown, MD, MSc*
10:07–10:12 a.m.	OP–1 Augmentation of Limb Lengthening: A Case Study *Jaroslaw Macias, MD, PhD*
10:12–10:22 a.m.	Discussion
10:22–10:27 a.m.	Reliability and Accuracy of Plain X–ray Scanogram, CT Scanogram and MRI Scanogram in the Measurement of Limb Lengthening *Roger F. Widmann, MD*
10:28–10:33 a.m.	Effect of Ultrasound Stimulation on Limb Lengthening *Alexander Cherkashin, MD*
10:34–10:39 a.m.	Multiplier Method for Predicting Adult Foot Length – *Dror Paley, MD*
10:39–10:50 a.m.	Discussion
10:50–11:00 a.m.	Closing Comments, Evaluation
11:00 a.m.	Adjourn *refreshments available at adjournment*