

Orthopedic Research

Denver Health & Hospital Authority



WINTER 2014

Special Announcements

Congratulations to Dr. Merribeth Bruntz for her 2nd place poster:
Transmetatarsal Amputation in an At-risk Diabetic Population: a Retrospective Study at Desert Foot 2013

Research Team:

Corey Henderson, MS, Coordinator
Hannah Gissel, BA, Coordinator
Benoit Herbert, MD, Res. Fellow
Jiandong Hao, MD, PhD, Res. Fellow
Derly Cuellar, MD, Res. Fellow
Ji Wan Kim, MD, Res. Fellow



Upcoming Presentations:

“Does the New OTA Classification for Open Fractures predict the Risk of Limb Amputation?” AAOS Annual Meeting. New Orleans, LA, March 11-15. Poster.

“Mice with Genetic Deficiency for Complement Receptor Type 2 (CR2) Show Neuroprotection After Experimental Closed Head Injury.” 10th World Congress on Brain Injury. San Francisco, CA, March 19-23. Presenter: Megan Rich

Selected 2014 Publications:

1. Mauffrey C, Scarlat MM, Pećina M. Setting standards for medical writing in orthopaedics. *Int Orthop*. 2014, 38(1): 1-5.
2. Young H, Hirsh J, Hammerberg EM, Price CS. Dental disease and periprosthetic joint infection. *J Bone Joint Surg Am*. 2014, 96(2): 162-8.
3. Stahel PF. The tenth year of the “Universal Protocol”: Are your patient safer today? *Bone and Joint 360*. 2014, 3:7-10.
4. Mauffrey C, Roberts G, Cuellar DO, Herbert B, Hak D. Balloon tibioplasty: pearls and pitfalls. *J Knee Surg*. 2014, 27(1): 31-8.
5. Mauffrey C, Hao J, Cuellar DO 3rd, Herbert B, Chen X, Liu B, Zhang Y, Smith W. The epidemiology and injury patterns of acetabular fractures: Are the USA and China comparable? *Clin Orthop Relat Res*. 2014 (in press).

Current Projects

Bioburden (Hak):

Study to characterize the extremity wound “Bioburden” at the time of definitive wound coverage/closure of severe extremity wounds, and to determine the correlation of the identified wound pathogens with subsequent deep wound infections.

External versus Internal Fixators (FIXIT) (Hak):

Multicenter randomized controlled trial of the use of modern ring external fixation versus internal fixation for fracture stabilization of severe open tibia fractures, analyzing re-hospitalization for limb complications, fracture healing, and patient outcomes.

Tibial Bone Graft (pTOG) (Hak):

Randomized, blinded multicenter trial to evaluate the use of rhBMP-2/ACS versus a control group of patients with tibial fractures with critical size defects, analyzing rate of nonunion, infection rate, and economic cost.

Lavage (Bruntz):

Prospective, randomized trials to evaluate the use of pulse lavage or gravity lavage during irrigation and debridement of diabetic foot infections, analyzing unplanned return trips to the operating room, time to healing, and time to return to normal activities.

Femoral Neck Fracture (FAITH) (Hammerberg):

Randomized, controlled clinical trial to assess the impact of sliding hip screws versus cancellous screw fixation on rates of revision surgery at 2 years in individuals with femoral neck fractures.

THA, Metal on Poly, Zimmer (Hammerberg):

Prospective, multicenter post market clinical follow-up study to obtain survival and patient-outcome data of the Continuum metal on polyethylene acetabular system when used in primary total hip arthroplasty.

TBI/FEMUR Safe Timing Study (Stahel):

Study to identify serum markers indicating the ideal time-point of femur fracture fixation in head-injured patients, and develop an algorithm to provide clinicians with pathophysiology-based guidelines for the ideal treatment modalities of patients with TBI and concomitant femoral shaft fractures.

Scapular Body Fractures (Stahel):

Multicenter cohort study comparing operative and non-operative treatment of extra-articular scapula fractures, comparing patient-oriented outcomes, functional outcomes, and complication rates.

Spinal Cord Injury, ASUBIO (Ladley-O'Brien):

Multicenter, randomized, double-blind study to evaluate the efficacy, safety, and pharmacokinetics of SUN 13837 versus placebo in adults with acute spinal cord injury.

Balloon Osteoplasty, Osteomed (Mauffrey):

Randomized trial to measure the quality of reduction in patients with either a depressed or split depressed tibial plateau fracture requiring surgical intervention, comparing traditional methods of reduction with the use of the balloon osteoplasty.

Predicting Compartment Syndrome (PACS) (Hak):

Prospective, multicenter study monitoring tissue perfusion via indwelling catheters in patients with high-energy, lower extremity injuries to develop a tool for accurate diagnosis of compartment syndrome so early fasciotomy can be performed, and unnecessary fasciotomy be avoided.

Quality of Life Following Orthopedic Trauma (TCCS) (Hak):

Multicenter, non-randomized trial to determine the effectiveness of an intervention based on a Trauma Collaborative Care (TCC) model to improve patient outcomes after severe orthopedic trauma.

Limb Salvage versus Transtibial Amputation (OUTLET) (Hak):

Prospective, observational multicenter study to compare functional outcomes and quality of life of patients undergoing salvage versus amputation following severe distal tibia, ankle, and/or foot injuries.

Distal Radius Fractures (Ipaktchi):

Observational study to evaluate the efficacy of carbon fiber plate (CarboFix) fixation in the treatment of distal radius fractures.

Proximal Humerus Fractures (Mauffrey):

Observational study to evaluate the efficacy of CarboFix carbon fiber plate fixation in the treatment of proximal humerus fractures.

OM Database (Mauffrey, Young):

A prospective database to evaluate both the treatment variability of osteomyelitis and the outcomes of each treatment in order to identify outcome-related cofactors.

Post DC Phone Calls (Mauffrey):

A prospective study to assess patient satisfaction comparing patients who sustained an orthopedic injury and received a telephone follow-up call after being discharged home to those who did not.

Upper vs Lower Limb Osteomyelitis (Mauffrey, Young):

A retrospective cohort study of all patients treated for limb osteomyelitis in order to identify the causative organism.

Department of Orthopedics 2013 Publications

1. **Stahel PF, Vanderheiden T**, Flierl MA, Matava B, Gerhardt D, Bolles G, Beauchamp K, Cothren Burlew C, Johnson JL, Moore EE. The impact of a standardized "spine damage control" protocol for unstable thoracic and lumbar spine fractures in severely injured patients: A prospective cohort study. *J. Trauma Acute Care Surg.* 2013, 74:590-6.
2. Weckbach S, Hohmann C, Braumueller S, Denk S, Klohs B, **Stahel PF**, Gebhard F, Huber-Lang MS, Perl M. Inflammatory and apoptotic alterations in serum and injured tissue after experimental polytrauma in mice: Distinct early response compared to single trauma or "double hit" injury. *J. Trauma Acute Care Surg.* 2013, 74:489-98.
3. Kent T, Yi C, **Livermore M, Stahel PF**. Skin grafts provide durable end-bearing coverage for lower extremity amputations with critical soft tissue loss. *Orthopedics.* 2013, 36:132-5.
4. **Mauffrey C**, Fader R, **Hammerberg EM, Hak DJ, Stahel PF**. Incidence and pattern of technical complications in balloon-guided osteoplasty for depressed tibial plateau fractures: Prospective pilot study in 20 consecutive patients. *Patient Saf. Surg.* 2013, 7:8.
5. Botolin S, **Mauffrey C, Hammerberg EM, Hak DJ, Stahel PF**. Heterotopic ossification in the reaming tract of a percutaneous antegrade femoral nail: A case report. *J. Med. Case Reports.* 2013, 7:90.
6. McDonald LS, Tepolt F, Leonardelli D, **Hammerberg EM, Stahel PF**. A cascade of preventable complications following a missed femoral neck fracture after antegrade femoral nailing. *Patient Saf. Surg.* 2013, 7:16.
7. Kim FJ, Pompeo A, Molina WR, Sehr D, Mariano da Costa Jr RM, Juliano C, Moore EE, **Stahel PF**. Early effectiveness of endoscopic posterior urethra primary alignment. *J. Trauma Acute Care Surg.* 2013, 75:189-94.
8. Saveli CC, Morgan SJ, Belknap RW, Ross E, **Stahel PF**, Chaus GW, **Hak DJ**, Biffi WL, Knepper B, Price CS. Prophylactic antibiotics in open fractures: A pilot randomized clinical safety study. *J. Orthop. Trauma.* 2013, 27:552-57.
9. Lin S, **Hammerberg EM, Stahel P, Hak DJ**. The success of single debridement and primary closure of acute postoperative infections after open reduction and internal fixation. *Curr. Orthop. Pract.* 2013, 24:523-8.
10. Flierl MA, Smith WR, **Mauffrey C**, Kaan I, Williams AE, Ross E, Peacher G, **Hak DJ, Stahel PF**. Outcomes and complication rates of different bone grafting modalities in long bone fracture-nonunions: A retrospective cohort study in 182 patients. *J. Orthop. Surg. Res.* 2013, 8:33.
11. Messina M, **Stahel PF, Mauffrey C**. Balloon osteoplasty for depressed proximal tibia fractures. *Orthop. Knowl. Online J.* 2013, 11(10).
12. **Stahel PF, Mauffrey C**, Smith WR, McKean J, Hao J, Cothren Burlew C, Moore EE. External fixation for acute pelvic ring injuries: Decision-making and technical options. *J. Trauma Acute Care Surg.* 2013, 75:882-7.
13. **Mauffrey C, Stahel PF**. Shared decision making – The importance of open communication with our patients. *Bone Joint J.* 2013 (February issue; no page number assigned).
14. Flierl MA, Rittirsch D, Huber-Lang MS, **Stahel PF**. Complement in human disease. *Clin. Dev. Immunol.* 2013, 920474.
15. **Stahel PF**. Swiss flag or Red Cross emblem – why the confusion? *Patient Saf. Surg.* 2013, 7:13.
16. **Stahel PF**. Essentials of spinal cord injury: Basic research to clinical practice. *J. Trauma Acute Care Surg.* 2013, 75:525.
17. **Stahel PF**, Moore TA, **Vanderheiden TF**. Timing of tracheostomy after anterior cervical spine fixation. *J. Trauma Acute Care Surg.* 2013, 75:538-9.
18. **Stahel PF**. Enhancing patient safety with readbacks. *Phys. Wkly.* 2013, 10:39.
19. **Stahel PF**, Barlow B, Tepolt F, Mangan K, **Mauffrey C**. Safe surgical technique: Reconstruction of the sternoclavicular joint for posttraumatic arthritis after posterior sternoclavicular dislocation. *Patient Saf. Surg.* 2013, 7:38.
20. Yoshihara H, **VanderHeiden TF**, Weckbach S, **Stahel PF**. Vertebral burst fractures. In: *Orthopaedic Trauma Call for the Attending Surgeon*. Hak DJ, Ipaktchi KR, Morgan SJ (Eds.), SLACK Inc, Thorofare, NJ, 2013, 307-17.
21. Burns S, Thornton R, Dauer LT, Quinn B, Miodownik D, **Hak DJ**. Leaded eyeglasses substantially reduce radiation exposure of the surgeon's eyes during acquisition of typical fluoroscopic views of the hip and pelvis. *J. Bone Joint Surg. Am.* 2013, 95: 1307-11.
22. **Vanderheiden TF, Stahel PF**. Spine fracture-dislocations. In: *Orthopaedic Trauma Call for the Attending Surgeon*. Hak DJ, Ipaktchi KR, Morgan SJ (Eds.), SLACK Inc, Thorofare, NJ, 2013, pp. 319-28.
23. **Vanderheiden TF, Stahel PF**. Low-energy spine trauma. In: *Orthopaedic Trauma Call for the Attending Surgeon*. Hak DJ, Ipaktchi KR, Morgan SJ (Eds.), SLACK Inc, Thorofare, NJ, 2013, pp.329-35.
24. Smith WR, **Stahel PF**, Suzuki T, Peacher G. Musculoskeletal trauma surgery. In: *Current Diagnosis & Treatment in Orthopedics*. Skinner HB, McMahon PJ (Eds.), McGraw-Hill, New York, 5th edition, 2013, pp. 18-87.
25. Mauser N, Gissel H, Henderson C, Hao J, **Hak D, Mauffrey C**. Acute lower leg compartment syndrome. *Orthopedics.* 2013, 36:619-24.
26. McKean JM, **Hak DJ**. Management of osteoporotic fractures of the humeral shaft. *Orthopaedic Knowledge Online Journal.* 2013, 11(8).
27. McKean J, Cuellar DO, **Hak D, Mauffrey C**. Osteoporotic ankle fractures: An approach to operative management. *Orthopedics.* 2013, 36:936-40.
28. **Hak DJ**. Olecranon fractures. In: *Orthopaedic Trauma Call for the Attending Surgeon*. Hak DJ, Ipaktchi K, Morgan S (Eds.), SLACK Inc, Thorofare, NJ, 2013, pp 97-103.
29. **Hak DJ**. Pelvic ring injuries. In: *Review of Orthopaedic Trauma*. 2nd Edition. Brinker MR (Ed.), Lippincott Williams and Wilkens, Philadelphia, PA, 2013, pp 210-23.
30. **Hak DJ**. Orthopedic traumatology: An evidence-based approach. *J. Trauma Acute Care Surg.* 2013, 74:699.

Department of Orthopedics 2013 Publications

31. **Hak DJ.** Changing nature of continuing medical education. *Orthopedics*. 2013, 36:748.
32. **Mauffrey C,** Morgan SJ. Femoral neck fractures. In: *Orthopedic Trauma Call for the Attending Surgeon*. Hak D, Ipaktchi K, Morgan S (Eds), SLACK Inc, Thorofare, NJ, 2013, pp 269-74.
33. Suzuki T, Smith W, **Mauffrey C,** Morgan S. Safe surgical technique for associated acetabular fractures. *Patient Saf. Surg.* 2013, 7:38.
34. Messina M, Herbert B, **Mauffrey C.** The use of arthroscopy to assist reduction of depressed tibial plateau fractures. *Curr. Orthop. Pract.* 2013, 24:160-4.
35. Sanders J, **Mauffrey C.** Long bone osteomyelitis in adults: Fundamental concepts and current techniques. *Orthopedics*. 2013, 36:368-75.
36. Pires R, Oliveira Santana E, Oliveira Moreira Santos N, **Mauffrey C.** Fixacao percutanea das fraturas do acetabulo. *Rev. Min. Ortopo. Traumatol.* 2013, 4:38-40.
37. Cuellar D, Stimac J, **Mauffrey C,** Seligson D. Masters technique in foot and ankle surgery: Application of the retrograde tibioalcaneal nail. *Curr. Orthop. Pract.* 2013, 24:631-35.
38. **Mauffrey C.** Military orthopaedics. *Curr. Orthop. Pract.* 2013, 24:113-5.
39. **Mauffrey C,** Scarlat M, Simon P, Travers V, Roll C, Kehr P. MEDLINE and the European Journal of Orthopaedic Surgery. *Europ J. Orthop. Surg. Traumat.* 2013, 23:249-50.
40. **Mauffrey C.** Further opinion on inadequate three-point fixation predicts failure of the gamma nail. *Bone Joint J.* 2013, 95:825-30.
41. Herbert B, Hao JD, **Mauffrey C.** The American Academy of Orthopaedic Surgeon 2013- New toys and new tools from the 'windy city'. *Bone Joint J.* 360. 2013, 2(4).
42. **Mauffrey C.** The power of international collaboration in orthopaedic trauma research. *Bone Joint J.* 2013, 95(3).
43. **Mauffrey C.** A Concise Guide for Postgraduate Exams. *J. Trauma Acute Care Surg.* 2013, 74:1380.
44. Gradl G, Neuhaus V, Fuchsberger T, Guitton TG, Prommersberger KJ, Ring D; **Science of Variation Group (Hammerberg EM, group authorship).** Radiographic diagnosis of scapholunate dissociation among intra-articular fractures of the distal radius: Interobserver reliability. *J. Hand Surg. Am.* 2013, 38: 1685-90.
45. Foit NA, Chen QM, Cook B, **Hammerberg EM.** Iliofemoral deep vein thrombosis after tibial plateau fracture fixation related to undiagnosed May-Thurner syndrome: A case report. *Patient Saf. Surg.* 2013, 7:12.
46. Doornberg JN, Guitton TG, Ring D; **Science of Variation Group (Hammerberg EM, group authorship).** Diagnosis of elbow fracture patterns on radiographs: Interobserver reliability and diagnostic accuracy. *Clin. Orthop. Rel. Res.* 2013, 471:1373-8.
47. **Hammerberg EM.** Periprosthetic fractures: Knee. In: *Orthopaedic Trauma Call for the Attending Surgeon*. Hak DJ, Ipaktchi KR, Morgan SJ (Eds.), SLACK Inc, Thorofare, NJ, 2013, 401-8.
48. Newman K, **Blei M.** Evaluation of smart phones for remote control of a standard hospital room. *Springer Wireless Personal Communication.* 2013, 11277:1404.
49. Kolakowsky-Hayner SA, Wright J, Englander J, Duong T, **Ladley-O'Brien S.** Impact of late post-traumatic seizures on physical health and functioning for individuals with brain injury within the community. *Brain Injury.* 2013, 27:578-86.
50. Kashuk J, Ozer K, **Livermore M.** Upper and lower extremity amputation. In: *Atlas of Trauma/Emergency Surgical Techniques*. Cioffi W, Ascensio JA. Elsevier Mosby (Eds.), Saunders, Philadelphia, PA, 2013.
51. Ozer K, **Ipaktchi K.** The windswept elbow: Injury pattern and reconstruction. *J. Orthop. Trauma.* 2013, 27:9-12.
52. **Ipaktchi K,** DeMars A, Park J, Ciarallo C, **Livermore M,** **Banegas R.** Retained palmar foreign body presenting as a late hand infection: Proposed diagnostic algorithm to detect radiolucent objects. *Patient Saf. Surg.* 2013, 7:25.
53. **Ipaktchi K,** Kolnik A, Messina M, **Livermore M,** **Banegas R,** Price C. Hazardous surgical instrument marking techniques: Established practices expose patients to "never events". *Patient Saf. Surg.* 2013, 7:31.
54. **Ipaktchi K,** **Livermore M,** Lyons C, **Banegas R.** Current concepts in the treatment of distal radius fractures. *Orthopedics.* 2013, 36:778-84.
55. **Ipaktchi K.** Distal radius fractures. In: *Orthopedic Trauma Call for the Attending Surgeon*. Hak DJ, Ipaktchi KR, Morgan, SJ (Eds.), SLACK Inc, Thorofare, NJ, 2013.
56. Couceiro J, Sanders S, Cobb M, Manon-Matos Y, **Banegas R.** Retiform hemangioendothelioma of the finger: A case report. *Hand Surgery.* 2013, 18:439-41.
57. Clegg T, Caborn D, **Mauffrey C.** Visco-supplementation with hyaluronic acid in the treatment for cartilage lesions: A review of current evidence and future direction. *Eur. J. Orthop. Surg. Traumatol.* 2013, 23:119-24.