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RESEARCH GOALS: My interests are in arthroplasty and trauma of the lower extremity especially as applied to the elderly patient. My research is both clinical and in the biomechanics lab.

RESEARCH SUMMARY AND SIGNIFICANCE: My primary research project is to investigate sacroplasty in the osteoporotic pelvis. Insufficiency fractures of the pelvis are a clinical dilemma with no good solution. The use of cement to augment these fractures (like vertebroplasty in the spine) has not been studied. I have developed a model for these fractures using cadaveric pelvises. Current research is to determine the amount and placement of cement needed to strengthen the pelvis.

This summer I plan to begin a retrospective review of pelvis fracture treated at our institution. This will lead to a prospective study to look at the outcomes of pelvic and sacral fractures in the elderly and at the clinical utility of sacroplasty.

FUTURE DIRECTIONS/AVAILABLE RESEARCH PROJECTS:

Epidemiology of infected total joints.

Drs John Zenilman, (Infectious disease) Tariq Nayfeh and I are investigating the rates of infection in joint prosthesis using national data bases. A current investigation of patients at Bayview is looking at the outcomes of MRSA infection after arthroplasty.

Femoral stem stability in osteoporotic bone.

Dr Steve Belkoff and I are investigating the initial stability of uncemented stems in osteoporotic bone. The current gold standard in these bones is a cemented prosthesis. This study looks at the initial stability of a fully coated and a tapered stem in osteoporotic femora.

Guidance for peri-acetabular osteotomy.

In collaboration with Dr Mehran Armand at the Applied Physics Laboratory, a guidance system for acetabular osteotomies has been developed. Studies continue using this system to show the ideal angle of positioning of the acetabulum and the use of this system clinically. We also hope to add modeling of the cartilage and head eccentricity to the computer algorithm used to measure hip pressures.

Guidance in teaching motor skills.

A planned project is to collaborate with the Applied Physics Lab to develop guidance tools with haptic feedback for use in teaching procedures. These include the placement of screws within the femoral head and the ability to use a saw and drill.

Arthroplasty in skeletal dysplasia.

With Drs. Michael Ain and Frank Frassica a database of procedures is being developed to study outcomes of arthroplasty in patients with skeletal dysplasia. We hope to investigate the precise patterns of hip pathology in patients with different diagnoses using CT scanning.

Use of mesenchymal stem cells in osteoporotic bone.

A project still in planning stages is a collaboration with Dr Jenniffer Ellisseff at JHH, Homewood Campus. This involves the use of mesenchymal stem cells to augment the strength of osteoporotic bone.

Recovery after hip replacement.

The merits of minimally invasive hip replacement are debated. I plan to study the short term outcomes of a two incision approach to hip replacement using instruments to look at parameters of early recovery.

Frailty and outcomes after osteoporotic ankle fractures.

Dr John Campbell and I plan to review the outcomes of ankle fracture in the elderly using validated outcomes instruments and using a measurement of frailty.

Use of pain catheters in total knee replacement.

A prospective randomized study is ongoing to evaluate the use of lumboplexus pain catheters after total knee replacement.

Effects of depth of anesthesia used for hip fracture repair.

A randomized study is examining the effect of depth of anesthesia used for hip fracture repair. Parameters to be evaluated include postoperative delirium and complications.

RECENT PUBLICATIONS:

1. Mears SC, Waites MD, Mathis JM, and Belkoff SM. A cadaveric model for sacral insufficiency fractures. Presidential poster presentation. American Geriatric Society, Chicago, IL, 2006.
2. Armiger R, Armand M, Lepisto J, Minhas D, Tallroth K, Mears SC, Waites M. Evaluation of a parametric technique for pre- and intra-operative measurement of joint realignment during peri-acetabular osteotomy. Poster presentation. Orthopedic Research Society, Chicago, IL, 2006.
3. Waites M, Mears SC, Mathis JM, Belkoff SM. Strength restoration by of simulated sacral insufficiency fractures, GRIBOI: 16th Interdisciplinary Research Conference on Biomaterials, Bern, Switzerland, 2006.
4. Fermanian S, Sharma B, Cascio B, Mears SC, Elisseff JH. Chondral Lesion Repair in a Critical Size Defect Goat Model Using an Injectable Hydrogel Scaffold in Conjunction with Marrow Stimulation. International Cartilage Repair Society, San Diego, CA, 2006.
5. Mears SC, Mont MA, Hixson J, Jones LC, Hungerford DS, Etienne G. Spontaneous Osteonecrosis of the Knee is not a True Osteonecrotic Condition. Podium presentation, American Academy of Orthopaedic Surgeons, Washington DC, 2005.
6. Cascio BM, Sharma B, Fermanian S, Gurken I, Mears SC, Park HB, Williams CG, Elisseff JH. Novel strategy for cartilage repair using acellular photopolymerizable hydrogels and subchondral drilling in a large animal model. Society of Military orthopaedic surgeons. Vail, CO, 2004.
7. Chen AL, Mears SC, Hawkins RJ. Orthopaedic care of the aging athlete. J Am Acad Orthop Surg. 2005 Oct;13(6):407-16.
8. Khasraghi FA, Christmas C, Lee EJ, Mears SC, Wenz JF, Sr. Effectiveness of a multidisciplinary team approach to hip fracture management. J Surg Orthop Adv 14(1): 27-31, 2005.
9. Mears SC, Zadnik, MB, Eglseder, WA. Salvage of functional elbow range of motion in complex open injuries using a sensate transposition lateral arm flap. Plast Reconstr Surg. 2004 Feb;113(2):531-5.
10. Mears SC. Results of revision total knee arthroplasty. Curr Opinion Orthop. 2004. 15(1):37-40.
11. Gurkan I, Faust AF, Mears SC, Wenz JF: Epidemiology and financial burden of hip fractures. Curr Opinion Orthop. 2004. 15(1)8-11.
12. Mears S, Schachner M, Brushart TM. Antibodies to myelin-associated glycoprotein accelerate preferential motor reinnervation. J Peripher Nerv Syst. 2003 Jun;8(2):91-99.
13. Mears SC, Lipsett PA, Brager MD, Riley LH 3rd. Metformin-associated lactic acidosis after elective cervical spine fusion: a case report. Spine. 2002. Nov 15;27(22):E482-484.