



McGILL ORTHOPAEDIC VIRTUAL VISITING PROFESSOR MAY 12TH AND MAY 26TH, 2022 (DIGITAL PLATFORM: ZOOM)



Professor Sigurd Berven, MD

Congratulations to Our Graduating Residents

R5



R4



R3



R2



R1





MCGILL UNIVERSITY

**ORTHOPAEDIC
VIRTUAL V.P.**

(DIGITAL PLATFORM: ZOOM)

MAY 12TH, 2022, 4:00-6:30 PM

CASE PRESENTATIONS:

<https://mcgill.zoom.us/j/82114326232>

MAY 26TH, 2022, 3:00-5:00 PM

RESIDENT RESEARCH PAPER COMPETITION

PRESENTATIONS:

<https://mcgill.zoom.us/j/88081526063>

MAY 26TH, 2022, 7:00-9:00 PM

**V.P. BANQUET
DINNER / AWARDS
(ON SITE)**

SIGURD BERVEN, MD



Chief, Spine Service
Department of Orthopaedic Surgery
University of California, San Francisco (UCSF) USA

Sigurd Berven, MD, is the chief of the Spine Service at UC San Francisco. He holds a joint appointment in Orthopaedic Surgery and Neurosurgery, and he leads the UCSF Spine Surgical Home Program. Dr. Berven studied Human Biology and Economics at Stanford University. He studied Philosophy, Politics and Economics (PPE) as a graduate student at Oxford University. He then studied medicine at Harvard Medical School, followed by residency in the Harvard Combined Orthopaedic Program. His post-graduate surgical training included a chief residency at the Boston Children's Hospital, and Spine Fellowship at UC San Francisco where he has been on the faculty since August, 2000. Dr. Berven is the Professor in Residence at UC San Francisco, and he serves as the Chief of the Spine Service and Director of the Spine Surgical Home Program and the Interdisciplinary Spine Service. His clinical interests include complex spinal deformity in the adult and pediatric patient. His research interests include studies on the value of interventions including non-operative management, operative strategies and new technologies. His research has been funded by the NIH, NIAMS, NSF, NASA, CDMI, NASS, SRS, OREF, and AO Spine.

JOSEPH MILLER, BSc, MSc, MD, FRCSC



(1930–1990)

Dr. Joseph Miller was born in Edmonton, Alberta, Canada, and received all of his formal education in that city, graduating from the University of Alberta with a B.Sc. degree in 1952, and M.Sc. degree in 1954, and an M.D. degree in 1955. He interned at the Montreal General Hospital and then spent two years at the London Hospital in England, serving as a middle registrar in orthopaedic surgery and trauma. He returned to Canada, taking a fellowship in pathology, and completed his training in orthopaedic surgery at McGill University in 1962.

Dr. Miller's first academic position was at the University of Illinois in Chicago. He spent two years on the faculty there and began his career by showing the traits that were to characterize the rest of his life. The graduating class of 1963 recognized him as the most outstanding clinical teacher on the faculty. He also began his scholarly activities, when he was assigned the job of directing the Muscular Dystrophy Clinic. He rapidly devised new techniques of treating patients who had this condition, and the children and their families became totally devoted to him, as he was to them. By the time he moved back to Montreal, he was recognized throughout the world as one of the outstanding authorities in the field.

In 1966, Dr. Miller was appointed Orthopaedic Surgeon-in-Chief at the Montreal General Hospital. He spent the rest of his career in that institution. From 1981 until 1986, he served as Chairman of the Division of Orthopaedic Surgery at McGill University, having been given the rank of Professor of Orthopaedic Surgery.

Dr. Miller's impact was as a scientist and as a person. He had an inquiring mind and intense curiosity. Although he was interested in many things, he concentrated on biomechanics, with an emphasis on the design of implants and on the interface between bone and either cement or the prosthetic surface. His creative activity resulted in equipment for the injection of cement. He was never satisfied with the status quo, and his ideas were always far in advance of clinical practice. He obviously still had a great deal of superb science to carry out.

In his inter-professional relationship with both his colleagues and patients he was sympathetic, understanding, and witty in all of his dealings. His residents used him as a role model. He was a truly brilliant teacher; the debates between Dr. Miller and his peers in the implant field were certainly entertaining, but, even more importantly, they informed the orthopaedic profession in an unforgettable way.

Dr. Miller died suddenly on March 1st, 1990, at the age of fifty-nine.

PAST ORTHOPAEDIC VISITING PROFESSORS
(1990 – 2022)

2024	Oncology	
2023	Upper Extremity	
2022	Spine	Dr. Sigurd BERVEN
2021	Virtual V.P. Leader in evidence-based surgery & orthopaedic research	Dr. Mohit BHANDARI
2020	Spine cancelled due to COVID-19. Virtual event by Zoom within division members.	No V.P. Present
2019	Sports	Dr. Robert McCORMACK
2018	Foot & Ankle	Dr. Mark E. EASLEY
2017	Trauma	Dr. Michael BAUMGAERTNER
2016	Arthroplasty	Dr. Robert TROUSDALE
2015	Oncology	Dr. Jay WUNDER
2014	Upper Extremity (hand + trauma)	Prof. Alain MASQUELET
2013	Sports	Dr. Richard PARKER
2012	Spine & Trauma	Dr. Carlo BELLABARBA
2011	Foot & Ankle	Dr. Ned AMENDOLA
2010	Arthroplasty	Dr. Michael MOUNT
2009	Upper Extremity (shoulder)	Dr. Gilles WALCH
2008	Oncology	Dr. Nicola FABBRI
2007	Trauma	Dr. Wolfgang ERTEL
2006	Spine	Dr. Robert F. MCLAIN
2005	Upper Extremity	Dr. Shawn W. O'DRISCOLL
2004	Trauma	Dr. L. Scott LEVIN
2003	Sports	Dr. Russell WARREN
2002	Arthroplasty	Dr. Kelly VINCE
2001	Tumor	Dr. Franklin SIM
2000	Foot & Ankle	Dr. Ian ALEXANDER
1999	Trauma	Dr. James KELLAM
1998	Arthroplasty	Dr. Victor GOLDBERG
1997	Spine	Dr. John WEBB
1996	Sports	Dr. Brian DAY
1995	Arthroplasty	Dr. Erwin MORSCHER
1994	Trauma	Dr. Joseph SCHATZKER
1993	Upper Extremity	Dr. Robin RICHARDS
1992	Foot & Ankle	Dr. Sigvard HANSEN
1991	Arthroplasty	Dr. Robert McGRAW
1990	Arthro/Shld	Dr. Charles A. ROCKWOOD Jr.

MCGILL DIVISION OF ORTHOPAEDIC SURGERY

CHIEF OF DIVISION

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PROGRAM DIRECTOR

DR. MITCHELL BERNSTEIN

RESEARCH DIRECTOR

DR. JAKE BARRALET

RESIDENCY PROGRAM RESEARCH DIRECTOR

DR. JOHN ANTONIOU

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Jewish General Hospital **Dr. David Zukor**
Montreal General Hospital **Dr. Gregory Berry**
St-Mary's Hospital **Dr. Ronald Dimentberg**

PAEDIATRIC ORTHOPAEDIC SERVICES

Shriners Hospitals for Children-Canada **Dr. Thierry Benaroch**
(Chief of Staff)
Montreal Children's Hospital **Dr. Thierry Benaroch**
(Site Director)

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Shriners Hospitals for Children-Canada **Dr. René St-Arnaud**
McGill University Health Centre **Dr. Jake Barralet**
Dr. Lisbet Haglund
Dr. Derek Rosenzweig
Dr. Rahul Gawri
Dr. Livia Garzia
Dr. Joanna Przybyl
Jewish General Hospital **Dr. Fackson Mwale**

McGILL DIVISION OF ORTHOPAEDIC SURGERY

FELLOWS BY SPECIALTY

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Dr. Abdullah ALSHAHRANI
Arthroplasty (JGH)

Dr. Sharbel HITTI
Foot & Ankle (JGH)

Dr. Karla Teresa Saldana ARANETA
Oncology & Adult Reconstructive
Surgery (MGH)

Dr. Anas NOOH
Oncology, Complex Lower Limb
Reconstruction & Osseointegration (MGH)

Dr. Khaled ABUDALOU

Dr. Yousef MARWAN

Dr. Utai RUDICH

Dr. Saleh ALFAISALI

Pediatrics & Limb Deformity

Dr. Rakan BOKHARI
Dr. Mohammad HASSANI
Dr. Miltiadis GEORGIPOULOS
Scoliosis & Spine (MGH)

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Dr. Abdulaziz ABDULLAH
Sports Medicine & Arthroscopy
Clinical & Research (MGH)

Dr. Suliman ALSHAMMARI
Sports Medicine & Arthroscopy (MGH)

Dr. Charles-Antoine DION
Trauma (MGH)

RESIDENTS

PGY 1

Dr. Khalifa ALHOJAILAN
Dr. Abdulrhman ALNASSER
Dr. Abdulrahman KHIZINDAR
Dr. Carl LAVERDIÈRE
Dr. Jin Yong Patrick PARK

PGY 2

Dr. Hussain ALALI
Dr. Nawaf ALAMIRI
Dr. Muadh ALZEEDI
Dr. Hamid AL BADI
Dr. Paul KOONER
Dr. Simon MARTEL
Dr. Drew SCHUPBACH

PGY 3

Dr. Salim AL RAWAHI
Dr. Dena BAKHSH
Dr. Lucy LUO

PGY 4

Dr. Faisal ALFAYYADH
Dr. Nawaf ALJARBOA
Dr. Abdullah ALSHAMMARI
Dr. Andrew KUSEK
Dr. Julien MONTREUIL

PGY 5

Dr. Saud ALFAYEZ
Dr. Mohammed ALOTAIBI
Dr. Bardia BARIMANI
Dr. Jason CORBAN
Dr. Susan Mengxiao GE
Dr. Bayan GHALIMAH

MCGILL ORTHOPAEDIC VIRTUAL V.P.

PROFESSOR SIGURD BERVEN, M.D.

Chief, Spine Service

Department of Orthopaedic Surgery

University of California, San Francisco (UCSF)

AGENDA

MAY 12TH, 2022

(DIGITAL PLATFORM: ZOOM)

THURSDAY, MAY 12TH

<https://mcgill.zoom.us/j/82114326232>

4:00 pm – 6:30 pm All case presentations will be focused on Spine and Pelvis and this year's VP, Professor Sigurd Berven will be discussing the cases presented by the R4s to the R5s. Staff, residents and fellows will be welcome to comment and contribute to the discussion of any and all of the cases that interest you. Each case should last no longer than 20 minutes, discussion time included. **Order of case presentation is subject to change.**

CASE PRESENTATIONS

- 4:00 pm – 4:15 pm **Introduction & Visiting Professor Opening Talk:**
Evidence in Orthopaedic Surgery: Sources of Evidence and Contributing to the Evidence
Dr. Sigurd Berven
- 4:15 pm – 4:35 pm **Case 1 – Pelvic Ring Injury**
Presented by Dr. Bernstein
- 4:35 pm – 4:55 pm **Case 2 – Sacro-Pelvic Tumor**
Presented by Dr. Aoude
- 4:55 pm – 5:15 pm **Case 3 – Degenerative Lumbar Spine Disease**
Presented by Dr. Aoude
- 5:15 pm – 5:30 pm **Visiting Professor Talk:**
Spinal Deformity – Impact and Challenges of Management in the Child and the Adult
Dr. Sigurd Berven
- 5:30 pm – 5:50 pm **Case 1 – Pediatric Thoracic Spine Tumor**
Presented by Dr. Ouellet
- 5:50 pm – 6:10 pm **Case 2 – Spine Trauma**
Presented by Dr. Weber
- 6:10 pm – 6:30 pm **Case 3 – Metastatic Pelvis & Hip Pathologic Fractures**
Presented by Dr. Reindl

MCGILL ORTHOPAEDIC VIRTUAL V.P. AGENDA

MAY 26TH, 2022

(DIGITAL PLATFORM: ZOOM)

THURSDAY, MAY 26TH

<https://mcgill.zoom.us/j/88081526063>

3:00 pm – 5:00 pm **Resident Research Paper Competition**

Each presentation should be 7 minutes long
and 2 minutes for questions and discussion.

*Jury: Dr. Sigurd Berven
Dr. Ahmed Aoude
Dr. Louis-Nicolas Veilleux*

3:54 pm – 4:14 pm **Research in Orthopaedic Surgery: Opportunities
and Challenges**

Dr. Sigurd Berven

7:00 pm – 9:00 pm **Dinner/Banquet Awards (on-site)**

L'étoile de l'océan
101 Rachel Street East
Montreal, QC H2W 1C8

Introduction by Dr. Berry

CONGRATULATIONS TO OUR GRADUATING FELLOWS

MGH Fellows

Presented by Dr. Berry

Paediatric Fellows

Presented by Dr. Hamdy

JGH Fellows

Presented by Dr. Antoniou

SMH Fellows

Presented by Dr. Dimentberg

Dr. Bernstein presents the R1's with lab coats

AWARDS

Fellow Teacher of the Year Award

Presented by Dr. Berry

Outstanding Educator of the Year Award

Presented by Dr. Corban

Farewell to PGY 5's

Presented by Dr. Bernstein

Robert Turcotte Altruistic Patient Care

Presented by Dr. Turcotte

Julie Laurin Compassion Award

Presented by Dr. Berry

Pierre Dupuis Award

Presented by Dr. Montreuil

Best Resident Research Paper

Presented by Dr. Aoude

Closing Remarks

Presented by Dr. Berry

Meal and beverage sponsored by our Division of Orthopaedics
and Association d'orthopédie du Québec

ORAL PRESENTATION SCHEDULE

<https://mcgill.zoom.us/j/88081526063>



PLEASE NOTE THAT **EACH** PRESENTATION SHOULD BE **7 MINUTES** AND **2 MINUTES** WILL BE FOR **QUESTIONS AND DISCUSSION**.

- 3:00 pm – 3:09 pm TALECTOMY FOR ARTHROGRYPOTIC FOOT DEFORMITIES: A SYSTEMATIC REVIEW
AL-ALI, Hussain
- 3:09 pm – 3:18 pm PSEUDOTUMOR AFTER TOTAL DISC REPLACEMENT IN THE LUMBAR SPINE: A CASE REPORT AND REVIEW OF THE LITERATURE
AL RAWAHI, Salim
- 3:18 pm – 3:27 pm IL-1 β -INDUCED DRG NEURONAL HYPERSENSITIVITY IS ABROGATED BY LINK N
ALAD, Muskan
- 3:27 pm – 3:36 pm LONG TERM HIP GEOMETRIC CHANGES AFTER SELECTIVE DORSAL RHIZOTOMY IN AMBULATING CEREBRAL PALSY PATIENTS
ALOTAIB, Mohammed
- 3:36 pm – 3:45 pm GLIDING SCREWS TREATMENT FOR EARLY ONSET SCOLIOSIS, A 5-YEAR EXPERIENCE
ALSHAMMARI, Abdullah
- 3:45 pm – 3:54 pm GROWTH MODULATION FOR THE TREATMENT OF JUVENILE HALLUX VALGUS: A SYSTEMATIC REVIEW OF LITERATURE
ALZEEDI, Muadh
- 3:54 pm – 4:14 pm *VP Talk:* RESEARCH IN ORTHOPAEDIC SURGERY: OPPORTUNITIES AND CHALLENGES
BERVEN, Sigurd
- 4:15 pm – 4:24 pm SIMILAR COMPLICATION AND READMISSION RATES FOLLOWING SIMULTANEOUS VS STAGED BILATERAL TOTAL HIP ARTHROPLASTY
BARIMANI, Bardia

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- 4:24 pm – 4:33 pm TARGETING SENESCENT CANCER CELLS USING
SENOLYTIC DRUGS TO PREVENT BREAST-TO-BONE
METASTASIS
HAMBURGER, Eleane
- 4:33 pm – 4:42 pm BONE ALLOGRAFT PEDICLE SCREW AUGMENTATION:
A BIOMECHANICAL STUDY
KOONER, Paul
- 4:42 pm – 4:51 pm PREDICTIVE VALUE OF PRESSURE MONITORING
COMBINED WITH CLINICAL FINDINGS FOR LOWER LEG
COMPARTMENT SYNDROME
LAVERDIÈRE, Carl
- 4:51 pm – 5:00 pm o-VANILLIN ENHANCED MESENCHYMAL STEM CELL
DIFFERENTIATION AND DISC CELL PHENOTYPE
Li, Li
- 5:00 pm – 5:09 pm EPISODE-OF-CARE COSTS OF TOTAL HIP ARTHROPLASTY:
DAY-SURGERY VERSUS SAME-DAY ADMISSION
PROTOCOLS
MONTREUIL, Julien

ORAL PRESENTATIONS

ALECTOMY FOR ARTHROGRYPOTIC FOOT DEFORMITIES: A SYSTEMATIC REVIEW

Sami Chergui, **Hussain Al-Ali**, Yousef Marwan, Khaled Abu Dalu,
Noémi Dahan-Oliel, Reggie Hamdy.

BACKGROUND Arthrogryposis multiplex congenita (AMC) is one of the most common congenital joint contracture syndromes. Talectomy has been proposed for severe foot deformities in AMC, but the literature is limited. The purpose of this systematic review is to evaluate the indications, outcomes and complications of talectomy in arthrogrypotic foot deformities.

METHODS The articles were found through Embase and Medline. Screening was conducted by two independent investigators with disagreements resolved by a third reviewer. Relevant data regarding demographics, outcomes and complications were collected.

RESULTS Of 232 feet, 71.98% and 62.22% had clinical and radiographic improvements respectively. Amongst 122 patients, 92.62% could ambulate following surgery. Recurrent deformities and revision surgery were seen in 16.81% and 13.36% of cases respectively.

CONCLUSIONS Talectomy is a valid surgical option for severe arthrogrypotic foot deformities with favorable post-operative outcomes and low complication rate.

PSEUDOTUMOR AFTER TOTAL DISC REPLACEMENT IN THE LUMBAR SPINE: A CASE REPORT AND REVIEW OF THE LITERATURE

**Muadh AlZeedi, Salim Al Rawahi, Mashaal Muwanis,
Thamer M Alraiyes, Humaid Al Farii, Peter Jarzem**

Division of Orthopaedic Surgery, Department of Surgery, McGill University,
Montreal, Quebec, Canada

BACKGROUND Total disc replacement as a treatment for degenerative disc disease is gaining increased popularity. There is limited data in the literature about formation of a pseudotumor as a complication following this procedure. We report a very rare case of a pseudotumor after a lumbar total disc replacement with a review of the literature.

METHODS A case study of a 49-year-old lady, who underwent L4-L5 total disc replacement and presented one year later with progressive back pain radiating to both lower extremities. Imaging revealed a soft tissue mass around the prosthesis. A review of the literature for similar cases has been done and reviewed.

RESULTS Imaging revealed a soft tissue mass around the prosthesis and left hydronephrosis. CT venogram for leg swelling showed total occlusion of the left common iliac vein. CT myelogram showed compression of the cauda from the pseudotumor. The prosthesis was removed and replaced by an allograft fusion cage and plate. Intraoperatively, both extremities became pulseless and bilateral common iliac arteries thrombectomy was carried out. This occurred again after closure immediately and bilaterally femoral artery exploration and thrombectomy was carried out. Histopathology showed a soft tissue with fibrinous necrosis and lymphohistiocytic inflammation.

CONCLUSION Soft tissue reaction and pseudotumor formation can be induced by Metal-on-Metal total disc replacement prostheses. Neurologic, vascular, and visceral complications may occur. In this case, implant removal stopped progression of the soft tissue reaction. Most patients in the literature benefit from implant removal followed by spinal fusion.

IL-1 β -INDUCED DRG NEURONAL HYPERSENSITIVITY IS ABROGATED BY LINK N

Muskan Alad^{1,2}, Michael P Grant¹, Laura M Epure¹, Olga L Huk^{1,2},
David J Zukor^{1,2}, Fackson Mwale^{1,2} and John Antoniou^{1,2}

¹Lady Davis Institute for Medical Research, Montreal, QC, Canada

²McGill University, Montreal, QC, Canada

INTRODUCTION Osteoarthritis (OA) is a painful and disabling chronic condition that constitutes a major challenge to health care worldwide. One of the main factors implicated in OA pain is abnormal sensory input (nociception) by dorsal root ganglia neurons that innervate the joint. IL-1 β is a key proinflammatory cytokine involved in the progression of degeneration and pain in OA. There is currently no cure for OA, and available analgesics do not offer adequate and sustained pain relief. We have demonstrated that LN, a 16-residue peptide derived from link protein, can suppress the upregulation of catabolic enzymes and inflammatory and pain factors in human chondrocytes. We have also demonstrated that LN can modulate pain behavior in a murine model with advanced OA. It remains unclear as to the mechanism(s) of LN on pain behavior. We hypothesize that LN plays a direct role in regulating IL-1 β signaling in joint and DRG neuronal cells to alter sensory pain in OA.

METHODS **Western Blotting**-Human OA chondrocytes and synovial fibroblasts isolated from donors (ages 45 – 65 yrs) undergoing knee arthroplasty were treated with LN [1 μ g/mL] with or without IL-1 β [1ng/mL] for up to 60 min. Cell lysates were collected and processed for Western blotting to identify changes in P-NF κ B, the transcription factor activated by the canonical signaling pathway of IL-1 β .

Ca²⁺-mobilization-DRG neurons were isolated from lumbar regions L2-5 in 15-week-old C57BL/6 mice and cultured in glass chamber slides for 7 days with IL-1 β with or without LN [1 μ g/mL]. Cells were loaded with Fura-4, AM and imaged for changes in intracellular Ca²⁺ either at resting state or following stimulation with capsaicin [100 nM] using a Zeiss LSM800 confocal microscope.

RESULTS In both chondrocytes and synovial fibroblasts, LN significantly suppressed the activation of P-NF κ B to levels comparable to controls for up to 60 min (ANOVA, posthoc Tukey; $p < 0.01$; $n = 4$). Ca-mobilization is used as a surrogate marker for excitability in DR neurons. When DRGs were incubated with IL-1, basal intracellular Ca²⁺ levels were elevated when compared to controls ($p < 0.001$; $n = 4$) but significantly decreased when LN was present ($p < 0.0001$; $n = 4$). When DRG neurons were stimulated with capsaicin, IL-1 preconditioned neurons demonstrated a sustained increase in intracellular Ca²⁺. Co-treatment with LN blunted the sustained Ca²⁺ increase induced by IL-1 β (Fig 1).

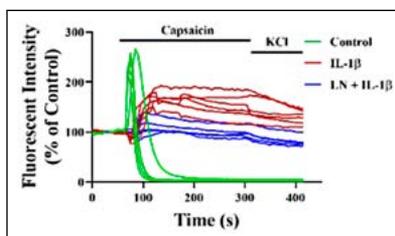


FIG 1. EFFECT OF LN ON IL-1-INDUCED HYPERALGESIA IN ISOLATED MURINE DRG NEURONS. DRG NEURONS WERE STIMULATED WITH CAPSAICIN [100 nM] FOR 240 S FOLLOWED BY KCL (100 nM) FOR 120 S. N = 6.

CONCLUSIONS In summary, LN inhibits IL-1 β signaling and regulates DRG neuronal-induced hypersensitivity. These results may support the use of LN in the treatment of OA pain.

LONG TERM HIP GEOMETRIC CHANGES AFTER SELECTIVE DORSAL RHIZOTOMY IN AMBULATING CEREBRAL PALSY PATIENTS

C. Pedneault, M. Alotaibi, S.K. Abidi, A. Aoude, JP Farmer, T. Benaroch, N. Saran

BACKGROUND Spastic diplegic cerebral palsy (SCP) frequently results in hip subluxation. Selective dorsal rhizotomy (SDR) is a surgical intervention used to decrease muscle spasticity in SCP patients. There is limited literature addressing the long-term effect of SDR on hip subluxation in these patients.

OBJECTIVE To determine the effectiveness of SDR in preventing progression of hip migration in SCP patients

METHODS A retrospective chart review included 68 SCP patients, total 136 hips, who underwent SDR, at mean age 4.82 (2-9.5) years and mean follow-up 10.5 (1.7-16.8) years. Demographic data were recorded, including age at surgery and GMFCS score. Migration percentage (MP), Hilgenreiner's acetabular index (AI), Sharp's angle, lateral center-edge angle (CEA) were calculated. Paired Student t-tests determined differences between preoperative and final follow-up MP for all patients.

RESULTS MP improved 3.3% from a preoperative mean MP of 26.2% to 22.9% at final follow-up ($p=0.0036$). Average preoperative AI was 20.17 (7-38, ± 5.9) degrees. Average postoperative Sharp's angle and CEA were 43.41 (21-60, ± 5.5) degrees and 25.77 (-8-48, ± 9.8) degrees respectively. According to GMFCS category, the GMFCS-1 group (11) had a 2% worsening of MP ($p=0.6$). The GMFCS-2 group (28) had a 3% improvement in MP ($p=0.04$) and the GMFCS-3 group (24) had a 6% improvement ($p=0.002$). The GMFCS-4 group (5) had a 1% improvement in MP ($p=0.887$). SDR had a success rate of 87% (no need for corrective surgery).

CONCLUSION These results suggest SDR can be a protective measure in preventing hip subluxation in SCP disease, especially in GMFCS-2 and GMFCS-3 patients.

KEYWORDS spastic diplegic, cerebral palsy, selective dorsal rhizotomy, hip dislocation subluxation.

GLIDING SCREWS TREATMENT FOR EARLY ONSET SCOLIOSIS, A 5-YEAR EXPERIENCE

Rodrigo Navarro-Ramirez, Oded Rabau, Abdullah Alshammari,
Jean Ouellet

OBJECTIVES To present our surgical, radiological, and clinical outcomes related to the utilization of gliding screws for the treatment of early-onset scoliosis in combination with; Modern Luque Trolley, growing rods, and magnetically controlled rods.

METHODS This is an original work based on prospectively collected and retrospectively analyzed data on all of those pediatric patients treated using gliding screws at a single institution from 2015 to 2020. Data collected was mainly but not limited to Age, Gender, Diagnosis, Complications. Preoperative and Post-operative: Type of curve, Curve magnitude, T1-L1 length, T1-T12 length, T1-S1 length (at each follow-up appointment).

RESULTS Demographics: 30 Patients with the diagnosis of early-onset scoliosis with associated pathologies such as neuromuscular condition, syndrome, mesenchymal disease such as osteogenesis imperfecta, among others diagnoses were treated using gliding screws between 2015 and 2020. The average age at the time of surgery was 7 years. Follow-up was between 24 to 50 months. Radiological outcomes: Percentage of immediate curve correction postoperatively was ~70% while at the latest follow up was 60% on 23% of patients. Growth wise; 70% of the patients reached 70% of their expected growth. However, 30% of patients grew less than 40% of their expected growth. Curve progression was observed on 70% of the patients and 2 patients required fusion due to the severity of their curve progression at 24 months after gliding screws insertion. No curve magnitude/diagnosis, curve magnitude/growth, expected growth/diagnosis correlation was statistically observed. Complications: 2 patients presented superficial wound infections and were treated conservatively. There were no complications or revision surgeries related to hardware failure.

CONCLUSIONS Gliding screws used in combination with growth modulation techniques such as modern Luque trolley, growing rods, and/or magnetically controlled growing rods represent a safe and relatively effective option to achieve and maintain curve correction while preserving growth after at least 24months follow up. However, further studies including a more homogeneous and larger sample may be necessary to confirm our results.

GROWTH MODULATION FOR THE TREATMENT OF JUVENILE HALLUX VALGUS: A SYSTEMATIC REVIEW OF LITERATURE

Muadh Alzeedi, MD; J. Patrick Park, MDCM, MSc;
Yousef Marwan, BMedSc, BMBCCh, FRCSC; Khaled Abu Dalu, MD;
Reggie C. Hamdy, MD, MSc, FRCSC; Chantal Janelle, MD, FRCSC

Shriners Hospital for Children - Canada, and Division of Orthopaedic Surgery,
McGill University Health Centre, Montreal, Quebec, Canada

BACKGROUND Juvenile hallux valgus is a complex forefoot deformity that causes pain and functional limitation. Management of this deformity poses a challenge in terms of the optimal technique and timing of intervention. A systematic review of the literature for the use of growth modulation in treating juvenile hallux valgus was conducted in this study.

METHODS Literature review was performed using PubMed and EMBASE searches for articles investigating growth modulation for treatment of juvenile hallux valgus published before December 1st, 2021. Eight articles were included in the final review that matched the inclusion and exclusion criteria. The primary outcomes included degree of correction of hallux valgus angle and intermetatarsal angle. A qualitative assessment of the articles included was done due to the heterogeneity of the growth modulation methods used in these articles.

RESULTS Total of 150 feet from 87 patients were included in the reviewed articles. Growth modulation methods included temporary screw lateral hemiepiphyodesis of the first metatarsal, Lateral drilling hemiepiphyodesis of the first metatarsal, and trephine plug removal of the lateral hemiepiphyosis followed by cancellous bone graft. The degree of correction of hallux valgus angle and intermetatarsal angle was found to be statistically significant in all studies regardless of the technique.

CONCLUSION Growth modulation for HV in skeletally immature patients via lateral hemiepiphyodesis with minimally invasive techniques showed favourable radiologic outcomes with some evidence of clinical improvement. Larger, prospective and comparative studies with objective clinical outcome measures may further consolidate this surgical approach as a mean to treating this deformity.

SIMILAR COMPLICATION AND READMISSION RATES FOLLOWING SIMULTANEOUS VS STAGED BILATERAL TOTAL HIP ARTHROPLASTY

Bardia Barimani, Evangelos Tyrpenou, MD;
Panayiotis D Megaloikonomos, MD; Laura Epure, MSc;
Olga Huk-Papanastassiou, MD; David Zukor, MD; John Antoniou, MD

INTRODUCTION Simultaneous bilateral total hip arthroplasty (THA) in patients with bilateral hip osteoarthritis is gradually becoming attractive, as it requires a single anesthesia and hospitalization. However, there are concerns about the potential complications following this surgical option. The purpose of this study is to compare the short-term major and minor complications and assess the readmission rate, between patients treated with same-day bilateral THA and those with staged procedures within a year.

METHOD We retrospectively reviewed the charts of all patients with bilateral hip osteoarthritis that underwent simultaneous or staged (within a year) bilateral total THA in our institution, between 2016-2020. Preoperative patient variables between the two groups were compared using the 2-sample t-test for continuous variables, the Fisher's exact test for binary variables, or the chi-square test for multiple categorical variables. Similarly, differences in the 30-day major and minor complications and readmission rates were assessed. A logistic regression model was also developed to identify potential risk factors.

RESULTS A total of 160 patients (mean age: 64.3 years, SD: ± 11.7) that underwent bilateral THA was identified. Seventy-nine patients were treated with simultaneous and eighty-one patients with staged procedures. There were no differences in terms of preoperative laboratory values, gender, age, Body Mass Index (BMI), or American Society of Anesthesiologists Scores (ASA) ($p > 0.05$) between the two groups. Patients in the simultaneous group were more likely to receive general anesthesia (43% vs 9.9%, $p < 0.001$) and they had a longer total operative time (182.8 vs 128.0 minutes, $p < 0.001$). The simultaneous group had an overall shorter total length of hospital stay (5.8 vs 8.6 days, $p < 0.001$). No difference was identified in transfusion rate between the two groups ($p = 0.229$). Major complications were recorded in three patients of the simultaneous (3.7%) and one patient of the staged group (1.2%); but no statistical difference was identified. Similarly, no difference in terms of minor complications was found between one-stage and two-stage THAs (16.5% vs 12.3% $p > 0.05$). After controlling for potential confounders, the multivariable logistic regression analysis showed similar odds of having a major (odds ratio 0.29, 95% confidence interval [0.30-2.88], $p = 0.29$) or minor (odds ratio 1.714, 95% confidence interval [0.66-4.46], $p = 0.27$) complication after simultaneous compared to staged bilateral THA. No differences in emergency department visits or readmission for reasons related to the procedure were recorded ($p > 0.05$).

CONCLUSION This study shows that similar complication and readmission rates are expected after simultaneous and staged THAs. Simultaneous bilateral THA is a safe and effective procedure, that should be sought actively and counselled by surgeons, for patients that present with radiologic and clinical bilateral hip disease.

TARGETING SENESCENT CANCER CELLS USING SENOLYTIC DRUGS TO PREVENT BREAST-TO-BONE METASTASIS

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INTRODUCTION Doxorubicin, a standard chemotherapeutic, can induce tumor and stromal cell senescence leading to therapy-resistance. Senescence can be characterized by the senescence-associated secretory phenotype (SASP) state, which causes the secretion of pro-inflammatory and pro-tumorigenic factors. The SASP can lead to chronic, systemic inflammation, immune suppression, and increased growth and spread of cancer. The main objective of our research is to generate treatments that target senescent cancerous and non-senescent cancerous cells as well as treatment-induced senescent stromal cells. Senolytic drugs target senescent cells and induce apoptosis, which may help decrease SASP, improve therapeutic efficacy, prevent metastasis, and improve patient outcomes.

METHODS We will assess low-dose chemotherapy inducing senescence in breast cancer (MDA-MB-231) and connective tissue cell lines (IRM-90) as well as patient-derived connective tissue and spine metastases cells in monolayer. We determined the effect of combining Doxorubicin with senolytics (RG-7112, o-Vanillin) regarding spheroid growth and viability using a spheroid bone-like tumor microenvironment model *in vitro*. AlamarBlue determined metabolic activity, p16^{INK4a} determined the extent of induced senescence, and spheroid size was determined using fluorescence microscopy.

RESULTS Cell lines MDA-MB-231 and IRM-90, representing the primary tumor and surrounding stromal cells as well as primary osteoblasts and spine metastases cells secondary to breast show a steady increase in the induction of senescence determined by p16^{INK4a} immunostaining (Figure 1). Combining senolytics with Doxorubicin resulted in a reduction of size, outgrowth, and viability of spheroids in comparison to control (Figure 2).

DISCUSSION This study has the potential to advance chemotherapeutic treatment, prevent metastasis to the bone, and enhance quality of life of patients being treated for solid tumor cancers with bone involvement. Effectively, targeting senescent cells may help avoid tumor reactivation in the spine and improve normal tissue homeostasis following chemotherapy.

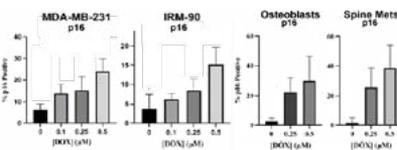


FIG 1. DOX INDUCED SENESCENCE IN BREAST CANCER, FIBROBLAST, OSTEOBLAST, AND SPINE MET CELLS TREATED FOR 48 HOURS. GRAPHS INDICATE THE PERCENT p16 POSITIVE CELLS FROM IMMUNOSTAINING.

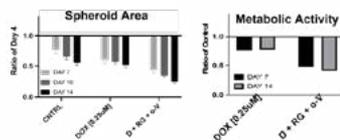


FIG 2. MDA-MB-231 SPHEROID AREA AND METABOLIC ACTIVITY OVER 14 DAYS OF TREATMENT STARTING AT 20,000 CELLS.

BONE ALLOGRAFT PEDICLE SCREW AUGMENTATION: A BIOMECHANICAL STUDY

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PURPOSE To evaluate a novel technique for screw augmentation using morselized cortico-cancellous bone allograft to fill the widened screw track of failed pedicle screws.

BACKGROUND Spinal instrumentation in patients with poor bone quality remains a challenge in spine surgery. A typical complication reported in several studies is pedicle screw loosening, with literature showing rates of 1-15% in non-osteoporotic patients, and as high as 60% in osteoporotic patients. Revision surgeries to correct previously failed instrumentation are becoming increasingly common, and techniques to enhance pedicle screw fixation are often required. Cement augmentation techniques include injecting polymethylmethacrylate (PMMA), calcium phosphate or hydroxyapatite into the loosened screw tract prior to recanalization with a solid or fenestrated pedicle screw. Studies have shown favourable outcomes in securing rigid fixation with cement augmentation, however disadvantages include the introduction of a foreign substance with the potential for extravasation into adjacent structures and a permanent foreign body that can only be completely removed using a corpectomy. To date, there are no known biological methods available for failed pedicle screw fixation.

METHODS we performed a comprehensive cadaveric biomechanical study to compare the fixation strength of primary screws, screws augmented with bone allograft, and screws augmented with PMMA cement.

RESULTS Fifty vertebrae were instrumented with pedicle screws. Our study showed that bone allograft augmentation using the same diameter screw was non-inferior to the fixation strength of the initial screw. In the axial pullout test, screws undergoing bone allograft repair failed at 25% lower loads compared to native screws, and screws augmented with cement showed approximately twice as much strength compared to native screws. In the cyclic displacement test, screws fixed with cement resisted loosening the best of all the groups tested. However, screws augmented with bone graft were found to have an equal strength to native screw purchase. our study did not find a correlation with bone mineral density (BMD) as a predictor for failure in axial pullout or cyclic displacement tests.

CONCLUSION Bone allograft augmentation for pedicle screw fixation was non-inferior to the initial screw purchase in this biomechanical study. This bone allograft technique is a viable option for screw fixation in the revision setting when there is significant bone loss in the screw track.

PREDICTIVE VALUE OF PRESSURE MONITORING COMBINED WITH CLINICAL FINDINGS FOR LOWER LEG COMPARTMENT SYNDROME

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Edward J Harvey

OBJECTIVE To evaluate whether published studies support basing the diagnosis of compartment syndrome of the lower leg on clinical findings, intra-compartmental pressure (ICP) monitoring, or a combination of both.

DATA SOURCES A PUBMED/MEDLINE, Web of Science, and Embase search of the English literature from 1966 to January 2022, was performed. This used “lower extremity” or “leg” or “tibia” and “compartment syndrome” and “pressure” as the subjects. A manual search of the bibliographies was performed, and cross referenced with those used to formulate the AAOS Clinical Practice Guidelines.

STUDY SELECTION AND EXTRACTION Inclusion criteria were traumatic tibia injuries, presence of data to calculate the sensitivity, specificity, positive and negative predictive value of clinical findings and/or pressure monitoring and the presence or absence of compartment syndrome as the outcome. A total of 2906 full articles were found, of which 63 were deemed relevant for a detailed review. Seven studies met all eligibility criteria.

DATA SYNTHESIS The likelihood ratio form of Bayes’ theorem was used to assess the discriminatory ability of the clinical findings and ICP monitoring as tests for compartment syndrome. No available published data allows precise characterization of statistical value for any individual clinical sign. The predictive value of grouped clinical signs was 21% and the value was 29% for pressure monitoring. When combining both, the probability reached 68%.

CONCLUSION The use of ICP monitoring may be helpful when combined with a clinical assessment to increase the sensitivity and specificity of the overall diagnosis. Previously accepted individual inference values should be revisited with new prospective studies to further characterize the statistical value of each clinical finding. Future research should focus on the use of more accurate ICP monitors to help develop standardized protocols for both the diagnosis of ACS and the surveillance of at-risk patient populations.

O-VANILLIN ENHANCED MESENCHYMAL STEM CELL DIFFERENTIATION AND DISC CELL PHENOTYPE

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INTRODUCTION Human mesenchymal stem cell (hMSC) therapy is a promising treatment for discogenic low back pain (LBP). This study aims to explore o-Vanillin use in enhancing hMSC differentiation toward disc-like cells and improving the phenotype of disc cells (DCs) from intervertebral discs (IVDs) of surgical patients with LBP.

METHODS Extracellular vesicle release and uptake between monolayer hMSCs and DCs were observed using fluorescence microscopy. We performed quantitative PCR to examine hMSC differentiation and DC phenotype in pellets following exposure to conditioned media (CM). Further experiments detected proteoglycan production, inflammatory mediators, and senescent cell accumulation. All were performed in the presence and absence of o-Vanillin.

RESULTS o-Vanillin significantly increased extracellular vesicle release and/or uptake in hMSCs and DCs. The expression of IVD markers, such as *FOXF1*, *PAX1*, *TIE2*, *SOX9* and *ACAN*, significantly increased in hMSCs exposed to DC CM. The expression of *FOXF1*, *TIE2*, *SOX9*, *HIF-1 α* and *ACAN* was further significantly increased by o-Vanillin in hMSCs adding to the effect of DC CM. In DCs exposed to hMSC CM, the expression of *FOXF1*, *SOX9*, and *HIF-1 α* significantly increased. In addition, the expression of *FOXF1*, *TIE2*, *SOX9*, and *HIF-1 α* was further increased following o-Vanillin treatment in DCs adding to the effect of hMSC CM. In pellet cocultures, the cumulative proteoglycan production was significantly higher in cocultures compared to each cell type alone. IL-6 and IL-8 concentrations significantly decreased in the o-Vanillin-treated cultures. The number of p16INK4a positive senescent cells was significantly decreased when hMSCs and DCs were combined and was further decreased by o-Vanillin treatment in the pellet cocultures.

CONCLUSIONS Our data showed that there is a crosstalk between hMSCs and DCs resulting in an improvement of the phenotype of cells from degenerating IVDs of patients undergoing surgery for LBP, which was enhanced by o-Vanillin. In addition, hMSCs promoted proteoglycan production and deposition, and reduced senescent cells, which were further enhanced by o-Vanillin. Furthermore, we found o-Vanillin increased vesicle release and/or uptake and suppressed inflammatory cytokine production. Our work revealed that a combination of stem cells and anti-inflammatory/senolytic compounds may potentially improve the outcome of cell supplementation therapy for LBP.

EPISODE-OF-CARE COSTS OF TOTAL HIP ARTHROPLASTY: DAY-SURGERY VERSUS SAME-DAY ADMISSION PROTOCOLS

Moisan P, **Montreuil J**, Bernstein M, Hart A, Tanzer M

BACKGROUND Although day surgery (DS) has a good patient satisfaction and safety profile, accurate episode-of-care cost (EOCC) calculations for this procedure compared to standard same-day admission (SDA), is not well known. This study assesses the EOCC for patients who underwent total hip arthroplasty (THA) while comparing DS and SDA (with a 1-day hospitalization) pathways.

MATERIAL AND METHODS The EOCC of 50 consecutive DS and SDA patients who underwent a THA were evaluated. The EOCC was determined using an Activity Based Costing method. Functional outcomes were measured using preoperative and postoperative Harris Hip Scores (HHS).

RESULTS Overall, the SDA THA costs 11% more than a DS THA. The mean total EOCC of DS THA was CAD 9,672 compared to CAD 10,911 in the SDA THA group. Both groups showed an improvement in HHS score following the procedure but patients in the DS group had a significantly higher postoperative HHS score (90 vs 73 $p<0.0001$) and a significantly greater improvement in their HHS score postoperatively.

CONCLUSION Day surgery THA is cost-effective, safe, and associated with high patient functional improvement. Providing policymakers the information to develop optimal financing methods is paramount for clinicians wishing to develop modern protocols, increase productivity while providing the optimal care for patients.

**WE WISH TO EXPRESS OUR ACKNOWLEDGEMENT
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