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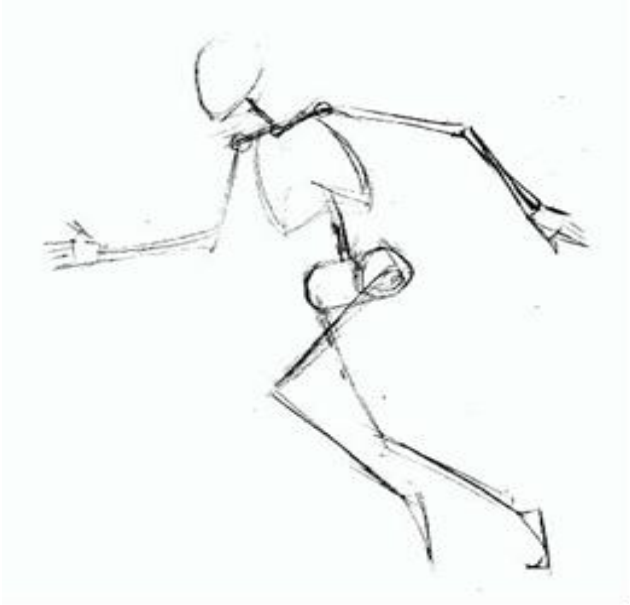
Trauma and Orthopaedics



Evidence Update

May/June 2018 (Quarterly)

Contents

Current Journals: Tables of Contents

Click on journal title (+ Ctrl) for hyperlink

Journal	Month	Volume	Issue
Journal of Bone and Joint Surgery	June	100	11
Journal of Orthopaedic Trauma	June	32	6
Injury	June	49	6
Strategies in Trauma and Limb Construction	April	13	1
Clinical Orthopaedics and Related Research	June	476	6

If you require full articles please email: library@uhbristol.nhs.uk

Lunchtime Drop-in Sessions

All sessions last one hour

June (12.00-13.00)

7th (Thu) **Literature Searching**

11th (Mon) **Critical Appraisal**

20th (Wed) **Interpreting Statistics**

28th (Thurs) **Literature Searching**

July (13.00-14.00)

5th (Thu) **Critical Appraisal**

9th (Mon) **Statistics**

19th (Thu) **Literature Searching**

23rd (Mon) **Critical Appraisal**

August (12.00-13.00)

1st (Wed) **Statistics**

6th (Mon) **Literature Searching**

16th (Thu) **Critical Appraisal**

22nd (Wed) **Statistics**

30th (Thu) **Literature Searching**

Your Outreach Librarian Jo Hooper

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Library Clinic

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June 19th: **Welcome Centre, BRI** *10.00-16.00*

July 3rd: **Welcome Centre, BRI** *10.00-16.00*

July 4th: **Canteen (Level 9, BRI)** *12.00-14.00*

August 8th: **Foyer, Education Centre** *12.00-14.00*

August 29th: **Foyer, St Michael's Hospital** *12.00-14.00*

September 5th: **Canteen (Level 9, BRI)** *12.00-14.00*

September 11th: **Welcome Centre, BRI** *10.00-16.00*

October 3rd: **Terrace (Level 4, Education Centre)** *12.00-14.00*

November 7th: **Canteen (Level 9, BRI)** *12.00-14.00*

December 5th: **Foyer, Education Centre** *12.00-14.00*

December 11th: **Welcome Centre, BRI** *10.00-16.00*

Latest Evidence

NICE National Institute for Health and Care Excellence

The use of adjunct psychosocial interventions can decrease postoperative pain and improve the quality of clinical care in orthopedic surgery. A systematic review and meta-analysis of randomized controlled trials Source: PubMed - 24 May 2018 - Publisher: The Journal Of Pain : Official Journal Of The American Pain Society Read Summary

Cochrane Library

Electrotherapy modalities for lateral elbow pain
Online Publication Date: June 2018

Videolaryngoscopy versus direct laryngoscopy for tracheal intubation in neonates
Online Publication Date: June 2018

Surgical interventions for patellar tendinopathy
Online Publication Date: May 2018

Canadian C-spine rule and the National Emergency X-Radiography Utilization Study (NEXUS) for detecting clinically important cervical spine injury following blunt trauma
Online Publication Date: April 2018

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Overview of ankle fractures in adults
- Indications for orthopedic consultation or referral
- Summary and recommendations

Literature review current through: May 2018. | **This topic last updated:** May 30, 2018.

Throwing injuries of the upper extremity: Clinical presentation and diagnostic approach
- Indications for orthopedic consult or referral
- Ulnar collateral ligament (UCL) injury
- Summary and recommendations

Literature review current through: May 2018. | **This topic last updated:** Apr 18, 2018.

Recent Database Articles

Below is a selection of articles related to orthopaedics recently added to the healthcare databases.

3D-printed scaffolds with calcified layer for osteochondral tissue engineering

Author(s): Li Z.; Jia S.; Hao F.; Liu J.; Yuan Z.; Xiong Z.; Long Q.; Yan S.

Source: Journal of Bioscience and Bioengineering; 2018

Publication Type(s): Article In Press

Abstract: Treating full-layer injury of bone and cartilage is currently a significant challenge in orthopedic trauma repair. Joint damage typically includes chondral defects, and the underlying subchondral defect sites are difficult to repair. Tissue engineering technology could potentially be used to treat such injuries; however, results to date been unsatisfactory. The aim of this study was to design a multilayer composite scaffold containing cartilage, bone, and calcified layers to simulate physiological full-thickness bone-cartilage structure. The cartilage layer was created using an improved temperature-gradient thermally induced crystallization technology. The bone and calcified layers were synthesized using 3D printing technology. We examined the scaffold by using scanning electron microscope (SEM), X-ray diffraction (XRD), fluorescence staining, and micro computed tomography (Micro-CT), and observed clearly oriented structures in the cartilage layer, overlapping structures in the bone scaffold, and a compressed calcified layer. Biomechanical performance testing showed that the scaffolds were significantly stronger than scaffolds without a calcified layer (traditional scaffolds) in maximum tensile strength and maximum shear strength ($P < 0.05$). After inoculating cells onto the scaffolds, we observed similar cell adherence and proliferation to that observed in traditional scaffolds, likely because of the high porosity of the whole scaffold. Our scaffolds could be used in bone and cartilage full-thickness injury repair methods, as well as applications in the field of tissue engineering.

The meaning of the plaster in the treatment of the vertebral fractures

Author(s): Rava A.; Girardo M.; Gargiulo G.; Cinnella P.; Viglierchio P.; Coniglio A.

Source: European Spine Journal; 2018; vol. 27 (no. 4); p. 943

Publication Type(s): Conference Abstract

Abstract: Introduction: The use of a pinstriped spine in lumbar back fractures is a fundamental cultural passage for those wishing to treat this condition. The orthopedic school offers the possibility to learn the use of this technique, which currently seems to be little used. In this retrospective study we evaluated the results of vertebral fractures of the dorsolumbar tract treated with a pinstripe bust, followed by a corset until healing. Materials and methods: From June 2008 to June 2015 we treated 72 patients (40 males and 32 females) suffering from somatic fractures of the dorsolumbar tract (T10-L2). The median age at the start of treatment was 26 years, with a range between 15 and 45 years. For the diagnosis of fracture we performed the following diagnostic investigations: radiographic evaluation in 2 P (n: 72), MRI (n: 72), TC (n: 72). The fractures treated were classified A1-A3. No patient presented neurological deficits. The treatment adopted consisted in the packaging of a plastered bust (BG) on Bell's bed, positioning the patient in hyperlordosis, thus allowing a distraction and for ligamentotaxis reduction of the cuneization. The pinstripe bust has been packaged in correction. The BG was maintained for 40 days, without concession of the load. At the

end of the 40 days, the plaster was replaced with a 3-point corset, like Jewett, for the remaining 50 days. Radiographic checks were performed at the end of the packaging of BG, at the removal, at 60 and 90 days from the fracture. The average follow-up was 4 years. Results: N: 22 treated patients have come to healing while maintaining the level of correction obtained during BG packaging. N: 40 healed while maintaining the vertebral cuneization manifested at the time of trauma. N: 10 patients did not respond to follow-up control. N: 2 patients required the early removal of BG, replaced with Jewetttype corset. There were no cases of surgery due to treatment failure. Discussion and conclusion: The study demonstrates the good efficacy of conservative treatment, which must be performed scrupulously, and under close clinical and radiological observation. The comparison with the vertebral stabilization (surgical treatment) that offers faster mobilization times and shorter recovery remains topical.

Managing soft tissues in severe lower limb trauma in an ageing population

Author(s): Noblet T.M.; Jackson P.C.; Foster P.; Taylor D.M.; Harwood P.J.; Wiper J.D.

Source: Injury; 2018

Publication Type(s): Article In Press

Abstract: Purpose: With an ageing population, the incidence of trauma in those aged over 65 years is increasing. Strategies for dealing with these patients must be developed. At present the standard management of open tibial fractures in the UK is described by the BOAST4 guidelines (from the British Orthopaedic Association and British Association of Plastic & Aesthetic Surgeons). It is not clear to what extent these are appropriate for older patients. We describe our experience of managing elderly patients presenting with open tibial fractures. Method: Patients were identified via prospectively collected national and departmental databases. These data were supplemented by review of the patient records and radiographs. Data collated included patient demographics, injury details, orthopaedic and plastic surgery operative details, and long-term outcomes. Results: Between January 2013 and June 2016, 74 patients aged over 65 years were admitted with open lower limb fractures. 54 of these were open tibial fractures and these patients formed the study group. 19 patients required soft-tissue reconstruction for Gustilo and Anderson IIIB tibial fractures (age range, 67-95 years). In these patients, there were 7 midshaft (AO 42), 1 proximal (AO 41), and 11 distal (AO 43) fractures. 13 patients were treated with internal fixation and 6 with circular frames. The median length of hospital stay was 27 days (range, 4-85). 14 patients received loco-regional flaps and 5 underwent free tissue transfer with one requiring preoperative femoral angioplasty. There were no flap losses. Four patients had fasciocutaneous flaps, 3 tibialis anterior transposition, 2 an extensor digitorum brevis flap, 1 a hemisoleus flap, and 4 were skin grafted. All patients went on to unite and return to their premorbid weight-bearing status (4 using walking frames, 3 using sticks, and 12 walking independently). Conclusion: Although the literature suggests a significantly higher complication rate in elderly patients with open fractures, we have demonstrated comparable rates of flap survival and bony union to those observed in younger patients. Challenges are presented in terms of patient physiology and these must be carefully managed pre- and postoperatively. These challenges are reflected in prolonged hospital stays.

Multidisciplinary approach to improve the quality of below-knee plaster casting.

Author(s): Williams, John Teudar; Kedrzycki, Marta; Shenava, Yathish

Source: BMJ open quality; 2018; vol. 7 (no. 2); p. e000284

Publication Type(s): Journal Article

Abstract: ProblemIn our trauma unit, we noted a high rate of incorrectly applied below-knee casts for ankle fractures, in some cases requiring reapplication. This caused significant discomfort and

inconvenience for patients and additional burden on plaster-room services. Our aim was to improve the quality of plaster casts and reduce the proportion that needed to be reapplied.MethodsOur criteria for plaster cast quality were based on the British Orthopaedic Association Casting Standards (2015) and included neutral (plantargrade) ankle position, adequacy of fracture reduction and rate of cast reapplication. Baseline data collection was performed over a 2-month period by two independent reviewers.InterventionsAfter distributing findings and presenting to relevant departments, practical casting sessions with orthopaedic technicians were arranged for the multidisciplinary team responsible for casting. This was later supplemented by new casting guidelines in clinical areas and available online. Postintervention data collection was performed over two separate cycles to assess the effect and permanence of intervention.ResultsData from the preintervention period (n=29) showed median ankle position was 32° plantarflexion (PF), with nine (31%) inadequate reductions and six (20%) backslabs reapplied. Following Plan-Do-Study-Act (PDSA) 1, ankle position was significantly improved (median 25° PF), there were fewer inadequate reductions (12%; 2/17) and a lower rate of reapplication (0%; 0/17). After PDSA 2 (n=16), median ankle position was 21° PF, there was one (6%) inadequate reduction and two (12%) reapplications of casts.ConclusionsFollowing implementation of plaster training sessions for accident and emergency and junior orthopaedic staff, in addition to publishing guidance and new protocol, there has been a sustained improvement in the quality of below-knee backslabs and fewer cast reapplications. These findings justify continuation and expansion of the current programme to include other commonly applied plaster casts.

Non-prosthetic peri-implant fractures: classification, management and outcomes

Author(s): Chan L.W.M.; Chua K.; Kwek E.B.K.; Gardner A.W.; Wong M.K.; Kagda F.; Murphy D.; Kein Boon P.

Source: Archives of Orthopaedic and Trauma Surgery; Jun 2018; vol. 138 (no. 6); p. 791-802

Publication Type(s): Article

Abstract: Introduction: Non-prosthetic peri-implant fractures (NPPIFs) are an under-reported entity. Management is challenging because of alterations in anatomy, the presence of orthopaedic implants and phenomena such as stress shielding, disuse osteopenia and fracture remodeling. The aims of this paper were to review patterns of injury, management and outcomes and to propose a classification system to aid further research. Materials and methods: This study is a multi-centered retrospective case series. Patients were identified from the orthopaedic department trauma databases of public hospitals in Singapore and individual surgeon case series of members of the Singapore Orthopaedic Research Collaborative (SORCE) group. Results: We collected a series of 60 NPPIFs in 53 patients. 38 fractures involved the femur, 12 the radius/ulna, 5 humeri, 3 tibia/fibula and 1 clavicle. 39 patients had fractures around plates and screws, 12 around nails, and 3 around screws. Fractures were managed with a variety of surgical techniques. Six patients had surgical complications with refracture in four and non-union in two cases. Two patients had multiple refractures (total 12 additional fractures). All surgical complications required further surgery. Three patients had deep vein thrombosis and one patient died of post-operative pneumonia. Fractures were classified according to the initial implant (plate or nail), the position of the new fracture relative to the original implant (at the tip or distant) and the status of the original fracture (healed, not healed or failing). Surgical strategies for common subtypes were reviewed. Conclusions: This study represents the largest series in the literature. NPPIFs are a challenging clinical problem with a high rate of post-operative complications. They are distinct from peri-prosthetic fractures and should be understood as a separate entity. We, therefore, propose a novel classification system. Further research is needed to determine the optimal treatment for the various subtypes. Level of evidence: Therapeutic Level IV-case series.

Intra-articular Hematoma Block Compared to Procedural Sedation for Closed Reduction of Ankle Fractures.

Author(s): MacCormick, Lauren M; Baynard, Taurean; Williams, Benjamin R; Vang, Sandy; Xi, Min;

Source: Foot & ankle international; Jun 2018 ; p. 1071100718780693

Publication Type(s): Journal Article

Abstract:BACKGROUNDInitial treatment for a displaced ankle fracture is closed reduction and splinting. This is typically performed in conjunction with either an intra-articular hematoma block (IAHB) or procedural sedation (PS) to assist with pain control. The purpose of this study was to compare the safety of IAHB to PS and evaluate the efficiency and efficacy for each method.METHODSA retrospective chart review for ankle fractures requiring manipulation was performed for patients seen in a level I trauma center from 2005 to 2016. The primary outcome was rate of successful reduction. Several secondary outcome measures were defined: reduction attempts, time until successful reduction, time spent in the emergency department (ED), rate of hospital admission, and adverse events. The analysis included 221 patients who received IAHB and 114 patients who received PS.RESULTSThe demographics between the 2 groups were similar, with the exception that more patients with a dislocation received PS, which prompted a subgroup analysis. This analysis demonstrated that patients with an ankle fracture and associated tibiotalar joint subluxation underwent closed reduction in a shorter period of time with the use of an IAHB compared with those receiving PS. In patients sustaining a tibiotalar fracture dislocation, patients receiving PS were successfully reduced with 1 reduction attempt more frequently than those receiving IAHB. Orthopedic surgeons also had higher rates of success on first attempt compared with ED providers.CONCLUSIONBoth IAHB and PS were excellent options for analgesia that resulted in high rates of successful closed reduction of ankle fractures with adequate safety. IAHB can be considered a first-line agent for patients with an ankle fracture and associated joint subluxation.LEVEL OF EVIDENCELevel III, retrospective comparative series.

Staged distraction osteogenesis followed by arthrodesis using internal fixation as a form of surgical treatment for complex conditions of the ankle.

Author(s): Lou, T-F; Hamushan, M; Li, H; Wang, C-Y; Chai, Y; Han, P

Source: The bone & joint journal; Jun 2018; vol. 100

Publication Type(s): Journal Article

Abstract: Aims The aim of this study was to describe the technique of distraction osteogenesis followed by arthrodesis using internal fixation to manage complex conditions of the ankle, and to present the results of this technique. Patients and Methods Between 2008 and 2014, distraction osteogenesis followed by arthrodesis using internal fixation was performed in 12 patients with complex conditions of the ankle due to trauma or infection. There were eight men and four women: their mean age was 35 years (23 to 51) at the time of surgery. Bone healing and functional recovery were evaluated according to the criteria described by Paley. Function was assessed using the ankle-hindfoot scale of the American Orthopedic Foot and Ankle Society (AOFAS). Results A solid fusion of the ankle and eradication of infection was achieved in all patients. A mean lengthening of 6.1 cm (2.5 to 14) was achieved at a mean follow-up of 25.2 months (14 to 37). The mean external fixation index (EFI) was 42 days/cm (33.3 to 58). The function was judged to be excellent in six patients and good in six patients. Bone results were graded as excellent in ten patients and good in two patients. The mean AOFAS score was 37.3 (5 to 77) preoperatively and 75.3 (61 to 82) at the final follow-up. Minor complications, which were treated conservatively, included pain, pin-tract infection, loosening of wires, and midfoot stiffness. Major complications, which were treated surgically included grade V

pin-tract infection with inflammation and osteolysis, poor consolidation of the regenerate bone, and soft-tissue invagination. The reoperations required to treat the major complications included the exchange of pins and wires, bone grafting and invagination split surgery. Conclusion The technique of distraction osteogenesis followed by arthrodesis using internal fixation is an effective form of treatment for the management of complex conditions of the ankle. It offers a high rate of union, an opportunity to remove the frame early, and a reduced EFI without infection or wound dehiscence. Cite this article: Bone Joint J 2018;100-B:755-60.

Minimally Invasive Plate Osteosynthesis Using Locking Plates for AO 43-Type Fractures: Lessons Learnt From a Prospective Study.

Author(s): Shukla, Rajeev; Jain, Nikhil; Jain, Ravi Kant; Patidar, Shravan; Kiyawat, Vivek

Source: Foot & ankle specialist; Jun 2018; vol. 11 (no. 3); p. 236-241

Publication Type(s): Journal Article

Abstract:INTRODUCTIONManaging fractures of distal tibia is still a subject of debate for orthopaedic surgeons in terms of both, reduction and fixation. Subcutaneous location and soft tissue anatomy predisposes it to angular and rotational instability as well as other bony and soft tissue complexities. Minimally invasive plating offers many advantages over conventional open techniques. It causes minimal soft tissue dissection and surgical trauma to the bone. Minimally invasive plate osteosynthesis(MIPO) maintains biological configuration of distal tibia and fracture hematoma and also provides a construct, which is biomechanically more stable.OBJECTIVESEvaluation of results of MIPO in management of distal tibia fractures considering radiological union, ankle function restoration, and complications.MATERIALS AND METHODSIn our study, 25 closed distal one-third tibia fracture with/without articular extension were taken, fulfilling the inclusion criteria (AO classification: 10, 43A1; 3, 43A2; 2, 43B1; 4, 43B2; and 6, 43C1). MIPO with locking plates was the treatment undertaken. Patients were followed up for 18 months prospectively.RESULTSAverage injury-hospital interval was 11.16 hours and average injury-operation interval was 2.44 days. All fractures showed radiological union at an average duration of 20.5 weeks (14-28 weeks). Olerud and Molander score was used for evaluation at 3, 6, and 18 months. One patient had union with valgus angulation >5° but there was no nonunion. There was 1 superficial postoperative wound infection.CONCLUSIONOur study shows that plating with MIPO is an effective treatment for closed distal one-third tibia fractures, considering union time and complications rate. Younger age promotes early union and functional recovery.LEVELS OF EVIDENCETherapeutic, Level II: Prospective.

Clinical Outcome of Laminoplasty in Cervical Myelopathy.

Author(s): Hoti, Yaser Ud Din; Aziz, Amir; Ishaque, Khurram; Abbas, Sadia; Ud Din, Tariq Salah

Source: Journal of the College of Physicians and Surgeons--Pakistan : JCPSP; Jun 2018; vol. 28 (no. 6); p. 466-469

Publication Type(s): Journal Article

Abstract:OBJECTIVEThe objective of the study was to assess the effectiveness of laminoplasty in terms of improvement in the Japanese Orthopedics Association (JOA) score in cervical spondylotic myelopathy (CSM).STUDY DESIGNDescriptive study.PLACE AND DURATION OF STUDYDepartment of Neurosurgery, Lahore General Hospital, Lahore, from June 2014 to October 2016.METHODOLOGYAll patients having CSM were assessed preoperatively and postoperatively by JOA score and radiological findings. Preoperative X-rays of cervical spine were done to rule out kyphotic deformity. CT scan and MRI of cervical spine were obtained preoperatively to assess the pathology. Single-door

laminoplasty with modified trauma plates were applied in each case by making the hinge over the right side. Digital cervical spine X-rays and CT scans with axial reconstruction were obtained postoperatively in all patients, ensuring spinal canal widening and stability.RESULTSAmong the 36 patients, 24 were males and 12 females, age ranging from 35 to 80 years. All the patients did extremely well with marked improvement in the symptomatology. The JOA scored improved in 32 patients, remained static in three patients and one patient had slight deterioration, which later on improved. Three patients developed postoperative kyphotic deformity, which settled in three months. Postoperative radiology showed significant increase in the axial diameter of spine.CONCLUSIONCervical laminoplasty remains an effective method for posterior decompression of spine. The most promising approach to cervical myelopathy ought to take into account both the features of patients and disease, as well as the competency and skills of the surgeon.

Bone bruise in anterior cruciate ligament rupture entails a more severe joint damage affecting joint degenerative progression.

Author(s): Filardo, Giuseppe; Andriolo, Luca; di Laura Frattura, Giorgio; Napoli, Francesca; Z

Source: Knee surgery, sports traumatology, arthroscopy : official journal of the ESSKA; Jun 2018

Publication Type(s): Journal Article Review

Abstract:PURPOSEDuring anterior cruciate ligament (ACL) injury, the large external forces responsible for ligament rupture cause a violent impact between tibial and femoral articular cartilage, which is transferred to bone resulting in bone bruise detectable at MRI. Several aspects remain controversial and await evidence on how this MRI finding should be managed while addressing the ligament lesion. Thus, the aim of the present review was to document the evidence of all available literature on the role of bone bruise associated with ACL lesions.METHODSA systematic review of the literature was performed on bone bruise associated with ACL injury. The search was conducted in September 2017 on three medical electronic databases: PubMed, Web of Science, and the Cochrane Collaboration. Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines were used. Relevant articles were studied to investigate three main aspects: prevalence and progression of bone bruise associated with ACL lesions, its impact on the knee in terms of lesion severity and joint degeneration progression over time and, finally, the influence of bone bruise on patient prognosis in terms of clinical outcome.RESULTSThe search identified 415 records and, after an initial screening according to the inclusion/exclusion criteria, 83 papers were used for analysis, involving a total of 10,047 patients. Bone bruise has a high prevalence (78% in the most recent papers), with distinct patterns related to the mechanism of injury. This MRI finding is detectable only in a minority of cases the first few months after trauma, but its presence and persistence have been correlated to a more severe joint damage that may affect the degenerative progression of the entire joint, with recent evidence suggesting possible effects on long-term clinical outcome.CONCLUSIONThis systematic review of the literature documented a growing interest on bone bruise associated with ACL injury, highlighting aspects which could provide to orthopaedic surgeons evidence-based suggestions in terms of clinical relevance when dealing with patients affected by bone bruise following ACL injury. However, prospective long-term studies are needed to better understand the natural history of bone bruise, identifying prognostic factors and targets of specific treatments that should be developed in light of the overall joint derangements accompanying ACL lesions.LEVELS OF EVIDENCEIV, Systematic review of level I-IV studies.

Stryker Orthopaedic Modeling and Analytics (SOMA): A Review.

Author(s): Schmidt, Walter; LiArno, Sally; Khlopas, Anton; Petersik, Andreas; Mont, Michael A

Source: Surgical technology international; Jun 2018; vol. 32 ; p. 315-324

Publication Type(s): Journal Article

Abstract: Due to the differences in bone morphology between demographics such as age, gender, body mass index, and ethnicity, the development of orthopaedic implants requires a large number of anatomical data from various patient populations. In an effort to assess these demographic variations, Stryker Orthopaedic Modeling and Analytics (SOMA) has been developed. SOMA is a suite of tools which utilizes a comprehensive database of computed tomography scans (CT-scans), plus associated three-dimensional (3D) bone models, allowing the user to assess population differences in bone morphology, bone density, and implant fit for the purposes of research and development. Several additional software tools are currently in development to further analyze bone density and have the potential to enhance component fit. These tools, in combination with the database, have been previously utilized for development of many implant designs and techniques in hip and knee arthroplasty, as well as in trauma surgery.

Populations of colony-forming mesenchymal stromal cells are tolerant to antimicrobial silver ion concentrations by activation of the glutathione antioxidant pathway

Author(s): Souter P.; Genever P.; Dodd J.; Blackwell K.; Tozer E.; Hall M.; Cunningham J.; Wilson D.

Source: Calcified Tissue International; May 2018; vol. 102 (no. 1)

Publication Type(s): Conference Abstract

Abstract: Orthopaedic trauma infection impacts patient wellbeing, healing rates and increases healthcare costs, therefore lowering the risk of implant infection is of benefit to all. The prevention of bacterial biofilm formation on the implant surface is a target to achieve clinical results, with the use of silver (Ag +) receiving increased attention. It was therefore the aim of this study to determine the effects of clinically relevant Ag + concentrations on the mesenchymal stromal cell (MSC) population and fracture healing. In vivo data revealed a rapid elution of Ag + from an intramedullary implanted pin, providing the potential to deliver a maximal intramedullary concentration (7.8 lM) below that determined as toxic to MSCs in our in vitro viability test (EC50 = 33 lM). Released Ag + did not reside in either the plasma or femur at 28 days. MSC viability and proliferation was unaffected at the sub-toxic concentration of 10 lM Ag + . At clonal density, the CFU-f capacity of MSCs was significantly reduced in the presence of Ag + as measured by CFU-f number (10 lM Ag + , $p<0.01$), an observation that was replicated using CFU-Ob (10 lM Ag + , $p<0.01$), suggesting however that a subpopulation of MSCs were able to survive and derive colonies from single cells. At a molecular level, surviving CFU-f demonstrated a significant upregulation of oxidative stress response genes. By qPCR, 20 genes demonstrated mean upregulation greater than twofold; of these, five showed significance compared to control (GCLM, NQO1, SQSTM1, TXN, TXNRD1, $p<0.05$). There was also a twofold upregulation of CCL5, SRXN1, GPX3, GPX6, FTH1 and UCP2 ($p>0.05$). Furthermore, a reduction in CFU-f number was observed at 5 lM Ag + when glutathione was blocked with BSO. These data have identified a population of MSCs that survive through activation of the glutathione antioxidant pathway and generate CFU-f under clinically relevant concentrations of silver.

Does mri affect the surgical plan in patients with thoracolumbar (t10-l1) burst fractures and incomplete spinal cord injuries?

Author(s): Pittman J.; Nguyen Q.; Bellabarba C.; Bransford R.

Source: Global Spine Journal; May 2018; vol. 8 (no. 1)

Publication Type(s): Conference Abstract

Abstract: Introduction: The initial imaging of patients with thoracolumbar burst fractures and incomplete spinal cord injuries often starts with obtaining a CT scan. While surgical intervention is often recommended1, obtaining an MRI prior to going to the operating room is at the discretion of the treating surgeon. MRI has been shown to be useful in determining the extent of soft-tissue damage in spinal trauma, but each study did not distinguish whether or not a spinal cord injury was present.2-4 Material and Methods: A survey of 127 spine surgeons was conducted to determine whether or not operative treatment plans were directly changed by the availability of MRI imaging studies in patients who had thoracolumbar burst fractures (T10-L1) and incomplete spinal cord injuries. The patients for this study (n = 10) were identified by searching the Department of Radiology's diagnosis database for the diagnosis of burst fracture and both CT and MRI studies that were obtained prior to any surgical interventions. The admission history and physical exam for each of these patients was also reviewed to determine whether or not an incomplete spinal cord injury was present at the time of initial evaluation. The axial and sagittal CT studies as well as the initial history and physical for each of these 10 patients were deidentified and presented to the surgeons participating in the survey. Each participant was then asked to formulate a surgical plan. Once a surgical plan was formulated based on the CT scan, they were asked whether or not an MRI was desired and why. The axial and sagittal T2 MRI scan images were then presented. The surgeons were then asked whether or not this altered their initial surgical plan. Results: Of those surveyed, 66% were practicing as Orthopaedic and 34% as Neurosurgery trained spine surgeons. The majority (66%) of those responding to the survey have been in practice greater than 10-years. In the patient population presented, after reviewing the initial CT scan, 41% of respondents stated that they would like to obtain an MRI before proceeding to the operating room. This was desired to evaluate for discoligamentous injuries adjacent to the fractured segment, to determine if anterior only treatment is sufficient or due to suspicion of adjacent bony injury not evident on CT scan. After reviewing the MRI, 19% of all respondents stated that their previous surgical plan had been changed. Out of the 41% of respondents that desired a MRI scan after evaluating the CT scan, 45% stated that they had changed their surgical plan. Conclusion: The majority of the time (59%), respondents did not feel that an MRI was necessary for operative planning. Eighty-one percent of the time, MRI made no difference in planned treatment. The MRI was most often desired due to it being the standard protocol of the treating institution or to evaluate the posterior ligamentous complex. In conclusion, the operative treatment of patients with thoraco-lumbar burst fractures is changed in 1 out of 5 patients by imaging the injured levels with an MRI.

Robotic assisted fixation of sacral fractures-initial experience

Author(s): Josh S.; Kaplan L.; Qutteineh B.; Weil Y.; Liebergall M.

Source: Global Spine Journal; May 2018; vol. 8 (no. 1)

Publication Type(s): Conference Abstract

Available at Global Spine Journal - from Europe PubMed Central - Open Access

Abstract: Introduction: Unstable sacral fractures are challenging for orthopaedic trauma surgeons. In most cases percutaneous fixation techniques are utilized after reduction. However, these techniques are not risk free mainly due to anatomical considerations. Screw misplacement is quite common and concerning. As spine surgery evolved, a miniature robotic guidance system was successfully utilized in pedicular screw insertion. The aim of the study was to demonstrate the use of the miniature robot in the fixation of unstable sacral fractures. Material and Methods: Patients and Methods: 10 patients with unstable sacral fractures without significant displacement were eligible for percutaneous fixation. These included 8 traumatic fractures and 2 pathological fractures. Nine fixation constructs were planned using a preoperative CT scans and one case was done with an intraoperative CT. The patients were placed prone and the robot was mounted on a Dynamic Reference Bridge (DRB), in

cases of the preoperative CT-2 verification fluoroscopic images were taken in the case of the intraoperative imaging a 3D scan was performed intraoperative after fracture reduction. The robot was mounted on the DRB and was sent by the robotic computer to the desired screw(s) trajectory. The guide wires were inserted through stab wounds and screws were placed subsequently. CT scans were made postoperatively and fluoroscopic and operative time were recorded intraoperatively. Results: Mean patient age was 29 (17-63) number of screws ranged 1-8 (average 2.5). Mean operative time was 50 min (range 15-90), and average fluoroscopic time was 18 sec (7-42). None was the screws was misplaced. Conclusion: Robotic assisted fixation of sacral fracture is promising. In displaced fractures intra operative reduction and fixation can be used as well.

Comparison between locked and unlocked intramedullary nails in intertrochanteric fractures

Author(s): Lanzetti R.M.; Caraffa A.; Ceccarini P.; Manfreda F.; Vicente C.I.; Rinonapoli G.;

Source: European Journal of Orthopaedic Surgery and Traumatology; May 2018; vol. 28 (no. 4); p. 649-658

Publication Type(s): Article

Abstract: Background: Intertrochanteric fractures are of great interest worldwide and are the most frequently operated fractures. Intramedullary nailing is commonly used in the treatment of intertrochanteric fractures. The purpose of this study is to assess the necessity of using the distal blocking screw in 31-A1 and 31-A2 fractures, classified according to the Orthopaedic Trauma Association classification system (AO/OTA). Methods: This is a prospective study of 143 consecutive patients (mean age 85.01 years, mean final follow-up 14.1 months) surgically treated with the same intramedullary nail. In 75 cases, the distal locking screw was not used. Parameters evaluated during follow-up were: blood loss, transfusion requirements, surgery duration, and fluoroscopy time. Harris Hip Score and Barthel Activity Daily Living were used for the clinical evaluation. Radiographic Union Score For Hip (RUSH score) and Tip apex distance (TAD) were measured for radiologic evaluation. Results: The group treated without locking screw showed significantly shorter surgical duration time (31.9 vs. 47.2 min), a decrease in blood loss (variation Hb - 1.06 vs. - 1.97), and reduced X-rays exposure time (25.4 vs. 31.6 s). No significant differences were observed in the postoperative period and in the radiographic and clinical scores. Conclusion: This study demonstrates that in intertrochanteric 31-A1 and 31-A2 stable fractures, the absence of distal locking screw does not compromise bone healing and prevents several clinical complications.

Isolated avulsion fracture of the first metatarsal base at the peroneus longus tendon attachment: a case report

Author(s): Weinberg M.W.; Krahenbuhl N.; Davidson N.P.; Hanrahan C.J.; Barg A.

Source: Skeletal Radiology; May 2018; vol. 47 (no. 5); p. 743-746

Publication Type(s): Article

Abstract: Avulsion fractures of the first metatarsal (MT1) base at the peroneus longus (PL) tendon attachment are rare and may be undiagnosed during an emergency visit. If the injury is not treated properly, chronic pain or persistent impairment for inversion and plantar-flexion of the first ray may occur. This case report presents a 30-year-old woman who presented 10 weeks post trauma to a foot and ankle surgeon due to a swollen right midfoot with diffuse tenderness over the medial Lisfranc joint. Further evaluation showed an isolated avulsion fracture of the first metatarsal, which was undiagnosed during the emergent visit following the accident. In this case, the patient was successfully treated conservatively. The goal of this article is to raise awareness of this rare injury for radiologists and orthopedic surgeons.

Hypovitaminosis D in Orthopaedic Trauma: Which Guidelines Should Be Followed?

Author(s): Schiffman, Brett; Summers, Hobie; Bernstein, Mitchell; DiSilvio, Frank; Foyil, Sarah

Source: Journal of orthopaedic trauma; May 2018

Publication Type(s): Journal Article

Abstract:OBJECTIVETo evaluate risk factors for hypovitaminosis D and determine the baseline vitamin D supplementation associated with normal vitamin D levels at presentation.DESIGNProspective observational study.SETTINGLevel I trauma center.PATIENTS259 adult patients undergoing operative treatment for orthopaedic trauma (OTA 11-15, 21-23, 31-34, 41-44, 61-62, 70C, 81-82, 87) between January 1 and December 31, 2014.INTERVENTIONProspective, observational study.MAIN OUTCOMESAssociation of hypovitaminosis D with patient characteristics, injury factors, and vitamin D supplementation.RESULTSUnivariate predictors of hypovitaminosis D included lack of pre-injury supplementation, non-white race, younger age, female gender, non-Medicare insurance, smoking, obesity, Charlson Comorbidity Index < 2, and high energy mechanism. On multivariate analysis pre-injury supplementation was associated with a lower risk (OR: 0.31, 95% CI: 0.15-0.63, p=.001) and non-white race was associated with a higher risk (OR: 3.63, 95% CI: 1.58-8.37, p=.001) of hypovitaminosis D. Logistic regression analysis found a dose-dependent relationship between vitamin D supplementation and hypovitaminosis D. Each 100 IU increase in vitamin D supplementation being associated with an 8% decrease in the risk of hypovitaminosis D.CONCLUSIONSLack of pre-injury supplementation and non-white race were independently associated with hypovitaminosis D. Baseline supplementation consistent with Endocrine Society guidelines (2000 IU daily) was more effective than that consistent with IOM guidelines (400 IU daily) in maintaining 25-hydroxyvitamin D above 30 ng/mL in this population.LEVEL OF EVIDENCEPrognostic Level II. See Instructions for Authors for a complete description of levels of evidence.

Costs and Radiographic Outcomes of Rotational Ankle Fractures Treated by Orthopaedic Surgeons With or Without Trauma Fellowship Training.

Author(s): Virkus, Walter W; Wetzel, Robert J; McKinley, Todd O; Sorkin, Anthony T

Source: The Journal of the American Academy of Orthopaedic Surgeons; May 2018

Publication Type(s): Journal Article

Abstract:INTRODUCTIONWe evaluated the radiographic outcomes and surgical costs of surgically treated rotational ankle fractures in our health system between providers who had completed a trauma fellowship and those who had not.METHODSWe grouped patients into those treated by trauma-trained orthopaedic surgeons (TTOS) and non-trauma-trained orthopaedic surgeons (NTTOS). We graded the quality of fracture reductions and calculated implant-related costs of treatment.RESULTSA total of 208 fractures met the inclusion criteria, with 119 in the TTOS group and 89 in the NTTOS group. Five patients lost reduction during the follow-up period. The adequacy of fracture reduction at final follow-up did not differ (P = 0.29). The median surgical cost was $2,940 for the NTTOS group and $1,233 for the TTOS group (P < 0.001).DISCUSSIONWe found no notable differences in radiographic outcomes between the TTOS and NTTOS groups. Cost analysis demonstrated markedly higher implant-related costs for the NTTOS group, with the median surgical cost being more than twice that for the TTOS group.LEVEL OF EVIDENCELevel III.

Ultralow-Dose CT (REDUCTION Protocol) for Extremity Fracture Evaluation Is as Safe and Effective as Conventional CT: An Evaluation of Quality Outcomes.

Author(s): Konda, Sanjit R; Goch, Abraham M; Haglin, Jack; Egol, Kenneth A

Source: Journal of orthopaedic trauma; May 2018; vol. 32 (no. 5); p. 216-222

Publication Type(s): Journal Article

Abstract:OBJECTIVESTo assess clinical and hospital quality outcomes of patients receiving the previously reported Reduced Effective Dose Using Computed Tomography In Orthopaedic Injury (REDUCTION) imaging protocol.DESIGNRetrospective Chart review.SETTINGLevel I Trauma Center and affiliated Tertiary Care Hospital Center.PATIENTS/PARTICIPANTSFifty patients who received this protocol for acute traumatic fracture evaluation and met the inclusion criteria were compared with a cohort of 50 patients matched for age and fracture type who previously received conventional CT scanning for acute traumatic fracture evaluation.INTERVENTIONReduced Effective Dose Using Computed Tomography In Orthopaedic Injury (REDUCTION) protocol for diagnostic fracture evaluation.MAIN OUTCOME MEASURESEstimated effective radiation doses were calculated and compared using Digital Imaging and Communications in Medicine (DICOM) information from all included studies. Patient outcomes between groups were compared with time to fracture union as the primary outcome. Secondary outcome measures included the presence of complication defined as infection, malunion, nonunion, failure of nonoperative treatment, painful implants, and implant failure. Other secondary quality outcomes that were recorded included readmission within 30 days and hospital length of stay. Functional quality measures included joint range of motion. Statistical analyses were conducted to identify significant differences between cohorts (significance designated as $P < 0.05$).RESULTSPatient characteristics between cohorts were not significantly different with respect to age, sex, body mass index, comorbidities, injury mechanism, or injury location. Fractures of the elbow, hip, knee, and foot/ankle were evaluated. Mean clinical follow-up was 9.5 ± 4.9 months for the REDUCTION cohort and 12.4 ± 5.3 months for the conventional CT cohort. Mean estimated effective dose for all REDUCTION scans was 0.15 milliSieverts (mSv) as compared to 1.50 mSv for the conventional CT cohort ($P = 0.037$). Preoperative diagnosis was confirmed intraoperatively in 49/50 cases in the REDUCTION cohort compared with 48/50 cases in the conventional CT cohort ($P = 0.79$). Outcomes including time to union, range of motion, complications, readmission, treatment failure, reoperation, and length of stay were not significantly different between groups.CONCLUSIONSThe REDUCTION protocol represents ultralow-dose CT developed for minimizing radiation exposure to patients presenting with traumatic fractures. This protocol resulted in a 10-fold reduction in radiation exposure. No difference in clinical or hospital quality outcomes was detected between patients who received this protocol as compared to those receiving automated dose CT. The REDUCTION protocol is a safe and effective method of performing CT for extremity fractures with significantly reduced radiation risk.LEVEL OF EVIDENCETherapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

Cost Determinants in the 90-Day Management of Isolated Ankle Fractures at a Large Urban Academic Hospital.

Author(s): Varacallo, Matthew; Mattern, Patrick; Acosta, Jonathan; Toossi, Nader; Denehy, Kevin;

Source: Journal of orthopaedic trauma; May 2018

Publication Type(s): Journal Article

Abstract:OBJECTIVESTo determine the independent risk factors associated with increasing costs and unplanned hospital readmissions in the 90-day episode of care (EOC) for isolated operative ankle fractures at our institution.DESIGNRetrospective cohort study SETTING:: Level I Trauma Center PATIENTS:: Two hundred ninety-nine patients undergoing open reduction internal fixation (ORIF) for the treatment of an acute, isolated ankle fracture between 2010 and 2015.INTERVENTIONnone MAIN OUTCOME MEASUREMENTS:: Independent risk factors for increasing 90-day EOC costs and unplanned hospital readmission rates.RESULTSOrthopedic (64.9%) and podiatry (35.1%) patients

were included. The mean index admission cost was $14,048.65 ± $5,797.48. Outpatient cases were significantly cheaper compared to inpatient cases ($10,164.22 ± $3,899.61 versus $15,942.55 ± $5,630.85, respectively, p < 0.001).Unplanned readmission rates were 5.4% (16/299) and 6.7% (20/299) at 30- and 90-days, respectively, and were often (13/20, 65.0%) due to surgical site infections. Independent risk factors for unplanned hospital readmissions included treatment by the podiatry service (p = 0.024), and an American Society of Anesthesiologists (ASA) score of ≥ 3 (p = 0.017). Risk factors for increasing total post discharge costs included treatment by the podiatry service (p = 0.011), and male gender (p = 0.046).CONCLUSIONIsolated operative ankle fractures are a prime target for EOC cost containment strategy protocols. Our institutional cost analysis study suggests that independent financial clinical risk factors in this treatment cohort includes podiatry as the treating surgical service and patients with an ASA score ≥ 3, with the former also independently increasing total post-discharge costs in the 90-day EOC. Outpatient procedures were associated with about a one-third reduction in total costs compared to the inpatient subgroup.

Reduction techniques for difficult subtrochanteric fractures.

Author(s): Kokkalis, Zinon T; Mavrogenis, Andreas F; Ntourantonis, Dimitris I; Igoumenou, Vasilios G;

Source: European journal of orthopaedic surgery & traumatology : orthopedie traumatologie; May 2018

Publication Type(s): Journal Article

Abstract: Subtrochanteric fractures can result from high-energy trauma in young patients or from a fall or minor trauma in the elderly. Intramedullary nails are currently the most commonly used implants for the stabilization of these fractures. However, the anesthetic procedure for the patients, the surgical reduction and osteosynthesis for the fractures are challenging. The anesthetic management of orthopedic trauma patients should be based upon various parameters that must be evaluated before the implementation of any anesthetic technique. Surgery- and patient-related characteristics and possible comorbidities must be considered during the pre-anesthetic evaluation. Adequate fracture reduction and proper nail entry point are critical. Understanding of the deforming forces acting on various fracture patterns and knowledge of surgical reduction techniques are essential in obtaining successful outcomes. This article discusses the intraoperative reduction techniques for subtrochanteric fractures in adults and summarizes tips and tricks that the readers may find useful and educative.

Revenue for initial orthopaedic trauma care: effects of patient and injury characteristics.

Author(s): Flanagan, Christopher D; Rascoe, Alexander S; Wang, David M; Vallier, Heather

Source: Journal of orthopaedic trauma; May 2018

Publication Type(s): Journal Article

Abstract:OBJECTIVETo characterize the charges and collections associated with the initial inpatient management of trauma patients who undergo operative fracture management DESIGN:: Retrospective SETTING:: Level 1 trauma center PARTICIPANTS:: 440 consecutive adult trauma patients INTERVENTION:: fixation for fracture of the spine, pelvis, acetabulum, and/or femur fractures MAIN OUTCOME MEASUREMENT:: Professional and technical (facility) charges and collections from the initial inpatient management and 6 months of subsequent related care RESULTS:: Patient were predominantly male (74.3%) and Caucasian (63.2%) with mean age 41 years and mean Injury Severity Score of 18.5. Uninsured (self-pay) patients represented the largest payer class (35.0%), and 34.5% of all patients were unemployed. Professional and technical charges totaled US $12,382,028 (US $28,140/patient) and US $39,682,225 (US $90,187/patient), respectively. Injury Severity Score, longer lengths of stay (LOS), and presence of a complication were positive predictors

of initial charges (p<0.0001, adjusted R=0.799). Professional and technical collections totaled US $2,418,096 (US $5,496/patient) and US $16,921,959 (US $38,459/patient) (percent of charge: 21.5% vs 41.3%, p<0.0001). Of the self-pay patients, 34.4% had no collections, resulting in potential lost revenue of US $2,513,988. Greater collections were predicted to occur in females, employed patients, and those with insurance (p<0.0001, adjusted R=0.35).CONCLUSIONTrauma patients often present without insurance, which compromises hospital revenue. Expectedly, charges are higher in more severely injured patients, those with longer lengths of stay, and those experiencing complications. A bundled model will proportionately decrease reimbursements for a given episode of care in the event of longer LOS or occurrence of complications.LEVEL OF EVIDENCEEconomic; Level IV.

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