

## **INDEX ORTHOPEDIC TRAUMA (INCLUDING SPINE AND PELVIC TRAUMA)**

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## Evaluation of current treatment regimens for prepatellar and olecranon bursitis in Switzerland.

Baumbach S F, Wyen H, Perez C, Kanz K G, Uckay I.

Eur J Trauma Emerg S. 2013;39(1):65-72.

10.1007/s00068-012-0236-4

### **Purpose**

Bursitis is a common entity. However, evidence for the best treatment procedures is lacking, with management concepts varying internationally. We evaluated current treatment regimens for septic (SB) and nonseptic (NSB) prepatellar (PB) and (OB) olecranon bursitis in Switzerland and compared them to the published literature.

### **Methods**

A voluntary 23-item online survey was distributed amongst all registered Swiss infectiologists and orthopedic surgeons in December 2011. The literature comparison was based on a systematic literature review.

### **Results**

Overall response rate was 14 % (n = 117); 11 % (n = 92) were included in the final analysis. The overwhelming majority (91 %) of the respondents differentiated between SB and NSB, with determination predominantly based on clinical presentation (83 %), blood chemistry (75 %), and bursal aspirate (66 %). NSB was predominantly treated conservatively via immobilization (78 %) and anti-inflammatory medication (73 %). For SB, 85 % indicated surgical intervention, with 73 % prescribing concomitant antibiotics. Regarding antibiotic choice, 90 % used an aminopenicillin or its derivatives for a mean of 11 +/- 5 days. The literature review revealed 66 relevant publications with an overall level of evidence of 2b, arguing for a conservative treatment approach in cases of SB or NSB.

### **Conclusion**

Therapeutic regimens for OB/PB differed considerably within Switzerland. Surgical intervention and antibiotic treatment was the most common therapy for SB, whereas a conservative approach predominated for NSB, which contrasts with the international literature. Clearly, prospective multicenter and multidisciplinary studies are needed to identify an optimal and cost-saving approach to the treatment of these common clinical entities.

### **Keywords**

Bursitis - olecranon - prepatellar - septic - nonseptic - antibiotics - septic bursitis - antibiotic-therapy – management

## Ottawa versus Bernese: which is better?

Beceren G N, Yolcu S, Tomruk O, Atay T, Baykal Y B.

Eur J Trauma Emerg S. 2013;39(2):147-150.  
10.1007/s00068-012-0249-z

### **Purpose**

Trauma of the foot and ankle is commonly seen in the emergency service. For most patients, fractures cannot be ruled out without radiography. The aim of this study is to consider these injured patients in the light of the Ottawa ankle rules and the Bernese ankle rules.

### **Methods**

Our study is a randomized, prospective clinical study. This study was performed during a 24-month period in the Suleyman Demirel University Emergency Medicine Service. A total of 962 adult patients with foot and ankle pain or tenderness following trauma incurring within the previous 10 days were included in the study. Patients were examined only by physicians who had been trained in the correct application of the Ottawa ankle rules and the Bernese ankle rules. All patients were X-rayed with standardized anterior-posterior and lateral radiographs of the ankle and foot, regardless of whether the Ottawa ankle rules and the Bernese ankle rules were positive or negative. The sensitivity and specificity of the Ottawa and Bernese ankle rules according to the study results regarding the correlation between physical examination and radiography were calculated.

### **Results**

For the Ottawa ankle rules, the sensitivity was 74.8 %, specificity was 68.6 %, false-negative ratio was 15.1 %, and the false-positive ratio was 46.3 %. For the Bernese ankle rules, the sensitivity was 55.7 %, specificity was 79 %, false-negative was ratio 21.4 %, and the false-positive ratio was 43.7 %.

### **Conclusion**

These data suggest that the Ottawa ankle rules are more sensitive than the Bernese ankle rules to accurately identify the fracture, but they are still not 100 % reliable.

### **Keywords**

ottawa ankle rules - bernese ankle rules - trauma of ankle - x-ray - decision rules - ankle rules

## **Percutaneous cement augmentation techniques for osteoporotic spinal fractures.**

Benneker L M, Hoppe S.

Eur J Trauma Emerg S. 2013;39(5):445-453.  
10.1007/s00068-013-0265-7

Minimally invasive vertebral augmentation-based techniques have been used for the treatment of spinal fractures (osteoporotic and malignant) for approximately 25 years. In this review, we try to give an overview of the current spectrum of percutaneous augmentation techniques, safety aspects and indications. Crucial factors for success are careful patient selection, proper technique and choice of the ideal cement augmentation option. Most compression fractures present a favourable natural course, with reduction of pain and regainment of mobility after a few days to several weeks, whereas other patients experience a progressive collapse and persisting pain. In this situation, percutaneous cement augmentation is an effective treatment option with regards to pain and disability reduction, improvement of quality of life and ambulatory and pulmonary function.

### **Keywords**

Osteoporosis - spine - fractures - surgery - cement augmentation - vertebroplasty - kyphoplasty - vertebral compression fractures - pulsed jet-lavage - polymethyl methacrylate - balloon kyphoplasty - pulmonary-embolism - randomized-trial - acrylic cement - vertebroplasty - body - polymethylmethacrylate

## **Skeletal injuries sustained during the Haiti earthquake of 2010: a radiographic analysis of the casualties admitted to the Israel Defense Forces field hospital.**

Blumberg N, Lebel E, Merin O, Levy G, Bar-On E.

Eur J Trauma Emerg S. 2013;39(2):117-122.  
10.1007/s00068-012-0215-9

To report the distribution and types of skeletal injuries demonstrated on the images taken at the field hospital following the Haiti 2010 earthquake.

Following the January 12, 2010, earthquake, the State of Israel dispatched a field hospital to Haiti, managing 1,111 patients from January 17, 2010, to January 26, 2010. Four hundred and seven patients (37 %) had 684 radiographic images, most of them (87 %) due to presumed skeletal injuries.

There were 224 limb fractures (excluding the hands and feet), with 77 % of them in the lower limbs (30 % femur, 17 % tibial shaft, 16 % ankle). Out of 37 axial skeleton fractures, 30 involved the pelvis (21 anterior posterior, three vertical shear, three lateral compression, three combined). Nine traumatic dislocations (five hips, three shoulders, one knee) were reduced. After reviewing all the digital radiographs, on a PACS-compatible radiography screen, few false diagnoses (2 %) were encountered, with none of them affecting the management of these injuries.

To the best of our knowledge, this is the first report of the radiological results emerging from a field hospital following a mass casualty event. Laptop personal computer-based workstations provide an adequate solution for radiographic image viewing in a field hospital setting. Recognition of the prevalence and distribution of skeletal injuries can improve the preparedness of such delegations before departure in the future.

### **Keywords**

mass casualty disaster - earthquake - field hospital - musculoskeletal injuries - Haiti - radiology - early disaster response - experience - trauma



## Deep venous thrombosis following different isolated lower extremity fractures: what is known about prevalences, locations, risk factors and prophylaxis?

Decker S, Weaver M J.

Eur J Trauma Emerg S. 2013;39(6):591-598.  
10.1007/s00068-013-0266-6

### **Introduction**

Deep venous thrombosis (DVT) offers a high risk of morbidity and mortality, especially in case of pulmonary embolism. Precise data as to DVT after isolated lower extremity fractures (ILEFs) are rare. Even organizations like the American Academy of Orthopaedic Surgeons or the American College of Chest Physicians do not state exact recommendations as to optimal DVT prophylaxis (ppx) after ILEFs.

### **Prevalence**

The incidence of DVT ranges from 5 to 86 % depending on the fracture whereas femur fractures offer the highest risk for clotting. The incidence seems to decrease in more distal fractures.

### **Location**

The risk to develop proximal clots is likely low, however, especially these are feared by surgeons. DVT can occur in both the injured and uninjured leg with a trend for higher incidences in the injured leg.

### **Risk factors**

Risk factors for DVT after ILEF seem to be similar to risk factors for DVT development after orthopaedic surgery and in general. Risk factors caused by surgeons are the use of a tourniquet, prolonged operative time and a delay from injury to surgery.

### **Prophylaxis**

Low molecular weight heparin is favoured by many authors, however, warfarin and acetylsalicylic acid are also used. Clear recommendations are still missing.

### **Conclusion**

The rate of morbidity caused by DVT after ILEF is poorly understood so far. Exact data on prevalences are missing and optimal DVT prophylaxis still has to be defined.

### **Keywords**

deep venous thrombosis - dvt prophylaxis - fracture - isolated lower extremity fracture - risk factor - molecular-weight heparin - total joint arthroplasty - total hip-arthroplasty - randomized

controlled-trial - antithrombin-iii complexes - fatal pulmonary-embolism - lower-limb injuries -  
trauma data-bank - vein-thrombosis - thromboembolic disease

## **Intraoperative PEEP-ventilation during PMMA-injection for augmented pedicle screws: improvement of leakage rate in spinal surgery.**

El Saman A, Kelm A, Meier S, Sander A L, Eichler K, Marzi I, Laurer H.

Eur J Trauma Emerg S. 2013;39(5):461-468.  
10.1007/s00068-013-0319-x

Within the last two decades the use of polymethylmethacrylate (PMMA) in the treatment of osteoporotic vertebral fractures has been established widely. Several techniques of cement application in spinal surgery have been described. Besides classical vertebroplasty, kyphoplasty and related techniques that reinforce stability of the fractured vertebral body itself, augmentation of pedicle screws became an issue in the past 10 years. Aim of this technique is strengthening of the implant-bone-interface and the prevention of loosening and failure of posterior instrumentation in limited bone quality due to osteoporosis. PMMA use in spinal surgery always bears the risk of cement leakage and cement embolism. There are only few publications dealing with cement leakage in pedicle screw augmentation. We examined our cohort concerning incidence and type of leakage in comparison to the literature. In particular, we evaluated a possible role of intrathoracic pressure during cementation procedure.

In this retrospective study 42 patients were included. Mean age was 74 (57-89) years. 311 fenestrated, augmented screws were analyzed postoperatively concerning leakage and subsequent pulmonary embolism of cement particles. Overall, there was a leakage rate of 38.3 %, and 28.6 % of patients showed pulmonary embolism of PMMA. During surgery, patients were in part ventilated with a positive end-expiratory pressure (PEEP) of 15 cmH<sub>2</sub>O during cement injection. These individuals showed significantly less leakage locally as well as less PMMA-emboli in the pulmonary circulation in contrast to patients ventilated without increased PEEP.

PEEP elevation during administration of PMMA via fenestrated pedicle screws is reducing the leakage rate in spinal surgery. These beneficial effects warrant further evaluation in prospective studies.

### **Keywords**

Peep - fenestrated pedicle screw - pmma - polymethylmethacrylate - osteoporosis - leakage - leakage rate - cement embolism - pulmonary embolism - end-expiratory pressure - pulsed jet-lavage - bone-cement - fat-embolism - polymethylmethacrylate augmentation - cardiovascular changes - in-vitro - vertebroplasty - sheep - model

## Reduced loosening rate and loss of correction following posterior stabilization with or without PMMA augmentation of pedicle screws in vertebral fractures in the elderly.

El Saman A, Meier S, Sander A, Kelm A, Marzi I, Laurer H.

Eur J Trauma Emerg S. 2013;39(5):455-460.  
10.1007/s00068-013-0310-6

Therapy of vertebral fractures in the elderly is a growing challenge for surgeons. Within the last two decades, the use of polymethylmethacrylate (PMMA) in the treatment of osteoporotic vertebral fractures has been widely established. Besides vertebroplasty and kyphoplasty, the augmentation of pedicle screws with PMMA found widespread use to strengthen the implant-bone interface. Several studies showed an enhanced pullout strength of augmented screws compared to standard pedicle screws in osteoporotic bone models. To validate the clinical relevance, we analyzed postoperative radiologic follow-up data in regard to secondary loss of correction and loosening of pedicle screws in elderly patients.

In this retrospective comparative study, 24 patients admitted to our level I trauma center were analyzed concerning screw loosening and secondary loss of correction following vertebral fracture and posterior instrumentation. Loss of correction was determined by the bisegmental Cobb angle and kyphosis angle of the fractured vertebra. Follow-up computed tomography (CT) scans were used to analyze the prevalence of clear zones around the pedicle screws as a sign of loosening.

In 15 patients (mean age 76 +/- A 9.3 years) with 117 PMMA-augmented pedicle screws, 4.3 % of screws showed signs of loosening, whereas in nine patients (mean age 75 +/- A 8.2 years) with 86 uncemented screws, the loosening rate was 62.8 %. Thus, PMMA-augmented pedicle screws showed a significantly lower loosening rate compared to regular pedicle screws. Loss of correction was minimal, despite poor bone quality. There was significantly less loss of correction in patients with augmented pedicle screws (1.1A degrees A A +/- A 0.8A degrees) as compared to patients without augmentation (5A degrees A A +/- A 3.8A degrees).

The reinforcement of pedicle screws using PMMA augmentation may be a viable option in the surgical treatment of spinal fractures in the elderly.

### Keywords

fenestrated pedicle screw - pmma - osteoporosis - loss of correction - loosening rate - thoracolumbar spine fractures - operative treatment - polymethylmethacrylate augmentation - bone-cement - vertebroplasty - instrumentation - revision - embolism - surgery

## **Extremity compartment syndrome and fasciotomy: a literature review.**

Fry W R, Wade M D, Smith R S, Asensio-Gonzales J A.

Eur J Trauma Emerg S. 2013;39(6):561-567.

10.1007/s00068-013-0329-8

Trauma surgeons frequently encounter injured limbs at risk for compartment syndrome. This article reviews data regarding the pathophysiology of compartment syndrome, factors in measuring compartment pressures, thresholds for performing fasciotomies, and outcomes from the development of compartment syndromes and performing fasciotomies.

### **Keywords**

extremity - compartment syndrome - compartment pressures - fasciotomy - lower leg - pressure - ultrasound - diagnosis - fractures - fascia - trauma - muscle

## Reamed intramedullary nailing of diaphyseal tibial fractures: comparison of compression and non-compression nailing.

Hogel F, Gerber C, Buhren V, Augat P.

Eur J Trauma Emerg S. 2013;39(1):73-77.

10.1007/s00068-012-0237-3

### **Background**

Modern intramedullary implants provide the option to perform compression at the fracture gap in long bone fractures via a compression screw mechanism. The aim of this study was to assess if the application of interfragmentary compression in the intramedullary nailing of tibia fractures could increase the union rate and speed of fracture healing.

### **Methods**

Sixty-three patients who suffered from an AO-type 42-A3 or 42-B2 fracture that was treated by reamed intramedullary nailing between 2003 and 2008 were included in this retrospective study. Twenty-five patients were treated with dynamic interlocking without compression while 38 were treated with compression nailing. The compression load of the dynamic proximal screw was calculated by postoperative X-ray and radiographs taken four weeks after operation. Healing was assessed by radiological evaluation until the completion of bony healing or the disappearance of clinical symptoms. Nonunion was defined as the absence of radiological union and the persistence of clinical symptoms after six months.

### **Results**

Postoperative compression was applied at a mean load of 1,852 N, and 980 N remained after four weeks. In the compression group, 19 open and 19 closed fractures occurred. In the non-compression group, 25 patients were included (14 closed and 11 open cases). Active compression decreased healing time significantly. Nonunion occurred in one compression patient and three non-compression patients.

### **Conclusion**

The results show that additional compression of the fracture gap can improve healing outcome in simple transverse tibial shaft fractures treated with reamed nailing.

### **Keywords**

intramedullary nailing - tibia fracture - nonunion - biomechanics - locked nailing - movement - fixation - diameter – shaft

## Elective spare parts free flap-calcaneal fillet of foot flap.

Holden D, Shayan R, Edwards E, Bruscano-Raiola F.

Eur J Trauma Emerg S. 2013;39(4):415-419.

10.1007/s00068-013-0288-0

Severe lower limb trauma with significant soft tissue injury can be managed with reconstruction or, if this is impossible, amputation. If amputation is considered, below-knee amputation preserving limb length is optimal for long-term functional outcome. At times, soft tissue/bony injury can limit the ability to preserve limb length, particularly with proximal tibial injuries. We present a case of elective below-knee amputation where leg length and adequate soft tissue coverage was only possible by using an osteocutaneous fillet of foot and lower leg spare parts free flap, maintaining the tibial nerve pedicle for sensation and the posterior tibial artery for vascularity of the nerve. The procedure was technically challenging and required follow-up debulking operations. However, the technique provided the significant advantage of immediate sensation of robust glabrous distal stump cover and optimising leg length to enhance functional outcome.

### **Keywords**

knee amputation - salvage - length - stump

## Do cervical spine X-rays for trauma have clinically significant incidental findings?

Koren L, Simonovich A, Norman D, Israelit S, Jerdev M, Sherter R, Yagil Y, Rozenberg R, Peled E.

Eur J Trauma Emerg S. 2013;39(5):477-480.

10.1007/s00068-013-0290-6

About 800,000 cervical X-rays for trauma are taken every year in the USA. Those X-rays are reviewed by orthopedic specialists in the emergency room (ER) for traumatic findings. The quantity of incidental atraumatic findings in this very prevalent examination is unknown. We sought to determine the incidence of those findings.

We retrospectively reviewed 521 consecutive cervical X-rays of patients with a whiplash injury that visited our ER from February to July 2010. X-rays that were technically insufficient were excluded. This left 356 X-rays that met the inclusion criteria, which were analyzed for incidental findings. The examinations were reviewed by five staff radiologists for incidental findings. The findings were reviewed and classified.

We identified incidental X-ray findings in 22 of the 356 patients (6.2 %) who underwent X-ray of the cervical spine during their visit to the ER. Stenosis with disk narrowing was the most common finding (2.8 %), followed by congenital anomaly of the cervical spine (2.2 %). Other findings were enlarged sella turcica (0.6 %), carotid atherosclerosis (0.3 %), and calcification of the stylomastoid ligament (0.3 %). Older age was found to be a risk factor for an incidental finding ( $p < 0.0001$ ).

Incidental findings in the cervical spine were associated with older age. Awareness of the prevalence of incidental findings is important in order to ensure that they are detected and managed appropriately.

### Keywords

cervical - trauma - incidental findings - whiplash-associated disorders - 2000-2010 task-force - neck pain - ct - prevalence - management - diameter – bone



## **Focus on spinal fractures in the elderly.**

Laurer H, Marzi I.

Eur J Trauma Emerg S. 2013;39(5):443-444. 10.1007/s00068-013-0320-4

## Angiographic embolization in the treatment of arterial pelvic hemorrhage: evaluation of prognostic mortality-related factors.

Lindahl J, Handolin L, Soderlund T, Porras M, Hirvensalo E.

Eur J Trauma Emerg S. 2013;39(1):57-63.

10.1007/s00068-012-0242-6

### **Purpose**

The control of arterial bleeding associated with pelvic ring and acetabular fractures (PRAF) remains a challenge for emergency trauma care. The aim of the present study was to uncover early prognostic mortality-related factors in PRAF-related arterial bleedings treated with transcatheter angiographic embolization (TAE).

### **Methods**

Forty-nine PRAF patients (46 pelvic ring and three acetabular fractures) with arterial pelvic bleeding controlled with TAE (within 24 h) were evaluated.

### **Results**

All large arterial disruptions (n = 7) were seen in type C pelvic ring injuries. The 30-day mortality in large vessel (iliac artery) bleeding was higher (57 %) than in medium- or small-size artery bleeding (24 %). Overall 30-day mortality was 29 %. No statistically significant difference in the first laboratory values between the survivors and nonsurvivors was found. However, after excluding patients dying of head injuries (n = 5), a reasonable cut-off value was identified for the base excess (BE; lower than -10 mmol/l) obtained on admission.

### **Conclusions**

PRAF patients with exsanguinating bleeding from the large pelvic artery have the worst prognosis. Very low BE values (<- 10.0 mmol/l) on admission for exsanguinating patients have a negative predictive value for survival, thus anticipating a poor outcome in bleeding controlled with TAE only and an increased risk of death. In critical cases, an aggressive bleeding control protocol prompts extraperitoneal pelvic packing prior to TAE. PRAF-related rupture of the external iliac artery is rare and indicates surgical techniques in controlling and restoring blood supply to the lower leg.

### **Keywords**

pelvic fracture - acetabular fracture - massive bleeding - bleeding pelvic arteries - angiographic embolization - mortality - hemodynamically unstable patients - injury severity score - fractures - management - packing - trauma - ring - arteriography – patient

## Computerized dynamic posturography analysis of balance in individuals with a shoulder stabilization sling.

Lui D F, Memon A, Kwan S, Mullett H.

Eur J Trauma Emerg S. 2013;39(6):635-639.  
10.1007/s00068-013-0309-z

### **Introduction**

Sling immobilization of the upper limb may affect balance. Computerized dynamic posturography (CDP) provides a validated, objective assessment of balance control and postural stability under dynamic test conditions. We tested the balance of individuals with a shoulder stabilization sling (SSS) using an EquiTest machine to objectively assess imbalance while wearing a sling.

### **Methods**

Forty-two right hand dominant (RHD) adults (16 females, 26 males; average age 22 years; range 20-35 years) were included in the study, comprising six controls and two SSS groups with 18 dominant hands (DH) and 18 non dominant hands (NDH). CDP assessed balance by the Sensory Organization Test (SOT), Motor Control Test (MCT), and Adaptation Test (ADT).

### **Results**

The composite equilibrium scores (CES) were as follows: controls 80.8 %, sling DH 71.1 versus sling NDH 69.6 %. Sling use has lower CES compared to controls ( $p = 0.025$ ). The use of a sling caused 31 % of subjects to have decreased CES. 22.9 % of sling users had imbalances. Among sling users, the DH group had 19.1 % imbalances compared to 26.8 % for the NDH group ( $p = 0.044$ ). There were six absolute falls in the DH group versus 12 in the NDH group.

### **Conclusions**

Wearing a sling causes balance decompensation in almost one-third of healthy volunteers, and this is greater when worn in the non dominant hand, with double the number of falls. This has significant implications for patients having prolonged use of a sling. Consideration should be given to operative procedures or conservative management of shoulder pathology where sling use is required and promotion of the early discontinuation of sling use can be considered.

### **Keywords**

computerized dynamic posturography - equitest - sensorimotor test - motor control test - adaption test - shoulder stabilization sling - balance - vestibular function - postural control - older persons - ototoxicity - stability - reflex - tilt

## **Nailing versus plating for comminuted fractures of the distal femur: a comparative biomechanical in vitro study of three implants.**

Mehling I, Hoehle P, Sternstein W, Blum J, Rommens P M.

Eur J Trauma Emerg S. 2013;39(2):139-146.

10.1007/s00068-012-0247-1

The purpose of our study was to determine the biomechanical properties of three different implants utilized for internal fixation of a supracondylar femur fracture. The retrograde supracondylar nail (SCN), the less invasive stabilization system plate (LISS) and the distal femoral nail (DFN) were tested and their biomechanical properties compared.

Twenty pairs of fresh-frozen human femora were used. Each femur was osteotomised to simulate a comminuted supracondylar fracture (AO/OTA 33.A3) and then randomized to fracture fixation with either SCN (n=9) or LISS (n=9). Each contralateral femur was stabilized with DFN as a control (n=18). Two femur pairs were spent on pretesting. All femora were subjected to axial (10-500 N) and torsional (0.1-14 Nm) loading.

Eighteen matched femur pairs were analyzed. The post-loading median residual values were 49.78, 41.25 and 33.51% of the axial stiffness of the intact femur and 59.04, 62.37 and 46.72% of the torsional stiffness of the intact femur in the SCN, LISS and DFN groups. There were no significant differences between the three implants concerning axial and torsional stiffness.

All implants had sufficient biomechanical stability under physiological torsional and axial loading. All three implants have different mechanisms for distal locking. The SCN nail with the four-screw distal interlocking had the best combined axial and torsional stiffness whereas the LISS plate had the highest torsional stiffness.

### **Keywords**

distal femur - fractures - biomechanics - retrograde intramedullary nailing - angle stable plating - cadaver - fracture fixation - retrograde intramedullary nail - invasive stabilization system - supracondylar femoral fractures - elderly-patients - internal-fixation - osteoporotic bone - epidemiology - diaphyseal - liss

## **Mortality and quality of life after proximal femur fracture-effect of time until surgery and reasons for delay.**

Muhm M, Arend G, Ruffing T, Winkler H.

Eur J Trauma Emerg S. 2013;39(3):267-275.  
10.1007/s00068-013-0267-5

Studies yield conflicting results from the effect of early surgery on mortality. Some observed a positive, others a negative and some did not find any effect of early operation. In this study, mortality and quality of life in relation to time until surgery as well as reasons for delay were observed prospectively.

Data of 138 patients (> 65 years) with proximal femoral fractures and consecutive surgery were observed. Demographic data as well as mortality rate, survival time and Barthel Index up to 1 year in relation to different time frames were observed. Reasons for operative delay were divided into being administrative or patient-related.

Three-month mortality was 10.1% and 1-years was 23.9%. Neither time from injury until hospital admission nor from injury until surgery or from hospital admission until surgery up to 48 hours had any effect on mortality and survival time. The age of patients dying in the follow-up period was significantly higher than the age of patients surviving (86.8 vs. 84.4 years). No influence of any delay in time until surgery on the Barthel Index was observed.

In proximal femoral fractures, a delay of surgery up to 48 hours did not influence mortality and Barthel Index negatively, nor did other associating factors. Only the patients age at the time of injury influences mortality rate, survival time, and Barthel Index significantly. The older the patient at the time of injury; the higher the mortality rate, the shorter the survival time and the lower the Barthel Index.

### **Keywords**

proximal femur fracture - time until surgery - mortality - barthel index - quality of life - reasons for delay - hip fracture - elderly-patients - surgical delay - femoral fractures - operative delay - functional recovery - early complications - to-surgery - fixation - morbidity

## Locking Compression Plates are more difficult to remove than conventional non-locking plates.

Musters G D, van Hensbroek P B, Ponsen K J, Luitse J S K, Goslings J C.

Eur J Trauma Emerg S. 2013;39(2):159-162.

10.1007/s00068-012-0245-3

Locking Compression Plates (LCPs) have been introduced in the last decade. Clinicians have the impression that hardware removal of LCPs are more difficult and associated with more complications than conventional (non-locking) plates. Therefore, this study compares the complication rates of Locking Compression Plate (LCP) removal and conventional non-locking plate removal.

Patients who underwent open reduction and internal fixation and subsequent hardware removal at the Department of Trauma Surgery at our Level 1 Trauma Centre between 1993 and 2007 were included through the hospital's information system. The primary outcome measure was the occurrence of complications during implant removal.

A total of 210 patients were included. The females were significantly older than the males [median age, 51.5 vs. 42.6 years ( $p < 0.001$ )]. The median operation time of LCP removal was significantly longer than the operation time of non-locking plate removal (72 vs. 54 min,  $p < 0.001$ ). In the total study population, complications during implant removal occurred in 25 patients (11.9%). The complication rate of conventional non-locking plate removal was 2.5%. The complication rate of LCP removal was significantly higher (17.7%,  $p = 0.001$ ).

LCP removal is associated with significantly more complications than conventional non-locking plate removal. The indication for removal of locking compression should be made cautiously, and surgical instruments for LCP removal should be optimized.

### Keywords

locking compression plates - lcp - complications - hardware removal - conventional plates - invasive stabilization system - complications - screws

## **Influence of implant design on the method of failure for three implants designed for use in the treatment of intertrochanteric fractures: the dynamic hip screw (DHS), DHS blade and X-BOLT.**

O'Neill F, McGloughlin T, Lenehan B, Condon F, Coffey J C, Walsh M.

Eur J Trauma Emerg S. 2013;39(3):249-255.  
10.1007/s00068-013-0257-7

The dynamic hip screw (DHS) has been widely adopted as the implant of choice in the treatment of intertrochanteric fractures. There have been attempts over the years to improve on the DHS lag screw design in order to reduce failure in the form of "cut out". The purpose of this study was to investigate how two new design variations of the DHS, the DHS blade and the X-BOLT, behave within bone, and if these design modifications do indeed improve the fixation achieved and lead to a reduction in failure due to cut out.

"Pushout" tests were chosen as the means of investigating the failure modes and patterns for these implants that lead to cut out. These pushout studies were performed in artificial bone substrate in the form of polyurethane foam blocks and in cadaveric femoral heads.

The results demonstrated that each individual implant produces its own specific distinct force-displacement curve or pattern of failure, and that despite the very different implant designs and methods of fixation, all of the implants tested reached very similar peak forces in each of the test materials used.

The results demonstrated that implant design only influences the pattern of failure, and that the peak forces reached by each implant are determined by the quality of the bone or test material into which they are placed. However, altering the force-displacement curve or pattern of failure may be enough to improve the fixation achieved and to provide an increased resistance to cut out.

### **Keywords**

intertrochanteric fractures - dhs - dhs blade - x-bolt - femoral fractures - fixation - nail

## Are soft tissue measurements on lateral cervical spine X-rays reliable in the assessment of traumatic injuries?

Patel M S, Grannum S, Tariq A, Qureshi A, Watts A, Gabbar O.

Eur J Trauma Emerg S. 2013;39(6):613-618.

10.1007/s00068-013-0302-6

### **Introduction**

Traumatic neck pain is a common presentation to the emergency department. Lateral plain radiographs remain the primary investigation in the assessment of these injuries. Soft tissue assessment forms an integral component of these radiographs. They can provide information on subtle injuries that may not be obvious. Many methods are used to assess the prevertebral soft tissue shadows. The two more commonly used techniques include the 'seven at two and two at seven' rule (method 1) and the ratio of the soft tissues with respect to the vertebral width (method 2).

### **Aim**

To assess which of the above two methods in assessing cervical spine soft tissue shadows on lateral radiographs is more sensitive in the presence of cervical spine injuries.

### **Methods**

A retrospective analysis of consecutive traumatic cervical spine films performed within a busy trauma tertiary centre over a period of 7 months. Patients were divided into two groups: group 1-fractures; group 2-no fractures. The prevertebral soft tissue shadows were measured at referenced points on the lateral cervical spine films with respect to the above two methods and comparisons between the groups were made.

### **Results**

Thirty-nine patients in group 1 were compared to a control group of 60 patients in group 2. Both methods failed to identify any significant differences between the two groups. The sensitivity and specificity for method 1 was 7.6 and 93 %, and for method 2, they were 7.6 and 98 %, respectively.

### **Conclusion**

There is no significant difference between the soft tissue shadows when comparing patients with and without cervical spine fractures on lateral radiographs. Both commonly used measures of soft tissue shadows in clinical practice are insensitive in identifying patients with significant osseous injuries. They, therefore, do not offer any further value in interpreting traumatic cervical spine radiographs. The management of patients with cervical spine trauma in the absence of obvious osseous injury on standard radiographs should warrant a computed tomography (CT) scan if clinically indicated.



**Keywords**

cervical spine injuries - cervical spine fractures - soft tissue measurements - lateral cervical spine radiographs - neck - radiographs

## Cervical spine fractures in the elderly: morbidity and mortality after operative treatment.

Sander A L, El Saman A, Delfosse P, Wutzler S, Meier S, Marzi I, Laurer H.

Eur J Trauma Emerg S. 2013;39(5):469-476.

10.1007/s00068-013-0311-5

Although there are currently many different strategies and recommendations in the therapy of cervical spine fractures in elderly patients, there are still no generally accepted treatment algorithms. The aim of the present study was to analyze the morbidity, mortality, and outcome of operated cervical spine injuries in the elderly.

This study presents a retrospective review of 69 patients aged 65 years or older admitted to our level I trauma center with cervical spine injury, who had undergone surgical treatment. The data were acquired by analysis of the hospital inpatient enquiry system and radiological review.

The ratio between male and female patients was 37:32. The average age of the patients was 76 years (ranging from 65 to 96 years) for males and 80 years (ranging from 66 to 93 years) for females. Injury to the cervical spine was caused by low-energy trauma in 71 % and high-energy trauma in 29 %, respectively. 55.1 % sustained isolated cervical spine injuries, 39.1 % injuries to two adjacent vertebrae, 2.9 % injuries to three adjacent vertebrae, and 2.9 % an odontoid fracture combined with associated fracture(s) in non-contiguous vertebra(e). Isolated spine injury level was dominated by C2 (47.8 %). The most common site for injuries to two adjacent vertebrae was observed at C6/C7 (14.5 %). The morbidity included cerebral complications, respiratory complications, Clostridium difficile-associated disease, heart failure, and acute renal failure. Operative complications included dislocation/malposition, neurovascular lesions, wound infection, and transient swallowing difficulty. The mortality rate at 3 months was 26.1 %, with an in-hospital mortality of 21.7 %. Age was associated with mortality at 3 months. A cervical fracture-induced neurological deficit was documented in 26.1 %, resulting in a mortality of 44.4 % (8/18). Twenty-seven of 33 patients living at home/nursing home at the time of injury returned to their home/nursing home after their hospitalization. The overall outcome was predominantly related to age and the severity of neurological deficit.

In elderly patients with cervical spine fractures, the hospital course is complicated by medical issues and early mortality rates are significant. Therefore, treatment strategies should be carefully individualized to the patients and their comorbidities.

### Keywords

cervical spine fracture - elderly - morbidity - mortality - operative treatment - anterior screw fixation - ii odontoid fractures - injuries - older - trauma – age

## Implant removal in children.

Schmittenebecher P P.

Eur J Trauma Emerg S. 2013;39(4):345-352.  
10.1007/s00068-013-0286-2

Implant removal in children is still a standard procedure. Implants may disturb function, and some theoretical long-term risks like growth disturbance, foreign body reaction, chronic infection and corrosion are used as arguments for removal. Implant migration or interference with any other orthopaedic treatment over the later course of life is also a matter of debate. On the other hand, the difficulty in removing single implants as well as possible perioperative complications has induced discussion about the retention of implants in childhood.

The current procedures are exposed and the available literature on implant removal in children reviewed.

Actually, a clear recommendation does not exist. The current line of action still includes routine removal, as it is preferred by some authors, whereas others argue for a selective procedure. K-wires as well as intramedullary nails are usually removed because the ends may interfere with the surrounding tissue. Screws and plates can be retained if there are no local problems. The removal of external fixators is non-controversial.

Benefits have to outweigh the risks and complications in the individual case and the procedure should not require a more extensive procedure than insertion. It has to be an individual decision in view of the lack of evidence to support routine removal as well as to refute it.

### **Keywords**

implant removal - implant retainment - child - complication - pediatric femur fractures - orthopedic implants - metal removal - routine removal - forearm plates - population - complications - retention - nails

## Diagnosis of cervical spine injuries in children: a systematic review.

Schoneberg C, Schweiger B, Hussmann B, Kauther M D, Lendemans S, Waydhas C.

Eur J Trauma Emerg S. 2013;39(6):653-665.  
10.1007/s00068-013-0295-1

### **Objective**

The objective of this systematic review was to discuss current knowledge of the diagnostic management of cervical spine (c-spine) injuries in children.

### **Methods**

Studies dealing with this topic were collected from the following sources: MEDLINE via PubMed, Embase, and Cochrane. Where possible, a meta-analysis was performed. Furthermore, the level of evidence for all the included publications was assigned.

### **Results**

The incidence of cervical spine injury (CSI) in children is rare (1.39 %). It seems that the upper c-spine is more often injured in children younger than 8 years of age. When a CSI is expected, immobilization should be performed. The best immobilization is achieved with a combination of a half-spine board, rigid collar, and tape. The literature for thoracic elevation or an occipital recess in children younger than 8 years of age is inhomogeneous. The c-spine in children can be cleared by a combination of the National Emergency X-Radiography Utilization Study (NEXUS) low-risk criteria and the Canadian C-Spine Rule. Caution is advised for nonverbal and/or unconscious children. In these children, plain radiographs should be performed. If these images are inadequate or show hints for bony injuries, a computed tomography (CT) of the c-spine should be considered. Additional views of the c-spine offer only little information for clearing the c-spine.

### **Keywords**

pediatric c-spine - cervical spine - cervical spine injury - ct - mri - flexion-extension radiographs - pediatric trauma - blunt trauma - computed-tomography - clearance protocol - neutral position - young-children - c-spine - association - age

## Special considerations in the interpretation of plain radiographs of the cervical spine in children. A review of the literature.

Schoneberg C, Schweiger B, Lendemans S, Waydhas C.

Eur J Trauma Emerg S. 2013;39(6):647-652.

10.1007/s00068-013-0305-3

### **Introduction**

This review provides an overview of the special considerations with regard to correct diagnosis of plain radiographs of the pediatric cervical spine. Injuries to the cervical spine are rare in children. The leading trauma mechanism is motor vehicle injury. Plain radiographs are a common tool in the search for a diagnosis. Taking the growth process into account there are many differences to be found compared to the adult c-spine. Knowledge of these differences is important when working towards the correct interpretation of plain radiographs of the pediatric c-spine.

### **Methods**

To create this review, a literature search of the electronic databases Cochrane, PubMed/MEDLINE and Embase was conducted.

### **Results**

Special considerations of plain radiographs of the pediatric c-spine are presented. Biomechanical and embryology specifics have been a focus of this review. They are explained relating on the development of the c-spine. The known auxiliary lines used in the interpreting of the pediatric c-spine are reported. A selection of these auxiliary lines is shown.

### **Conclusion**

Knowledge of the c-spines characteristics is of major importance for every physician involved in pediatric trauma care. This could lead to not only avoiding misdiagnosis but could also lead to avoiding the overuse of computed tomography of the pediatric c-spine.

### **Keywords**

pediatric c-spine - cervical spine - cervical spine injury - plain radiographs - young-children - injuries - fracture - atlas - pseudosubluxation - trauma - c2

## **Metal removal.**

Schwarz N.

Eur J Trauma Emerg S. 2013;39(4):325-326.  
10.1007/s00068-013-0275-5

## Technical complications during removal of locking screws from locking compression plates: a prospective multicenter study.

Schwarz N, Euler S, Schlittler M, Ulbing T, Wilhelm P, Fronhofer G, Irnstorfer M.

Eur J Trauma Emerg S. 2013;39(4):339-344.  
10.1007/s00068-013-0301-7

To assess the risk for technical complications in patients undergoing removal of locking compression plates (LCP) with head locking screws.

A total of 205 patients who were scheduled for implant removal surgery after a healed fracture of the femur, tibia, humerus, distal radius, or clavicle in nine Austrian clinics were prospectively included in the study, all of whom had previously undergone fracture fixation by plates, with titanium implants used in 98 % of the patients. Intraoperative technical complications and the methods used to solve them were documented by the surgeon.

During the course of this study, a total of 1,462 locking screws were removed from 204 LCPs. While 95 % of these screws could be removed without difficulties, technical complications were reported for 41 patients with 78 screws which could not be removed with standard screwdrivers and required the use of additional instruments. The estimated risk for the occurrence of at least one technical complication during implant removal surgery was 20.1 %. The most frequently observed complications were screws that could not be loosened because they were jammed in the LCP, screws with a damaged recess in which the screwdriver turned freely, as well as a combination of both events. The majority of these screws could be removed with the use of a conical extraction screw or by drilling off the screw head. In one patient, an intraoperative refracture of the humerus occurred during plate removal. Even though there is a rate of 20 % for technical complications when removing the implants, only a few patients experience a clinical impact.

Titanium LCPs are prone to technical complications during implant removal, but the majority of the issues can be solved using special techniques.

### Keywords

implant removal - locking compression plate - locking screw - complications - invasive stabilization system - hardware removal - refracture - metal – bone

## Does the ratio and thickness of prevertebral soft tissue provide benefit in blunt cervical spine injury?

Shiau J P, Chin C C, Yeh C N, Chen J F, Lee S T, Fang J F, Liao C C.

Eur J Trauma Emerg S. 2013;39(3):297-303.

10.1007/s00068-013-0270-x

Although many reports advocate computed tomography (CT) as the initial surveillance tool for occult cervical spine injury (CSI) at the emergency department (ED), the role of a lateral cervical spine radiograph (LCSX) has still not been replaced. We hypothesized that the increased width of the prevertebral soft tissue on an LCSX provides helpful information for selecting the high-risk patients who need to be evaluated with more accurate diagnostic tools.

This was a retrospective and consecutive series of injured patients requiring cervical spine evaluation who were first imaged with three-view plain films at the ED. The prevertebral soft tissue thickness (PVST) and ratio of prevertebral soft tissue thickness to the cervical vertebrae diameter (PVST ratio) were calculated on the LCSX. Suspicion of CSI was confirmed by either CT or magnetic resonance imaging (MRI) scans.

A total of 826 adult trauma patients requiring cervical spine evaluation were enrolled. The C3 PVST and PVST ratio were significantly different between patients with or without upper cervical area injury (UCAI, 8.64 vs. 5.49 mm, and 0.394 vs. 0.276, respectively), and, likewise, the C6 PVST and PVST ratio for patients with or without lower cervical area injury (LCAI, 16.89 vs. 14.66 mm, and 0.784 vs. 0.749, respectively). The specificity was greater than 90 % in predicting UCAI and LCAI when combining these two parameters.

This method maximizes the usefulness of LCSX during the initial assessment of a conscious patient with blunt head and neck injury, especially for the identification of high-risk patients requiring prompt CT or MRI; on the other hand, it prevents the overuse of these high-cost imaging studies as initial diagnostic tools.

### Keywords

prevertebral soft tissue thickness ratio - prevertebral soft tissue - cervical vertebrae - cervical spine injury - lateral cervical spine radiograph - computed-tomography scan - trauma - clearance - fractures - mri - ct



## Evaluation of the use of the hook plate in Neer type 2 lateral clavicle fractures and Rockwood types 3-5 acromioclavicular joint dislocations.

van Hooff C C D, Haverlag R, Willems W J.

Eur J Trauma Emerg S. 2013;39(6):619-626.  
10.1007/s00068-013-0303-5

### **Purpose**

For most types of acromioclavicular (AC) injuries, treatment is well established. For Neer type 2 lateral clavicle fractures and Rockwood types 3-5 AC dislocations, the ideal treatment is still a point of debate. The purpose of this study was to evaluate the functional and radiological outcome in patients treated for one of these two lesions in our hospital.

### **Methods**

Our study group consisted of 30 patients with a Neer type 2 lateral clavicle fracture (n = 19) or Rockwood types 3-5 AC dislocation (n = 11) treated with the clavicle hook plate. All implants were removed after healing. At a mean follow-up of 40 months (12-92), data were collected by the analysis of questionnaires (DASH, NSST, OSS, SF-36), clinical examination (Constant-Murley score), and radiological evaluation (Zanca view).

### **Results**

The mean Constant score was 88 [standard deviation (SD) 8] compared to 92 (SD 6) on the contralateral non-operated side. The questionnaires resulted in the following scores: median DASH: 4.5 (0-70); median NSST: 100 (8-100); mean OSS: 41 (SD 8); mean SF-36: 81 (SD 12). The mean coracoclavicular (CC) and AC distances were not significantly different.

### **Conclusions**

This study suggests that hook plate fixation is a reliable treatment for Neer type 2 lateral clavicle fractures and Rockwood types 3-5 AC injuries. It results in a good and comparable function of the shoulder when compared to the contralateral side, high union rate, good to excellent objective and subjective results, and allows early active motion with limited abduction. A disadvantage is the necessity to remove the plate.

### **Keywords**

hook plate - clavicle fractures - ac dislocations - constant-murley score - dash - oxford shoulder score - unstable fractures - distal clavicle - surgical-treatment - health survey - shoulder - fixation - sf-36

## Impact of ulnar styloid fractures in nonoperatively treated distal radius fractures.

van Valburg M K, Wijffels M M E, Krijnen P, Schipper I B.

Eur J Trauma Emerg S. 2013;39(2):151-157.

10.1007/s00068-013-0256-8

The effect of an ulnar styloid fracture (USF) on the stability of nonoperatively treated distal radius fractures (DRF) is unknown. The aim of this study was to evaluate the influence of USFs on the dislocation of DRFs treated by closed reduction.

Standardized radiographs of 100 nonoperatively treated DRFs were evaluated. DRFs with a USF were compared to DRFs without a USF with respect to dorsal tilt, radial inclination, and ulnar variance.

We evaluated the radiographs of 100 DRFs in 99 consecutive patients, of whom 84 were women. An accompanying USF was present in 58 wrists, of which 49 were displaced. On the trauma radiograph, the USF group showed significantly more overall dislocation. After closed reduction, fracture position improved, and no significant differences in dislocation were observed between groups. After a mean of 42 days, radial inclination significantly decreased if a USF was present. When USF displacement was taken into account, significantly more ulnar variance occurred in the displaced USF group on the trauma and follow-up radiograph compared to the nondisplaced USF group and no-USF group.

The results of this study show that presence of a dislocated USF in patients with a DRF is associated with a worse position directly after trauma, and with recurrence of radial shortening after adequate reduction. These results warrant early radiologic follow-up in patients with reduced combined DRFs and USFs in order to evaluate the redislocation of the distal radius. Early detection of redislocation in these combined fractures may induce early surgical intervention.

### Keywords

distal radius fracture - ulnar styloid fracture - fracture stability - dislocation - nonoperative treatment - triangular fibrocartilage complex - radioulnar joint - young-adults - stability - injuries - fixation - wrist - end - biomechanics - diagnosis

## Indications for implant removal after fracture healing: a review of the literature.

Vos D I, Verhofstad M H J.

Eur J Trauma Emerg S. 2013;39(4):327-337.  
10.1007/s00068-013-0283-5

The aim of this review was to collect and summarize published data on the indications for implant removal after fracture healing, since these are not well defined and guidelines hardly exist.

A literature search was performed.

Though there are several presumed benefits of implant removal, such as functional improvement and pain relief, the surgical procedure can be very challenging and may lead to complications or even worsening of the complaints. Research has focused on the safety of metal implants (e.g., risk of corrosion, allergy, and carcinogenesis). For these reasons, implants have been removed routinely for decades. Along with the introduction of titanium alloy implants, the need for implant removal became a subject of debate in view of potential (dis)advantages since, in general, implants made of titanium alloys are more difficult to remove. Currently, the main indications for removal from both the upper and lower extremity are mostly 'relative' and patient-driven, such as pain, prominent material, or simply the request for removal. True medical indications like infection or intra-articular material are minor reasons.

This review illustrates the great variety of view points in the literature, with large differences in opinions and practices about the indications for implant removal after fracture healing. Since some studies have described asymptomatic patients developing complaints after removal, the general advice nowadays is to remove implants after fracture healing only in symptomatic patients and after a proper informed consent. Well-designed prospective studies on this subject are urgently needed in order to form guidelines based on scientific evidence.

### **Keywords**

implant removal - hardware removal - metal implants - osteosynthesis - fracture healing - indications - orthopedic implants - intramedullary nails - internal-fixation - hardware removal - routine removal - open reduction - plate removal - knee pain - forearm - complications

## A practical therapeutic protocol for cervical tuberculosis.

Wang X Y, Luo C K, Li W W, Wu P, Pang X Y, Xu Z Q, Zeng H, Peng W, Zhang P H.

Eur J Trauma Emerg S. 2013;39(1):93-99.

10.1007/s00068-012-0243-5

### **Purpose**

Cervical tuberculosis (CTB) is a relatively rare entity, even in endemic countries. Currently, management ranges from conservative to radical surgical approaches. We report our experience in diagnosing and treating 66 cases of CTB in the past eight years using our CTB therapeutic protocol.

### **Methods**

All patients diagnosed with CTB were followed up over a 3.5-year period. Patients were divided into three grades using clinicoradiological criteria designed to evaluate the initial severity of the disease. Overall performance status was assessed based on the American Spinal Injury Association (ASIA) scale. Neurological recovery was evaluated with the ASIA scale as well as using X-rays and computed tomography every four weeks for the initial three months and every three months thereafter.

### **Results**

The mean follow-up duration was 38.2 +/- 6.2 months. No mortality occurred. One case of recurrence due to irregular antitubercular treatment (ATT) was cured by abscess clearing and regular ATT. All other patients had good clinicoradiological outcomes, regardless of grading.

### **Conclusions**

The use of our proposed scoring system and management protocol allowed speedy management of CTB.

### **Keywords**

cervical tuberculosis - scoring system - management protocol - pott's spine

## No additional value of routine check X-rays after internal fixation of hip fractures.

Westerterp M, Emous M, Vermeulen M C, Eerenberg J P, van Geloven A A W.

Eur J Trauma Emerg S. 2013;39(2):163-165.

10.1007/s00068-012-0244-4

Annually approximately 18,044 patients are admitted to Dutch hospitals with hip fractures. This is an increasing demand for medical care due to the increasing amount of elderly people. Although previous studies showed that routine check of X-rays following hip fracture surgery is unnecessary, it remains routine in most clinics in the Netherlands. In addition to the radiation exposure to the patient, it is painful and leads to unnecessary costs. This study aims to establish if routine check X-rays 1 day after internal fixation for hip fracture with adequate image intensifier guidance influence postoperative management.

A retrospective study was performed for all patients undergoing internal fixation of hip fractures with image intensifier guidance in the period from January 2006 until December 2007 in our hospital.

In that period 294 patients underwent internal fixation of hip fractures, 254 underwent a check X-ray and were included in this study. In only two patients the check X-ray did change patient management.

A check X-ray following internal fixation of hip fractures after adequate peroperative image intensifier guidance is not useful. Dismissing this unuseful medical investigation, leads to less radiation exposure, less pain and less costs.

### Keywords

hip fracture - surgery - check x-ray - image intensifier - image intensifier guidance - postoperative radiographs - management

## A new fixation method for Hoffa fracture.

Xu Y, Li H, Yang H H.

Eur J Trauma Emerg S. 2013;39(1):87-91.  
10.1007/s00068-012-0238-2

### **Purpose**

To investigate the clinical effect of a new fixation method for Hoffa fractures.

### **Methods**

We treated eleven patients with Hoffa fracture using the new fixation method (fixation with one screw inserted from the femoral intercondylar notch and two screws inserted from the nonarticular lateral (or medial) surface of the fractured condylar fragment; the two sets of screws were crossed).

### **Results**

After an average follow-up period of 24 months (range 5-28 months), all fractures had healed. The average healing time was 11.6 weeks (range 9-14 weeks). On the version of the Knee Society Score modified by Dr. John Insall in 1993, the average score was 174.6 points (range 125-199 points).

### **Conclusions**

The new fixation method for Hoffa fracture is effective, and may provide a new way to treat Hoffa fractures.

### **Keywords**

hoffa fracture - femoral intercondylar notch - internal fixation - open reduction - lateral femoral condyle - coronal fractures - knee

## **A holistic hip fracture approach: individualized diagnosis and treatment after surgery.**

Amling M, Oheim R, Barvencik F.

Eur J Trauma Emerg S. 2014;40(3):265-271.

10.1007/s00068-014-0374-y

Secondary fracture prevention is of paramount importance in the clinical management of patients with hip fractures. However, in contrast to the excellent surgical care provided to these patients in the Western hemisphere and despite good medical options, causative treatment of the underlying osteopathy causing skeletal fragility remains an unmet medical need that urgently needs to be improved. This calls for a concerted action between orthopedic/trauma surgeons and osteologists, as outstanding hospitals not only treat fragility fractures, but also prevent fractures from recurring. Aiming for a holistic hip fracture approach, in this work we highlight aspects of (a) improved risk assessment and differential diagnosis, (b) optimized basic medical care, and (c) options for individualized, specific medical intervention within a realistic framework of current medical options and future perspectives.

### **Keywords**

osteoporosis - fragility fractures - secondary fracture prevention - risk assessment - bone structure - xtremect - dxa - vitamin d - ppi - hypochlorhydria - bisphosphonates - teriparatide - denosumab - strontium ranelate - cathepsin k - sklerostin - vitamin-d deficiency - postmenopausal women - calcium homeostasis - reoperation rate - iliac crest - bone mass - osteoporosis - health - risk - germany

## A measuremental approach to calcaneal fractures.

Arslan G, Yirgin I K, Tasguzen A.

Eur J Trauma Emerg S. 2014;40(5):593-599.  
10.1007/s00068-013-0359-2

### **Objective**

The calcaneus is the most frequently broken tarsal bone in the setting of trauma. The diagnosis, treatment and prognosis of calcaneal fractures depend on the location and type determined by the Sanders classification. With the help of measurements on lateral view radiographs like the Bohler's angle, the angle of Gissane, the calcaneal inclination angle and the calcaneal facet height, we can predict the severity of the trauma and prognosis by assessing the collapse of the calcaneus. On computed tomography (CT), calcaneal fractures which reach into the joint space can be classified by the Sanders classification system according to the number of fragments. In this study, we tried to determine whether calcaneal fracture severity determined by angle and facet height measurements on lateral X-ray radiographs correlate with the Sanders classification.

### **Materials and methods**

Among 69 patients diagnosed with calcaneal fractures, we performed a retrospective study by analysing the Bohler's angle, the angle of Gissane, the calcaneal inclination angle and the calcaneal facet height on digital lateral X-rays and by classifying the fractures according to the Sanders classification by CT. We compared the results of the two different imaging modalities.

### **Results**

We found that, as the Sanders classification type became more severe from type 1 to type 4, a general decrease was observed in the Bohler's angle, the inclination angle and the facet length, whereas a general increase was observed for the mean values of the angle of Gissane.

### **Conclusion**

These findings suggest that measurements obtained from lateral X-rays coincide with the Sanders classification and, therefore, might indicate the prognosis.

### **Keywords**

calcaneal fractures - the bohler's angle - the angle of gissane - bohlers - angle



## Incidence and characteristics of distal radial fractures in an urban population in The Netherlands.

Bentohami A, Bosma J, Akkersdijk G J M, van Dijkman B, Goslings J C, Schep N W L.

Eur J Trauma Emerg S. 2014;40(3):357-361.

10.1007/s00068-014-0394-7

The increasing incidence of distal radius fracture is thought to be due to the aging population. Surprisingly, some authors have reported a decrease in the incidence of distal radius fracture. Moreover, the type-specific incidence of distal radial fracture classified according to fracture severity is not well documented. The aim of this population-based study was to estimate the overall and type-specific incidences of distal radius fracture in a urban population in The Netherlands. During 2009, all persons aged a parts per thousand yen18 years old with an acute distal radius fracture in two hospitals in The Netherlands were prospectively registered. In 2009, the mid-year study population consisted of 245,559 inhabitants a parts per thousand yen18 years old. Fractures were categorized according to the AO classification. 494 patients with acute distal radius fractures were registered in the two participating hospitals during the 1-year study period. The overall incidence of distal radius fracture was 20 per 10,000 person-years. Among women, the incidence rate increased from the age of 50 and reached a peak of 124 per 10,000 person-years in women 80 years and older. Among men, the incidence rate was low until the age of 80 years and older, and reached a peak of 24 per 10,000 person-years. The incidence rate among women between 50 and 79 years was 54/10,000 person-years. Extra-articular AO type A fractures were most common among all age groups, comprising 50 % of all fractures (40 % in men and 53 % in women). The overall incidence rate of distal radius fracture was 20 per 10,000 person-years. This incidence increases with age for both women and men. A lower incidence rate among women 50-79 years of age was found than previously reported, which may indicate a declining incidence in this age group. Extra-articular AO type A fractures were the most common fracture types.

### Keywords

distal radial fracture - wrist - incidence - the netherlands - osteoporotic fractures - forearm fractures - epidemiology - mortality - injuries - wrist - risk - hand - age

## Mechanism of injury and treatment of trauma-associated acute compartment syndrome of the foot.

Brink F, Bachmann S, Lechler P, Frink M.

Eur J Trauma Emerg S. 2014;40(5):529-533.

10.1007/s00068-014-0420-9

Acute compartment syndrome (ACS) of the foot represents a rare complication following trauma of the lower extremity. Early diagnosis and treatment are necessary to prevent poor outcome. The study was conducted to describe etiology and treatment of foot ACS. In the current study, patients diagnosed with and treated for ACS between 1st December 2000 and 30th September 2007 were included. Mechanism of injury, additional injuries and treatment was analyzed. We included 31 patients (21 males) with a mean age of 33.8 +/- 16.9 years. Most injuries were caused by a motor vehicle accident, while nearly 20 % occurred after a low-energy mechanism. Multiple injuries with a mean ISS of 19.5 +/- 11.0 were present in 14 patients. Superficial infections occurred in 6 feet, while a deep infection only developed in one patient. Acute compartment syndrome of the foot has a low incidence. A thorough clinical examination in patients on risk is required to provide timely diagnosis and adequate surgical decompression.

### Keywords

acute compartment syndrome - foot - pressure measurement - tibial fractures - lower-extremity - lower-limb - leg - decompression - fasciotomy - pressure - patterns - therapy

## Acute traumatic fractures to the craniovertebral junction: preliminary experience with the "MILD" score scale.

Debernardi A, Sala E, D'Aliberti G, Talamonti G, Cenzato M.

Eur J Trauma Emerg S. 2014;40(3):343-350.

10.1007/s00068-014-0387-6

Traumatic fractures to the craniovertebral junction (CVJ) are rare events requiring complex clinical management. Several classification systems are currently in use; however, recent improvements of junctional knowledge has focused attention on the role of ligaments and membranes in vertebral biomechanical stability. The aim of this study was to present our preliminary experience with the "MILD" score scale, which should allow fast and effective classification of all CVJ traumatic fractures based on vertebral instability in the acute setting.

A prospective study was conducted on 38 consecutive patients with 43 traumatic junctional fractures identified by computed tomography (CT) scan in the acute trauma phase. The MILD scale was applied to all fractures, and a score was obtained for each patient. All cases underwent magnetic resonance imaging (MRI) to assess the anatomical integrity of ligaments and membranes.

Twenty-seven patients (71 %) were classified as MILD type 1 (0-1 points), showed a negative MRI, and healed with conservative treatment. Eight patients (21 %) were classified as MILD type 2 (2 points) and showed modest indirect signs of ligamentous injuries. Four of these patients healed with conservative treatment, while three patients underwent surgery due to wide bone fracture fragment displacement. Three patients (8 %) were classified as MILD type 3 (3 points), all of whom showed extensive ligamentous damage and underwent surgery.

The close association between the MILD scale and spinal instability is promising, although further studies are warranted in order to confirm our preliminary data.

### Keywords

craniovertebral junction - fractures - ligaments - spine - stability - trauma - transverse atlantal ligament - occipital condyle fractures - cervical-spine - axis - injuries - classification - guidelines - management - atlas - event

## Comparison of upper limb amputees and lower limb amputees: a psychosocial perspective.

Desteli E E, Imren Y, Erdogan M, Sarisoy G, Cosgun S.

Eur J Trauma Emerg S. 2014;40(6):735-739.

10.1007/s00068-014-0418-3

Amputation of limb is essential in certain conditions; however, it may have significant impact on the patient's psychological condition. The present study investigates psychological responses of upper limb (UL) amputees versus lower limb (LL) amputees regarding prosthetic adjustment, social discomfort, depression, and body image anxiety.

Traumatic major amputations of 20 upper and 38 lower extremities of 58 patients who were currently using prosthesis were included. 12 of UL amputations were of dominantly used limb. Seven of the UL amputations, and nine of the LL amputations were female. The Trinity Amputation and Prosthesis Experience Scales was used for adjustment, restriction, and satisfaction. Anxiety and depression levels were assessed using Hospital Anxiety and Depression Scale (HADS). Body image disturbance and social discomfort were assessed with Amputation Body Image Scale-Revised (ABIS-R) and Social Discomfort Score, respectively.

58 individuals with 20 UL and 38 LL amputations were included. Mean age of UL amputees was 44.76 +/- A 12.26 and 49.1 +/- A 14.3 years for LL amputees. Mean time of daily prosthesis use was 11.35 +/- A 4.8 and 11.52 +/- A 4.7 h, respectively. Mean time since amputation was 35.4 +/- A 14.3 and 36.05 +/- A 13.6 months; length of prosthesis use time was 24.8 +/- A 13.4 and 23.9 +/- A 15.12 months, respectively. Social adjustment and adjustment to limitation subscales had significantly higher scores in LL amputees ( $p < 0.001$ ). There was statistically significant difference between mean HADS depression and anxiety scores ( $p < 0.001$ ). Mean total ABIS-R score indicated significantly greater body image disturbance for UL amputees ( $p < 0.001$ ).

Well-adjusted LL prosthesis probably has better cosmetic appearance compared to that of UL prosthesis and perception of cosmetic appearance may be the key factor that leads to increased levels of body image anxiety and social discomfort.

### Keywords

Epidemiologic and prognostic study, level III., amputee - prosthesis - upper limb - lower limb - psychosocial adjustment - body-image - physical-disability - amputation - depression - adjustment - anxiety - experience - people - scale - pain

## **Psoas:lumbar vertebra index: central sarcopenia independently predicts morbidity in elderly trauma patients.**

Ebbeling L, Grabo D J, Shashaty M, Dua R, Sonnad S S, Sims C A, Pascual J L, Schwab C W, Holena D N.

Eur J Trauma Emerg S. 2014;40(1):57-65.  
10.1007/s00068-013-0313-3

Central sarcopenia as a surrogate for frailty has recently been studied as a predictor of outcome in elderly medical patients, but less is known about how this metric relates to outcomes after trauma. We hypothesized that psoas:lumbar vertebral index (PLVI), a measure of central sarcopenia, is associated with increased morbidity and mortality in elderly trauma patients.

A query of our institutional trauma registry from 2005 to 2010 was performed. Data was collected prospectively for the Pennsylvania Trauma Outcomes Study (PTOS). Inclusion criteria: age > 55 years, ISS > 15, and ICU LOS > 48 h. Using admission CT scans, psoas:vertebral index was computed as the ratio between the mean cross-sectional areas of the psoas muscles and the L4 vertebral body at the level of the L4 pedicles. The 50th percentile of the psoas:L4 vertebral index value was determined, and patients were grouped into high (> 0.84) and low (a parts per thousand currency sign0.83) categories based on their relation to the cohort median. Primary endpoints were mortality and morbidity (as a combined endpoint for PTOS-defined complications). Univariate logistic regression was used to test the association between patient factors and mortality. Factors found to be associated with mortality at  $p < 0.1$  were entered into a multivariable model.

A total of 180 patients met the study criteria. Median age was 74 years (IQR 63-82), median ISS was 24 (IQR 18-29). Patients were 58 % male and 66 % Caucasian. Mean PLVI was 0.86 (SD 0.25) and was higher in male patients than female patients (0.91 +/- A 0.26 vs. 0.77 +/- A 0.21,  $p < 0.001$ ). PLVI was not associated with mortality in univariate or multivariable modeling. After controlling for comorbidities, ISS, and admission SBP, low PLVI was found to be strongly associated with morbidity (OR 4.91, 95 % CI 2.28-10.60).

Psoas:lumbar vertebral index is independently and negatively associated with posttraumatic morbidity but not mortality in elderly, severely injured trauma patients. PLVI can be calculated quickly and easily and may help identify patients at increased risk of complications.

### **Keywords**

trauma - elderly - sarcopenia - outcomes - preexisting conditions - older-adults - frailty - mortality

## Ultrasound diagnosis of supracondylar fractures in children.

Eckert K, Janssen N, Ackermann O, Schweiger B, Radloff E, Liedgens P. Eur J Trauma Emerg S. 2014;40(2):159-168.

10.1007/s00068-013-0306-2

### **Purpose**

The objective of our study was to evaluate the safety and accuracy of ultrasound (US) compared to standard radiographs in diagnosing supracondylar fractures (SCFs) of the humerus in children.

### **Patients and methods**

A total of 106 children (aged between 1 and 13 years) with clinically suspected SCF of the humerus were primarily examined by US followed by standard two-plane radiographs of the elbow. US was conducted with a linear scanner viewing the distal humerus from seven standardized sectional planes. US fracture diagnosis was established either by a cortical bulging or cortical gap, or by a positive dorsal fat pad (dFP) sign. X-ray diagnosis was stated by an independent pediatric radiologist and, afterwards, compared to our US findings. Sonographic and radiographic findings were collected in a contingency table. The sensitivity, specificity, negative predictive value (NPV), and positive predictive value (PPV) for US fracture diagnosis were calculated according to the radiographs. In addition, by identifying significant angulation and/or disruption, SCFs were classified as non-operative/stable and operative/unstable SCFs according to the AO Pediatric Fracture Classification System.

### **Results**

By US, a SCF could be excluded in 43 patients and in 63 patients, a fracture was diagnosed. In contrast, by radiographs, a SCF could be excluded in 46 patients and in 60 patients, a fracture was diagnosed. For US fracture diagnosis in comparison to radiographs, we calculated a sensitivity of 100 %, a specificity of 93.5 %, an NPV of 100 %, and a PPV of 95.2 %. Thirty-nine SCFs were sonographically classified as stable grades 1/2 SCFs and confirmed in 37 patients by X-rays. All four operative/unstable SCFs were correctly identified by US.

### **Conclusion**

By identifying a positive dFP sign and/or cortical lesions of the distal humerus, SCFs can be detected very sensitively by US. Even the estimation of fracture displacement seems to be possible. We suggest US as an applicable alternative method in the primary evaluation of suspected SCF in children, guiding further diagnostics, where appropriate. After minor injuries, if clinical assessment for an elbow fracture is low and US examination is negative for fracture, additional radiographs are dispensable. Thereby, the amount of X-ray burden during childhood can be reduced, without loss of diagnostic safety.

**Keywords**

ultrasound - supracondylar fracture - humerus - elbow - children - distal forearm fractures - standard-x-rays - sonographic diagnosis - bedside ultrasound - elbow joint - ultrasonography - radiation - trauma - humerus - infants

## Crossover external fixator for acetabular fractures: a cadaver study.

Frank M, Dzupa V, Smejkal K, Baca V, Dedek T.

Eur J Trauma Emerg S. 2014;40(5):601-606.  
10.1007/s00068-013-0362-7

### **Background**

Dislocated acetabular fractures in polytraumatized patients are very challenging cases to deal with. Temporary stabilization by skeletal traction is difficult in these patients. A more effective solution can be an external fixation.

### **Objective**

The authors designed a new crossover external fixation frame for acetabular fracture. The aim of this study is the biomechanical testing of this frame on human cadavers.

*Methods* This study is an experiment on ten human cadavers. The acetabular fracture C2.2 was created. The stabilization effect of external fixation was compared with stabilization by large distractor. Femoral heads' shifts caused by standardized manipulation with the cadaver were obtained from X-ray pictures.

### **Results**

The mean total shift in stabilization technique by external fixation was 2.56 (1-4) mm. In stabilization by large distractor, the mean of the total shift after cadaver manipulation was 5.11 (0-10) mm. No significant differences were found between stabilization by external fixation and by large distractor ( $p = 0.066$ ).

### **Conclusions**

The stabilization of acetabular fracture C2.2 by a crossover external fixator is as effective as large distractor. The crossover external fixation could be a suitable solution for the temporary stabilization of acetabular fractures in polytraumatized patients. Subsequent studies including clinical trials are necessary to confirm the authors' suggestion.

### **Keywords**

external fixation - acetabular fracture - polytrauma - cadaver - trauma



## Clinical and functional outcomes of internal fixation with intertrochanteric antegrade nail in older patients with proximal extracapsular femoral fractures.

Galli M, Ciriello V, Bocchino L, Gangemi N M, Peruzzi M, Marzetti E.

Eur J Trauma Emerg S. 2014;40(4):495-500.  
10.1007/s00068-013-0343-x

The intertrochanteric Trigen Intertan(A (R)) nail (Smith & Nephew, Memphis, TN) is a popular fixation device for proximal extracapsular femoral fractures (PEFFs). We evaluated clinical and functional outcomes in patients with PEFFs treated with Trigen Intertan(A (R)) nail.

In a single-site, prospective observational study, clinical and functional parameters were recorded for all patients admitted to the Emergency Department with PEFFs from June 2008 through June 2011. Patients with severe cognitive impairment, severe disability, neoplastic pathological fractures, or suffering from terminal illnesses were not eligible for the study. Fractures were classified according to the AO/OTA classification system. Preoperative physical fitness was assessed via the American Association of Anaesthetists (ASA) score. The Barthel index was used to quantify the level of physical function before fracture and at follow-up.

One-hundred thirty-five patients with PEFFs were eligible for inclusion during the 3-year survey (mean age 83.2 +/- A 9.5 years; 82 % females). Fracture type distribution was as follows: A1.1 = 18 %, A1.2 = 7 %, A1.3 = 5 %, A2.1 = 44 %, A2.2 = 21 %, A2.3 = 5 %. All patients were treated with Trigen Intertan(A (R)) nail. Two patients experienced a fracture of the femoral shaft during the insertion of a long nail for an A2.3 fracture. Weight-bearing was allowed between the third and tenth postoperative day depending on pain tolerance and general conditions. No loss of reduction, collapse of the femoral neck, nonunion or fixation failure were observed. Two patients died within 10 days postoperatively, and nine within 6 months after surgery. Functional status 1 month after surgery was lower than pre-fractural levels, and improved over follow-up. At 6 months, functional status was comparable to the pre-fractural level.

Trigen Intertan(A (R)) produces highly satisfactory clinical and functional results in older patients with PEFFs. Complete functional recovery is obtained on average 6 months after surgery.

### Keywords

elderly - hip fracture - pertrochanteric fracture - proximal femoral nail - osteosynthesis - surgical treatment - compression hip screw - gamma-nail - femur - osteosynthesis

## Lower extremity fractures in falls.

Hadjizacharia P, Joseph B, Aziz H, Pandit V, Chan L S, Demetriades D, Rhee P.

Eur J Trauma Emerg S. 2014;40(3):331-336.

10.1007/s00068-013-0358-3

Lower extremity fractures are very common in victims of falls. These fractures are usually associated with other bodily injuries and can lead to permanent disability if appropriate management is not provided. The aim of this study was to evaluate the incidence and outcomes of associated injuries in victims of falls with lower extremity fractures.

This is a retrospective review (1995-2006) of all fall-related trauma patients evaluated at our Level I trauma center. Injuries were categorized as: isolated femur fractures (FF), isolated tibia fractures (TF), and both femur and tibia fractures (FTF). Data were analyzed for differences in patterns of injury, associated fractures and injuries, and mortality and morbidity according to age groups within patients with minor body injuries expressed by Abbreviated Injury Score (AIS) < 3.

Three hundred and thirty-two patients (64.8 %) had FF, 164 patients (32 %) had TF, and 16 patients (3.2 %) presented with FTF. The incidence of severe trauma was 9.4 % (Injury Severity Score, ISS > 25). A higher incidence of ISS > 25 was observed in patients with FF. Increased mortality was observed in the elderly group, especially in patients with an isolated femur fracture.

Patients with a combination of femur and tibia fractures have a significantly higher risk of associated injuries compared to patients with either a femur or a tibia fracture. Elderly patients (a parts per thousand yen65 years of age) have higher morbidity and mortality compared to younger patients after falls. Clinicians evaluating these patients should be aware of these injury patterns. Further studies assessing the impact of age and pattern of injury in patients following falls are warranted.

### **Keywords**

extremity fractures - falls - injury severity - pelvic fractures - injuries - epidemiology - outcomes - trauma - age

## **Acute compartment syndrome.**

Hildebrand F, Pape H C.

Eur J Trauma Emerg S. 2014;40(5):519-520.  
10.1007/s00068-014-0434-3

## More adverse events than expected in the outcome after use of the reamer-irrigator-aspirator.

Jakma T S C, Roling M A, Punt B, Reynders-Frederix P.

Eur J Trauma Emerg S. 2014;40(3):337-341.

10.1007/s00068-013-0345-8

The reamer-irrigator-aspirator (RIA) system is described as having high success rates and only few complications. The RIA was originally designed to ream the intramedullary canal in a single step prior to the placement of an intramedullary nail for femur fixation. Its purpose was to collect and evacuate marrow contents during reaming to prevent embolism into the systemic circulation. Marrow evacuation is also used to stimulate healing in nonunion fractures, segmental bone defects, and osteomyelitis. Despite the described success rates, we experienced severe adverse events. Our aim was to describe these events and point out possible complications.

A retrospective study of all consecutive patients treated for nonunion fractures, bone defects, or osteomyelitis from October 2007 to March 2010. All patients were treated with the RIA system. We analyzed demographic characteristics, consolidation on X-rays, time from injury to healing, complications, and postoperative pain caused by the reaming procedure.

We included 32 patients (21 males) with an average follow-up of 277 days. Successful healing was achieved in 66 % of all patients, and 18 % suffered from postoperative pain. A complication due to the use of the RIA system was registered in 31 % of the patients. Recorded complications were bone defects, signs of lung embolism, a myocardial infarction, and fissure fractures.

The RIA system has benefits in the treatment of nonunion and osteomyelitis defect, but is not without risk. Meticulous surgical technique is mandatory and peroperative constant monitoring of patients and the assembled device is mandatory.

### Keywords

ria - reamer-irrigator-aspirator - complication - adverse event - bone-graft - case series - ria - system - osteomyelitis

## The pediatric vs. the adolescent elbow. Some insight into age-specific treatment.

Kraus R.

Eur J Trauma Emerg S. 2014;40(1):15-22.

10.1007/s00068-013-0342-y

Almost 20 % of all long bone fractures in childhood and adolescents involve the elbow region. Physicians dealing with pediatric trauma cases on a regular basis must be familiar with the specific radiologic features of the elbow at every developmental stage. This includes the shape and the appearance of elbow ossification centers, and knowledge of age-specific injury patterns. In young children, lateral condyle and supracondylar fractures of the distal humerus are most common. Radial neck fractures, Monteggia's lesion and olecranon fractures appear in every age during growth. Bicondylar fractures of the distal humerus, capitellar fractures and radial head fractures almost solely occur after the tenth year. Treatment options depend on fracture type, age and demands and vary from immobilization to closed reduction and open reduction including internal fixation with different types of materials. Special circumstances to influence the treatment regimen in every single injury entity are discussed. Additionally, the most common malformations and nontraumatic diseases of the elbow region are mentioned.

### **Keywords**

elbow - fracture - injury - children - adolescents - radial head dislocation - neck fractures - children - osteosynthesis - reduction - injuries - fixation

## Posterior fixation of type IV humeral capitellum fractures with fully threaded screws in adolescents.

Kurtulmus T, Saglam N, Saka G, Avci C C, Kucukdurmaz F, Akpinar F.

Eur J Trauma Emerg S. 2014;40(3):379-385.

10.1007/s00068-013-0332-0

Humeral capitellum fractures comprise approximately 1% of all elbow fractures. In this study, we examined the clinical, radiographic, and functional outcomes following operative stabilization of Bryan and Morrey type IV fractures of the capitellum in adolescents. We applied headless cannulated screws in a posteroanterior direction without damaging the articular cartilage surface of the fractures.

Eight adolescent patients (six male, two female) with a mean age of 15 +/- A 2.1 years (range 13-18 years) were treated for type IV (McKee) humerus capitellum fractures. In the preoperative radiological evaluation, anteroposterior and lateral radiographs and computed tomography (CT) images were performed. A lateral surgical approach was used, and cannulated fully threaded headless screws were applied in a posteroanterior direction as fixation materials in the fracture reduction. The Mayo Elbow Performance Score was used in the evaluation of elbow joint functions.

Patients were followed up for a mean of 24.6 months. Fracture union was achieved at a mean of 5 +/- A 0.92 weeks (range 4-6 weeks). The mean elbow extension flexion arc was 135A degrees A A +/- A 13.47A degrees (range 110A degrees-150A(0)) and the mean pronation supination arc was 156A degrees A A +/- A 4.43A degrees (150A degrees-160A degrees). In one patient, there was nonconformity in the humerus trochlea and in another patient, there was keloid formation on the surgical scar. All patients attained excellent results according to the Mayo Elbow Performance Score.

In the treatment of type IV capitellum fractures in adolescents, open reduction with a lateral surgical approach and fixation using posteroanterior directed, cannulated, fully threaded, headless screws is a reliable method to achieve a pain-free functional elbow joint.

### Keywords

capitellum - coronal shear fracture - internal fixation - screw placement - coronal shear fractures - internal-fixation - open reduction - distal humerus - articular fractures - management - trochlea - end

## Epidemiology of pertrochanteric fractures: our institutional experience.

Lamb J N, Panteli M, Pneumaticos S G, Giannoudis P V.

Eur J Trauma Emerg S. 2014;40(3):225-232.  
10.1007/s00068-014-0375-x

Hip fractures, a common manifestation of fragility fractures, represent a major cause of morbidity and mortality in the elderly population and may have devastating consequences to the patient, their family, and society thereafter. We attempted to define the epidemiology of pertrochanteric fractures treated at a large university teaching hospital in the UK and compared our findings with the national and international literature.

Between April 2008 and March 2013, we conducted a retrospective cohort study at our institution. All adult patients sustaining a proximal femoral fracture were included in our study. The following parameters were collected and evaluated: (1) demographics, (2) fracture pattern, (3) American Society of Anaesthesiologists (ASA) grade, (4) type of pre-injury mobilization, and (5) method of stabilization. Our findings were then compared to the national data as published in the National Hip Fracture Database (NHFD).

Over a period of 5 years, 3,036 proximal femoral fractures were managed at our institution, with 916 (30.2 %) being classified as pertrochanteric fractures (250 male; mean age 82.0, SD 11.2). No significant change in the incidence of pertrochanteric fractures was evident during the same period. Between 2012 and 2013, 51,705 proximal femoral fractures were recorded in England, of which 19,569 (37.8 %) were classified as pertrochanteric fractures. Comparison between pertrochanteric and intracapsular fractures with respect to their demographics did not reveal any significant difference. In female patients, the relative incidence of pertrochanteric fractures was shown to increase with age. However, this was not the case in the male population.

The incidence of pertrochanteric fractures remained unchanged over the last 5 years. The relative incidence of pertrochanteric fractures is higher in elderly females; this may be explained by reduced bone mineral density and reduced trochanteric bone strength. Rigorous preventive treatments of osteoporosis should be considered in high-risk patients, along with improved safety measures to reduce falls.

### Keywords

hip fracture - pertrochanteric - intertrochanteric - epidemiology - incidence - trochanteric hip-fractures - femoral-neck - intertrochanteric fractures - mortality - fixation - femur - age - metaanalysis - predictors - patterns

## Current issues with lower extremity amputations in a country at war: experience from the National Military Hospital of Kabul.

Mathieu L, Marty A, Ramaki A, Najib A, Ahmadzai W, Fugazzotto D J, Rigal S, Shirzai N.

Eur J Trauma Emerg S. 2014;40(3):387-393.

10.1007/s00068-013-0334-y

Management practices associated with war-related amputations in countries at war may be different from the recommendations of occidental Health Force Services due to the high numbers of wounded persons to treat in precarious conditions. This observational retrospective study documents the current management of local lower extremity amputees in Afghanistan. Surgical practices, with or without delayed primary closure (DPC), and prosthetic rehabilitation issues are analyzed.

This retrospective study was conducted in the National Military Hospital (NMH) of Kabul from May 2011 to November 2011. Fifty-four Afghan patients who underwent a lower extremity combat-related amputation were included. Ten of them sustained a bilateral amputation.

Injuries were caused by improvised explosive devices (IEDs) or mines in 48 cases, bullets in three cases, and exploding shell fragments in three cases. Of the 64 amputations studied, 46 were open length preserving amputations and primary closure (PC) was applied in 18 cases. Patients were reviewed with a mean follow-up of 5.4 months (range 1-28 months). In the DPC group, secondary closure was performed with a mean time of 18.7 days (range 4-45 days) from injury. The proportion of infectious complications seemed to be higher in the PC group (5/18) than in the DPC group (3/46), but it was only a statistical trend ( $p = 0.1$ ). Forty-three patients were not prosthetic fitted at the last follow-up.

This study supports the surgical strategy of a two-stage procedure for lower limb amputations in countries at war, but underlines the problems of late secondary closure and prosthetic fitting related to decreased sanitary conditions.

### Keywords

amputation - lower extremity - combat - countries at war - afghanistan - infection - injuries - lessons - trauma - iraq



## The diagnosis of acute compartment syndrome: a review.

McQueen M M, Duckworth A D.

Eur J Trauma Emerg S. 2014;40(5):521-528.  
10.1007/s00068-014-0414-7

Delay in the diagnosis of acute compartment syndrome (ACS) has serious and sometimes catastrophic consequences for the outcome of injury, and has been recognised as one of the primary causes of a poor outcome. This article reviews the evidence for the use of clinical findings and intra-compartmental pressure (ICP) monitoring in making a prompt diagnosis of ACS. Clinical findings have poor sensitivities (13-64 %) compared to ICP monitoring (94 %) using a differential pressure threshold of less than 30 mmHg for more than 2 h. The specificities of clinical findings range from 63 to 98 % compared to a value of 98 % for ICP monitoring. Patients at risk of ACS or at risk of a delayed diagnosis are defined, and it is recommended that these patients undergo ICP monitoring. It is recommended that decompression is carried out primarily on the basis of the differential pressure being less than 30 mmHg for more than 2 h as this results in a reduced time to definitive treatment when compared to waiting for the development of clinical symptoms and signs.

### Keywords

acute compartment syndrome - diagnosis - compartmental pressure monitoring - threshold for decompression - risk factors - tibial diaphyseal fractures - near-infrared spectroscopy - intracompartmental pressure - intramuscular pressure - tissue pressure - slit catheter - wick catheter - lower-limb - leg - children

## Mortality after proximal femur fracture with a delay of surgery of more than 48 h.

Muhm M, Klein D, Weiss C, Ruffing T, Winkler H.

Eur J Trauma Emerg S. 2014;40(2):201-212.  
10.1007/s00068-013-0368-1

### **Purpose**

For hip fractures, guidelines require surgery as soon as possible, but not later than 48 h. Some authors observed a positive and some a negative effect of early operation on mortality rate. The aim was to evaluate the mortality rate of patients with a delay of surgery[48 h after admission, as well as influencing factors and reasons for delay.

### **Methods**

One hundred and thirty-six patients with hip fractures (>65a) from 2007 to 2011 were included. Comorbidities, the American Society of Anaesthesiologists (ASA) classification, time of admission and surgery, and mortality were recorded up to 12 months. Reasons for delay were divided into administrative-related or patient-related. The following time intervals were observed: 48.01-72 h (2-3 days), 72.01-120 h (3-5 days), 120.01-168 h (5-7 days), 168 h (>7 days).

### **Results**

94.9 % of the reasons for delay were patient-related. The mean survival times of the first three intervals were almost the same (9.5-9.9 months) ( $p = 0.75$ ). The last group had a significantly shorter survival time (7.8 months). Summarizing the first three groups, a significant shorter ( $p = 0.03$ ) survival time and significantly higher ( $p = 0.04$ ) 12-month mortality rate in patients with a delay >7 days was observed. The probability of death was primarily dependent on the ASA classification ( $p < 0.0001$ ) and secondarily on the patient's age at the time of injury ( $p = 0.005$ ).

### **Conclusions**

In hip fractures, reasons for a delay >48 h are mainly patient-related. A delay up to 7 days did not influence survival time and mortality negatively. The higher the value of the ASA classification and the older the patient was at the time of injury, the higher the mortality rate and the shorter the survival time.

### **Keywords**

femur fracture - hip fractures - delay of surgery - survival time - femoral-neck fractures - time-to-surgery - hip fracture - elderly-patients - surgical delay - operative delay - functional recovery - complications - fixation - impact

## Extramedullary fixation of trochanteric hip fracture.

Parker M J.

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10.1007/s00068-013-0365-4

Extramedullary fixation with a sliding hip screw remains the treatment of choice for the majority of trochanteric hip fractures. Attention to surgical detail is far more important than the actual choice of implant. The fracture must be reduced to an anatomical or slight valgus position using the fracture table. Surgical exposure need not be excessive as most fractures can be reduced by closed means. The position of the lag screw is critical to achieve a central to inferior position on the anterior-posterior radiograph and a central position on the lateral view. A four-hole plate should suffice for most fractures. After surgery, weight bearing as able should be allowed. For fractures fixed correctly, wound or fracture healing complication should be rare, occurring in < 5 % of cases.

### **Keywords**

hip fracture - extramedullary fixation - sliding hip screw - compression - failure - screw - femur - neck

## Intramedullary nailing in pertrochanteric fractures of the proximal femur.

Ponce S J, Laird M P, Waddell J P.

Eur J Trauma Emerg S. 2014;40(3):241-247.

10.1007/s00068-013-0371-6

Petrochanteric fractures of the proximal femur should be treated surgically, unless the medical condition of the patient does not allow it. Currently, there are two ways to fix these fractures; either with a sliding hip screw or with an intramedullary nail. However, there is much debate over which implant is the best for pertrochanteric fracture fixation. The sliding hip screw has been used over time with good clinical results. While it was true that with first generation intramedullary nails the risk of complications was higher, there is evidence supporting the superiority of intramedullary nails in these fractures when compared with sliding hip screws. This evidence is based on the good clinical results and fewer complications, due to an improvement in the design of the implants and surgical technique used by surgeons. In stable fractures, despite the method chosen for fixation, obtaining a good reduction prior to placing the implant is the most important factor that can be controlled by the surgeon. In stable fractures the surgeon experience is a strong factor to account for when choosing the type of implant. Clearly there are fracture patterns (reverse oblique and subtrochanteric extension) that benefit from the use of intramedullary devices due to the high risk of failure if plates are used. It is very important that the surgeon identifies these fractures, so the type of fixation device which is chosen achieves the greatest stability possible. The aim of this paper is not to convince the surgeon about using intramedullary nails, but highlight the potential benefits intramedullary nailing has when compared with the use of extramedullary devices.

### **Keywords**

pertrochanteric fractures - intramedullary nail - intramedullary device - sliding hip screw - compression hip-screw - intertrochanteric fractures - femoral nail - gamma-nail - cement augmentation - metaanalysis - design - long

## Distal femoral replacement for selective periprosthetic fractures above a total knee arthroplasty.

Rao B, Kamal T, Vafe J, Moss M.

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10.1007/s00068-013-0347-6

### **Background and aim**

The management of distal femur periprosthetic fractures in the elderly remains a challenge. The aim of this study was to evaluate the results of distal segmental femur replacement as an alternative to fixation in complex distal femoral periprosthetic fractures in elderly patients.

### **Methods**

Twelve patients were included in this prospective study, with a mean age of 78 years (range 68-90 years); incidentally, all were female. Fractures of the distal femur were classified as per Kim et al.'s classification (Clin Orthop Relat Res 446: 167-175, 2006); our series included eight patients with type III and four patients with type II periprosthetic fractures. All 12 patients were treated with segmental distal femur replacement (Zimmer Inc., Warsaw, IN, USA). Nine patients required 90 cm and three patients required 130 cm of distal femur segment with a rotating hinge knee prosthesis.

### **Results**

The mean follow up period was 20 months (range 15-28 months), with no major surgical complications reported. The mean duration of hospital stay following surgery was 12 days (range 7-36 days). All patients were mobilising full weight-bearing by day 3. All patients returned to their prior living arrangements. Ten patients returned to their original domicile, with one patient being discharged to a care home requiring minimal ambulatory assistance. The remaining two patients returned to their care homes.

### **Conclusions**

WOMAC scores improved from the pre-injury state with a mean of 49.62 to 72.54 post-surgery (p-value of 0.0001). The Knee Society scores, possible only following surgery, had a mean value of 72. The mean VAS pain score was 1.75 (0 = no pain to 10 = worst pain ever felt). The average range of knee flexion was from 4 degrees to 89 degrees (range -5 degrees to 110 degrees). The mean SF-36 physical functioning score was 45.64 [range 40.70-48.90; standard deviation (SD) - 2.62] and the mean SF-36 mental functioning score was 52.94 (range 45.8-57.70; SD -3.38).

### **Keywords**

periprosthetic fracture of distal femur - distal femoral replacement - rotating hinge knee arthroplasty - invasive stabilization system - femur fractures - supracondylar fracture - elderly-patients - internal-fixation - management - liss

## Pertrochanteric fractures: tips and tricks in nail osteosynthesis.

Ruecker A H, Rueger J M.

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10.1007/s00068-013-0366-3

Intramedullary fixation of intertrochanteric fractures has become the standard method of fixation especially in unstable fracture types. Even though there have been developments on implant design and technology, the surgical technique of reduction and implant positioning remains the mandatory factor in treating these fractures successfully. The advantages of nailing in the mainly elderly patients sustaining intertrochanteric femur fractures are a short lever arm and a lateral support in the trochanter supplied by the nail. The disadvantages are that it is often harder to achieve a closed reduction of a displaced fracture and to maintain the reduction with the intramedullary implant.

To obtain and maintain anatomic reduction and a secure fracture fixation, the surgical approach and fixation technique is of great importance. It starts with correct patient positioning, fracture reduction (accounting for varus dislocation and dislocation of flexed fragments), choosing the correct nail entry point and perfect lag screw positioning within the head-neck fragment and distal locking. To maintain the reduction achieved intraoperatively, the decision has to be made to use a cerclage wiring or to tolerate fracture gaps in the metaphyseal area. Intraoperative controlled compression of the neck or the subtrochanteric area is of great importance to reduce delayed unions or nonunions.

Intramedullary fixation of unstable per-, inter- or subtrochanteric fractures shows biomechanical advantages compared to extramedullary fixation techniques. Even though there have been several amendments and developments of implants, a better implant does not compensate for an inadequate surgical approach or deficient surgical techniques which are paramount for successful treatment. When fixing fractures with intramedullary nailing systems, the surgeon should always try to achieve anatomic reduction and a perfect implant positioning to allow immediate full weight bearing without an increased risk of cut-out, non-union and implant failure.

### **Keywords**

intertrochanteric - fracture - femur - fixation - dynamic hip screw - long gamma-nail - femoral fractures - proximal femur - fixation - plate - device

## **Focus on pertrochanteric fractures.**

Rueger J M.

Eur J Trauma Emerg S. 2014;40(3):223-224.  
10.1007/s00068-014-0415-6

## Triplane fractures: do we need cross-sectional imaging?

Schneidmueller D, Sander A L, Wertebroek M, Wutzler S, Kraus R, Marzi I, Laurer H.

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10.1007/s00068-013-0338-7

Diagnosis of Triplane fractures remains difficult in common practice. Aim of the study was the evaluation of the fracture pattern and the benefit of cross-sectional imaging in classification of Triplane-fractures.

A total of 27 pediatric patients treated for ankle fractures were identified from patient charts. Radiographic images of epiphyseal fractures (X-rays and additional cross-sectional imaging) were blinded evaluated by 13 observers to answer a specific questionnaire regarding type or fracture and treatment suggestion.

There were seven Triplane-I and eight Triplane-II fractures. The other physeal ankle fracture group consisted of four patients with a Twoplanefracture, five Salter-and-Harris (SH) II, one SH-III, and two SH-IV fracture. Accuracy of classification improved considerably depending on the experience of the observer in pediatric trauma care. Surgeons specialized in pediatric trauma care classified correctly with conventional X-rays in 48.1 % of all cases presented versus 31.5 % appropriate diagnosis by younger fellows. Accuracy in exact specification of Triplane-fractures was comparable lesser in younger fellows (31.1 vs. 22 %). Cross-sectional imaging improved classification of all fractures in both groups (75.6 % specialized vs. 47.3 % non specialized). Whereas availability of cross-sectional imaging improved treatment recommendation in specialized surgeons this benefit was not detectable for the doctors without specialization. Evaluation of fracture pattern showed a relatively stereotypical fracture pattern in Triplane-II fractures, whereas Triplane-I fractures were more variable.

The additional information of cross-sectional imaging seems helpful for any physician in finding the right classification of a pediatric ankle fracture. However, the additive information appears especially viable for experienced surgeons to suggest the appropriate treatment.

### Keywords

triplane - transitional fracture - pre-operative imaging - distal tibia fracture - ankle joint - physeal fracture - distal tibial epiphysis - term follow-up - ankle fractures - growth-plate - children - ct - classification - injuries - physeal - shaft



## Contrast enhanced ultrasound (CEUS) reliably detects critical perfusion changes in compartmental muscle: a model in healthy volunteers.

Sellei R M, Waehling A, Weber C D, Jeromin S, Zimmermann F, McCann P A, Hildebrand F, Pape H C.

Eur J Trauma Emerg S. 2014;40(5):535-539.  
10.1007/s00068-014-0443-2

### **Purpose**

The purpose of this study was to assess the utility of contrast enhanced ultrasound (CEUS) in the differentiation between physiological and simulated pathophysiological lower limb muscle perfusion pressures in healthy volunteers.

### **Methods**

The lower limb muscle perfusion pressures in eight healthy volunteers were assessed in the supine position (as a control) and then subsequently in an elevated position with a thigh tourniquet applied to induce venous stasis. An intravenous bolus injection of 2.5 ml contrast agent was given to create a perfusion signal, which was measured with a multiple-frequency probe. Semiquantitative analysis was performed using specific software to create a perfusion curve which allowed measurement of six parameters: the time to arrival (TTA) starting from bolus application (s); peak of signal intensity (%); time to peak (TTP) maximum (seconds); regional blood volume (RBV), regional blood flow (RBF), and mean transit time (MTT) in seconds. Statistical analysis was performed using the Mann-Whitney U test as a non-parametric test (IBM SPSS statistics, version 21, USA).

### **Results**

The group of simulated hypoperfusion showed significant higher values for TTA (39.8 +/- 5.1 s) ( $p = 0.028$ ), TTP (43.8 +/- 13.6 s) ( $p = 0.003$ ), RBV (8,424 +/- 5,405) ( $p = 0.028$ ), and MTT (262 +/- 90.6 s) ( $p = 0.005$ ). In contrast, the parameter of regional blood flow (32.1 +/- 10.9) was significantly lower ( $p = 0.038$ ). The peak signal intensity (25.8 +/- 8.2 %) was lower, but this was not significant ( $p = 0.083$ ).

### **Conclusions**

CEUS provides a reliable non-invasive imaging modality for the assessment of lower limb muscle perfusion pressures. This may be of clinical use in the assessment of a developing compartment syndrome. Further clinical studies are required to further define its accuracy and reproducibility.

### **Keywords**

compartment syndrome - ceus - tic - time to peak - regional blood flow - lower leg - pressure - fractures - time - trauma - foot

## Elastic stable intramedullary nailing (ESIN) in the adolescent patient- perils, pearls, and pitfalls.

Sommerfeldt D W, Schmittenbecher P P.

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10.1007/s00068-013-0330-2

Elastic stable intramedullary nailing (ESIN) has become the treatment of choice for diaphyseal long-bone fractures in children. This paper reviews the complications and limitations of this method which can occur when applying this osteosynthesis to patients within the adolescent age group.

Each topographic site where ESIN is used was analyzed individually and systematically. Technical errors, indicational problems, and mistakes during the rehabilitation process are pointed out and recommendations are given on how to avoid failure.

ESIN can be safe and efficacious within certain limits also in the adolescent age group. Whenever errors and mistakes occur in combination, e.g., applying ESIN to a patient with a multi-fragmented fracture and a high body mass index (BMI), the adolescent age group is less forgiving to indicational "stretching" than the pediatric age group.

The best prophylaxis for failure of ESIN is a stable and symmetric construct with correctly sized implants. This holds even more true for the adolescent patient. Using ESIN in difficult situations such as longitudinally unstable fractures, patients with a body weight > 50 kg, or away from the diaphysis should be considered and followed up carefully. If possible, these patients should be treated in specialized pediatric trauma centers.

### **Keywords**

pediatric trauma - adolescent - esin - long-bone fracture - treatment - osteosynthesis - radial neck fractures - shaft fractures - children - reduction - fixation

## **Focus on surgical care of the adolescent trauma patient.**

Sommerfeldt D W.

Eur J Trauma Emerg S. 2014;40(1):1-2.  
10.1007/s00068-013-0354-7

## Massive haemorrhage following minimally displaced pubic ramus fractures.

ten Broek R P G, Bezemer J, Timmer F A, Mollen R M H G, Boekhoudt F D.

Eur J Trauma Emerg S. 2014;40(3):323-330.

10.1007/s00068-013-0361-8

Fractures of the pubic rami are the most frequent osteoporotic pelvic fracture. Although generally innocuous, epidemiologic research demonstrated a decreased survival in patients with pubic rami fractures compared to healthy controls. Sporadic cases of potentially lethal bleedings have been reported. The aim of this study was to report a consecutive series and review of the literature of patients with severe bleeding following minimally displaced pubic ramus fractures. We report on four cases who presented at our emergency department in 2012 and 2013. A systematic review was performed to find other cases of pubic ramus fracture with severe bleeding from the literature.

Four elderly patients presented with severe bleeding following os pubis fracture after trivial falls from ground level. Successful arterial embolisation was performed in two cases. These patients were discharged in good clinical condition. Two other patients were refrained from further treatment due to a pre-existing poor prognosis. Twenty-two additional cases were found in the literature. Successful arterial embolisation was performed in 20 cases, of whom 17 survived.

Severe bleeding, mostly secondary to corona mortis avulsions, is a rare but potentially lethal complication of pubic ramus fractures. Physicians should be aware of this complication and actively look for symptoms of bleeding. Super-selective arterial embolisation seems safe and highly effective to control bleeding secondary to pubis rami fractures in elderly patients.

### Keywords

pubic bone - osteoporosis - fracture - haemorrhage - angiography - inferior epigastric artery - aberrant obturator artery - pelvic fracture - corona mortis - embolization - avulsion - branch

## Reamed versus unreamed nail in the treatment of tibia shaft fractures.

Trlica J, Koci J, Lochman P, Smejkal K, Frank M, Holecek T, Hasenohrlova L, Zahradnicek J, Folvarsky J, Zvak I, Dedek T.

Eur J Trauma Emerg S. 2014;40(4):489-493.  
10.1007/s00068-013-0340-0

The aim of the prospective randomized study was to compare the results of the treatment of tibia shaft fractures (TSF) by reamed or unreamed intramedullar nail.

There were 103 patients with 104 TSF enrolled in the study within the period from December 2005 to June 2010. Seven patients were excluded from the study. Factors of injury severity, course of surgery and hospitalization, and incidence of early and delayed complications were recorded. X-ray was performed every 4 weeks until the fracture was healed. Functional results were evaluated at least 1 year after the surgery. Closed fractures were classified according to Tscherne classification and the open ones according to Gustilo classification.

Forty-eight patients with 49 TSF were treated by unreamed tibial nail. There were 15 women and 33 men in this group. Injury severity score (ISS) ranged from 4 to 25 (o 6.63). There were 45 closed fractures (O 16; I 22; II 7) and four open fractures (I 2; II 1; IIIA 1). In the reamed nail group there were 48 TSF. ISS ranged from 4 to 18 (o 6.13). There were 35 closed (O 17; I 13; II 5) and 13 open (I 5; II 5; IIIA 3) fractures in this group. The time of operation was on average 15 min shorter in the unreamed nail group. X-ray healing was the same in both groups (18.12 versus 17.92 weeks). We had four patients in the unreamed nail group and six patients in the reamed nail group with delayed healing (28-44 weeks). We recorded no infection, loss of reduction or re-operation in both groups. Follow-up of functional results was 90 %.

There was no statistically significant difference in clinical and functional results between the groups. We suggest that both methods are comparable.

### Keywords

tibia shaft fracture - reamed nail - unreamed nail - follow-up - management - epidemiology - metaanalysis

## Posterior only versus combined posterior and anterior approaches in surgical management of lumbosacral tuberculosis with paraspinal abscess in adults.

Zeng H, Wang X, Pang X, Luo C, Zhang P, Peng W, Wu P, Xu Z.

Eur J Trauma Emerg S. 2014;40(5):607-616.  
10.1007/s00068-013-0367-2

### **Purpose**

To compare single-stage posterior transforaminal lumbar interbody fusion, debridement, posterior instrumentation, and postural drainage (posterior-only surgery) with a combined posterior-anterior surgical approach for treatment of adults with lumbosacral spinal tuberculosis (STB) with paraspinal abscess and to determine the clinical feasibility and effectiveness of posterioronly surgical treatment.

### **Methods**

Thirty-nine patients with lumbosacral STB and paraspinal abscess were treated with one of two surgical procedures in our center from September 2003 to December 2012. Nineteen patients were treated with posterioronly surgery (Group A) and 20 were treated with combined posterior-anterior surgery (Group B). Surgery duration, intraoperative blood loss, length of hospitalization, bony fusion rates, complication rates, neurological status, lumbosacral angle correction, and Kirkaldy-Willis functional outcomes of the two groups were compared.

### **Results**

The average follow-up period was 39.1 +/- 12.0 months for Group A and 40.7 +/- 12.4 months for Group B. Under the Frankel classification, all patients improved with treatment. STB was completely cured and grafted bones were fused within 5-11 months in all patients. There were no persistent or recurrent infections or obvious differences in radiological results between the groups. The lumbosacral angle was significantly corrected after surgical management, but loss of correction was seen in both groups. The average operative duration, blood loss, length of hospital stay, and postoperative complication rate of Group A were lower than those of Group B.

### **Conclusions**

Posterior-only surgery is feasible and effective, resulting in better clinical outcomes than combined posterior-anterior surgeries, especially in surgical time, blood loss, hospital stay, and complications.

### **Keywords**

lumbosacral spinal tuberculosis - posterioronly approach - transforaminal lumbar interbody fusion (tlif) - paraspinal abscess - postural drainage - thoracolumbar spinal tuberculosis -

transforaminal lumbar debridement - pedicle screw fixation - interbody fusion - radical debridement - instrumentation - bone - spondylodiscitis - surgery - lesions

## Primary prosthetic replacement in per- and intertrochanteric fractures.

Hoffmann M, Hartel M, Rueger J M, Lehmann W.

Eur J Trauma Emerg S. 2014;40(3):273-277.

10.1007/s00068-014-0412-9

Hip arthroplasty is rarely indicated in the treatment of per- and intertrochanteric femur fractures. Although the majority of fractures are amenable to closed- or open reduction and internal fixation (CRIF/ORIF), in some patients the complexity of the fracture or other patient-related factors may cause the orthopaedic surgeon to consider arthroplasty as the treatment of choice. Decision-making is challenging, and a reliable score has not yet been established.

Reviewing literature, several predictors of inferior outcome after CRIF/ORIF in per- and intertrochanteric fractures such as age, gender, poor bone quality, hip osteoarthritis, operation time and postoperative weight-bearing restrictions have been identified. Based on the literature review, a novel Hamburg Per- and Intertrochanteric Fracture Score (HPIFS) is proposed to support decision-making for per- and intertrochanteric fracture treatment.

CRIF/ORIF remain the workhorses in per- and intertrochanteric fracture management. Arthroplasty offers an advantageous treatment option for a well-defined patient and fracture collective. The HPIFS might support the decision-making process.

### Keywords

arthroplasty - pertrochanteric intertrochanteric fracture - score - treatment algorithm - dynamic hip screw - elderly-patients - pertrochanteric fractures - trochanteric fractures - internal-fixation - femoral fractures - gamma-nail - arthroplasty - mortality - femur



## Knee injuries in children and adolescents.

Hoetzel J, Preiss A, Heitmann M A, Frosch K H.

Eur J Trauma Emerg S. 2014;40(1):23-36.

10.1007/s00068-013-0339-6

As more children and adolescents are involved in sporting activities, the number of injuries to immature knees rises. We will focus on three entities: ruptures of the anterior cruciate ligament, patellar dislocation, and meniscal injuries. There is a trend in recent literature toward early reconstruction of the anterior cruciate ligament in children and adolescents. In this article, we will try to highlight the anatomic specialities and the diagnostic steps toward the correct diagnosis, review technical considerations and risks of the different surgical techniques, and present outcomes and offer a treatment recommendation. The treatment of patellar dislocation has changed considerably since we gained a better understanding of the unique anatomy of the patellofemoral joint. We will show diagnostic steps and risk factors for recurrent patellar dislocation, discuss conservative and different operative therapy options, and present a modified technique to achieve a dynamic reconstruction of the medial patellofemoral ligament without damage to the growth plates. Meniscal tears and discoid menisci are rare in comparison to the other injuries. We will herein explain what specialities in the anatomy should be considered in children and adolescents concerning the menisci, and present the diagnostic steps and treatment options available.

### Keywords

knee injury - anterior cruciate ligament - patella dislocation - meniscal rupture - anterior cruciate ligament - acute patellar dislocation - medial patellofemoral ligament - skeletally immature patients - discoid lateral meniscus - trochlear groove distance - 7-year follow-up - natural-history - young athlete - arthroscopic repair