

# EXPERT OPINION ON PUBLISHED ARTICLES

Reviewer: Dr Simon Sombili  
 Department of Orthopaedics  
 Steve Biko Academic Hospital  
 Pretoria  
 Tel: (012) 354-5032

## Chondrolysis, osteonecrosis and slip severity in patients with subsequent contralateral slipped capital femoral epiphysis

Yakup Yildirim, MD, Severino Bautista, MD and Richard S. Davidson, MD  
*J Bone and Joint Surgery Am* 2008 March;90-A:485-92

This is a very interesting article for the orthopaedic community at large, especially for registrars. It would seem that the days of the controversies surrounding the pinning of the contralateral normal hip in slipped capital femoral epiphysis are numbered.

The aim of the study was to identify the prevalence of chondrolysis, osteonecrosis and the degree of the slip in contralateral hips with subsequent slipped capital femoral epiphysis. The authors demonstrated that the complications associated with a subsequent contralateral slip were greater than the risk of prophylactic pinning of the normal hip.

In this retrospective study the incidence of a subsequent slip following pinning of the primary slip was 36%. Current literature reports a range of between 25% and 40%. The authors reviewed 227 patients operated between 1993 and 2003 at a single hospital. The average follow-up was 24 months or until skeletal maturity. A total of 82 patients had subsequent slips.

### Definitions

Four important definitions are reviewed in this article:

- Chondrolysis: Joint space = 3 mm or less
- Acute: Symptoms less than three weeks
- Chronic: Symptoms three weeks or more
- Acute on chronic: Exacerbation of symptoms of more than three weeks' duration.

The Southwick grading system was used to determine the degree of the slip. The younger the patient at the time of the slip, the greater the chances of a subsequent slip on the contralateral side as demonstrated by other authors such as Hagglund and Loder *et al.*

The incidence of major complications (osteonecrosis, chondrolysis) in the subsequent slipped capital femoral epiphysis was 23%. Kocher *et al* reported complication rates of 0.2% in contralateral hips that were pinned prophylactically and other authors reported no complications.

### Recommendations

The authors of this article therefore recommend pinning of the contralateral hip for the following reasons:

- Studies have shown a low turn-up rate for the close follow-up visits in the patients with contralateral hips that were not pinned prophylactically.
- Pinning of the normal contralateral hip is technically easy and can be done at the same time as the primary hip.
- Prophylactic pinning diminishes the need for repeated screening during the remaining growth period.
- Prophylactic pinning allows the patient to be more active without the constant fear of a sequential slip.
- Prophylactic pinning eliminates the risks associated with a second administration of anaesthesia.
- It makes salvage procedures such as proximal femoral osteotomies, total hip arthroplasty, lateral shelf osteotomy and hip arthrodesis unnecessary.

### Shortcomings of the study

- The authors of the study do not state clearly how many pins or screws were used in their pinning of the hips. They showed one X-ray of a subsequent contralaterally pinned slip that developed osteonecrosis of the femoral head. It is, however, clear that two screws were used to pin the hip but the authors do not discuss this case in more detail.
- It is a retrospective study.

### References

1. Hagglund G. The contralateral hip in slipped capital femoral epiphysis. *J Pediatr Orthop B* 1996;5:158-61.
2. Schultz WR, Weinstein JN, Weinstein SL, Smith BG. Prophylactic pinning of the contralateral hip in slipped capital femoral epiphysis: evaluation of the long-term outcome for the contralateral hip with use of decision analysis. *J Bone Surg Am* 2002;84:1305-14.

Reviewer: Dr E Werner Müller  
 Orthopaedic Surgeon  
 Moot General Hospital  
 Eugene Marais Hospital  
 Pretoria  
 Tel: (012) 330-8205

## Bony landmarks and topography of the femoral insertion of the anterior cruciate ligament: An anatomical study

M Ferretti, W Shen, FH Fu

In: *The Pittsburgh Orthopaedic Journal*.

Selected articles 2007

Most of us are familiar with popular landmarks used as a guide in the reconstruction of the anterior cruciate ligament. The o' clock position and Clancy's 'resident ridge' are a few common examples. These are often crude methods in an attempt to get a reliable and repeatable anatomical reconstruction of the anterior cruciate ligament. Fu and his co-workers in Pittsburgh, aimed with this study, to identify bony landmarks on the femoral insertion area that would contribute to our understanding of the insertion and thus assist us with a more reliable anatomical reconstruction of the anterior cruciate ligament. The secondary aim of their study was to quantitatively analyse the surface area of the femoral footprint. The latter information is particularly important in double bundle surgery. In other words the footprint surface area needs to be big enough to accommodate two tunnels for two bundles.

In the study they identified two specific bony landmarks:

- The 'lateral intercondylar ridge'. This is a bony ridge that runs through the entire anterior cruciate ligament femoral insertion site, from proximal to distal. It is not situated in the roof of the notch but more inferior in the flexed knee. The

entire anterior cruciate takes its origin posterior of this ridge.

- The 'lateral bifurcate ridge'. This is a bony ridge found between the femoral insertions of the posterolateral and anteromedial bundles of the anterior cruciate ligament. It runs from anterior to posterior in the anatomic knee.

The insertion areas of the entire anterior cruciate, antero-medial and posterolateral bundles were 196.8 mm<sup>2</sup>, 120 mm<sup>2</sup> and 76.8 mm<sup>2</sup> respectively.

Their recommendations are that a single bundle should be placed posterior to the 'lateral intercondylar ridge' and with a double bundle technique, the posterolateral bundle should be placed distally and the anteromedial bundle proximal to the 'lateral bifurcate ridge'.

In my opinion the article has the following valuable lessons:

- If one uses bony landmarks to guide your tunnel placement in anterior cruciate reconstructions, you can assure a more reliable and repeatable placement. It is obviously more accurate than relying on soft tissue or imaginary landmarks.
- The tibial and femoral tunnels should not be co-dependent on each other. Most surgeons still use a trans-tibial approach to place their femoral tunnels. The femoral insertion site described by Fu *et al* is difficult, if not impossible to reach through a trans-tibial approach. The implication is that a medial or an accessory medial portal is needed for an anatomic placement of the femoral tunnel.

In summary, I believe this is a good guide for an anatomic approach to anterior cruciate ligament reconstruction. Double bundle surgery might not be for everyone, but the minimum one should aim for is an anatomically reconstructed anterior cruciate ligament, be it single or double bundle.

Reviewer: Dr FF Birkholtz  
 Orthopaedic Surgeon  
 Unitas Hospital Suite 8C  
 Tel: (012) 644-2641

## Delayed internal fixation of femoral shaft fracture reduces mortality among patients with multisystem trauma

Saam Morshed, MD, MPH; Theodore Miclau III, MD; Oliver Bembom, PhD; Mitchell Cohen, MD; M Margaret Knudson, MD; and John M Colford Jr, MD, PhD

*J Bone Joint Surg Am* 2009;91:3-13

The management of long bone fractures in poly-trauma patients is not controversial. The timing of this management, however, is controversial and this has been the subject of numerous articles, editorials and conference papers in recent years.

Nobody would argue that definitive fracture fixation is beneficial to the polytrauma patient. Timing this fixation seems to be the key to good outcomes in these patients. It does seem that performing damage control orthopaedics in the more severely injured group of patients may decrease ARDS and increase survival rates. The reasons for this revolve around the pro-inflammatory nature of definitive long-bone fixation (nailing or plating) and the 'second hit' effect this has on the already compromised host.

This is a large observational study reported from California, where a large cohort of severely injured patients (ISS > 15) with concomitant femur fractures were studied and reported upon. More than 3 000 patients were included in the group. The group was divided into

sub-groups depending on the timing of the definitive fracture fixation. Mortality was compared across the subgroups and also compared across injury patterns and other confounding factors.

The result was clear: The patients who received definitive treatment for their femur fractures at a later stage (after 12 hours) had significantly **lower** mortality rates. This benefit was even more pronounced in the group of patients who had significant abdominal trauma.

The reason for this is probably that the severely injured patient is probably still poorly resuscitated or recovering physiologically from the shock state during the first 12 hours post-injury and is thus very vulnerable to the second hit phenomenon.

This study clearly supports the new trend toward damage control orthopaedics in the setting of long bone fractures in conjunction with severe other injuries (ISS > 15).

This is the largest series to date with mortality as the end-point and seems to be a very relevant article in this field.

Reviewer: Dr CH Snyckers  
 Consultant: Department of Orthopaedics  
 University of Pretoria

## Musculoskeletal manifestations of human immunodeficiency virus infection

Ayaz A Biviji, MD; Guy D Paiement, MD; Lynne S Steinbach, MD.

*Journal of the American Academy of Orthopaedic Surgeons* Sept/Oct 2002;10(5):312-9

**H**uman immunodeficiency virus infection is a reality that orthopaedic surgeons cannot ignore. An estimated 71% of patients with HIV infection will develop bone, joint or muscle involvement and can sometimes be the presenting complaint of the disease.

Certain infections and inflammatory conditions are rarely seen in the general population but are more prevalent in the HIV population. Musculoskeletal manifestations usually occur in the later stages of the infection but can occur in any phase. The literature is awash with new publications and it can sometimes be difficult and confusing to stay informed. This article attempts to give a short overview of the clinical musculoskeletal manifestations that patients with HIV can present with.

The article focuses on:

<b>Acute infection</b>	
<b>Myopathies</b>	
• Pyomyositis	
• Polymyositis	
• AZT myopathy	
<b>Skeletal infections</b>	
• TB osteomyelitis	
• Bacillary angiomatosis	
<b>Neoplastic conditions</b>	
• Non-Hodgkin's lymphoma	
• Kaposi's sarcoma	
<b>Inflammatory arthropathies</b>	
• Reiter's disease	
• Psoriatic arthritis	
• HIV-associated arthritis	
• Painful articular syndrome	
• Acute symmetric polyarthritidis	
• Hypertrophic osteoarthropathy	
<b>Osteonecrosis (AVN)</b>	
<b>Surgical outcome</b>	

It is well known that a patient in the acute infection phase is highly infective, although the HIV-Elisa and even the PCR can be negative. It can thus be imperative for the treating surgeon to recognise the symptoms of myalgia, artralgia and paraesthesia that manifest in the early disease, as these complaints may bring the patient to an orthopaedic surgeon. A low-grade fever and a maculopapular rash often accompany these symptoms.

Due to the possible inaccuracy of blood tests in the very early phase of infection post-exposure prophylaxis is still encouraged in all situations.

Pyomyositis, although more common in advanced disease, can often be the first presentation to the orthopaedic surgeon. The first stage is characterised by cramp-like pain and induration along a muscle group (75% in the quadriceps). A high level of suspicion is necessary as these can often be misdiagnosed as muscle strain or contusions. Left untreated this can develop into a fulminating abscess and septic shock. The mortality rate of pyomyositis ranges from 1%–20%. The erythrocyte sedimentation rate is raised but the creatine kinase (CK) is often normal. The MRI shows rim enhancement on T1 weighted images. Blood cultures are only positive in 5%, thus tissue sampling is essential. *Staphylococcus aureus* is responsible for 90% of cases, but any host of organisms can be isolated and swabs

should therefore include aerobic, anaerobic, fungal and TB cultures. The treatment is aggressive and early surgical drainage and intravenous antibiotics are essential.

Polymyositis and AZT myopathy both present with symmetrical proximal limb girdle weakness and elevated serum CK levels. The AZT myopathy is dose related and subsides once the AZT is discontinued. The polymyositis on the other hand is possibly due to a direct invasion of the muscle tissue by the virus. On MRI images rim enhancement is not seen and the diagnosis can be confirmed by muscle biopsy. The polymyositis can effectively be treated with anti-inflammatories.

The prevalence of tuberculosis is 500 times greater in the HIV-infected population.

Tuberculosis osteomyelitis develops from haematogenous seeding from a newly acquired or reactivated site. The thoracic and lumbar regions are the most common, followed by the hip and knee. The infection typically starts in the anterior portion of the vertebrae and spreads to the adjacent disc spaces and may spread underneath the longitudinal ligament. These patients can also present with a psoas abscess. In other bones the metaphyseal region is most commonly affected. Radiographs can show calcified cold abscesses. Treatment consists mainly of chemotherapy for periods of one year. Surgery is reserved for refractory cases, progressive neurological deficit or structural instability.

Bacillary angiomatosis is a unique multi-system infection caused mainly by *Bartonella henselae* acquired through cat scratches or bites and is seen exclusively in immunocompromised patients. These patients develop vascular proliferations of the skin (resembles Kaposi's sarcoma), CNS (aseptic meningitis), viscera (peliosis hepatitis) and lymph nodes (adenitis). Multi-organ involvement can be fatal. One-third of patients with bacillary angiomatosis have lytic osseous lesions. The organism can be identified with Warthin-Starry silver staining. The osseous lesions can effectively be treated with erythromycin. Therefore any HIV patient presenting with a lytic osseous lesion should undergo a biopsy and receive erythromycin.

Although Kaposi's sarcoma is the most common neoplasm in Aids, osseous involvement is rare. Non-Hodgkin's lymphoma is the second-most common tumour in HIV-infected individuals and tends to be more aggressive. The tumour predominantly affects the lower extremities and often presents with a pathological fracture. The radiographs usually show an osteolytic lesion with cortical destruction and a permeative pattern. MRI images classically show a low signal on T1 and a high signal on the T2 images. Treatment consists of biopsy, chemotherapy and radiation, with surgical debulking in selected cases.

Although certain rheumatic conditions (rheumatoid arthritis, systemic lupus erythematosus) tends to improve with HIV infection due to immune modulation, there are certain specific inflammatory arthropathies known to be prevalent and often more aggressive in HIV patients. Reiter's disease is 100–200 times more prevalent and typically has oligoarticular involvement of the large joints of the lower limb.

The enthesopathies (Achilles tendon, plantar fascia, rotator cuff, etc) are very common and can lead to an 'Aids foot' with painful heels. Inflammatory markers are often raised and HLA-B27 positive (70%–80%). Psoriatic arthritis is 10–40 times more prevalent and patients often have a severe cutaneous disease consisting of silvery-scaled maculopapules on the knee, trunk, scalp and elbow. Nail changes are common and often severe. Radiological changes often show severe destruction with pencil-in-cup digital deformities and osteolytic destruction. Management of these inflammatory arthropathies is problematic as immunosuppressive agents can lead to full-blown Aids and Kaposi's sarcoma. Recognition and anti-inflammatories are the mainstay of treatment although sulfasalazine has been found to be effective.

#### **Surgical outcome in the HIV patient is still debated, especially regarding bone and soft tissue healing and post op infection**

HIV-associated arthritis is a subacute oligoarthritis that develops over a period of 1–6 weeks and may last up to 6 months. Patients develop incapacitating joint pain (knee and ankle). Radiographs are essentially normal and biopsy reveals only a chronic mononuclear infiltrate. Rheumatoid factor and HLA-B27 is negative. Intra-articular steroid therapy can be very effective. The painful articular syndrome is seen as often as in 10% of patients. These patients often present with acute, severe arthralgia (knee) that simulate a septic joint. There is no effusion or synovitis and this condition responds well to narcotics. It is self-limiting and usually lasts less than 24 hours. Acute symmetric polyarthritis is a unique rheumatoid arthritis found in HIV patients that resembles rheumatoid arthritis in all aspects apart from the acute onset and negative rheumatoid factor. Again treatment can be difficult. Hypertrophic osteoarthropathy is a systemic disorder seen with pulmonary diseases (TB etc). Patients present with extensive periosteal reaction and subperiosteal proliferation in the long bones of the lower limb. A bone scan will reveal increased uptake along the cortical surfaces. Treatment consists of treating the primary lung condition.

Osteonecrosis (most commonly of the hip) is being seen with more frequency in the HIV population group, although the cause is not yet apparent, but can be either disease or treatment dependent. The main presenting symptom is pain and a high index of suspicion is needed in the HIV patient with hip pain. Other joints can be involved in up to 70% of cases and is often bilateral.

Surgical outcome in the HIV patient is still debated, especially regarding bone and soft tissue healing and post op infection. In elective surgery with an optimised patient and CD4 counts >200 cells/mm<sup>3</sup> there is no higher risk for postoperative infection, but in trauma cases the risk is higher. Even in asymptomatic HIV-positive patients the risk for infection is greater, especially in open fractures. Routine HIV testing in trauma cases do not seem to be beneficial though. Late implant sepsis and bone healing still seems to be a problem, but routine implant removal cannot be supported currently.

Unfortunately no overview article can cover all aspects of musculoskeletal manifestations of HIV as the subject matter

becomes too large. Unfortunately there is no mention of the immune restoration inflammatory syndrome (IRIS). This well-known entity of immune reconstitution with the commencement of highly active antiretroviral therapy (HAART) in advanced disease can precipitate a severe immunological response that can 'unmask' subclinical infections (i.e. TB). Furthermore treatment related (HAART) complications (i.e. arthralgia, frozen shoulder, de Quervain's and carpal tunnel, etc) are not elaborated on. There is also no mention made of the osteoporosis associated with HIV infection and HAART therapy and the possible role of bisphosphonates in the treatment of accompanying osteoporosis. It must also be stressed that pyogenic septic arthritis (and osteomyelitis) is very common in HIV patients constituting 23% of musculoskeletal infections. The varied causative organisms found in HIV also need mentioning as this necessitates wide spectrum antibiotic cover while awaiting specimen culture and sensitivity results. Reticuloendothelial blockade (RE-blockade) is very common leading to haemopoietic dysfunction in HIV individuals. Impaired iron regulation leads to a normocytic-normochromic anaemia with low iron stores. This leads to low T1 signal intensity of the bone marrow especially in the vertebrae. These can be mistaken for infiltrating tumour and contrast sequences are necessary.

In conclusion this article, although not a complete summary of all HIV-associated musculoskeletal conditions, provides a concise overview of the subject matter in a well-structured manner. It therefore remains a good review of a large topic that we as orthopaedic surgeons do not often have the time to work through. With the prevalence of HIV in our population, the availability of HAART and the increased life expectancy of our patients, more and more HIV-positive patients will present to orthopaedic surgeons with musculoskeletal complaints, which makes this article invaluable.

#### **Acknowledgement**

Dr A Visser, Registrar Clinical Pathology, University of Pretoria, National Health Laboratory Service.

#### **Bibliography**

1. Florence E, Schrooten W, Verdonck K. Rheumatological complications associated with the use of indinavir and other protease inhibitors. *Ann Rheum Dis* 2002;61:82-4.
2. Harrison WJ. HIV/AIDS in trauma and orthopaedic surgery. *J Bone Joint Surg (Br)* 2005;87-B:1178-81.
3. Lawn S, Bicanic T, Macallan D. *C Inf Diseases* (correspondence) 2004;38 (1Feb):461-3.
4. Lima A, Zumiotti V, Camanho G. Osteoarticular complications related to HIV infection and highly active antiretroviral therapy. *Bra Journ Inf Dis* 2007;11(4):426-9.
5. Tehranzadeh J, Ter-Oganesyan R, Steinbach L. Musculoskeletal disorders associated with HIV infection and AIDS. Part I Infectious musculoskeletal conditions. *Skeletal Radiol* 2004;33:249-59.
- 6.. Tehranzadeh J, Ter-Oganesyan R, Steinbach L. Musculoskeletal disorders associated with HIV infection and AIDS. Part II Non-infectious musculoskeletal conditions. *Skeletal Radiol* 2004;33:311-20.

Reviewer: Dr MT Ramokgopa

Consultant Orthopaedic Surgeon

Trauma Orthopaedics Unit

Charlotte Maxeke Johannesburg Hospital and

Division of Orthopaedic Surgery

Wits University

Johannesburg

Tel: (011) 484-8106

## Advances in the treatment of intracapsular hip fractures in the elderly

Ross K Leighton, Andrew H Schmidt, Pamela Collier, Kelly Trask

*Injury* September 2007;38(Suppl 3):S24-S34

**B**y far the elderly intracapsular fractures are among the most common adult fractures treated in our Orthopaedic Surgery trauma units. The decision-making revolves around the question of whether to perform an internal fixation or arthroplasty. For us to decide on the available treatment options we would normally look at the various parameters including the physiological age of the patient, the co-morbidities, the pre-fracture level of function, the quality of bone and the pattern of the fracture, especially with regard to the amount of the fracture comminution.

### Arthroplasty allows rapid, safe mobilisation of the patient without the fear of implant failure or fracture non-union

The authors of this article, based on their own experience and an extensive review of the literature (at least 53 publications) seek to give us a guide on how to reach the best clinical decision for the benefit of the individual presenting patient.

The key facts derived from this article are the following:

- The 2003 Bhandari *et al* meta-analysis of the outcome of the displaced femoral neck fractures showed the rates of osteonecrosis and non-union to be 20–30% and that among a total of 1 901 patients, 35% with displaced femoral neck fractures treated with ORIF required a re-operation with immense economic costs.
- Even with the healed femoral neck fractures and the absence of osteonecrosis, the functional outcome over a 10-year follow-up show a deterioration.
- Arthroplasty allows rapid, safe mobilisation of the patient without the fear of implant failure or fracture non-union.
- Joint replacement is commonly performed for the patients most at risk for the complications of the internal fixation who would be elderly with severe osteopaenia and fracture comminution.
- The recommended standard treatment for the undisplaced femoral neck fractures (Garden I and II) remains the internal fixation methods.

The indications for the fractured hip joint arthroplasty are considered to be the following:

- displaced Garden III and IV fractures over the age of 60 years
- pre-existing symptomatic osteoarthritis
- inflammatory hip joint disease
- poor re-operative risk and anticipated reduced lifespan
- poor bone quality making a stable internal fixation impossible.

### Available arthroplasty options

#### Austin-Moore prosthesis

- Is cementless and has a poor femoral fixation.
- Quicker procedure, reduced blood loss, avoids cardiovascular cement side effects.
- Has an increased potential to erode the acetabulum.
- Is ideally reserved for the medically infirm, low demand patients and non-ambulatory.

#### Thompson prosthesis

- Is cemented, thus confers femoral stability and allows for early weight bearing.
- For the not-too-active patient.
- Has a limited offset and hence reduced hip abductor tension and poor gait stability.
- Acetabular erosion in 20% patients reported over 10 years.

#### Bipolar or modular unipolar hemiarthroplasty

- Good for community ambulators.
- Conversion to a total hip arthroplasty (THA) later possible.
- Leg length and femoral head offset adjustable rendering improved gait.
- Reduced dislocation rate compared to the primary THA (2%).

#### Total hip arthroplasty

- Has good predictable long-term results and better functional capacity.
- Problems include a prolonged surgical time, increased blood loss and the high 10% dislocation rate with a primary post-fracture joint replacement.
- Its absolute indications are the pre-existing symptomatic hip osteoarthritis and the revision for a failed ORIF or hemiarthroplasty.
- The relative indication is the displaced femoral neck fracture in a very active patient with a potentially long life expectancy of more than 8–10 years.
- The usage of large femoral heads and meticulous capsular repairs is recommended to circumvent the problem of the hip dislocations in the primary surgery.

This is a good study and literature review that provokes our continued desire to refine our approach to the common, challenging and interesting problem of the fractured hip in the elderly that should help save our patients' lives by expeditiously getting them out of their bedridden situation.