# EXPERT OPINION ON PUBLISHED ARTICLES

**Reviewer: Prof NS Motsitsi**
Department of Orthopaedic Surgery
Kalafong Hospital
Tel: (012) 373-1010

## Early versus late surgery for traumatic spinal cord injury: the results of a prospective Canadian cohort study

**JR Wilson, A Singh, C Craven, *et al.***
***Spinal Cord* 2012;50:840-43**

### Summary of the article

This is a multi-centre prospective cohort study of 84 patients. Adult patients with spinal cord injury plus compression were included in the study. They were divided into two groups: Group A (patients operated within 24 hours) and Group B (those operated after 24 hours). The time was chosen arbitrarily.

The final conclusion was that patients operated within 24 hours show better neurological recovery.

### Critical appraisal

The study addresses a clinically important question. There is much debate concerning the neurological outcome between early vs late surgery. Animal models demonstrate the benefit of early surgery.

However, there are some concerns about the study. Some of these are highlighted below:

- **Initial evaluation**:
  The patients were evaluated on admission by different trained professionals – physicians, nurses or research assistants. This raises the question of inter-observer variability.
- **Group allocation**:
  This was not randomised. The allocation was determined by many factors, e.g. surgeon preference, time for diagnostic work-up, medical stabilisation, etc.
- **Control group**:
  There was no control group to compare the surgical intervention to. Without a control group the question always arises as to whether the intervention had any effect at all.
- **The protocol was not uniform**:
  Some centres used methylprednisolone in the initial management of the patients and others did not.
- **Surgical technique**:
  The surgical method was chosen on a case-by-case basis by the treating surgeon (neurosurgeon or orthopaedic surgeon). Without uniformity of treatment it is difficult to compare the outcome.
- **Difference in critical variables**:
  Patients with severe neurological deficits (ASIA GROUP A) were over-represented in their group. They were operated within 24 hours and showed better neurological recovery compared to those operated later. These results tend to contradict our understanding. This raises the question of the accuracy of neurological examination done within 24 hours: i.e., how accurate is the neurological examination done within 24 hours? One study showed that we tend to overestimate the degree of neurological deficits in patients assessed within 24 hours.
- **Follow-up**:
  The follow-up period was short – it was less than six months. Neurological recovery after six months is very unlikely to be functionally significant. It would have been advisable to follow up all patients for at least 12 months. The mean length of rehabilitation stay was 89.6 (±47.4) days.
- **Attrition rate**:
  There was a significant attrition rate. Of the original 84 patients, 55 (65%) had follow-up neurological information available on rehabilitation discharge.

The article is interesting to read as the authors address a clinically important question. However, the study did not provide a convincing answer.

*Patients operated within 24 hours show better neurological recovery*

**Reviewer: Dr A Visser**
Head of Division Clinical Pathology
Department Medical Microbiology
University of Pretoria
National Health Laboratory Services
Tshwane Academic Division
Tel: +2782 780 1051
adele.vis@gmail.com

## Sonication cultures of explanted components as an add-on test to routinely conducted microbiological diagnostics improve pathogen detection

**J Holinka, L Bauer, AM Hirschl, W Graninger, R Windhager, E Presterl**
***J Orthop Res* 2011;29:617–22**

This study is a comprehensive work performed by an Austrian group of researchers as a collaborative effort by the Departments Orthopaedic Surgery, Clinical Microbiology and Infectious Diseases Division of Medicine. This reflects the degree of complexity in the relatively rare, but highly relevant and costly clinical entity of prosthesis sepsis. The researchers utilised various traditionally accepted methods of investigation (tissue culture [TC], synovial fluid culture and histopathology) in addition to the use of sonication for both culture and rapid diagnosis through Gram staining.

Sonication is a process whereby the prosthesis is placed in a water-bath and bombarded with sound waves. The basic principle is that this process breaks down

biofilms, which among other things, contain the pathogen implicated in infection. This release of organisms enables application of normal culture and identification techniques. It holds the advantage of release of pathogens for culture, but over-zealous application may actually render the organisms non-viable thus negating identification.

In total, 60 patients were included in this study of which 40 patients had overt septic loosening. The patients were not selected based on the type of prosthesis involved, and therefore the implant breakdown included 24 total knee prostheses, 21 hip prostheses, six modular tumour prostheses, two shoulder prostheses, six osteosynthesis and one spinal instrumentation. Studies of this nature performed in the past have by and large focused on a specific type of prosthesis. In addition, determination of risk factors for the development of prosthetic infection also seems to focus on specific prostheses. Most notably, Berbari *et al* (1998) alluded to three major risk factors. These are surgical site infection (odds ratio [OR] = 35.9; confidence interval [CI] = 8.3–154.6), a National Nosocomial Infection Surveillance System Score (NNIS) of 1 or greater (OR = 1.7; CI = 1.2–2.3) and underlying malignancy (OR = 3.1; CI = 1.3–7.2). However, considering these risk factors, the underlying disease pathogenesis for prosthesis infection, of whichever type, seems to be similar. Therefore, the inclusion of this array of prosthetic devices should not be considered inappropriate; in fact, it greatly contributes to the sample size and the statistical conclusions which can be drawn from this data.

The diagnostic criteria utilised for the diagnosis of prosthetic infection were the presence of two or more cultures obtained intra-operatively yielding the same organism(s), purulence surrounding the prosthesis at time of explantation, acute inflammation consistent with infection on histopathological examination, or the presence of a communicating sinus tract. From a microbiological view, a single culture was considered to be diagnostic if it occurred in conjunction with suggestive histopathological findings, but contamination in its absence.

The sonication culture (SC) method yielded 33 pathogens compared to the 30 from TC. However, discrepancies in organism identification (six cases) were noted, significantly complicating choices in antimicrobial therapy. Prior treatment with antibiotics significantly reduced culture yield in all microbiological assays. Specificities obtained for all the culture-based testing methods (SC and TC) were 95%. However, the sensitivity of SC exceeded both single positive tissue cultures (TC) (72.2%) and two positive TC (61.1%). This may suggest that SC can replace TC as a culture method of choice. However, three cases were described where organisms were isolated from TC and not in SC. Notably, there was a single case each of methicillin-resistant *Staphylococcus aureus* (MRSA), *Staphylococcus hominis* and *Finegoldia magna*. It should be noted that the aim of sonication remains to disrupt the biofilm found on a prosthesis, which contains the infecting pathogen. Sonication protocols are typically restricted in time, as in addition to biofilm disruption, it has been proven to be detrimental to the bacteria itself by causing direct lysis and DNA shearing. The process of sonication should therefore represent a fine balance between release of bacteria and actual lysis. This may supply a reason for SC-negative TC-positive cases.

The following points are made clear in this work: First, a multisystem approach is needed in the diagnosis and management of these patients. This is evident in the multidisciplinary team involved in this research. In addition, the diagnostic criteria utilised also reflect a close relationship between clinical, histopathological and microbiology parameters used in close partnership. Secondly, none of the special investigations utilised in this work has proven individual superiority and all are therefore considered as valuable adjuncts in the diagnosis of prosthesis sepsis. And lastly, the methodology of SC is comprehensively described in this paper, and proves to be a labour-intensive investigation, from the laboratory perspective. However, in view of the low prevalence of these infections together with the high cost of management, it seems to be entirely implementable from a practical point of view. Therefore, orthopaedic surgeons should have routine access to this adjunctive diagnostic method.

**Reviewer: Prof J Shipley**
Department of Orthopaedic Surgery
University of the Free State
Tel: 051 405-2242

## Why markets in healthcare don't work: lessons from the US

**A Relman**
***Brit Med J* May 12, 2012;344:26**

Although written for a British journal, there are sufficient similarities between the US and South African private healthcare systems for this article to be of interest here. The author is Emeritus Professor of Medicine at Harvard, and was editor of the *New England Journal of Medicine* for 14 years so his views have some authority.

'Why do we spend so much on medical care without anything like a commensurate return, and how does our system differ from those in other countries that spend barely half as much but do so much better?' asks the author. We may well ask the same.

Relman's answer is that medical care in the US has been allowed to become a market and its physicians to become businessmen; it consumes 18% of US GDP with little government regulation and shows 'what happens when medical care becomes a commodity rather than a social service'. His point is that classical market forces controlling costs cannot work in medicine because the same doctors who control supply of services also largely determine the demand for them. Obviously the patient arrives with a complaint, but the doctor decides how far to investigate and treat the problem, and so is responsible for the resulting snowball of costs. The author identifies fee-for-service practice, ignorance of the costs of services requested, perverse incentives, direct marketing of products and services to patients and profit motive by doctors, service providers and private health insurers as the main drivers of increasing costs.

The costs of public healthcare in the US have increased at a lower, but still unaffordable, rate compared to the private sector. This is partly due to the increased age of patients treated, but largely because similar billing and service costs apply to both sectors.

*Medical care in the US has been allowed to become a market and its physicians to become businessmen*

Relman's solutions are:

- to replace all present insurances by a single public insurance scheme funded by a compulsory income-related tax, and
- to move towards private, non-profit, multi-speciality group practices (including family medicine) with salaried doctors. Already 25% of doctors in the US are employed this way, and the number is increasing by 10% each year.

He estimates that these measures could potentially reduce medical costs by 30–40% by avoiding private insurance overheads, fraudulent billing and unnecessary or duplicated services.

The situations in our two different countries need to be placed in perspective. South African private healthcare costs around a quarter of that in the US, and half that in Canada for a very high standard of care (±US$ 1 500 RSA cf 6 700 USA, 3 700 Canada per person per annum), and appears to be very competitive in global terms. Nevertheless, private care is expensive in local terms, and with the collapsing public health service there is an increasing need to include people who can only marginally afford such fees. So there is good reason to improve the cost efficiency of our private system by incorporating some of the author's suggestions.

Relman is effectively proposing a national health insurance system for the US, and with our different demographics it would be ridiculous to expect that the NHI we may expect in this country would resemble a first world system in anything but name. Realistically we can expect a hybrid public/private system but this surely offers an opportunity for our threatened private healthcare sector to re-position itself in South Africa by developing systems similar to those Relman suggests to supplement the NHI.

## Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours

**MS Pearce, *et al.***
***Lancet* June 7, 2012 (online)**

The authors reviewed a series of patients from the United Kingdom for development of leukaemia or brain tumours following cranial CTs performed before the age of 22 years. Patients originally investigated for cancer diagnoses were excluded and the statistical analysis, though complex, appears meticulous. They found that cumulative organ doses of 50 mGy to skull red bone marrow might almost treble the risk of leukaemia, and 60 mGy to the brain that of brain malignancy. In practice this would require about 5–10 cranial CTs for marrow and 2–3 for brain exposure to reach these levels. Although the risks remain small (about one case of each per 10 000 CTs) due to the rarity of these conditions, this is the first study to document a direct link between organ irradiation dose from the use of CT and subsequent malignant change in the area irradiated.

Children's tissues are particularly sensitive to irradiation and there is good evidence that most types of cancer can be induced by radiation, and the risk does not decline with time after exposure. There is some evidence that multiple CT scans may increase the risk of cardiovascular disease. An abdominal or pelvic CT has an estimated lifetime risk of 1 per 500 scans irrespective of age.

In orthopaedics, CT scans are mainly used for evaluation of tumours, trauma and spinal deformity. They are cheaper, more accessible and rapid (and so more convenient in children) than MRI scans. They undoubtedly have a place in our diagnostic battery, but repeated CTs or extensive scans carry a risk and this article reminds us that we should use them appropriately and with discretion.

**Reviewer: Dr G Grobler**
Cape Hip and Knee Practice
Tel: 021 506 5610
Fax: 021 506 5619
lalena@capehipandknee.co.za
garth@capehipandknee.co.za

## The ten-year survival of the Birmingham Hip Resurfacing

**DW Murray, G Grammatopoulos, H Pandit, R Gundle, HS Gill, P McLardy-Smith**
***Journal of Bone and Joint Surgery* September 2012;~~94-B~~(9):1180–86**

Metal-on-metal articulation in hip arthroplasty has generated much discussion in the literature as well as in the social media, television and news articles in recent years. Litigation has reared its ugly head and therefore it remains imperative that good perspective is maintained.

The introduction of resurfacing arthroplasty held much promise as femoral bone stock was maintained, the large diameter head lessoned the risk of dislocation and it was anticipated that wear rates would also be less of a problem. We now know that this articulation is not without its own inherent problems.

The article by Dr DW Murray *et al* from an independent design centre, reporting on the ten-year survival of the Birmingham Hip Resurfacing, helps us to make informed decisions regarding resurfacing hip arthroplasties. They show that the results at ten years are very different between men and women. In females survival of the implant is 74% and in men it is 95% and in fact it is better in men younger than 50 years (at 99%), even though this is the most demanding group of patients with conventional total hip replacements.

The gender difference may be due to the use of smaller implants or greater susceptibility to metal reaction.

Reasons for revision:

1. Pseudotumour: 48%
2. Fracture neck of femur: 22%
3. Impingement: 15%
4. Loosening: 6%
5. Infection: 5%
6. Recurrent dislocation: 4%

The authors do note that the pseudotumour formation in men continues to rise from 0.5% at 8 years to 1.5% at ten years and therefore we need to remain vigilant.

In conclusion, resurfacing arthroplasty remains a good choice in young active male patients but should not be considered in female patients.