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# EXPERT OPINION ON PUBLISHED ARTICLES

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## **The timing and influence of MRI on the management of patients with cervical facet dislocations remains highly variable**

A survey of members of the Spine Trauma Study Group

Jonathan N Grauer, MD,\* Alexander R Vaccaro, MD, *et al*

*J Spinal Disord Tech* April 2009, **Volume 22**, Number 2

## **Controversies in the treatment of cervical spine dislocations**

Joon Y Lee, MDa\*; Ahmad Nassr, MDb; Jason Eck, DO, MSc; Alexander R Vaccaro

*The Spine Journal* 2009, **Volume 9**, pp 418–423

**T**hese two excellent articles highlight the uncertainty and lack of uniformity in managing a common devastating spinal injury even in developed countries. The South African conditions are particularly vulnerable to widely differing methods of management.

The management of traumatic facet dislocation in the South African environment remains a challenging condition. We have enormous dichotomy in surgical expertise. Our centres of excellence match most renowned institutions worldwide but rural areas still lack many basic skills and resources. There are deficits in skilled personnel, lack of imaging facilities and inadequate surgical skills to deal with these injuries.

Cervical facet dislocations result from distractive flexion forces (with or without rotational forces) on the sub-axial cervical spine. There is a spectrum of associated ligamentous, intervertebral disc, osseous, capsular and neurological injury with these dislocations.

Management should include treatment of associated injuries, early reduction and direct or indirect spinal cord decompression and stabilisation.

### **The ideal management of acute cervical dislocations**

The diagnosis is made with appropriate cervical radiographs and/or CT scans by the primary medical staff. Standard immobilisation techniques and spinal precautions are routine along ATLS principles.

Patients may present neurologically normal or with neurological deficits, incomplete or complete.

All cervical dislocations should have MRI imaging. MRI defines non-contiguous spinal injuries, the extent of the index level injury and the presence of a clinically significant disc herniation.

The timing of MRI however is determined by several factors including availability of imaging and urgency of reduction.

Ideally all acute cervical facet dislocations would be managed with emergent surgical decompression and stabilisation. Anterior discectomy allows safe reduction without risk of iatrogenic cord compression from disc fragments. MRI should be performed prior to theatre. Surgical decompression and stabilisation within 6 h of partial spinal cord injury allow up to 70% of patients to have some neurological improvement.

Urgent surgical open reduction is not always practical and closed reduction (indirect decompression) needs to be performed when theatre is not immediately accessible. MRI scanning prior to closed reduction is desirable if circumstances allow. MRI can delay treatment by up to several hours and should not be performed at the expense of urgent closed reduction in the presence of deteriorating neurological function or complete neurological deficits. After closed reduction, surgical stabilisation can be performed at a more convenient time.

Closed reduction is safe where there are no contraindications. The incidence of permanent neurological complication after closed reduction in cooperative patients is approximately 1%. Conversion to emergent open reduction is indicated with failure of closed reduction or deteriorating neurological status. In these situations pre-reduction MRI would be prudent.

In the South African context many of these injuries are managed at smaller district hospitals and the management options may be restricted. Surgical options are limited and this should be taken into consideration when embarking on a treatment option.

### Management of cervical dislocations with limited surgical resources

*Neurologically complete* and deteriorating neurological deficits should have closed reduction as an emergency using standard protocols. The neurologically 'complete' patient has nothing to lose and everything to gain from urgent reduction especially with bifacet dislocations.

The *neurologically intact* patient on the other hand has very little to gain but should they deteriorate during closed reduction without surgical management being available, it would be catastrophic. MRI prior to reduction can give additional information regarding significant disc herniation but is not conclusive regarding the choice of open vs closed reduction.

Closed reduction in these patients should only be attempted where an unreasonable delay is expected in getting the patient to theatre for definitive treatment.

*Neurologically incomplete* patients need individual management decisions. Without appropriate surgical expertise the benefits of immediate closed reduction need to be weighed against the risks of iatrogenic neurological deterioration. With severe deficits the balance is in favour of early closed reduction when definitive surgical management is not readily accessible.

### Summary

The techniques and indications of gradual closed reduction should be mandatory knowledge in all hospitals. Where closed reduction is to be attempted provision should be made for conversion to surgical reduction if required. Where this is not possible closed reduction should be reserved for the severely neurologically injured patient where the risk–benefit ratio is favourable or when unacceptable delay in definitive surgical management is anticipated.

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## Obesity and joint replacement

F Horan

*Journal of Bone and Joint Surgery (Br)* 2006; **88-B**: 1269-71

Recently I had many patients in my practice who were refused funding for joint arthroplasty on account of their weight. According to their funders obesity carried an unacceptable risk to joint arthroplasty (hips and knees). I couldn't understand the reason for this and researched the literature. I found 110 articles, published over the past ten years, in the English-language literature, which refers to obesity and joint replacement. The most relevant of these in my opinion was an excellent editorial in the British *JBJS* by Horan.

It seems that a similar strategy was followed in England by funders who refused funding of arthroplasty for obese patients. In this paper by Horan, he questions the validity of the exclusion of obese patients. Horan looked at hip and knee replacements. The literature shows no objective evidence that there is a difference in outcome between obese and non-obese patients. Although some short-term studies reported a higher rate of wound complications and thromboembolism, several long-term studies showed no difference in the

outcome of hip or knee arthroplasty in obese and non-obese patients. Horan makes one comment on the morbidly obese patient. In a study by Amin in the same journal an adverse functional and radiological outcome was shown in the morbidly obese with knee arthroplasty. He cautions however that this is a short-term study and that long-term follow-up is necessary to validate the findings.

Horan states that at present there is no randomised controlled trial that suggests an adverse outcome for hip or knee replacements in obese patients. On the contrary, the studies available show equivocal outcomes for obese and non-obese patients. It seems possible that morbidly obese patients (BMI>40) might have an increased risk for complications. This however needs further research. Horan also states that it remains a fact that the improvement in the quality of life of hip and knee arthroplasty patients is considerable, irrespective of their weight, and surgery should not be refused on weight issues.

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## Propionibacterium acnes colonisation of the human shoulder

A Patel, RP Calfee, A Green, *et al.*

*J Shoulder Elbow Surg* 2009; **18**: 897–902

## Propionibacterium acnes infection after shoulder arthroplasty: A diagnostic challenge

CC Dodson, EV Craig, RF Warren, *et al.*

*J Shoulder Elbow Surg* 2010; **19**: 303–307

The above articles have revealed the increased consideration for the pathogen *Propionibacterium acnes* as a cause of infection after shoulder surgery, especially in shoulder arthroplasties. *P. acnes* is a Gram-positive anaerobic bacillus that is closely associated with sebum-rich hair follicles.

The paper by Patel *et al* proves that *P. acnes* colonises the skin around the shoulder in greater numbers than around the knee or hip. They evaluated shoulder surgical sites such as the anterior and posterior acromion area as well as the anterior axillary fold. Male patients were found to have a higher rate of colonisation of *P. acnes* than women. The reason for this is the higher incidence of hair and perspiration in men compared to women. It is important to note that the *P. acnes* organism is difficult to culture. This is due in part to the organism's ability to reside intracellularly and remain dormant for weeks. Anaerobic tissue culture and prolonged incubation (up to 14 days) are required to isolate the organism. The study has also revealed that the level of *Staphylococcus* colonisation in the shoulder areas is just as high as that of *P. acnes*. It is therefore important for the surgeon performing shoulder procedures to consider these factors when deciding on his or her prophylactic antibiotic regimen.

In the second article related to this organism the authors retrospectively evaluated 11 cases of infected shoulder arthroplasties due to *P. acnes* in order to determine its clinical presentation and to propose treatment options. Group I consisted of five patients who were diagnosed with infection clinically on the basis of wound erythema or drainage, positive cultures or the presence of a fluid collection. Group II consisted of six patients who were treated for prosthetic- or soft tissue-related dysfunction without any suspicion of an under-

lying infection. An infection was then 'incidentally' diagnosed intra-operatively. Confirmation of infection in both groups was made by means of frozen sections intra-operatively. The presence of the organism was then confirmed by culture samples and only after an average of nine days of incubation. When they evaluated the sensitivity and resistance of these cultures they found them to be resistant to metronidazole but sensitive to penicillin and clindamycin. The authors came to four valuable recommendations to prevent and manage these patients:

- Isolate the axilla by means of an adhesive antimicrobial drape (Ioban™; 3M) before any skin incisions are made.
- All culture specimens from potential surgical site infections or infected prosthesis components should be incubated for a minimum of 10 days.
- All patients undergoing revision shoulder surgery should be informed beforehand that intra-operative findings such as a positive frozen section (indicating possible infection) can alter the planned treatment intra-operatively. This is especially applicable in cases where infection is not suspected.
- Surgeons should have a very high index of suspicion for infection in all patients with a painful shoulder following the insertion of a prosthesis.

Being aware of the role of *P. acnes* in causing infections related to shoulder surgery will assist in the successful prevention and treatment of these difficult cases. It is important to take note that standard techniques of culturing specimens will not isolate the *P. acnes* organism. Surgeons should therefore discuss these cases with their microbiologist to ensure that correct culturing techniques are used.

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## External Fixation: How to Make It Work. Instructional Course Lecture

BH Ziran, WR Smith, JO Anglen, P Tornetta P  
*JBJS(A)* Volume **89-A**, Number 7, July 2007, pp  
 1619 – 1632

This is an American Academy Instructional Course Lecture that was published both in the *Instructional Course Lectures Journal*, as well as in the American version of the *Journal of Bone and Joint Surgery*. I found it to be a useful overview of external fixation as it applies to the majority of orthopaedic surgeons.

The authors rightly state that external fixation is embraced by only a few orthopaedic surgeons as a primary mode of treatment, but that it is a useful adjunct in orthopaedic trauma surgery.

The article describes a few key concepts in utilising external fixation. Firstly it categorises the use of external fixators into temporary and permanent fixators. The indications of each are discussed briefly and then the use of temporary fixators in damage control is discussed reasonably comprehensively. Damage control orthopaedics is a management method whereby a critically injured patient is stabilised using temporary external fixation of long bones in order to prevent the deadly triad of hypovolaemia, hypothermia and coagulopathy. This can really only be achieved effectively using external fixation.

Different frame configurations are also described and

illustrated with relevant photographs. The frames demonstrated are useful constructs and can be used clinically to great effect. These examples cover femoral, tibial and elbow frames, among others.

Next, pin design and insertion techniques are discussed and these factors are important to bear in mind. It is well known that improper pin design and/or insertion techniques result in compromise of the pin-bone interface as well as pin infections.

A section on external fixation and MRI makes important reading, as a number of issues are relevant, e.g. component compatibility, induction of currents and heating of components. There is always a concern in the ICU regarding the MRI compatibility of an external fixator, especially if the patient requires MRI imaging for a spinal injury.

Definitive fixator constructs are also discussed, including the hybrid frame. Although I personally do not use the hybrid frame at all, because of biomechanical reservations on my part, the hybrid frame is widely used and its design and application are covered well in the article.

An extremely important section on appropriate pin tract care follows. This is arguably the most important section of the article, as we all know that pin tract infection remains the weak point of external fixation and that this is also the most important reason cited by orthopaedic surgeons for not using external fixation.

I think this article makes essential reading for all of us who are involved in orthopaedic trauma surgery, as it lays the groundwork for some basic external fixation principles.

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## The Biomechanics of Pedicle Screw Based Instrumentation

W Cho *et al.*  
*JBJS* **92-B**, 8; 1061; August 2010

This annotation is an excellent review of the current status of pedicle screw instrumentation, and is recommended for registrars and young specialists, or the occasional spinal surgeon. The article summarises the biomechanics of the screw itself, especially factors influencing pullout and fatigue strength, insertion technique, augmentation and salvage procedures, and the mechanics of different constructs, including the use of transverse connectors.

### Points of interest to me were:

- Use of a large diameter screw in osteoporosis does not increase the stability of the construct, and may reduce pullout strength by damaging the pedicle.
- Insertional torque, the subjective feeling of the grip of the screw, has no relation to pullout strength.
- Tapping the screw hole reduces pullout strength; if considered necessary preferably undertap by 1 mm.
- Although the conventional converging trajectory (delta configuration) of pedicle screws is still the standard, there is evidence that a laterally directed screw is equally strong, especially in osteoporotic bone.
- Transverse connectors provide only torsional rigidity, and are primarily indicated in correction of rotational deformity or instability (e.g. anterior column deficiency).