

EXPERT OPINION ON PUBLISHED ARTICLES

Reviewer: Dr Abdirashid Aden

Department of Orthopaedics
Helen Joseph and Rahima Moosa Hospitals,
Johannesburg
Tel: 011 489-0636

Relationship of radiographic acromial characteristics and rotator cuff disease: a prospective investigation of clinical, radiographic and sonographic findings

Nady Hamid, MD, Reza Omid, MD, Ken Yamaguchi, MD, Karen Steger-May, MA, Georgia Stobbs, RN, Jay D. Keener, MD
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Rotator cuff disease is a quite common cause of shoulder pain. There are as many proponents of the extrinsic theory as there are for the intrinsic one and the debate on the role of the acromion is still ongoing. However, most of the surgical procedures are based on the concept of decompression of the subacromial space. While a lot has been written about it, there are still gaps in our knowledge in areas like the natural history of rotator cuff. This article is a level III epidemiology study with a mixture of cross-sectional and longitudinal data. It attempts to determine the relationship between rotator cuff disease and the development of symptoms with acromion type, index and presence of spur. Subjects were grouped into two groups: the study group, which comprises those who are asymptomatic with partial and full thickness tear, and the control group with an intact rotator cuff. All patients were interviewed and examined, and X-rays and ultrasound examinations were done at the point of data collection. The supraspinatus outlet view was used for the definition of acromion type and the presence of a spur, while the antero-posterior view was used to measure acromion index. The ultrasound investigation was used to determine presence of rotator cuff tear as well as tear width, retraction and relationship to the biceps tendon. Trained radiologists performed the ultrasound investigation and blinded observers assessed the X-rays. Bigliani *et al* typing of acromion was used to classify acromial morphology and a digital software was used to measure the size of the acromial spur. Of the 250 study patients, 216 were suitable for clinical analysis and 208 were suitable for X-rays and ultrasound investigations.

Although it is a mixture of longitudinal and cross-sectional data, it is a valuable article

Findings:

- For acromial morphology, the inter-observer reliability was poor.
- The presence of an acromial spur, regardless of size, was highly associated with a full-thickness rotator cuff tear, even after adjusting for age, sex and hand dominance. Furthermore, spurs bigger than 5 mm were associated with larger tears. Acromial spurs were more common in older patients.
- The inter-observer reliability for the acromial index was excellent.
- Acromial index was higher in women than in men. It did not correlate with age or hand dominance. It showed no difference with or without tear, partial or complete. In the longitudinal study section, a slightly larger acromial index was seen in shoulders that became painful.

In my opinion this article confirms some aspects of rotator cuff disease that we know already. Although it is a mixture of longitudinal and cross-sectional data, it is a valuable article. The prospective follow-up overtime of asymptomatic shoulders with and without sonographically proven tears makes it quite interesting. The cross-sectional leg of the study affirms the importance of presence and size of acromial spur in rotator cuff pathology and its progress. The acromial index is a relatively new radiological parameter of the shoulder, and its value has not yet been proven. The discrepancy in conclusion between this article and the original article of Nyffeler *et al* may be due to the position of the shoulder. I expect this to take some time before acromial index proves to become a valuable index. However, the high inter-observer reliability of the index shown in this study can be a starting point. In the longitudinal leg of the study, the authors found that a high acromial index is slightly associated with symptomatic progress. Further studies are required to prove this.

Reviewer: Dr Sithombo Maqungo
Orthopaedic Trauma Service
Groote Schuur Hospital
University of Cape Town

Examination under anesthetic for occult pelvic ring instability

H. Claude Sagi MD, Franco M. Coniglione DO, Jason H. Stanford MD

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High energy trauma is becoming an increasingly big part of our daily practice as orthopaedic trauma surgeons. The increase in the number of such cases has brought with it an associated increase in the number of high energy pelvic ring injuries. The traditional way of classifying these injuries is according to the Young and Burgess mechanistic classification based on the injury force vector.

This system has the following shortcomings:

- It is based on a static radiograph that does not take into account the effect of the numerous ligaments and muscles in the pelvis that can reduce the amount of displacement sustained at the time of injury. The radiographs can therefore look rather benign in a setting of gross instability due to the 'recoil' effect of these ligaments.
- There is poor inter-observer reliability with more complex fracture patterns.
- The widespread use of pelvic binders prior to X-rays being obtained leads to X-rays being obtained in the reduced position. The true extent of instability in these cases is not well appreciated, especially posterior instability.

We know from the work of numerous authors that complex pelvic ring injuries have poor functional outcomes and this may in part be due to residual posterior instability or malunion. We also know that biomechanically the most stable fix where the ring is disrupted anteriorly and posteriorly is 'front and back' fixation.

The reasons posterior lesions have not been adequately addressed include lack of image modalities to appreciate these lesions (CT scans), high rates of wound breakdown and the generally technically demanding nature of these procedures.

In an effort to address the question of how to diagnose occult or suspected pelvic ring instability, the authors took 68 patients for examination of their pelvic ring injuries under anaesthesia.

They use the AO classification system: A (rotationally and vertically stable); B (rotationally unstable but vertically stable); and C (rotationally and vertically unstable). Fourteen patients were initially classified as APC-1 and presumed stable, but upon dynamic testing, seven of these had pubic diastasis more than 2.5 cm and so warranted anterior fixation.

Twenty-three patients were initially classified as APC-2 but upon dynamic stressing at the time of anterior fixation, nine had posterior rotational instability without vertical instability so that fixation with an ilio-sacral screw was warranted. The authors have termed these APC-2b injuries where the instability is multiaxial but there is no vertical instability. The 13 patients with no posterior instability were termed type APC-2a.

Similar results were found in lateral compression injuries where, upon stressing, some presumed LC-1 injuries exhibited rotational instability and presumed LC-2 injuries exhibited vertical instability.

I am particularly pleased to note the appreciation that not all APC-2s are the same because of the extent and strength of ligament complexes posteriorly. This is a point I have always stressed in my unit and at some stage we considered doing an MRI on all APC-2s in order to quantify the extent of posterior ligamentous disruption. Simple dynamic testing seems to have answered some of these questions.

Of course the message is not that all patients with pelvic ring injuries need to be EUA'd but rather that if the fractures are within acceptable displacements patients still need to be cautious about weight-bearing and also need to be followed up and not simply subjected to the instruction 'discharge when they can straight leg raise, weight-bearing as pain permits, no follow-up'.

In all cases where posterior instability is suspected it seems prudent then to perform dynamic testing and consider fixation if warranted.

PUBLICATION OF ETHICS ARTICLES

As usual, in this issue of *SA Orthopaedic Journal*, we are publishing an article covering one or more topics related to ethics in the practice of medicine (see page 74). Not only does this enhance the status of the journal but it also helps doctors to earn those rather elusive ethics CPD points. A questionnaire accompanies the article and doctors are encouraged to send in their answer form in order to qualify for ethics CPD points. Please refer to page 78 and follow the instructions at the bottom of the page.

Reviewer: Dr M Solomons
 Department of Orthopaedic Surgery
 University of Cape Town
 Tel: (021) 506-5670

Arthroplasty for CMCJ Osteoarthritis

Journal of Hand Surgery (European)

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The thumb CMC joint is the most common site of osteoarthritis in the hand. It is estimated that one in four women over 65 years will suffer this malady.

Despite published good results with excision arthroplasty and other soft tissue procedures, CMCJ arthroplasties continue to interest the hand and general orthopaedic surgeon. This journal publishes four articles on various devices and the Editorial correctly cautions on the widespread 'acceptance' of these novel techniques.

1. Elektra prosthesis for trapeziometacarpal osteoarthritis: a follow-up of 39 conservative cases

A Klahn, M Nygaard, R Gvozdenovic & MEH Boeckstyns; pp 605–609

This paper reports on 39 Elektra prostheses in 37 patients. The Elektra prosthesis is a cementless ball-and-socket prosthesis with metal-on-metal articulating surfaces. Follow-up was 4 years. The authors observed a rapid recovery from pain and of grip strength. Pinch strength interestingly, was not improved. At 36 months, 24% of implants had been revised and this increased to 34% at 48 months. Sixty-five per cent of 20 patients with a follow-up longer than 4 years had been revised.

Editorial comment

'For the Elektra report, the only report of "good outcomes" was from the originator, who also reported a high rate of complications. Given the very poor results reported in this journal in 2012 by two different units, and no other independent reports of good outcomes, use of the implants should also be suspended until the reports of good outcomes with adequate follow-up.'

2. High frequency failure of the Moje thumb carpometacarpal joint arthroplasty

B Kaszap, W Daecke & M Jung; pp 610–616.

This paper reviews the results of 12 implants at 50 months follow-up. All patients presented with loosening, migration or tilting of one or both implant components. In 42% the symptoms and radiological failure required revision.

Editorial comment

'For the Moje CMC joint arthroplasty, for which there appears to be no reports of good outcomes and only reports of high failure rates, it seems clear that use of the Moje thumb CMC implant should be suspended until reports of good outcomes with adequate follow-up are published.'

3. Thumb carpometacarpal osteoarthritis: trapeziectomy versus pyrocarbon interposition implant (Pi2) arthroplasty

M Maru, P Jettoo, L Tourret, M Jones & L Irwin; pp 617–620

The authors reviewed the results of two different techniques at a mean of 20 months (7 to 56 months). The MEAN-DASH scores were 27 for trapeziectomy and 35 for Pi2 arthroplasty ($P=0.001$). No other clinical outcome differences. Six out of 18 (33%) thumbs in the Pi2 group required multiple operations usually for dislocation or subluxation of the implant. The early results of Pi2 arthroplasties show a high complication rate compared with trapeziectomy and no identifiable benefit.

4. De la Caffinière thumb trapeziometacarpal joint arthroplasty: 16–26 year follow-up

P Johnston, A Getgood, D Larson, A J Chojnowski, A J Chakrabarti & PG Chapman; pp 621–624.

An initial cohort of 93 implants in 70 patients has been reported twice already. This latest paper reviews the results at a mean of 19 years (16 to 24 years). Thirty-nine implants in 26 patients were available for review. Failure as defined by 'revision for any reason' was 26.1% at 26 years. Failure as defined 'implant revised or at risk (radiographs failure)' was high at 74% at 26 years.

Reviewer's comments

Luckily the Moje and De la Caffinière prostheses are not available in our country. Unfortunately there are quite a few similar designs without published short-, medium- or long-term results – use with caution.

Reviewer: Dr N Ferreira

Tumour, Sepsis and Reconstruction Unit

Department of Orthopaedic Surgery

University of KwaZulu-Natal

Greys Hospital

Pietermaritzburg

Tel: +27 033 897 3299

Early fracture stabilisation in the presence of subclinical hypoperfusion

B Grey, RN Rodseth, DJJ Muckart

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Damage control orthopaedics has been one of the major advances in the management of polytrauma patients over the last 20 years. The philosophy behind this approach is to control haemorrhage, minimise contamination and achieve provisional fracture stability, rather than reconstructing anatomy. This strategy is aimed at preventing the lethal triad of coagulopathy, hypothermia and metabolic acidosis. During the second stage, the patient is resuscitated in a high care environment prior to the third stage of definitive surgery.

The merits of this staged approach in a select group of polytrauma patients have conclusively been established. In contrast, 'early total care' consists of early definitive fixation for all musculoskeletal injuries. Early total care has also been evaluated and shown to improve outcome in a select group of patients. The decision regarding what strategy to follow can be difficult, and is too often left to the anaesthetist in theatre.

To help guide the approach, four categories of patients have been identified, and patients should be placed into one of these categories to guide their subsequent care. Of these four categories, the borderline group is the grey area; most difficult to define and difficult to know how to treat.

The borderline category is patients who respond to initial resuscitation but have certain injury combinations or clinical findings associated with poor outcome. These include:

- Injury severity score > 40 in absence of thoracic trauma
- Injury severity score > 20 and additional thoracic trauma
- Polytrauma with abdominal or pelvic trauma and hypovolaemic shock
- Radiographic evidence of bilateral lung contusions
- Initial mean pulmonary arterial pressure > 24 mmHg or an increase of > 6 mmHg in pulmonary arterial pressure during intramedullary nailing

Previous articles have alluded to the possibility that at the end of resuscitation when haemodynamic parameters have returned to normal, there may still be a substantial oxygen debt at cellular level. Inadequate tissue perfusion leads to anaerobic metabolism and the production of lactate, which can then easily be measured. This situation of normal vital signs with an elevated serum lactate is referred to as subclinical hypoperfusion.

The authors of the above article aimed to establish whether subclinical hypoperfusion (SCH) was responsible for increased morbidity in polytrauma patients who underwent fracture fixation. Patients with normal vital signs (mean arterial pressure \geq 60 mmHg and heart rate \leq 110 beats/min) following resuscitation, and lactate $>$ 2.5 mmol/L were diagnosed as having SCH.

The authors undertook a database review of polytrauma patients with significant long-bone or pelvic injuries who underwent definitive fracture fixation within 48 hours of injury. Patients with normal pre-operative vital signs were divided into a control group (lactate $<$ 2.5 mmol/L) and a subclinical hypoperfusion (SCH) group (lactate $>$ 2.5 mmol/L). The findings showed that the SCH group required more ionotropic support in the first 24 hours, had an increased incidence of multiple organ dysfunction, and required longer mechanical ventilation.

This article emphasises the physiological basis for the damage control approach in polytraumatised patients. It helps to identify the borderline patients who should rather be treated with a damage control approach. Orthopaedic surgeons should identify these patients and take an active role in the decision-making process regarding which treatment strategy to employ.

Barefoot running

Andrew R Hsu, Chicago, Illinois

Foot & Ankle International

September 2012, page 787

Barefoot running is a new 'buzz word' and this article is an excellent review of the status of research with regard to running with and without shoes, at the current time.

In spite of the fact that running shoes have been extensively engineered since the early 1970s, the incidence of running injuries has not decreased and for this reason barefoot running has now been pushed as an alternative.

In essence the difference between barefoot running and running in shoes is that in barefoot running you run with a mid- and forefoot strike and in running with shoes you run with a heel strike.

The background is discussed and we are reminded that the human foot has been around for two million years and is well developed.

The physiology and anatomical adaptations are discussed and it is interesting to note that there is a 5° loss of range of motion of the ankle when wearing modern running shoes.

The metabolic demands are also less when running barefoot.

Reviewer: Dr JJ van Niekerk

Orthopaedic Surgeon

PO Box 650819

Benmore 2010

Tel: (011) 883-1719

Fax: (011) 884-2349

When we come to the biomechanics the impact forces are looked at and it is interesting that the impact forces vary greatly between the barefoot running and the heel strike running methods. They are much lower in the barefoot style.

The 'coordinative strategy' is also discussed and the feedback with very minimal sole under the foot is a lot better and should increase the function of the foot and also the protection provided by muscle contracture. This is because the runner will continually modify his foot and ankle position to adapt to the terrain.

The potential risks of barefoot running are looked at and this really has to do with lacerations to the sole of the foot but then also the changes in the muscles used. The possibility of stress fractures is discussed.

The current limitations of this research are that there are no good trials comparing barefoot and shod runners with regard to injuries. This research will obviously be done in due course but this article is excellent in bringing one up to date with the current status of research in this field.

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