



Volume 2, Issue 1
January 2010

The Australasian Society for Motorsports Medicine and Rescue

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Race control

Welcome to Volume 2 of the ASMMR newsletter. A new year has begun and with it a new year of racing. Hopefully, the first year of the ASMMR newsletter has been helpful to its readership, or at least interesting. I would like to think that it can follow suit this year.

In this issue, common joint dislocations are reviewed in summary form; concentrating on clinical features and reduction methods. Clinical skills are usually all that are available to doctors and paramedics who provide medical support at motor sporting events and an awareness of the major principals of the common joint dislocations helps to avoid missing injuries and providing the appropriate management.

There is also a short review of some of the technical and regulatory changes that are being brought in for this year's Formula 1 season, along with some of their implications.

Good luck.

Matthew Mac Partlin



Clinical review

Common joint dislocations

The main tenets of joint dislocations are as follows:

- Be aware of the potential for associated open injury, fractures, neurovascular and ligamentous injury. Such injuries require urgent orthopedic intervention.
- Reduction is best achieved early, with steady, sustained traction and good analgesia and relaxation. Procedural sedation, while not always required, may help.
- Successful reduction is usually indicated by a sudden reduction in pain and ease of full range of motion. Recheck joint stability and neurovascular function following successful reduction.
- Failed reduction usually indicates an inadequate level of relaxation or interposed cartilage or fracture fragment and requires operative repair.
- All dislocations should have orthopedic follow-up arranged to assess joint stability and function and to exclude subtle fractures, which may impair long term function.

Shoulder (Glenohumeral) joint

Anteroinferior

More common (95%)

Mechanism:

- any mechanism that produces excess shoulder joint external rotation and abduction

Clinical features:

- pain
- loss of normal rounded contour of deltoid
- palpable humeral head inferior to lateral third of clavicle
- limited range of motion, especially abduction and internal rotation (can't put hand on opposite shoulder or on top of head)
- always assess neurovascular bundle, especially the axillary nerve, before and after attempting reduction
- may be associated with Bankart lesion (avulsion fracture of anterior glenoid labrum), Hill-Sachs lesion (a cortical depression fracture of the humeral head), fracture of humeral neck or shaft or SLAP lesion (tear of the glenoid labrum; typically the superior portion, but there are several subtypes). Pre-reduction x-ray useful to exclude associated fracture

Reduction method

- Hippocratic method: Traction on forearm with foot in axilla as counter-traction → no longer an acceptable method
- Kocher's method: External rotation followed by adduction of the elbow towards the midline and internal rotation, with a reduction 'clunk' felt midway through internal rotation. No longer recommended due to risk of spiral fracture of the humeral shaft
- Stimson method (Gravity): Patient lies prone on bed with affected arm hanging off edge of the bed. Strap two 1 litre bags of saline or two sandbags to the forearm and wait. Patient usually becomes suddenly aware that the shoulder feels better. Atraumatic, though positioning may be difficult. Useful trial of therapy while manging other issues.
- Scapular rotation: Patient lies prone on bed with affected arm hanging off edge of the

bed, or, sits forward in chair, with gentle traction applied to the affected arm at the elbow. Ipsilateral scapula held with thumb and forefinger at superior margin and inferior tip. Tip is rotated in towards vertebral column and lateral end of upper margin is rotated inferiorly and held. Humeral head often slips back into place without significant 'clunk'. Minimally traumatic and can be done without analgesia or sedation.

- Milsch method: Patient lies supine on bed. Assistant provides counter-traction with sheet looped under ipsilateral axilla and crossing chest to contralateral shoulder. Operator holds ipsilateral forearm just below the elbow and applies gentle, sustained traction in external rotation and approximately 20 degrees of abduction, by simply leaning back and holding. A sudden give and shortening is felt and the shoulder reduces

Commonly placed in a collar and cuff, or sling, for 4 - 6 weeks afterwards, though there is concern that this may exacerbate a Bankart lesion. Surgery may be offered to young athletes due to the increased risk of recurrence with subsequent shoulder instability.

Posterior

Uncommon

Mechanism = direct blow or excess internal rotation with adduction

Clinical features:

often few, other than limited range or motion, with or without pain
neurovascular compromise is less common

Reduction

- axial traction in 90 degrees of abduction

Luxatio erecta

Rare.

The humeral head lies inferior to the glenoid fossa and the arm is held in abduction.

Frequently has associated greater tuberosity fracture, rotator cuff injury or axillary nerve injury.

Requires urgent reduction, using in line traction with gentle abduction.

Elbow

Posterior dislocation

Mechanism = fall on outstretched, hyper-extended, adducted arm.

Clinical features:

- pain
- elbow joint held in flexion
- associated fracture in 30%
- 8% have associated brachial artery injury
- neurological injury is uncommon.

Reduction method:

- Steady traction applied at the proximal forearm with the elbow in flexion. An assistant pressing on the olecranon process with their thumbs, while providing counter-traction is

useful. Usually requires a degree of sedation in addition to analgesia to gain the required level of relaxation.

- If only one treating person is available, place the patient prone on the bed and hang the affected arm off the side of the bed, flexed at the elbow with two sandbags strapped to the patient's forearm. The operator then grasps the patient's arm and applies forward pressure on the olecranon using his thumbs.
- Apply an above elbow backslab at 90 degrees of flexion following successful reduction and neurovascular assessment.

Anterior dislocations are less common and usually due to a direct blow, with greater risk of brachial artery injury. The elbow joint is held in extension and the forearm appears lengthened.

Reduction:

- Operator grasps the patient's wrist and applies sustained backward pressure to the supinated, proximal forearm, while an assistant, if available, steadies the arm.

For both posterior and anterior dislocations, strongly consider admission for limb observations for 24 hours, regardless of success at reduction.

Wrist

Lunate, perilunate, trans scaphoid perilunate and scaphoid dislocations are difficult to diagnose clinically and usually require radiology to confirm and characterise. The main concern is neurovascular injury, especially to the median nerve with a lunate dislocation. Open reduction is often required.

Interphalangeal

Mechanism:

- Hyperextension injuries produce dorsal PIP or DIP joint dislocations with potential volar plate rupture and/or phalangeal base avulsion fracture.
- Hyperflexion injuries produce volar PIP or DIP joint dislocations with potential extensor hood injury.
- Either mechanism may result in an associated lateral collateral ligament injury.

Clinical features:

- pain, though often not severe
- obvious deformity usually present
- check distal neurovascular function
- loss of axial alignment suggests a lateral collateral ligament injury

Reduction method:

- With a digital ring block or metacarpal block in place, gently but firmly exaggerate the deformity. Then apply steady axial traction and maneuver the phalangeal base back into position.
- Once reduced, check joint stability and then splint the joint. For a dorsal dislocation, place a dorsal finger splint with a degree of flexion. For a volar dislocation, place a volar splint in full extension.
- If the joint cannot be maneuvered back into position, there is probably an interposed piece of adipose tissue, cartilage or osteochondral fragment and open reduction will be needed.

Hip

The hip is a stable joint and requires significant force to disrupt. Therefore have a high level of suspicion for associated pelvic, abdominal, chest and head injury. Prosthetic hip joints require less force to dislocate and often require operative reduction.

Posterior

Accounts for 80 – 90% of hip joint dislocations.

Mechanism = axial force transmitted through femur, often with the hip in flexion. Most typically associated with motor vehicle collisions.

Clinical features:

- severe pain
- limited range of movement
- hip joint usually held in flexion, adduction and internal rotation
- 10% have associated sciatic nerve injury → impaired ankle plantar and dorsiflexion, loss of ankle jerk, sensory loss along posterior thigh and below the knee

Reduction method:

- Allis technique: Patient supine on the bed or floor. Procedural sedation with good analgesia and relaxation required. Assistant stabilises pelvis. Operator stands over patient with the hip and knee joint at 90° flexion. Axial traction applied to femur. Gentle adduction of the hip joint and/or lateral traction to the proximal femur may assist in guiding the head of the femur over the acetabular rim.
- Stimson technique: Similar to the Allis technique, but with the patient lying prone at the edge of the bed with the affected limb hanging over the edge at 90° flexion. Operator places steady force to the patient's calf. Not practical in a polytrauma patient, or if there is risk of the patient falling off the bed.
- Whistler technique: Patient lies supine, sedated and relaxed. Assistant stabilises pelvis. Operator places one hand on the good knee with their arm under the flexed knee of the affected side. The operator's other hand is stabilises the foot on the affected side. The operator then lifts their arm under the knee, applying traction to the hip joint.

Anterior

Mechanism = Hyperextension of the hip or direct blow to the posterior aspect of the proximal femur. Again, usually occurs during a motor vehicle collision.

Clinical features:

- severe pain
- limited range of movement
- hip held in flexion, external rotation and abduction
- 10% associated with femoral artery or nerve injury (quadriceps weakness, reduced knee jerk and loss of sensation to anterior and medial thigh.

Reduction method:

- Modified Allis technique: Set up as for a standard Allis. Traction applied with the hip joint

in a neutral position and lateral traction applied to the proximal femur.

Central

Central hip dislocation occurs when the femoral head is driven through the acetabulum. In effect, a fracture dislocation. Requires an open repair.

Hip dislocations are significant, not only for the force required to produce them and their associated implication for additional major trauma, but also for their sequelae. They are associated not only with neurovascular bundle injury, but also avascular necrosis of the femoral head (especially with delayed, difficult or multiple attempts at reduction, resulting in a 10 – 20% incidence of subsequent chronic hip arthritis and joint dysfunction), DVT, acetabular fracture and recurrent dislocations.

Knee

Patella

Usually dislocates over the lateral tibial condyle. Manually reduced while extending the knee joint.

Knee joint

A potentially severe injury. A stable joint that requires significant force to disrupt it. Usually occurs in the context of motor vehicle collisions and falls from a height.

Clinical features

- may be masked by the facts that it often occurs in the context of multi-trauma, the patient may be unconscious and the joint often spontaneously reduces but remains highly unstable
- 20 – 30% are open injuries
- 20 – 30% have associated peroneal nerve injury
- 30 – 40% have associated popliteal artery and vein injury
- there is high risk of compartment syndrome, which may be delayed

Management

- Reduction of the injury is often easy, but requires splinting in 20° of flexion due to instability
- Delayed reduction > 8 hours is associated with an 80% risk of amputation
- ABCD resuscitation takes precedence, but any “hard sign” evidence of vascular injury requires expeditious operative management

Ankle

Can occur in any direction and, due to ankle joint mechanics, often with an associated fracture. Neurovascular threat is a main concern and overlying skin may be stretched, resulting in ischaemic necrosis.

Urgent reduction under regional or general anaesthesia is required.

References:

- The Emergency Medicine Manual: Robert Dunn, 2nd Edition
- eMedicine.com



Recent race results

The Dakar Rally has opened 2010 with a South American event, based in Argentina and Chile. The cars and trucks completed a total of 9,030km and the bikes and quads 8,937km, including stage connections. See http://www.dakar.com/2010/DAK/presentation/us/r3_5-le-parcours.html for the route map.

Cars

| | | |
|---|--|---|
| 1. SAINZ (ESP) CRUZ (ESP) VOLKSWAGEN 47:10:00 | 4. PETERHANSEL (FRA) COTTRET (FRA) BMW +02:17:21 | 7. DE VILLIERS (ZAF) VON ZITZEWITZ (DEU) VOLKSWAGEN +05:10:19 |
| 2. AL-ATTIYAH (QAT) GOTTSCHALK (DEU) VOLKSWAGEN +00:02:12 | 5. CHICHERIT (FRA) THOERNER (CHE) BMW +04:02:49 | 8. GORDON (USA) GRIDER (USA) HUMMER +06:02:24 |
| 3. MILLER (USA) PITCHFORD (ZAF) VOLKSWAGEN +00:32:51 | 6. SOUSA (PRT) BAUMEL (FRA) MITSUBISHI +04:31:45 | 9. TERRANOVA (ARG) MAIMON (FRA) MITSUBISHI +06:04:47 |

Trucks

| | | |
|---|--|---|
| 1. CHAGIN (RUS) SAVOSTIN (RUS) NIKOLAEV (RUS) KAMAZ 55:04:47 | 4. MACIK (CZE) KALINA (CZE) BERVIC (CZE) LIAZ +12:21:21 | 7. SUGAWARA (JPN) SUZUKI (JPN) HINO +17:29:37 |
| 2. KABIROV (RUS) BELYAEV (RUS) MOKEEV (RUS) KAMAZ +01:13:08 | 5. MARDEEV (RUS) MIZYUKAEV (RUS) KARGINOV (RUS) KAMAZ +14:59:29 | 8. OLIVERAS (AND) CAMARA ORDONEZ (ESP) CAMARA (ESP) MERCEDES +23:39:06 |
| 3. VAN VLIET (NLD) VAANHOLT (NLD) VAN VEENENDAAL (NLD) GINAF +10:43:20 | 6. VAN GINKEL (NLD) DE ROOIJ (NLD) TIJSTERMAN (NLD) GINAF +15:29:16 | 9. JUVANTENY (ESP) CRIADO (ESP) ROMAN (ESP) MAN +24:15:27 |

Bikes

| | | |
|--|--|--------------------------------------|
| 1. DESPRES (FRA) KTM 51:10:37 | 4. RODRIGUES (PRT) YAMAHA +01:19:33 | 7. STREET (USA) KTM +02:49:43 |
| 2. ULLEVALSETER (NOR) KTM +01:02:52 | 5. FRETIGNE (FRA) YAMAHA +01:55:56 | 8. PRZYGONSKI (POL) KTM +03:15:59 |
| 3. LOPEZ CONTARDO (CHL) APRILIA +01:09:48 | 6. DUCLOS (FRA) KTM +01:58:35 | 9. PAIN (FRA) YAMAHA +03:28:20 |

Quadbikes

| | | |
|--|--|---------------------------------------|
| 1. PATRONELLI (ARG) YAMAHA 64:17:44 | 4. DECLERCK (FRA) POLARIS +05:46:56 | 7. BRAZINA (CZE) POLARIS +16:33:41 |
| 2. PATRONELLI (ARG) YAMAHA +02:22:59 | 5. SONIK (POL) YAMAHA +05:50:24 | 8. AUERT (FRA) CAN-AM +16:52:16 |
| 3. GONZALEZ COROMINAS (ESP) YAMAHA +05:07:31 | 6. HALPERN (ARG) YAMAHA +09:07:31 | 9. GRAUE (ARG) CAN-AM +17:37:20 |



F1 update

The major new regulatory change for Formula 1 in 2010 is the banning of refueling during the race. Pit stops will still occur, but only for tyre changes. There have been a number of projected technical developments as a result. To begin with, the fuel tank will essentially double in capacity, from 125litres to 235 litres. As a result it will create a longer wheel base, wider-bodied car. There have been ongoing discussions regarding how this might effect other aspects of the car. The driver's seat may be nudged forward and the gearbox may be moved back behind the engine.

Additionally, there will be a wider space between the nose cone and the inside wall of the front wheels, which no doubt will be fill with aerodynamic wizardry. The tyres will be narrower than 2009 in attempt to limit speed.

Whether any of these changes will affect rescue crews is not yet clear, although the potential for pit lane fires seems reduced with no race refueling.



Caught by the cameras

Travis Pastrana is a US rally driver who has made his name not only winning Rally America championships, but also dirt bike competitions and is a regular X-Games competitor. He landed the first dirt bike double back flip and has jumped a single back flip over a hovering helicopter near the Sydney Harbour Bridge. For New Year's Eve 2009, he broke the world record for longest rally car jump, by jumping 269ft in a Subaru Impreza at Pine Street Pier, Long Beach Harbour, California. The previous record stood at 100ft, held by his team mate, Ken Bloch.

<http://www.youtube.com/watch?v=Y411FcxKDFw>

