BokSmart
WINNERS PLAY SMART

KNEE, SHOULDER, ANKLE AND CERVICAL SPINE ASSESSMENT

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SA RUGBY

ABSA

CHRIS BURGER PLAYERS FUND PETRO JACKSON

Providing coaches, referees, players, and administrators with the knowledge, skills, and leadership abilities to ensure that safety and best practice principles are incorporated into all aspects of contact rugby.

KNEE ASSESSMENT

KNEE HISTORY

MECHANISM OF INJURY:

Record the mechanism of injury

Primary mechanisms and structures usually injured are[1]:

Valgus force (± Rotation)

- MCL
- Posterior medial capsule
- Medial meniscus
- ACL

Hyperextension

ACL ± Meniscal tears

Flexion with posterior translation

PCL

Varus force

LCL

Posterior capsule

PCL

Acceleration

Meniscus

Deceleration

ACL

PCL

Rotation

Meniscus

Cutting

PCL

PAIN

Record the location and character of the pain[2]:

- **Pain at rest**; not usually mechanical in origin
- **Pain during activity** is usually seen in structural abnormalities:

Subluxation

Patella tracking abnormalities

- **Pain after activities**: inflammatory disorders

Plica

Tendonosis

Paratendonosis

Sinding-Larson-Johansen syndrome

SWELLING

Record any swelling or fullness in the joint[2]:

- **Immediate swelling** usually indicates bleeding into joint:

ACL pathology

- **Delayed swelling** 8-24 h after injury indicates:

Instability

Meniscal pathology

Bursa

Inflammation

FUNCTIONALLY

Record any of the following:

"Giving way" this may indicate:

Instability of the knee

Meniscal pathology

Patella subluxation

Patellofemoral pain syndrome (especially when walking uphill or downhill)

Loose body

- **Has the knee ever locked** (this usually means the knee cannot fully extend, with flexion being normal) – usually indicates:

Meniscal pathology

Loose body

- Grating or clicking: this may indicate

Degeneration

One structure snapping over another

Functional limitations related to the players position:

Training limitations

Playing limitations

OBJECTIVE CLINICAL ASSESSMENT

KNEE FLEXION

DEFINITION

Knee flexion

PURPOSE

To assess the active range of knee flexion

EQUIPMENT

Firm bed/plinth

Goniometer

LANDMARKS

Midpoint of lateral joint line

Lateral malleolus

Greater trochanter

PROCEDURE

Player lying supine

Ask the player to actively flex the knee as far as possible

Overpressure may be applied to assess further passive range, and assess the end-feel and note for any pain

SCORING

Measure the degree of active knee flexion with the goniometer centered over the lateral knee joint line

Compare with the opposite side[3]

NORMS

Active knee flexion : 0°-135°[4]

COMMENT

Note that the tracking of the patella should be a smooth curve from lateral to medial during flexion

KNEE HYPEREXTENSION

DEFINITION

Knee hyperextension

PURPOSE

To assess the degree of knee hyperextension and laxity of the knee joint

EQUIPMENT

Firm bed/plinth

Goniometer

LANDMARKS

Midpoint of the lateral joint line

Lateral malleolus

Greater trochanter

PROCEDURE

Player lying supine

Examiner stabilizes proximal tibia by applying a posteriorly directed force

Gripping under the distal leg with the other hand, raising the leg into hyperextension

SCORING

Record the degree of hyperextension

NORMS

Hyperextension: 0°-15°[4]

COMMENT

Knee extension is typically 0° but may be -15° especially in women[4]

TIBIAL ROTATION

DEFINITION

Tibial Internal/External rotation (at 90°)

PURPOSE

To assess the rotational mobility of the tibiofemoral joint

EQUIPMENT

Chair

Goniometer

Paper

Pen

LANDMARKS

Midpoint of posterior aspect of the calcaneus

Medial aspect of first MTPJ

PROCEDURE

Internal rotation

Player sits on chair with hips, ankle, and knees at 90° flexion

Mark neutral position

The foot and tibia is rotated internally around the fixed heel

The knee is maintained parallel to the midline of the body throughout the test

External rotation

Player sitting as above with both fists clenched and separating the knees

Foot is externally rotated; knees must stay in contact with the fists during the test

SCORING

Mark the full range of internal and external rotation just medial to the MTPJ

Align the goniometer with the stationary arm in the sagittal plane and record degree of rotation

NORMS

Medial rotation of tibia on femur: 20°-30°[4]

Lateral rotation of tibia on femur: 30°-40°[4]

PATELLOFEMORAL GLIDE

DEFINITION

Patellofemoral glide test

PURPOSE

To assess the mobility of the PFJ in a medial and lateral direction

EQUIPMENT

Firm bed/plinth

LANDMARKS

Patella superior and inferior poles

PROCEDURE

Player lying supine with knee extended and quad muscles relaxed

Examiner places thumbs on the lateral border of patella and performs a medial glide noting resistance and range of movement. The examiners fingers are then placed on the medial border of the patella and a lateral glide is performed

SCORING

Comment on whether the glide is restricted or tight and if there is a painful response

Compare to opposite side

Divide patella into four quadrants

NORMS

Hypomobile: less than one quadrant movement on medial or lateral glide

Normal: two quadrants (half width of patella movement)

Hypermobile: More than two quadrants of movement [5]

COMMENT

Note any rotation of the patella with medial and lateral glides

Can also test at 30° and 45°, which is a more functional position; note presence of pain or apprehension[5]

ANTERIOR DRAWER TEST

DEFINITION

Anterior drawer test

PURPOSE

To assess the anterior displacement of the tibia on the femur, which may be due to ACL insufficiency

EQUIPMENT

Firm plinth/bed

LANDMARKS

Nil

PROCEDURE

Player lying supine, hip flexed to 45°, knee flexed to 90°, tibia in neutral rotation

Foot remains flat on plinth throughout the test; examiner stabilizes this position by sitting on the foot

Examiner places both hands around upper tibia with thumbs on the joint line anteriorly

Fingers wrap around the leg posteriorly so index fingers can palpate hamstring tendons to ensure hamstrings remain relaxed throughout the test

Examiner pulls proximal tibia forward and palpates anterior joint line with thumbs to detect anterior displacement of the tibial plateau

SCORING

Record palpable anterior or posterior displacement of the tibia on the femur

NORMS

Normal amount of movement is 6mm[4]

COMMENT

A positive finding indicates that further assessment of the integrity of the ACL must be performed including Lachman and Pivot Shift tests[4]

There are many structures other than the ACL that can influence this test (Capsule, MCL, ITB, popliteus)

It is important to recognize the possibility of a false negative test due to PCL damage allowing the tibia to fall posteriorly prior to the commencement of the test (look for posterior sag)[4]

LACHMAN TEST

DEFINITION

Lachman test of the knee

PURPOSE

To identify the integrity of the Anterior Cruciate Ligament (ACL)

EQUIPMENT

Firm bed/plinth

LANDMARKS

Anterior joint line

PROCEDURE

Player lying supine

Knee held in approximately 15°-30° of flexion throughout test

Examiner stabilizes distal thigh in one hand and grasps proximal tibia in the other with the fingers wrapping around posteriorly

Examiner pulls proximal tibia forward

SCORING

Positive test = excessive anterior displacement of tibia on femur[3;4]

Lack of normal (sudden, firm) end feel also indicative of ACL damage[4]

NORMS

Normal

Firm end feel

5-8mm shift[3]

Abnormal

Mushy end feel

7-9mm shift[3]

Disappearance of infrapatella tendon slope [4]

COMMENT

Displacement must be compared between knees

The Lachman test is claimed to be the most accurate clinical test for the integrity of the ACL but may also indicate injury to:

1. Posterior oblique ligament[4]
2. Arcuate-popliteus complex[4]
3. False negatives may occur due to bucket handle meniscal tears[4]

PIVOT SHIFT TEST

DEFINITION

Pivot Shift Test

PURPOSE

To identify anterolateral rotary instability of the tibiofemoral joint

As a test to evaluate ACL integrity

EQUIPMENT

Nil

LANDMARKS

Lateral tibial plateau

PROCEDURE

Player lying supine

Examiner standing at the side of the bed

Examiner places one hand under the athletes heel and passively raises leg 5-10cm off plinth, keeping knee extended

Examiner places other hand on lateral tibial plateau

Examiner internally rotates the lower leg via the foot and applies a gentle valgus stress to the knee

While maintaining internal rotation and valgus stress examiner slowly flexes knee joint

SCORING

Anterior subluxation of the lateral tibial condyle occurs initially

A positive test results when the lateral tibial plateau is felt/observed to reduce posteriorly (lateral tibial rotation) sometimes with a clunk at 30-40° of flexion [3]

NORMS

In a positive test there is subluxation of the tibial condyle and then reduction[3;4]

COMMENT

A positive test indicates probable damage to:

ACL

Posterolateral capsule

Arcuate-popliteus complex

LCL

The ITB must be intact for a positive test[4]

POSTERIOR DRAWER TEST

DEFINITION

Posterior drawer test of the knee

PURPOSE

To assess the posterior displacement of the tibia on the femur, which may be due to PCL insufficiency

EQUIPMENT

Firm plinth/bed

LANDMARKS

Nil

PROCEDURE

Player lying supine, hip flexed to 45°, knee flexed to 90°, tibia in neutral rotation

Foot remains flat on plinth throughout the test; examiner stabilizes this position by sitting on the foot

Examiner places both hands around upper tibia with thumbs on joint line anteriorly. Fingers wrap around the leg posteriorly so index fingers can palpate hamstring tendons to ensure hamstrings remain relaxed throughout the test

Examiner pushes proximal tibia posteriorly and palpates anterior joint line with thumbs to detect posterior displacement of the tibial plateau

SCORING

Record palpable posterior displacement of the tibia on the femur

NORMS

Normally the medial tibial plateau extends 10mm anteriorly beyond the femoral condyle at 90° flexion; if this step is lost or there is posterior displacement it constitutes a positive test [4]

COMMENT

A positive finding indicates that the following structures may have been injured to some degree:[4]

PCL

Arcuate-popliteus complex

Posterior oblique ligament

ACL

MEDIAL COLLATERAL (MCL) STRESS TEST

DEFINITION

MCL Valgus stress test of the knee

PURPOSE

To assess the integrity of the medial collateral ligament and medial joint capsule of the knee

EQUIPMENT

Firm bed/plinth

LANDMARKS

Medial joint line

PROCEDURE

Player lying supine

Examiner passively flexes knee to 30° over side of plinth, thigh remains flat on plinth throughout the test

Examiner grasps distal tibia in one hand and places palm of the other hand on the lateral aspect of the knee with the fingers over the medial joint line

Examiner applies valgus stress to the knee by pushing the tibia into abduction, while applying a counterforce to the lateral knee

Test protocol is repeated with knee in full extension

SCORING

Record palpable and observable opening along the medial joint line when valgus stress is applied

Compare to opposite side

NORMS

Grade I: 5mm opening

Grade II: 5-10mm opening

Grade III: >10mm opening[6;7]

COMMENT

Opening in extension indicates possible damage to the following structures[4]:

MCL (superficial and deep fibers)

Posteromedial capsule

ACL

PCL

Medial quadriceps expansion

Semimembranosus

Opening at 30° indicates possible damage to the following structures[4]:

MCL

Posterior oblique ligament

PCL

Posterior medial capsule

LATERAL COLLATERAL (LCL) STRESS TEST

DEFINITION

Lateral Collateral Ligament (LCL) varus stress test

PURPOSE

To assess the integrity of the lateral ligament complex of the knee

EQUIPMENT

Firm bed/plinth

LANDMARKS

Lateral joint line

PROCEDURE

Player lying supine

Examiner passively flexes knee to 30° over side of plinth, thigh remains flat on plinth throughout the test

Examiner grasps distal tibia in one hand and places palm of the other hand on the medial aspect of the knee with the fingers over the lateral joint line

Examiner applies varus stress to the knee by pushing the tibia into adduction, while applying a counterforce to the medial knee

Test protocol is repeated with knee in full extension

SCORING

Palpable and observable opening along the lateral joint line when varus stress is applied

Compare with opposite side

Note athletes pain response

NORMS

Grade I: 5mm opening

Grade II: 5-8mm opening

Grade III: >8mm opening (usually painless)[6;7]

COMMENT

A positive test in extension indicates possible damage to the following structures[4]

LCL

Posterior lateral capsule

Arcuate-popliteus complex

Bicep femoris tendon

PCL

ACL

Lateral gastrocnemius muscle

ITB

A positive test in 30° flexion indicates possible damage to[4]:

LCL

Posterolateral capsule

Arcuate-popliteus complex

Bicep femoris tendon

ITB

McMURRAY'S TEST

DEFINITION

McMurray's test of meniscus

PURPOSE

To assess the posterior horn of the medial and lateral meniscus

EQUIPMENT

Firm bed/plinth

LANDMARKS

Joint line

PROCEDURE

Player lying supine

Examiner passively flexes hip and knee to full knee flexion

Examiner cups one hand around heel and grasps rear foot, palm of other hand is placed on the lateral aspect of the knee joint, with the fingers over the medial joint line

Examiner laterally rotates lower leg through the rear foot and applies a valgus stress to the knee

While maintaining external rotation and valgus force the examiner slowly extends the knee from a fully flexed position to a position of 90° flexion

This test is repeated with a combination of internal rotation and varus force

SCORING

Record pain and/or a palpable/audible click in the knee during passive extension[8]

NORMS

Positive test: pain and/or a palpable/audible click in the knee during passive extension

COMMENT

A positive test generally indicates pathology of the meniscus usually the posterior horn [9]

It has been reported that meniscal lesions may be found on the medial side with lateral rotation and on the lateral side with medial rotation[10]

This test has been found to have a sensitivity of 26% and a specificity of 85%, thus false positives are common[11]

Tenderness on palpation of the joint line is positive with meniscal lesions in 85% of cases and is perhaps considered a more accurate test [12]

SQUAT TEST (DUCK WALK)

DEFINITION

Squat test or Duck Walk Test

PURPOSE

To assess the ability to achieve a full squatting position; to evaluate for meniscal pathology in a weight-bearing position

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Player stands initially, then squats down on toes slowly as far as possible, keeping the heels elevated

Examiner views the quality of movement, and if the squat position is achieved and maintained without problems; over pressure is applied downwards through the shoulders of the player

As a more provocative test of the menisci, a “duck walk” can be performed by the player in the full squat position

SCORING

Record any pain response (and location) elicited with squat and overpressure [3;13] and or duck walk

Limitation of movement if appropriate

NORMS

Painless, ability to duck walk with no difficulty[3;13]

COMMENT

Pain, snapping or a click is considered positive for a posterior horn lesion of the meniscus [13]

McCONNELL TEST

DEFINITION

McConnell test for patellofemoral pain syndrome [14]

PURPOSE

To determine if knee pain is patellofemoral in origin

EQUIPMENT

Nil

LANDMARKS

Patella

PROCEDURE

Player sitting with femur laterally rotated

Player performs isometric quadriceps contractions at 120°, 90°, 60°, 30° and 0°, with each contraction held for 10 seconds

If pain is produced during any of the contractions the player's knee is fully returned to extension by the examiner; the patient leg is then fully supported on the examiners knee and the examiner pushes the patella medially

The medial glide is maintained while the knee is returned to the painful angle, and the player performs an isometric contraction again, with the patella held medially

The test is repeated at each angle

SCORING

If pain is decreased, with medial glide the pain is patellofemoral in origin [4;14]

NORMS

Painless

ANKLE ASSESSMENTS

ANKLE HISTORY

MECHANISM OF INJURY

Record the position of the foot at the time of injury there may be a combination of positions

Inversion

Eversion

Plantar flexion

Dorsiflexion

Also record the intrinsic mechanism of injury

Acceleration

Deceleration

Cutting

Twist

FUNCTIONALITY

Was the player able to continue with activity? If so it is probably not too severe

Inability to bear weight, severe pain, and rapid swelling indicate a severe injury[15]

Walking is compatible with a second-degree sprain; pain with running usually indicates a first-degree sprain [16]

SWELLING

Record any swelling or fullness in the joint:[17]

Immediate swelling usually indicates bleeding into joint:

Delayed swelling (8-24h) after injury indicates

Instability

Capsulitis/synovitis

Inflammation

PAIN

Record the location and character of the pain[17]

- Pain at rest; not usually mechanical in origin
- Pain during activity is usually seen in structural abnormalities:
- Pain after activities: inflammatory disorders

OBJECTIVE CLINICAL ASSESSMENT

NON WEIGHT-BEARING PLANTAR FLEXION

DEFINITION

Non-weight-bearing ankle plantar flexion range of movement

PURPOSE

To assess range of movement of the foot complex into plantar flexion

EQUIPMENT

Goniometer

Firm bed/plinth

LANDMARKS

Tip of medial malleolus

Medial joint line of first MTP joint

PROCEDURE

Player long sitting or supine, feet off end of the bed/plinth

Maintain leg flat and knee extended throughout test

Player actively plantar flexes as far as possible

SCORING

Record angle formed by line joining landmarks relative to the horizontal[3]

Note the limiting factor: muscular or joint tightness

NORMS

Normal range is 50°[18]

COMMENT

The patient's heel normally inverts with non-weight-bearing plantar flexion. If inversion does not occur, the foot is unstable or there is tibialis dysfunction or tightness [19]

The range of plantar flexion may be limited following injury and impair performance[3]

ROM can be tested in weight-bearing to differentiate joint restriction from weak plantar flexion[3]

NON WEIGHT-BEARING DORSIFLEXION

DEFINITION

Non weight-bearing dorsiflexion

PURPOSE

To measure active ankle dorsiflexion range of movement

To assess the length of gastrocnemius and soleus in a non weight-bearing position

EQUIPMENT

Goniometer

Firm bed/plinth

LANDMARKS

Tip of medial malleolus

Medial joint line of first MTP joint

PROCEDURE

Player long sitting or supine, feet off end of the bed/plinth

Maintain leg flat and knee extended throughout test

Subtalar joint maintained in neutral position throughout test

Player actively dorsiflexes as far as possible

SCORING

Record angle of foot relative to the vertical, axis of goniometer placed over inferior tip of the medial malleolus

Note the limiting factor: muscular or joint tightness

NORMS

Normal range 20°[17;18]

COMMENT

If restricted perform at 30° of knee flexion to eliminate posterior muscle tightness[4]

WEIGHT-BEARING DORSIFLEXION

DEFINITION

Weight bearing dorsiflexion (extension)

PURPOSE

To assess the range of talocrural dorsiflexion in a functional position for weight-bearing sports

Indirectly measures the length of the gastrocnemius and soleus muscles

EQUIPMENT

Goniometer with spirit level

LANDMARKS

Inferior tip of lateral malleolus

Midline of lateral aspect of the head of the fibula

PROCEDURE

Part I (Soleus)

Player in stride-stand position, no shoes

Maintain heel contact with floor throughout test

Maintain subtalar joint in stable position throughout the test to prevent pronation

Bend knee forward in line with the second toe until heel contact decreases or pain is experienced

Part II (Gastrocnemius):

Repeat test and maintaining knee extension throughout the test this will indicate the relative length of the gastrocnemius muscle

SCORING

Record the angle formed by the shaft of the fibula relative to the vertical

NORMS

Soleus: 30°-40°

Gastrocnemius: 20°-30°

The difference between the two measures should be close to 10° [17]

COMMENT

Restriction of dorsiflexion at the talocrural joint may be due to gastrocnemius-soleus complex tightness[18]

Players with restriction of dorsiflexion often compensate by pronating the foot in weight bearing. This can cause biomechanical changes and predispose to injury[18]

SUPINATION / PRONATION

DEFINITION

Supination and pronation range of motion of the ankle joint

PURPOSE

To identify hypo- and hypermobility of the ankle, which may be sequelae to ankle joint injuries

EQUIPMENT

Firm bed/plinth

Goniometer

LANDMARKS

Nil

PROCEDURE

Player long sitting or supine, feet off end of bed/plinth

Maintain hip joint in a neutral position, knee joint extended and foot in dorsiflexion throughout test

Starting position of foot in neutral

Player actively supinates the foot as far as possible

After returning to the starting position the player actively pronates the foot as far as possible

SCORING

Record range of movement

Watch for subluxation of tendons

NORMS

Supination: 45°-60°[17]

Pronation: 15°-30°[17]

COMMENT

Supination combines the movements of:

Inversion

Adduction

Plantar flexion

Pronation combines the movements of [17]:

Eversion

Abduction

Dorsiflexion

If tibialis anterior is weak supination will be affected[17]

If the peronei are weak or the tendons sublux, pronation will be affected[17]

The range of subtalar movement is generally considered to be 2/3 inversion and 1/3 eversion[18]

TALAR TILT TEST

DEFINITION

Talar tilt test or Lateral ligament stress test

PURPOSE

To assess the integrity of the calcaneofibular and anterior-posterior talofibular ligaments

EQUIPMENT

Firm bed/ plinth

LANDMARKS

Nil

PROCEDURE

Player lying supine with feet over end of bed/ plinth

Examiner stabilizes the lower leg with one hand and grasps the calcaneus in the palm of the other hand with the thumb or index finger placed over the calcaneofibular ligament

Examiner applies inversion stress by rolling the calcaneus inwards causing the talus to tilt

SCORING

Positive test: excessive talar tilt or gapping of the joint compared to the other side[17]

NORMS

No gapping of joint, bilaterally similar[17]

COMMENT

At 90° the calcaneofibular ligament is tested[17]

If the foot is plantar flexed the anterior talofibular ligament is more likely to be tested[17]

MEDIAL LIGAMENT STRESS

DEFINITION

Medial (Deltoid) ligament stress test

PURPOSE

To assess the integrity of the medial collateral (deltoid) ligament of the ankle and its stability within the mortise

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Player lying supine with feet over end of bed/ plinth

Examiner stabilizes the lower leg with one hand and grasps the calcaneus in the palm of the other hand with the thumb or index finger placed over the medial ligament

Examiner applies eversion stress by rolling the calcaneus outwards

SCORING

Record excessive tilt or gapping of joint compared to the other side

Record medial ankle pain

NORMS

Positive test: excessive moment, pain[17]

ANTERIOR DRAWER TEST

DEFINITION

Anterior drawer test of the ankle joint

PURPOSE

To assess the stability of the anterior talofibular ligament

EQUIPMENT

Firm bed/ plinth

LANDMARKS

Nil

PROCEDURE

Player lying supine with feet over the end of the bed/plinth

Examiner stabilizes the lower leg with one hand and cups the calcaneus in the palm of the other hand, holding foot in 20° of plantar flexion

Examiner pulls heel and foot anteriorly while applying a counterforce to the lower leg

SCORING

Record excessive anterior glide compared to the other side

NORMS

Positive test: excessive movement, pain, sulcus

COMMENT

Sometimes a dimple appears over the area of the anterior talofibular ligament on anterior translation (sulcus sign)[17]

If straight anterior movement or translation occurs the test indicates both medial and lateral ligament instabilities, indicating damage to[17]:

Superficial and deep deltoid ligaments

Anterior talofibular ligament

Anterolateral capsule

If the tear is only on one side the affected side would translate forward resulting in rotation of the talus, this is increasingly evident with increasing plantar flexion of the foot [20]

DISTAL TIBIOFIBULAR COMPRESSION TEST

DEFINITION

Distal tibiofibular compression test

PURPOSE

To assess the integrity of the syndesmosis

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Player lying supine with feet over the end of the bed/plinth

Examiner grasps the lower leg with both hands and applies pressure over the malleoli and distal tibia and fibula

SCORING

Record any pain in the lower leg on compression which may indicate a syndesmotic injury[17]

NORMS

Painless

COMMENT

It has been reported that the "length of tenderness" above the lateral malleolus gives an indication of severity [21]

EXTERNAL ROTATION STRESS TEST

DEFINITION

External rotation stress test of syndesmotic integrity

PURPOSE

To assess the integrity of the ankle syndesmosis

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

The subject is seated with the leg hanging over the examination table with the knee at 90°

The examiner faces the leg, holds the foot in plantargrade (90°) and applies a lateral rotation stress to the foot and ankle

SCORING

Record the pain response, a positive test if pain is produced over the anterior or posterior tibiofibular ligaments or interosseous membrane[17;22]

NORMS

Painless

POSTERIOR IMPINGEMENT

DEFINITION

Posterior impingement test of the ankle

PURPOSE

To impinge the posterior ankle structures (capsule, synovium, bone) in forced plantar flexion

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Player lying prone with knee flexed at 30°

Examiner grasps the dorsal aspect of the forefoot with one hand and the calcaneus with the other

The ankle is forced into full plantar flexion with overpressure given at the end of range

SCORING

Positive test: pain on forced plantar flexion[17]

NORMS

Painless

ANTERIOR IMPINGEMENT

DEFINITION

Anterior impingement test of the ankle

PURPOSE

To impinge the anterior ankle structures (capsule, synovium, bone) in forced dorsiflexion

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Player lying supine with foot resting over the edge of the bed and knee flexed at 30-40° to reduce Achilles' tension

Examiner uses the heel of one hand under the metatarsal heads to force the ankle into full dorsiflexion with overpressure given at the end of range. The other hand may be used to stabilize the tibia

SCORING

Positive test: pain on forced dorsiflexion[17]

NORMS

Painless

PROPRIOCEPTION

DEFINITION

Lower limb proprioception

PURPOSE

To evaluate the balance and proprioception within the lower extremity (foot, ankle, knee and hip)

EQUIPMENT

Foam block

Wobble board

Stopwatch

LANDMARKS

Nil

PROCEDURE

Stage I

Player stands on one foot, knee bent slightly for 30 s (hands may be used for balance)

Stage II

As above with eyes closed

Stage III

As above with head tilted backwards

Stage IV

Player standing on one foot on a piece of foam, knees bent slightly, and eyes closed

Players are instructed to put the opposite foot down to steady themselves if they begin to lose balance and not to hop

SCORING

Record the number of touchdowns of the opposite foot during the 30 sec test period[17]

Comments on the quality/stability of ankle/knee/hip movements may be appropriate

NORMS

Compare left and right

COMMENT

If poor proprioception and balance is found then the player may be prone to ankle sprains and recurrence of these injuries

Poor proprioception may be the result previous ligamentous and joint damage/surgery which has not been fully rehabilitated

OTTOWA ANKLE RULES

DEFINITION

Ottawa Ankle Rules [23]

PURPOSE

To determine when it is appropriate to X-ray the ankle or foot after injury

EQUIPMENT

X-rays

LANDMARKS

Lateral malleolus

Medial malleolus

Navicula

PROCEDURE

Palpate the following for tenderness

Posterior edge or tip of lateral malleolus

Posterior edge or tip of medial malleolus

Base of the Fifth metatarsal

Navicula

SCORING

If the player is unable to weight-bear or has tenderness at any of the following points a X-ray is warranted [23]:

Posterior edge or tip of lateral malleolus

Posterior edge or tip of medial malleolus

Base of the Fifth metatarsal

Navicula

NORMS

Normally painless

COMMENT

Leddy and associates[22] changed this with the “Buffalo Modification” to include the mid portion of the malleolus proximal to the ligament attachments in the assessment

The Ottawa ankle rules do not apply to [23]:

Players under the age of 18

Multiple painful injuries

Head injury

Intoxication

Neurological deficit

Pregnancy

NECK ASSESSMENTS

NECK HISTORY

MECHANISM OF INJURY

Record the mechanism of injury:

Trauma (e.g. whiplash) was the player hit from front, back side

Stretching (burners, brachial plexus injury)

Overuse (thoracic outlet syndrome, cervical spondylolisthesis)

Did the head strike anything or did the patient lose consciousness (LOC)?

PAIN

What are the sites and boundaries of the pain?

Cervical radiculopathies (injuries to the nerve roots) are associated with [24]:

Unilateral motor and sensory symptoms of upper limb

Muscle weakness

Sensory alteration

Decreased reflexes

Cervical myelopathies (injuries to the spinal cord itself) are usually associated with [25]:

Spastic weakness

Parasthesia

Loss of coordination

May be bilateral

May affect lower limb, bowel function

Record the character of the pain

Deep

Superficial

Shooting

Aching

Radiating

Is the pain affected by coughing, laughing, or straining? If so an increase in intra-abdominal pressure may be contributing to the problem [26]

Are there any associated headaches, signs of a headache of cervical origin include [26]:

Occipital or sub occipital component

Neck movement alters headache

Painful limitation of neck movements

Abnormal head or neck posture

Sub occipital or nuchal tenderness

Abnormal mobility at C0 - C1

Sensory abnormalities at the occipital or sub occipital areas

PARASTHESIA

Record any parathesia ("pins and needles feeling") or tingling

This sensation is present if pressure is applied to the nerve root [26]

May become evident if pressure is relieved from a nerve trunk [26]

DIZZINESS

Does the patient experience any dizziness, faintness or seizures? This may be related to semicircular canal or vertebral artery problems [26]

AGGRAVATING AND RELIEVING FACTORS

Record any aggravating or relieving factors. Are there any neck or head positions that the patient finds particularly bothersome?

If the symptoms are not relieved by a change in position the problem is not likely to be mechanical in origin [26]

Lesions of the C3,C4, C5 may affect the diaphragm and therefore affect breathing [26]

OBJECTIVE CLINICAL ASSESSMENT

CERVICAL FLEXION/ EXTENSION

DEFINITION

Cervical flexion and extension

PURPOSE

To assess the flexion and extension range of movement and segmental mobility of the cervical spine

EQUIPMENT

Firm bed/plinth

LANDMARKS

Clavicle

Earlobe

PROCEDURE

Player sitting on the edge of the plinth in an upright posture with knees against the edge, and looking forward

Player fully flexes neck with the examiner viewing posteriorly and laterally. Good lumbar and thoracic posture should be maintained during movement

The neck is then fully extended, again with the examiner viewing posteriorly and laterally [27]

SCORING

Record the movement as a fraction /10, as well as any hypo/hyper mobile levels, any pain should be also recorded

NORMS

Active flexion : 80° - 90°[26]

Active extension: 70° [26]

COMMENT

The extreme flexion ROM is found when the chin is able to reach the chest with the mouth closed, however up to two finger widths is considered normal

At extreme extension ROM the plane of the nose and forehead is nearly horizontal

In flexion[26]:

The intervertebral disc widens posteriorly

The intervertebral foramen is 20-30% larger

The vertebrae shift forward

In extension[26]:

The intervertebral disc narrows posteriorly

The intervertebral foramen is smaller

The atlas tilts upwards resulting in posterior compression between atlas and the occiput

CERVICAL LATERAL (SIDE) FLEXION

DEFINITION

Cervical lateral (side) flexion

PURPOSE

To assess the lateral flexion movement and segmental mobility of the cervical spine

EQUIPMENT

Firm bed/plinth

LANDMARKS

Clavicle

Earlobe

PROCEDURE

Player sitting on the edge of the plinth in an upright posture with knees against the edge, and looking forward

Player laterally flexes neck fully to right and then to left whilst maintaining neutral rotation and neutral flexion/extension position

The examiner views posteriorly[27]

SCORING

Record the movement as a fraction /10, as well as any hypo/hyper mobile levels, any pain should be also recorded

NORMS

Lateral flexion : 20°- 45°[26]

COMMENT

Most of the lateral flexion occurs between the occiput and C1, and between C1 and C2[26]

Ensure the ear moves towards the shoulder and not the shoulder towards the ear

CERVICAL ROTATION

DEFINITION

Cervical lateral (side) flexion

PURPOSE

To assess the rotational movement and segmental mobility of the cervical spine

EQUIPMENT

Firm bed/plinth

LANDMARKS

Clavicle

Earlobe

PROCEDURE

Player sitting on the edge of the plinth in an upright posture with knees against the edge, and looking forward

Player rotates head and neck fully first to the right and then to the left

SCORING

Record the movement as a fraction /10, as well as any hypo/hyper mobile levels, any pain should be also recorded

NORMS

Rotation: 70° – 90°[27]

The chin does not quite reach the plane of the shoulder[26]

COMMENT

Rotation and side flexion always occur together in the cervical spine (coupled movement)[26]

CERVICAL RETRACTION

DEFINITION

Cervical retraction

PURPOSE

To assess the upper cervical flexion and segmental mobility of the cervical spine

EQUIPMENT

Firm bed/plinth

LANDMARKS

Clavicle

Earlobe

PROCEDURE

Player sitting on the edge of the plinth in an upright posture with knees against the edge, and looking forward

Player asked to pull chin in so as to flex upper cervical spine

Overpressure may be given by the examiner to further assess the motion by stabilizing the lower cervical spine with one hand and applying a posteriorly directed force to the athletes chin with the other

SCORING

Record the final active position of the earlobe relative to the clavicle: Anterior, level or posterior[27]

Any pain produced is also recorded

NORMS

Painless and in line with clavicle

MUSCLE STRENGTH

DEFINITION

Cervical myotome muscle strength test

PURPOSE

To determine the muscle power and possible neurological weakness originating from the cervical nerve roots

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Player seated, instruct the patient "***don't let me move you***" so that an isometric contraction is obtained

Hold each contraction for 5 seconds

Test both sides at the same time to provide a comparison as below[27]

Cervical muscle myotomes and testing procedure[27]

Myotome	Test	Procedure
C1, C2	Neck flexion	Apply pressure to forehead with neck in slight flexion
C3 & CN XI	Neck side flexion	Support shoulder apply pressure above ear
C4 & CN XI	Shoulder elevation	Apply downward force on both shoulders
C5	Shoulder abduction	Ask patient to elevate arms above 75°, elbows flexed, apply downward force
C6	Elbow flexion	Arms by side, elbows flexed to 90°, apply downward pressure
C7	Elbow extension	Arms by side, elbows flexed to 90°, apply upward pressure
C8	Thumb extension	Athlete extends thumb just short of full range
T1	Finger abduction	Abduct fingers and apply pressure against abduction

SCORING

Record any weakness /5

Compare L and R

Muscle test grading[2]

Grade	Value	Movement
5	Normal (100%)	Complete range of motion against gravity with maximal resistance
4	Good (75%)	Complete range of motion against gravity with some (moderate) resistance
3+	Fair +	Complete range of motion against gravity with minimal resistance
3	Fair (50%)	Complete range of motion against gravity
3-	Fair -	Some but not complete range of movement against gravity
2+	Poor +	Initiates movement against gravity
2	Poor (25%)	Complete range of movement with gravity eliminated
2-	Poor -	Initiates movement if gravity is eliminated
1	Trace	Evidence of slight contractility but no movement
0	Zero (0%)	No contraction palpated

NORMS

5

COMMENT

Repetitive tests may be used to fatigue muscle and elicit subtle weakness

CERVICAL REFLEXES

DEFINITION

Cervical reflexes

PURPOSE

To evaluate the cervical reflexes if neurological involvement is suspected

EQUIPMENT

Reflex hammer

LANDMARKS

Biceps tendon

Triceps tendon

PROCEDURE

Biceps (C5-C6)

Examiner places his thumb over the biceps tendon, and then taps the thumb with the reflex hammer to elicit the reflex

Triceps (C7-C8)

Examiner places elbow in flexion and strikes directly on triceps tendon to elicit reflex

SCORING

Grade reflex 0-4[(2)]

0 – absent

1 – Diminished

2 – Average (normal)

3 – Exaggerated

4 – Clonus, very brisk

NORMS

2

CERVICAL QUADRANT

DEFINITION

Cervical quadrant test

PURPOSE

To assess mobility of, and pain response to the combined cervical movements of extension, lateral flexion and ipsilateral rotation (closed packed position)

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Player sits on the edge of the plinth facing forward with hands resting on sides

Examiner passively moves athletes head and cervical spine first into extension, then right lateral flexion and finally right rotation

The test is repeated to the left[26]

SCORING

Record gross range of movements as a fraction /10

Record player's pain response

Examiner must be aware of any dizziness or vertebral artery symptoms

NORMS

Painless

COMMENT

This test is supposed to be a clearing test of cervical spine

These movements act to fully compress the unilateral facet joints, as well as stretching numerous other structures

If a painful or apprehensive response is found, further assessment of the cervical spine may be necessary[26]

SPURLING'S TEST

DEFINITION

Foramina compression (Spurling's) Test

PURPOSE

To provoke cervical nerve root symptoms, if patient history is indicative of nerve root symptoms

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Player sits on the edge of the plinth facing forward with hands resting on sides

The examiner compresses down on the head while the player laterally flexes the neck first to the unaffected side, then to the affected side [28]

Bradley and colleagues[29] advocate doing this test in three stages, each of which is more provocative; if symptoms are produced one does not proceed to the next stage

Stage I

Compression with the head in neutral position

Stage II

Compression with the head in extension

Stage III

Compression with the head in extension and rotation to the unaffected side

SCORING

A test result is classified as positive if pain radiates into the arm toward which the head is laterally flexed[28]

NORMS

Painless

COMMENT

The test position narrows the intervertebral foramen, which is compounded by other conditions which also narrow the foramen such as:

Stenosis

Cervical spondylosis

Osteophytes

Trophic facet joints

Herniated disc, which also narrows the foramen; may lead to symptoms[27]

Neck pain with no radiation into the shoulder and arm does not constitute a positive test[27]

The dermatome distribution of the pain and altered sensation can give an indication as to which nerve root is involved

If pain is felt in the opposite side to which the head is laterally rotated, it is called a reverse Spurling's sign and is indicative of muscle spasm in conditions such as tension myalgia and whiplash syndromes[30]

DISTRACTION TEST

DEFINITION

Cervical distraction test

PURPOSE

This test is conducted in patients who have complained of radicular symptoms, or showed radicular signs on examination. It is used as a diagnostic aid and to alleviate symptoms

EQUIPMENT

Nil

LANDMARKS

Chin

Occiput

PROCEDURE

The examiner places one hand under the chin and the other hand around the occiput

The examiner then slowly lifts the patients head

SCORING

The test is classified as positive if the pain is relieved or decreased when the head is lifted or distracted[27]

NORMS

Painless

COMMENT

A positive test indicates pressure on the nerve roots[27] (this is relieved during the distraction)

This test may also be used to check if shoulder pain is of cervical origin; if the pain is relieved by distraction the pain is likely to be cervical in origin and not related to shoulder pathology[27]

UPPER LIMB TENSION TESTS

DEFINITION

Upper limb tension tests (ULTT) or brachial plexus tension tests

PURPOSE

To assess the mobility of the cervical nerve roots, nerve root sheaths and the brachial plexus

EQUIPMENT

Firm bed/plinth

Goniometer

LANDMARKS

Medial and lateral epicondyle

Wrist

Shoulder

PROCEDURE

This is a progressive test the sequence of events must follow the order described. In can be quite provocative so the therapist must continually monitor the athlete's symptoms during the test[26]

Athlete lying supine

See table for order of joint positioning

Upper Limb tension tests showing order of joint positioning and nerve bias[27]

	ULTT1	ULTT2	ULTT3	ULTT4
Shoulder	Depression and abduction (110°)	Depression and abduction (10°)	Depression and abduction (10°)	Depression and abduction (10°-90°), hand to ear
Elbow	Extension	Extension	Extension	Flexion
Forearm	Supination	Supination	Pronation	Pronation
Wrist	Extension	Extension	Flexion and ulna deviation	Extension and radial deviation
Fingers and thumb	Extension	Extension	Flexion	Extension
Shoulder	-	Lateral rotation	Medial rotation	Lateral rotation
Cervical spine	Contra lateral side flexion	Contra lateral side flexion	Contra lateral side flexion	Contra lateral side flexion
Nerve bias	Median nerve, anterior interosseous nerve, C5, C6, C7	Median nerve, musculocutaneous nerve, axillary nerve	Radial nerve	Ulna nerve C8, T1

SCORING

Record pain or discomfort response with ipsilateral and contralateral lateral flexion[26]

NORMS

Normal response (negative)[27]:

Deep ache or stretch in cubital fossa (99%)

Deep ache or stretch into anterior and radial aspect of forearm and radial aspect of hand (80%)

Tingling of the fingers supplied by the appropriate nerve bias

Stretch into the anterior shoulder area

These responses can increase with contralateral cervical lateral flexion (90%)

These responses decrease with ipsilateral cervical side flexion (70%)

Pathological response (positive)[27]:

Production of patients symptoms

A sensitizing test in the ipsilateral quadrant alters the symptoms (head and cervical spine taken to ipsilateral side)

Different symptoms between right and left

COMMENT

These tests are equivalent to the SLR test in the lower limb

SHOULDER ABDUCTION TEST

DEFINITION

Shoulder abduction (relief) test

PURPOSE

To test for radicular symptoms particularly those involving the C4 and C5 nerve roots

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Player sits or lies down

Examiner passively or the athlete actively elevates the arm through abduction, so that the forearm rests on top of the head

SCORING

A decrease or relief of symptoms indicates a positive test

NORMS

Painless

COMMENT

Relief of symptoms indicates a cervical extradural compression problem such as[27]:

Herniated disc

Epidural vein compression

Nerve root compression

VERTEBRAL ARTERY TEST

DEFINITION

Vertebral artery (cervical quadrant) test

PURPOSE

To assess possible vertebral artery compression

EQUIPMENT

Firm bed/plinth

Stopwatch

LANDMARKS

Nil

PROCEDURE

Player supine

Examiner takes the player's head into extension and lateral flexion stabilizing the head and shoulder

Examiner then rotates the neck to the same side and holds for 30 seconds

Repeat on the opposite side

SCORING

Record any dizziness or nyastagmus; which indicates that the vertebral arteries are being compressed and constitutes a positive test[27]

NORMS

Asymptomatic

COMMENT

This test must be done with caution

SHOULDER ASSESSMENTS

SHOULDER HISTORY

GENERAL

Record which hand is dominant

Often the shoulder is lower on the non-dominant side, the dominant shoulder often also has less ROM due to the increased musculature[31]

MECHANISM OF INJURY

Did the player fall on an outstretched hand (FOOSH), which could indicate a fracture or dislocation of the glenohumeral joint[31]

Did the player fall or receive a blow to the tip of the shoulder, this mechanism may indicate an acromioclavicular subluxation or dislocation[32]

What was the direction of force? Anterior, posterior, lateral, superior or inferior; this will give an indication of which structures may be injured

FUNCTIONALLY

Record what the player is unable to do functionally:

Does the shoulder feel unstable or feel like it is “coming out” during movement? This may indicate gross or anatomical instability, as a result of recurrent shoulder dislocation, subluxation, or subtle translational instability [31]

Is the player able to tackle on that shoulder, tackle with outstretched arm, gym, or do overhead activities?

PAIN

Record what positions produce pain or symptoms:

Lateral rotation may cause pain in patients who have had recurrent dislocations because this movement is involved in anterior dislocations of the shoulder[31]

Medial rotation may cause pain in recurrent dislocators because at the extreme of medial rotation the humeral head is tightened against the anterior glenoid[31]

Excessive abduction and lateral rotation may lead to dead arm syndrome in which the patient feels a sudden paralyzing pain and weakness in the shoulder. This symptom is often an indication of anterior shoulder instability[33]

Night pain and pain at rest are often related to rotator cuff tears and on occasion, tumors

Record the character of the pain:

Deep, boring toothache-like pain may indicate thoracic outlet syndrome or acute brachial plexus neuropathy[31]

Dull aching pain that is worse at night usually indicates rotator cuff pathology[31]

Burning pain is usually indicative of acute calcific tendonosis[31]

Record if there are any activities that aggravate or relieve the pain:

This may help indicate which structures are involved (e.g. does reaching or overhead activities aggravate the pain?)

Elevation of the arm may relieve symptoms in patients with nerve root pain, but aggravate symptoms in patients with instability or inflammatory conditions[31]

SYMPTOMS

Does the athlete complain of weakness or heaviness in the shoulder or arm after activity?

This may indicate vascular involvement such as thoracic outlet syndrome[31]

Is there any indication of a nerve injury?

Any history of weakness, pain or parathesia may indicate a possible nerve injury/irritation

OBJECTIVE CLINICAL ASSESSMENT

GENERAL

A shoulder assessment should always include a cervical assessment as well[31]

An understanding of the force couples acting on the shoulder complex and the necessity for balancing the muscle strength and endurance of these muscles are especially important when assessing the shoulder. Force couples are groups of counteracting muscles that show obvious action when a movement is done or loaded quickly. With a particular movement, one group of muscles (the agonists) act concentrically while the other group (the antagonists) act eccentrically in a controlled, harmonized fashion to produce smooth movement. They also have a stabilizing effect on the joint[31]

SHOULDER FLEXION

DEFINITION

Shoulder flexion range of movement, elevation of shoulder through forward flexion

PURPOSE

To assess shoulder girdle flexion range of movement, consisting of combined movement of scapulothoracic, acromioclavicular, sternoclavicular and glenohumeral joints

EQUIPMENT

Long arm goniometer with spirit level

LANDMARKS

Midpoint of lateral border of acromion process

Superior tip of olecranon process

PROCEDURE

Standing arms by sides, elbows extended

Thumbs forward, the athlete raises both arms forward and above head as far as possible[34]

SCORING

Record the angle formed by the shaft of the humerus relative to vertical[34]

NORMS

Normal ROM of elevation through forward flexion is: 160°-180°[31]

SHOULDER EXTENSION

DEFINITION

Shoulder extension range of movement

PURPOSE

To assess shoulder girdle extension range of movement, consisting of combined movement of scapulothoracic, acromioclavicular, sternoclavicular and glenohumeral joints

EQUIPMENT

Long arm goniometer with spirit level

LANDMARKS

Midpoint of lateral border of acromion process

Superior tip of olecranon process

PROCEDURE

Standing arms by sides, elbows extended

Thumbs forward, the athlete raises extends both arms backwards as far as possible without bending forward[34]

SCORING

Record the angle formed by the shaft of the humerus relative to vertical[34]

NORMS

Normal ROM of extension: 50°-60°[31]

SHOULDER ABDUCTION

DEFINITION

Shoulder abduction range of movement, elevation through abduction

PURPOSE

To assess active range of shoulder girdle abduction

EQUIPMENT

Long arm goniometer with spirit level

LANDMARKS

Posterior margin of acromion process

Superior tip of olecranon process

PROCEDURE

Standing arms by sides, elbows extended

Whilst keeping palms facing forward, athlete abducts both arms as far as possible[34]

SCORING

Record the angle formed by the shaft of the humerus relative to vertical [34]

NORMS

Normal ROM of elevation through abduction: 170°-180°[31]

COMMENT

As the player elevates the shoulder the examiner should note whether a painful arc is present[35]

A painful arc may be caused by[31;36]:

Subacromial bursitis

Calcium deposits

Peritendonitis of the rotator cuff muscles

Tendonosis of the rotator cuff muscles

The pain is the result of pinching of inflamed or tender structures under the acromion process and the coracoacromial ligament[31]. Initially the structures are not pinched, so the patient is able to abduct the arm 45°-60° with little difficulty. As the patient abducts further (60°-120°) the structures become pinched and the patient is often unable to abduct fully because of pain. If full abduction is possible, the pain diminishes after 120° because the pinched soft tissues have passed under the acromion process and are no longer being pinched[31]

Scapulohumeral rhythm:

When evaluating this movement the examiner must also take time to observe the scapulohumeral rhythm of the shoulder complex. During the 180° of abduction there is roughly a 2:1 ratio of movement of the humerus to the scapula, with 120° of movement occurring at the glenohumeral joint and 60° at the scapulothoracic joint. However there is a great deal of variability between individuals and authors[37-39]

SHOULDER ADDUCTION

DEFINITION

Shoulder adduction range of movement

PURPOSE

To assess shoulder girdle adduction range of movement

EQUIPMENT

Long arm goniometer with spirit level

LANDMARKS

Midpoint of lateral border of acromion process

Superior tip of olecranon process

PROCEDURE

Standing arms by sides, elbows extended

Thumbs forward, the athlete adducts straight arm in front of the body

SCORING

Record the angle formed by the shaft of the humerus relative to vertical[34]

NORMS

Normal ROM of abduction is: 50°-75°[31]

EXTERNAL ROTATION

DEFINITION

Shoulder external rotation in neutral flexion/abduction

PURPOSE

To assess the range of glenohumeral external rotation and anterior muscle and capsule laxity

EQUIPMENT

Goniometer

LANDMARKS

Tip of olecranon process

Ulna styloid process

PROCEDURE

Athlete standing comfortably with elbows bent to 90° and resting at the side

Externally rotate glenohumeral joint as far as possible, keeping elbows at the sides[34]

Align goniometer under the tip of the olecranon process and parallel to the sagittal plane

Align moveable arm with ulna styloid process

SCORING

Record the range of external rotation in degrees from the sagittal plane

NORMS

Normal range external (lateral) rotation: 80°-90°[31]

INTERNAL ROTATION

DEFINITION

Shoulder internal rotation in neutral flexion/abduction

PURPOSE

To assess the range of glenohumeral internal rotation and posterior muscle and capsule laxity

EQUIPMENT

Goniometer

LANDMARKS

Tip of olecranon process

Ulna styloid process

PROCEDURE

Athlete standing comfortably with elbows bent to 90° and resting at the side

Internally rotate glenohumeral joint as far as possible, keeping elbows at the sides[34]

Align goniometer under the tip of the olecranon process and parallel to the sagittal plane

Align moveable arm with ulna styloid process

SCORING

Record the range of internal rotation in degrees from the sagittal plane

NORMS

Normal range internal (medial) rotation: 60°-100°[31]

COMMENT

Hand behind back test

This test can also be used to test a combination of internal rotation, extension and adduction in a functional position

The athlete puts his hand behind the back and reaches up the spine as far as possible, the furthest point reached is marked[34]. The distance reached can be measured from the C7 spinous process. The test is then repeated on the other side

SUPINE 90° INTERNAL ROTATION

DEFINITION

Supine passive internal rotation at 90° abduction of the shoulder

PURPOSE

To assess the passive flexibility of the glenohumeral external rotators (supraspinatus, infraspinatus, teres minor) and the posterior joint capsule

EQUIPMENT

Goniometer with spirit level

Firm bed/plinth

Second examiner may be required to achieve accurate measurements

LANDMARKS

Olecranon process of ulna

Ulna styloid process

PROCEDURE

Player lying supine with arm to be tested at 90° abduction and elbow flexed to 90°

Examiner passively internally rotates the elbow via the forearm, ensuring that the posterior aspect of the shoulder maintains contact with the plinth by stabilizing the shoulder anteriorly

Rotation is performed until either[34]:

The athlete complains of pain

The humeral head begins to lift off the bed

No further range can be achieved

SCORING

At the limit of test record the degree of internal rotation relative to the vertical[34]

Record the reason for cessation of the test

NORMS

Normal range internal rotation at 90° abduction: 70-100°[31]

SUPINE 90° EXTERNAL ROTATION

DEFINITION

Supine passive external rotation at 90° abduction of the shoulder

PURPOSE

To assess the passive flexibility of the glenohumeral internal rotators (pectoralis major, teres major, subscapularis, latissimus dorsi) and the anterior joint capsule tightness/laxity

EQUIPMENT

Goniometer with spirit level

Firm bed/plinth

Second examiner may be required to achieve accurate measurements/

LANDMARKS

Olecranon process of ulna

Ulna styloid process

PROCEDURE

Player lying supine with arm to be tested at 90° abduction and elbow flexed to 90°

Examiner passively externally rotates the elbow via the forearm, ensuring that the posterior aspect of the shoulder maintains contact with the plinth by stabilizing the shoulder anteriorly

Rotation is performed until either[34]:

The athlete complains of pain or apprehension

The athlete begins to extend their thoracic spine

No further range can be achieved

SCORING

At the limit of test record the degree of internal rotation relative to the vertical[34]

Record the reason for cessation of the test

NORMS

Normal range external rotation at 90° abduction: 70-100°[31]

COMMENT

Take care with athletes who have had previous shoulder dislocations or instability/laxity as the test position is quite provocative and possibly unstable in this position[34]

GLENOHUMERAL ANTERIOR DRAWER TEST

DEFINITION

Glenohumeral anterior drawer test/anterior shift test at 0° abduction

PURPOSE

To identify anterior laxity of the glenohumeral joint at 0° abduction

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Athlete sitting on plinth with arms resting by side

Examiner stabilizes scapula anteriorly over the clavicle with one hand and grasps around the humeral head with the other

Anterior glide of the humeral head is produced whilst minimizing scapula/shoulder girdle protraction

Repeat at 45° and 90° of abduction

SCORING

Record the degree of laxity from Grade 0-III[34;40;41]:

Grade 0: No anterior translation (0-25%)

Grade I: humeral head rides up slope of glenoid labrum but not over the edge (25-50%)

Grade II: humeral head rides up over edge of labrum but reduces spontaneously when force is removed (>50%)

Grade III: humeral head rides over edge of labrum and does not reduce once force is removed (>50%)

NORMS

Translation of 25% or less is considered normal (3-13mm)[34;40]

Up to Grade II anterior laxity may be considered normal in asymptomatic athletes[41]

COMMENT

The primary restraints to anterior translation in this position (0° abduction) are the superior and middle bands of the anterior glenohumeral ligaments[42]. Testing may be carried out in 45° and 90° of abduction to assess the other anterior ligamentous restraints, and the position of the arm should be recorded

Up to Grade II anterior laxity may be considered normal in asymptomatic athletes[41]. No significant coloration has been shown between the degree of laxity in the glenohumeral joint and the range of glenohumeral motion or nature of sports participation[34]

If there is anterior subluxation of the humeral head the degree of lateral rotation required to reduce the translation can be recorded and is an indicator of the functional laxity of the anterior inferior capsular ligaments[31]

GLENOHUMERAL POSTERIOR DRAWER TEST

DEFINITION

Glenohumeral posterior drawer test/anterior shift test at 0° abduction

PURPOSE

To identify posterior laxity of the glenohumeral joint at 0° abduction

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Athletes supine

Examiner passively flexes the shoulder to 90° and elbow to 90°

Examiner places one hand under the shoulder to stabilize the posterior scapula and palpate the posterior aspect of the glenohumeral joint

Examiner applies posterior longitudinal force through the elbow to the shaft of the humerus and palpates posterior subluxation of the glenohumeral joint with the stabilizing hand

SCORING

Posterior translation of the humeral head or apprehension and muscle guarding to prevent subluxation constitutes a positive test [34]

NORMS

Up to 50% translocation is considered normal (3-20mm)[31;34]

COMMENT

Posterior longitudinal force to the humerus should also be applied in sport position specific or symptom-specific positions of glenohumeral flexion/abduction/rotation

Medial rotation causes the posterior band of the inferior glenohumeral ligament and posterior-inferior capsule to become increasingly tight so that posterior translation will decrease as medial rotation increases[43]

GLENOHUMERAL APPREHENSION TEST

DEFINITION

Glenohumeral apprehension (Crank) test for anterior shoulder laxity

PURPOSE

To test for chronic anterior glenohumeral joint instability or previous dislocation

EQUIPMENT

Firm

LANDMARKS

Nil

PROCEDURE

Athletes supine

Passive flexion of elbow to 90°

Passive abduction of humerus to 90°

Passive external rotation of glenohumeral joint

Repeat at 45°, 120° of abduction

Repeat with the fist/hand under the humeral head to apply an anterior translational force to the humeral head

SCORING

Positive test: athlete reports a feeling of apprehension, or that the shoulder may sublux or dislocate[34] (This may also be associated with pain or discomfort in the glenohumeral joint and surrounding muscle spasm may occur)

NORMS

Painless, no apprehension

COMMENT

This test should not be performed following acute glenohumeral dislocation

Reporting of pain alone is not necessarily a reliable indicator of anterior joint laxity as it may be clouded by a number of other joint pathologies[34] (e.g. rotator cuff tears, internal impingement)

Apprehension reported in this position has been shown to have a superior sensitivity, specificity, positive predictive value or negative predictive value for identifying anterior instability when compared to pain[44]

The use of the more provocative testing position (addition of an anterior translational force) was also shown to be more reliable in identifying anterior instability[44]

GLENOHUMERAL (JOBES) RELOCATION TEST

DEFINITION

Glenohumeral relocation test following a positive apprehension (Crank) test for anterior shoulder laxity (Jobes Relocation Test)[45]

PURPOSE

To assess the diminution of pain or apprehension in the glenohumeral joint after a positive apprehension test

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Perform the apprehension test as previously described

While in the apprehension position, a posteriorly directed force is produced over the proximal humerus (not the humeral head) and any change in symptoms are noted

SCORING

Positive test: The athletes previous feelings of apprehension and/or pain is reduced or eliminated after application of the posteriorly directed force[34]

NORMS

Painless, no apprehension

COMMENT

If the patients symptoms decrease or are eliminated when doing the relocation test, consider[34]:

Glenohumeral instability,

Subluxation or dislocation

Impingement

If apprehension predominated with the crank test and disappears with the relocation test consider[34]:

Glenohumeral instability

Subluxation or dislocation

If pain predominated with the apprehension test and disappeared with the relocation test the probable diagnosis is[34]:

Anterior instability (either at the glenohumeralor scapulothoracic joint) with secondary impingement

If the arm is released after the relocation test and this produces pain and forward translation is noted consider[34]:

Anterior shoulder instability

Labral lesion

Bicipital tendonosis or peritendonitis

Patients with primary impingement will show no change in their pain with the relocation test[44]

If when doing the relocation test, posterior pain decreases it is a positive test for posterior internal impingement[45]

SULCUS SIGN FOR INFERIOR LAXITY

DEFINITION

Sulcus sign test for inferior shoulder instability

PURPOSE

To identify laxity of the superior glenohumeral ligament or a tear of the inferior portion of the glenoid labrum

EQUIPMENT

Firm bed/plinth or chair

LANDMARKS

Nil

PROCEDURE

Athlete sitting

Examiner grips the athlete's arm and applies downward traction to the humerus whilst palpating the gap between the humeral head and the acromion process with the other hand

Repeat at 20° and 50° of abduction

Proceed to the Feagin Test[31]:

Patient stands with the arm abducted to 90° elbow extended and forearm resting on examiners shoulder

Examiner clasps hand over humerus and pushes the humeral head downwards (inferiorly). Looking for a sulcus or apprehension/pain

SCORING

Positive test: the humeral head is displaced inferiorly causing an increased gap between the humeral head and acromion. This can be palpated or appears as an indentation (sulcus) beneath the acromion[34]

The degree of inferior displacement should be estimated and graded[46]:

1+ : 0.5-1.0cm of inferior displacement

2+ : 1-2cm

3+ : 2-3cm or more,

NORMS

Usually there is no sulcus although if bilateral may be normal[31]

COMMENT

It has been reported that the best position to test for inferior instability is at 20-50° of abduction with neutral rotation. Thus more than one position should be tested [31]

If the sulcus sign and Feagin test are positive is a strong indicator of multidirectional instability rather than just laxity[31]

SHOULDER IMPINGEMENT TEST 1 (NEER & WELSH)

DEFINITION

Neer and Walsh posterior impingement test[47]

PURPOSE

To impinge tendons of supraspinatus and long head of biceps as well as the subacromial bursa, between the head of humerus and acromion process and/or coracoacromial arch

EQUIPMENT

Nil

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Player standing, arm in anatomical position. Can also be done with player supine

Whilst maintaining the elbow in extension, the examiner passively flexes the glenohumeral joint to fully elevate and provides passive overpressure

SCORING

Record the patient's response

Positive test: shoulder pain particularly at the end of range of movement

NORMS

Painless

COMMENT

Pain may indicate posterior impingement and/or pathology of one or more of[34]:

Supraspinatus

Long head of biceps

Subacromial bursa

Head of humerus

Coracoacromial arch

- Labrum

If the test is positive with the arm laterally rotated, the examiner should check the acromioclavicular joint (acromioclavicular differentiation test)[48]

SHOULDER IMPINGEMENT TEST 2 (HAWKINS & KENNEDY)

DEFINITION

Hawkins and Kennedy posterior impingement test[49]

PURPOSE

To impinge tendons of supraspinatus, infraspinatus and long head of biceps between greater tuberosity of humerus and acromion process and/or coracoacromial arch

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Athlete standing, arm in anatomical position. Can also be done with athlete supine

Examiner passively flexes glenohumeral joint to 90°

Examiner passively flexes elbow to 90°

Examiner passively internally (medially) rotates humerus

The test may also be performed in varying degrees of forward flexion

SCORING

Record the patient's response

Positive test: internal rotation causes shoulder pain particularly at the end of the range

NORMS

Painless

COMMENT

This test pushes the supraspinatus tendon against the anterior surface of the coracoacromial ligament and coracoid process[31]

Pain indicates a positive test for supraspinatus paratendonitis/tendonosis or secondary impingement[36]

ACROMIOCLAVICULAR HORIZONTAL ADDUCTION TEST

DEFINITION

Acromioclavicular horizontal adduction test

PURPOSE

To stress the acromioclavicular joint at the end range of glenohumeral motion

EQUIPMENT

Nil

LANDMARKS

Nil

PROCEDURE

Athlete standing

Athlete actively flexes and adducts the arm across body towards the opposite shoulder

Examiner applies overpressure at end range, looking for any pain response from the athlete

SCORING

Positive test: pain over the Acromioclavicular joint[34]

NORMS

Normally painless

LABRAL CLUNK TEST

DEFINITION

Clunk test of labral integrity

PURPOSE

To test the integrity of the shoulder labrum

EQUIPMENT

Firm bed/plinth

LANDMARKS

Nil

PROCEDURE

Athlete supine

The examiner places one hand on the posterior aspect of the shoulder over the humeral head

The other hand holds the humerus above the elbow

The examiner fully abducts the arm over the patients head

The examiner then pushes anteriorly with the hand over the humeral head (may be facilitated by making a fist), while the other and rotates the humerus into lateral rotation

SCORING

A clunk or grinding sound indicates a positive test and is usually indicative of a tear of the labrum[31]

NORMS

Painless no clunk or grind

COMMENT

This test may also cause apprehension if anterior instability is present[31]

LABRAL CRANK TEST

DEFINITION

Crank test of labral integrity[50]

PURPOSE

To test the integrity of the shoulder labrum

EQUIPMENT

Firm bed/plinth/chair

LANDMARKS

Nil

PROCEDURE

Player supine lying or sitting

The examiner elevates the arm to 160° in the scapular plane

An axial load is then applied to the humerus with one hand of the examiner while the other hand rotates the humerus medially and laterally

SCORING

A positive test is indicated by pain on rotation, especially lateral rotation with or without a click or reproduction of the patient's symptoms[50]

NORMS

Painless

SPEED'S TEST (BICEPS STRAIGHT ARM TEST)

DEFINITION

Biceps straight arm test (Speed's Test)

PURPOSE

To detect pathology of the long head of biceps tendon and or SLAP lesion

EQUIPMENT

Nil

LANDMARKS

Bicipital groove

PROCEDURE

Athlete sitting

Elbow fully extended

The examiner resists forward flexion of the shoulder while the patients forearm is first supinated and then pronated (elbow maintained fully extended)

SCORING

A positive test elicits increased tenderness over the bicipital groove especially with the arm supinated[31]

NORMS

Painless

COMMENT

A positive test may indicate[31]:

Bicipital tendonosis or paratendonitis

SLAP lesion

Partial rupture of the long head of biceps tendon especially if associated with weakness

SUPRASPINATUS TEST (EMPTY CAN TEST/JOBES TEST)

DEFINITION

Supraspinatus empty can test

PURPOSE

To identify pathology of the rotator cuff, in particular the supraspinatus muscle

EQUIPMENT

Nil

LANDMARKS

Bicipital groove

PROCEDURE

Player standing

Player moves arm to 90° shoulder abduction and 30° horizontal adduction (scapula plane),while maintaining elbow extension, player internally rotates humerus with thumbs pointing towards the floor; as if “empting two beer cans”

Examiner applies a downward force to the distal forearm while the player maintains the position (isometric hold)

SCORING

Positive test: Pain in the anterior aspect of the glenohumeral joint or weakness on the isometric hold[34]

NORMS

Painless

COMMENT

Pain or weakness suggests pathology or impingement of the supraspinatus tendon/rotator cuff and requires more detailed assessment[34]

Others have said that testing the arm with the thumbs up (full can) position is best for maximum contraction of supraspinatus[51]

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