Summary points

To apply the offside rule correctly in a football game, the referee must be able to keep in his visual field at least five objects at the same time—two players of the attacking team, the last two players of the defending team, and the ball

This is beyond the capacity of the human eye, which may explain why so many offside decisions are controversial

The use of modern technology such as freeze frame television to aid referees' decisions is necessary for the offside rule to be applied correctly

be able to keep in his visual field at least five objects at the same time (two players of the attacking team, the last two players of the defending team, and the ball), and this may not be compatible with the normal eye function—especially as these five objects can be anywhere within the defenders' half of the pitch, an area of at least 3200 m^2. This may explain at least some of the instances when television replays of a game clearly show that the offside rule was not properly implemented. The key factor in applying this rule correctly is that the player in question must be in the offside position at the exact time when the ball is passed from a team mate, not when the player receives the ball or when the ball is en route between the players.

By reviewing the physiology of the eye movements likely to be involved in assessing an offside position, I have shown that the relative position of four players and the ball cannot be assessed simultaneously by a referee, and unavoidable errors will be made in the attempt. The use of modern technology during games—freeze frame television and frame by frame analysis—is advisable to limit these errors.

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An unusual complication of Kocher's manoeuvre

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A 25 year old man presented to the emergency room with a right anterior glenohumeral dislocation after a fall. He was attended to by a 30 year old, left hand dominant orthopaedic resident. Kocher's manoeuvre was attempted to reduce the dislocation.

As the patient's arm was slowly externally rotated the patient resisted forcefully and suddenly internally rotated his arm. The resident immediately heard a "pop" in his own left shoulder, followed by a burning sensation with subsequent weakness.

The resident was an active individual, who did regular weight training and played competitive ice hockey. He had no previous shoulder problems and denied using anabolic steroids.

On examination there was a loss of the normal anterior axillary fold, bruising in the upper arm (figure), and weakness in adduction and internal rotation. Neurovascular examination was normal. Plain radiographs were unremarkable. Magnetic resonance imaging confirmed a near total rupture of the pectoralis major tendon from its humeral attachment. The marrow signal was normal.

The resident had surgical repair of the tendon five days after the injury. The tendon was reattached to the lateral lip of the bicipital groove using Mitek anchors and number 2 Ethibond. At final follow up at 24 months, the functional range of shoulder movement had returned with good muscle strength and endurance as assessed with isokinetic and functional testing.

Discussion

Pectoralis major tendon injury, though rare, was first described in 1822 by Patissier.[1] Such injuries are becoming more common owing to an increasing number of recreational and professional athletes. The mechanism is of a violent eccentric contraction and is associated with doing bench presses, wrestling, and water skiing.[2]

The pectoralis major muscle is a powerful adductor, internal rotator and flexor of the shoulder. The sternocostal and clavicular heads insert at the lateral lip of the bicipital groove to form two separate laminae that are oriented perpendicular to each other. When the arm is abducted and externally rotated the sternocostal fibres are maximally stretched.

Numerous reduction techniques for anterior glenohumeral dislocations have been described. They

Loss of normal anterior axillary fold and contour of the pectoralis belly, along with substantial bruising around the axilla

fall into three main categories: traction techniques (Hippocrates,[3] Stimson[4]) leverage techniques (Kocher,[5] Milch[6]), and scapular manipulation.[7]

Kocher's manoeuvre was originally described in 1870.[5] The affected arm is flexed at the elbow and adducted against the side of the body. The forearm is rotated externally and the upper arm lifted in a sagittal plane as far as possible and finally internally rotated. There have been many adjustments to this widely used technique, especially as the additional torque resulting from adduction and internal rotation have been associated with humeral shaft fractures in elderly people.[8 9]

To perform Kocher's manoeuvre the surgeon must abduct and externally rotate his own arm, this means the fibres of the sternocostal head of his pectoralis major are maximally stretched. If a patient is not well sedated or has not received adequate analgesia he or she is more likely forcefully to resist the reduction. This results in a sudden uncoordinated eccentric contraction of the surgeon's pectoralis major muscle, which in our case resulted in a pectoralis major rupture. If adequate sedation and pain relief are not possible, reduction under general anaesthetic may be necessary to minimise the risk of complications for both the patient and the doctor.

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Easy ways to resist change in medicine

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These time honoured techniques will help doctors resist the forces that prevail on them to change their ways of taking care of patients

Numerous forces have been imposed on physicians to make them change their practice behaviours. Under the guise of "quality improvement," managed care organisations, accrediting bodies, and the government are meddling in medicine. Even continuing medical education, previously a form of intellectual entertainment or a forum for much needed sleep, has refocused its efforts towards improving the care of patients (figure).

Techniques to resist change

Techniques are available, however, that will allow doctors to practise unimpeded by new information that should induce change. To avoid succumbing to both the inner and outer forces prompting change, we offer the following techniques and methods.

Don't pay attention

Get so busy with your practice that you do not have the time to read, attend meetings, understand your own practice, or observe the practice of colleagues. Forget about Stephen Covey's seventh habit of "sharpening the saw."[1] Create your own habit of sawing harder and harder, with a dull saw.

Attack the data

When provided with new information that may require a change in practice:

- Firstly, diss the source. No one expects you really to believe information from sources outside your specialty or geographical area.
- Secondly, question the validity of the information. Every study or report contains some loophole in its

Levels of belief

- Class 0: Things I believe
- Class 0a: Things I believe despite the available data
- Class 1: Randomised controlled clinical trials that agree with what I believe
- Class 2: Other prospectively collected data
- Class 3: Expert opinion
- Class 4: Randomised controlled clinical trials that don't agree with what I believe
- Class 5: What you believe that I don't

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