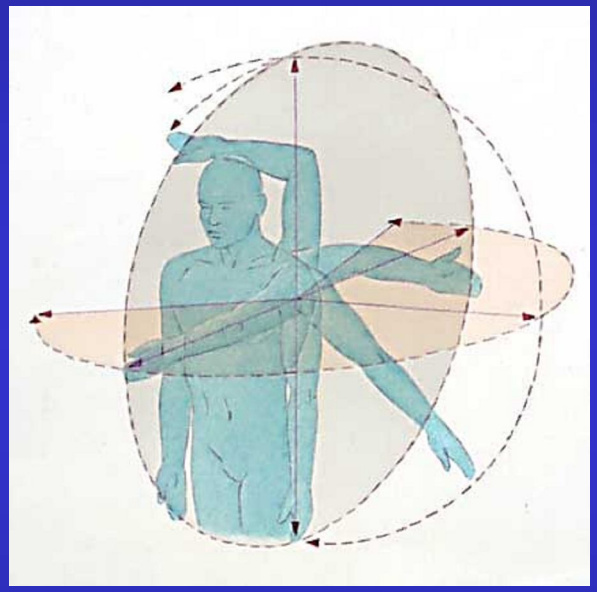
Classification & Management of Atraumatic/Muscle Patterning Instability



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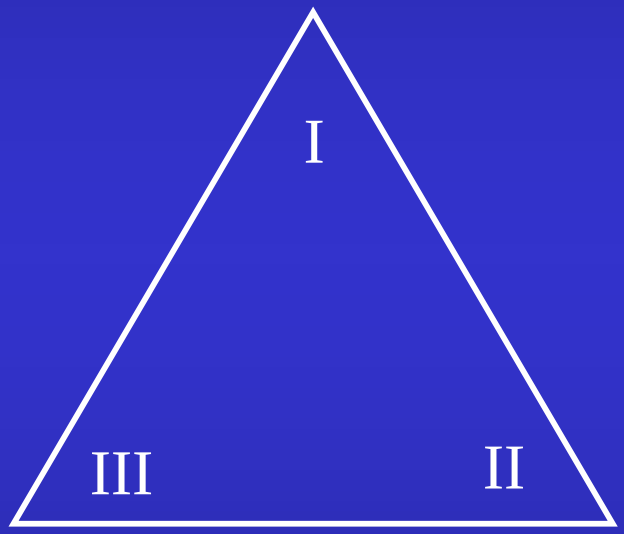
Classification

- Recognising all aetiologies contribute to instability
  - Dynamic vs Static
  - Dual aetiologies can co-exist within one shoulder
- Instability is symptomatic laxity
  - Confusion around the term MDI, symptom not diagnosis
- Groups defined by history/structural abnormality /muscle activation (Lewis at al 2004)

Stanmore Triangle

Traumatic



Muscle
Patterning

Atraumatic
Structural

Capacity for complexity

Continuum of different aetiologies

Inappropriate Muscle Patterning

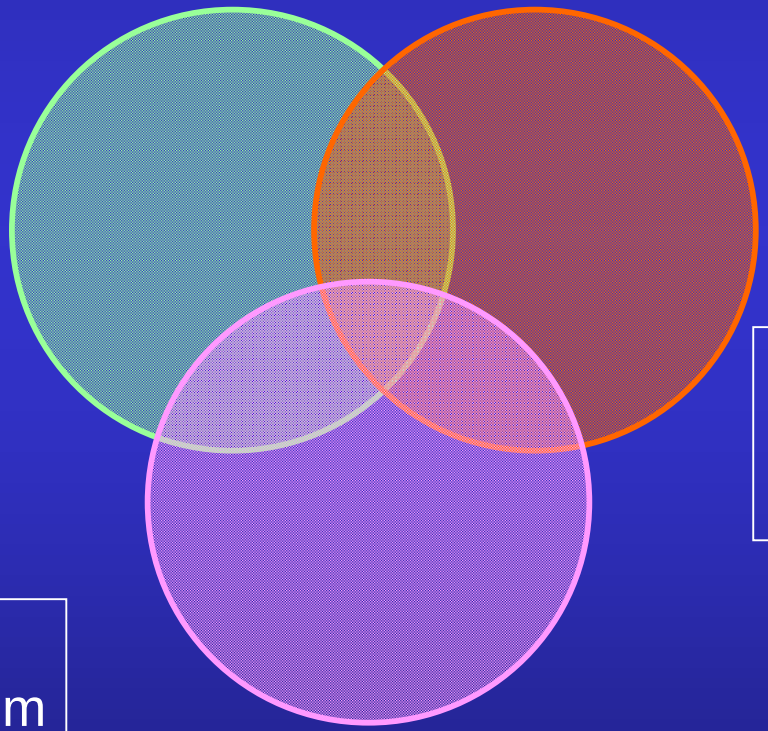
Multifactorial

- **Environmental – sport/age/occupation**
- **Biomechanics – laxity/muscular imbalance/scapula-humeral rhythm congenital anomalies**
- **Genetics – Heritable connective tissue disorders (HCTs)**
- **Hormones – females >males**
- **Psychological – fear/avoidance, stress, anxiety**

Muscle patterning

"A Symptom not a Diagnosis"

Peripheral generators
Mechanoreceptors / JPS
Pain, structural damage,
Muscle imbalance
(Myers & Lephart 2002)



Psychological
Fear / avoidance
Stress, anxiety

Neural control
Central postural mechanism
Higher cortical control
(Barrett et al 2000)

Aims of Treatment

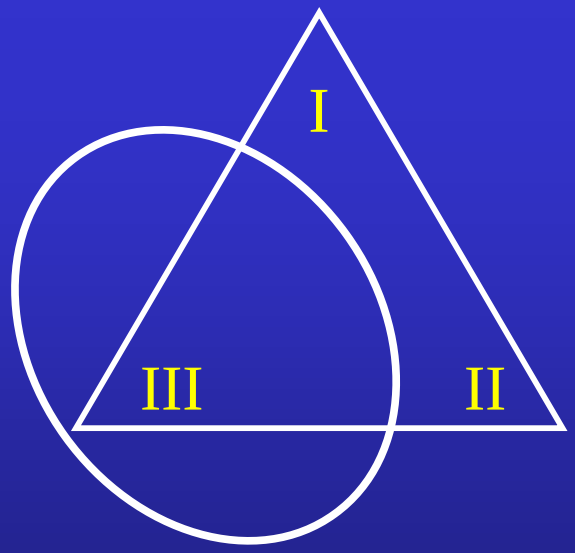
- Regain normal motor patterns prior to strengthening
- Optimise muscular control within the shoulder girdle
- Maximise efficiency by correcting posture and trunk stability
- Improve joint position sense
- Rehabilitate to the point of function

Examination

- Postural alignment
- Global Laxity (JHS)
- Trunk stability
- Scapula dysrythmia
- Observation/palpation of muscle tone
- Joint position sense
- Balance

Muscle patterning (Type III)

EMG analysis has been useful in confirming the diagnosis of shoulder instability on the Stanmore Triangle

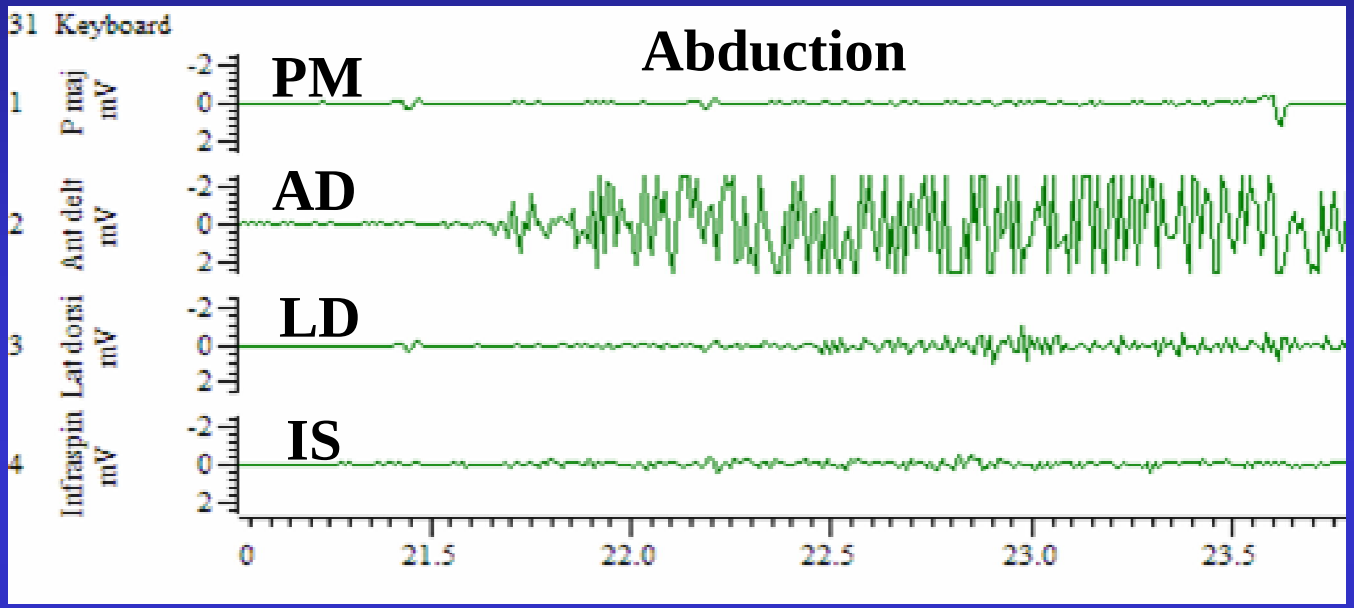


Dynamic EMG analysis

Pairs of fine tungsten electrodes
Inserted into Pectoralis Major, Anterior deltoid, Infraspinatus and Latissimus Dorsi

Activity measured at rest and through a series of movements (Jaggi et al 2008)

Dynamic EMG analysis



Malone et al (2006)

Anterior Instability – PM inappropriate in 60%

LD inappropriate in 81%

Posterior Instability – PM inappropriate in 37%

LD inappropriate in 80%

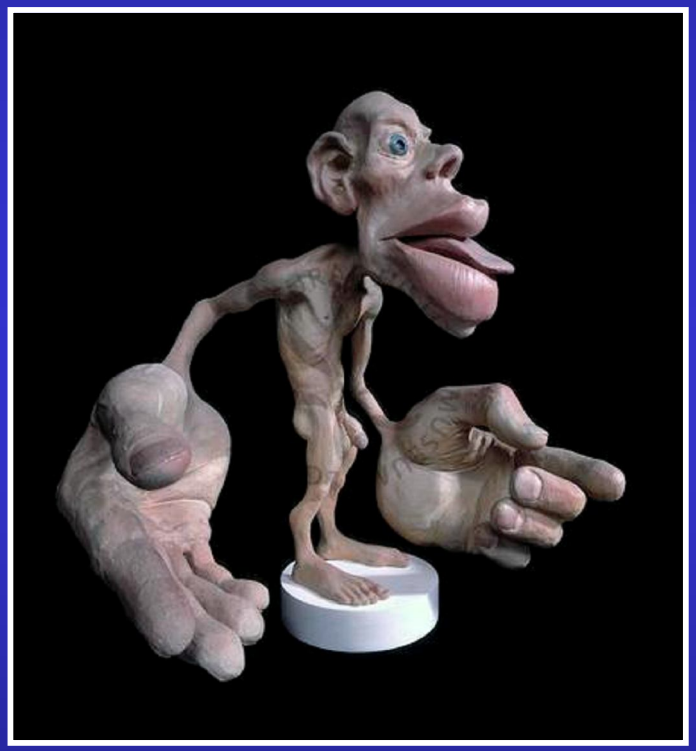
Postural Control

- Shoulder does not function in isolation, lower limb and trunk stability has a resultant affect on GHJ control. (Hodges et al 1999,Kibler 2001, McMullen & Uhl 2000)
- Central postural control mechanism

Core Stability

Enhancing postural stability will help to activate deeper stabilisers & decrease fixation of superficial torque muscles e.g Lat Dorsi (Gibson 2004).

Sensory Feedback

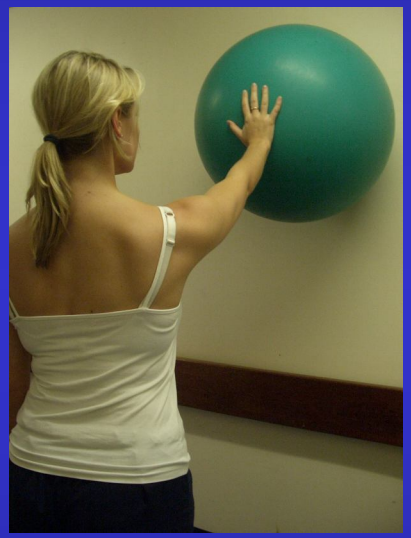


- Motor learning can be enhanced with sensory feedback, biofeedback techniques can be more effective than strengthening alone
  (Beall et al 1987, Reid et al 1996, Kiss et al 2001, Magarey & Jones 2003)
- Biofeedback techniques can help to voluntary influence muscle activity
  (Simons & Mense 1998)
- Techniques can include mirrors, EMG, pressure, audible feedback.

Pressure Feedback

Pressure garments provide afferent feedback for repositioning sense (Ulkar et al 2004, Chu et al 2002)

Proprioception



Weight bearing exercises enhance joint stability, stimulate muscular co-activation & facilitate proprioception
(Wilk & Arrigo 1993, Dines & Levinson 1995, Lephart & Henry 2000, Kibler 2000).

The Role of Botulinum Toxin

- Initial experience shows the role of BoTox to be effective in resistant cases (Sinha et al 1999, Gibson et al 2004, 2008).
- Helps in inhibiting the overactive muscle tone. However can reduce function if reliant on abnormal tone.
- Not so useful where the problem is more of central RC and deltoid tone rather than over activation of muscles
- May help with pain relief & allows a window of opportunity to re-pattern the shoulder.

It is important not to recognise it as an end solution as it may not restore cortical re-mapping.

Conclusions

- Abnormal muscle activation must be recognised to contribute to instability
- Causes are multifactorial
- Shoulder does not function in isolation
- Assessment of trunk and scapula stability is essential