

# Acromioclavicular Joint Pathomechanics

By Dr Angela Cadogan *PhD, NZRPS*



The acromioclavicular (AC) joint is a common cause of pain in active individuals. Understanding how various movements, arm positions and muscle actions influence the AC joint can help you modify a gym programme to help them remain active and experience the benefits of exercise without unnecessary pain provocation.



**Dr Angela Cadogan, PhD**  
*Specialist Physiotherapist (MSK)*

## Causes of AC Joint Pain

In people who regularly undertake upper body strengthening exercises in the gym for recreation or as part of strength and conditioning training for various sports, the AC joint is often put under repetitive stress, and subjected to high compressive, tensile or shear stresses. Over time, repetitive stress and high loads at the AC joint may cause pain associated with clavicular osteolysis or arthritis.<sup>1</sup>

In younger people, the AC joint is also a common site for ligamentous injury, commonly after a fall onto the point of the shoulder. This can result in AC joint pain

and, depending upon the degree of ligamentous injury, AC joint instability. Pain associated with ligamentous injury can be aggravated by positions and activities that cause stress on the injured ligaments.

Impact loading, including repetitive tackling such as occurs in rugby and other contact sports is another cause of AC joint pain. Post-traumatic osteolysis, or osteolysis associated with repetitive tackling or other impacts over a period of time can also cause pain at the AC joint.<sup>1</sup>

## Biomechanics of the AC Joint

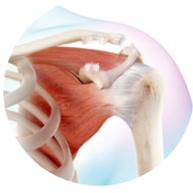
High compressive, tensile or shear forces may aggravate pain at the AC joint regardless of the nature of the pathology. To understand how to modify a gym programme for a person with AC joint pain, it helps to understand the pathomechanics of the AC joint.



The clavicle confers movement to the AC joint (when the AC joint capsular ligaments are intact). As a result, motion of the clavicle and scapula cause stress and strain at the AC joint.

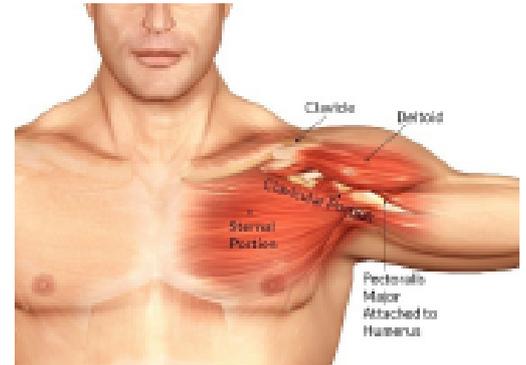
This occurs during physiologic movements of the scapula (elevation, depression, protraction & retraction), and as a result of the conjunct motion of the clavicle and scapula during movements of the arm (scapula upward rotation, posterior tilt and external rotation & clavicle rotation). Cont.

**"I go into more depth about how to manage these cases in my [online AC Joint course](#)."**



## Biomechanics of the AC Joint cont.

There are also a number of muscles that act across the AC joint. When tight/short, the pec minor can cause anterior rotation of the scapula causing rotation at the AC joint. Pec major and anterior deltoid cause compression at the AC joint under load by virtue of their origin and insertion sites.



The table below presents a summary of movements that occur at the AC joint:

<b>Physiologic Movements</b> Movements that cause stress/strain at the AC joint.	<b>Conjunct motions</b> Motions that cannot be performed by the individual, but occur during physiologic movements and cause stress/strain at the AC joint.	<b>Dynamic muscle forces</b> Forces caused by contraction of muscles acting across the AC joint causing tensile, compressive or shear stresses.
Scapula elevation/ depression E.g upright rows	Scapula upward/downward rotation E.g overhead press, lat pulldowns	Pectoralis minor (tightness)
Scapula protraction/ retraction E.g push ups, chest press	Scapula anterior/posterior tilt E.g tricep dips	Pectoralis major activation E.g pec flys, push ups
Arm elevation (end range) E.g military press, lat pulldown	Scapula internal/external rotation E.g push ups	Deltoid activation (esp. anterior deltoid) E.g front raises, shoulder press
Horizontal adduction E.g cable flys	Clavicle rotation E.g shoulder press, lat pulldown	

## My Golden Rules for Gym Exercises with AC Joint Pain

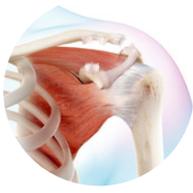
- ⊘ Avoid "pushing"/plank (pec dominant) exercises
- ✔ Pulling exercises
- ⊘ Avoid extreme overhead (vertical) shoulder press
- ✔ Use incline press
- ⊘ Avoid heavy downward traction (e.g deadlift)
- ✔ Support the arm
- ⊘ Avoid high repetitions
- ✔ Minimise frequency

To learn more about the AC Joint with Dr Angela Cadogan.



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# Acromioclavicular Joint Pathomechanics

## Want to Learn More?

### ONLINE COURSE - THE ACROMIOCLAVICULAR JOINT MODULE

You can learn more about the pathoetiology, natural history, diagnosis and management of acromioclavicular and sternoclavicular joint conditions in our Acromioclavicular Joint online course.

#### The AC Joint Module Includes 4 Lessons\*:

- Diagnosis of Acromioclavicular Joint Pain
- Acromioclavicular Joint Instability
- Acromioclavicular Joint Arthropathy
- The Sternoclavicular Joint

*Lessons are also available individually.*

 This module is available at a discounted price as part of our [Shoulder Academy membership](#).

Each lesson is approx 2-3 hrs learning time.  
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 **Dr Angela Cadogan** PhD, NZRPS  
Specialist Physiotherapist



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### ONLINE COURSE - SURGICAL MANAGEMENT & POST-OPERATIVE REHABILITATION OF THE AC JOINT

This comprehensive course covers pathoetiology, diagnosis and management, with a focus on surgical management & post-operative rehabilitation for AC joint conditions including instability and arthropathy. Mr Khalid Mohammed (Shoulder & Upper Limb Specialist) presents on "Surgical Management" of the AC Joint and Dr Angela Cadogan presents the post-operative rehabilitation of the AC Joint.

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SURGICAL MANAGEMENT & **Post-Operative Rehabilitation of the AC Joint** ONLINE LEARNING COURSE

 **Mr Khalid Mohammed** FRACS  
Orthopaedic Surgeon

 **Dr Angela Cadogan** PhD, NZRPS  
Specialist Physiotherapist



### RECORDED WEBINAR - THE ACROMIOCLAVICULAR JOINT IN SPORT



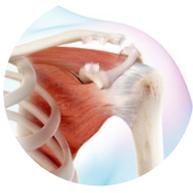
**The AC Joint in Sport** RECORDED WEBINAR

 **Dr Ian Horsley** PhD, MCSP, CSCS  
Physiotherapist



In this webinar, Dr Ian Horsley discusses management of ACJ traumatic injuries and the differential diagnosis, along with rehabilitation strategies that include the scapula and thoracic spine. Ian covers the ACJ anatomy (in brief) and its relationship to the SCJ, and briefly discusses clinical examination of the ACJ. The concept of regional Interdependence is presented with respect to ACJ dysfunction and how to move from a local to a global examination.

[Learn More](#)



# Acromioclavicular Joint Pathomechanics



## REFERENCES

1. Cahill BR. Atraumatic osteolysis of the distal clavicle. A review. *Sports Medicine*. 1992;13(3):214-22.

## Your Instructor

**Dr Angela Cadogan** *PhD, NZRPS, M.Sports Physio, Dip.MT Physiotherapy Specialist (Musculoskeletal)*

Dr Angela Cadogan is a NZ registered Physiotherapy Specialist (Musculoskeletal). She has a PhD in Musculoskeletal Diagnostics from AUT University, with a sub-specialty in the diagnosis and management of shoulder pain. She has published several papers from her thesis in the area of shoulder diagnostics and sports physiotherapy.

Angela has an ongoing research interest in shoulder conditions and has been an invited keynote speaker at many national and international shoulder conferences.



Angela is based in Christchurch, New Zealand where she works as a clinical consultant in her own physiotherapy practice and in a diagnostic Orthopaedic Triage role (Shoulder) with the Canterbury District Health Board.

Angela is the Director of Physio Academy and runs her own online and in-person courses to help upskill other physiotherapists in the assessment and management of the shoulder. For more information, go to: [www.drangelacadogan.co.nz](http://www.drangelacadogan.co.nz)



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