COSTOCHONDRITIS
Evidence Based Prevention
(as of 11-17-10)

Prevention of idiopathic costochondritis (CC) is truly an elusive subject in the scientific literature. Only a handful of studies have been performed that even attempt to address risk factors or prevention. All are observational. The following are have been rated as C and have very limited evidence.

RISK FACTORS AND PREVENTION STRATEGIES

1. **Posture (C):** Jensen et al state postural stressors such as bending, twisting, stooping or prolonged head down posture can result in CC (1)

2. **Physical activity (C):** Repetitive or sustained activities such as pulling, pushing, heavy lifting or repeated activities using the arms can result in CC (1). Rovetta et al state that unaccustomed physical activity is also a risk factor (2).

3. **Age/gender (C):** It appears that there is a slight imbalance in gender distribution of CC with females predominating. The most common age group is 40 to 50 years old (3).

4. **Other (C):** Peyton in his study found excess **tension** and **excess weight** may play a role in the genesis of CC (3).

Although not commonly thought of as a risk factor Freeston et al reported that 36% of patients with CC also presented with co-existing conditions such as psoriasis, ulcerative colitis, rheumatoid arthritis and polyarthritis (4). In a larger study of 293 patients the authors reported an individual symptom of chest pain in 55% of patients with fibromyalgia compared to 8% in controls (5).

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Costochondritis
Evidence Based Diagnosis
(As of 12/13/10)

The diagnosis of costochondritis (CC), when it is present, is relatively easy to establish when confronted in a patient experiencing anterior chest pain. However the dire consequence of missing a concurrent cardiovascular event, pulmonary embolism (PE) or pneumonia when making this diagnosis places an extra burden upon the diagnosing physician. A review of the literature reveals several sobering facts. Miller et al found in their study of 17737 patients who were diagnosed with non-cardiac chest pain and released from the hospital emergency rooms, 4.3% had definite evidence of adverse cardiac events or unstable angina (1). A second study of 108 patients that were diagnosed with non-cardiac chest pain found 2.7% had died within 1 year of heart disease or emphysema. This study also reported 6% of patients with presumed CC were also experiencing myocardial infarction (MI) (2).

Other study findings which are of interest when dealing with a patient with chest pain follow:

- Musculoskeletal presentation of chest pain is far more common in general practice than in emergency rooms, 36% compared to 6% (3).
- The percent of chest pain that remains undiagnosed after 1 year is approximately 11% (2;4)
- Causes of chest pain in the emergency room (4):
    - Cardiac diseases: 51.7%
    - Pulmonary disease: 14.2%
    - Gastro-esophageal diseases: 2.4%
    - Musculoskeletal pathology: 7.1%
    - Somatization disorders: 9.2%
    - Other: 4.3%
    - Unknown: 11.1%

An aid to identifying high risk patients for MI, PE and pneumonia with anterior chest pain are prediction rules that are well accepted in the literature. The *American Family Physician* recently published an article detailing the these prediction rules which are available in more detail at http://www.aafp.org/afp/2005/1115/p2012.html (5). A brief synopsis of these rules follows:

Rouan Decision Rule for MI

- Age greater than 60 years
- Diaphoresis
- History of MI or angina
- Pain described as pressure
- Radiating pain

Cayley indicates chest pain radiating to both arms, hypotension, S3 gallop, dyspnea and hyperlipidemia are associated with increased risk of MI (5).

Wells Model for PE

- Clinical signs of deep vein thrombosis (DVT)
- PE most likely diagnosis
- Patient experienced 3 or more consecutive days of bedrest in last 4 weeks
- Previous diagnosis of DVT
- Hemoptysis
- Cancer treatment that is ongoing or during past 6 months

Diehr Rule for Pneumonia

- Myalgia
- Night sweats
- Sputum production all day
- Respiratory rate more than 25
- Temperature over 100 degrees
- Presence of rhinorrhea and/or sore throat decrease probability

Chest wall syndrome is a term to describe pain arising from the chest wall that is musculoskeletal in origin. It is a term which includes CC as well as several other sources of musculoskeletal pain. Verdon et al provided 6 characteristics of chest wall syndrome (CWS) that help to distinguish CWS from other more serious conditions (6). These include:

Pain is

- Not squeezing or oppressive: Odds Ratio (OR) 2.52 (1.21-5.28)
- Localized on the left or median left part of the chest wall: OR 2.26 (1.58-3.28)
- Well localized on the chest wall: OR 2.10 (1.37-3.22)
- Non-exercise induced pain: OR 1.58 (1.00-2.49)
- Influenced by movement or posture: OR 1.54 (1.06-2.24
- Reproducible by palpation: 5.72 (1.20-5.28)

CLINICAL TESTING

Very little information, other than observational studies and expert opinion, appears in the literature relating to the diagnosis of CC. Most of the investigational effort has been directed at insuring the patient does not have a more serious cardiac or respiratory pathology.

1. **Palpation (C):** Christensen et al found palpation of the costochondral junction had low inter-examiner agreement with a kappa value <.40 and suggested use of the algometer to improve reliability (7). Still most experts consider palpation to be an essential step in the diagnosis of CC (3;8-11). Pain on palpation along the 2nd to 5th intercostal junctions which duplicates the pain is considered a common finding in patients with CC (9). When combining palpation with a thorough history and examination Brunse et al found substantial agreement between examiners (12).
2. **Pain on movement (C):** Several authors have reported pain on movement, particularly using the arm on the effected side, is a common finding in CC (9;13). Expansion of the thorax initiated by deep breathing may also duplicate pain (13;14). Several different maneuvers have been described in the literature to duplicate pain

although all are untested. These include the “crowing rooster” position which consists of neck extension with traction on posteriorly extended arms (15) and sternal compression (16).

3. **Imaging (C):** Although chest radiographs are recommended for most patients with chest pain, the purpose is to assist in ruling out more serious pathology. Imaging has only a very limited role in establishing a diagnosis of CC (5). CT imaging should be used when infectious or neoplastic pathology is suspected. Nuclear scanning with technetium 99 scintigraphy can be useful in identifying patients with CC but is not considered specific (13).

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Costochondritis
Evidence Based Treatment
(as of 12-17-10)

As discussed in the costochondritis (CC) prevention and diagnosis monographs, CC has been investigated on a very limited basis. Investigations into treatment of CC provide equally sparse information. There are no randomized controlled trials or even quasi-experimental trials testing different interventions. Only case reports, case series, retrospective studies and expert opinion are available for both conservative and pharmaceutical interventions.

Costochondritis is generally considered a self limiting condition. Disla et al reported, regardless of intervention, up to 1/3 of patients are still symptomatic at 1 year (1).

CONSERVATIVE TREATMENT OPTIONS

1. **Chiropractic (C):** Several case studies reported improvement of CC after multi-modal chiropractic intervention (2-5). All patients were seen on multiple visits, usually starting with 3 visits per week. Total treatment time was over a period of several weeks. Treatment included such diverse interventions as **spinal manipulative therapy, Active Release Technique, Graston Technique, scapular stabilization exercises, pectoral strengthening exercises, acupuncture, Muscle Energy Technique, kinesio-taping, heat and cryotherapy.** All authors reported improvement in their patients but exacerbations of symptoms were reported in two of the studies.

2. **Reassurance (C):** Once more serious pathology has been ruled out several authors emphasize the importance of reassurance of the patient that the nature of their condition is benign. This step is considered essential by these authors, if not the most important aspect of treatment (6-9).

Costochondritis
Evidence Based Pharmaceutical or Invasive Treatment
(as of 12-17-10)

Just as the literature is sparse in all other aspects of prevention, diagnosis and conservative treatment of CC, pharmaceutical and invasive treatment is equally challenged. No high quality research has tested the following interventions.

1. **Analgesic drugs (C):** Use of nonsteroidal drugs (orally or topically) or acetaminophen appears to be the initial intervention offered in most articles relating to treatment (6;9). No evidence as to effectiveness is reported.

2. **Injection Therapy (C):** In cases where analgesic drugs are ineffective perichondral steroid injections are sometimes recommended (6). However the reoccurrence rate in these patients is a discouraging 82% (7)

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