

Causation Analysis: Applying Bradford Hill Criteria to Workers' Compensation Cases

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*Work Related Injuries Workshop
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Occupational Medicine Practice Guidelines

[https://www.acoem.org/uploadedFiles/Knowledge_Centers/Practice_Guidelines/ACOEM Practice Guidelines Methodology.pdf](https://www.acoem.org/uploadedFiles/Knowledge_Centers/Practice_Guidelines/ACOEM_Practice_Guidelines_Methodology.pdf)



Bradford Hill Criteria - Causation

- (1) **Temporal Relationship**: Exposure always precedes the outcome; this is the only absolutely essential criterion.

- (2) **Strength**: The stronger the association, the more likely it is causal, but a small association does not mean that there is not a causal effect.

- (3) **Dose-Response Relationship**: An increasing amount of exposure increases the risk. This is strong evidence for a causal relationship, but the absence of a dose-response relationship does not rule out a causal relationship, for example, if a threshold exists above which a relationship may develop.



Bradford Hill Criteria

(4) **Consistency**: The association is consistent when results are replicated in studies in different settings using different methods. This strengthens the likelihood of an effect.

(5) **Plausibility**: The association agrees with currently accepted understanding of pathological processes. A plausible mechanism between cause and effect is helpful, but Hill noted that knowledge of the mechanism is limited by current knowledge.

(6) **Consideration of Alternate Explanations**: It is always necessary to consider multiple hypotheses before making conclusions about causal relationships.



Bradford Hill Criteria

(7) **Experiment**: The condition can be altered by an appropriate experimental regimen. The hypothesis can be tested.

(8) **Specificity**: This is established when a single putative cause produces a specific effect. This is the weakest of all the criteria, and absence of specificity in no way negates a causal relationship. Because outcomes are likely to have multiple factors influencing them, it is highly unlikely that a one-to-one cause-effect relationship exists.

(9) **Coherence**: The association should be compatible with existing theory and knowledge, but the lack of laboratory evidence cannot nullify the epidemiological affect on associations.

CAUSATION FROM THE LEGAL PERSPECTIVE

Alan S. Pierce and Michael Ready

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Critical Questions

- 1. Is there a pre-existing injury or disease?
- 2. Is the pre-existing injury or disease work-related or non-work-related?
- 3. Did the pre-existing injury or disease combine with a work injury to cause an incapacity and need for treatment?

Pre-Existing Condition Work Related

- If the pre-existing injury or disease is related to a work injury compensable in Massachusetts and if it combines with an injury at work, the employee must prove that the work injury is a cause, however minor, of the incapacity and need for treatment.
- This is known as “Simple Causation” and is the easiest burden of proof to meet.

Pre-Existing Condition Not Work Related

- If the pre-existing injury or disease is non-work-related and combines with the work injury to cause an incapacity and need for treatment, the employee must prove that the work injury is a major but not necessarily predominant contributing cause of the incapacity and need for treatment.
- A major cause is an important cause, a serious cause or a moderately significant cause.
- There can be multiple major causes



Causation Focus For Insurers

- 1. Establish the existence of a pre-existing non-work-related injury or disease
- 2. Provide medical evidence that the pre-existing non-work-related injury or disease combined with the work injury to cause an incapacity and need for treatment
- 3. Obtain expert medical opinion that the work injury is either no cause or no more than a minor or marginal cause of the incapacity and need for treatment



Causation Focus For Employees

- Provide medical evidence that the pre-existing non-work-related injury did not combine with the work injury, or:
- If there is combination, offer expert medical opinion that the work injury is a major but not necessarily predominant contributing cause of the incapacity and need for treatment

Legal/Medical Probability

- Lawyers need to prove things as being more probable than not (more than 50% probability);
- Routinely lawyers ask doctors to opine that an opinion is made with a reasonable degree of medical certainty or probability
- The doctor may view medical certainty as much more than whether the opinion is more probable than not
- The medical expert should offer his or her opinion in terms of whether the opinion is at least 51% or more probable

Causation Analysis: Sample Case

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Case – T.F.

- 49 yr old male (RHD), right shoulder injury at work.
 - Fell onto his right shoulder, felt his shoulder dislocate “popped out”
 - Weakness “Can’t lift his shoulder”
 - Pain with activities
 - Night Pain - “ Can’t Sleep”
 - Prior injury to his shoulder ~ 5 years ago
 - Gone back to work with no issues.

Exam

- Passive FF ROM is 0 to 160 and **active 0 to 20.**
- Passive Abduction is 0 to 80 and **active 0 to 30.**
- ER is 0 to 30 passive with **40 degrees of lag sign.**
- Belly press is 4/5, Bear hug is 4/5.



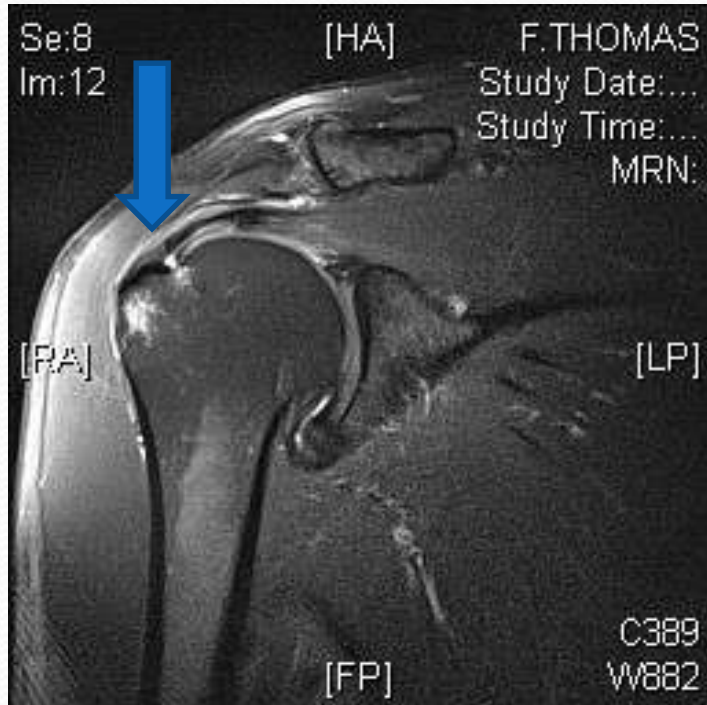
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Images

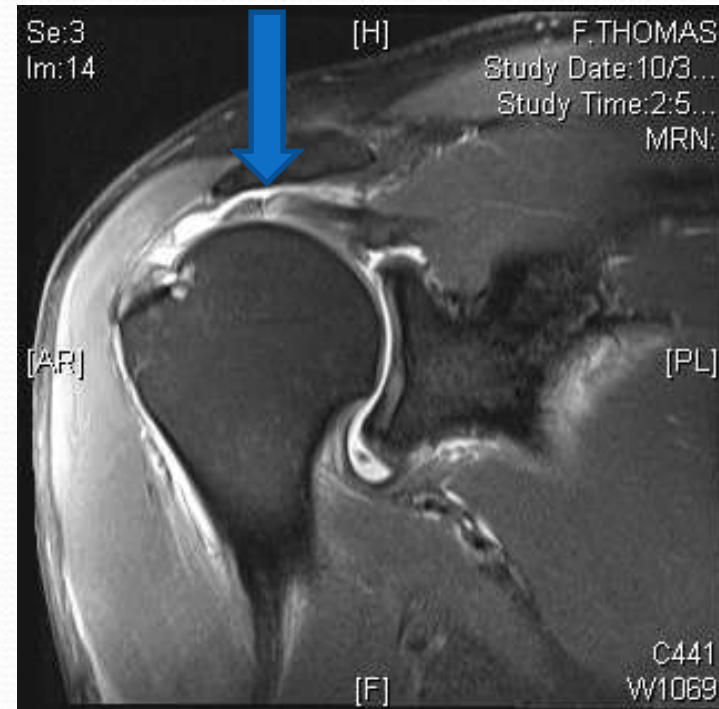


MRI Images

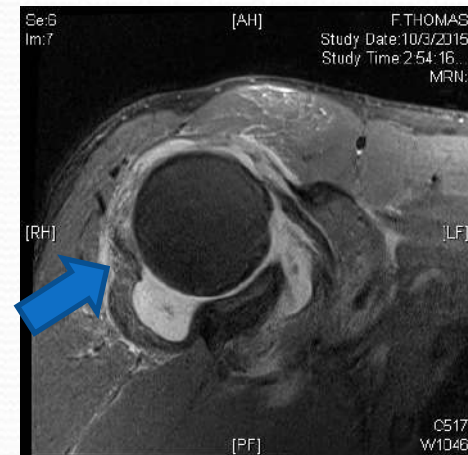
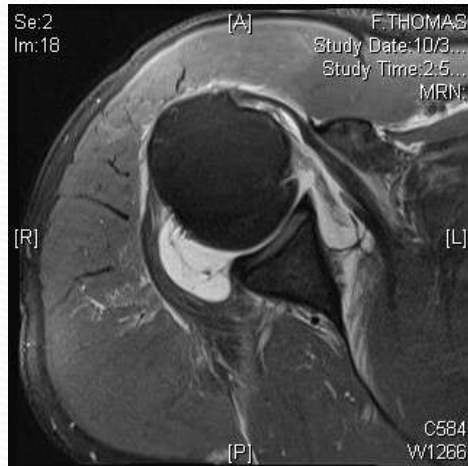
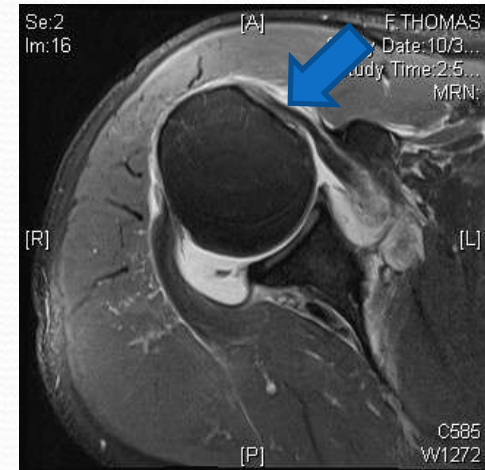
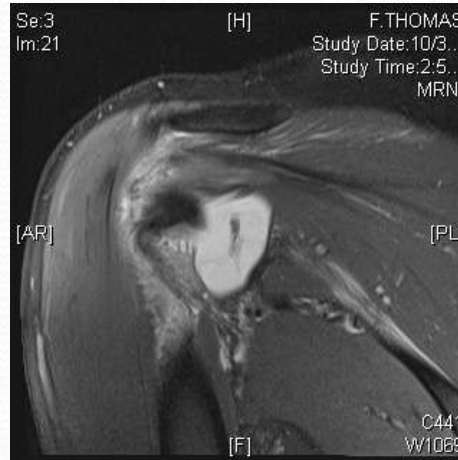
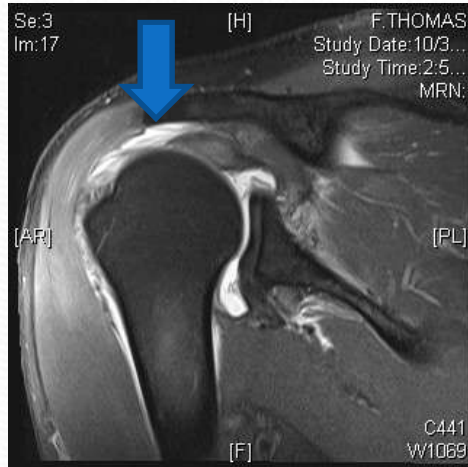
2011



2016



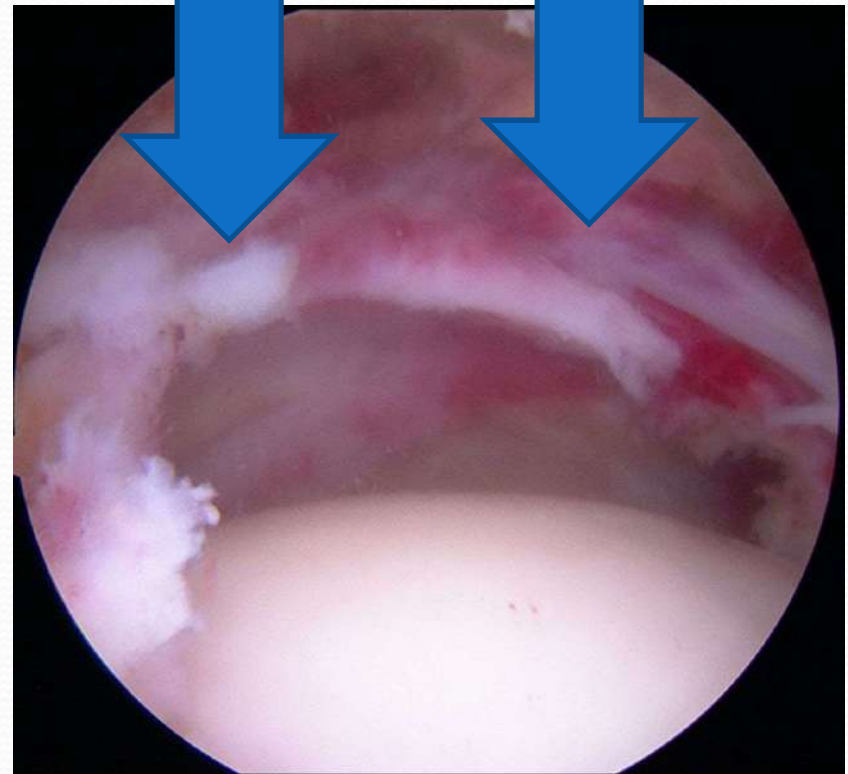
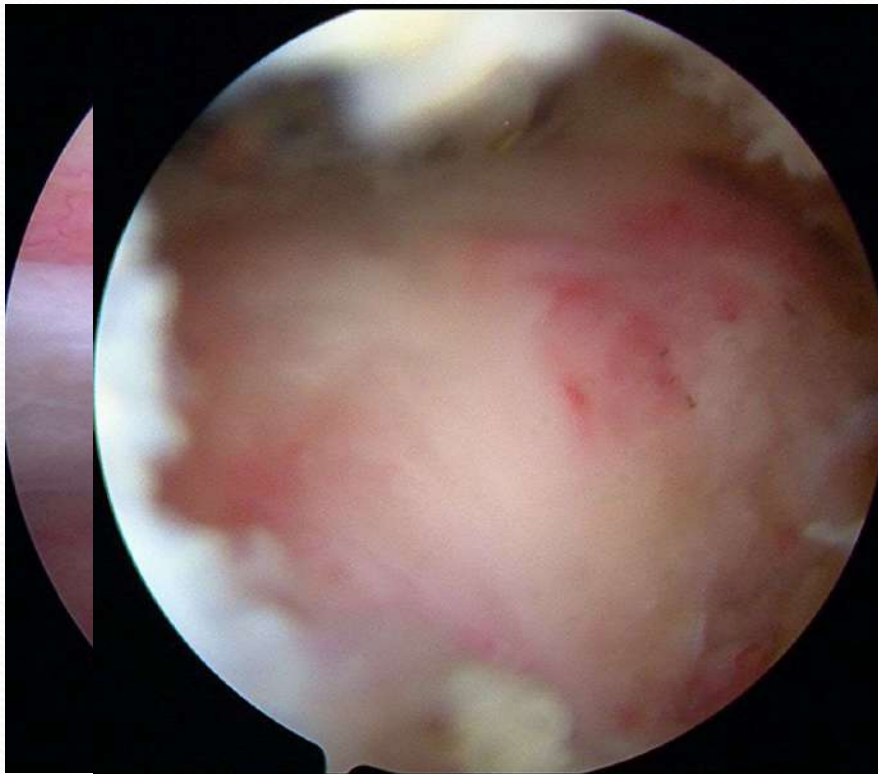
MRI Images - 2016

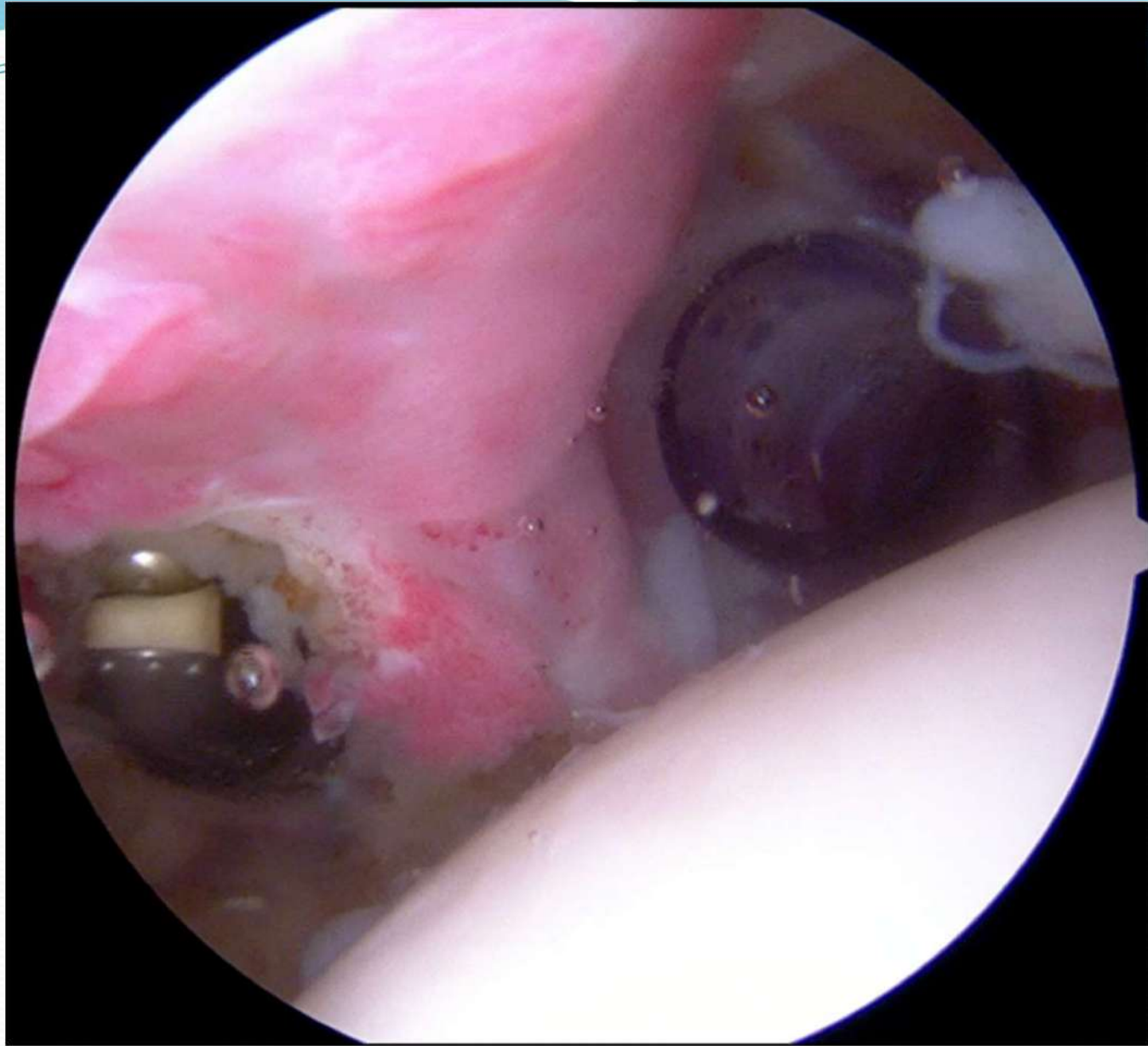


CAUSATION ANALYSIS

- BRADFORD HILL CRITERIA?
- LEGAL PERSPECTIVE?
- MEDICAL PERSPECTIVE?
- PATIENT'S PERSPECTIVE?

Date of Injury to Surgery ~4 Plus Months





1 year Follow Up

