Using Movement System Diagnoses Versus Pathoanatomic Diagnoses in Everyday Clinical Decision Making

Paula M Ludewig, PhD, PT
The University of Minnesota

Objectives
- Recognize advantages and disadvantages of pathoanatomic versus movement system diagnostic labels
- Identify specific limitations of broad diagnostic categories such as shoulder impingement or adhesive capsulitis, based on scientific evidence
- Recognize alternative diagnostic labels and process for physical therapists, based in the movement system

Pathoanatomic Diagnostic Labels
- Common and “Traditional”
- Communication with surgeons and other health care providers
- Focus on identifying tissue pathology as the basis for the patients pain or dysfunction
- Important to surgical decision making
- Important for PT decision making

Concerns with Pathoanatomic Labels
- Often do not adequately direct physical therapy intervention
- Disconnect between our diagnostic and treatment process
- Often we cannot determine an anatomical source
- What about co-existing pathologies?
- Inconsistent use confounds communication

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Why Classify?
- Direct Intervention
- Prognosis
- Communication
- Others
  - Influence reimbursement
  - Define homogenous subgroups for research

Provide a Diagnostic Label
Diagnosis as Pattern Recognition

- Assumes subgroups of subjects exist for which similar treatment interventions are useful
- For orthopaedic physical therapy, what best defines these subgroups?
- Should they be based in the movement system?
- Should they be based in movement impairments?
- What level of specificity do we need?

Clinical Practice Guidelines/ICF Approach

- Shoulder Pain & Mobility Deficits: Adhesive Capsulitis
- Shoulder Stability & Movement Coordination Impairments
- Shoulder Pain and Muscle Power Deficits: Rotator Cuff Syndrome

Pathokinesiologic Model

- Focus on identification of characteristic movement impairments that are the cause of the patient’s pain or dysfunction
- Also (more) important for physical therapy decision making – greater potential to guide interventions
- Stronger relationship between impairment and function, easier integration with ICF
- Does not presume or preclude specific tissue pathology

Possible Labels

- Glenohumeral mobility deficit associated with capsular contracture
- Glenohumeral mobility deficit associated with osteoarthritis
- Scapular upward rotation deficit associated with rotator cuff disease
- Scapular upward rotation deficit associated with multi-directional instability

Advantages

- “Reorders the label” consistent with physical therapist identity as movement system experts
- Prioritizes movement in diagnostic process
- No issues of scope of practice
- Avoids “misdirection” of intervention from tissue pathology that may not relate to function

Concerns About Pathokinesiologic Model

- Creating a new and unfamiliar language/system
- Are we just “afraid” to use traditional labels or advances in diagnostic tools (imaging)?
- Reliability/validity not established
Evaluation/Intervention Component 1: medical screening

Evaluation/Intervention Component 2: differential evaluation of clinical findings suggestive of musculoskeletal impairments of body functioning (ICF) and the associated tissue pathology/disease (ICD)

Evaluation/Intervention Component 3: diagnosis of tissue irritability level

Shoulder Impingement

• Most common diagnostic label/disorder for the shoulder
• Large number of potential tissue pathologies
• Movement impairments variable between investigations of this condition
• This diagnosis becoming controversial

What Did Neer Think?

• Anterior acromion “at fault”
• Anterior acromioplasty “makes room”
• Modifying surgery from radical lateral acromionectomy
• Developed “impingement test”
• Anatomical (Surgical) Problem…
• …Surgical treatment
Arthroscopic Acromioplasty

Vitale et al (JBJS 2010)
In 1996 there were 5571 acromioplasties in New York State, representing a population incidence of 30.0 per 100,000

In 2006 there were 19,743 acromioplasties, representing a population incidence of 101.9 per 100,000

Rotator Cuff Disease Mechanisms

• Eccentric overload
• Ischemia, degeneration: tendinopathy
• Impingement

Damage/Inhibition
Pain/Inflammation
Altered Kinematics

Impingement Syndrome Survey Data

Bas de Witte et al, 2014
Not able to reach a consensus definition!
GPs may think differently than surgeons than PTs

Some Ortho Surgeons declined to complete the survey with comments that “impingement is not relevant to my practice” or “diagnosis of impingement is obsolete”

Problems

Professional Disagreement
• Using same label for many things
• Broad use limits effectiveness of decision making
• Using same label with different meaning

Miscommunication
• Not treating or studying homogenous patient groups
• Some physicians advocating for different label

Is Advanced Imaging the Solution?

• Assists surgical decision making
• Does not relate strongly to functional status
  – Asymptomatic pathology
• Static tissue pathology is not enough to direct physical therapy intervention
• Does not account for movement and function

Biomechanical Evidence for Mechanical Impingement

• Physiologic condition needs to be distinguished from the clinical diagnostic label
• Is there risk of/evidence for mechanical compression of the rotator cuff in these patients?
30/60/90° Humerothoracic Elevation

Red = < 2.5mm
Orange = 2.5 – 5mm
Yellow = 5 – 7.5mm

Subacromial Risk 30-70°
Bey 2007
Giphart et al 2012

Internal Impingement

Classic description:
Abduction external rotation
Further Problems

- Subacromial mechanical impingement occurs in lower ranges of motion than classically described with the painful arc of motion
- Internal impingement is not just an overhead athlete phenomenon (abduction/external rotation)
- Classic impingement tests do not coincide with greatest mechanical cuff contact risk positions
Rotator cuff disease/impingement/bursitis/long head biceps tendinopathy/partial thickness tears/isolated full thickness tears/labral tears

- Not well distinguished clinically and often occur in combination
- Some advocate for calling this anterior shoulder pain or anterior shoulder pain of unknown origin
  - "low back pain" label

Support for Mechanical Impingement

- Positional risk is present with arm elevation
- Evidence of abnormal movement patterns in symptomatic patients
- Cause vs. compensation?
- Epidemiologic evidence for positional risk (occupational risk of elevated arm positions)
- Mechanically reducing space interacts with eccentric overload to create disease

The Path Forward

Don’t subcategorize under Impingement, reconsider the condition, restart the conversation
Create a new diagnostic language
Use accurate terms

Mechanical impingement is a mechanism not the only mechanism, and not an ideal diagnostic label
Understand what many surgeons hear when you say "impingement" and ensure that that is what you want them to hear.

Problem is Not Just the “Impingement” Diagnosis

- Adhesive Capsulitis
  - Ortho Section CPG
  - Capsular adhesions may not be present (response to anesthesia, injections)
  - Predominant characteristic
    - “global loss of both active and passive shoulder range of motion”
  - Glenohumeral mobility deficit associated with capsular contracture, vs associated with OA

“A medical diagnosis of adhesive capsulitis may be helpful in describing the tissue pathology, but it does not aid in treatment decision making for rehabilitation. An impairment-based classification is necessary to guide rehabilitation; however, there is no published classification system. “

RCT Summary Improvement

Looking closely at variety of shoulder pain RCTs including exercise and/or manual therapy
Using MCID as defining “improvement for an individual”

About 2/3 improve beyond chance improvement threshold
“Average” improvement is about 50%
How to Improve?

- There are clusters of patients with similar movement impairments who will likely benefit from similar treatments
  - Posterior shoulder tightness (Tyler et al 2010)
  - Microinstability

Need to target the right treatments to the right patients at the right dosages

Why not identify movement impairment related diagnostic categories?

Case examples

- 29 y.o. male office worker w/ lateral shoulder pain
  - Onset: insidious, 3 years prior
  - Imaging: increased signal intensity at supraspinatus tendon

Case #2 Swimmer

- 25 y.o. female, former college swimmer with anterior-lateral shoulder pain
  - Onset: insidious during college and continues with overhead activities
  - Imaging: MRI with contrast - possible labral tear

So what should we be calling these problems?

- Currently diagnosis of exclusion
- Pain localization/history are important
- Need to identify clusters of movement impairments
- Pain provocation vs. pain relief tests
  - Scapular assistance test
- What is the appropriate level of specificity of a label?

Office Worker Video

Case examples

- 29 y.o. male office worker w/ lateral shoulder pain
  - Onset: insidious, 3 years prior
  - Imaging: increased signal intensity at supraspinatus tendon

Office Worker

Selected Findings

- Movement: scapular dyskinesia/“dumping”
- ROM: within normal limits
- Strength:
  - Normal: serratus anterior, rotator cuff
  - Abnormal: middle and lower trapezius (2/5)
- Joint mobility: normal
- Special Tests:
  - (+) Hawkins-Kennedy, Neer, painful arc, external rotation resistance
- Diagnosis: Impingement

Case #2 Swimmer

- 25 y.o. female, former college swimmer with anterior-lateral shoulder pain
  - Onset: insidious during college and continues with overhead activities
  - Imaging: MRI with contrast - possible labral tear
Former Swimmer Video

Selected Findings
- Movement: scapular dyskinesia
- ROM:
  - Involved: ER 106º, IR 39º
  - Uninvolved: ER 107º, IR 60º
- Strength: within normal limits
- Joint mobility:
  - Moderate anterior and mild inferior hypermobility
  - Moderate posterior hypomobility
- Special tests:
  - (+) Hawkins-Kennedy, Neer, empty can, painful arc
- Diagnosis: Impingement

Case #3 Grad Student
- 25 y.o. male, grad student, recreational volleyball player
- Onset: insidious during grad school and continues with overhead activities especially volleyball
- Imaging: None

Grad Student Video

Selected Findings
- Movement: no obvious scapular dyskinesia, excessive GH external rotation
- ROM
  - Involved: ER 115º, IR 35º
  - Uninvolved: ER 90º, IR 60º
- Strength: within normal limits
- Joint mobility: decreased inferior mobility
- Special tests:
  - (+) Neer, post impingement, external rotation test, painful arc
- Diagnosis: Impingement

Diagnosis Guides Intervention
- Office Worker: Dx: Impingement
- Swimmer: Dx: Impingement
- Graduate Student: Dx: Impingement

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**Diagnosis Guides Intervention**

**Office Worker**
- Dr. Scapular Dyskinesia/Rapid Downward Rotation
- Impairments/Tissue Status: Impingement

**Swimmer**
- Dr. Scapular Dyskinesia/Glenohumeral Hypermobility
- Impairments/Tissue Status: Impingement

**Graduate Student**
- Dr. Glenohumeral Hypermobility associated with humeral retrusation
- Impairments/Tissue Status: Impingement

**Strengths**
- A diagnosis that guides intervention
- Fits our expertise as movement specialists
- Efficiency of diagnostic process
- Efficiency of educational process
- Integrates pathokinesiology and pathoanatomy
- Provides a starting point for further development

**Weaknesses**
- Best labels not yet delineated
- Clinical exam not yet standardized or proven reliable/valid
- Direct relationships between pain and movement abnormalities not fully known
- Requires observational expertise

**Possible Movement Subgroupings**
- GIRD/Posterior Shoulder Tightness
- Stiffness
- Microinstability/instability
- Low elevation versus high elevation
- Scapular “dyskinesia”
  - Clavicle depression and protraction with scapular downward rotation and internal rotation
  - Shoulder "shrugging"
  - Scapular anterior tilting
  - Scapular “dumping”

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**Diagram**

- Shoulder Origin
- Non-Shoulder Origin
- Hypermobility (Instabilities)
- Hypomobility (Adhesive Capsulitis, Arthritis, Post-Fx)
- Aberrant Motion (Rotator Cuff, Impingement, Labral Tears)

**Subgroupings**

- Scapular Dyskinesia
- Excess Humeral External Rotation
- Rotator Cuff Syndrome/Impingement

- Scapular Upward Rotation Deficit
- Scapular Posterior Tilt Deficit

- Subacromial Impingement
- Inferior Instability
- Internal Impingement

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Evaluation/Treatment Approach
- Observe alterations in the movement pattern
- Does altering abnormal pattern reduce symptoms?
- Which biomechanical factors may be contributing?
- Stretch muscles or structures which can limit desired motions
- Strengthen/train muscles which can produce desired motions
- Influence postural factors that may affect the movement
- Influence pain cycle, individualize to patient

Questions
- Do we agree on the most common clusters of patients?
- Do we want to classify or stage within traditional medical diagnostic labels, or associate tissue impairments with movement diagnoses?
- Is the status quo adequate?
- How do we most efficiently teach students to think like seasoned clinicians?
- How can we impact health care reform/cost accountability?
- How will this help us measure and describe outcomes?

Summary
- Use of Impingement diagnostic label evolved to be overly broad
- Practitioners and researchers miscommunicating about conditions
- Mechanistic conditions do not behave as originally believed
- Classic impingement tests do not best identify mechanical impingement
- Need diagnostic labels that guide intervention with adequate specificity
- Clusters of movement impairments offer potentially useful diagnostic classification

Discussion is Critical
- Opportunity to impact diagnostic decisions
- Physical therapists are "branded" in the movement system
- ICF Model – need to go beyond tissue pathology and impairment to function and disability

Work in Progress
- Need to get more than 2/3 of patients 50% better
- The timing is right
- Conversation should be international

Other Collaborators
Kristin D. Zhao, PhD
Vandana Phadke, PhD, PT
Jack Lewis, PhD
Mike McGinnity, RN
Robert LaPrade, MD, PhD
Cort Cieminski, PhD, PT
Fred Wentorf, PhD
Nicki Kangus – CT Tech
Pieter bas de Witte, MD
Nicole M Hybben DPT, Brett W Petersen DPT, Caroline S Nystrom DPT, Tien D Pham DPT
Nathan Martinez DPT, Kaley Kosak DPT, Meleah Murphy DPT, Ashleigh Knutson DPT
Kara Beranek DPT, Kelsey Blom DPT, Adam Burandt DPT, Kate Seely DPT

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Thank You!
Questions/Discussion

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