Joint Mobilization

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THE UNIVERSITY OF TENNESSEE CHATTANOOGA Physical Therapy
K9 Fit Club Fit! Changing Lives One Dog at a Time™
TEDx Chattanooga x = independently organized TED event
Manual Therapy

● Skilled hand movement techniques intended to:
  ● Improve issue extensibility
  ● Increase ROM
  ● Induce relaxation
  ● Mobilize or manipulate soft tissues and joints
  ● Modulate pain
  ● Reduce swelling and inflammation
Basic Principles of Joint Mobilization

- Physiologic Motion
- Accessory Motion
Basic Principles of Joint Mobilization

● Physiologic Motion
  ● Normal active motion that is available at a joint
  ● Examples: flexion, extension, abduction, internal rotation, etc.
Physiological Shoulder Motion
Basic Principles of Joint Mobilization

- Accessory Motions
  - Movements that cannot be performed actively
  - Examples: distraction, compression, glides, spins, rolls
Accessory Motions
What accessory motions happen at the stifle during flexion and extension?

During flexion we have a **Glide** - Cranial glide of the Femur on the tibia **Rotation** - Tibia internally Rotates during flexion

Trouble sitting/flexion
Accessory Shoulder Motion
Concave/Convex Relationship of Joints

- **Concave-on-convex**
  - The articular surface moves in the same direction of the shaft of the bone
  - Ex: When the distal radius is being moved on the stationary carpal bones, the concave surface of the radius is rolling and sliding on the convex proximal row of carpal bones
Convex-on-concave

- The articular surface moves in the opposite direction of the shaft of the bone
- Ex: when the shoulder joint is being flexed by moving the humerus, the convex surface of the humerus is sliding and spinning on the concave glenoid of the scapula
Concave/Convex Relationship of Joints

- Concave on Convex, same direction
- Convex on Concave, opposite direction

Diagram showing:
- Posterior rolling
- Posterior sliding
- Inferior sliding
- Superior rolling
Concave/Convex Relationship of Joints
So is it really true...

- Generally, but there is another way to look at it...
Some names you might hear about

- James Cyriax
- Stanley Paris
- Robin McKenzie
- Geoffrey Maitland
- Brian Mulligan (NAGS, SNAGS, MWM’s)
# Joint End Feel Characteristics

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Example</th>
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<tr>
<td>Bony or hard</td>
<td>Bone approximates bone, resulting in an abrupt, hard stop.</td>
<td>Loss of flexion with end-stage elbow osteoarthritis; loss of stifle motion as a result of quadriceps contracture following fracture of the distal femoral physis</td>
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<td>Soft tissue</td>
<td>Motion is stopped by compression of soft tissues.</td>
<td>Normal stifle flexion</td>
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<td>approximation</td>
<td>Abnormal if occurs too early in the range as the result of edema.</td>
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<td>Capsular or firm</td>
<td>A firm but slightly yielding stop occurs as a result of tension in the joint capsule or ligaments. Abnormal if occurs too early in the ROM.</td>
<td>Normal carpal extension</td>
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<tr>
<td>Springy block</td>
<td>A rebound is felt at the limit of motion—motion stops and then rebounds. Abnormal; may indicate joint effusion or a joint mouse.</td>
<td>Entrapped torn medial meniscus.</td>
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<td>Empty</td>
<td>No end point is felt because the patient stops the motion because of pain; no resistance felt. Abnormal; indicates presence of sharp pain.</td>
<td>Sciatic nerve entrapment as a result of a migrating intramedullary pin; fracture of the lateral humeral condyle</td>
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Joint Mobilization

- Indications
  - Pain and/or loss of motion 2° to musculoskeletal dysfunction
  - Example: Dogs with limited motion and/or pain due to canine hip dysplasia, elbow dysplasia, intervertebral disk disease, and osteoarthritis
Joint Mobilization

- Precautions/Contraindications
  - Spinal instability, bacterial infection, malignancy, joint replacements (hip, elbow, etc.), systemic localized infections, sutures, recent fracture, cellulitis, febrile state, hematoma, open wound at treatment site, osteomyelitis, inappropriate end feel, constant severe pain, pain unrelieved by rest, severe irritability
Disclaimer

- Practice according to all regulatory rules and regulations in your region
- If in doubt, don’t do it!
- Constantly assess the patient
- Know the diagnosis and any precautions and contraindications
- Anatomy knowledge is crucial
Mobilization vs. Manipulation

- **Joint mobilization**
  - Passive movements that are performed within available ROM
  - Grades I - IV

- **Joint manipulation**
  - High velocity, low amplitude passive movement performed at the physiologic limit of ROM
  - Grade V
Grades of Mobilization

- **R1**: point of passive ROM where the clinician first senses resistance
- **R2**: resistance felt at the end of available ROM
Hand position

- Should be as close together as possible to feel the joint motion
- Watch lever arm length/forces
- No deaths grips!
- Stabilizing hard
- Mobilizing hand
- Tissues need to be relaxed!
Mobilization

Bad

Good
Stretching

Bad

Good
Finding R1 and R2
Joint Mobilization

- All grades of mobilization (I-IV) may be performed as an accessory or physiological or both.

- What might lead you to choose one over the other?
Loose-packed position

- A position where the joint surfaces are not congruent and the ligaments and capsule are loose or lax
- Sometimes called open-packed position
Grade I Mobilization

- Small amplitude movement performed in pain-free range
- Activates Type I mechanoreceptors
- Before R1
- 3-4 oscillations per second
- Working usually in direction OPPOSITE of painful movement
- Example: Pain with extension, perform grade I toward flexion
Accessory Grade I Hip Flexion
Grade II Mobilization

- Large amplitude movement performed in a pain-free range approaching R1 but should not cause pain
- Activates Type I mechanoreceptors to greater extent than grade I
- 3-4 oscillations per second
- Working usually in direction OPPOSITE of painful movement
- Example: Pain with extension, perform grade II into/toward flexion
Accessory Grade II Hip Flexion
Grade III Mobilization

- Large amplitude movement that occurs between R1 and R2 near end of range of restricted motion (bumping R2)
- 3-4 oscillations per second
- May cause slight discomfort for patient
Accessory Grade III Hip Flexion
Grade IV Mobilization

- Small amplitude movement that occurs near R2
- 3-4 oscillations per second
- May cause slight discomfort for patient
Accessory Grade IV Hip Flexion
The Shoulder Joint

- Ball-and-socket joint
- Convex-on-concave pattern
- Common impairments of shoulder ROM
  - Fracture of the humerus, supraspinatus tendinitis, bicipital tenosynovitis, osteochondritis dissecans, infraspinatus contracture, scapular fracture, surgical repair for shoulder instability
  - Compensations or increased forces placed on the joint as a result of hindlimb or spinal problems
Scapular Mobilizations

- Almost always a grade III or IV
- To increase shoulder extension you would perform upward rotation
- To increase shoulder flexion you would perform downward rotation
- Upward and downward glides also improve overall mobility
Scapular Mobilizations
Upward Rotation - Grade III
Relationship between pain and stiffness

Hypomobility

- Hypomobility with limited pain (Grades III-IV)
- Hypomobility and pain (Grades I-IV)
- No pain and excessive mobility (mobilizations contraindicated)

No Pain

- Pain dominance with hypermobility (Grades I-II)

Significant Pain

- No pain and excessive mobility (mobilizations contraindicated)

Hypermobility
Irritability

- Pain is easily brought on and takes a long time to settle down.
- Trauma, post-op, chemical pain, acute flare-ups, etc.
- Tx - rest, NSAIDS, Cryotherapy, Laser, E-stim, Grades I and II mobs
Choosing the Appropriate Mobilization Grade

- When ROM is decreased due to pain:
  - If the pain is treated, ROM should increase
  - Grade I and II mobilizations should be performed in the pain-free range for ~30 seconds

- If ROM is decreased due to stiffness
  - Grades III and IV mobilizations should be used
  - Performed in the direction of stiffness for up to 60 seconds followed by stretching if able and re-assessment
Choosing the Appropriate Mobilization Grade

- If pain is being treated and physiologic mobilization grades I and II cause pain
- Accessory grades I and II should be performed
- If 50% of physiologic active ROM is not available secondary to pain
- Use accessory grades I and II to treat pain (50/50 rule)
Some terms to start with..

- Cranial-Caudal or A-P (anterior-posterior)
  - Sometimes called just caudal glide
- Caudal-Cranial or P-A (posterior-anterior)
  - Sometimes called just cranial glide
- Longitudinal Distraction
- Rotation
- Joint Traction/Distraction
- Joint Compression
- Medial Glide
- Lateral Glide
Stretching and Joint Mobilization

- When to choose one over the other?
- When to do both?
- Is one better for certain tissues?
- Studies that compare them?
1 more general principle

- PROM (whether improved by stretching or joint mobilization), is followed by active motion to use the joint in the new ROM and reinforce it if possible.
CRYOTHERAPY
References


References


References


References

- **Massage Therapy Attenuates Inflammatory Signaling After Exercise-Induced Muscle Damage** Crane JD, et. al, Sci Transl Med 1 February 2012 4:119ra13
Questions?

Notice

Exorcising of dogs not allowed on the course area