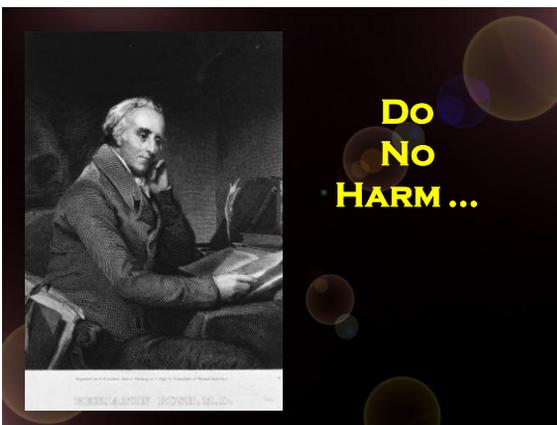


OBJECTIVES FOR TODAY

- Examine the biomechanical components of mobilization
- Identify the principles behind Maitland's approach to mobilization
- Outline the different grades used by Maitland
- Discuss the use of mobilization techniques in treatment of conditions

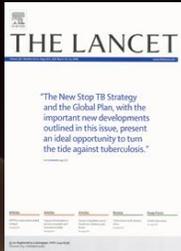
ORTHOPEDIC MANUAL THERAPY



BENJAMIN RUSH

- America's most prominent physician in 1796
- Believed mental illness was caused by irritation of blood vessels in the brain
- He also concluded that the most logical approach for the treatment of fever – was 'bleeding'.
- The patient went from being hot, flushed, and delirious to being cold, pallid, and euphoric, in the eyes of physicians of that time clearly the first step to a cure.

POPULARITY AND PROMINENCE DO NOT MAKE SOMETHING RIGHT



- Named after the instrument used to 'bleed' patients who had fever – some mistakes are remembered



WHERE DID MANUAL PHYSICAL THERAPY COME FROM?



CYRIAX: FATHER OF ORTHOPEDIC MEDICINE (1930'S ONWARDS)



- Specific and scientifically sound examination approach, which delineates faulty structures by "selective tension"
- Systematic joint examination processes
- Disc as the primary source of low back pain
- Tendons treated with cross friction massage.

ACCESSORY MOTION: FRANK MENNEL (1940'S)

- Mennel first described joint play as involuntary motion that is present in all synovial joints.
- It is necessary for normal, pain free voluntary motion.
- When joint play is diminished as in cases of hypomobility therapeutic intervention becomes necessary.
- Abnormalities in joint play form the basis for mobilization.

NORWEGIAN/KALTENBORN (1950'S)



- Normalization of function is dependent upon the restoration of normal arthrokinematics.
- Influence of "somatic dysfunction" (muscle function and soft tissue alteration,
- Cause for the presence of symptoms and therefore, loss of function.

STANLEY PARIS (1950'S)



- Synthesis of osteopathic and chiropractic from work originated by Alan Stoddard.
- Orientation views the "normalization of arthrokinematics" as key to improvement in function.
- Generally does not use the patient's pain symptoms as a guide to treatment.

TRAVELL/SIMMONS (1960's)



- Recognized that skin and underlying musculoskeletal structures when irritated may refer symptoms regionally and cause regional soft tissue changes (**trigger points**).
- Stimulation of the regional areas can reflexively alter the pain referral: soft tissue alteration cycle.

KINEMATICS

- **Arthrokinematics**- the motion (translatory) that occurs within the joint (concave - same as osteokinematic motion, convex- opposite of osteokinematic motion).
- **Osteokinematics**- motion of the bone
example-abduction refers to humeral motion, when addressing the shoulder.

MOBILIZATION

Mobilization is passive movement using arthro- and osteo-kinematic principles to increase the mobility of joints.

JOINT PLAY AND COMPONENT MOTION GRADING

Motion	Grade	Intervention
	0 Ankylosed	Surgery (?)
Hypo	1 Gross Restrict.	Manipulation
	2 Slight Restrict.	Mobilization
Normal	3 Normal	
	4 Slight Increase	Exercise
Hyper	5 Moderate Increase	Brace/Exercise
	6 Unstable	Surgery

CONVEX AND CONCAVE JOINT SURFACES

- Joint movement requires combined motions of rolling and gliding.
- As a bone moves in one direction, the associated roll occurs in the same direction.

COMPONENT MOTIONS

- Component motions are those motions necessary for full active motion but are not generally recognized as part of the motion.
- An example would be the anterior glide and external rotation of the tibia during knee extension.

ASSOCIATED TRANSLATORY GLIDE

- Kaltenborn (1980) proposed the convex-concave rule
- Based decision on mechanical models
- Questions have been raised as to the effectiveness of this 'rule'
- In the opposite direction if the moving joint surface (usually the distal surface) is convex.
- In the same direction if the moving joint surface is concave.

ASSOCIATED TRANSLATORY GLIDE

- The therapist must know the joint surface of the bone to be moved to accurately apply the principles of mobilization.
- The convex surface of a joint is more curved than the concave surface.

RESTORING MOTION

- The inhibiting factor for that movement should be established
 - articular surfaces
 - joint capsule
 - ligaments
 - muscles
- Appropriate treatment given to the **inhibiting structure**

STRETCHING

- Stretching, regardless of the source, is a common and effective method for restoring motion.
- Common methods include static, muscle-energy, and passive stretching.
- Classically used in instances of tight musculature or even ligamentous structures.

JOINT CAPSULE

- The joint capsule is an innervated bi-layered structure.
- The inner layer is the synovial lining and the outer or external layer is dense, irregular collagenous connective tissue.
- The outer layer tends to become thickened and immobile in joints demonstrating a **capsular pattern** of motion restriction.

JOINT CAPSULE

- Collagen fibers do not stretch like elastic fibers, but do exhibit a degree of plasticity.
- They tend to deform over time and respond to mobilization that is graded and persistent (as opposed to manipulation).
- Articulating and stretching techniques are most appropriate when confronted with a capsular pattern of hypo-mobility.

ARTICULATING TECHNIQUES (MAITLAND)



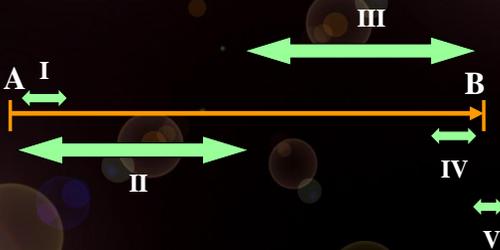
Articulations are graded oscillations, used to restore joint play, component motion, or range of motion in a hypo-mobile joint.

ARTICULAR RANGE

The extent of accessory movement from beginning to end of range.



GRADES FOR NORMAL RANGE



GRADE I OSCILLATION



- Small amplitude movement – short of resistance (R1)
- Gentle oscillation used for pain relief
- Requires great control to remain within the required small amplitude

GRADE II OSCILLATION



- Large amplitude movement – short of resistance (R1)
- Can occupy any part of the range that is free of any stiffness or spasm
- Never reach into resistance, always resistance-free movements

GRADE III OSCILLATIONS



- Large amplitude movement to mid-point of resistance (50% of R1 – R2)
- Move from R1 to half way between R1 and R2

GRADE IV OSCILLATIONS



- Small amplitude movement to the mid-point of resistance— between R1 and R2
- Oscillatory movement often stretching into stiffness or spasm

GRADE V OSCILLATIONS



- Small amplitude, high velocity thrust at the end of motion – at R2
- Single thrust once patient is correctly positioned – may or may not be an audible associated

MANIPULATION – GRADE V

- Manipulations include the same techniques as articulations but incorporate a high velocity thrust.
- The thrust is usually a short arc at the end of the available range of motion, i.e at or close to R2.

APPLICATION OF MOBILIZATION FORCES

- Movements are oscillations within the range
- If the oscillations are too fast or too slow it will be impossible to gain any feel of the movement
- The whole body (of the PT) should be used to generate the movement, not just the small muscles of the hands and fingers

APPLICATION OF MOBILIZATION FORCES

- Maximum movement will be produced when the joint to be mobilized is in the mid-position for all other movements
- The therapist's hands must be relaxed so the 'feeling' can be maximized
- Pressure and force should be sufficient to the grade intended

APPLICATION OF MOBILIZATION FORCES

- Pain often limits the therapists' ability to mobilize in the appropriate direction.
- In these cases, it is desirable to continue in a pain limited or pain free range.

APPLICATION OF MOBILIZATION FORCES

- Occasionally, it may be necessary to mobilize in the direction opposite to what is desired.
- This can lead to appropriate mobilization because of the effect of tractioning the joint followed by relaxation.

DIRECTION OF MOBILIZATION FORCES

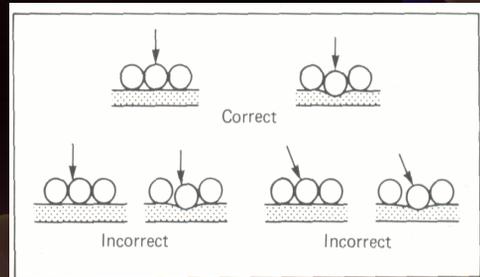


Figure 5.2 Direction of pressure on spinous processes

TREATMENT USING MOBILIZATION FORCES

- Initial sessions should be relatively brief and tolerated well by the patient.
- Initial mobilization should only last 30 secs
- Five to thirty second delays between mobilizations are desirable for relaxation and accommodation.

RULES OF MOBILIZATION

- Patient and therapist must relax.
- Keep procedures as pain free as possible.
- Stabilize and mobilize.
- Brief first session, monitor reaction.
- Compare to the "normal" side.
- One joint, one movement at a time.
- Do not mobilize acute, actively inflamed joints.

CONTRAINDICATIONS TO MOBILIZATION

- **ABSOLUTE**
 - Malignancy involving the spine
 - Cauda equina or spinal cord compression (≥ 2 levels)
 - Rheumatoid Arthritis (acute inflammatory stage)
 - Active inflammation or infective arthritis
 - Bone disease
 - Fracture
 - Vertebral Artery insufficiency
 - Undiagnosed pain

CONTRAINDICATIONS TO MOBILIZATION

- **CARE REQUIRED**
 - Presence of Neurological deficit
 - Rheumatoid Arthritis (no inflammation, stable C sp)
 - Osteoporosis
 - Spondylololsthesis
 - Hypermobility
 - Instability

CONTRAINDICATIONS TO MOBILIZATION

- Pregnancy
- Malignant disease not affecting the spine
- Acute trauma
- Protective spasm
- Gross degenerative changes or foraminal encroachment
- Psychological pain
- Steroid or anticoagulant therapy
- Sever nerve root pain

CONTRAINDICATIONS & LIMITING FACTORS

- Malignancy (especially involving the spine)
- Neurological
 - Signs and symptoms of cauda equina & spinal cord compression involvement of more than one nerve root
 - Neurological diseases (i.e.transverse myelitis)

CONTRAINDICATIONS & LIMITING FACTORS

- Bone
 - Articular
 - Fracture
 - Spondylolsthesis
 - Gross foraminal encroachment on X-ray
 - Disease
 - Osteoporosis
 - TB
 - Osteomyelitis
 - Paget's Disease

CONTRAINDICATIONS & LIMITING FACTORS

- Inflammatory conditions
 - Rheumatoid arthritis (acute inflammatory stage)
 - Active inflammation or infective arthritis
 - Ankylosing Spondylitis
 - Pregnancy
 - Advanced diabetes
 - Hx of steroid use/abuse
- General Health

CONTRAINDICATIONS & LIMITING FACTORS

- Pain
 - Psychological
 - Undiagnosed
- Palpation
 - Hypermobility
 - Instability
 - Spasm or lack of relaxation
 - Rubbery resistance

ARTICULAR POSITIONS

How Joints Fit Together

CLOSE PACKED POSITION

- The close-packed position is the extreme of one of the most habitual motions of a joint.
- It is the position in which:
 - The concave surface (smaller area) is in complete congruence with the larger, convex surface.
 - The capsule and ligaments are under maximal tension.
 - The joint is minimally distracted when a traction force is applied.

LOOSE PACKED POSITION

- Any position other than the close packed position is considered to be loose packed.
- Articular surfaces are not in complete congruence
- Some parts of the capsule are lax

GENERAL RULES FOR ARTICULAR POSITIONS

- Joint rotation will cause close packed position
- The extremes of all motion tends to be close packed
- Mid-range of motion tends to be loose packed
- There are exceptions to the rules

END FEEL TYPES

- **Capsular**- stretching leather, gradual increasing resistance
- **Ligamentous** - (similar to capsular) but harder
- **Soft** - soft tissue approximation - painless compression of soft tissues

END FEEL TYPES

- **Hard** - bone on bone - hard, sudden stop
- **Spastic** - palpable muscular resistance to stretch
- **Springy** - loose-body blockage
- **Empty** - patient stops motion before resistance is felt

SOMATIC DYSFUNCTION

Diagnosing and Treating
Peripheral Joints

SOMATIC DYSFUNCTION

- An area of impaired function of related components of the musculoskeletal system (muscle, bone, fascia, ligament) and its associated or related parts of the vascular, lymphatic, and nervous system.

COMPONENTS OF SOMATIC DYSFUNCTION

- Symptoms
- Soft tissue changes
- Changes in function:
 - strength
 - co-ordination
 - mobility (joints, neural, vascular)
 - endurance

ETIOLOGY OF SOMATIC DYSFUNCTION

- Neurophysiological
- Mechanical
- Combinations

ASSESSMENT OF SOMATIC DYSFUNCTION

- By integrating data obtained from the subjective examination (base history) and objective (physical examination) assessment of the patient you can assess the effects on other body systems.

Reasons to Use Mobilizations

TO RELIEVE PAIN

- Immobilization:
 - General
 - Local
 - Thermo-Hydro-Electric
 - Special Procedures e.g. relaxation techniques, breathing, visual imagery

To INCREASE MOBILITY

- Soft Tissue Mobilization:
 - Massage
 - Active relaxation
 - Passive stretch
 - Exercises

To INCREASE MOBILITY

- Joint Mobilization:
 - General
 - Specific
 - Thrust
 - Exercises
 - General & Regional Manipulation

To REDUCE MOBILITY

- Supportive and Controlling Procedures
- Exercise

To INFORM, INSTRUCT, AND TRAIN

- Exercises
- Prophylactic Procedures
- Activities of Daily Living

