Spondyloarthritris and Exercise

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Confusion- Where to Start?
Early Approach to AS

- “active approach is generally accepted”: British Medical Journal, 1978
- Emphasize the role of physical measures
  - Firm bed w/ a small pillow
  - Avoid prolonged bending occupations—either modify pattern of work or find another occupation
  - Avoid smoking
  - Adjustable mirror to bed for better viewing
  - Right-angled convex mirror device fixed to the car bonnet to improve vision to L and R—esp. at intersections
Continuing the journey

- Maintain and improve mobility of the spine and peripheral joints
- Strengthen the muscles of the back, trunk, legs and abdomen
- Achieved by both supervised and unsupervised exercise regimens
- Also by exercise group and by individuals
Value of exercise

“Positive effects of exercise in non-severe AS, especially in the short term, have been demonstrated by randomized controlled clinical trails”

Andre Calin, Chairman
National Ankylosing Spondylitis Society
Bath UK
Inter. Jour. of Therapy and Rehab.- Feb 04
So now what?

- Generally regarded as an important part of treatment
- Current research data shows support for short term improvements from exercise

Exercise components
- Range of motion
- Aerobic
- Strengthening
- Balance
Exercise for ankylosing spondylitis: An evidence-based consensus statement

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10 Recommendations

- Assessment
- Monitoring
- Safety
- Disease Management
- AS Specific Exercise-Mobility
- AS Specific Exercise- Other
- Physical Activity
- Dosage
- Adherence
- Exercise Setting
Biomechanical changes
Functional and Postural Aspects

- ↓ mobility - main manifestation
- = abnormal loading
- = changes in normal biomechanics – spinal facet joints
- Inflammatory changes
- Early degeneration- high abnormal loads
Exaggerated thoracic kyphosis
Loss of lumbar lordosis
Compensatory hyperextension of neck
Vertebrae fused together
Fixed flexion of hips
Compensatory flexion of knees

Normal posture
Posture in patient with advanced spondylitis
Lumbar Spine
Lumbar Spine

- Postural Changes
  - Posterior tilting sacrum
  - Decrease in lordosis
  - Compensatory posture
  - Decreased elasticity of the long anterior ligament

- Examples of Treatment
  - Careful manipulation*
  - Stretching of taut muscles
  - Strengthening
  - Postural training
  - Mobility exercises
#notmanipulation
Mobilization/Manipulation

- They are passive skilled manual therapy techniques
  - applied to joints and related soft tissues
  - at varying speeds and amplitudes using physiological or accessory motions for therapeutic purposes.
- speeds and amplitudes could range from
  - a small-amplitude force applied at high velocity
  - to a large-amplitude force applied at slow velocity
Thoracic Spine
Thoracic Spine

**Postural Changes**
- Decreased mobility = anterior force = increase thoracic kyphosis
- Shortening of pectoral muscles
- Decreased flexion in g-h joints
- Decreased chest expansion
- Pain with coughing/breathing
- Mimic cardiac sx’s - can lead to true sx’s - difficult cases

**Examples of Treatment**
- Facilitate mobility of the thoracic spine
- Breathing exercises
- Strengthen extensor muscles
- Shoulder blade strength and positioning
- Careful manipulation
Cervical Spine
Cervical Spine

- **Postural Changes**
  - Forward head-flattening of cervical lordosis
  - Decreased mobility
  - Occur with worse postural changes
  - Muscle pain/tension neck and shoulder

- **Examples of Treatment**
  - Active and passive movements
  - Stretching
  - Manual traction- home traction unit
  - Careful manipulation
  - Massage
Abnormal loading on the hip and knee due to change in posture

Compensation by increased flexion

Tight/weak muscles—hams/quads/glutes/hip flexors

Easier to maintain balance with abnormal positioning

Decreases extension with walking-altered mechanics = increased energy expenditure

Stretch tight muscles
Muscle Changes

- Loss of strength
- Shortening of muscle
- Structural change in the muscle—may chronic denervation or fibrosis
- Decreased energy production
- May be pronounced by inactivity

- Improve endurance
- Coordination skills
- Aerobic capacity
- Strength training
What treatments are appropriate?
Manual Therapy

- “hands-on” treatments
- Myofascial Manipulation-
  - Deep tissue
  - Kneading
  - Light stroking
- Joint manipulation
  - Oscillatory
  - Thrust
  - Done with movement
- No randomized clinical trails evaluating efficacy
- Never used in isolation in treatment
- Varies by practitioner
- Difficult and poorly reflective to standardize
- Manipulation can help musculoskeletal movement and nutrition- varies at stage of disease
Electrophysical Agents and Thermotherapies

- Used to reduce muscle pain and facilitate joint motion prior to exercise
- Diathermy
- Ultrasound
- TENS
- Low-level Laser therapy

- AS-no studies evaluating electrophysical agents identified in systematic review
- Used anecdotally
- No evidence of benefits other than short term analgesia
- May help for increase tolerance to rigor of programming
Hydrotherapy or Balneotherapy

- Exercise in heated water
- For patients with severe symptoms or multi-joint involvement where land-based therapeutic exercise is too painful
- High cost/limited accessibility

- AKA “spa therapy”
- Passive bathing in thermal/mineral water
- Will be combined with other treatments
- In-patient/out-patient programming combo
- High cost/limited accessibility
- Not proven v. exercise for benefit over long term
Exercise

- Plausible long term benefits
  - Increased joint protection
  - Increased joint nutrition
  - Improved muscle function
  - May slow down disease progression
  - Decrease disability
  - Change lifestyle- changing co-morbidities
  - Decrease pain
  - Limit structural deformities
Exercise Prescription

- General guidelines do not represent pathology and individual in current course
- Each person should be assessed prior to exercise programming
- Posture, mobility and respiratory function should be addressed with each program and in daily life

Nolte, van Rensburg 2001 Int Sport Med J
Exercise recommendations

- **Uhrin et al**
  - ↓ 15 years AS-recreational exercises-but not back exercises=
    improved pain and stiffness not function
  - ↑ 15 years AS back exercises not recreational improved pain and function

- **Santos et al**
  - Moderate exercise= ↓ disease activity and ↑ function
  - Intense exercise = improved function, but not disease activity
  - Consistency more important than quantity
Exercise consensus

- **Early stage AS**
  - 200 min per week of activity
  - Average 30 min per day
  - No prolonged flexion
    - Cycling, bowling
  - Encourage ext./rot.
    - VB, BB, squash
    - Swimming

- **Later stage AS**
  - Gall recommends general strengthening exercises 1-3 times per wk.
  - Back extension exercises be performed twice daily minimum 5 days per week

- Uhrin et al
  Arch of Internal Med 2000
Mobility

- Demand maximal ROM for the area being mobilized
  - Free swinging of the limbs; flexion and extension
  - Rotation of the neck
  - Flexion, extension, and rotation of the spine
  - Pelvic Tilting
  - Flexion, extension, and rotation of the hip
  - Knee and Ankle movements
Flexibility

- Passive stretching shown effective and patient can maintain by self stretching
  - Clinical Biomechanics 1987 Bulstrode et al.

- Target areas
  - Short neck muscles
  - Pectoral girdle
  - Hamstrings
  - Hip Flexors
  - Spinal rotators

Warm-up prior is essential
Posture Correction Maintenance

- Strengthening of the upper back extensor muscles
- Elasticity of the pectoral muscles
- Flexibility of the lumbar curve
- Extension exercises for the lower back
- Pelvic-tilt exercises
- Self mobilization by patient
Strengthening

**Land**
- Alternate exercise position
- Increase number of reps
- Free weights v. Therabands
- Equipment-specific muscles useful but must maintain position
- Gym ball-support inflexible spine
- No heavy weights-to much strain

**Water**
- Provide resistance against buoyancy
- May allow for more volume of work
- May allow for more intensity of work
- Precaution with low vital capacity
Cardiovascular Exercise

- Despite restricted spinal and chest-wall mobility, AS patients w/ modest exercise could maintain satisfactory work capacity

- Short lived increase in spinal flexibility
  - Immediately after exercise

- Regular aerobic exercise safe for AS patients w/o hip involvement
  - No high impact—possibly to much stress w/ hip involvement
    - 60 % of Max HR
Breathing Exercises

- Practiced at all stages
- Maintain/improve vital capacity
- Mobility of thoracic joints
  - Diaphragmatic
  - Abdominal
  - Full rib-cage expansion should be encouraged
What is the Diaphragm

- Fibromuscular / musculo-tendinous structure that separates the thoracic cavity from the abdominal cavity.
- Main function is inspiration
- Developed from inner (transversus) layer of body wall muscles
Diaphragmatic Breathing

**Diaphragm Function in Breathing**

**During Inhalation**
- Inhaled air
- Chest cavity expansion
- Intercostal muscles
- Contraction of the intercostal muscles
- Lungs expanding with inhaled O2-rich air
- Ribs
- Diaphragm
- Contraction (flattening) of the diaphragm

**During Exhalation**
- Exhaled air
- Chest cavity contraction
- Relaxation of the intercostal muscles
- Lungs contracting and expelling the CO2-rich air
- Relaxation of the diaphragm

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Breathing Mechanics

The two breathing mechanisms are called **diaphragm breathing** and **costal breathing** and they usually work together to some degree.

At rest, ventilation is mostly diaphragm breathing but extreme conditions like strenuous exercise will increase the proportion of costal breathing to more than half. The greater the volume of inspiration &/or expiration, the greater the ratio of costal breathing.
Contraction of external intercostal muscles

Elevation of ribs & sternum
Increase side-to-side and front-to-back dimensions of thoracic cavity (X & Y axes)

Diaphragm (relaxed)

Contractions of external intercostal muscles causes elevation of ribs, which increases side-to-side dimension of thoracic cavity
**Inspiration**

- External intercostals contract
- Diaphragm contracts
- Chest wall and lungs expand
- Expansion of ribs moves sternum upward and outward

**Expiration**

- External intercostals relax
- Internal intercostals and abdominals contract for active expiration only
- Diaphragm relaxes
- Chest cavity and lungs contract
- Ribs and sternum depress
GOALS OF DIAPHRAGMATIC BREATHING:
- To improve the efficiency of ventilation and oxygenation
- Decrease the work of breathing
- Increase the excursion (descent or ascent) of the diaphragm
- Improve gas exchange and oxygenation.
- Diaphragmatic breathing exercises also are used during postural drainage to mobilize lung secretions.
- Reduces work of breathing
- Reduces the incidence of post operative pulmonary complications
- Improve ventilation
- Eliminates accessory muscle activity
- Decrease respiratory rate
- Increase tidal ventilation
- Improve distribution of ventilation
Let’s Practice

Diaphragmatic Breathing

- “Breathe in through your nose and out through your mouth”
- “Push out into my hands as you breathe in”
Conclusions

“Goal is to restore optimal physical functioning”

Best Practice & Research Clinical Rheumatology 2004- M. Fransen
THANKS FOR YOUR ATTENTION...
NOW YOU CAN CLAP...

IF YOU HAVE ANY QUESTIONS, MY FRIEND GOOGLE WILL ANSWER THEM...