Shoulder Impingement Syndrome (SIS)

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ABSTRACT

The structure of the shoulder joint includes the shoulder girdle, the arms, and the hands. The shoulder joint is a ball-and-socket joint which allows the possibility of a wide range of movement. It is designed with a wider and more varied range of motion than any other joint in the human body. It allows us to carry out everyday activities such as reaching our arms, placing our arms behind our head/neck/back and playing sports. The mobility in the shoulder joint is accompanied by a lack of stability. There is very little bone/ligament support, therefore without correct mechanics it is susceptible to injury.

Shoulder dysfunction and pain are frequently encountered because of incorrect mechanics and lack of muscular stability/support. Some common shoulder injuries are: round shoulder syndrome, impingement syndrome, rotator cuff tendinopathy, rotator cuff tear, neck pain and headaches, thoracic outlet syndrome, shoulder instability or dislocation, and tendonitis. Shoulder pain usually starts gradually, and as a result of repetitive poor movement the joint gets inflamed. When the shoulder joint becomes painful to move, it becomes stiff and function is impaired.
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ANATOMICAL DESCRIPTION

The shoulder is made up of several joints combined with tendons and muscles that allow a wide range of motion in the arm. It is made up of three bones: upper arm bone (Humerus), shoulder blade (Scapula) and the collarbone (Clavicle). (6)

The primary joint in the shoulder is the glenohumeral joint. This joint is between the humerus and the glenoid cavity of the scapula. The other two joints are: acromioclavicular joint - between the distal clavicle and the acromion process of the scapula, and the sternoclavicular joint - between the medial clavicle and the manubrium of the sternum.

The humerus is held in place by what is referred to as the rotator cuff. The rotator cuff is comprised of 4 muscles/tendons - supraspinatus, infraspinatus, teres minor, subscapularis. These muscles cover the top of the humerus and attach to the scapula, holding the arm in the socket. Between the rotator cuff and the acromion there is a sac called a bursa that allows the tendons to glide freely when the arm is moved. (6)
The shoulder has a wide range of movements that include: elevation, depression, abduction, adduction, medial rotation, lateral rotation, anterior flexion, and posterior flexion. It is very complex and has two important functions:

1. It must be very flexible, allowing the hand and arm a huge range of motion.
2. It must be strong, allowing certain actions such as lifting a heavy object or pushing against resistance. (5)

**COMMON INJURIES**

Due to the wide range of motion and mobility of the shoulder, pain in the rotator cuff is very common in young adults and athletes. Young athletes who use their arms for overhead swimming, baseball and tennis are most vulnerable. Individuals who do repetitive lifting or overhead activities using the arm are also susceptible.

Rotator cuff pain can be the result of:

- **Tendinitis** - when the rotator cuff tendons are irritated and damaged.
- **Bursitis** - when the bursa becomes inflamed and swells with fluid.
- **Impingement** - when raising your arm to shoulder height, the space between the acromion and rotator narrows causing the acromion to rub against the tendon and bursa.
Symptoms usually begin with mild pain, sometimes swelling and tenderness in the shoulder and pain and stiffness when lifting the arm. These symptoms may include:

- Pain during activity and rest.
- Pain at the front of the shoulder and increased pain with shoulder movements (especially overhead movements and abduction).
- General aching in and around the shoulder at both rest and activity.
- Pain radiating from the front of the shoulder to the side of the arm.
- Pain above the rotator cuff tendons when the arm is flexed or abducted.
- Pain during internal rotation (especially with lifting and reaching movements).
- Increased pain at night (especially when lying on affected shoulder).
- Loss of strength and/or range of motion.

Individuals experiencing such pain should start with an examination by their doctor. The doctor will typically measure the range of motion in the shoulder, test arm strength, and have the individual move their arm in several different directions to better assess the injury. In many cases an MRI/ultrasound will be performed. Initial treatment is usually non-surgical. Doctors may advise the individual to begin with rest and avoiding overhead activities. Physical therapy and exercise are often recommended to restore normal range of motion to the shoulder. Once the pain starts improving a therapist will recommend a strengthening program for the rotator cuff muscles. (1)(3)(4)
CASE STUDY

Danielle, a 44 year old female, avocational tennis player. She plays tennis 5 times a week and participates in women’s monthly tennis league matches. Approximately 6 months ago Danielle began experiencing mild pain in her right shoulder. There was no specific trauma to her shoulder. The pain was aggravated when she was serving in tennis, hitting an overhead volley, or reaching behind her back. The pain gradually increased and she began experiencing pain during activity and rest. She also began experiencing pain at night. The pain affected her range of motion and it was becoming an overall discomfort. She decided to meet with an Orthopedist. The doctor performed several range of motion tests and an MRI. The MRI revealed mild tendinitis, minor impingement of the supraspinatus muscle and tendon at the level of the acromioclavicular joint and minimal joint incursion. Her doctor recommended arthroscopic surgery, cortisone injections 4x/day for several weeks, 6 weeks of physical therapy 2 times/week. This was to also include ice, electrical stimulation, massage, and isotonic and isokinetic strengthening. Danielle returned to the doctor after 8 weeks for a follow up appointment. Her pain had minimized, however, she was still experiencing some stiffness and limitations in the range of motion of her shoulder. Danielle had done pilates somewhat in the past and felt that if she returned to pilates she may be able to regain strength and mobility in her shoulder.

EXERCISE PROGRAM

When I first met Danielle we discussed her shoulder limitations and what she would like to achieve with pilates. I asked her to do a roll down so I could assess her posture and alignment. While performing the roll down I observed that Danielle had some postural deviations in
addition to her shoulder limitations. These deviations could be a result of tight hamstrings, hip flexors, back extensors and a lack of overall core strength.

In developing a pilates program for Danielle, I chose to focus on the following:

1. Increased shoulder mobility/strength.
2. Stabilizing core muscles to support the spine.
4. Pelvic stability to improve posture.

Our job as pilates instructors is to help clients improve the quality of shoulder movement in a pain free range. Pilates exercises help strengthen not only your stabilizer muscles for your core but the stabilizer muscles around your joints. Pilates can help re-educate an injured shoulder to work with the rest of the body and avoid unwanted movement patterns, muscle work and extra tension.

Training with a qualified pilates instructor, who is knowledgeable about proper posture, shoulder biomechanics/injuries, can help you learn to use your body more efficiently. Pilates can rehabilitate your shoulder muscles and help you learn to use/work your bod from head to toe, preventing future injuries.

It is important that full mobility/strength are regained in the shoulder, core muscles are strengthened to support the spine, back extensors are strengthened to support the spine and pelvic stability is achieved for overall rehabilitation to be successful. In my first session with Danielle I selected the following fundamental/Intermediate exercises to access her mobility and strength, giving her a baseline to start and build upon over time. (2)(3)
## REFORMER

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<tr>
<th>BLOCK</th>
<th>EXERCISES</th>
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<tr>
<td>Warm Up</td>
<td>Roll Down</td>
<td>Spinal articulation, hamstring control, pelvic lumbar stabilization, abdominal control/strength</td>
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<tr>
<td></td>
<td>Pelvic Curl</td>
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<td></td>
<td>Spine Twist Supine</td>
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<td>Chest Lift</td>
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<td></td>
<td>Chest Lift with Rotation</td>
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<tr>
<td>Foot Work</td>
<td>Fundamental Foot Series</td>
<td>Focus is on developing hip/knee extensor strength and ankle plantar flexor strength.</td>
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<tr>
<td>Abdominals</td>
<td>Hundred Prep</td>
<td>Develops abdominal strength and shoulder extensor control to help strengthen core muscles and improve posture.</td>
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<td>Coordination</td>
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<tr>
<td>Hip Work</td>
<td>Frog</td>
<td>Building adductor strength, knee extensor control and pelvic lumbar stabilization.</td>
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<td>Circles Down</td>
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<tr>
<td></td>
<td>Circles Up</td>
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<td>Openings</td>
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<tr>
<td>Spinal Articulation</td>
<td>Bottom Lift</td>
<td>Spinal articulation and hip extensor control.</td>
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<tr>
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<td>Bottom Lift with Extension</td>
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<td>Stretches</td>
<td>Standing Lunge</td>
<td>Hip flexor and hamstring stretch.</td>
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<tr>
<td>Full Body Integration</td>
<td>Scooter</td>
<td>Focus on abdominals for trunk/shoulder stabilization, hip extensor control/strength, knee extensor control/strength.</td>
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<tr>
<td>Arms</td>
<td>Arm Supine Series</td>
<td>Shoulder extensor, adductor, and elbow extensor strength. Scapular stabilization, shoulder mobility and trunk stabilization.</td>
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<tr>
<td>Legs</td>
<td>Single Leg Skate</td>
<td>Strengthen gluteus mediums to increase hip abductor/knee extensor strength and pelvic lumbar stabilization.</td>
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<tr>
<td>Lateral Flexion</td>
<td>Side Over on Box</td>
<td>Focus on the abdominals/obliques for increased abdominal strength ad trunk stabilization.</td>
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<tr>
<td>Back Extension</td>
<td>Breaststroke Prep</td>
<td>Strengthen back extensors</td>
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In our next 2-10 sessions we continued to use the block system on the Cadillac, Wunda Chair and
Ladder Barrel incorporating exercises that focused on regaining mobility/strength in her shoulder while at the same time strengthening her core and back muscles, improving her pelvic stability and overall posture.

**CADILLAC/WUNDA CHAIR/LADDER BARREL**

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<thead>
<tr>
<th>BLOCK</th>
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| Intermediate Warm Up | Roll Down  
Roll Up  
Spine Twist Supine  
Double Leg Stretch  
Single Leg Stretch  
Criss Cross        | Abdominal strength, spinal mobility and stability, pelvic stabilization, trunk stabilization |
| Foot Work        | Footwork Series  
(Cadillac)                                              | Hip extensor strength/stretch, knee extensor strength, pelvic lumbar stabilization, hip adductor control, foot alignment and stabilization |
| Abdominals       | Standing Pike  
Pike Sitting  
(Wunda Chair)                                          | Lower back stretch, abdominal control, scapular stabilization, trunk stabilization, shoulder extensor strength |
| Hip Work         | Hip Work Series  
(Cadillac)                                               | Adductor strength, hip extensor strength, hip disassociation, hip extensor control, pelvic lumbar stabilization |
| Spinal Articulation | Monkey  
(Cadillac)                                            | Abdominal control, spinal stretch/mobility, hamstring/calf stretch |
| Stretches        | Shoulder Stretch 1  
Shoulder Stretch 2  
(Ladder Barrel)                                          | Shoulder extensor stretch, shoulder flexor stretch |
| Full Body Integration | Push Through Series  
(Cadillac)                                          | Shoulder stretch, spinal articulation, trunk stabilization, hamstring stretch, back extensor control, abdominal oblique control |
| Arms             | Shrugs  
Triceps Press Sit  
Triceps Prone  
(Wunda Chair)                                      | Trunk stabilization, scapular depressor control, scapular stabilization, elbow extensor strength |
| Legs             | Leg Press Standing  
(Wunda Chair)                                          | Balance, hip/knee extensor control |
CONCLUSION

I feel that Pilates helped Danielle get back to “normal.” After my 5th session with Danielle, the stiffness in her shoulder had dissipated and she had regained full mobility in her shoulder. Over the next 5 sessions we focused on building strength/stability in her shoulder as well as her core, back and pelvis. After our 10th session Danielle had noticed significant improvement and said she felt better than she had in months. She no longer experienced pain/stiffness, regained her shoulder mobility and felt an overall increase in body strength. She returned to playing tennis and decided to keep Pilates as part of her weekly exercise routine in an effort to strengthen her body and prevent future injury.

Pilates is an ideal exercise program to help individuals improve the quality of shoulder movement by strengthening core stabilizer muscles and stabilizer muscles around the joints. By incorporating the Basi Pilates method individuals can re-educate their injured shoulder, allowing the shoulder to work with the rest of the body, avoiding unwanted movement patterns, muscle work and extra tension. Pilates should definitely be incorporated in tennis players weekly exercise routines in an effort to prevent injury.

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<td>Lateral Flexion</td>
<td>Side Stretch (Wunda Chair)</td>
<td>Lateral flexor stretch, abdominal control with oblique emphasis</td>
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<tr>
<td>Back Extension</td>
<td>Swan Basic (Wunda Chair)</td>
<td>Abdominal control, scapular stabilization, back extensor strength</td>
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</table>

**Lateral Flexion**
- Side Stretch (Wunda Chair)
- Lateral flexor stretch, abdominal control with oblique emphasis

**Back Extension**
- Swan Basic (Wunda Chair)
- Abdominal control, scapular stabilization, back extensor strength


Images:

http://curator.com

http://physiopedia.com

http://muscleandjoint.ca


http://dynamicphysiotherapy.ca/conditions/shoulder-conditions/rotator-cuff-injuries/