



**QUESTION |** ARE THERE ANY NEW ADVANCEMENTS IN THE TREATMENT OF SHOULDER IMPINGEMENT SYNDROME?

---

**ANSWER |**

Charles Neer first described outlet impingement, or subacromial impingement syndrome, as a distinct clinical entity in 1972. Impingement was the result of the rotator cuff impinging upon the anterior one third of the acromion, the CA ligament, and the AC joint. This lack of space for the rotator cuff produced changes within the substance of the tendon. He described three stages of disease associated with age:

Stage I- oedema and haemorrhage, patients less than 25 years old.

Stage II- Irreversible changes of fibrosis and tendinitis; age 25 to 45 years old.

Stage III- Partial or complete tears of the rotator cuff, age greater than 45 years.

Causes of impingement have been described under two main categories, intrinsic and extrinsic.<sup>1</sup> Intrinsic factors involve dysfunction or degeneration of the rotator cuff. Degeneration of the rotator cuff occurs with age, which in turn can lead to muscle imbalance. Nirschl reported that impingement occurs due to muscle<sup>14</sup> weakness. Jerosch et al. showed that muscle imbalances can cause impingement.<sup>15</sup> More recently, Teyhen et al. showed eloquently with dynamic fluoroscopic video that muscle fatigue of the rotator cuff allowed the humeral head to be positioned more superiorly (closer to the acromion). This occurred even in healthy individuals. The concept that muscle imbalance and fatigue can lead to shoulder impingement has been validated over the years, and supports the use of rotator cuff strengthening exercises as an effective treatment for shoulder impingement. Extrinsic factors involve the anatomy of the acromion, acromioclavicular (AC) joint, and coracoacromial (CA) ligament. Bigliani studied the anatomy of the acromion and found three main types- I (flat), II (curved), and III (hooked). He had found that a substantially higher prevalence of full-thickness tears was noted in association with type III acromions. Spurs off of the acromion or AC joint, or thickening of the CA ligament can cause impingement of the rotator cuff.

The diagnosis of impingement syndrome can be made with a proper history and physical exam. The onset of pain is usually insidious. Classic impingement pain occurs at the distal acromion and radiates down the arm. Pain can be worse at night, with patients often reporting that they cannot sleep on the affected side, or wake up

during the night with pain. On physical examination, pain is reproduced with tests described by Neer and Hawkins. With a positive Neer sign, pain is elicited when the arm is passively elevated in the scapular plane between 70 and 120 degrees. With the Hawkins sign, the arm is first passively elevated to 90 degrees, and then internal rotation reproduces pain.

Radiographs can demonstrate bony signs of impingement. An AP can reveal subchondral cysts or sclerosis of the greater tuberosity. A supraspinatus outlet view can demonstrate the acromial anatomy described above and acromial spurs. An MR arthrogram is a useful tool when concerned about the presence of a concomitant rotator cuff tear.

Treatment options have remained relatively constant over the years. Recent literature and reviews of previous literature have confirmed the effectiveness of our available treatments for shoulder impingement syndrome. Non-operative management is very effective for most patients with impingement. Options include activity modification, NSAIDs, physio and exercise programs, and subacromial injections.

Kuhn performed an evidenced-based review of the literature to evaluate the effectiveness of exercise as treatment for shoulder impingement.<sup>13</sup>

They concluded that exercise has statistically and clinically significant effects on pain reduction and improving function, but not on range of motion or strength. They extrapolated the most effective exercises from all articles reviewed to come up with a “gold standard” rehab protocol.

Subacromial cortisone injections can be a useful tool to help with diagnosis and treatment. In Neer's first description of shoulder impingement, he described the Neer impingement test. Ten mL of lignocaine are injected into the subacromial space. If pain is eliminated, this confirms the presence of subacromial impingement. Strength testing after an injection (without pain) is useful to diagnose the presence or absence of a rotator cuff tear. A Cochrane review of subacromial injections in 2003 concluded that subacromial injections may be beneficial but the effect may be small.<sup>5</sup> I prefer to use injections for two main reasons. Firstly, it serves as a good diagnostic tool for reasons explained above. Secondly, I find the reduction in pain is useful as it allows patients to more easily begin physiotherapy with less discomfort.

Treatments that have proven to be effective for other tendinoses have been tried for shoulder impingement. However, results have confirmed that these other treatments are no better than what we have traditionally used. Extracorporeal shock-wave therapy, proven useful for Achilles tendinosis, was compared to supervised exercises by Engebretsen et al in 2011.<sup>8</sup> They found no significant differences between both methods at one year follow-up. Low laser therapy was also found to be no better than an exercise program in a randomized control trial.<sup>9</sup>

The current mainstay of surgical treatment for impingement syndrome is arthroscopic subacromial decompression. With the advances in arthroscopic surgery, an arthroscopic approach has replaced the traditional open acromioplasty. Advantages include a minimally invasive approach, the ability to identify and address rotator cuff and other lesions, and preserving the attachment of the deltoid muscle to the

acromion. Recent articles have confirmed its effectiveness as treatment, Odenbring et al. reported on a 12-year follow-up of patients that underwent arthroscopic acromioplasty, with good or excellent results in 77% of patients.<sup>7</sup> In summary, the diagnosis and treatment of outlet impingement syndrome first described by Neer in 1972 has been relatively unchanged. Studies testing the diagnosis and treatment options have served to confirm the effectiveness of our traditional management techniques. The use of physiotherapy and subacromial injections will cure most patients. When these options have failed to help, arthroscopic subacromial decompression is a viable and effective treatment option, with long term good results.

## References

1. Bigliani LU, Levine WU. Current Concepts Review- Subacromial Impingement Syndrome, *J Bone Joint Surg (AM)*, Vol 79-A, No 12, Dec 1997.
2. Royer PJ, Kane EJ, et al. Fluoroscopic assessment of rotator cuff fatigue on glenohumeral arthrokinematics in shoulder impingement syndrome. *J Shoulder Elbow Surg* (2009) 18, 968-975.
3. Teyhen et al. Rotator cuff fatigue and glenohumeral kinematics in participants without shoulder dysfunction. *J Athlet Training* 2008; 43;352-8.
4. Pappas, GP et al. In Vivo anatomy of the Neer and Hawkin's sign positions for shoulder impingement. *J Shoulder Elbow Surg*, vol 15 No. 1, 2006.
5. Buchbinder R, Green R. Corticosteroid Injections for shoulder pain. *Cochrane Database Syst Rev*. 2003;(1)
6. Klintberg H, Karlsson J, et al. Health-related quality of life, patient satisfaction, and physical activity 8-11 years after arthroscopic subacromial decompression. *J Shoulder Elbow Surg*. 2010 Dec 7.
7. Odenbring S, Wagner P, et al. Long-term outcomes of arthroscopic acromioplasty for chronic shoulder impingement syndrome: a prospective cohort study with a minimum of 12-years follow-up. *Arthroscopy*. 2008 Oct;24(10):1092-8
8. Engebretsen E, Grotle M, et al. Supervised exercises compared with radial extracorporeal shock-wave therapy for subacromial shoulder pain: 1-year results of a single-blind randomized controlled trial. *Phys Ther*. 2011 Jan;91(1):37-47.
9. Dogan SK, Ay S. The effectiveness of low laser therapy in subacromial impingement syndrome: a randomized placebo controlled double-blind prospective study. *Clinics (Sao Paulo)*. 2010;65(10):1019-22.
10. Morrison DS, Frogameni AD. Non-operative Treatment of Subacromial Impingement Syndrome. *J Bone Joint Surgery (Am)*, vol 79A, May 1997.
11. Walther M et al. The subacromial impingement syndrome of the shoulder treated by conventional physiotherapy, self-training, and a shoulder brace: Results of a prospective randomized study. *J Shoulder Elbow Surg* July/August 2004.

12. Dorrestijn O, et al. Conservative or surgical treatment of subacromial impingement syndrome? A systematic review. J Shoulder Elbow Surg, 2009, 18, 652-660.
13. Kuhn JE. Exercise in the treatment of rotator cuff impingement: A systematic review and a synthesized evidence –based rehabilitation protocol. J Shoulder Elbow Surg (2009), 18, 138-160.
14. Nirschl, RP. Rotator cuff tendinitis: basic concepts of pathoetiology. In Instructional Course Lectures, The American Academy of Orthopaedic Surgeons. Vol 38, pp 439-445, 1989
15. Jerosch J et al. Zur Aetiologie des subacromiolen Impingement-Syndroms—eine biomechanische Untersuchung. Beitr. Orthop. Traumatol, 36: 411-418, 1989.

**Dr Todd Gothelf**

**[www.orthosports.com.au](http://www.orthosports.com.au)**