Preliminary Report – “Choosing Wisely”
Identifying Musculoskeletal Interventions with Limited Levels of Efficacy in the Shoulder & Elbow.

Prepared for
The Canadian Orthopaedic Association
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Executive Summary
The OrthoEvidence “Choosing Wisely” Series identifies treatments currently in use that may be ineffective or have low levels of efficacy through the evaluation of high-quality evidence. This installment of the report series examines orthopaedic treatments of the shoulder and elbow.

Conditions of the Shoulder – The Take Home Messages

- **Operative management of Displaced Proximal Humeral Fractures** in the elderly does not provide any significant benefit over non-operative treatment and leads to a greater number of additional surgeries.
- **Operative management of Shoulder Impingement Syndrome** appears to be no more effective than conservative management (exercise) for the reduction of pain symptoms.
- **Platelet-rich plasma injections in Rotator Cuff Repair** do not improve tendon healing, pain or functional outcomes, and have limited support for routine use in rotator cuff repair surgery.
- **Acromioplasty in Rotator Cuff Repair** has limited efficacy, as this procedure does not appear to improve pain or patient quality of life. Further studies are needed to conclusively determine the effect of acromioplasty on re-tear rate.
- **Efficacy of conservative treatments for Adhesive Capsulitis remains inconclusive**; corticosteroids may be effective over short periods of time; however, studies have shown non-superiority to other treatments over mid- to long-term follow-ups. The efficacy of other potential conservative treatments remains inconclusive, as there is limited evidence evaluating hyaluronic acid, manipulation under anesthesia, and hydrodilation of the glenohumeral joint.
- **Immobilization in external rotation following Shoulder Dislocation** may provide lower risks of recurrence; however, some studies show non-superiority to immobilization in internal rotation.

Conditions of the Elbow – The Take Home Messages

- **The efficacy of conservative treatments for Lateral Epicondylitis is questionable.** Corticosteroid injections appear to provide favourable short-term pain and functional outcome, but may lead to a high risk of recurrent pain and disability. PRP and extracorporeal shock wave therapy (ESWT) have shown the potential to be effective treatments, but there remains a limited amount of evidence evaluating their efficacy. Medical exercise for lateral epicondylitis was shown to improve clinical and functional outcomes over short- and long-term periods. However, when evaluated as a whole in recent meta-analysis, conservative treatments appeared to show little benefit over no treatment or placebo.
Choosing Wisely – What Does the Evidence Say?

Orthopedic medicine is rapidly evolving to improve care and meet the needs of an aging Canadian population. The pursuit of improved patient outcomes has led to the development and use of a multitude of novel management options across a wide array of orthopaedic specialties. Some of these management options, which provide purported benefits over conventionally accepted methods, may not be as efficacious as first reported when released. However, the dissemination of evidence evaluating the efficacy of these treatments has been limited, and treatments that provide minimal or no additional benefits may still currently be in use. OrthoEvidence has conducted a review of high-quality evidence from leading orthopaedic research journals to identify potential treatments that may have limited efficacy in the treatment of patients to help guide practitioners in their selection of management options.

OrthoEvidence’s review of the literature has been subdivided by anatomical region, providing evaluations of treatments for Foot & Ankle, Knee, Hip, Spine, Shoulder & Elbow, and Hand & Wrist. This preliminary report provides evaluations of treatments used within the Shoulder & Elbow region.

Treatments of the Shoulder & Elbow

1. Shoulder
In this section, OrthoEvidence has provided a review of the high-quality evidence evaluating the efficacy of common orthopaedic treatments used in the shoulder, identifying those that may have limited support within high-quality literature. Treatments identified include surgical management of displaced proximal humeral fractures, surgical options for shoulder impingement syndrome, conservative treatments for adhesive shoulder capsulitis, adjunctive treatments in rotator cuff repair, and immobilization methods following shoulder dislocation.

1.1. Treatment of Displaced Proximal Humeral Fractures in the Elderly
- Operative management of displaced proximal humeral fractures in the elderly does not provide any significant benefit over non-operative treatment, and leads to a greater number of additional surgeries.

The treatment of complex displaced humeral shaft fractures in the elderly presents a challenge due to poor functional outcomes associated with this patient population. While non-displaced fractures can be effectively treated with non-operative methods, there has been a lack of clarity surrounding the use of operative (ORIF/nailing) or non-operative methods for complex and displaced fractures. OrthoEvidence synthesized results from 7 high-quality publications evaluating the comparative efficacy of operative and non-operative treatments for displaced proximal humeral fractures. Evidence from the 7 studies indicated no functional difference between the two methods at 2 year follow-up. Operative treatments were associated with a greater incidence of complications and the need for additional surgery. The use of operative treatment was also associated with an increased cost due to a greater number of index and
additional surgical procedures. Based on the available high-quality evidence, operative treatment does not appear to provide any benefits to patient outcomes, and may lead to additional surgical procedures and costs. A recent meta-analysis comparing joint preserving techniques (ORIF, Nailing and Conservative Methods) and arthroplasty within this patient population has indicated that joint preserving techniques may offer advantages towards patient outcome over arthroplasty, but further high-quality evidence is needed before definitive conclusions can be drawn. 1,2,3,4,5,6,7,8

1.2. Surgical Treatments for Shoulder Impingement

- Surgical management of shoulder impingement syndrome appears to be no more effective than conservative management using exercise for the reduction of pain symptoms.

Shoulder pain is one of the most common non-traumatic complaints arising from the arm, shoulder, and neck anatomy, and a leading cause for this pain is shoulder impingement syndrome. There are a number of surgical and non-surgical treatment options for patients suffering from shoulder impingement syndrome; however, the efficacy of a number of these treatments has yet to be established in the literature. The decision between operative and conservative management is often encountered by practitioners, but it has yet to be determined if surgical treatment provides significant benefits over non-operative treatment options. High-quality evidence from a recent meta-analysis of 7 randomised trials indicated that surgical treatment is no more effective than conservative treatment through exercise in reducing pain from shoulder impingement syndrome. Further high-quality evidence is needed to further evaluate the comparative efficacy of surgical and conservative treatment methods, but the increased cost and potential risk of complications indicate that conservative options should be considered in the first line of treatment. 9, 10, 11, 12

1.3. Adjunctive Treatment in Rotator Cuff Repair

In this section, OrthoEvidence has provided a review of high-quality evidence evaluating the efficacy of adjunctive treatments for rotator cuff repair, identifying treatments or techniques that may have limited support within the literature. Treatments identified include platelet-rich plasma and acromioplasty.

1.3.1. Platelet-Rich Plasma (PRP)

- Platelet-rich plasma injections, as an adjunct to rotator cuff repair, do not appear to improve tendon healing, pain or functional outcomes, and have limited support for routine use in rotator cuff repair surgery.

Platelet-rich plasma as an adjunctive treatment in rotator cuff repair hypothetically offers the potential for improved tendon healing and reduced pain. These purported benefits have led to an increase in popularity and use, but the efficacy of platelet-rich plasma in these procedures has yet to be definitively demonstrated. OrthoEvidence identified 10 high-quality studies evaluating the use of PRP as an adjunct to rotator cuff repair. Synthesized results from the identified studies indicated no significant differences in re-tear rate (Figure 1) or functional outcomes. Based on the current high-quality evidence, PRP appears to provide no additional benefits in tendon healing and functional outcome following rotator cuff repair, and should not be recommended for routine use in such cases. 13, 14, 15, 16, 17, 18, 19, 20, 21
1.3.2. Acromioplasty

- The addition of acromioplasty to rotator cuff repair has limited efficacy, as this procedure does not appear to improve pain or quality of life of patients. Further studies are needed to conclusively determine the effect of acromioplasty on re-tear rate.

Impingement of the rotator cuff tendons has been identified as a potential contributor to the etiology of rotator cuff tears, leading to an increase in the adoption of acromioplasty as part of many rotator cuff repair procedures. While removal of the acromion may, in theory, reduce the potential for re-tear, reduce pain and improve function, there is still a lack of compelling evidence to support this claim. OrthoEvidence gathered data from 7 studies to assess the effect of acromioplasty when added to rotator cuff repair in the treatment of rotator cuff tears. Five (5) of the studies indicated no significant difference in functional, quality of life, or reoperation outcomes when acromioplasty was added to rotator cuff repair. However, one study found that, although there were no significant quality of life benefits, the addition of acromioplasty led to fewer revision surgeries. Despite this, based on the available high-quality evidence, the addition of routine acromioplasty to rotator cuff repair does not appear to provide significant improvement in function, quality of life and reoperation rate.

22, 23, 24, 25, 26, 27

1.4. Treatment of Adhesive Capsulitis

Adhesive capsulitis is a common condition that causes severe pain and limits mobility. While there are a number of treatment options for this condition, the comparative efficacy among these options remains unknown. In this section, OrthoEvidence has provided a review of high-quality evidence evaluating the efficacy of different management options for adhesive capsulitis, identifying treatments or techniques that may have limited support within the literature. Treatments reviewed include corticosteroids, hyaluronic acid, manipulation under anesthesia, and hydrodilation.

1.4.1. Corticosteroids

- Corticosteroids may be effective in reducing pain and functional disabilities over short periods of time; however, studies have shown non-superiority to a variety of other adhesive capsulitis treatments over mid- to long-term follow-ups.

Corticosteroids have been proven effective for pain relief in various orthopaedic injuries and diseases, and are often used in the treatment of adhesive capsulitis. However, their long-term efficacy has
recently been called into question, as improvements that are seen over the short-term are often lost and may lead to recurrence of severe pain and disability. OrthoEvidence sought to determine whether the benefits of this treatment outweighed the possible complications and potential for recurrence. Of the 8 randomized controlled trials that were identified evaluating the use of corticosteroid in adhesive capsulitis, only 2 studies indicated that corticosteroids provided improvements over other treatments. One study indicated significantly superior short-term improvements in pain, function, and range of motion when compared to stretching, while the other indicated significantly faster pain relief and functional improvements over a short-term period when compared to non-steroidal anti-inflammatory drugs. The remaining 6 studies indicated improvements in outcomes such as pain, function, range of motion, and disability; however, there were no significant differences in treatment results over a period greater than 6 weeks compared to shoulder manipulation, arthroscopic arthrolysis, placebo injections, hyaluronic acid injections, and physiotherapy. Based on the available evidence, corticosteroids may only be effective in treating pain and functional disabilities associated with adhesive capsulitis over the short-term, while providing no additional benefit over other treatments in the mid- to long-term. Further evaluations are needed to assess corticosteroid use compared to placebo over a longer follow-up period.

1.4.2. Hyaluronic Acid

- The efficacy of hyaluronic acid in the treatment of adhesive capsulitis has yet to be fully investigated. The limited high-quality evidence that is currently available provides contrasting results. Additional studies are required to further assess the efficacy of this treatment before it should be consider as a viable treatment option to be used in common practice.

The properties of hyaluronic acid make it a good, potential treatment for adhesive capsulitis, allowing for chondroprotection, suppression of synovitis, and improved synovial fluid properties. There are, however, a limited number of high-quality trials assessing its use. Two randomized controlled trials were identified that evaluated the use of hyaluronic acid as a treatment for adhesive capsulitis. One study indicated that the addition of hyaluronic acid to a standard physiotherapy programme provided no significant benefits in pain, disability, range of motion, or quality of life compared to physiotherapy alone. The second study compared hyaluronic acid injections to those of corticosteroids, and found no significant differences in pain or function, suggesting similar benefits of corticosteroids. Due to the limited number of studies, and somewhat contrasting results, definitive conclusions regarding the efficacy of hyaluronic acid for adhesive capsulitis cannot be made. Further research comparing hyaluronic acid to a placebo are needed to establish if hyaluronic acid is a viable treatment.

1.4.3. Manipulation Under Anesthesia

- The efficacy of manipulation under anesthesia remains inconclusive, as there is limited evidence evaluating its use. The few studies available indicate that results may be similar to corticosteroid injections, but slightly worse than hydrodilation therapy.

Manipulation under anesthesia presents a potential treatment option for adhesive capsulitis that can potentially reduce pain and improve range of motion. However, the use of manipulation under anesthesia presents a number of potential complications that may be mitigated with the use of less invasive methods. OrthoEvidence assessed the relevant high-quality evidence to determine whether manipulation under anesthesia provided superior results over other treatment options to justify its use. Three randomized controlled trials were identified assessing the use of manipulation under anesthesia to other comparators for the treatment of adhesive capsulitis. Two of the trials indicated that although both manipulation under anesthesia and corticosteroid injections led to improvements in pain, function,
and range of motion, there were no significant differences in improvement between groups. The third study found that manipulation under anesthesia led to significantly inferior improvements in pain, function and patient satisfaction, when compared to hydrodilation. Based on the evidence available, the efficacy of manipulation under anesthesia remains unclear, as further studies are required to establish this treatment as more effective than placebo and other conservative methods. 39, 40, 41

1.4.4. Hydrodilation

- Hydrodilation of the glenohumeral joint appears to allow for improvement in pain and function in patients with adhesive capsulitis, although its superiority to other treatments has yet to be established.

Hydrodilation consists of the injection of saline solution into the shoulder joint capsule, which leads to distention. While this treatment has shown positive results, its efficacy in comparison to other treatments has not been demonstrated. OrthoEvidence was able to identify two randomized controlled trials evaluating the use of hydrodilation, and results differed between trials. One study found that the addition of hydrodilation to corticosteroid injection did not result in improvements in function, pain, and range of motion compared to injection of corticosteroid alone. The second study indicated significantly superior pain, function, and patient satisfaction over a 6 month period among patients who had undergone hydrodilation, when compared to patients who had undergone manipulation under anesthesia. High-quality evidence evaluating hydrodilation is limited, and while the treatment may provide potential benefits, further research is needed before definitive conclusions can be made regarding this treatment. 42, 43

1.5. Management of Primary Shoulder Dislocation

The recurrence rate following primary shoulder dislocation is very high, especially in the younger, more active population. There has been recent debate over how practices following dislocation can affect the recurrence rate and functional outcomes of patients, with some immobilization methods potentially reducing recurrence. While there is high-quality evidence evaluating these techniques, a definitive conclusion has yet to be reached. OrthoEvidence sought to determine if there are indeed differences in recurrence rates between different immobilization techniques

1.5.1. External Rotation Immobilization

- Immobilization in external rotation following shoulder dislocation may provide lower risk of recurrence; however some studies show non-superiority to immobilization in internal rotation. The effectiveness of external rotation immobilization for shoulder dislocation among all age groups remains inconclusive.

An analysis of 7 randomized controlled trials and 3 meta-analyses and systematic reviews have indicated mixed results. Four randomised trials demonstrated no significant difference in recurrence between patients immobilized in internal or external rotation, while three randomized controlled trials indicated a reduced recurrence rate with immobilization in external rotation. A meta-analysis of 7 prospective studies indicated a non-significant difference between methods, but a trend towards reduced recurrence in external rotation (RR 0.65 [95%CI 0.41, 1.03]; p=0.067); however Figure 2 illustrates the results from another meta-analysis of 7 RCTs, which indicated a significantly lower rate of recurrence among patients who had undergone immobilization in external rotation than those who had undergone immobilization in internal rotation (21.8% vs 32.9%, OR 0.45 [95% CI 0.21, 0.95]; p=0.04).
Figure 2. Meta-analysis of recurrent dislocation rate between groups treated with external rotation versus internal rotation following primary shoulder dislocation.

Of the studies assessed, 5 presented results evaluating treatment efficacy based on age. A higher treatment compliance was found in patients under the age of 30 in 3 trials, whereas the 2 other trials found no significant treatment compliance or recurrence rate differences among age groups. Based on the mixed results from various studies, it is difficult to make definitive conclusions regarding the superiority of one immobilization method over another. Additional large-scale studies are therefore required. 43, 44, 45, 46, 47, 48, 49, 50

2. Elbow

In this section, OrthoEvidence has provided a review of the high-quality evidence evaluating the efficacy of common orthopaedic treatments used in the management elbow conditions, identifying those that may have limited support within the literature. Management options for lateral epicondylitis were identified as treatments that may potentially have limited efficacy. These treatments include corticosteroids, platelet-rich plasma, extracorporeal shock wave therapy, and medical exercise/physiotherapy.

2.1. Treatment of Lateral Epicondylitis

Lateral epicondylitis is a common condition that has been linked to overuse. However, the etiology of this condition is not fully understood, which has limited the ability to develop effective treatments. A wide array of options are currently available, but the efficacy of a number of these treatments remains unknown. The sections below provide an evaluation of the treatments currently being used by practitioners.

2.1.1. Corticosteroids

- Corticosteroid injections appear to provide favourable short-term pain and functional improvements for patients with lateral epicondylitis, although the time-limited effect of corticosteroid injections may lead to a high risk of recurrent pain and disability.

Although numerous treatments for lateral epicondylitis exist, corticosteroid injections are among the most commonly used conservative treatment methods. Previous studies have demonstrated its efficacy,
however its generally short-term effects have led to fears of increased injury recurrence. OrthoEvidence evaluated relevant studies to assess such claims.

16 randomized controlled trials, meta-analyses, and systematic reviews which assessed the efficacy of corticosteroid injections for lateral epicondylitis indicated that such treatment often significantly improves clinical outcomes such as pain, pinch strength, grip strength, and function. However, many of the trials indicated that corticosteroid injections are only clinically effective over short-term periods of between 4 weeks and 6 months. One study also suggested that corticosteroid injections lead to high rates of recurrence due to its lack of long-term efficacy.

![Figure 3](image-url)

**Figure 3.** Meta-analysis of visual analog scale (VAS) pain scores over time between PRP- and corticosteroid-treated groups in patients with lateral epicondylitis.
Figure 4. Meta-analysis of Disabilities of the Arm, Shoulder, and Hand (DASH) scores over time between PRP- and corticosteroid-treated groups in patients with lateral epicondylitis.

2.1.2. Platelet-Rich Plasma

- A general consensus between the studies reviewed indicated significant improvements in clinical outcomes, including pain. The treatment benefits were present for all follow-up periods up to 2 years.

Platelet-rich plasma is a novel treatment that has garnered increasing attention due to its favourable anti-inflammatory and growth factor release properties, which can theoretically lead to shortened healing time. OrthoEvidence evaluated the results of randomized controlled trials, meta-analyses, and reviews which investigated the effects of platelet-rich plasma on lateral epicondylitis, to evaluate whether its theoretical benefits translate to clinical efficacy.

Each of the 7 studies evaluated indicated significant improvements from baseline in clinical and functional outcomes, and grip strength, with the use of platelet-rich plasma, maintained up to 2 years post-injection. Pooled results suggested lower efficacy compared to corticosteroid when considering pain (MD 2.15 [95% CI 0.61, 3.70]; p=0.006) (Figure 3) and disability outcomes (MD 11.75 [95% CI 4.15, 19.35]; p=0.002) (Figure 4) in the short-term (2-4 weeks), though long-term results favoured PRP treatment for pain (MD -2.05 [95% CI -2.73, -1.38]; p<0.00001) (Figure 3). However, it is important to note that none of the studies included in this treatment review contained comparisons to placebos, thus making it difficult to assess whether improvement in the long-term is attributable to PRP treatment, or the self-limiting nature of lateral epicondylitis over time.
2.1.3. Extracorporeal Shock Wave Therapy (ESWT)

- Extracorporeal shock wave therapy for lateral epicondylitis appears to improve pain and function over short- and long-term periods, although there are only a limited number of studies investigating this treatment.

Extracorporeal shock wave therapy (ESWT) has emerged recently as a possible conservative treatment method for those suffering from lateral epicondylitis, however there are only a few studies which have investigated the efficacy of this treatment. OrthoEvidence sought to evaluate the current literature on ESWT efficacy in the treatment of lateral epicondylitis, and identified two randomized trials. Within both, a significant improvement from baseline in pain and function were observed following treatment with ESWT, though in neither was a significant advantage of ESWT over other conservative management options documented. Additionally, neither study allocated patients to a placebo/control group, ultimately making it difficult to evaluate whether a quantifiable effect of ESWT is present compared to the natural course of lateral epicondylitis. Therefore, the actual effect of ESWT for treating lateral epicondylitis remains unknown.

2.1.4. Medical Exercise or Physiotherapy

- Medical exercise for lateral epicondylitis was shown to improve clinical and functional outcomes over short- and long-term periods. Eccentric exercises were also suggested to be superior to concentric exercise programs.

Medical exercise and physiotherapy have previously displayed positive treatment outcomes for lateral epicondylitis, and are often prescribed for treatment of pain and disability associated with the condition. OrthoEvidence sought to confirm such practices through the analysis of 3 randomized controlled trials. All trials which were assessed indicated improvements in pain, grip strength, function, and quality of life following medical exercise or physiotherapy. The treatment demonstrated effective symptom relief throughout the periods evaluated of up to 22 months. One trial also suggested that eccentric exercises allowed for more pain relief and increased strength than concentric exercises, although both approaches led to similar improvements in function and quality of life.