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# Lateral epicondylitis treatment: international survey of surgeons' preferences and literature review

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**SUMMARY**

**Background:** Lateral epicondylitis (LE) is a common cause of elbow pain. Despite a relatively high prevalence and morbidity, there is still no single effective ('gold standard') treatment for LE. We hypothesised that a surgeon's experience, country of origin and area of expertise would influence choices concerning patient management. The purpose of this survey was to describe the current trends and common practices in treating LE worldwide. **Material and methods:** A total of 291 orthopaedic surgeons of 12 subspecialties from 57 countries were surveyed on their choice of LE treatment modalities. Their preferences were analysed according to country of origin, field of expertise and seniority. The results were compared with current published level-1 evidence. **Results:** The most popular modalities of treatment among all of the surveyed orthopaedic surgeons were non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroid (CS) injection (38% of recommendations each). The most popular Modalities of treatment among the hand surgeons was NSAIDs (48%) and CS injection (30%). There was no significant difference in recommendations based on geography, seniority or specialisation (i.e., hand surgeons among others). **Conclusions:** Neither geography, seniority nor medical specialty affects surgeons' preferences in the treatment of LE. There appears to be little correlation between scientific evidence and therapeutic choices for managing LE.Level of evidence: Level V, Study.

**What's known**

Despite its relatively high prevalence and morbidity, there is still no single effective ('gold standard') treatment for lateral epicondylitis (LE). There is no evidence-based recommendation for most of the offered treatments.

**What's new**

Orthopedic surgeons' treatment recommendations for LE do not correlate with geographic location, seniority and sub-specialty. The correlation between scientifically based evidence and common practices in treating cases of LE, appears to be weak.

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Nothing to disclose (all authors).

## Introduction

Lateral epicondylitis (LE) is a common cause of elbow pain in the general population, affecting 1–3% of adults each year (1,2). Historically, it has been termed writer's cramp (3), rider's sprain (4), and the more familiar, tennis elbow (5). LE is characteristically found among adults in the 4th–5th decade of their lives, with no gender predisposition and with symptoms more commonly seen in the dominant arm (6). Overexertion of the extremity with repetitive wrist extension and alternating forearm pronation/supination may play a role in the onset of symptoms (7). A recent study identified a history of manual labour with heavy tools and significant strain while performing repetitive tasks as risk factors for LE (8).

Despite its relatively high prevalence and morbidity, there is still no single effective ('gold standard') treatment. A myriad of therapeutic modalities have been proposed, among which are acupuncture (9–11), non-steroidal anti-inflammatory drugs (NSAIDs) (12–16), corticosteroid (CS) injections (16–23), extra-corporal shock wave (ECSW) (24–31) and surgery, either in an open procedure (32,33), a percutaneous release (34,35) or an arthroscopic release (36,37).

An overview of the evidence that appears in the literature review on the treatment of LE does not support ECSW and acupuncture. Evidence indicates that while CS injections may be useful diagnostically, those approaches are not favoured as therapeutic interventions (level A recommendation) (38). Evidence suggests that topical NSAIDs are beneficial in the short term (level A recommendation), though no conclusions can be made on oral NSAIDs (level I recommendation) (38). Finally, the authors consider that open, percutaneous, or arthroscopic lateral release surgery, is indicated in symptomatic LE persisting beyond 6 months (level C recommendation) (38).

Prospective randomised clinical trials are considered to produce the best quality of evidence in medical literature. They are sources for the systematic

reviews and meta-analyses that comprise level-1 evidence and guide clinical decision making (39,40). While physicians are expected to be influenced by such evidence, other factors such as marketing, peer pressure, preliminary data, lower quality of evidence and tradition also influence decision making (39). We hypothesised that a surgeon's experience, country of origin and area of expertise, along with published level-1 evidence, would have an impact on choices of therapeutic management. The purpose of this survey was to describe the current trends and common practices in the treatment of LE.

## Methods

### Study design

The survey was distributed to orthopaedic surgeons at two major international conferences held in the USA and Europe: The Annual Meeting of the American Academy of Orthopaedic Surgeons held in San Diego, February 2011, and the 12th EFORT held in Copenhagen, June 2011. In January 2011, prior to phrasing the questions in the survey, a literature search was conducted to evaluate updated evidence for treating LE. We limited the search to randomised controlled trials or meta-analyses. The modalities of treatment for which we could find recommendation levels A–C (38) were chosen for analysis. The question we asked the group of orthopaedic surgeons was: 'Which of the following treatments do you recommend for patients with lateral elbow pain?' The responders were asked to choose between acupuncture, NSAIDs, CS injection, ECSW therapy and surgery (multiple selections were allowed). The responders were also asked to provide their country of origin, field of specialty, number of years of experience and professional status (i.e. senior surgeon, fellow or resident).

### Literature search

A literature search was conducted in January 2011 to evaluate updated evidence for treating LE. We limited the search to randomised controlled trials or meta-analyses that were available in PubMed in English.

### Statistical analysis

A univariate analysis was performed using the $\chi^2$ test to detect significant differences in choices between surgeons from various regions of the world, varying subspecialties (hand surgery or other) and different levels of experience (seniors, fellows or residents). Fisher's exact test was applied when appropriate. The level of significance was set at 0.05. The IBM® (Armonk, New York, NY) SPSS® 19 for Windows was used for all analyses.

## Results

A total of 291 surgeons from 12 subspecialties comprised of 64% senior surgeons, 22% residents and 14% fellows from 57 countries (52% Europe, 22.55% North America, 8.36% Asia, 5.82% South America, 6.55% Middle East and 4.73% Africa) took part in this survey. The average level of experience was 10.8 years (range 0–45) and 14 (6%) described themselves as hand surgeons. The response rate was 94.5%. Eighty-eight surgeons marked more than one therapeutic modality in their response.

The most popular modalities of treatment among the general population of the survey were NSAIDs and CS injection (38% each), followed by ECSW (12%), surgery (10%) and acupuncture (2%) (Table 1). Geographical location did not significantly affect the distribution of recommendations ($p = 0.49$). The most popular treatment modality among the hand surgeons was NSAIDs (48%), followed by a CS injection (30%), surgery (18%) and ECSW (4%) (Table 2). Geographical affiliation did not significantly affect the distribution of recommendations among the responders who described themselves as hand surgeons ($p = 0.477$). There were no significant differences in the distribution of therapeutic recommendations between the hand surgeons and the general orthopaedic surgeons ($p = 0.411$), nor according to professional seniority ($p = 0.54$).

## Discussion

The principle results of the survey demonstrate that the two most common treatment modalities are NSAID and CS injections, both among hand surgeons and among the general orthopaedic population. Furthermore, the distribution of recommendations among the responders has not been affected by geographical affiliation, seniority or sub specialty (i.e. hand surgeons vs. other orthopedic surgeons).

### Acupuncture

In this survey, six surgeons (2%, none of whom were hand surgeons) recommended the use of acupuncture. In the literature review, we found three level I studies on acupuncture therapy. In a randomised, controlled, double blind study involving 45 LE patients, Fink et al. (11) noticed a significant improvement in maximum grip strength, pain and function in disabled arms, shoulders and hands (DASH) form at 2 weeks in the true acupuncture group vs. the sham acupuncture group. Though this benefit was no longer seen at 2 months. Molsberger and Hille's (9) single blinded, randomised, controlled trial involving 48 LE patients showed acupuncture

**Table 1** Preferred therapeutic management of lateral epicondylitis of all surveyed orthopaedic surgeons by geographical region

| | Africa | Asia | Europe | Middle East | North America | South America | Total |
|---|---|---|---|---|---|---|---|
| Acupuncture | – | 1 (4%) | 2 (1%) | – | 2 (2%) | 1 (4%) | 6 (2%) |
| CS injection | 10 (56%) | 11 (39%) | 68 (36%) | 13 (52%) | 48 (38%) | 10 (35%) | 160 (38%) |
| ECSW | 2 (11%) | 1 (4%) | 29 (15%) | 2 (8%) | 9 (8%) | 5 (18%) | 48 (12%) |
| NSAIDs | 4 (22%) | 12 (42%) | 76 (40%) | 9 (36%) | 49 (39%) | 10 (35%) | 160 (38%) |
| Surgery | 2 (11%) | 3 (11%) | 15 (8%) | 1 (4%) | 19 (15%) | 2 (8%) | 42 (10%) |
| Total | 18 | 28 | 190 | 18 | 127 | 28 | 416 |

CS, corticosteroid; ECSW, extra-corporal shock wave; NSAIDs, non-steroidal anti-inflammatory drugs.

**Table 2** Preferred therapeutic management of lateral epicondylitis of hand surgeons by geographical region

| | Africa | Asia | Europe | Middle East | North America | South America | Total |
|---|---|---|---|---|---|---|---|
| Acupuncture | – | – | – | – | – | – | – |
| CS injection | – | – | 1 (14%) | 1 (100%) | 4 (40%) | 1 (25%) | 7 (30%) |
| ECSW | 1 (100%) | – | – | – | – | – | 1 (4%) |
| NSAIDs | – | – | 5 (72%) | – | 4 (40%) | 2 (50%) | 11 (48%) |
| Surgery | – | – | 1 (14%) | – | 2 (20%) | 1 (25%) | 4 (18%) |
| Total | 1 | 0 | 7 | 1 | 10 | 4 | 23 |

CS, corticosteroid; ECSW, extra-corporal shock wave; NSAIDs, non-steroidal anti-inflammatory drugs.

pain relief to be superior and longer lasting (20.2 vs. 1.4 h on average) than sham acupuncture. Davidson et al. (10) compared acupuncture with ultrasound in a study on 16 LE patients, and found significant improvement in both treatments over baseline DASH scores, pain and pain-free grip strength. Though there was no significant difference between the two modalities at 1 month. Altogether, there is not enough evidence to definitively support the therapeutic benefits of acupuncture, but these studies suggest (grade B) that it may have a role in the short term (< 6 weeks). The scarce recommendation of acupuncture is therefore supported by the body of evidence drawn from the literature review.

## Non-steroidal anti-inflammatory drugs

In this survey, 160 (38%) surgeons (48% of the hand surgeons) recommended the use of NSAIDs. In the literature review, one meta-analysis conducted by Green et al. (41) included three randomised, controlled trials that compared topical NSAIDs with placebos. These trials (12,13,15) had a combined population of 130 subjects and assessed the effect of topical NSAIDs (two trials used diclofenac and 1 trial used Difflam) on pain. The pooled weighted mean difference (WMD) was −1.88 [95% confidence interval (CI), −2.54 to −1.21] in the short term (1–3 weeks). This indicates that the subjects in the topical NSAID group had 1.88 less pain at the end of the trial than the subjects in the placebo group, on a visual analogue scale (VAS) of 0–10. The reviewers concluded that there is some support for the use of topical NSAIDs to relieve LE pain, at least in the short term.

Two other trials that compared oral NSAIDs with placebos had contradictory findings. Labelle and Guibert (14) compared 28 days of oral NSAID (diclofenac) use with placebo use in 129 patients. There was a significant difference in pain reduction but not in grip strength or function in the diclofenac group. Yet the diclofenac users had a higher incidence rate of abdominal pain (30% vs. 9%) and diarrhoea (39% vs. 20%) than the placebo group. Hay et al. (16) evaluated the effect of a 2-week course of naproxen vs. a placebo in 111 patients, and the results showed no treatment effect at 4 weeks, 6 months, or 12 months (16).

In conclusion, there is some evidence to support pain reduction after use of NSAIDs at least in the short term. In this survey NSAIDs were the most common treatment modality despite the lack of compelling evidence to support it.

## Corticosteroid injection

In our survey, CS injection was recommended by 160 (38%) surgeons (30% of the hand surgeons). In the literature survey, a recent meta-analysis conducted by Coombes et al. (42) reviews the efficacy

and safety of CS and other injections for the management of tendinopathy. They report strong evidence for the benefits of CS injection in the short term, compared with non-injection interventions across all outcome measures. On the other hand, when reviewing the medium and long-term results, the authors claimed that there is strong evidence to suggest that CS injections are less beneficial than NSAIDs for the treatment of LE at 26 weeks. These poorer effects remained significant at 1 year, with the exception of SC injection vs. NSAIDs, which no longer differed at that point in time. In a more recent meta-analysis (10 trials, 12 treatment arms with 310 patients), Krogh et al. (43) compared the effectiveness of injection therapies in LE and found no significant difference in benefits compared with placebos for SC (standard mean difference, −0.04; 95% confidence interval, −0.45 to 0.35; $p = 0.81$).

In conclusion, there is some evidence to support pain reduction after use of CS injections at least in the short term. On the other hand, there is strong evidence that in medium and long-term follow-ups, CS injections do not show long-lasting benefits. In this survey, CS was the second most common treatment modality, despite the lack of compelling evidence to support it.

### Extra-corporal shock wave

In this survey, 48 (12%) surgeons (4% of the hand surgeons) recommended the use of ECSW. In the literature, Buchbinder et al.'s (44) meta-analysis on ECSW for LE pain described three trials that reported significant differences in favour of ECSW for all or most measured end-points (24,30,31), whereas four trials reported no benefits of ECSW over placebos for any of the measured end-points (25,26,28,29). A pooled analysis combining results of other trials failed to demonstrate significant benefits for ECSW over placebos, across a range of outcomes. The reviewers concluded that based on the findings of a pooled population of over 1000 patients, ECSW provides little to no benefits in terms of pain and function in LE pain. The lack of support in the body of evidence was demonstrated in the survey as well. Only a small percentage of the orthopedic surgeons, and an even smaller portion of hand surgeons, recommended this treatment modality.

### Surgery

In this survey, 42 (10%) surgeons (18% of the hand surgeons) recommended surgery. According to the literature, the surgical results for LE are generally encouraging. Most surgical series report predominantly good to excellent outcomes, although some patients report persistence of mild and intermittent symptoms (33), and only 62–80% of patients experienced complete relief of LE pain (36). A comparative study between the three surgical techniques (i.e. open, percutaneous or arthroscopic lateral release) did not identify any significant difference in outcomes between the groups (45).

In conclusion, the literature supports surgery as a beneficial treatment modality. Only a minority of the survey responders recommended surgery as a treatment for LE.

As demonstrated in the discussion, there is some discrepancy between the literature recommendations and the actual treatment recommendations in the survey. This may stem from other factors, such as marketing, peer pressure, preliminary data, lower quality of evidence and tradition (39). This discrepancy may be more conspicuous in areas where high-quality evidence is not available or in which evidence is inconclusive (40). Another difficulty with the scientific approach of evidence-based medicine lies in interpreting the outcomes. Clinician-reported outcomes may differ considerably from patient-reported outcomes, making it all the more difficult to judge the advantages of one approach over another (40).

### Study limitations

This is a survey, and as such no homogeneity of the groups in terms of geographical affiliation, seniority or subspecialty, could be manufactured. The data recorded in the survey could be neither verified nor validated by asking the same question in other forms.

The second limitation is that the survey question did not include all available treatment modalities.

Finally, we did not presume to perform a systematic literature review, and there may be other evidence not in concordance with this review.

## Conclusions

According to the results of our international survey, geographical location, seniority and specialty do not affect surgeons' preferences in the treatment of LE. The correlation between scientifically based evidence and common practices in treating cases of LE appears to be weak.

## Authors' contributions

EA: Participated in survey design, acquisition of data, analysis and interpretation of data and drafting the manuscript. OC: Conceived of the study, participated in survey design and data acquisition, and helped to draft the manuscript. MK: Participated in survey design and acquisition of data, and helped to draft

the manuscript. RL: Participated in survey design and acquisition of data, and helped to draft the manuscript. ER: Participated in survey design and acquisition of data, and helped to draft the manuscript.

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