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The Effectiveness of Corticosteroid Injections in the Management of Lateral Epicondylitis, Review of Literature

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Abstract

Background: Lateral Epicondylitis (LE) is a common condition that represents an overuse injury of forearm common extensor tendon. Generally, it is a self-limiting process. However, if symptoms are persistent or recurrent, patient may benefit from conservative management options such as Physiotherapy, or Corticosteroids Injections (CSI). This paper will discuss in depth the role of corticosteroids injection for the management of LE.

Methods and Results: A comprehensive search performed to review the most relevant, and high evidence level literature. Only Systemic Reviews and Randomised Controlled Trials (RCTs) were included in the review. Results showed that CSI is superior to other management options in terms of short-term outcomes and pain relief. However, long-term follow up reported better outcomes after Physiotherapy, Platelets Rich Plasma or Placebo compared to CSI.

Conclusion: CSI can offer rapid symptoms improvement when it is needed. Yet, the literature suggests that CSI may not be effective, or may even worsen the patient's condition in the long-term.

Keywords: Common extensor tendinopathy; Conservative management; Corticosteroid injection; Elbow; Epicondylalgia; Lateral epicondylitis

Introduction

Lateral Epicondylitis (LE), or tennis elbow, is a common musculoskeletal condition and is the most common cause of elbow pain that occurs in approximately 1-2% of the adult population, commonly between 35 - 50 years of age. It usually affects athletes or people who are performing activities that demand repetitive wrist extension with supination and pronation [1-3]. LE is considered to be an overuse injury of the forearm extensor tendons [4]. The most common presenting symptom of LE is elbow pain, which increases significantly with a resisted dorsiflexion of the wrist or a

powerful grasp [5]. The injury that results in LE is believed to be due to a tear (Either microscopic or macroscopic) in the origin of the common extensor tendons of the wrist, it has been thought that this tear may result in an inflammatory process [6].

However, a pathologic specimen showed no inflammatory cells and a normal level of inflammatory mediators, as a result, this disease process is now considered to be a degenerative process (tendinosis) [7,8]. Generally, LE is a self-limiting condition where most of the cases could respond to simple analgesics, nevertheless, for the patients with recurrent or persistent symptoms other treatment modalities may be considered, such as physiotherapy, injections, shockwave treatment, watchful waiting or surgery [1,2]. The objective of this essay is to critically discuss the role of Corticosteroids Injections (CSI) in the management of

LE. A comprehensive search of multiple databases, including ScienceDirect, PubMed, Springer, Web of Science, Google Scholar and Cochrane Library was performed to review the most relevant, and high evidence level literature.

Literature Review

Corticosteroids Injection

LE, as a form of degenerative tendinosis, represents a therapeutic challenge for orthopaedists and rheumatologists [9]. According to the National Institute for Health and Care Excellence NICE 2012, the typical episode of LE may last from 6 months to 2 years, but the condition tends to relapse frequently [10]. Although multiple conservative measures have been considered for the management of LE, there is no consensus about the most effective management option [11]. Local CSI is one of the most commonly used conservative management measures, it had previously been assumed that CSI may act as an anti-inflammatory treatment. However, with the absence of an inflammatory picture in the pathological specimen, it is thought that CSI may act by decreasing neuropeptides in the common extensor tendons, so it helps to decrease pain significantly. However, adverse effects such as local skin depigmentation and subcutaneous fat atrophy should be considered [12,13]. The effectiveness of CSI in the management of the patients with LE was evaluated by a systemic review of literature by Smidt, et al. [14]. A total of 13 randomised trials were included in the review, it was shown that CSI can result in a clinically relevant and statistically significant improvement in pain, grip strength and global situation of the patients in the short term (<6 weeks). Whereas, no significant improvement was reported in the intermediate-term (6 weeks - 6 months) or in the long term (≥ 6 months).

Generally, this review included 13 randomised trials with a significant total number of participants (> 1000 patients); and the mean age of patients was around forty in almost half of the included trial. However, there are limitations with this study, firstly, some trials provided no clear information regarding the duration of symptoms before intervention, and other trials assessed patients with acute, sub-acute and chronic LE. Secondly, ten of the included trials did not clarify whether the participants were complaining of any shoulder or neck problems, as it is important to exclude patients with shoulder or neck problems while assessing LE, because cervical referred pain, or shoulder pathology, may interfere with the clinical assessment of elbow pain [15,16]. Finally, for most of the trials, there was no clear information about blinding, procedure of randomisation, number of any participants withdrawing and whether co-intervention had been prevented or not, as these factors may affect the internal validity of the included trials significantly. So, it is difficult to make any decision regarding the efficacy of CSI in the management of LE based on the results of the above systemic review alone.

Corticosteroid Injections Versus Physiotherapy

A similar result was reported by Bisset, et al. [17] through performing a single blinded Randomised Controlled Trial (RCT), to examine the effectiveness of CSI in patients with LE, 198 patients were randomised into three groups, CSI, group (A), physiotherapy, group (B) and wait and see, group (C). The results showed that, at six weeks, 78% of group (A) patients reported improved grip force, a better global improvement and assessor assessment of severity, compared to a 27% and 65% improvement rate in group (C) & (B), respectively. However, between 6-52 weeks of follow-up, group (A) reported poorer outcomes, and high recurrence rate (72%), compared to only 9% and 8% recurrence rate for groups (C) & (B), respectively. The side-effects were more common in the CSI group, however, most of the reported side effects were only mild pain, and only 2 participants reported a post-injection depigmentation and one participant reported local skin atrophy.

Bisset, et al. [17] concluded that the CSI is only effective in the short-term (6 weeks), but its effectiveness is paradoxically reversed after six weeks, so it should be used with careful monitoring for the management of LE. Additionally, it has been reported that in the long-term, physiotherapy may be more effective than CSI for the management of LE. Furthermore, the heterogeneity of the sample studied, the clear inclusion and exclusion criteria and the blinding of assessors throughout the study period, are important factors that can improve the study's internal validity and reliability. The main limitation with Bisset, et al. [17] study may be that the patients were allowed to use analgesics as they needed them, so it may be difficult to judge whether the initial improvement after CSI was really due to CSI or in fact the effect of the analgesia.

Corticosteroids Injections Versus Platelets Rich Plasma (PRP)

In the same context, Gosens, et al. [18] conducted an RCT to evaluate the effectiveness of CSI compared with Platelet Rich Plasma (PRP) in the management of LE over two years of follow-up. Gosens, et al. [18] concluded that CSI could be useful initially, however, after prolonged follow-up, the patients may return back to the baseline level of functional impairment. On the other hand, PRP injections were more successful at relieving pain and improving disability even after a prolonged follow-up. A total of 100 patients with LE were randomised into CSI group (N=49), and PRP group (N=51). Successful treatment was defined as ≥ 25 % reduction in Disability of Arm, Shoulder and Hand (DASH) scores or Visual Analogue Scale (VAS), with no need for re-intervention. Two years' follow-up stated that, regarding DASH scores, 19 patients in the CSI group were treated successfully, compared to 37 patients in the PRP group, ($P < .0001$).

Also, for the VAS scales, 21 patients in the CSI group were successfully treated, compared to 39 patients in the PRP group, ($P < .0001$) (the results are detailed in Figures 1&2). On

the contrary, the treatment failed (as defined as the need for re-intervention at six-month follow-up) in 14 patients in the CSI, compared to 6 patients in the PRP group. Additionally, the fair sample size, blinding of both the patients and the assessors and prolonged follow-up duration are positive factors that enhance the results accuracy. However, symptom duration before intervention was not specified, and this is important, as that the natural history of LE is thought to be of a spontaneous recovery (within 1-2 years) [19], it may be necessary to clarify the symptom duration before intervention, because the patients' improvement in Gosens, et al. [18] trial may be the result of a spontaneous healing process rather than the result of CSI.

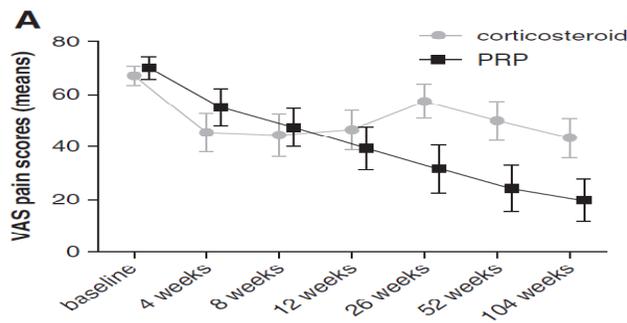


Figure 1: The VAS scale throughout the follow-up duration, Bars present 95% confidence intervals, CSI the grey line, PRP the black line [18].

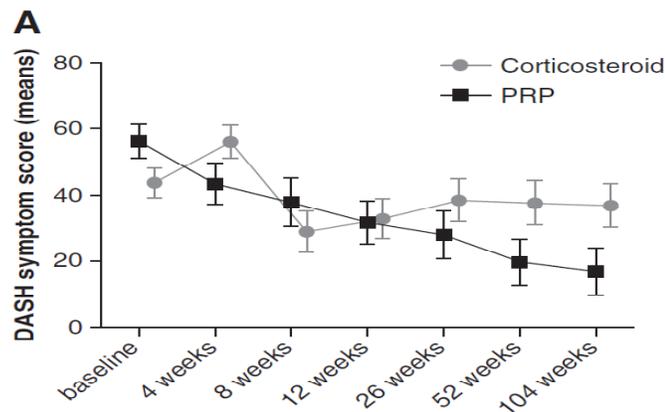


Figure 2: The DASH score throughout the follow-up duration, Bars present 95% confidence intervals, CSI the grey line, PRP the black line [18].

A more recent systematic review was performed by Sims, et al. [20] to identify the efficacy of non-surgical management of LE. The results stated that CSI may provide more symptom relief than other conservative management in the first 1-2 months after injections, nevertheless, around one year after injections, CSI may have no significant effects; Sims, et al. 2014 [20] stated that this

may be due to the fact that LE is a result of micro-trauma rather than being an inflammatory process. Importantly, this review included a significant number (58) of a high level of evidence randomised trial (level 1 &2), which enhances the result accuracy, however, in some trials, it was not clear whether the assessment was done by the same person or not, and whether the assessors were blinded or not; this may cause the result to be biased. In short, it may be concluded from the four studies above: [14,17,18,20] that CSI may be used for the management of this case study patient, who is looking for a rapid improvement in symptoms, as there was some evidence suggesting that it may help to improve the patient's symptoms and functional scores in the short-term. However, the literature suggested that CSI may be ineffective in the long term, or it may even worsen the patient's prognosis, so it should be used carefully in a highly selected case.

Corticosteroids Injections Versus Placebo

Not all the literature reported similar results on the role of CSI in the management of LE, for instance, according to the results reported by the randomised trials [21,22], CSI may not affect the apparently self-limiting LE. Lindenhovius, et al. [21] reported statically significant results by conducting a prospective, double-blinded randomised trial to assess the difference between CSI and a placebo in the management of LE. Patients with LE (N=64) were randomised into CSI group (N=31), and placebo (lidocaine injection) group (N=33). The result showed that there was no significant difference between CSI and the placebo, as both groups improved, (the results are summarized in Table 1). In general, the population studied in this trial match to some extent the case study patient regarding their age (average participants' age was around 50 years old) and symptom duration before intervention (<6 months). Still, the slightly significant dropout rate (a total of 21 patients) may affect the results as these patients were considered when the data were analysed.

Comparison cohort	DASH		VAS		grip strength	
	One month	six months	One month	six months	One month	six months
CSI	24 points	18 points	3.7	2.4	83%	98%
Placebo	27 points	13 points	4.3	1.7	87%	97%
P	0.72	0.34	0.42	0.39	0.57	0.86

Table 1: The Reported Patients' Outcome Scores After 1 & 6 Months [21].

A similar result was reported by a prospective RCT performed by Wolf, et al. [22] it was shown that there was no advantage for CSI over a placebo saline injection in the management of LE throughout 6 months of follow-up, as both the groups were improved. Wolf, et al. 2011 [22] randomised 28 patients into three

groups, a CSI group, Autologous Blood Injections (ABI) group and saline group. The result stated that there was a significant improvement in DASH scores after 6 months of intervention compared to baseline measurements in all groups ($P < 0.001$). While, there was no significant difference in DASH score between the three groups ($P = 0.188$), (the results of DASH scores are summarized in Table 2). Consequently, Wolf, et al. [22] concluded that LE is a self-limiting process, and there may be no need for CSI, as it may not be superior to a placebo. Importantly, the average age for the participant (49 years old) matches to some extent the case study patient's age, additionally, randomisation of the groups may enhance the trial's internal validity, however, the small sample size may affect its external validity significantly. To conclude, the previously mentioned 2 randomised trials suggest that CSI may not be better than a placebo for the management of LE, as the disease is a self-limiting process which may settle spontaneously, however, there may be limited evidence to support this suggestion.

Time point	Saline injection (Mean [SD])	Blood injection (mean [SD])	steroid injection (mean [SD])
initial	38 (10.0)	38 (14.1)	37 (14.1)
2 weeks	24 (16.0)	36 (22.3)	25 (19.5)
2 months	20 (15.8)	28 (22.4)	28 (24.2)
6 months	10 (10.9)	20 (16.3)	13 (12.8)

Table 2: The Results of DASH Scores of CSI, Saline Injection and ABI Groups at a Total of 6 Months Follow-up [22].

On the other hand, Coombes, et al. [23] reported that CSI may be inferior to a placebo in the management of patients with LE. Coombes, et al. 2013 [23] conducted an RCT, 165 patients with LE were randomised into 4 groups, CSI with analgesia, placebo (saline) alone, CSI plus physiotherapy and Placebo plus physiotherapy. The outcome measures of pain, disability, complete recovery and improvement were assessed regularly. It was shown that, after 1 year of follow-up, the CSI with analgesia result had lower improvement than the placebo alone (83% versus 96%, respectively), $P = 0.01$, and a higher recurrence rate (54% versus 12%, respectively), $P < 0.001$, whereas, the addition of physiotherapy did not affect the results significantly. However, the main limitation with this study may be that the injection therapy was given by 5 different medical practitioners, and there was no clear information about the injection technique, which may be a source of an inter-personal bias, as each one of these practitioners may have different experience levels and different techniques of drug administration.

Discussion

LE is a quite common musculoskeletal disorder of middle-

age people, and several management options can be taken, yet, there is no consensus about the most effective management option. However, considering the role of CSI in the management of LE, CSI can be used for patients who are looking for a rapid improvement in their symptoms, as there is some evidence to suggest that CSI may be effective in the short term. Still, the literature suggests that CSI may not be effective, or may even worsen the patient's condition in the long-term. As a result, CSI should only be used with careful monitoring and in highly selective cases and based on the surgeon's opinion and the patient's preference. From another perspective, there is some evidence to suggest that CSI may not be superior to a placebo in the management of LE, as it is a self-limiting condition, moreover, some literature suggests that CSI may be inferior to a placebo, however, neither of these suggestions can be supported with strong evidence. Interestingly, there was some evidence to suggest that the long-term outcomes of PRP in the management of LE might be better than CSI, in fact, this particular point may need to be assessed more regarding PRP efficacy and cost, and this option would need to be discussed with the patient.

Turning now to discuss the effect of injection techniques on the result of CSI in the management of LE, it has been thought that the long-term effects of CSI may depend on the injection technique; combining the CSI with Peppering Technique (PT) may improve the long-term effects of CSI [24,25]. In fact, this hypothesis was investigated by Dogramaci, et al. [26] by performing a randomised clinical trial to determine the effectiveness of CSI versus placebo with and without PT. Up to 75 patients were divided into 3 groups, CSI with analgesia (group 1), local analgesic injection (LAI) with PT (group 2) and CSI with PT (group 3). After 6 months of follow-up, there was a statistically significant improvement in group 3 (84% of patients) compared to only 36% and 48% improvement rate for group 1 and 2, respectively ($P = 0.006$). In fact, there are some issues that may affect the study's internal validity, first of all, is that it was not clear whether the injection was delivered by the same person or not, secondly, no clear information was reported about the patients' assessment during follow-up and, thirdly, there was a short follow-up period. Consequently, it may be difficult to decide whether patients' improvement in the previous trial was due to the PT by itself, or it was really due to the combined effect of CSI with the PT.

Finally, the CSI side effects may be an important issue to be considered, according to Coombes, et al. [27], accidental injection to the tendon may weaken its structure and increase the risk of Spontaneous Tendon Rupture (STR). Yet, the risk of STR is reported to be low; only 1 patient out of 2672 patients who were assessed by the systemic review of the literature performed by Coombes, et al. [27]. STR is supposed to be the result of suppressive effects of corticosteroids on proteoglycan production by the human tenocytes [28]. In addition to that, some evidence suggests that CSI may worsen the patient's condition in the long-

term, compared with a placebo [29]. Additionally, CSI has been associated with many other side effects, such as local skin atrophy (2.4%), skin depigmentation (0.8%), localized erythema and warmth (0.7%) and facial flushing (0.6%) [30].

Conclusion

To conclude, CSI may be useful in carefully selected patients with LE, as it provides rapid symptomatic improvement. Yet, CSI side effects need to be considered and discussed with the patients. CSI was not superior to placebo in the long term, probably as LE is a self-limiting condition. There was a piece of evidence to suggest that the techniques of injections can affect the outcomes after CSI, however, bigger series with a longer follow-up are needed to formulate a solid evidence.

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