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Original Research Article

To Evaluate and Investigate Potential Relationship between MRI Abnormalities of the Common Extensor Tendon (CET) and its Clinical Symptom in Patients with Chronic Lateral Epicondylitis: A Retrospective Study

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Abstract:

Background: The condition known as tennis elbow, or Chronic Lateral Epicondylitis (CLE), is a painful ailment that affects the outside of the elbow. Magnetic Resonance Imaging (MRI) provides critical information for accurate diagnosis and treatment planning by revealing structural alterations inside the Common Extensor Tendon (CET).

Method: Data from 250 patients at Government medical College and hospital Purnia with a confirmed diagnosis of CLE (Agale group) were analysed in this retrospective analysis. Clinical complaints were evaluated using standardised measures, and MRI abnormalities of the CET were diagnosed. Pearson's correlation coefficients and multivariate regression were used for the statistical analysis.

Results: MRI findings included tendon thickening (68%) and tendon rips (42% and tendon inflammation (56%) were common. MRI abnormalities positively correlated with pain ($r = 0.62$, $p < 0.001$) and functional impairment ($r = 0.48$, $p < 0.001$). Fewer MRI abnormalities were seen in patients experiencing symptoms for longer ($r = -0.22$, $p = 0.017$).

Conclusion: Our results show that CET anomalies observed by MRI correlate firmly with patients' reported symptoms of CLE. The results highlight the significance of MRI in CLE diagnosis and developing individualised treatment plans. This study significantly contributes to our understanding of the pathophysiology of CLE and highlights the need for further investigation into improving patient management.

Keywords: Chronic Lateral Epicondylitis, Common Extensor Tendon, Magnetic Resonance Imaging, Pain, Structural Abnormalities, Tennis Elbow.

Introduction

CLE, or "tennis elbow," is a common musculoskeletal condition caused by overuse of the wrist flexor muscles and the forearm supinator muscles and is characterised by discomfort and tenderness near the lateral epicondyle of the humerus [1]. Despite the common association with tennis players, CLE can affect people in various professions and hobbies. Due to repetitive stress from usage, forearm tendinitis is caused by microtears, degeneration, and inflammation in the CET [2].

CLE frequently leads to discomfort, functional impairment, and decreased occupational and recreational performance, significant0ly affecting an individual's quality of life and job productivity [3]. Despite the ease with which CLE can be diagnosed clinically to its characteristic symptoms, researchers and clinicians continue to be interested in the underlying pathological changes within the CET, especially as detected by cutting-edge imaging techniques like Magnetic Resonance Imaging (MRI) [4].

Investigating the connection between common extensor tendon MRI anomalies and the symptoms experienced by individuals with CLE is essential [5,6]. Insights into the pathophysiology of CLE, such as the potential for earlier diagnosis, more targeted treatment, and better patient outcomes, could be gained from a thorough comprehension of this link. Furthermore, these studies can help doctors decide whether to use conservative or aggressive treatment, which can improve the overall management of CLE.

Research Objectives

- To determine the frequency and nature of common extensor tendon MRI anomalies in patients with CLE.

- To evaluate the duration, severity, and impact of pain and functional limitations among research participants.
- To examine the relationship between specific MRI abnormalities (such as tendon rips or degeneration) and the symptoms that patients report experiencing in the clinic.
- Insights into MRI's diagnostic and prognostic value for CLE management will be provided.

We postulate that MRI-detected anomalies in the common extensor tendon are significantly related to the existence and severity of Chronic Lateral Epicondylitis. We hope that by analysing data from 250 people, we can shed light on this connection and add to what is already known about CLE's aetiology and therapeutic management.

MRI as a Diagnostic Tool

MRI has developed into a proper diagnostic technique for evaluating musculoskeletal conditions. It's great for examining disorders like CLE since it provides high-resolution images of soft tissues like tendons [7]. Imaging anomalies in the CET using MRI, such as tendon thickness, rips, and inflammation, may the causes of CLE.

MRI Findings in CLE Patients

Several studies have analysed MRI scans of CLE patients to identify CET characteristics. According to [8,9], MRI can reveal tendon anomalies in people with CLE, such as higher signal intensity and tendon thickness. These MRI findings correlated highly with clinical complaints, which may point to a link between structural changes and pain.

Figure 1: MRI of CET (Source:[10])

Correlation between MRI Abnormalities and Symptoms

[11,12] looked at MRI findings in CLE patients and compared them to patients' reported symptoms. Patients with more severe MRI abnormalities, like tendon tears or systemic inflammation, reported considerably higher levels of pain and functional impairment. This supports MRI's utility in gauging the seriousness of CLE symptoms before treatment begins.

Limitations and Considerations

MRI has been helpful in evaluating CET abnormalities in patients with CLE, but it is not without its limitations. MRI, for instance, isn't always readily available and may miss subtle alterations or preliminary signs of illness. Not all CLE patients with MRI abnormalities exhibit significant clinical symptoms, suggesting that other factors, including as pain perception and individual variation, may influence symptomatology.

Method

Study Design and Rationale

The purpose of this retrospective study is to investigate whether or not individuals with CLE who have MRI anomalies of the CET also have clinical symptoms. It was chosen to adopt a retrospective approach to review preexisting medical records and imaging data in order to

analyse a big patient group over time. The time and money saved by using this strategy in data collection are two of its main selling points.

Study Population

Study participants, or the "Agale group," of 250 people who presented for therapy at Government medical College and hospital Purnia with a CLE diagnosis between and. The hospital's EMR (Electronic Medical Record) system was used to locate the relevant patient files.

Data Collection Process

MRI Protocols

The hospital's radiology department provided the MRI scans. T1, T2, and proton density-weighted MRI sequences were all utilised.Field of view, slice thickness, and imaging plane were all standardised to guarantee uniformity in picture capture.

Clinical Assessments

Patient records were reviewed to gather clinical data such as demographics, medical history, symptom duration, and pain and functional impairment assessments. Standardised assessments or clinical evaluations were used to quantify functional impairment, and pain was quantified on a Visual Analogue Scale (VAS).

Inclusion and Exclusion Criteria

Inclusion Criteria

- Individuals who have been clinically evaluated and documented as having Chronic Lateral Epicondylitis.
- Patients for whom MRI scans of the injured elbow are available.
- Aged patients.

Exclusion Criteria

- People whose health records are missing critical information.
- People who have had elbow surgery in the past.
- Patients have other illnesses (such as rheumatoid arthritis or neuropathies) that might affect the study's findings.

Ethical Considerations and Approvals

The Institutional Review Board of Government medical College and hospital Purnia confirmed that this study followed all ethical standards. All patient data was anonymised and treated discreetly to ensure patient privacy and adhere to applicable data protection rules.

Statistical Methods

Statistical programs were used to analyse the data. Patient characteristics and MRI findings were summarised using descriptive statistics, including means, standard deviations, and frequencies. Statistical tests were used to determine whether or not MRI abnormalities were associated with clinical complaints. For instance, compare pain ratings with tendon thickness using Pearson's correlation coefficient for continuous variables—chi-square test for categorical data (tear presence versus impairment in daily functioning, for instance). Using a multivariate regression model, we attempted to remove the effects of any confounding factors.

Confidence intervals were determined, and statistical significance was fixed at p 0.05. The results were made more reliable by controlling for age and the time patients experienced symptoms. Such a thorough technique permits the systematic gathering and analysis of data to assess the possible connection between MRI anomalies of the CET and clinical symptoms in patients with CLE.

Results

Patient Characteristics

The study involved 250 patients diagnosed with CLE (Agale group). The age range of the patients was from 30 to 60 years old, with a mean age of 45 years old (SD = 7.3). Sixty-five per cent of the patients were male, and eighty-two per cent were right-handed.

MRI Abnormalities in the Study Group

Table 1: Prevalence of MRI Abnormalities in CET of CLE Patients

MRI Abnormality	Prevalence (%)
Tendon Thickening	68%
Tendon Tears	42%
Tendon Inflammation	56%
Other Abnormalities	15%

Tendon thickening was the most common MRI abnormality in CLE patients, occurring in 68% of instances. An enlarged CET, as seen in a thickened tendon, indicates chronic inflammatory alterations in the tendon.

This data further substantiates the deteriorative character of CLE. Significant MRI abnormalities related to CLE include tendon tears, which occur in 42% of patients. These tears can range from mild to really severe. Tears indicate CET structural damage linked to CLE symptoms such as pain and limited

mobility. Five-sixths of the cases had MRI evidence of tendon inflammation. Increased signal intensity inside the CET indicates tendon inflammation, which can be acute or chronic.

It may exacerbate the suffering of CLE patients. Additional MRI abnormalities, such as bursitis and calcifications, were found in 15% of patients and are categorised under "Other Abnormalities." The results show how complicated CLE is and how many diseases can affect the elbow. Tendon thickness, rips, and inflammation are frequent MRI findings in the CET of CLE patients, as highlighted in Table 1. These irregularities shed light on the pathophysiology of CLE by reflecting the underlying structural alterations in the tendon. Due to its association with clinical complaints like pain and functional limitations, understanding the types and incidence of MRI abnormalities in CLE patients is critical for diagnosis and treatment planning.

Correlation between MRI Abnormalities and Clinical Symptoms

Table 2: Correlation Between MRI Abnormalities and Clinical Symptoms

Clinical Symptom	Pearson's Correlation Coefficient (r)	p-value
Pain Severity (VAS)	0.62	<0.001
Functional Impairment	0.48	<0.001
Duration of Symptoms	-0.22	0.017

Clinical symptoms of CLE are significantly correlated with MRI anomalies inside the CET, as seen in Table 2. Both pain intensity (as measured by the Visual Analogue Scale, VAS) and functional impairment ($r = 0.48$, $p < 0.001$) are positively correlated with MRI abnormalities, as shown by Pearson's correlation coefficients. According to these results, patients with more severe CET abnormalities, including tendon thickening, tendon rips, and inflammation, are more likely to experience discomfort and impaired elbow function. Symptom duration was negatively correlated with MRI abnormalities ($r = -0.22$, $p = 0.017$), suggesting that patients who have experienced symptoms for longer may have less severe abnormalities on MRI. However, more research is required to grasp this inverse association's ramifications correctly. These findings collectively highlight the clinical significance of MRI anomalies in CLE, demonstrating their value as predictors of symptom intensity and functional impairment in affected people.

Discussion

The results of this retrospective investigation provide how CET MRI anomalies may be related to clinical complaints in CLE patients. Tendon thickening, rips, and inflammation are just some of the MRI abnormalities that are commonly seen in the CET, highlighting the structural changes that are taking place. Significantly, we find that these MRI abnormalities positively correlate with the intensity of pain and functional impairment in CLE patients. That MRI-observed structural changes within the CET play a critical role in determining the clinical manifestation of CLE is consistent with our original hypothesis.

Clinical Implications

The clinical significance of these findings cannot be overstated. They first stress the value of MRI as a diagnostic tool for CLE evaluation. MRI in clinical practice can predict the diagnosis and degree of clinical symptoms. Conservative care may be appropriate for patients with minor CET abnormalities, whereas more aggressive treatment may be necessary for those with more severe abnormalities.

In addition, a patient's unique MRI profile can be used to inform targeted interventions like physical therapy, corticosteroid injections, or even surgery for chronic lumbar pain and dysfunction.

Comparison with Previous Studies

Our results are consistent with other research examining the link between MRI abnormalities and CLE signs and symptoms.

Table 3: Comparison with Previous Studies

Study	Sample Size (n)	MRI Abnormalities Investigated	Correlation with Pain	Correlation with Function	Findings
This Study	250	Tendon Thickening, Tendon Tears, Tendon Inflammation, Others	Strong Positive ($r = 0.62$, $p < 0.001$)	Strong Positive ($r = 0.48$, $p < 0.001$)	MRI abnormalities correlated significantly with pain and functional impairment in CLE patients.
[13]	150	Tendon Tears, Tendon Inflammation	Positive Correlation ($r = 0.57$, $p <$	Positive Correlation ($r = 0.42$, $p <$	Found significant correlations between MRI abnormalities and pain and function in CLE

			0.01)	0.05)	patients. Smaller sample size compared to this study.
[14]	80	Tendon Tears, Tendon Thickening	Positive Correlation ($r = 0.48$, $p < 0.05$)	Positive Correlation ($r = 0.35$, $p < 0.05$)	Demonstrated associations between MRI abnormalities and clinical symptoms in CLE patients. Smaller sample sizes and limited MRI abnormalities were investigated.
[15]	180	Tendon Inflammation	Positive Correlation ($r = 0.41$, $p < 0.001$)	Positive Correlation ($r = 0.28$, $p < 0.01$)	I was focused on tendon inflammation and its correlation with pain and function in CLE patients. A larger sample size but limited MRI abnormalities were investigated.

To compare with previous research, Table 3 emphasises significant connections between MRI abnormalities and clinical complaints in individuals with CLE. Our analysis of 250 individuals shows that MRI abnormalities are significantly associated with both pain ($r = 0.62$, $p <0.001$) and functional impairment ($r = 0.48$, $p <0.001$). The consistency between MRI abnormalities and CLE symptoms is further supported by our results, which align with those of [13] and [14]. Positive associations were also reported by [15]. However, they narrowed their research emphasis to tendon inflammation. The aggregate data highlights the clinical significance of CET MRI abnormalities as indications of pain and functional limits in CLE, further strengthening their utility for patient assessment and treatment planning despite discrepancies in sample sizes and MRI abnormalities studied.

Limitations

There are several caveats to this study that need to be mentioned. As a first issue, the study's retrospective design adds the possibility of selection bias and reduces our power to demonstrate causation. Furthermore, despite its benefits, MRI may miss some minor abnormalities, and differences in MRI techniques may influence the abnormalities detected. Additionally, the data was only collected from one hospital. Therefore, the results may need to be more generalisable. Finally, this study did not adequately account for potential confounding factors such as age, comorbidities, and prior treatment.

Areas for Future Research

Future studies need to focus on overcoming these obstacles. More definitive evidence linking MRI abnormalities with CLE symptoms can be obtained through prospective research with more extensive and diverse patient populations, standardised MRI methods, and extended follow-up periods. The best ways to care for patients with CLE may be gleaned through research into the effects of different treatments on MRI abnormalities and symptom results.

Conclusion

The critical association between MRI-detected anomalies within the CET and the clinical symptoms experienced by CLE patients was illuminated in this retrospective study of 250 individuals with CLE. Our results highlight the clinical relevance of these structural changes in CLE, particularly the incidence of CET MRI abnormalities and their substantial positive associations with pain and functional impairment. Furthermore, our findings highlight the importance of MRI as a powerful diagnostic and prognostic tool in managing CLE, confirming the initial premise. Clinicians may improve patient outcomes and quality of life by offering more individualised treatment plans after identifying CLE individuals at higher risk of severe symptoms by MRI examinations. More research is needed to improve our understanding of this link further and optimise treatment strategies for this challenging condition. Our work adds to the expanding body of evidence supporting the efficacy of MRI in learning and controlling CLE.

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