CASE REPORT

Association Between Arterial Hypertension and Degenerative Rotator Cuff Tears: An Expanded Comparative Clinical Study of 30 Cases

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Abstract

Background: Degenerative rotator cuff tears (RCTs) are caused due to multiple factors which involves aging, mechanical overload, hypo vascularity, and systemic influences. Arterial hypertension is recognized as one of the major contributory factors for tendon degeneration due to its effects on microvascular integrity and metabolic homeostasis.

Objective: Our objective was to evaluate the association between arterial hypertension and degenerative rotator cuff tears by comparing 30 cases.

Methods: Thirty patients who were diagnosed with degenerative Rotator cuff tears were divided into two groups: 15 who were a known case of hypertension and 15 normotensives (NT group). All the patient's necessary reports done and were compared which included MRI tear characteristics, fatty infiltration, intra-operative tendon quality, functional outcomes, and re-tear rates.

Results: Hypertensive patients showed markedly larger tear sizes, higher levels of fatty infiltration, and poorer tendon integrity when compared to normotensive patients. Postoperative outcomes measured by UCLA scores were also compared which was significantly lower in the HTN group.

Conclusion: Patients with arterial hypertension tend to have more severe rotator cuff degeneration and may have less healing after a tear. So, it is necessary to consider blood pressure when evaluating and planning treatment for individuals with rotator cuff tears, as it may influence both disease severity and recovery outcomes.

Keywords: Degenerative rotator cuff tears, arterial hypertension, tendon degeneration, fatty infiltration, tendon integrity, MRI characteristics, postoperative outcomes, UCLA score, re-tear rate

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Introduction

Rotator cuff tear is considered to be one of the leading causes of shoulder morbidity, affecting many individuals worldwide. Although the major causes attributed are mechanical impingement and age-related tendon degeneration, recent studies have showed the role of systemic metabolic and vascular disorders contributing to tendon injury. Among them, arterial hypertension is considered important as it has high global prevalence and pervasive impact on tissue vascularity and healing.

Hypertension can lead to chronic changes in microcirculation, including intimal thickening, luminal narrowing, and endothelial dysfunction. These changes can disturb perfusion to peripheral tissues, including the tendons of the shoulder. The rotator cuff, specifically the supraspinatus tendon, which already has a natural hypo vascular zone, and additional compromise from systemic hypertension can cause the tissue to go in earlier or more severe degeneration[4].

Epidemiological studies have showcased an increase in prevalence of RCTs among hypertensive populations, with studies connecting hypertension to larger tear sizes and more advanced fatty degeneration[123]. Despite of these findings, some studies have added direct clinical comparisons of hypertensive versus patients with normal blood pressure, especially in limited, controlled cohorts where detailed tendon quality of the patients and postoperative healing can be compared and evaluated closely.

Hence, this study fulfills by analyzing 30 patients with degenerative RCTs and comparing structural tear characteristics, intra-operative tendon quality, functional outcomes, and early postoperative healing between hypertensive group and normal blood pressure group.

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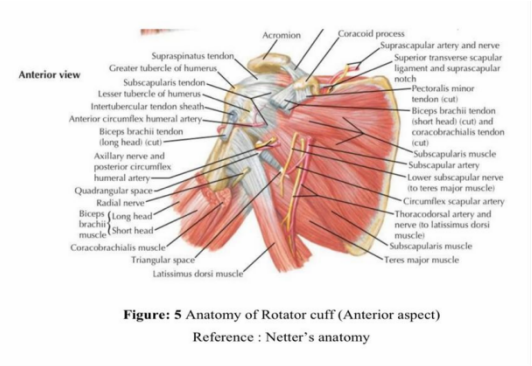

Figure: 5 Anatomy of Rotator cuff (Anterior aspect)
Reference : Netter's anatomy

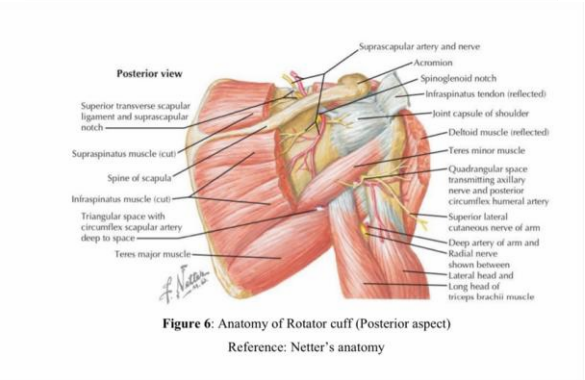

Figure 6: Anatomy of Rotator cuff (Posterior aspect)
Reference: Netter's anatomy

Materials and Methods Study Design

This study included 30 adult patients treated surgically for symptomatic degenerative Rotator cuff tears. All were evaluated preoperatively using MRI scans and clinically with standardized shoulder scoring systems. Arthroscopic repair was done by the same surgical team for all the patients to minimize procedural inconsistency.

Inclusion and Exclusion Criteria

Patients included in this study were aged between 40 to 75 years with full-thickness degenerative rotator cuff tears. Tears caused by Trauma, inflammatory arthropathies, diabetes mellitus, chronic corticosteroid use, and previous shoulder surgeries were not involved to separate the effect of hypertension and avoid interfering systemic factors.

Grouping

Participants were allocated into:

- Hypertensive Group (HTN): 15 patients who were a known case of hypertension for >5 years, under regular treatment.
- Normotensive Group (NT): 15 patients without a known case of hypertension or elevated blood pressure.

Results

Tear Size and Morphology

When these groups were compared the most notable difference was the size of the tendon tear. Patients who had hypertension reported with a mean anteroposterior tear size of 28.4 mm, nearly 9 mm greater than the mean size in normotensive individuals (19.7 mm). Also, hypertensive patients showed a higher number of large tears exceeding 30 mm.

This suggests that hypertension contributes to a larger degenerative cascade, probably due to prolonged ischemia at the tendon insertion. Reduced perfusion in the supraspinatus critical zone[4] can disturb collagen turnover, weaken the tendon, and increase susceptibility to progressive tearing.

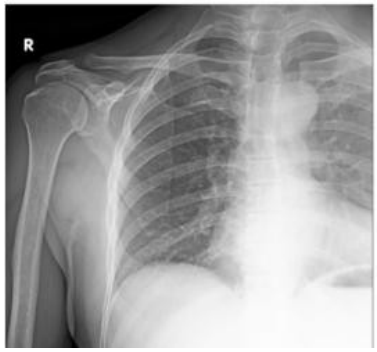

Figure 1- Shoulder X-ray AP view

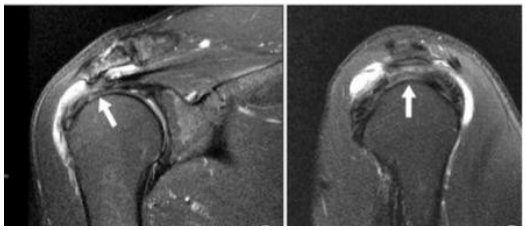

Figure 2- shows high-grade partial-thickness tear of right supraspinatus tendon tears (arrow) in coronal and sagittal planes of fat saturated T2-weighted MR images in Normotensive patient

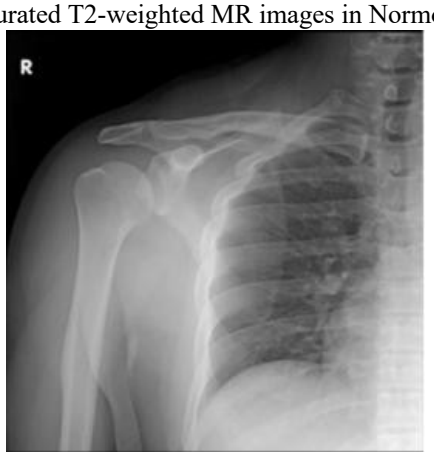

Fig 3 - Shoulder X- ray AP view

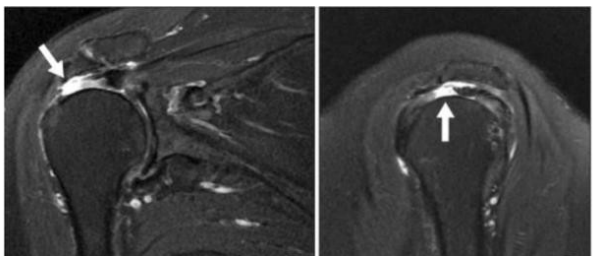

Fig 4 - shows full thickness tear at right supraspinatus tendon (arrow) in coronal and sagittal planes of fat saturated T2-weighted MR images in Hypertensive patient

Fatty Infiltration

MRI reports showed a significant difference in fatty infiltration patterns between groups. Most of the Hypertensive individuals showed moderate to advanced fatty infiltration (Gout Allier grades 2–4). Whereas, normotensive patients mostly showed minimal to mild fatty degeneration.

Fatty infiltration is one of the important features of chronic tendon degeneration which correlates with poor postoperative prognosis. The increasing number of cases with more severe tears among hypertensive patients likely reflects long-standing metabolic stress, oxidative imbalance, and decreased vascular supply within the tendon tissue[5].

Intra-operative Tendon Quality

During arthroscopy, hypertensive patients exhibited noticeably compromised tendon quality. The surgeon frequently countered weak tendon fibers, poor tissue holding strength, and thin, retracted tendon edges. Almost 40% of the HTN group had “poor” intra-operative tissue quality.

In comparison, normotensive patient’s tendons were stronger, more structured tendon tissue. These observations orient with animal studies showing systemic hypertension reduces tendon strength and modifies collagen microstructure, rendering the tendon mechanically inferior[6].

Functional Outcome

Functional assessment using the UCLA Shoulder Rating Scale at 6 months postoperatively uncovered poorer outcomes among hypertensive patients. While most normotensive participants achieved good to excellent scores, only slightly more than half of the hypertensive group dropped into these categories. A higher percentage of hypertensive patients demonstrated only fair or poor outcomes.

This functional variation likely reflects the combined consequences of larger tear size, poorer tendon quality, increased fatty infiltration, and disrupted biological healing capacity in hypertensive individuals[78].

Re-tear Rates

Postoperative MRI at 6 months displayed double the re-tear rate in the hypertensive group (26.6%) compared to the normotensive group (13.3%). Re-tear risk is altered by tissue biology, tear size, repair tension, and healing capacity. Hypertension affects multiple elements of the

healing cascade, including angiogenesis, fibroblast function, and collagen remodeling, which may explain the higher failure rate[7].

Discussion

This extended comparative analysis reinforces the significant relationship between chronic arterial hypertension and the severity of degenerative rotator cuff pathology. The hypertensive group consistently demonstrated more extensive structural deterioration of the tendon, as evidenced by larger tear size, greater fatty infiltration, and poorer tissue quality.

Mechanisms Behind Larger Tear Size

Hypertension leads to persistent vascular remodeling, increased arterial stiffness, and reduced microvascular thickness. In an already hypo vascular tendon insertion, this additional burden may hasten degeneration. The combined effect is a reduced ability to maintain collagen turnover and increased susceptibility to microtears that progress into full-thickness defects.

Fatty Degeneration as indicator of Chronicity

Fatty infiltration is considered irrecoverable beyond a certain threshold and links strongly with chronic tendon disuse and degeneration. The increased frequency of high-grade fatty infiltration in hypertensive patients suggests that systemic vascular compromise influences not only to the onset but also to the progression of tendon degeneration.

Poor Tendon Quality and Mechanical Weakness

Hypertension has been connected with decreased collagen synthesis, increased oxidative glycation, and alterations in extracellular matrix enzymes. These changes impair tensile strength and reduce the biological capacity of tendons to withstand mechanical load[6].

Impaired Healing and Higher Re-tear Rates

The healing of a repaired tendon relies heavily on sufficient vascular supply to stimulate fibroblast activity, collagen deposition, and remodeling. Hypertensive tissue, characterized by endothelial imapirment and reduced capillary density, does not support this process effectively. As a result, hypertensive patients encountered delayed healing, lower functional scores, and increased structural failure rates.

Clinical Relevance

Given these findings, patients with hypertension should be informed of their elevated risk for:

- More extensive initial tear size
- Poorer tendon quality during surgery
- Slower recovery
- Greater likelihood of re-tear

Improving blood pressure preoperatively and addressing underlying vascular health may improve outcomes.

Conclusion

This detailed comparison of 30 cases demonstrates that arterial hypertension profoundly affects the presentation and prognosis of degenerative rotator cuff tears. Hypertensive patients present with more severe tendon damage, show reduced postoperative functional recovery, and face higher re-tear rates.

Hypertension should be considered an crucial systemic factor when evaluating RCT patients, and management plans should incorporate vascular optimization to improve outcomes.

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