Angiotensin receptor blockers and their relation to the presentation and prognosis of adhesive capsulitis

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INTRODUCTION: Adhesive capsulitis is a common self-limiting pathology of the shoulder, leading to limited range of motion thought to be secondary to an inflammatory process involving proinflammatory mediators including transforming growth factor-beta 1 (TGF-beta1). Angiotensin receptor blockers (ARBs) are commonly used antihypertensives and play a role in blocking TGF-beta1. In the orthopaedic literature, the use of ARBs has been implicated in improved cartilage healing and decreased fibrosis. While inconclusive, prior studies have suggested ARBs may contribute to decreased rates of operative intervention required for patients suffering from adhesive capsulitis.

METHODS:

A retrospective cohort of patients ages 40-60 with the diagnosis of adhesive capsulitis were identified at a single institution from 2018-2024. Patients were excluded if decreased passive and active range of motion were not both documented, or if an alternative diagnosis was confirmed on further workup. Demographic data, prior ipsilateral shoulder surgery or trauma, medical comorbidities and medications as well as range of motion at initial diagnosis were recorded. Final range of motion and need for manipulation under anesthesia (MUA) and/or arthroscopic capsular release was recorded on further follow up, as available. Demographic risk factors, initial and final range of motion and need for operative intervention were compared between groups. A multivariate analysis was used to control for confounders and identify independent risk factors of operative intervention.

RESULTS:

A total of 614 patients were included, 575 within the control group and 39 within the ARB group. Patients in the ARB group had similar rates of current or prior tobacco use (23.1% vs 24.8%, p 0.92), but were older (53.6 ± 5.2 vs 51.5 ± 5.4, $p < 0.01$), had a higher mean BMI (33.5 ± 5.7 vs 28.4 ± 6.4, $p < 0.001$), were more likely to have a history of diabetes (48.7% vs 18.8%, $p < 0.001$) and had a higher mean Charlson Comorbidity Index (CCI, 4.0 ± 3.1 vs 1.9 ± 2.7, $p < 0.001$) when compared to those in the control group. Initial and final forward elevation (FE) was similar between groups (122° vs 122°, p = 1.00; 147° vs 148°, p = 0.88), while initial and final external rotation (ER) was decreased in the ARB group (25° vs 31°, p 0.05; 36° vs 47°, p 0.02). The frequency of arthroscopic release and/or manipulation under anesthesia (MUA) was less in the ARB group, however not statistically significant (2.7% vs 11.2%, p = 0.109). In a multivariate analysis, when investigating initial range of motion as well as sex, age, CCI, BMI, and diabetes, only initial ER was found to have a significant effect on need for operative intervention (OR 0.98 [95% CI 0.96-0.98]), demonstrating a decreased odds of operative intervention for those with greater ER compared to those with lower ER at the time of presentation. ARB use trended towards being protective against need for operative intervention, however this did not reach statistical significance (OR 0.16 [0.02-1.23]).

DISCUSSION AND CONCLUSION:

While previous studies have found inconclusive relationship between ARB use and adhesive capsulitis, this is the first study to confirm diagnosis as part of inclusion criteria as well as document range of motion. The results confirm the increased number of medical comorbidities of patients with concurrent ARB use, which likely plays a role in operative decision making. The rate of operative intervention was lower in patients taking ARBs at the time of diagnosis, however was not statistically significant, even when controlling for other comorbidities. Interestingly, among all risk factors, increased ER at the time of diagnosis was found to be protective of operative intervention. Given the number of confounders in this patient population, further research with larger sample sizes is necessary to tease out the relationship between ARBs and development and progression of adhesive capsulitis.