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A Prospective Study of Rotator Cuff Tears in Hypercholesterolemia Patients

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Abstract
One of the most prevalent orthopedic musculoskel *et al* conditions that is becoming more significant because of the high cost of healthcare is rotator cuff tears. Rotator cuff tears have a variety of unknown causes. According to earlier research, there may be a connection between rotator cuff tears and an elevated serum lipid profile in the western population. As a result, we conducted research in our Indian community to determine whether hypercholesterolemia and rotator cuff tears are related. after receiving the Institutional Ethics Committee's approval, during our study period, we prospectively collected fasting lipid samples from the community of people who complained of shoulder pain and visited our hospitals. An ultrasonography of the affected shoulder revealed the rotator cuff tear in 40 individuals. fourty were seen for problems unrelated to handcuffs. Strict inclusion and exclusion guidelines were adhered to. According to our research, there is no statistically significant (p=0.526) link between our patient's with rotator cuff tears and hypercholesterolemia. When compared to the cuff intact group, patients with rotator cuff tears had higher TC, TG and LDL levels. When compared to the group that had their cuffs intact, HDL was lower. There was no statistically significant relationship seen between hypercholesterolemia and rotator cuff tears in the Indian population.

INTRODUCTION

One of the most common orthopedic conditions in developed countries that is driving up health care expenses is rotator cuff tears. Growing older causes a higher frequency of cuff tears, which affect 23% of adults over 50 years of age. Rotatory cuff tears can occur due to degenerative diseases and trauma. The most frequently involved rotator cuff group is supraspinatus. Despite being prevalent, the precise cause of degenerative tears remains unknown. There are several theories regarding degenerative tears, including intrinsic and extrinsic theories. Demographic and impingement factors are examples of extrinsic factors, while age-related degeneration, hypo vascularity, inflammation and oxidative stress are examples of intrinsic factors connected to the cuff. While the bulk of spontaneous acute rotator cuff tears appear to be caused by chronic degenerative changes, a number of studies have also revealed a connection between high blood lipid profiles and tendon ruptures, although not rotator cuff tears specifically.

Low-density lipoprotein (LDL, the so-called “bad” cholesterol and high-density lipoprotein (HDL, the so-called “good” cholesterol) are the two types of cholesterol. Both forms of cholesterol can be affected by heredity, certain diseases, smoking, alcohol, diet, and physical activity. The National Cholesterol Education Program defines optimal cholesterol levels as being below 200 mg/dL. Hypercholesterolemia, also known as high cholesterol, is defined as a blood cholesterol concentration greater than or equal to 240 mg/dL, with concentrations between 200 mg/dL and 239 mg/dL considered borderline high.

Neer suggested that during overhead exercises, the coracoacromial arch impinges on the anterior portion of the cuff, potentially leading to a rupture. Tendon degeneration weakens the cuff and even minor damage might result in a large tear. Although the exact cause is still unknown, research has indicated that the incidence of cuff tears rises with body mass index (BMI). Tenocytes undergo apoptosis in response to oxidative stresses, while inflammatory mediators exacerbate cellular degenerative processes and increase burden. But aging still has the advantage and frequent injuries lead to long-term alterations in tendons, which then suffer severe tears as a result of trauma. We conducted research to determine whether hypercholesterolemia and rotator cuff disease are related or not.

MATERIALS AND METHODS

All participants who had been clinically and imaging-diagnosed as having a rotator cuff injury were prospectively recruited for the study between AUGUST 2022-JULY 2023 after receiving approval from the Institutional Ethics Committee. Each participant completed a consent form prior to participating in the trial, after receiving information about the study's goals and specifics from a patient information leaflet.

Inclusion and Exclusion Criteria: We included individuals whose X-rays and shoulder ultrasounds performed by senior radiologists and clinical examinations conducted by the authors of the study revealed a clinical diagnosis of rotator cuff injury.

The Following Were Disqualified:

- Smokers
- Shoulder infections in the past
- chronic steroid use
- Frozen shoulder
- Younger than 21 years of age
- Calcific tendinitis and
- Tendinopathy

For the purpose of estimating the lipid profiles of 40 patients who visited our institutions for the treatment of rotator cuff disease, we collected fasting samples. These 40 patients were included in the case group because they had rotator cuff tears. Additionally, 40 individuals with intact rotator cuffs who experienced shoulder problems provided samples, which were gathered for the control group. We had 40 patients in the case group, 12 of them were female. The patient’s mean age was 53.075 years. Two were under thirty five years old, six were between thirty six and forty five years old, ten were between forty six and fifty five years old and twenty-two were beyond fifty five.

Of these, 32 had right-handed dominance and the dominant extremity included 85% of the tears. Within our cohort, patients exhibited a 55% pure supraspinatus tear, a 25% supra and subscapularis tear, a 10% supra and infraspinatus tear and a remaining 10% had complete cuff tear. Ten percent of our patients were injured while playing, thirty percent were injured while working, five percent had a history of road traffic accidents (RTAs) and the remaining patients complained of subtle pain that began slowly.

We gathered the first 40 patients who arrived throughout our trial period for our control group. There were ten ladies out of the 52.175 mean age. Two were under thirty five, five were between thirty five and forty five, fourteen were between forty six and fifty five and the final nineteen were above fifty five. 33 of them having right hand dominance, with 55% patients had pain in their dominant extremities. Every patient satisfied the inclusion and exclusion criteria, and their intact rotator cuffs were validated radiologically and clinically, if appropriate. Patients experienced subacromial bursitis (25%), proximal humerus fractures (25%), clavicle fractures (40%) and acromioclavicular joint arthritis (10%). In our study,

70% of participants reported having experienced RTA, 15% had experienced a workplace fall from a height, and the remaining participants could not recall the trauma's mechanism.

We took note of each patient's age, sex, past medical history, BMI and a thorough shoulder examination in order to determine the mechanism of trauma. We also recorded shoulder movements using a goniometer, evaluated the rotator cuff muscles and searched for indications of past infection, deformity, prior surgery and related illness.

Senior radiologists performed an ultrasound on our shoulder to check for tears. Shoulder X-ray taken to check for related pathology. Within five days of the condition's diagnosis, we collected a fasting sample for lipid profile assessment. It was run through an analyzer to determine total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL) and low-density lipoprotein (LDL).

Our study was a case control study and SPSS version 17 was used for statistical data analysis using the odds ratio and Chi-square test.

RESULTS AND DISCUSSIONS

In the case group, 18 out of 40 patients (45%) (range 130-321) had high cholesterol (TC > 240 mg/dl) than compared to control group 16 out of 40 (40%) (range 132-301 mg/dl). No significant correlation between the groups is shown by p=0.526.

Approximately 30%(12 out of 40) of the rotator cuff tear group had high TGs, compared to 25% of the control group, who had 10 out of 40 high TGs. P=0.673 indicates that there is no correlation between the two. While 12 out of 40 patients (30%) in the control group and 14 out of 40 patients (35%) in the cuff tear group had low HDL (normal range <40 mg/dl), p=0.726 indicates no statistical significance.

Approximately 14 out of 40 (35%) in the tear group and 12 out of 40 (30%) in the control group had elevated LDL, which is typically more than 160 mg/dl. However, p=0.673 indicates no statistical significance. Although our study's p value was intended to be <0.05 with a 95% power, there are no statistically significant differences between the groups.

According to our research, there is no statistically significant (p=0.526) link between our patient's with rotator cuff tears and hypercholesterolemia. When compared to the cuff intact group, patients with rotator cuff tears had higher TC, TG and LDL levels. When compared to the group that had their cuffs intact, HDL was lower.

The rotator cuff is a collection of muscles that are sensitive to repetitive stress, they are mostly made up of four muscles. The exact causes of rotator cuff tears are yet unknown. Neer was the first to propose a theory regarding rotator cuff tears: they were caused by the cuff being impinged upon by the coracoacromial arch during overhead movements[1]. Biglani postulated that morphological alterations in the acromion process cause the cuff to weaken and eventually burst[2]. Research has demonstrated that oxidative stress causes tenocyte death. Cells lose their integrity as aging progresses and degeneration starts in. In tenocytes of the cuff, there will be fatty, hyaline and myxoid degeneration and they will rip at the most slight injury.

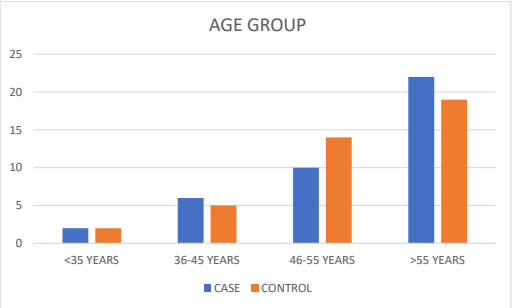

Fig. 1: AGE Group

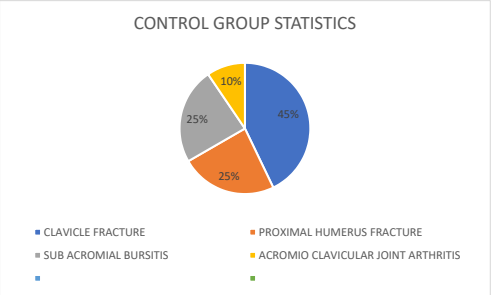

Fig. 2: Control group statistics

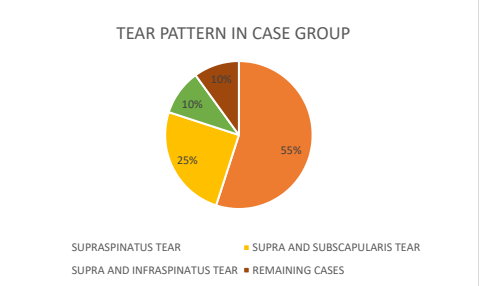

Fig. 3: Tear pattern case group

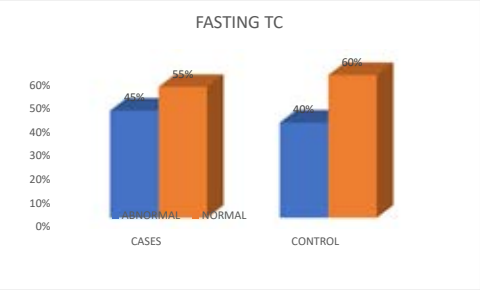

Fig. 4: Fasting TC

According to a study by Mathiak *et al.,* 83% of patients with ruptured Achilles tendon had elevated cholesterol[3]. According to Klemp *et al.,* soft tissue

manifestation was alleviated in 63% of patients following antilipidemic medication, but musculoskel *et al* manifestation was observed in 38% of adolescent hypercholesterolemia cases[4]. Harvie *et al*. discovered that siblings of patients with cuff tears had full thickness rotator cuff tears, demonstrating that hereditary factors do contribute to cholesterol deposition[5]. According to Crouse *et al.,* even healthy connective tissue exhibits cholesterol buildup with aging[6]. 63% of patients with rotator cuff tears had elevated cholesterol, according to research by Abboud and Kim[7].

In order to determine whether there is a correlation among Indians, we conducted a study. Although there was high cholesterol, high LDL, low HDL and high TGs amongst groups, the results did not reach the statistical significance level[8-10].

Limitations of the Study:

- Histology correlation was lacking for diagnosis confirmation, nevertheless, it may be limited by histology research
- Selection bias was present in our analysis of patients, most of whom were from our local area. This bias can be reduced by conducting extensive multicentric trials throughout India
- The patients that visited us might not be gender or habitually similar to the general community
- We did not evaluate other factors that might have caused the tear, such as the importance of exercise, dietary practices, the insignificance of the injury, or coexisting illnesses. By having many variables and correlating relationships, we can rule out these factors

CONCLUSION

We draw the conclusion that there is no evidence linking hypercholesterolemia to rotator cuff diseases in Indians. Additional research is necessary to increase the study power. Extensive multicentric experiments are required to determine the correlation. To improve our treatment plan, more study on the rotator cuff degeneration module is necessary to understand the pathomechanics of cuff tears.

REFERENCES

1. Neer, C.S., 1972. Anterior acromioplasty for the chronic impingement syndrome in the shoulder: A preliminary report. J. Bone Joint Surg. Am., 54: 41-50.
2. Bigliani, L.U., J.B. Ticker, E.L. Flatow, L.J. Soslowsky and V.C. Mow, 1991. The relationship of acromial architecture to rotator cuff disease. Clin. Sports Med., 10: 823-838.
3. Mathiak, G., J.V. Wening, M. Mathiak, L.F. Neville and K. ,H Jungbluth, 1999. Serum cholesterol is elevated in patients with achilles tendon ruptures. Arch. Orthop. Trauma Surg., 119: 280-284.
4. Klemp, P., A.M. Halland, F.L. Majoos and K. Steyn, 1993. Musculoskeletal manifestations in hyperlipidaemia: A controlled study.. Ann. Rheum. Dis., 52: 44-48.
5. Harvie, P., S.J. Ostlere, J. Teh, E.G. McNally and K. Clipsham *et al.,* 2004. Genetic influences in the aetiology of tears of the rotator cuff. J. Bone Joint Surg. Br., 86: 696-700.
6. Crouse, J.R., S.M. Grundy and E.H. Ahrens, 1972. Cholesterol distribution in the bulk tissues of man: Variation with age. J. Clin. Invest., 51: 1292-1296.
7. Abboud, J.A. and J.S. Kim, 2010. The effect of hypercholesterolemia on rotator cuff disease. Clin. Orthop. Relat. Res., 468: 1493-1497.
8. Meislin, R.J., J.W. Sperling and T.P. Stitik, 2005. Persistent shoulder pain: epidemiology, pathophysiology and diagnosis. Am. J. Orthop., 34: 5-9.
9. Hashimoto, T., K. Nobuhara and T. Hamada, 2003. Pathologic evidence of degeneration as a primary cause of rotator cuff tear. Clin. Orthop. Relat. Res., 415: 111-120.
10. Nho, S.J., H. Yadav, M.K. Shindle and J.D. MacGillivray, 2008. Rotator cuff degeneration: Etiology and pathogenesis. Am. J. Sports Med., 36: 987-993.