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The Relationship between Cervical and Lumbar Pathologies with Rotator Cuff Dysfunction

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Abstract

Aim: The purpose of this study is to determine the relation of shoulder pain with lower back and neck pain and to highlight that rotator cuff muscle group (RTC) dysfunction must also be taken into consideration in addition to cervical pathologies in patients admitting with arm pain.

Materials and methods: Two-hundred twelve patients with shoulder pain between June 2018 and September 2018 were retrospectively analysed. Among the patients who applied to the polyclinic with shoulder pain, those diagnosed with RTC pathologic pathology were considered as Group 1 and the patients without pathologic pathology in the shoulder were considered as Group 2. Student T, Chi-square and Pearson Correlation tests were used for variables. $p < 0.05$ was considered as significance level for statistical analyses.

Results: The mean age of the patients with shoulder pain was 44.08 ± 11.86 . Shoulder pathology was detected in 167 patients (78.8%) and there was no pathology in 45 patients (21.2%). Pathology in RTC muscle groups was most common in the supraspinatus muscle (81%). The most common pathology type in RTC muscle groups was tendinitis (79.2%). Among 212 patients, 179 of them female and 33 were male. Shoulder pathology was also detected in 55.7% of the patients with cervical pathology ($p < 0.001$).

Conclusion: Pathology in RTC muscle groups was most prevalent in supraspinatus and the most common pathology was tendinitis. The mean age of the patients with pathology was greater than the patients without pathology. Shoulder pathology were associated with cervical pathology, however, there was no relation with lumbar pathology.

Keywords: Rotator cuff muscle; Shoulder pain; Cervical pain; Lumbar pain

Introduction

The integrity of the rotator cuff muscle group (RTC) is critical for the shoulder function. RTC pathology is one of the most common causes of shoulder pain and affects a large portion of the population.

The prevalence of cervical spine and RTC pathologies increases with age [1]. Cervical spondylosis and cervical discopathy are among the most prevalent problems today. Especially the increase in physical activities requiring the use of arm and the widespread use of devices like computers and typewriters in the workplaces lead to neck and shoulder-arm pain [2,3]. While neck pain can be caused by a simple muscle spasm, it may also be an indicator of many problems from intracranial pathology to chest pain, shoulder pathology to vascular pathology.

Anatomically speaking, RTC is innervated by the suprascapular nerve. Axillary, lower and upper subscapular nerves all branch out from fifth (C5) and sixth (C6) cervical nerve roots. Clinically, it may be difficult to distinguish C5 radiculopathy from RTC disease. Both pathologies can exhibit symptoms like shoulder pain, weakness and restricted abduction and external rotation. C6 radiculopathy may manifest itself with shoulder pain and weakness in arm distal. Any pathology in the deltoid muscle or axillary nerves that enable innervation can also lead to referred pain in the neck, nape and chest by hindering abduction, flexion and horizontal rotation of the arm. The damage to the roots due to a nerve injury at cervical nerve level can also cause RTC pathology. However, this relation is yet to be fully defined [4,5].

The purpose of this study is to determine the relation of shoulder pain with lower back and neck pain and to highlight that rotator cuff dysfunction must also be taken into consideration in addition to cervical pathologies in patients admitting with arm pain.

Materials and Methods

This study was designed as a retrospective study. The ethical approval for the study was granted by the local ethics committee of Saglik Bilimleri University, Diyarbakir Gazi Yasargil Training and Research Hospital (Date: 05/10/2018 No:

153). The medical files of the patients who had admitted to Saglik Bilimleri University Gazi Yasargil Training and Research Hospital physical rehabilitation and Rehabilitation polyclinic and Neurosurgery polyclinic between June 2018-September 2018 with shoulder pain that may also be accompanied by lower back, neck and arm pain were retrospectively scanned. The medical files of 212 patients were retrospectively reviewed and age, weight, length, sex, body mass index, diagnosis date, anamnesis, physical examination, laboratory tests and radiological imaging results were recorded. RTC muscle group pathologies like edema and tear and pathologies like cervical spinal stenosis, discopathy and spondylotic myelopathy were recorded upon reviewing the MRI report results. Among patients who applied to the polyclinic with shoulder pain, those diagnosed with pathologic pathology in the shoulder were considered as Group 1 and patients without pathologic pathology in the shoulder were considered as Group 2.

Patients under 18 years of age, with chronic diseases, psychiatric diseases, breast-feeding or menstruating women, patients with alcohol or other substance abuse, patients who had undergone any surgical intervention within last 6 months, patients with continuous medication their records and patients with insufficient data were excluded from the study. Aside from these, patients older than 18 years of age who had admitted with shoulder pain and had sufficient data were included in the study.

First, the study data were recorded in an Excel spread sheet. Then, the statistical analyses of this data were performed with SPSS 20 pilot software.

Table 1 Comparison of demographic and laboratory data of patients.

Parameters	Group 1 (N=167) Shoulder pathology Mean \pm SD	Group 2 (N=45) No shoulder pathology Mean \pm SD	p*
Age (Years)	44.08 \pm 11.86	39.20 \pm 11.94	0.015
BMI (kg/m ²)	26.38 \pm 2.20	25.99 \pm 2.71	0.324
Hbg (g/l)	13.10 \pm 2.88	13.16 \pm 1.51	0.824
HTC (%)	39.42 \pm 5.20	39.86 \pm 3.96	0.598
ALT (mg/dl)	20.80 \pm 13.27	21.26 \pm 13.02	0.835
AST (mg/dl)	19.81 \pm 8.06	19.00 \pm 4.96	0.520
Urea (mg/dl)	26.32 \pm 7.56	27.02 \pm 6.95	0.574
Creatinine (mg/dl)	8.60 \pm 7.26	8.37 \pm 2.67	0.838
Glucose (mg/dl)	105.44 \pm 48.30	112.62 \pm 38.33	0.358

ALT: Alanine Aminotransferase, AST: Aspartate Transaminase, HBG: Hemoglobin, HTC: Hematocrit, BMI: Body Mass Index
*Student-t test

The mean age of the patients with shoulder pain who were diagnosed with shoulder pathology was 44.08 \pm 11.86 and the mean age of patients without pathology was 39.20 \pm 11.94. The mean age of the patients with RTC pathology was significantly greater (p=0.015).

The descriptive data was calculated as mean \pm standard deviation and as percentage. Student T test was used for continuous variables and Chi-square test was used for categorical variables.

Pearson Correlation test was used to determine any potential relation between data. p<0.05 was considered as significant for 95% confidence level.

Results

Shoulder pathology was detected in 167 patients (78.8%) and there was no pathology in 45 patients (21.2%) among all cases who admitted to our polyclinic with shoulder pain (**Table 1**).

According to MRI data, pathology in RTC muscle groups was most common in supraspinatus (n=128, 81%) muscle.

According to MRI data, the most common pathology type in RTC muscle groups was tendinitis (n=123, 79.2%).

There were 179 females among 212 patients included in the study and 142 of them had shoulder pathology.

There were 33 male patients and 25 of them had shoulder pathology. Results were similar for female and male patients in terms of sex (p=0.645).

In our study, it was determined that incidence of shoulder pathology increased with age and found that BMI had no effect on shoulder pathology.

Shoulder pathology was also detected in 55.7% of the patients with cervical pathology (p<0.001). Although 21.2% of the patients had cervical pathology, there was no shoulder pathology. While 23.1% of the patients had cervical pathology, there wasn't any shoulder pathology. There was no statistical

significance for patients who had no cervical and shoulder pathology (**Table 2**).

Table 2 The relationship between shoulder pathology and lumbar and cervical pathology in the patients.

Parameters	Group 1 (N=167) Shoulder pathology	Group 2 (N=45) No shoulder pathology	p [*]
Cervical pathology			
Yes	118.4 (55.7%)	45 (21.2%)	<0.001
No	49 (23.1%)	0	--
Lumbar pathology			
Yes	59 (27.8%)	16 (7.5%)	0.978
No	108 (50.9%)	29 (13.7%)	--

Table 3 Correlation of shoulder pathologies with lumbar and cervical pathology.

Parameters	Shoulder pathology	Cervical Pathology	Lumbar pathology
Age (Years)	r=0.080	r=0.280	r=-0.095
	p=0.246	p<0.001	p=0.168
BMI (kg/m ²)	r=-0.133	r=0.076	r=0.076
	p=0.053	p=0.274	p=0.003
BMI: Body Mass Index, r: Pearson correlation rank. p [*] : Pearson correlation test			

There were 59 (27.8%) shoulder pathology cases among the patients who were diagnosed with lumbar pathology. And there was no lumbar pathology in 16 patients (7.5%) despite having shoulder pathology. One-hundred eight patients (50.9%) had no lumbar pathology despite having shoulder pathology. In addition, 29 patients (13.7%) had neither lumbar nor shoulder pathology (**Table 2**). There was a moderately strong opposite relation between shoulder pathologies and BMI according to Pearson Correlation test ($r=-0.133$, $p=0.053$). Relations between other main parameters are shown in **Table 3**.

Discussion

In our study, the most prevalent pathology location for RTC muscle groups was supraspinatus and the most common pathology type observed in RTC muscle groups was tendinitis. The mean age of the patients diagnosed with pathology was greater than the patients without any pathology. Shoulder pathology was also present in 55.7% of the patients with cervical pathology.

RTC disease is a common and intrinsic degenerative process. RTC disease as acute traumatic tear, edema or tendinitis can occur in young pitcher athletes, shoulder dislocations or avulsion injury. In many patients with RTC pathology, lateral shoulder pains consistent with the affected deltoid muscle generally start after excessive activities. Pain at night and decreased active movement range should increase the suspicion for a shoulder muscle tear or tendinitis. However, no

relation was established between the severity of the pain and the severity of the shoulder muscle pathology [6,7].

Anatomically, RTC is innervated by the suprascapular, axillary and lower and upper subscapular nerves that branch out from fifth (C5) and sixth (C6) cervical nerve roots. Clinically, it may be difficult to distinguish C5 radiculopathy from RTC disease as both them may exhibit shoulder pain, weakness and restricted abduction and external rotation. C6 radiculopathy, the second most common cervical radiculopathy, is also manifested with shoulder pain and weakness; however, it may also be accompanied by distal extremity symptoms [8].

The cause of RTC pathology has multiple factors and it is clear that peripheral innervation of the muscles is necessary to preserve muscle quality and function. As the prevalence of both cervical spine and RTC disease increase with age, the definite differentiation between these pathological conditions becomes difficult [8]. RTC rates in patients younger than 50 years of age are considered to be lower [9]. This may be assumed as a natural outcome since the tendon quality is expected to be better in younger patients. Pain in young patients may be frequently related to trauma. Contrary to this, the mean age of the patients (44.08) with shoulder pain and diagnosed with RTC pathology in our study was lower than the literature. However, this mean age value was greater than the patients without pathology. All of this pathology had no known trauma anamnesis.

There are various factors that may contribute to the formation of RTC pathology and these are typically diagnosed

as trauma, tendinitis, degeneration, and tendinopathy involving tendinosis and partial thickness tendon tear [10]. In this study, RTC pathology was mostly the tears occurring in the supraspinatus tendon and most of these tears were defined as smaller than 5 cm in size [11]. Eljabu et al. [12] reported increased asymptomatic rotator cuff tear size and that this was related to decreased muscle quality and caused symptom development for 3 years. During his review of natural history of rotator cuff tear, Abdul-Wahab et al. [13] determined that atraumatic tears were associated with muscle weakness and minor discomfort that did not appear to increase with increasing tear size. All of the cases included in our study had admitted to the polyclinic with shoulder pain. However, we were unable to obtain healthy information about the onset date of the pain or whether they were acute or chronic. In our study, the most common pathology type in RTC muscle groups was reported as tendinitis according to MRI data. In addition, supraspinatus was the most common location among RTC muscles where pathology was detected. However, there was no sufficient data in our records with regards to the severity of the pathology. This was a major limitation of our study.

Although it is believed that there is an anatomic and clinic relation between shoulder and cervical spine pathology, current clinical studies are insufficient. In this study, 38% suprascapular nerve damage, 15.4% axillary nerve damage, 7.7% brachial plexus upper body damage and 3.8% indefinite level of cervical radiculopathy was reported for the patients with massive RTC tear and peripheral neuropathy [14]. Zhang et al. also reported a significantly increased relation between RTC pathology and cervical spine pathology with age in patients younger than 60 years of age, and that 13% of the patients older than 60 years of age with cervical spine pathology also had RTC diagnosis. Although lumbar spinal pathology was four times more than cervical spine pathology, researchers reported a significant correlation between RTC and cervical spine pathology [15].

In a study with unilateral and bilateral shoulder impingement symptoms, 5.3% of EMG showed C5/6 radiculopathy and 23.7% showed indefinite levels of cervical radiculopathy [16].

Similarly, in our study, the shoulder pathology rate was significant in the patients with cervical pathology. And a significant correlation was detected between cervical and shoulder pathologies. However, there was no significant relationship between shoulder pathology and lumbar pathology.

There are many studies about RTC pathologies in the literature; however, most of these have lack of evidence or results that are contradictory with other studies. This situation points at the necessity for more extensive and meaningful Meta data analyses.

Our study has important limitations. One of the limitations was the absence of sufficient data about demographic information like diabetes, hypertension and rheumatoid arthritis in patients with neck and shoulder pain. In addition, the absence of EMG records in the files and electronic archive

was a major limitation. Another limitation was despite having records of pathologies like cervical spinal stenosis, discopathy and spondylotic myelopathy; data related to the rates of these pathologies were missing, therefore, they were not mentioned in our study. Lastly, there was no record of the RTC pathology severity, for example size of the rupture and extent of the tendinitis.

Conclusion

In conclusion, the most common location for RTC muscle group pathology was supraspinatus. The most prevalent pathology was tendinitis. The mean age of the patients with pathology was greater than the patients without pathology. A significant portion of the patients with cervical pathology also had shoulder pathology. In our study, shoulder pathologies were associated with cervical pathologies; however, there was no relation with lumbar pathology.

Limitation

Being a retrospective study, there can be variation in the recording of signs and symptoms at the time of presentation. There is enough evidence in literature on the subject that patients with shoulder pain can have either shoulder pathology or cervical pathology or both. We recommend prospective, randomized, controlled trials in the future.

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