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## The dervan upper limb dermatome syndrome pilot study of high incidence of cervical disc disease in patients presenting with primary shoulder pain & restriction of movements

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### Abstract

**Introduction:** Shoulder pain is among the most common complaints in the orthopedic outpatient department. It can be due to local pathology or a referred pain from cervical disc degeneration. Frequently, neck and shoulder pathologies may co-exist causing a dilemma regarding treatment approach. Although there are many studies published in literature, we think ours is the first published Indian study to make the observation of concomitant cervical disc degeneration in patients with ipsilateral shoulder pain.

**Materials & Methods:** 39 patients with shoulder pain without any history of trauma, attended the OPD of Walawalkar hospital, Dervan. Of the 3 patients 32 agreed to be part of this pilot study. They underwent x rays & MRI of the shoulder as well as cervical spine.

**Results:** All patients who presented in the orthopaedic opd with complaints of atraumatic shoulder pain, showed varying degrees of cervical disc disease. The commonest affected cervical spine pathological segment was C5-C6 i.e 92 % with two patients having C6-C7 disc disease i.e 8 %.

Grading of disc disease was 78.1 % grade 2<sup>8</sup>, 6 patients had grade 3 disc disease, 18.75 %, and only 1 patient had a grade 1 disease with typical signs of chemical radiculopathy with shoulder pain & restriction.

X Ray of shoulder showed normal acromiohumeral distance of more than 7 mm in more than 70 % of patients and less than 2 mm in only 1 patient who also incidentally had grade 3 disc disease.

MRI of shoulder showed 78 % patients with grade 2 or less of Goutallier grading<sup>[9]</sup> and all patients of Grade 3 disc disease having grade 3 Goutallier grading and a positive Tangent sign<sup>[10]</sup>. (18.75 %)

This may open another vista in investigation of degenerative rotator cuff disease mimicking grading and severity of cervical disc disease although that is not the primary objective of this paper. We aimed to bring to light the concomitant cervical spine pathology in patients presenting with shoulder pain in this original research.

**Conclusion:** This study found an unusually high rate of coexistent shoulder and cervical spine pathologies. Almost all patients had some form of cervical disc disease and on deeper questioning related signs and symptoms of cervical spondylosis concurrently or a few weeks ago. It undermines the need for investigating this important contributor, the cervical spine, to clinically diagnose the enigma of shoulder pain.

**Keywords:** Shoulder pain, dermatome, frozen shoulder, cervical disc disease, spondylosis dervan

### Introduction

Shoulder pain is among the commonest complaints in the outpatient orthopedic department. However the cause does not always originate from the shoulder itself. It is reported that painful shoulder impingement may occur in up to 24% of patients with cervical radiculopathy<sup>[1]</sup>. But, Is the percentage still the same or with the vast increase of modern technology and hand held devices, is the number much more than revealed or investigated so far. Shoulder pain is used by the patient more as an umbrella term. Concordance studies have shown that approximately 1 in 10 patients referred for cervical radiculopathy have comorbid shoulder pathology<sup>[2]</sup>. In addition, pain reported in the neck may represent referred pain from the shoulder girdle and

vice versa, because selective injections into the cervical facet joints have been found to manifest as shoulder pain [3,4].

In fact very few patients give the complete list of accompanying symptoms. They have more often than not to be coaxed out of the patient. To make matters more complex, Referred pain from the Cervical spinal nerves, elbow and wrist joints join the many structures around the shoulder to make shoulder pain an vague term for this Pandora's Box. Misdiagnosis or partial diagnosis leads to inadequate or wrong treatment and continued suffering for the patient treating doctors.

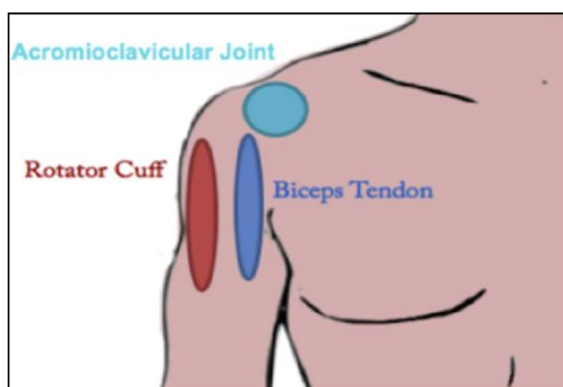
This coexistence of cervical spine and shoulder pathology also emphasizes need to

1. Investigate causality of shoulder pain and C5-C6 pathology as chicken and egg syndrome.
2. Need to compulsively probe for coexistence of concomitant Cervical spine pathology with the vague term shoulder pain as it is the one factor which will influence complete diagnosis, counseling, legal consent taking, simultaneous treatment of both cervical spine and shoulder disease and postoperative (root block) rehabilitation protocol.
3. Further Examine possibility of simultaneous treatment of shoulder pain, i.e the entire Dermatome, by surgical intervention as a holistic and complete treatment and long term relief to the patient.

There is a emergent need in this era of surgical super specializations NOT to treat shoulder pain as a specialty in itself, thereby ignoring the holistic view of considering contributions to pain from the neighboring joints & cervical spine. Specialization should not lead to separation. Ignoring the role of the Spine as a pain generator, is hazardous in a disputative society & may lead to erroneous pathological labeling of terminally painful and restricted movements of shoulder joints as being from the shoulder joint only.

### Anatomy of shoulder joint

The shoulder represents a complex structure consisting of bony, muscular, and ligamentous structures [5]. It consists of a number of joints including the acromioclavicular, glenohumeral, sternoclavicular, and scapulothoracic joints. The shoulder is highly dependent on additional static and dynamic stabilizers [5].

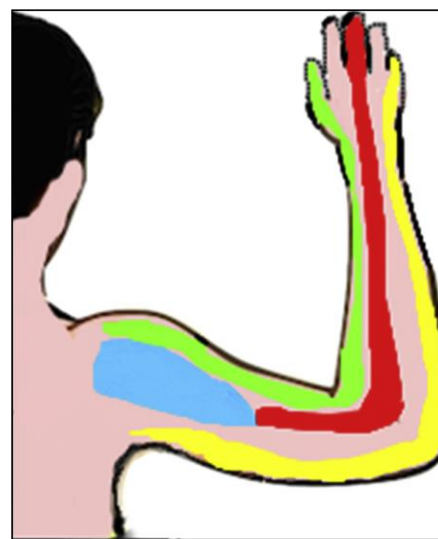


**Fig 1:** Common location of specific pain generators within the shoulder [6].

### Cervical Spine

Cervical radiculopathy commonly produces pain around the lateral portion of the shoulder girdle. Classically, patients with cervical radiculopathy report a combination of strength and

sensory disturbances starting in the neck and radiating to the upper extremity, although the presentation may differ on the basis of myotome and dermatome variation (Figure 2) [7]. More than 90% of patients with cervical radiculopathy present with arm pain, and thus symptoms of arm pain (especially atraumatic) should trigger an evaluation of the cervical spine [7].



**Fig 2:** Common anatomic patterns of cervical radiculopathic pain for C5 (blue), C6 (green), C7 (red), and C8 (yellow) nerve roots.

### Materials and methods

This is a prospective observational study conducted in BKL Walawalkar Rural Medical College and Research Center, Dervan, Maharashtra, India from Jan 2019 to March 2019. Consecutive patients coming to orthopedic department with complaints of shoulder pain were included. Written informed consent of all the patients was taken. All of the patients with evaluated clinically and radiologically. Imaging studies done were -

1. Xray Shoulder -AP
2. Xray Cervical spine -AP/lateral and MRI cervical spine (including T1 and T2 weighted images)

The eligibility criteria that were used were

#### Inclusion criteria

1. Non-traumatic shoulder pain
2. Age above 20 years old

#### Exclusion criteria

1. History of recent shoulder trauma pain
2. Post-traumatic arthritis
3. Inflammatory arthritis with or without its systemic associations (e.g. inflammatory bowel disease)
4. Septic arthritis
5. Intra-articular malignancies
6. Neuropathic joints
7. Neurological disorders (e.g. diabetic neuropathies, cerebrovascular stroke)
8. Previous history of shoulder surgery

Data was collected and analyzed by the Radiological imaging center and reported by a senior radiologist. Results were calibrated and presented in graphical form of pie charts.

### Results

All patients showed varying degrees of Cervical spine pathology. The commonest affected segment was C5-C6 i.e

92 % with two patients having C6-C7 is 8 %.

The purpose of this pilot study is only to alert the surgical and rehabilitation colleagues of the frequent coexistence of the Cervical spine pathology and shoulder conditions for Counseling, consent, surgery(root block)& rehabilitation.

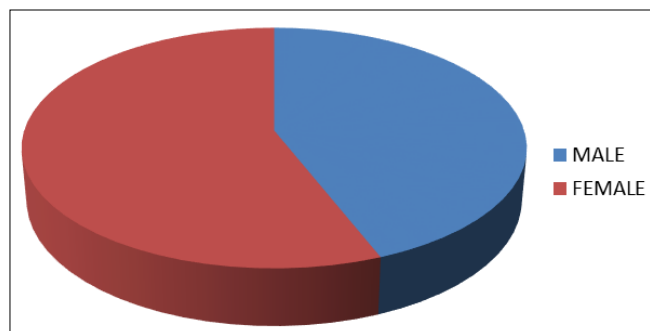


Chart 1: Sex ratio

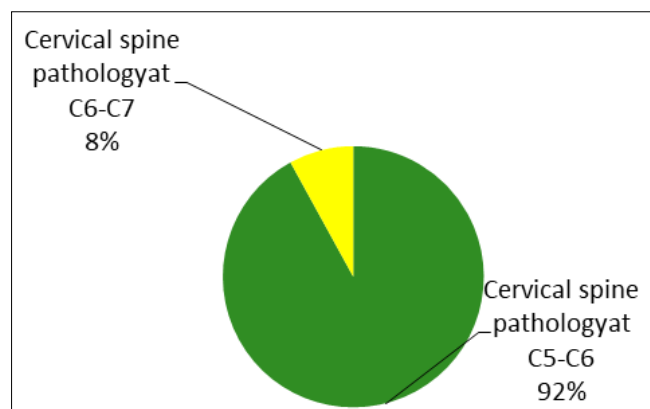


Chart 2: Cervical spine pathology Pattern

**Discussion**

The senior contributors of our team have studied the subject of shoulder pain with special reference to C5-C6 radiculopathy.



Shoulder pain has been shown to commonly arise from the C5-C6 nerve roots.

Painful and terminally restricted movement of shoulder is

common accompanying symptoms.

We conclude that a predominant cause for the above is missing the element of coexistent cervical spine pathology or not giving it due importance in counseling, rehabilitation and treatment.

We follow a simple protocol to guide us to the contributing causes of shoulder pain.

Majority have a contribution of radiculopathy from the C5-C6 nerve root.

Patient with shoulder complaints are questioned for past history of cervical pain and fresh, coexisting or previous radiculopathy symptoms. We have found an extremely high incidence of Radiculopathy which correlates greatly with subsequent MRI of Cervical spine. Shoulder MRI showing no significant findings, the commonest culprit cervical spine pathology being at the level of C5-C6.

It is too early for us to confirm that the shoulder pathology must be caused by commonly cervical spine pathology of C5-C6 segment. However the cervical spine as a possible contributor either primary or secondary, cannot be overruled.



Modifications in our treatment protocol are then made for Counseling, Rehabilitation and Treatment of such patients who may have coexistent cervical spine and shoulder pathologies. We have developed “The Dervan Shoulder Protocol” for investigation which includes shoulder and cervical spine x-rays and MRI of Cervical spine and Shoulder joint.

Often on deep probing and explaining the concept of shoulder as a tubelight, the nerve as a wires & Spine as a junction box, the patient is able to relate to the pain generator concept and does remember an episode of cervical pain followed by radiculopathy (shoulder pain) etc.

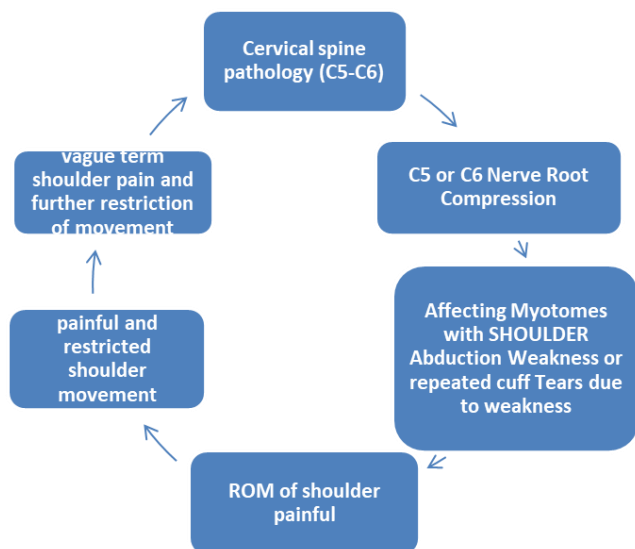
Patient is then offered a cervical root block with special focus on concomitant rehabilitation of cervical spine, a training of day to day correct postural ergonomics and shoulder physiotherapy. However this paper is to report the imperative need for the diagnosis rather than treatment. We have called it the “Dervan Upper Limb Dermatome Syndrome” Rehabilitation of the patient is done following the “Sathi Protocol” which is also under review for publication. To our knowledge this is the first study to report the high incidence of association between shoulder pain and cervical spine pathologies and its ramifications.

Shoulder pain is commonly considered an independent and separate clinical entity in itself.

Specialization has unfortunately led to separation. A shoulder pain specialist is concerned more with the MRI and X rays of the shoulder and seldom seeks to find the alternate or maybe even true pain generator after a positive imaging finding in

the shoulder. Unfortunately even after proper and complete readdressal of the image by shoulder surgery, many patients complain of persistent pain, to be slowly referred to other colleagues including counselors. Practicing as a holistic orthopedic team along with pain medicine specialists, at the Rural Medical College in Dervan gave us the opportunity to probe for all possible causes of shoulder pain, confirm by radiology imaging and then redress all of them together. This enumeration of all causes of pain gave us a much better and complete approach to counseling preoperatively.

complaint often coexists with cervical spine pathology at C5-C6 level whether there may be associated acute complaints or not. This condition often leads to inadequate management or mismanagement, which can, in turn, result in persistent pain and suffering. And patient present in OPD as a vague shoulder pain with painful and terminally restricted movements and difficulty to do his/her day to day daily routine activity. Because the clinical findings in shoulder pain suggest so and pain persists which leads to patients dissatisfaction clinicians should be aware of ways to recognize correct and coexistence other condition for correct further management. All it needs is a mindful approach & Holistic diagnosis.



**Fig 3:** The Possible Cycle of Dervan Upper limb Dermatome Syndrome



Newer directions from our study show that shoulder pain as a

**MRI STUDY OF LEFT SHOULDER JOINT**

**OBSERVATIONS:**

STIR / PDFS / T2 hyperintense signal noted involving supraspinatus tendon adjacent to tendinous insertion however continuity is maintained with fluid in subacromial and subdeltoid bursa- suggestive of supraspinatous tendinosis.

Mild fluid also seen in glenohumeral joint extending in subscapularis and axillary recess.

The head of the humerus shows normal contour and head and upper shaft of the humerus show normal signal intensity.

The visualized scapula appears normal.

The glenoid labrum is unremarkable.

The biceps tendon in the bicipital groove shows normal signal intensity.

The articular cartilage of the head of the humerus appears normal.

**IMPRESSIONS:**

- STIR / PDFS / T2 hyperintense signal noted involving supraspinatus tendon adjacent to tendinous insertion however continuity is maintained with fluid in subacromial and subdeltoid bursa- suggestive of supraspinatous tendinosis.
- Mild fluid also seen in glenohumeral joint extending in subscapularis and axillary recess.

Our study creates awareness about the existence of the commonly coexistent clinical finding which we have labelled the 'Dervan Upper Limb Dermatome Syndrome' and to highlight that surgical intervention may not or even aggravate the clinical condition due to clinical misdiagnosis or under diagnosis.

We suggest that every patient of non traumatic shoulder pain must undergo clinical examination and radiograph of cervical spine and affected shoulder. On shoulder x-ray not showing any significant bony abnormality, but in cervical spine showing degenerative/spondylosis/canal stenosis like changes. To confirm our clinico radiological finding by doing MRI of Cervical spine and affected Shoulder joint. MRI showing no significant finding in affected shoulder joint but cervical spine pathology at the level of C5-C6 (compression of C5-C6 nerve root). After knowing the entire gamut of clinical affliction along with radiological verification, the patient may be much better guided to the treatment, rehabilitation & care. We will shortly reporting a series of cases co existence of two entity ie Cervical spine pathology (C5-C6) and shoulder pain. This should also bring to light the need to make disease classification not only anatomical but functional too.

### Conclusion

The purpose of this pilot study is only to alert the surgical and rehabilitation colleagues of the frequent coexistence of the cervical spine and shoulder conditions for Counseling, consent, surgery or root block treatments& rehabilitation. We cannot ignore the spine and its nerve supply to the joints. Further studies are being undertaken to resolve the disease cascade in atraumatic shoulder pain, with or without adhesive capsulitis, and its now revealed close relationship to cervical spine pathology.

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