

# Cervical Angina as a Neglected Symptom of Cervical Spine Pathologies: Retrospective Observational Study

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## Abstract

**Objective:** The objective is to assess the incidence of cervical angina as presentation of cervical spine pathologies. **Materials and Methods:** Data were collected retrospectively from patients' medical records from January 2018 to December 2022 who presented to our pain clinic with chest pain, neck pain, upper extremity pain and tingling numbness. A total of 168 patients with cervical spine pathologies were identified. Those having chest pains were analyzed subsequently treated with pharmacotherapy, intramuscular stimulation (IMS). Cervical epidural adhesiolysis was performed depending on spine pathology based on clinical picture, severity of symptoms and radiological findings. **Results:** Among 168 patients 25 had chest pain. Out of 25 patients, 18 (72%) had chest pain as presenting symptom and 7 (28%) patients had associated chest pain. All 25 patients had cervical radiculopathy with or without nerve compression. Nerve root involved were C4 in 4 patients, C5 in 16 patients, C6 in 22 patients, and C7 in 8 patients, commonly involved were C5 and C6 with C4-C5 and C5-C6 prolapsed intervertebral disc. Thirteen patients (52%) were treated with pharmacotherapy and physiotherapy; seven (28%) patients had 2–3 sessions of IMS with pharmacotherapy. Five patients (20%) had undergone cervical epidural adhesiolysis, where conservative management failed. **Conclusions:** Even though cervical angina is an underdiagnosed disease, pain physicians and spine surgeons should be familiar with it for diagnosis and treatment. Cervical angina is associated with broad range of cervical spinal pathologies; the most common is cervical disc herniation. It can be easily diagnosed with high level of suspicion and treated with pharmacotherapy, IMS, and cervical epidural adhesiolysis.

**Keywords:** Cervical angina, cervical spine pathologies, chest pain, prolapsed intervertebral disc

Received: 27-06-2023

Revised: 22-11-2023

Accepted: 28-11-2023

Published: 30-12-2023

## INTRODUCTION

Pseudo angina pectoris, commonly referred to as cervical angina, is a rare noncardiac syndrome of chest pain that was first recognized by Phillips in 1927.<sup>[1]</sup> The syndrome was later referred to as “protopathic” pain resulting from ventral nerve root compression by Nachlas in 1934 and it was officially termed “cervical angina” by Davis in 1950.<sup>[2,3]</sup>

Each year more than 7 million patients present to emergency departments with chest pain.<sup>[4]</sup> The majority of these patients are admitted in-hospital to “rule out” cardiac causes. However, only 15%–25% of patients with acute chest pain have acute coronary syndrome.<sup>[5,6]</sup> In the evaluation of chest pain, ruling out red flags such as acute coronary syndrome, pulmonary embolism, and pneumothorax are important. Noncardiac causes of chest pain include disorders related to the gastrointestinal (GI) system, lung, musculoskeletal, and

cervical spine. These should be looked for in patients who remain undiagnosed.<sup>[7]</sup>

The prevalence of noncardiac chest pain is estimated to be more than 50% of all cases with chest pain that present to the emergency department.<sup>[8]</sup> Cervical angina is one of the causes of noncardiac chest pain. It originates from disorders of the cervical spine. The exact mechanisms of pain production remain unclear. Previous studies mention the pain is mainly due to the involvement of cervical nerve root compression, cervical sympathetic afferent fibers, or lesions of the posterior horn of the spinal cord. Cervical angina presents with chest

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**How to cite this article:** Kurhade V, Bawage RV, Bangar KA, Page N, Bangar G, Baheti S. Cervical angina as a neglected symptom of cervical spine pathologies: Retrospective observational study. Indian J Pain 2023;37:S62-6.

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10.4103/ijpn.ijpn\_68\_23

pain, upper limb tingling numbness, and radicular pain. There should be a strong suspicion of cervical angina in any patient with unexplained noncardiac chest pain and positive neurological signs and symptoms. Cervical angina can be diagnosed with a positive neurologic examination, cervical radiographic findings (herniated disc, spinal cord compression, or foraminal encroachment), and negative cardiac workups.

In this digitalized era, prolonged improper ergonomics especially while using computers and mobile phones increases the burden on the cervical spine and the risk factor for cervical angina. Pain physicians and spine surgeons should raise awareness of this condition, especially for noncardiac chest pain.

### MATERIALS AND METHODS

Herein, research was conducted according to the World Medical Association Declaration of Helsinki. We present a retrospective observational study of 168 cases of cervical spine pathology [Figure 1]. All patients presented to our pain clinic from January 2018 to December 2022, and those diagnosed with cervical spine pathology were identified. The data have been submitted to the ethical committee. We included the patient with chest pain as a primary or secondary symptom with neck pain and upper extremity pain, tingling, and numbness, patients having radiological evidence of cervical spine pathology, diagnosis of cervical radiculopathy, cervical facet arthropathy, cervical disc prolapse, and cervical internal disc disruption and patients having negative cardiac and GI workups. Patient with chest pain due to cardiac or GI system origin, patients without any radiological imaging, and patients with history of ischemic heart disease were excluded from studies. Demographic, clinical, and radiographic evidence data were retrieved from medical case records and entered into a predesigned case record form. Variables included were clinical symptoms, their duration, physical examination findings including para spinal muscle spasm, Spurling test, facet loading test, and sensory and motor examination. Radiography reports included were magnetic resonance imaging (MRI) cervical spine and X-ray anterior-posterior (AP) lateral views of the cervical spine.

We have used descriptive statistics to see for central tendency and analysis of dispersion. Categorical variables were expressed as counts and percentages.

### RESULTS

As per Table 1 out of 168 patients having cervical spine pathology,  $n = 25$  (14.88%) patients had chest pain as either presenting or associated symptoms. In this cohort of 25 patients, the age range was 24–69 years. The mean age was 40.64 years. Twenty-eight percent ( $n = 9$ ) were male and 72% ( $n = 18$ ) were female. Out of those 25 patients, 18 (72%) patients had chest pain as presenting complaints along with neck pain and upper extremity pain, and tingling numbness, 7 (28%) patients presented with neck pain and upper extremity radicular pain and chest pain was associated symptom.

Out of 18 patients who presented with chest pain as the main symptom,  $n = 6$  (33.33%) patients had only chest pain.

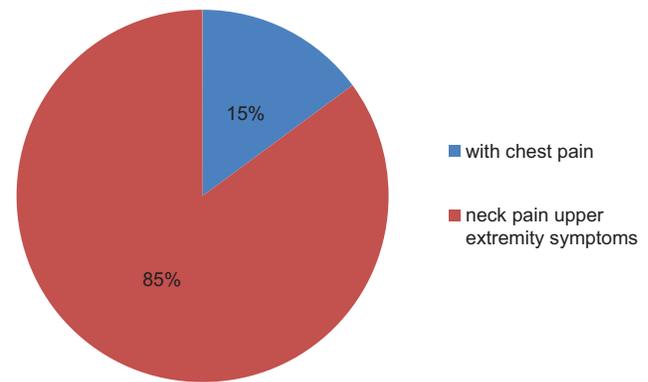
As per Table 2 out of 25 patients,  $n = 16$  (64%) had anterior chest wall pain,  $n = 3$  (12%) had retrosternal chest pain,  $n = 3$  (12%) had both anterior chest wall and midline pain, and  $n = 3$  (12%) had pain in the lower half of chest.

The duration of chest pain and associated symptoms ranged from 3 months to 5 years.

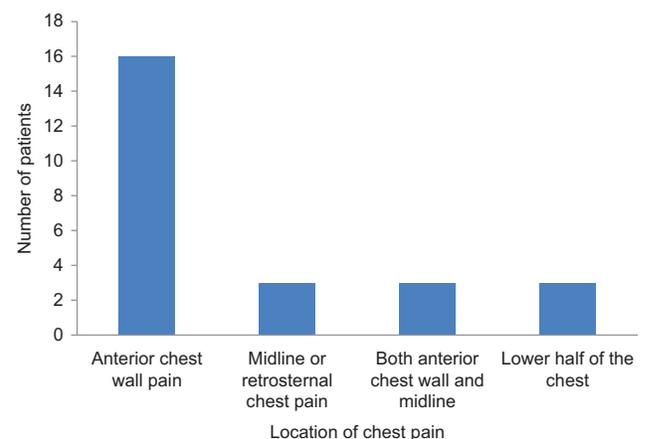
Out of 25 patients, in 21 patients diagnosis of prolapsed intervertebral disc was confirmed with MRI cervical spine findings, and in four patients prolapsed intervertebral disc was confirmed with cervical spine X-ray AP and lateral view with reduced disc height.

As per Table 3 all patients had cervical disc herniation with or without nerve root compression. C4 nerve root was involved in 4 patients, C5 in 16, C6 in 22, and C7 in 8. Prolapsed intervertebral disc level at C3-C4 in 4 patients, C4-C5 in 16, C5-C6 in 22, and C6-C7 in 8. The most commonly involved

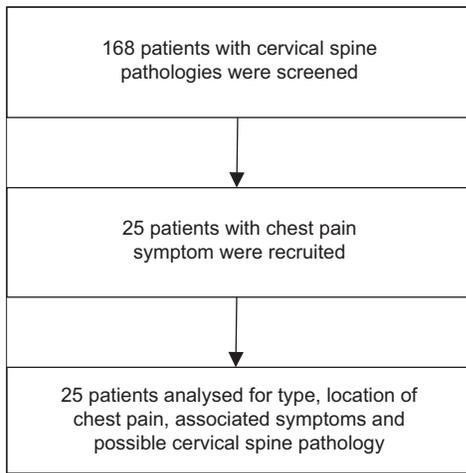
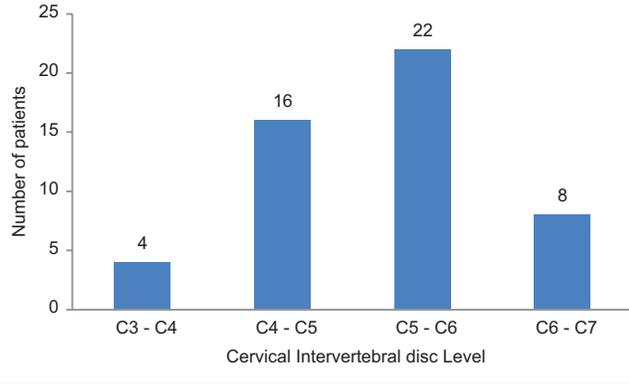
**Table 1: A diagrammatic representation of symptoms of cervical spine diseases**



**Table 2: Diagrammatic presentation of a pattern of chest pain**



**Table 3: Diagrammatic representation of affected prolapsed intervertebral disc**



**Figure 1:** Flow diagram for retrospective data collection and analysis

nerve root was C5 and C6 with C4-C5 and C5-C6 prolapsed intervertebral disc levels.

Out of 25 patients, 13 (52%) patients were treated with pharmacotherapy, 7 (28%) patients had 2–3 sessions of intramuscular stimulation (IMS) dry needling along with pharmacotherapy, and 5 (20%) patients had undergone fluoroscopy-guided cervical epidural adhesiolysis, none required surgical intervention.

**DISCUSSION**

This retrospective study demonstrates that patients with cervical spine pathology present with various clinical entities, cervical angina being one of them. The true incidence and prevalence of this condition are unknown. Many patients with cervical angina undergo extensive cardiac evaluations and often experience a delay in diagnosis.<sup>[9]</sup> In many cases, the neurological signs and symptoms are often overlooked. The clinician can mistake the diagnosis of patients with symptoms of chest pain and any associated neurological signs or symptoms as dual clinical entities. Prompt diagnosis of

this under-recognized syndrome requires an awareness of the common presenting features and clinical findings of cervical angina.

In our study, 25 (14.88%) patients among 168 patients with cervical spine diseases had chest pain. In a study conducted by Nakajima *et al.*<sup>[10]</sup> they found among 706 who undergone cervical spine surgery 10 patients presented with cervical angina. Jacob *et al.*<sup>[11]</sup> reported 164 patients of cervical angina over 22 years period. Sussman *et al.*<sup>[12]</sup> observed out of 44 patients admitted with atypical or noncardiac chest pain 6 patients had cervical angina and concordant physical examination findings and cervical imaging.

In our study, of those patients who had chest pain 72% of them had continuous sharp aching type of pain mainly radiating from the neck to the anterior chest wall and 28% of patients had occasional chest pain. Associated symptoms were neck pain, upper arm radicular pain, and occipital headaches. Physical examination findings noted were restricted cervical spine range of motion, paraspinal tenderness, and positive Spurling’s maneuver. As per the observation of Constant patients with cervical angina frequently present with anterior chest pain which is sharp and crushing in quality. The pain may be present at rest or aggravated by a cervical range of motion or movement of the upper extremity, usually for >30 min or <5 s<sup>[13]</sup> and it can be either paroxysmal or continuous. Jacobs<sup>[11]</sup> revealed the same manifestations associated with cervical angina which were neck and arm pain, upper arm radicular symptoms and fatigue, parasternal tenderness, and occipital headache.

In our study, all the patients had a negative cardiac evaluation; some had extensive cardiac work including a trade mill test, and coronary angiography which was negative before coming to a pain clinic. Varying degrees of cardiac workups must be performed to rule out true angina pectoris.<sup>[10]</sup>

In our observation, we found that all our patients had nerve root compression because of the prolapsed disc as a cause of cervical angina. The most commonly involved discs were C4-C5 and C5-C6. Most cases of cervical angina have been attributed to cervical nerve root compression.<sup>[14,15]</sup> Nachlas<sup>[2]</sup> postulated the theory that the medial anterior thoracic nerve (C8-T1 Nerve root), and the lateral anterior thoracic nerve (C6-C7 Nerve root) innervate the pectoralis major and minor muscles. These nerves are primarily motor in function and do not carry sensory fibers. They can possess protopathic sensibility. Nerve compression in this area might induce diffuse pain. This pain may be referred to the terminal portion of the nerve. Brain *et al.* and Frykholm *et al.* observed that ventral nerve root compression at the cervical foramina can induce radicular pain.<sup>[16,17]</sup> This pain is not radicular but diffuse in the muscles innervated by the same cervical myotomes resulting in precordial pain. The most common nerve root involved in cervical angina is disorder at the C6 or C7 level. In 1985, Brodsky<sup>[1]</sup> reported the largest series of 438 cases of cervical angina. He observed this radicular pain is mediated by compression of the cervical C4-C8 nerve roots. These nerve

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roots supply sensory and motor innervations to the anterior chest wall through the medial and lateral pectoral nerves. The most frequently affected levels were C6-7 levels (30%), C5-6 (37%), C4-5 (27%), and C3-4 levels (4%).<sup>[1]</sup> A similar conclusion that nerve root compression could also be the origin of precordial pain was verified in the observation of Jacobs.<sup>[11]</sup>

A few cases have been reported in which cervical angina was attributed to cervical myelopathy,<sup>[10]</sup> spinal cord infarction,<sup>[18,19]</sup> spinal cord tumors,<sup>[20]</sup> cervical instability,<sup>[21]</sup> and intervertebral disc disease.<sup>[9]</sup> In this study we didn't come across the patients with cervical myelopathy, cervical cord infarction, spinal cord tumors, cervical instability, we came across prolapsed intervertebral disc diseases. The chest pain in degenerative disc disease and facet joint pathology may refer through the sinuvertebral nerves which are independent of root compression. Myelopathic pain and sympathetic-mediated pain have also been suggested as potential mechanisms.<sup>[10]</sup> Although the exact mechanism is unclear, pain may be mediated by the sympathetic afferent fibers to the heart and coronary arteries, which originate in the dorsal root ganglia of C8-T9. In cervical myelopathy, dorsal horn lesions or disruption of the ascending cardiac spinothalamic tracts can cause the sensation of precordial chest pain.<sup>[18,19]</sup>

In our study, 13 (52%) patients were treated with pharmacotherapy and physiotherapy, 7 (28%) had 2–3 sessions of IMS dry needling, and 5 (20%) patients had undergone fluoroscopy guided cervical epidural adhesiolysis none required surgical intervention. In a study conducted by Brodsky 80% of patients were treated with pharmacotherapy or conservative therapy while 20% required surgical decompression with the anterior approach.<sup>[1]</sup> Nakajima *et al.* in their series of 10 patients, all patients were treated with surgical decompression with the anterior approach.<sup>[10]</sup> We found in none of the previous studies that patients with cervical angina had undergone fluoroscopic guided cervical epidural adhesiolysis. This needs further trials or observational studies for long-term effect of this modality on cervical angina relief.

According to review of literature on cervical angina by Feng *et al.* conservative treatment is successful in most of the patients and recommended for at least 3 months.<sup>[22]</sup>

Major fallacies of our study are small sample size, single-center, secondary outcomes not measured, and no long-term follow-up of patients to assess symptom relief.

Further research is required in terms of treatment protocol in cervical angina cases with long-term follow-up to assess the effectiveness of conservative treatment and interventional procedures.

## CONCLUSIONS

Chest pain is a very common presenting symptom from various causes such as cardiac, GI, myofascial pain, cervical spine pathologies, costochondritis, and fibromyalgia.

Pain physicians and spine surgeons should have a high index of suspicion to look for cervical spine pathologies in such cases. The possibility of cervical angina should be considered especially when neurologic signs and symptoms are also present. In our study, we found 14.88% of incidence of cervical angina in cases of cervical spine pathology patients. Raising awareness of this unusual radiating pattern for cervical pathology will hopefully lead to early diagnosis and recognition of cervical angina. Cervical angina is associated with a broad range of cervical spinal pathologies, the most common of which is cervical disc herniation. Moreover, it can be successfully treated with various modalities such as pharmacological, IMS, cervical epidural adhesiolysis, or surgical interventions in refractory cases.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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