Comparing Radiological characteristics of Neck Pain in Younger versus Older Patients: A retrospective analysis

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Abstract

Cervical Radiculopathy, or neck pain, commonly occurs during the fifth or sixth decade of life due to degenerative changes in the spine [1]. With increased usage of digital technology from a very young age we hypothesized an earlier age of onset of these degenerative changes. There have been no recent epidemiologic studies that investigated difference in radiological changes seen in older versus younger patients presenting with neck pain. Hence, this study is undertaken with the objective of analyzing the variability in radiological changes seen in the cervical vertebrae between older (>50) versus younger (≤50) patients presenting to Beaumont Royal Oak with the chief complaint of neck pain. We queried the PACS database and analyzed the data of 110 eligible patients (770 cervical levels). We then constructed various heat maps and graphs to identify the underlying characteristics of neck pain based on age. C3 to C6 vertebral levels were found to be the most affected across all age groups and foraminal narrowing was the most frequent degenerative change seen, followed by disc spurs. Our study showed that the incidence of foraminal narrowing and disc spurs is much higher in patients >50 as compared to patients ≤50 (P=0.0007, P= 0.006 respectively).

Introduction

Cervical radiculopathy is a common cause of both acute and chronic neck pain and upper-limb motor and sensory symptoms. One of the largest epidemiologic studies of cervical radiculopathy was a retrospective population-based review of 561 patients (332 men and 229 women) with cervical radiculopathy seen from 1976 to 1990 in Rochester, Minnesota [4]. All patients with complaints of neck pain were screened, and clinical criteria using symptoms, signs, and diagnostic testing were used to retrospectively make the diagnosis of definite, probable, or possible cervical radiculopathy.

While previous research has examined bidirectional association between psychological factors and low back and neck pain [2,3]; there has been no recent epidemiologic studies that investigated difference in radiological changes seen in older versus younger patients presenting with neck pain. More specifically, the cervical vertebral levels that are most affected and the most common types of radiological changes seen in those that are 50 years old or younger compared to those that are older than 50 has not been studied [5, 6]. Hence, this study is undertaken with the objective of analyzing these changes and correlating the degenerative changes with age.

Methods

We queried the PACS database at Beaumont Hospital Royal Oak and populated a spreadsheet with a total of 110 patients who presented with neck pain. Inclusion criteria included patients 18 years or older with neck pain and associated radiological investigations. Patients with structural abnormalities of the vertebral column from birth and trauma to the spine were excluded.

With MRNs of eligible subjects, we organized and analyzed the data of patients above and below the age of 50 associated with neck pain along with radiological changes. We then correlated the associated radiological changes in these patients based on age and the associated radiological changes to identify the underlying characteristics of neck pain in those that are under the age of 50 compared to those that are over the age of 50.

The specific analyses used were Chi-Squared and Fisher Exact Tests. Categorical variables were presented via frequency and percent, whereas continuous variables were summarized using medians and interquartile ranges. To test for an association between age group and findings, Chi-Squared tests were used when appropriate. When necessary, Fisher's Exact Test was used. All statistical analysis was done using SAS v9.4.

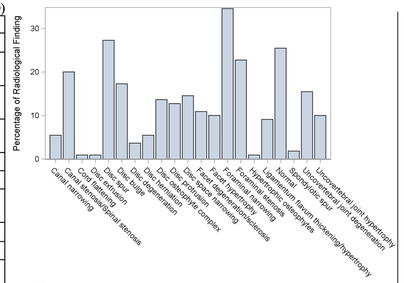
Results

A total of 110 patients were enrolled in this study. 60 patients were below the age of 50 and 50 patients were above the age of 50. All 7 Cervical vertebral levels of each patient were analyzed and the pathological changes seen on radiology were noted. A total of 770 cervical vertebral levels were analyzed. Specifically, we looked at the data in two different ways; by patient and by cervical level. The findings we were looking for were at each cervical level were:

1. Disc extrusion
2. Disc spur
3. Foraminal narrowing
4. Uncovertebral joint degeneration
5. Disc protrusion
6. Foraminal stenosis
7. Canal narrowing
8. Uncovertebral joint hypertrophy
9. Disc bulge
10. Disc degeneration
11. Ligamentum flavum thickening/hypertrophy
12. Facet degeneration/sclerosis
13. Canal stenosis/Spinal stenosis
14. Disc osteophyte complex
15. Disc space narrowing
16. Facet hypertrophy
17. Disc herniation
18. Spondyltic spur
19. Hypertrophic osteophytes
20. Cord flattening
21. Normal

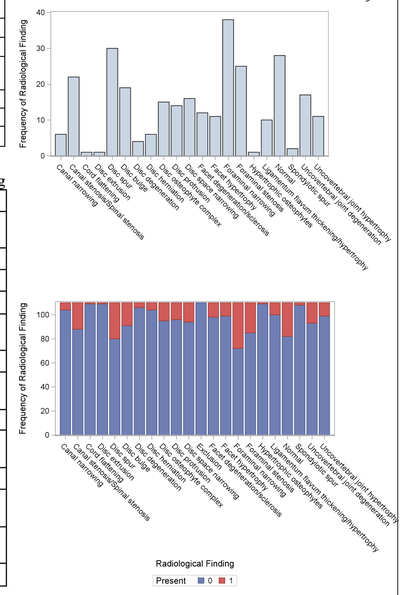
Average age of each finding (for N ≥ 10)

Finding	*Average age*
Cord flattening	73
Ligamentum flavum Hypertrophy	65.7
Facet degeneration/sclerosis	65.4
Hypertrophic osteophytes	63
Facet Hypertrophy	62.6
Disc Space Narrowing	60.1
Disc Osteophyte complex	59.9
Disc Spur	59
Foraminal Stenosis	58.9
Canal Stenosis/Spinal Stenosis	58.8
Foraminal narrowing	**58.4**
Disc Bulge	54.4
Uncovertebral joint degeneration	53.2
Disc Herniation	51.2
Disc Protrusion	50.3
Spondyltic Spur	48.5



Most common radiological finding

Finding	*Percent*
Foraminal narrowing	**34.55**
Disc spur	27.27
Normal	25.45
Foraminal stenosis	22.73
Canal stenosis/Spinal stenosis	20
Disc bulge	17.27
Uncovertebral joint degeneration	15.45
Disc space narrowing	14.55
Disc osteophyte complex	13.64
Disc protrusion	12.73
Facet degeneration/sclerosis	10.91
Uncovertebral joint hypertrophy	10
Facet hypertrophy	10



Most common radiological findings (Age > 50)

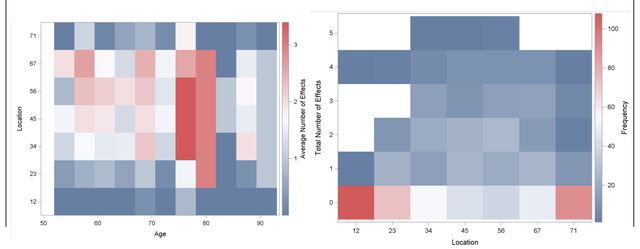
Finding	*Percent*
Foraminal narrowing	**52.08**
Disc spur	43.75
Canal stenosis/Spinal stenosis	33.33
Foraminal stenosis	31.25
Disc space narrowing	22.92

Most common radiological findings (Age ≤ 50)

Finding	*Percent*
Normal	41.94
Foraminal narrowing	**20.97**
Foraminal Stenosis	16.13
Disc spur	14.52
Disc protrusion	14.52

(Chi-square p-values)

Finding	*Percent*
Normal	<0.001
Foraminal narrowing	**0.0007**
Foraminal Stenosis	0.0605
Disc spur	0.0006
Disc protrusion	0.5223



Conclusions

We hypothesized that with excessive use of technology, even younger patients would present with early radiological degenerative changes of the cervical spine. However, our data shows that most young patients (41.94) did not show any radiological changes. In both age groups, foraminal narrowing is the most common radiological presentation. The average of foraminal narrowing is 58.4.

Foraminal narrowing was the most common radiologic finding seen. In total there were 38 (34.5%) patients who presented with foraminal narrowing, and 72 (65.5%) who did not. When looking at Age group ≤50 there were 13 (21.0%) patients who presented with foraminal narrowing, while 49 (79.0%) did not. This is compared to 25 (52.1%) patients with foraminal narrowing and 23 (47.9%) without, in patients aged >50. The p-value (0.0007) when compared to an alpha of 0.05 suggests there is evidence of an association between foraminal narrowing and age group, with ages > 50 having a higher percentage of foraminal narrowing than those ≤ 50. The average age of presentation of foraminal narrowing was 58.4.

There were 30 (27.3%) patients who presented with disc spurs, and 80 (72.7%) who did not. When looking at Age group ≤ 50 there were 9 (14.5%) patients who presented with disc spurs, while 53 (85.5%) did not. This is compared to 21 (43.8%) patients with disc spurs and 27 (56.3%) without, in patients aged >50. The p-value (0.0006) when compared to an alpha of 0.05 would suggest there is evidence of an association between disc spur and age group, with ages > 50 having a higher percentage of disc spurs than those ≤50.

This is a preliminary study with only 110 patients enrolled at a single institution. It would be worthwhile to further investigate changes occurring in younger patients with a larger patient group.

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