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Clinical features of patients with neck pain and cervical disc herniation – A report of 60 cases

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Cervical spine disease is one of the common diseases in China. Neck pain is the main clinical symptom of cervical spine disease. Neck pain seriously affects people's work efficiency and quality of life. The aim of our study was to analyze the clinical characteristics of patients with neck pain and cervical disc herniation (CDH), it provides the basis for clinical treatment and rehabilitation training. We collected the electronic medical records of 60 patients with neck pain. These patients aged between 20-69 years (average age 43.06 ± 10.04 years). We analyzed the age distribution and clinical characteristics of patients with neck pain, analyzed the CT imaging data of patients with CDH, and used IBM SPSS 22 statistical software to analyze the different characteristics patients in different ages. In our results, CDH is the main cause of neck pain, followed by vertebra proliferation and ligament calcification. Our study showed that C4-C5 was the most common site of CDH. Patients with single segment herniation accounted for 34.4 % of all CDH patients; Patients with double segment herniation accounted for 31.3 % of all CDH patients, and patients with three-stage herniation accounted for 28.1 %. Among CDH patients aged 20-57 years old, middle-aged (aged 40-57 years old) CDH patients were more than young (aged 20-39 years old) CDH patients, and there was a statistically significant difference between the two groups, $P < 0.05$. Among these patients with CDH, more than half of the patients had hand numbness symptoms, and more than 40% of CDH patients have dural sac compression. Neck pain is one of the common diseases, mostly in patients aged 30-39 years, and the main reason is CDH.

Key words: *neck pain, cervical disc herniation, hand numbness,
dural sac compression*

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Introduction

Cervical spine disease is one of the common diseases in China. Neck pain is the main clinical symptom of cervical spine disease. Neck pain seriously affects people's work efficiency and quality of life.

In 1990, neck pain was the eighth leading cause of disability-adjusted life year (DALY) loss in Chinese women aged 25-49. In 2016, neck pain was the sixth leading cause of DALY loss in Chinese women aged 25-49. Neck pain is one of the factors affecting the health of Chinese people, and this trend is increasingly obvious for both men and women (Yang et al, 2022).

A survey in Urumqi showed that the prevalence of cervical spondylosis in female office workers aged 20-29 years was 25.8%, and 22.9% in men. The incidence of cervical spondylosis increases with age, among patients aged 20-29 years, 86% of patients had cervical flexion changes, 24.7% of patients had bone hyperplasia, and 6.6 % - 9.7% of patients aged 30-49 years had neck ligament calcification (Ming et al., 2017).

In 1992, the Chinese Medical Association held the second conference on cervical spondylosis in Qingdao, which defined cervical spondylosis. Cervical disc degeneration and its secondary pathological changes and its surrounding structures, such as nerve roots, spinal cord, vertebral artery, sympathetic nerve, etc., with corresponding clinical manifestations such as neck pain, dizziness and hand numbness. Neck pain is caused by irritation and compression of cervical nerve roots in the spinal canal or at the intervertebral foramen due to cervical disc herniation (CDH), disc degeneration, and osteophytes (Feng et al., 2015).

When patients with neck pain undergo cervical CT examination, common clinical manifestations include cervical disc herniation, cervical physiological curvature changes, cervical vertebral bone hyperplasia, ligament calcification, etc. In healthy volunteers, the ratio of disc compression of the dural sac was 59% (Kovalova et al., 2016). Cervical hyperosteoegeny and posterior ligament calcification can cause neck pain, spinal stiffness, and limited neck mobility (Yachoui et al., 2017; Hirai et al., 2016).

The relationship between cervical lordosis and neck pain is controversial and has not been confirmed by high-quality prospective studies. Many researchers believe that the loss of cervical lordosis measured using plain films may be the cause of neck pain. However, other researchers believe that the lack of lordosis is a normal variant and therefore not a cause of neck pain symptoms (Shilton et al., 2015).

The cervical lordosis (CL) could theoretically decrease with narrowed cervical disc height and cervical disc angle (CDA), but this relationship has not been fully elucidated. At any rate, the pearson correlation coefficients of the CDA at the C3/4 and C4/5 levels were larger than those of the other variables (Huang et al., 2020), the angle of cervical lordosis is greater in men than in women, and the wedge angle increases with age (Tao et al., 2021), the patient imaging data from a lateral X-ray examination, this is quite certain and clear.

In this study is to use the electronic medical record information and CT image data of patients with CDH, analyze the age characteristics of patients, location and type of CDH, compare the different ratio of dural sac compression. The aim of our study so as to provide basis for the rehabilitation treatment of patients with CDH.

Method

We collected the electronic medical records of 60 patients with neck pain. These patients came to the rehabilitation medicine clinic of our hospital from March to October 2021, aged between 20-69 years (average age 43.06 ± 10.04 years).

These patients mainly complained of neck pain. All patients used Siemens AS 128 whole-body double row spiral Computed Tomography (CT machine). Patients lying on their back on the scanning table, and routinely performed C2-C6 intervertebral disc plain scanning, with a layer thickness of 3 mm and 5 layers of each intervertebral space, the CT image of CDH is show in Figure1.

Figure 1

CT scan: C4-C5 and C5-C6 disc herniation with ligament calcification



The statistical analysis used IBM SPSS 22.0 software, the Pearson's chi-squared test was used to test the rate, and T test was used for significance difference test, p-value <0.05 was considered statistically significant. The results are expressed as means±SEM.

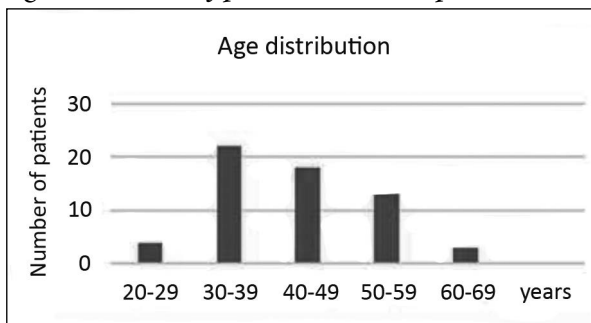
Results

Age distribution of patients with neck pain

Among the 60 patients, the age range was 20-69 years, the average age was 43.06 ± 10.04 years. As shown in Figure 2, between the ages of 20-29 years, there were 4 patients distributed, accounting for 6.67% of the total number of patients. Between the ages of 30-39 years, there were 22 patients accounted for 36.67% of the total number of patients. There were 18 patients aged 40-49 years, accounting for 30% of the total number of patients. Between the ages of 50-59 years, there were 13 patients distributed, accounting for 21.67% of the total number of patients. Between the ages of 60-69 years, there were 3 patients distributed, accounting for 5% of the total number of patients.

Figure 2

Age distribution of patients with neck pain



Causes of low back pain

Among 60 patients with neck pain, 32 patients were diagnosed with CDH, accounting for 53.3% of all patients, 18 patients with vertebra proliferation, accounting for 30% of all patients, 9 patients with straight cervical spine,

accounting for 15% of all patients, 1 patients with calcification of cervical ligament, accounting for 1.67% of all patients, as shown in Table 1.

Location of cervical disc herniation (CDH) and cervical segment

As shown in Table 1, among 60 patients with neck pain, 32 patients with cervical disc herniation. In 32 patients with CDH, six cervical intervertebral discs protrude at the C2-C3 level, 20 cervical intervertebral discs protrude at C3-C4 level, 25 cervical intervertebral discs protrude at C4-C5 level, 12 cervical intervertebral discs protrude at C5-C6 level.

In 32 patients with CDH, eleven patients had single-level disc herniation, accounting for 34.38% of all patients. Among 32 patients with CDH, ten patients had herniated discs at both levels, accounting for 31.25% of all patients. Nine patients had disc herniation at three levels, accounting for 28.12% of all patients, two patients had herniated discs at four levels, accounting for 6.25% of all patients.

Table 1

Clinical data of patients with neck pain

Basic information of patients	Total of patients (n) with neck pain	60
	Average age (years)	43.06 ±10.04
	Gender (male/female)	15/45
Location of disc herniation	Location of herniation	Intervertebral disc (n)
	C2 – C3	6
	C3 – C4	20
	C4 – C5	25
	C5 – C6	12
	Total of intervertebral disc	63
Segments of disc herniation	Segments	Patients (n)
	single segments	11
	double segments	10
	three segments	9
	four segments	2
	Total of patients	32
Causes of neck pain	Diagnose	Patients (n)
	intervertebral disc herniation	32
	vertebra proliferation	18
	straight cervical spine	9
	calcification of cervical ligament	1
	Total of patients	60

Clinical characteristics of patient with CDH in different ages

As show in Table 2, twenty-six patients aged 20-57 years were diagnosed with CDH, the patients were divided into two groups, one with patients aged 20 to 39 and the other with patients aged 40 to 57 among which 9 patients aged 20-39 years were diagnosed with CDH, accounting for 34.61% of 26 patients. There were 17 patients aged 40-57 years with CDH, accounting for 65.38% of 26 patients. The results showed that more patients aged 40 to 57 years had cervical disc herniation than those aged 20 to 39 years, the chi-square test showed a significant difference between the two groups, $p < 0.05$ ($p = 0.027$).

Compressed cervical spinal dural sac and hand anesthesia

In the first group (aged 20-39 years), 55.5% of patients with CDH had hand anesthesia. It was 64.7% in the second group (age 40-57 years). There was no statistically significant difference between the two groups ($p > 0.05$); in the first group (age 20-39 years), 44.4% of patients with CDH had cervical spinal dural sac compression; In the second group of patients (age 40-57 years), 52.9%. As show in Table 2, there was no significant difference between the two groups, $p > 0.05$.

Table 2

Clinical characteristics of patients with CDH at different ages

Group	Age	CDH		Compress dural sac		Hand numbness	
		n	%	n	%	n	%
Group 1	years						
	20-39	9/26	34.6	4/9	44.4	5/9	55.5
Group 2	40-57	17/26	65.4	9/17	52.9	11/17	64.7
p value			$p = 0.027$		$p > 0.05$		$p > 0.05$

Discussion

Previous studies have shown that neck pain is more common between the ages of 40 and 59, there were more female patients than male patients (Kazeminasab et al., 2022). Among college students in their 20s, the longer they use phones and computers with their heads bowed, the longer neck pain lasts (Al-Hadidi et al., 2019). When the neck flexes 20° , the load on the

cervical intervertebral disc increases by 70%, and when the neck flexes 45°, the load on the vertebrae increases by 121%. The C4-C5 stress is the largest, and the C5-C6 stress is medium (Cao et al., 2021). In our study, the patients with neck pain are most in the age group of 30-39 years old, followed by the patients in the age group of 40-49 years old, and the third is the patients in the age group of 50-59 years old, patients with neck pain are getting younger, a feature of modern society.

The cervical spine is a part of the spine column, with a total of 7 vertebrae from C1 to C7. Studies have shown that cervical vertebrae rotate more than 600 times per hour. C1 and C2 in cervical spine rotation, flexion, extension activities frequently, large load. Therefore, the incidence of bone hyperplasia is most likely to occur in C2 (Li et al., 2016).

Spinal ligament calcification is a common clinical manifestation. Due to trauma and chronic ligament overload, ligament degeneration forms osteophytes. The incidence of men is higher than that of women, and increases with age (Kim et al., 2019). In our study, 1 patient had ligament calcification, accounting for 1.66% of 60 patients. Cervical vertebral hyperosteo-geny occurred in 18 patients, accounting for 30% of the 60 patients. Patients with cervical hyperosteo-geny significantly more than patients with ligament calcification.

The cervical spine starts where the top vertebra (C1) connects to the bottom of the skull. The cervical spine curves slightly inward and ends where C7 joins the top of the thoracic spine (the chest area). Previous studies have suggested that cervical disc loads in compression and shear increased from upper to lower cervical levels as the total mass above each level increased naturally (Arshad et al., 2022). Cervical disc herniation usually occurs in C2-C7, the most frequent level involved is C5-C6, followed by C4-C5 and C6-C7 and most patients are in the fifth decade of age (Iencean & Poata, 2015).

In our results, CDH is the main cause of neck pain, followed by bone hyperplasia and changes in cervical physiological curvature. Cervical ligament calcification can also cause neck pain. In our study, one patient had ligament calcification, accounting for 1.67% of all patients. Our study showed that C4-C5 was the most common site of CDH, the second is C3-C4, the third is C5-C6. Patients with single segment herniation accounted for 34.4 % (11/32) of all CDH patients, patients with double segment

herniation accounted for 31.3% (10/32) of all CDH patients, and patients with three-stage herniation accounted for 28.1% of all CDH patients.

Among CDH patients aged 20-57 years old (n=26), middle-aged (aged 40-57 years old, n=17) CDH patients were more than young (aged 20-39 years old, n=9) CDH patients, and there was a statistically significant difference between the two groups, $p < 0.05$. Among 26 CDH patients, more than half of the patients had hand numbness symptoms, and 44.4% of the young CDH patients had compression of the dural sac. In middle-aged patients, 52.9% of patients oppressed the dural sac, and there was no statistically significant difference between the two groups.

There are some limitations in our study. Due to the small number of patients in our study, there was no grouping of male and female patients, the differences between male and female patients were not compared. Are there gender differences in the clinical characteristics of patients with neck pain? Are the clinical symptoms of cervical disc herniation different in men and women? In the future, we need to increase the number of patients in the study to further clarify.

Conclusion

Our results show that the majority of patients with neck pain are 30-39 years old, and cervical disc herniation is the most common cause of neck pain. The main location of cervical disc herniation is C4-C5, a single segment of the prominent more than double segment and three segments.

The age of patients with cervical disc herniation is mostly 40-57 years old, more than 20-39 years old young patients, there is a significant difference between the two groups of patients statistically. In all patients with cervical disc herniation, half of the patients with cervical disc herniation compressed the dural sac, and nearly half of the patients experienced hand numbness.

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KLINIČKE KARAKTERISTIKE PACIJENATA SA VRATNIM BOLOM I CERVICALNOM DISKUS HERNIJOM - IZVEŠTAJ O 60 SLUČAJEVA

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Sažetak

Bolest vratne kičme je jedna od najčešćih bolesti u Kini. Bol u vratu je glavni klinički simptom bolesti vratne kičme. Bol u vratu ozbiljno utiče na radnu efikasnost i kvalitet života ljudi. Cilj našeg istraživanja bio je da se izvrši analiza kliničkih karakteristika pacijenata sa bolom u vratu i cervikalnom diskus hernijom (CDH), što predstavlja osnovu za kliničko lečenje i rehabilitaciju.

Prikupili smo elektronsku medicinsku dokumentaciju 60 pacijenata sa bolom u vratu. Pacijenti su starosti između 20-69 godina (prosečna starost $43,06 \pm 10,04$ godina). Analizirali smo starosnu distribuciju i kliničke karakteristike pacijenata sa bolom u vratu, CT nalaze pacijenata sa CDH i koristili IBM SPSS 22 statistički softver za analizu različitih karakteristika pacijenata u različitim starosnim dobima.

Prema našim rezultatima, CDH je glavni uzrok bola u vratu, praćen proliferacijom prđljenova i kalcifikacijom ligamenata. Naša studija je pokazala da je C4-C5 segment gde se najčešće javlja CDH. Pacijenti sa hernijacijom jednog segmenta činili su 34,4% svi pacijenata sa CDH, sa dvosegmentnom hernijacijom 31,3%, a sa trostepenom 28,1%. Među pacijentima sa CDH starosne dobi od 20 do 57 godina, statistički značajno više ($p < 0,05$) je bilo onih sredovečnih (40-57 godina) nego mladih (20-39 godina). Više od polovine pacijenata sa CDH je imalo simptome utrnulosti ruke, a više od 40% pacijenata kompresiju duralne vreće.

Bol u vratu je je jedna od čestih bolesti, uglavnom kod pacijenata starosti od 30 do 39 godina, a glavni razlog pojave bola je cervikalna diskus hernija.

Ključne reči: bol u vratu, hernija cervikalnog diska, utrnulost šake, kompresija duralne vreće