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Original Article

Epidemiology, Clinical Features and Management of Patients with Cervical Spinal Stenosis in the City of Yaounde

Épidémiologie, Aspects Cliniques et Thérapeutiques des Patients Pris en Charge pour Canal Cervical Étroit à Yaoundé

Haman NO[1,3], Ndome Toto O[1,4], Nchufor R[2], Anu RF[1,3], Haram DB[2], Djientcheu VDP[1,3]

Affiliations
[1] Faculty of Medicine and Biomedical Sciences, University of Yaounde 1 (Yaounde, Cameroon)
[2] Faculty of Health Science, University of Bamenda (Bamenda, Cameroon)
[3] Neurosurgery department, Yaounde General Hospital (Yaounde, Cameroon)
[4] Douala General Hospital (Douala, Cameroon)

Corresponding author:
Haman Nassourou Oumarou.
Mail: Haman06@yahoo.fr
Tel: +237 694194727

ABSTRACT

Objective. This study aimed to describe the sociodemographic, clinical, and therapeutic characteristics of patients diagnosed with cervical spinal stenosis at the Yaounde General Hospital and Yaounde Central Hospital. **Patients and Methods.** We conducted a retrospective, descriptive, cross-sectional study in the neurosurgery departments of the two aforementioned hospitals over a seven-year period, from January 1, 2015, to December 31, 2021. All medical records of patients admitted for cervical spinal stenosis and meeting the inclusion criteria were reviewed and included in the analysis. **Results.** A total of 82 patients were included in the study, consisting of 50 men (61%) and 32 women (39%). The mean age was 57.43 years, with a range of 35 to 80 years. The most common clinical manifestations included cervical pain (n=75, 90.2%), paresthesia (n=71, 86.6%), numbness (n=58, 70.7%), sphincter dysfunction (n=46, 56.1%), motor deficits (n=79, 98.7%), and sensory deficits (n=58, 70.7%). Muscle strength was graded as 2 (n=25, 30.5%) and 3 (n=24, 29.3%). According to the Nurick classification, grade 2 was identified in 21 cases (25.6%). Radiological evaluations primarily involved CT scans (n=79, 96.3%), with a smaller number of MRI studies (n=3, 3.7%). Imaging findings revealed anterior cord compression in 47 cases (57.3%) and posterior cord compression in 35 cases (42.7%). The most frequently affected levels were C3-C5 (n=38, 46.3%) and C5-C7 (n=22, 26.8%). The number of compression levels was less than 3 in 60 patients (73.2%) and 3 or more in 22 patients (26.8%). Treatment modalities included SAID (n=18, 21%) and cervical orthoses (n=45, 54.9%). Surgical interventions were performed via an anterior approach in 45 cases (54.9%) and a posterior approach in 32 cases (39%). **Conclusion.** Cervical spinal stenosis is a relatively common condition, with a higher prevalence among male patients and elderly individuals. The clinical presentation is predominantly characterized by neurological deficits, reflecting the severity of the disease. Surgical management remains a cornerstone in the treatment of this condition.

RÉSUMÉ

Objectif. Le but de ce travail était de décrire les caractéristiques sociodémographiques, cliniques et thérapeutiques des patients atteints de canal cervical étroit à l'Hôpital Général et à l'Hôpital Central de Yaoundé. **Patients et Méthodes.** Nous avons mené une étude transversale rétrospective descriptive dans les services de neurochirurgie des 02 hôpitaux sus-cités durant la période du 1er janvier 2015 au 31 décembre 2021. Nous avons inclus tous les dossiers médicaux des patients admis pour canal cervical étroit et répondant aux critères d'inclusion. **Résultats.** Au total, 82 participants ont été inclus, dont des hommes (n=50, 61%) et des femmes (n=32, 39%). L'âge moyen était de 57,43 ans avec extrêmes 35 et 80 ans. Les signes cliniques étaient les suivants : douleurs cervicales (n=75, 90,2%), paresthésie (n=71, 86,6%), engourdissement (n=58, 70,7%), troubles sphinctériens (n=46, 56,1%), déficits moteurs (n=79, 98,7%), déficits sensitifs (n=58, 70,7%). La force musculaire était de grade 2 (n=25, 30,5%), et grade 3 (n=24, 29,3%). Selon la classification de Nurick, le grade 2 était retrouvé dans 21 cas (25,6%). L'examen radiologique était le scanner (n=79, 96,3%), l'IRM (n=3, 3,7%) montrant une compression médullaire antérieure (n=47, 57,3%), une compression postérieure (n=35, 42,7%), niveau de compression C3-C5 (n=38,46. 3%), C5-C7 (n=22, 26.8%) et nombre de niveaux de compression <3 (n=60, 73.2%) et ≥3 (n=22, 26.8%). Les modalités thérapeutiques étaient AIS (n=18, 21%), utilisation d'orthèse cervicale (n=45, 54.9%). Le traitement chirurgical était fait par abord antérieur (n=45, 54,9%) et abord postérieur (n=32, 39%). **Conclusion.** Le canal cervical étroit est relativement fréquent avec une prédominance masculine et des personnes âgées. La présentation clinique est dominée par le déficit neurologique qui annonce la gravité de la pathologie. La chirurgie joue un rôle clé dans la prise en charge.

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INTRODUCTION

Cervical stenosis is the narrowing of the cervical spinal canal or intervertebral foramina secondary to a pathologic process of the cervical vertebrae at different cervical anatomical levels. According to world literature, the mean age of patients with cervical stenosis is 57.2 years and the most compromised levels are C4-C5 and C5-C6 [1]. Cervical spinal stenosis results from different pathological processes, with starting point being spinal or intra spinal, compressing the spinal cord and gradually leading to a loss of function. The lesions of the spinal cord are the consequence of an ischemic and/or compressive mechanism. The problem with spinal cord compressions is their risk of aggravation in the event of delay in management with the possibility of total interruption and irreversible spinal pathways [2]. Any Cervical spinal compression is therefore an emergency. The global impact is difficult to assess with precision, because people affected are not necessarily admitted to rehabilitation centers [3]. According to a study carried out in Australia and in Netherlands, the annual incidence varies from 6 to 76 cases per 1 million people [4, 5]. In Africa, few studies have been devoted to this pathology. In Algeria, a study by Mammasse et al. revealed that cervical canal stenosis (CCS) of tumoral and infectious origin represents 1.64% of all hospitalizations [6]. Processes that may cause spinal cord dysfunction are many and varied. Cervical spondylosis affects up to 50% of individuals over 40 years of age. It often causes spinal canal stenosis (SCS), leading to neck pain, cervical radiculopathy and cervical myelopathy. Patients with cervical spondylosis have a higher risk of spinal cord lesions since the cord cannot move freely within the spinal canal. Thus, mild cervical trauma can cause devastating spinal cord injury [7]. Increased knowledge of the anatomy, physiology and biomechanics of the cervical spine and the enclosed neural and vascular elements is leading to a better understanding of the importance of cervical spine stenosis, as certain clinical syndromes may respond well to operative decompression [8]. We then opted to describe the current socio-demographic, clinical, diagnostic and therapeutic features of CCS in two reference hospitals of the town of Yaounde. Thereby, giving more light on our experience and baseline information for further studies.

PATIENTS AND METHODS

Sites of study

This study took place in the neurosurgery departments of two University Teaching Reference Hospitals of the Town of Yaounde: the Yaounde General Hospital (YGH) and the Yaounde Central Hospital (YCH). These hospitals receive the majority of the neurosurgery cases in the Centre Region and numerous referred neurosurgery cases from the other regions of Cameroon.

The Yaounde General Hospital (YGH)

The YGH is a public institution created in 1988 by presidential decree N° 1921. It is a first category and 4th reference hospital that provides the Cameroonian population with first-class health care in the fields of general surgery and specialties, internal medicine, gynecology and obstetrics, anesthesia and resuscitation, cancerology, and anatomopathology. It is the center of excellence for Neurosurgery in Cameroon. The neurosurgery department is headed by a Full Professor in neurosurgery assisted by an Associate Professor in neurosurgery and three neurosurgeons. It is the main training site for interns and residents of neurosurgery and has an annual surgical activity of about 250 interventions.

The Yaounde Central Hospital (YCH)

The YCH is a second category and 3th reference hospital created in 1933. It is the first neurosurgery center in Cameroon. It provides patients with quality care via its various departments among which a neurosurgery department. This department is run by three neurosurgeons. It has an annual surgical activity of about 200 interventions.

Type of study

We conducted a retrospective and descriptive cross-sectional study of all patients who were managed for cervical spinal stenosis at the neurosurgery departments of the General and Central Hospitals of Yaounde from 1st January 2015 to 31st December 2021 (7 years).

Population of study

Our population of study was made up of the medical booklets of patients in the neurosurgery departments of the YGH and the YCH with diagnosis of cervical spinal stenosis during the study period. The target population included medical booklets of patients with spine imaging confirming the existence of degenerative cervical spinal stenosis. Medical booklets of patients with traumatic cervical spine injuries or previous surgical intervention on the spine were excluded. 102 medical records of patients managed for cervical spinal stenosis were reviewed within the framework of our study period and 82 were retained. A simple and consecutive recruitment was done. Therefore, no formal sample size calculation was performed.

Procedure of data collection and analysis

After obtaining ethical clearance to carry out the study and administrative authorization from the Directors of the Yaounde General and Central Hospitals, patient medical records and achieves that met the inclusion criteria for the study were recruited. With the aid of a pre-established technical sheet, the following data were collected from the medical records of our target population: socio-demographic features (age, sex, occupation, residence), clinical features (signs and symptoms; motor deficits, sensory deficits, paraesthesia, dysesthesia, numbness, sensory ataxia, sphincter dysfunction, muscle strength, Nurick's grading), radiological aspects (type of investigation: x-ray, CT-Scan, MRI; type of compression: anterior compression, posterior compression; level of compression; number of levels of compression, and therapeutic features (medical treatment, surgical treatment; anterior approach/posterior

18

approach). The data collected were entered and analyzed using the using the Statistical Package for Social Sciences (SPSS) Standard version, Release 20.0 (IBMInc.2012). The entire study was carried out in strict respect of the fundamental rules of ethics in medical research.

RESULTS

In our study, 102 medical records of patients managed for cervical spinal stenosis were reviewed. Eighty-two were retained as they met with the selection criteria.

Socio-demographic features

Among the 82 patients, 50 (61%) were male and 32 (39%) were female, giving a sex ratio of 1.56. Their mean age was 57.43±10.56 years. The modal age group was 55-64 years (n=26, 31.7%) with the ages ranging from 35-80 years. (Table I)

Table I: Distribution of patients according to socio-demographic characteristics (N= 82)

Variables	N	%
Age category (years)		
35-44	8	9.8
45-54	25	30.5
55-64	26	31.7
65-74	20	24.4
>75	3	3.7
Sex		
Male	50	61
Female	32	39
Marital Status		
Cohabitating	2	2.4
Divorced	3	3.7
Married	66	80.5
Widow	10	12.2
Single	1	1.2
Occupation		
Retired	40	48.8
White collar jobs (office work)	30	36.6
Labourers	11	13.4

Clinical features

The most common signs and symptoms were neck pain (n=74, 90.2%), paresthesia (n=71, 86.6%), numbness (n=58, 70.7%), and dysesthesia (n=54, 65.9%). Other signs and symptoms found were sphincter dysfunction (n=46, 56.1%), motor deficit (n=79, 98.7%) and sensory deficit (n=58, 70.7%). Grade 2 muscle strength was predominant (n=25, 30.5%). Information on the Nurick's classification was obtained and the majority of patients (n=31, 37.8%) were at grade 3. (Table II, III, IV)

Table II: Distribution of patients according to the clinical signs and symptoms (N=82)

Variables	N	%
Neck pain	74	90.2
Paresthesia	71	86.6
Dysesthesia	54	65.9
Numbness	58	70.7
Sphincter dysfunction	46	56.1
Type of sphincter dysfunction		
Incontinence	17	20.7

Marked difficulty with micturition (retention)	5	6.1
Difficulty with micturition (urinary frequency)	23	28
Unable to void	1	1.2
Sensory deficits	58	70.7
Motor Deficits	79	98.7

Table III: Distribution according to muscle strength and paresis (N=82)

Variable	N	%
Muscle Strength(Grade)		
No contraction, bedridden (0)	11	13.4
Movement with assistance (1)	17	20.7
Active movement, impossible to move against gravity (2)	25	30.5
Active movement, possible to move against gravity and not against resistance (3)	24	29.3
Active movement, possible to move against gravity and resistance (4)	5	6.1
Normal muscle strength (5)	0	0
Paresis		
Paraparesis	43	40.2
Tetraparesis	6	7.3

Table IV: Distribution according to the Nurick's grading (N=82)

Grade	N	%
Grade 0	6	7.32
Grade 1	20	24.39
Grade 2	21	25.61
Grade 3	32	37.80
Grade 4	4	4.8
Grade 5	0	0

Radiological features

Brain CT-scan was performed in 79 cases (96.3%). The following findings were got on imagery: anterior compression (n=47, 57.3%), upper cervical compression C3-C5 (n=38, 46.3%) and < 3 levels of compression (n=60, 73.2%) (Table V).

Table V: Distribution of study population according to radiological findings (N=82)

Variables	N	%
Radiological modality		
X-ray	0	0
CT-scan	79	96.3
MRI	3	3.7
Type of compression		
Anterior compression	47	57.3
Posterior compression	35	42.7
Level of compression		
Upper cervical (C3-C5)	38	46.3
Lower cervical (C5-C7)	22	26.8
Both upper and lower Cervical	22	26.8
Number of levels of compression		
< 3 levels	60	73.2
≥ 3 levels	22	26.8

19

Treatment

Surgery was the main treatment modality used and involved essentially discectomy and fusion via the anterior approach (n=45, 54.9%). Methylprednisolone (Solu-Medrol) was used in 18 cases (21%). Cervical orthosis was used in 45 cases (54.9%). [Table VI]

Table VI: Distribution of patients according to the therapeutic modalities used (N=82)

Management	N	%
Methylprednisolone	18	21
Use of cervical orthosis	45	54.9
Surgical management		
Anterior approach, discectomy and fusion	45	54.9
Anterior approach, corpectomy and fusion	2	2.4
Posterior approach, laminectomy	32	39.0

DISCUSSION

Sociodemographic features of the study population

In our study, the age group of 55-64 years was the most represented with 26 cases (31.7%). The average age was 57 years with extremes of 35 and 80 years old. These results are similar to those of Hima-Maiga _et al_ in Niger [9]. This similitude maybe due to similar study design and study population and this also shows that cervical spinal stenosis is common in patients 57 years and above.

In our study, patients were male in 61% of cases, female in 39% of cases. This gave a male to female sex ratio of 1.56. Several studies equally found a male predominance [9, 10]. This male predominance is partly attributable to the high frequency of cervical spinal stenosis in men due to their greater involvement in intense physical activity.

The most represented occupation is the retired with 48.8%, followed by white collar jobs with 36.6% [11]. These findings converge with those got by Konate et al. in Mali [12]. There is a discrepancy to the study carried out by Aly Doumbia [13] and can be explained by the difference in age of retirement. This can equally explain why cervical spinal stenosis is frequent in patients 57 years and above.

Clinical features

Neck pain, paresthesia and numbness are frequent symptoms in the neurosurgical consultation with an occurrence rate of 90.2%, 86.6% and 76.7% respectively. These results join those of Diomande et al [11] in which neck pain was present in 89.0% of patients. This similarity may be due to the alikeness in the study population and age group.

Sphincter dysfunctions are often of late onset but nevertheless frequent. They can be incontinence or retention. A delay in urination, urinary urgency or frequency can be the first manifestations. Sphincter dysfunction was found in 56.1% of patients. A similar result was got by Konate et al in Mali [12] and maybe due to similarity in study population. This finding however, differs from those of Mammasse et al and Diomande et al [6, 11] due to difference in study design.

In our study motor deficit was found in 98.7% and was mostly mild motor deficit, paraparesis in 40.2%,

tetraparesis in 7.3% which differ with the study carried out by Mammasse et al. and Aly Dounbia et al. [6, 13]. There is similarity with the study carried out by Diomande et al. [11] and this can be attributed to the similarity in the study design.

Sensory deficits were present in 70.1% of cases. This primarily involved mild sensory loss. Severe sensory loss was not common and accounted for 18.3%. Grade 2 muscle strength was predominant (30.5%) of cases followed by grade 3. Using the Nurick's grading, grade 3 was the most common (37.8%) followed by grade 2 (25.61%) which showed that patients presented with symptoms already advanced [14, 15].

Paraclinical features

The standard radiography in all patients showed an image of cervical spinal stenosis in 100% of cases. CT scan was the most performed diagnostic investigation in 96.3% which confirmed cervical spinal stenosis [11]. MRI was less common and accounted for only 3.7% of the radiologic investigations used. Despite the greater sensitivity of MRI over CT particularly for medullar and radicular lesions, the greater use of CT can be explained by the higher accessibility and availability of CT to MRI in our context. Anterior compression was more frequent (57.3%) with the C3-C5 level of compression being the most affected. A greater proportion of the patients (73.2%) had less than 3 levels affected.

Therapeutic features

Medical treatment was initiated in all patients for analgesic purposes and to reduce inflammatory phenomena. Cervical orthosis was used to immobilize the neck. In our Study, 77 patients were operated (93.9%). Indeed, the essential surgical treatment was decompressive laminectomy. It had 3 objectives:

- Stop the development of compression, taking into consideration that 31 (37.8%) of cases had a Nurick score of 3 at their admission to the ward.
- Promote the regression of certain neurological disorders. It is believed particularly to improve the physical and moral comfort of patients.
- Specify the etiological diagnosis and guide the subsequent therapeutic protocol.

In our series, the posterior approach was used in 32 cases (39%). The anterior approach with discectomy and fusion was the most used therapeutic modality in our study including 45 (54.9%) of cases. However, the posterior approach is more reported in literature [6, 13, 16, 17].

Limitations

The main weakness of our study is that it was based on retrospective information (secondary data source) obtained from patient's medical records and registers at the Yaounde General and Central Hospitals. Consequently, the results might be biased due to problems such as missing data linked to the use of secondary data sets. In addition, the sample size which is relatively small, reduces the generalizability of the findings. However, the results of this study can serve as relevant basis for future studies.

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CONCLUSION

Cervical spinal stenosis is relatively common at the neurosurgical units of the Yaounde General and Central Hospitals. Males and elderly individuals are more affected. The clinical picture is dominated by neck pain and neurological deficit signs which announce the seriousness of the pathology. Patients because of the delay and difficulties in diagnosis need medical and surgical management in order to minimize functional disability. CT and/or MRI are essential imaging techniques in the diagnosis of cervical spinal stenosis.

DECLARATIONS

Conflicts of interest

The authors declare no conflict of interest

Funding

The work was carried out with own funds

Ethical considerations

All stages of the work were carried out in compliance with the Declaration of Helsinki. The approval of the institutional ethics committee was obtained prior to the start of the study.

REFERENCES

1. Gilbert Dechambenoit (2006) Spine pathology, spinal cord, nerve. Neurosurgery Campus: 1/30: http://campus.neurochirurgie.fr/spip.php?article170
2. Farry A, Baxter D (2010) The incidence and prevalence of spinal cord injury in Canada: Overview and estimates based on current evidence. Rick Hansen Institute and Urban Futures.
3. Moutquin JM, Larouche K, Mayot MH, Rossignol M (2013) Traumatic and non-traumatic spinal cord injuries: comparative analysis of the characteristics and organization of rehabilitation care and services in Quebec. ETMIS; Vol 9: 6.
4. New PW, Sundararajan V (2008) Incidence of non-traumatic spinal cord injury in Victoria, Australia: A population-based study and literature review. Spinal Cord 46(6): 406-11.
5. Schönherr MC, Groothoff JW, Mulder GA, Eisma WH (1996) Rehabilitation of patients with spinal cord lesions in The Netherlands: An epidemiological study. Spinal Cord; 34(11): 679-83.
6. MAMMASSE S, MENDIL N (2016) Slow medullary Compression. Medical thesis. Université Abderrahmane Mir De Bejaia (ALGERIE)
7. Hauret L, Graef C, Bellaiche R, Dion AM, Geffroy Y, Bourcier B et al (2005) The spinal intracanal compartments: anatomy, semiology and pathology. Feuillets de Radiologie 45(1) : 37-48.
8. Harris P (1977) Cervical spine stenosis. Paraplegia 15(2):125-32.
9. Hima-Maiga A. et al (2020) Cervical myelopathy at the Era of CT Scan and MRI in Niger. Médecine d'Afrique Noire, 67:457-470.
10. Olarinoye-Akorede SA, Ibinaiye P.O et al (2016) Evaluation and modification of Kang's MRI method of grading cervical spinal canal stenosis among african patients: an initial study. AJNS 35 (2)
11. M. Diomandé et al (2015) Epidemiological and clinical characteristics of cervical myelopathy at the university hospital center of Cocody in Abidjan, Côte d'Ivoire.Rev. méd. Madag 5(1): 501-504
12. Konate, M.B. (2012) Management of cervical spondylotic myelopathy in the neurosurgery department at Gabriel Toure University Hospital. University of Sciences, Techniques and Technologies of Bamako, Mali.
13. Aly Doumbia (2020) Slow Medullary compression (30 cases). Medical Thesis. University of Kankou Moussa de Bamako 117P.
14. Nurick S (1972) The pathogenesis of the spinal cord disorder associated with cervical spondylosis. Brain 95(1):87–100.
15. Loembe P.M et al (2004) Cervical spondylotic myelopathy with functional disability. Long term results concerning 18 patients operated on by anterior approach in Gabon. AJNS 23(1).
16. Kone Issa (2011). Management of vertebro-medullary tumors. Medical thesis. Faculty of Medicine, Pharmacy and Odontostomatology of Mali 57-59.
17. Emel E, Abdallah A, Sofuoglu, Ofluoglu A, Gunes M, Guler B, Bilgic B (2017) Long-term Surgical Outcomes of Spinal Schwannomas: Retrospective Analysis of 49 Consecutive Cases, TurkNeurosurg 27(2):217-225.