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ORIGINAL ARTICLE

Association of the Moore sign with the presence of deep neck abscess of retropharyngeal space

Asociación del signo de Moore con la presencia de absceso profundo de cuello de espacio retrofaríngeo

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Abstract

Background: *Deep neck abscesses can cause life-threatening complications. They are diagnosed by physical examination, and contrasted tomography as the gold standard. There are no studies about the association of Moore's sign with infections of the retropharyngeal space.* **Objective:** *To determine the usefulness of Moore's sign in the diagnosis of deep retropharyngeal abscess.* **Method:** *Observational, analytical, cross-sectional, study of patients with deep neck abscess, from May 1, 2019, to August 30, 2021, with report of Moore's sign.* **Results:** *87 patients were included, 49 (56.3%) males (p = 0.45). Of those who developed complications, 77.8% had a negative Moore's sign (p = 0.001). Of those admitted to the ICU, 72% had a negative Moore's sign (p = 0.001). The sensitivity of the absence of the sign with retropharyngeal involvement was 95.4%, and the specificity was 86.3%. By logistic regression, it was found that those with retropharyngeal involvement are 467 times more likely to present a negative sign (p < 0.05).* **Conclusions:** *The presence of abscess in the retropharynx is associated with complications and a worse prognosis. The evaluation of Moore's sign can be a useful tool to suspect compromise of this space.*

Keywords: *Neck. Deep abscess. Retropharyngeal space. Sign. Physical exam.*

Resumen

Antecedentes: *Los abscesos profundos de cuello pueden ocasionar complicaciones letales. Se diagnostican por exploración física, y la tomografía contrastada es el método de referencia. No existen estudios de asociación del signo de Moore con infecciones del espacio retrofaríngeo.* **Objetivo:** *Determinar la utilidad del signo de Moore en el diagnóstico de absceso profundo en el espacio retrofaríngeo.* **Método:** *Estudio observacional, transversal y analítico, de pacientes con absceso profundo de cuello, del 1 de mayo de 2019 al 30 de agosto de 2021, con reporte de signo de Moore.* **Resultados:** *Se incluyeron 87 pacientes, de los cuales 49 (56.3%) eran de sexo masculino (p = 0.45). De los que desarrollaron complicaciones, el 77.8%, tenían el signo de Moore negativo (p = 0.001). De los que ingresaron a la unidad de cuidados intensivos, el 72% tenían negativo el signo de Moore (p = 0.001). La sensibilidad de la ausencia del signo con afección del espacio retrofaríngeo fue del 95.4%, y la especificidad del 86.3%. Por regresión logística se encontró que aquellos con afección del espacio*

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retrofaríngeo tienen 467 veces más posibilidades de presentar signo negativo (p < 0.05). **Conclusiones:** *La presencia de un absceso en el espacio retrofaríngeo se asocia a complicaciones y peor pronóstico. La evaluación del signo de Moore puede ser una herramienta útil para sospechar compromiso de ese espacio.*

Palabras clave: *Cuello. Absceso profundo. Espacio retrofaríngeo. Signo. Exploración física.*

Introduction

Deep neck abscesses can lead to complications such as mediastinitis, airway obstruction, empyema, and sepsis, causing death[1-3]. They occur more frequently in males[4,5] (55.63%)and at an average age of 40 years[6,7]. The characteristic symptoms consist of fever, increased volume, general malaise, dysphagia, trismus, dysphonia, and dyspnea[1,7]. The involvement of two or more spaces is the most frequent presentation (34.9%)[1], which may affect the retropharyngeal space (RPS)[8,9]. Examination reveals increased volume and tenderness, and there may be Moore's sign[9-11], which consists of pushing the thyroid cartilage posteriorly, making a movement from one side to the other and palpating the crepitation produced by the friction of this structure with the vertebral bodies (normal finding), reporting this as positive if it is present[12]. Contrast-enhanced computed tomography (CT) of the neck is the imaging study of choice for the diagnosis of a deep neck abscess[13,14], with a sensitivity of RPS involvement of 88-91%. To date, there are no studies that evaluate the association of Moore's sign with the presence of deep neck abscess in RPS.

The objective of this study was to determine the association of Moore's sign with the presence of deep neck abscess of RPS.

Method

An observational, cross-sectional, and analytical study was carried out. The study population was patients admitted to the head and neck surgery department, over 18 years of age, with a diagnosis of deep neck abscess in the period from March 1, 2019 to August 30, 2021. The inclusion criteria were patients with a complete clinical record, with Moore's sign in the initial evaluation note, with a neck CT and report of surgical findings. The elimination criteria were patients who did not have a tomographic report or previous neck surgery.

In the statistical analysis, for continuous variables without assumption of normality, a Mann-Whitney U test was performed to identify differences between groups (positive sign or negative sign). For the dichotomous variables, the χ^2 test or Fisher's exact test between groups was used. The sensitivity and specificity of the sign with respect to RPS involvement were calculated, and at the end a multiple logistic regression model was performed to identify the variables associated with the absence of the sign. A value of $p < 0.05$ was considered statistically significant. To analyze the data, the STATA 15.1 software (StataCorp 2017. Stata Statistical Software: Release 15. College Station, TX, USA) was used.

In accordance with Article 17 of the Regulations of the General Health Law on Research (Ley General de Salud en Materia de Investigación), the present study is considered risk-free research. All procedures performed on patients are part of the usual treatment of this pathology, following the Good Clinical Practice guidelines and the regulations in force at the Mexican Social Security Institute. The study was approved by the institution's local research committee.

Results

87 patients were included, of which 38 (43.7%) were female and 49 (56.3%) were male (p = 0.45). There was no age group with a higher prevalence: 29 (33.3%) were under 40 years of age, 33 (37.9%) were between 40 and 60 years of age, and 25 (28.7%) were over 60 years of age. On a bivariate basis, differences were found between the mean days of hospitalization, of 7.9 ± 6.1 and 11.4 ± 7.0, for those who presented the positive and the negative sign, respectively (p = 0.019) (Table 1). Regarding symptoms, 29 (33.3%) patients reported dysphagia, of which 19 (65.5%) had a negative Moore's sign and presence of abscess in the RPS, being significant with respect to those who did not present dysphagia (48 [82.8%]) with a positive Moore's sign, and absence of abscess in the RPS (p = 0.01) (Table 1).

Of the patients who developed complications, 77.8% had a negative Moore's sign (p = 0.001). Of the patient total, 25 (28.7%) required admission to the ICU, and of them, 18 (72%) had a negative Moore's sign

Table 1. Sociodemographic and clinical characteristics

Variable	Total (n = 87)	Moore's sign		p
		Positive (n = 58)	Negative (n = 29)	
Age, A (SD)	49.3 ± 16.9	47.7 ± 17.1	52.3 ± 16.5	0.298[a]
Urea, A (SD)	42.0 ± 29.0	37.5 ± 21.7	51.0 ± 38.7	0.054[a]
Glucose, A (SD)	155.5 ± 107.0	154.8 ± 114.9	156.9 ± 91.0	0.066[a]
Hemoglobin, A (SD)	13.5 ± 2.3	13.9 ± 2.0	12.8 ± 2.8	0.150[a]
Hematocrit, A (SD)	41.1 ± 9.0	42.4 ± 8.6	38.5 ± 9.2	0.173[a]
Platelets, A (SD)	318.2 ± 134.1	316.8 ± 124.1	321.0 ± 154.6	0.659[a]
White blood cells, A (SD)	13.5 ± 5.0	13.1 ± 5.0	14.3 ± 4.9	0.366[a]
Neutrophils, A (SD)	10.7 ± 4.7	10.2 ± 4.7	11.6 ± 4.6	0.199[a]
Neutrophil/lymphocyte ratio, A (SD)	9.1 ± 7.1	8.7 ± 7.0	9.9 ± 7.3	0.224[a]
Days of hospital stay, A (SD)	9.0 ± 6.6	7.9 ± 6.1	11.4 ± 7.0	0.019[a]
Sex, n (%)				
Female	38 (43.7)	27 (46.6)	11 (37.9)	
Male	49 (56.3)	31 (53.4)	18 (62.1)	0.445[b]
CT, n (%)				
RPS positive	21 (24.1)	1 (1.7)	20 (69.0)	
RPS negative	66 (75.9)	57 (98.3)	9 (31.0)	< 0.001[c]
Death, n (%)				
No	83 (95.4)	55 (94.8)	28 (96.1)	
Yes	4 (4.6)	3 (5.2)	1 (3.4)	1.000[c]
ICU admission, n (%)				
No	69 (79.3)	54 (93.1)	15 (51.7)	
Yes	18 (20.7)	4 (6.9)	14 (48.3)	< 0.001[c]
Complications, n (%)				
No	62 (71.3)	51 (87.9)	11 (37.9)	
Yes	25 (28.7)	7 (12.1)	18 (62.1)	< 0.001[b]
Dysphagia, n (%)				
No	58 (66.7)	48 (82.8)	10 (34.5)	
Yes	29 (33.3)	10 (17.2)	19 (65.5)	0.001[b]
Type 2 diabetes *mellitus*, n (%)				
No	55 (63.2)	36 (62.1)	19 (65.5)	
Yes	32 (36.8)	22 (37.9)	10 (34.5)	0.753[b]
Systemic arterial hypertension, n (%)				
No	64 (73.6)	42 (72.4)	22 (75.9)	
Yes	23 (26.4)	16 (27.6)	7 (24.1)	0.731[b]

SD: standard deviation; RPS: retropharyngeal space; A: average; CT: computed tomography; ICU: intensive care unit.
[a]Mann-Whitney U test for independent samples.
[b]χ^2 test.
[c]Fisher's exact test.

(p = 0.001). Mortality was 4.6%, with no difference between presenting the sign or not (p = NS). When calculating the sensitivity of the absence of the sign to the exploration with the involvement of the RPS by CT, it was 95.4%, with a specificity of 86.3%, a positive predictive value of 70% and a negative predictive value of 98%. The deep neck space most frequently involved was the submandibular one, in 64 (73.6%) of the patients. Of those with RPS involvement, 21 (72.4%) had a negative Moore's sign (Table 2).

In the logistic regression model, it was found that, for each unit increase in the urea level, the possibility of presenting negative sign increases by 4% (odds ratio [OR]: 1.04; p < 0.05), and that people with RPS

Table 2. Spaces that were found to be affected during surgery

Space	Total (n = 87) n (%)	Moore's sign		p
		Positive (n = 58) n (%)	Negative (n = 29) n (%)	
Sublingual				
No	83 (95.4)	56 (96.6)	27 (93.1)	
Yes	4 (4.6)	2 (3.4)	2 (6.9)	0.598[a]
Peritonsillar				
No	85 (97.7)	57 (98.3)	28 (96.6)	
Yes	2 (2.3)	1 (1.7)	1 (3.4)	1.000[a]
Masticator				
No	75 (86.2)	53 (91.4)	22 (75.9)	
Yes	12 (13.8)	5 (8.6)	7 (24.1)	0.048[b]
Oral				
No	82 (94.3)	56 (96.6)	26 (89.7)	
Yes	5 (5.7)	2 (3.4)	3 (10.3)	0.328[a]
Parotid				
No	79 (90.8)	53 (91.4)	26 (89.7)	
Yes	8 (9.2)	5 (8.6)	3 (10.3)	1.000[a]
Posterior triangle				
No	83 (95.4)	56 (96.6)	27 (93.1)	
Yes	4 (4.6)	2 (3.4)	2 (6.9)	0.598[a]
Retropharyngeal				
No	65 (74.7)	57 (98.3)	8 (27.6)	
Yes	22 (25.3)	1 (1.7)	21 (72.4)	0.001[a]
Visceral				
No	64 (73.6)	47 (81.0)	17 (58.6)	
Yes	23 (26.4)	11 (19.0)	12 (41.4)	0.025[b]
Submental				
No	72 (82.8)	45 (77.6)	27 (93.1)	
Yes	15 (17.2)	13 (22.4)	2 (6.9)	0.080[a]
Pharyngeal mucosal	80 (92.0)	56 (96.6)	24 (82.8)	
No	7 (8.0)	2 (3.4)	5 (17.2)	0.039[a]
Yes				
Vascular				
No	80 (92.0)	57 (98.3)	23 (79.3)	
Yes	7 (8.0)	1 (1.7)	6 (20.7)	0.005[a]
Parapharyngeal				
No	59 (67.8)	45 (77.6)	14 (48.3)	
Yes	28 (32.2)	13 (22.4)	15 (51.7)	0.006[b]
Submandibular				
No	23 (26.4)	14 (24.1)	9 (31.0)	
Yes	64 (73.6)	44 (75.9)	20 (69.0)	0.492[b]
Prevertebral				
No	86 (98.9)	58 (100)	28 (96.6)	
Yes	1 (1.1)	0 (0.0)	1 (3.4)	0.333[a]

[a]Fisher's exact test.
[b]χ^2 test.

Table 3. Logistic regression model to identify variables associated with not presenting the sign

Variable	OR	p[a]	95%CI
Sex			
Female	1.0		
Male	5.0	0.096	0.7-34.0
CT			
RPS negative	1.0		
RPS positive	467.3	< 0.001	32.9-6627.9
Urea	1.04	0.038	1.00-1.07
Sublingual			
No	1.0		
Yes	13.9	0.036	1.2-161.7
Pharyngeal mucosal	1.0		
No	26.9	0.013	2.0-359.8
Yes			

RPS: retropharyngeal space; 95%CI: 95% confidence interval; OR: odds ratio; CT: computed tomography.
[a]p significant value < 0.05.

involvement by CT are 467 times more likely to present a negative sign than those with CT without RPS involvement (OR: 467.3; p < 0.05) (Table 3).

Discussion

87 patients with a mean age of 49.3 years were analyzed. 56.3% were men, which is in line with the literature (55.63% of cases)[15]. The diagnosis of abscess in the RPS is accompanied by variable and non-specific symptoms[16]. The clinical presentation coincides with that reported in the literature[17], which mentions that there are no specific symptoms. Dysphagia was identified in 33.3% of the patients, of which 65.5% did not present Moore's sign, showing that dysphagia suggests the presence of an abscess in the RPS. It was evident that patients with a negative Moore's sign had a higher rate of complications and ICU requirements, as described in the literature[17], and the mortality rate with any type of affected space was 4.6%, slightly higher than that reported by Harkani et al.[17] in 234 patients in Germany, where it was 2.6%. Regarding the sensitivity and specificity of the Moore's sign for the diagnosis of retropharyngeal abscess, they were similar to those reported by Seer Yee et al.[18] by CT, with a sensitivity of 98.6%, a positive predictive value of 94.7% and a specificity of 67.2%. Patients with RPS involvement showed increased levels of serum urea, which represents protein catabolism and, when elevated, would serve as a marker in patients with the absence of Moore's sign (p = 0.054), which is corroborated with the logistic regression. We must consider that the patients were evaluated by different doctors, and there may be variation in the interpretation of Moore's sign among them. Likewise, the surgical findings could differ since they are determined by the surgeon according to their perspective and experience. To validate our results, we would recommend conducting a new prospective study with a larger sample size.

Conclusions

Retropharyngeal abscess is an emergency due to the complications that may occur if it is not treated in a timely manner. The presence of an abscess in the RPS appears to be associated with a higher rate of complications and a worse prognosis than abscesses located in other deep spaces of the neck. The evaluation of Moore's sign in the emergency room can be a useful tool in combination with imaging studies to diagnose RPS involvement, be able to refer patients to a tertiary center or achieve adequate surgical planning, reducing time and costs of care.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that they have followed their center's protocols on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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