Revista Médica del
Hospital General de México

PERMANYER

Check for updates

ORIGINAL ARTICLE

Empirical antibiotic therapy selection in deep neck abscesses: a clinical experience from March 2024 to April 2025

Abraham Pulido-Cejudo[1], Luis M. Hurtado-López[1], Edgar R. Montes de Oca-Durán[1], Cristobal S. Duarte-Regalado[2], Brian A. Saavedra-Serrano[2], José M. Gómez-González[2], and María T.D. Ortega-Hernández[3]*

[1]*Surgery Service, Clínica de Tiroides;* [2]*Surgery Service;* [3]*General Medical Coordination. Hospital General de México Dr. Eduardo Liceaga, Secretaría de Salud, Mexico City, Mexico*

Abstract

Introduction: *Deep neck abscesses (DNAs) represent a medical emergency that requires timely surgical attention and appropriate empirical antibiotic management. The choice of antibiotics faces the challenge of polymicrobial flora and the growing emergence of antimicrobial resistance.* **Objective:** *The objective of the study is to describe the microbiological distribution and antibiotic sensitivity profile of DNAs in a referral hospital and to propose an empirical antibiotic therapy regimen based on the findings.* **Materials and methods:** *A retrospective, observational, cross-sectional study was conducted that included patients diagnosed with DNAs treated between March 2024 and April 2025. Clinical, microbiological, and therapeutic variables were analyzed. Cultures were processed and antimicrobial susceptibility was determined according to the Clinical and Laboratory Standards Institute standards.* **Results:** *61 patients were included, predominantly male (54.1%), with a mean age of 45.6 ± 17.3 years. Aerobic bacteria were identified in 76% of cases, with Streptococcus spp. (19%) and Staphylococcus aureus (14%) being the most frequent. The highest sensitivity was observed with carbapenems (100 %), amoxicillin/clavulanic acid (82%), and metronidazole (78 %).* **Conclusion:** *The findings support the use of amoxicillin/clavulanic acid or metronidazole as the initial empirical regimen, reserving carbapenems for severe cases or cases of therapeutic failure. Local monitoring of the microbiological profile is recommended to guide therapeutic decisions.*

Keywords: *Deep cervical abscess. Empirical antibiotic therapy. Antimicrobial susceptibility. Neck surgery. Deep infections.*

Introduction

Deep neck abscesses (DNAs) are serious infections that affect the potential spaces bound by the cervical fascia. Its origin is usually related to odontogenic infections, tonsillitis, or oropharyngeal trauma, and its evolution can compromise the airway, cause mediastinitis, or sepsis[1].

Early diagnosis with timely treatment, including surgical drainage removing the focus, reduction of inoculum, and empirical antibiotic therapy, is essential to avoid complications. Given the polymicrobial nature of these infections, antibiotic treatment should cover both aerobic and anaerobic bacteria[2]. However, the initial choice of antibiotic can be challenging in the absence of up-to-date local microbiological information.

Recent studies have highlighted the variability of sensitivity profiles between regions, as well as the importance of host factors such as diabetes mellitus, which has been associated with increased morbidity, hospital stay, and the need for reoperations[3]. In Mexico, recent reports on the bacterial profile and antimicrobial susceptibility of DNAs are scarce. This lack limits the

***Correspondence:**
Abraham Pulido-Cejudo
E-mail: pulidohgm@gmail.com

Date of reception: 22-06-2025
Date of acceptance: 21-08-2025
DOI: 10.24875/HGMX.25000051
Available online: 24-04-2026
Rev Med Hosp Gen Mex. 2026;89(2):69-73
www.hospitalgeneral.mx

0185-1063/© 2025 Sociedad Médica del Hospital General de Mexico. Published by Permanyer. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

possibility of establishing empirical schemes based on local evidence.

Given the high risk of complications and the increasing emergence of resistant strains, it is essential to have studies that support the rational use of antibiotics from the patient's admission. This work provides current microbiological information derived from a cohort of patients treated at the *Hospital General de México Dr. Eduardo Liceaga* (HGM) in the general surgery service in the thyroid clinic, with the aim of optimizing empirical therapy and improving clinical outcomes.

The general objective of the study is to evaluate the clinical and microbiological profile and response to empirical antibiotic treatment in patients with DNAs treated between March 2024 and April 2025. Likewise, it is intended to answer some specific objectives such as to describe the clinical characteristics and comorbidities of patients with DNAs, to identify the microorganisms isolated in the cultures obtained from these abscesses, to determine the antibiotic susceptibility profile of the isolated microorganisms, to analyze the association between comorbidities and clinical evolution, to evaluate the effectiveness of the empirical schemes used, and to propose an initial empirical scheme adapted to the needs of the patients local findings.

Materials and methods

An observational, retrospective, longitudinal, and analytical study was carried out. Records of patients over 18 years of age with a clinical and tomographic diagnosis of DNAs, surgically treated at the HGM in the thyroid clinic, between March 2024 and April 2025, were included. The inclusion criteria were confirmed diagnosis of DNAs by contrast-enhanced tomography, surgical drainage performed at the host hospital, culture with available microbiological result, and complete clinical record. Exclusion criteria were patients with an alternative diagnosis (e.g., cellulitis without collection), cases with negative or contaminated culture, and patients with immunosuppression due to HIV/AIDS, chemotherapy, or transplantation. Data were obtained through review of electronic records and laboratory reports. They were captured in a confidential database. The following demographic variables were collected: age, sex, comorbidities, and study variables: duration of symptoms, location of the abscess, origin of infection (odontogenic, pharyngeal, and idiopathic), culture outcome (microorganisms isolated), antimicrobial susceptibility profile, initial antibiotic regimen and subsequent changes, hospital stay, reoperations, and complications.

Table 1. Comorbidities identified in patients with deep neck abscess

Comorbidity	Patients	
	No.	%
Type 2 diabetes mellitus	24	39.3
Systemic arterial hypertension	15	24.6
Obesity	12	19.7
Chronic kidney disease	3	4.9
No comorbidities	13	21.3

Statistical analysis

Measures of central tendency (mean) and measures of dispersion (standard deviation) were used, as well as the relative and absolute frequencies for qualitative variables. For comparative analysis, Student's t-tests were applied for quantitative variables and Chi-square tests for qualitative variables. A $p < 0.05$ was considered statistically significant and the confidence interval (95% Confidence interval) was obtained. Each test was performed according to groups matched to each other, according to the best result obtained in therapeutic response to the two antibiotics; no more than two were included in each case.

Results

Clinical evaluation

A total of 61 clinical records of patients with a confirmed diagnosis of DNAs were analyzed. The mean age was 45.6 ± 17.3 years, with a range of 18-79 years. 54.1% (33 patients) were men. The most frequent comorbidities were type 2 diabetes mellitus with 24 (39.3%) patients and systemic arterial hypertension with 15 (24.6%); it should be noted that 6 patients had 2 comorbidities: arterial hypertension/diabetes mellitus (Table 1).

The mean time of evolution was 5.2 ± 2.6 days and the mean hospital stay was 9.1 ± 3.4 days. Patients with diabetes mellitus had a mean stay of 11.2 ± 4.5 days, which compared to the group without comorbidities was longer and statistically significant ($p = 0.034$). In patients

Table 2. Relationship between comorbidities and hospital stay in patients with deep neck abscess

Comorbidity	Average stay (days)	p
No comorbidities	7.3 ± 2.8	-
With diabetes mellitus	11.2 ± 4.5	0.034*
With systemic arterial hypertension	10.1 ± 3.9	NS
With both	12.4 ± 4.7	0.029*

*p < 0.05.
NS: not significant.

Table 3. Anatomical location of deep absence in patients

Anatomical space	Patients	
	No.	%*
Submandibular	38	62.3
Parapharyngeal	18	29.5
Retropharyngeal	6	9.8
Multiple spaces	8	13.1

*The percentages add up to more than 100 because one or more spaces are affected.

with both comorbidities, a statistically significant hospital stay was also observed (p = 029) (Table 2). Reoperation was required in 11% of cases. No infection-related deaths were documented.

Etiology and anatomical location

Regarding the origin of the DNAs, 21 (34.4%) patients were odontogenic, 18 (29.5%) were tonsillar, and 22 (36.1%) were of another origin (pharyngeal-cutaneous, etc.). Regarding location, the most frequently affected spaces were the submandibular (62.3%) and parapharyngeal (29.5%), with 13.1% of multispatial cases (Table 3).

Microbiology

13 different bacterial genera were identified. The most frequent microorganisms were *Streptococcus spp.* (19%), *Staphylococcus aureus* (14%), and *Klebsiella pneumoniae* (11%); it is noteworthy that 14% of anaerobic bacteria such as *Peptostreptococcus* spp. and *Bacteroides fragilis* were identified (Table 4).

Table 4. Microorganisms isolated in cultures

Microorganism	%
Streptococcus spp.	19
Staphylococcus aureus	14
Klebsiella pneumoniae	11
Prevotella spp.	10
Fusobacterium necrophorum	8
Peptostreptococcus spp.	6
Escherichia coli	6
Other anaerobes	8
Other aerobes (enterobacteriaceae, etc.)	18

Antibiotic sensitivity profile

82% of the cultures were sensitive to the amoxicillin-clavulanic acid combination and 78% to metronidazole. 11% had resistance to clindamycin and 8% to ceftriaxone. In patients with resistant isolates, the regimen was adjusted to carbapenems or vancomycin (Table 5).

Table 5. Antibiotic sensitivity of major microorganisms

Antibiotic	Global sensitivity (%)
Amoxicillin/clavulanic acid	82
Metronidazole	78
Clindamycin	61
Ceftriaxone	74
Ciprofloxacin	69
Vancomycin	100 (g + only)
Meropenem	100

Discussion

DNAs continue to represent a diagnostic and therapeutic challenge, especially in patients with comorbidities such as diabetes mellitus, in whom the clinical course tends to be more torpid[1,2]. In this study, it is confirmed that the odontogenic etiology is the most frequent,

consistent with what has been reported in other Latin American series[3].

The microbiological spectrum was varied, highlighting the predominance of *Streptococcus* spp. and *S. aureus*, which is consistent with previous studies in which polymicrobial infections are the norm[4,5]. The finding of anaerobes such as *Peptostreptococcus* and *B. fragilis* reinforces the need to include specific coverage in the initial empirical scheme[6].

The combination of amoxicillin with clavulanic acid and metronidazole showed high efficacy against isolated pathogens, which validates its initial empirical use in the absence of risk factors for resistant organisms. It is notable that resistance to clindamycin and ceftriaxone, although not elevated, justifies the need to reevaluate empirical schemes in local contexts[7].

The length of hospitalization was significantly longer in diabetic patients, a finding consistent with other studies suggesting a greater severity of infection and exacerbated inflammatory response in this population group.

DNAs continue to represent a diagnostic and therapeutic challenge, especially in patients with comorbidities such as diabetes mellitus, in whom the clinical course tends to be more torpid[1,2]. In this study, it is confirmed that the odontogenic etiology is the most frequent, consistent with what has been reported in other Latin American series[3].

The microbiological spectrum was varied, highlighting the predominance of *Streptococcus* spp. and *S. aureus*, which is consistent with previous studies in which polymicrobial infections are the norm[4,5]. The finding of anaerobes such as *Peptostreptococcus* and *B. fragilis* reinforces the need to include specific coverage in the initial empirical scheme[6].

The combination of amoxicillin with clavulanic acid and metronidazole showed high efficacy against isolated pathogens, which validates their initial empirical use in the absence of risk factors for resistant organisms. It is notable that resistance to clindamycin and ceftriaxone, although not elevated, justifies the need to reevaluate empirical schemes in local contexts[7].

The hospitalization time was significantly longer in diabetic patients (11.2 ± 4.5 days) and increased when associated with systemic arterial hypertension (12.4 ± 4.7 days). This finding is consistent with other research suggesting increased infection severity and exacerbated inflammatory response in this population group[8]. Previous studies emphasize the need to adjust initial empirical treatment in patients at high risk of therapeutic failure, such as those with diabetes mellitus or deep tissue infections[9]. Mexican authors have stressed the importance of antibiotic selection aimed at high-risk patients, considering not only the pathogen but also the expected clinical response in contexts of comorbidity or increased severity[10].

Conclusion

The empirical choice of antibiotic therapy in DNAs should consider the local prevalence of pathogens and their susceptibility patterns. The combination of amoxicillin-clavulanic acid with metronidazole provides adequate coverage in most cases. Patients with comorbidities such as diabetes require close monitoring and possibly more aggressive or prolonged treatment regimens. It is recommended to strengthen local microbiological surveillance studies to update institutional therapeutic guidelines.

Funding

The authors declare that they have not received funding.

Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. This study does not involve personal patient data, medical records, or biological samples and does not require ethical approval. SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

References

1. Huang TT, Liu TC, Chen PR, Tseng FY, Yeh TH, Chen YS. Deep neck infection: analysis of 185 cases. Head Neck. 2004;26:854-60.
2. Marioni G, Rinaldi R, Staffieri C, Marchese-Ragona R, De Filippis C, Zanon F, et al. Deep neck infections: a study of 365 cases highlighting recommendations for management and treatment. Eur Arch Otorhinolaryngol. 2020;277:967-76.
3. Boscolo-Rizzo P, Marchiori C, Montolli F, Vaglia A, Da Mosto MC. Deep neck infections: a constant challenge. ORL J Otorhinolaryngol Relat Spec. 2006;68:259-65.
4. Eftekharian A, Roozbahany NA, Vaezeafshar R, Narimani N. Deep neck infections: a retrospective review of 112 cases. Eur Arch Otorhinolaryngol. 2009;266:273-7.

5. Wang LF, Kuo WR, Tsai SM, Huang KJ. Characterizations of life-threatening deep cervical space infections: a review of one hundred ninety-six cases. Am J Otolaryngol. 2003;24:111-7.
6. Brook I. Microbiology and management of deep facial infections and Lemierre syndrome. J Oral Maxillofac Surg. 2004;62:491-5.
7. Bottin R, Marioni G, Rinaldi R, Boninsegna M, Salvadori L, Staffieri A. Deep neck infection: a present-day complication. A retrospective review of 83 cases (1998-2001). Eur Arch Otorhinolaryngol. 2003;260: 576-9.
8. Sakaguchi M, Sato S, Ishiyama T, Katsuno S, Taguchi K. Characterization and management of deep neck infections. Int J Oral Maxillofac Surg. 1997;26:131-4.
9. Lodise TP, Heil EL, Friedland I. Management of acute bacterial skin and skin structure infections with a focus on patients at high risk of treatment failure. J Antimicrob Chemother. 2018;73 Suppl 1:i2-i11.
10. Pulido-Cejudo A, Guzmán-Gutierrez M, Jalife-Montaño A, Ortiz-Covarrubias A, Martínez-Ordaz JL, Noyola-Villalobos HF, et al. Management of acute bacterial skin and skin structure infections with a focus on patients at high risk of treatment failure. Ther Adv Infect Dis. 2017;4:143-61.