

## Deep Cervical Abscess Associated with Internal Carotid Pseudoaneurysm and Acute Ischemic Stroke: a case report

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**Research Ethics Committee Approval (if necessary):** We declare that the patient approved the study by signing an informed consent form and the study followed the ethical guidelines established by the Declaration of Helsinki.

Received on: Apr 3, 2022. Accepted on: Apr 27, 2021. Available online: May 2, 2022.

### Abstract

The formation of an internal carotid pseudoaneurysm is a rare complication of upper airway infections, mainly after the advent of antibiotic therapy. Despite the low incidence of this condition, it is an extremely serious and potentially lethal scenario; therefore, the rapid identification and establishment of an effective therapy is vital to patient. Normally, the proposed treatment is an immediate open ligation of the involved artery. Currently, new endovascular techniques have been used in the treatment of this pathology. Unfortunately, even after the establishment of adequate measures in order to contain hemorrhages, many cases evolve to cerebral ischemia, besides other complications. The present study reports the case of a four-year-old boy who presented with a right parapharyngeal abscess, which developed into an internal carotid pseudoaneurysm, treated with embolization. Regardless of the treatment, the patient had an unfavorable evolution, in which he had disease progression with fistula, hemorrhage and consequent acute ischemic stroke (AIS).

**Keywords:** Carotid Artery Injuries; Pseudoaneurysm; Parapharyngeal Abscess; Acute Ischemic Stroke.

### Introduction

Deep neck abscess are a group of potentially severe infections that impact the deep cervical space, characterized by rapid progression and complications,

associated with a high risk of death [1]. Refers to a collection of purulent material, and it is usually associated because of an inflammatory-infectious processes of the head and neck.

Regarding the etiologies of these collections, they are categorized into non-infectious and infectious. Infectious etiologies are the most frequent and they are most represented by the distinct pathologies such as acute or chronic tonsillitis, peritonsillar abscess, odontogenic infection and Bezold's abscess.

The incidence of deep neck abscess is approximately 10/100.000 inhabitants/year, and the most affected regions are: peritonsillar cervical region (26.7%), submandibular/floor of the mouth (22.7%), parapharyngeal (18.8%), retropharyngeal (17.8%), masticatory (7.92%) and jugulo-carotid (3.96%). The age group most frequently involved is the young people aged up to 40 years. The mean age of affected children is 8,4 years, in which males have a slightly higher prevalence [3].

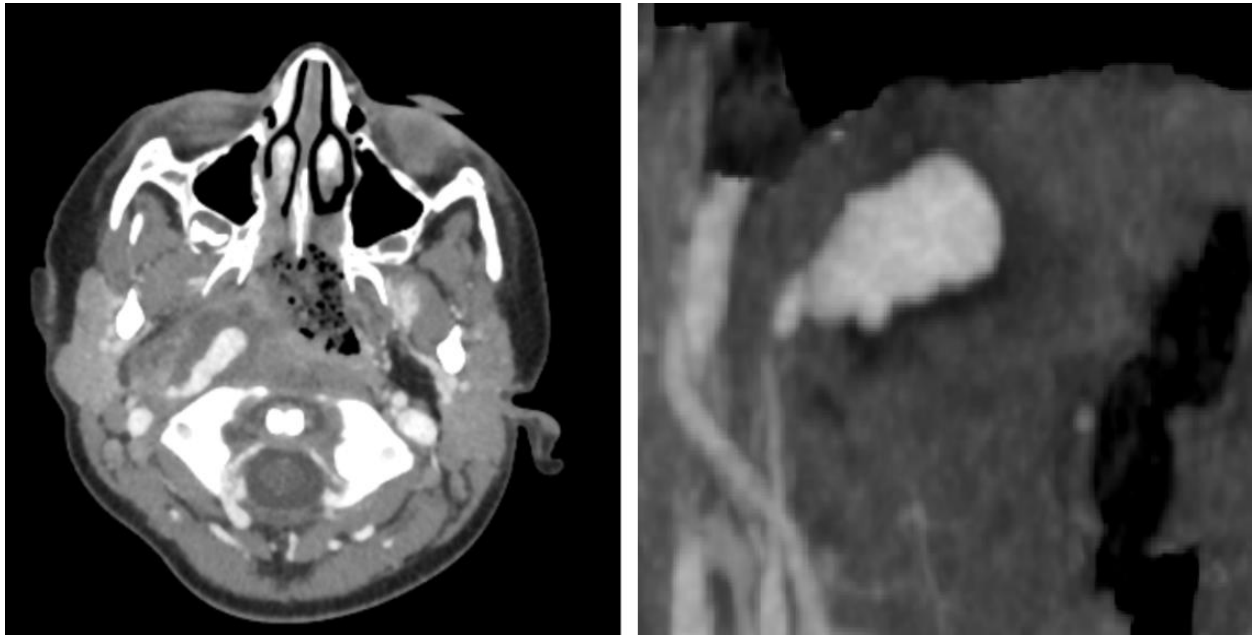
The presented case report discusses the progression of a deep neck abscess in a child caused by a pharyngitis, which resulted in a pseudoaneurysm of the internal carotid artery, a rare and potentially lethal complication, representing a medical emergency. The case had an unfavorable evolution, in which the child had disease progression to fistula, hemorrhage and consequent acute ischemic stroke (AIS).

## Case report

A 4-year-old male child male sought medical care in a local basic

health unit (UBS) with clinical symptoms of neck pain and fever, where he received non-steroidal anti-inflammatory drugs and analgesics treatment. Subsequently, he was admitted to a general-microregional hospital after progression of the condition to bulging in the right cervical region, in addition to large volume nasal and oral hemorrhage. In this period, he was given antibiotic benzathine benzylpenicillin and, during hospitalization, it was started treatment with the compound ampicillin-sulbactam associated with clindamycin.

Computed Tomography (CT) of the cervical region without contrast was performed and revealed an increase in the volume of the right parapharyngeal space with central hypodensity. Due to the persistence of the upper airways bleeding with hemodynamic instability, the patient was transferred to a reference pediatric hospital for an otorhinolaryngological evaluation. Upon the admission to the hospital, the child was submitted to a cervical CT (Figure 1).



**Figure 1.** (A) Contrast-enhanced computed tomography revealed collection in the carotid and parapharyngeal space on the right, in addition to thinning of the internal carotid artery with formation of a pseudoaneurysm near the base of the skull; (B) Magnified image focusing on the pseudoaneurysm in axial section.

Shortly after the imaging exam, he progressed to hemorrhagic shock and needed to be taken to the surgical center, where he underwent angiography, which identified the right internal carotid pseudoaneurysm. This finding was treated with embolization, however, without success.

Regarding this situation, surgical occlusion of the right internal carotid artery was chosen. After the established measures, there was a significant reduction in the volume of the parapharyngeal abscess with consequent resolution of the pseudoaneurysm. Unfortunately, during the hospitalization, the child presented a condition compatible with acute ischemic stroke on the right side,

confirmed by magnetic resonance imaging (Figure 2).

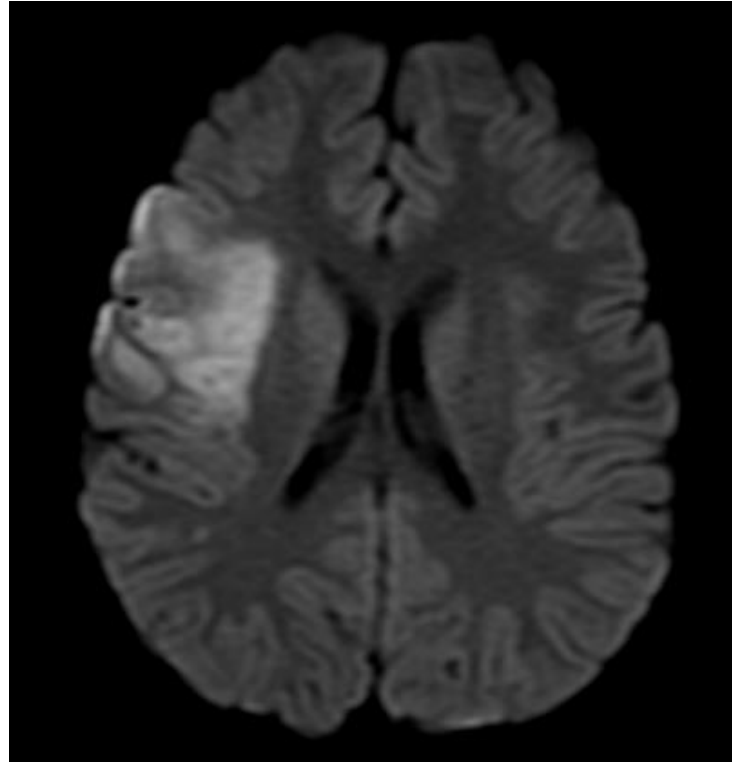
The patient was followed up until hospital discharge, when it was identified neurological sequelae due to impaired ability to name objects – agnosia.

## Discussion and Conclusion

The deep neck abscess had its incidence decreased after the age of antibiotics, however, represents an extremely challenging diagnosis due to its low incidence, which often leads to underdiagnosis. The clinical presentation of this condition is variable and dependent on the affected anatomical location, as well as on the relations with adjacent structures [2].

Clinical symptoms normally include fever (86.1%), neck pain (81.1%), odynophagia (75.2%), cervical edema

(60.3%), trismus (47.5%) and clinical signs of bacteremia (14.8 %) [3].



**Figure 2.** Magnetic resonance imaging (MRI) revealed an area of diffusion restriction in the region of the frontal operculum, insula, inferior frontal gyrus and part of the ipsilateral inferior parietal lobe, consistent with recent ischemia.

Occasionally, these signs and symptoms overlap the clinical features of more common pathologies, such as pharyngitis, tonsillitis and other less serious infections of the upper airways, which result in a delay in the diagnosis. The mean time between the beginning of the clinical manifestations and the diagnosis of deep neck abscess is from eight to 20 days [3].

Brito et al. [3] has proven that the main risk factors for deep neck abscess are: smoking habits, alcoholics, intravenous drug users, diabetics, congenital

cysts and fistulas, tuberculosis, SIDA and head and neck tumors [3]. These risk agents are, in general, not seen in the age group most affected by this pathology; therefore, making the differential diagnosis more difficult.

Untreated deep neck abscess consequences include internal carotid artery pseudoaneurysm, cervical necrotizing fasciitis, internal jugular vein thrombosis, empyema, disseminated intravascular coagulation, mediastinitis, aspiration pneumonia, pericarditis, pleural empyema, arterial wall erosion, air-

way obstruction upper respiratory tract infections and sepsis [3].

Ozono et al. [7] suggested that it is very important and should always be investigated the possibility of pseudoaneurysm complicating a deep neck infection (DPI) if the patient complains of unknown epistaxis after a DPI. Immediate treatment and accurate diagnosis are essential for the best management and outcome of these cases.

Furthermore, the main consequences of untreated pseudoaneurysms include hemorrhage and clot embolization [4]. The mortality rate is 77% if the complication is not treated and 35% if it is correctly managed. Clinical presentation of carotid rupture are oropharyngeal bleeding, typically bright red, rapidly growing neck mass, ipsilateral Horner syndrome, oropharyngeal mucosal ecchymosis, presence of fremitus over the mass, and cranial nerve paralysis (pairs IX and XII) [5].

Contrast-enhanced computed tomography (CT) of the neck is the standard diagnostic method, due to its high sensitivity and the effectiveness to perform the best therapeutic approach. The deep neck abscess approach is based on four main characteristics collection distribution, configuration and mass effect, presence of parietal thickening associated with contrast enhancement, as well as the presence of

possible additional findings [6]. Loss of definition of the carotid artery close to an abscess suggests arterial involvement, as well as prominent enhancement of the central portion of the mass located in the course of the carotid artery indicating the diagnosis of pseudoaneurysm.

CT of the neck was used for establishing which of the neck spaces were involved by infection and to identify deep-neck abscess formation. CT accurately identifies the anatomical location of the abscess, allowing a more precise planing of the surgical approach. Therefore, CT gave an accurate diagnosis of the presence, location and involvement of the internal carotid artery, and the presence of pseudoaneurysm; which was important for the decision to treat with embolization.

Magnetic resonance angiography (MRA) is a non-invasive method of visualizing blood flow through the effects of moving spins on the MRI signal. Thus, the absence of flow signal in the intracranial segments of the right internal carotid artery to the ophthalmic segment associated with the absence of flow void, in this patient, may correspond to occlusion/low velocity flow in these segments [8].

Angiography exam can confirm arterial involvement and allows for the assessment of collateral circulation in the Polygon of Willis beforehand, which

helps in taking the appropriate course of action. In case of hemorrhage, angiography identifies the candidate vessels for intervention. Magnetic Resonance Imaging (MRI) is an excellent alternative to CT, since, due to its excellent sharpness, MRI is superior to CT in assessing the local extent of infection in the deep cervical spaces and their proximity to vessels.

The present case report aims to contribute to the experience and scientific discussion regarding this rare complication of airway infection: deep cervical abscess associated with formation and rupture of internal carotid artery pseudoaneurysm. Despite the lack of scientific discussion due to the rarity of cases about possible complications, airway infection is one of the most diagnosed pathologies in the emergency department and this report contribute to the discussion of similar cases.

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**Conflict of interest:** The author declares no conflicts of interest.

**Acknowledgements:** None.

**Funding:** None.

**How to cite this article:** Ferreira IS, Kepler CK, Dornelles NT, Nin CS. Deep Cervical Abscess Associated with Internal Carotid Pseudoaneurysm and Acute Ischemic Stroke: a case report. *Brazilian Journal of Case Reports*. 2022 Jan-Mar;02(2):134-140.