



Case Series

Usefulness of Procalcitonin in the Management of Partially Treated Deep Neck Abscesses

Utilité du Dosage Plasmatique de la Procalcitonine dans les Abscès Profonds du Cou Décapités

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RÉSUMÉ

Deep neck infections are serious but treatable infections that affect the deep cervical spaces. Patients with deep neck abscesses present with high-grade fever, odynophagia, unilateral sore throat, or otalgia. Late diagnosis is a risk factor for poor outcomes due to a lack of effective diagnostic biological parameters. A correlation of procalcitonin with bacterial sepsis onset and severity has been reported. We present two cases in which procalcitonin levels effectively guided management. Procalcitonin is an affordable and reliable marker that could help diagnose and monitor patients with deep neck abscesses.

ABSTRACT

Les infections cervicales profondes sont des infections graves mais traitables qui affectent les espaces cervicaux profonds. Les patients présentant des abcès profonds du cou présentent une fièvre élevée, une odynophagie, un mal de gorge unilatéral ou une otalgie. Un diagnostic tardif est un facteur de risque de mauvais résultats en raison du manque de paramètres biologiques diagnostiques efficaces. Une corrélation entre la procalcitonine et l'apparition et la gravité du sepsis bactérien a été rapportée. Nous présentons deux cas dans lesquels les niveaux de procalcitonine ont efficacement guidé la prise en charge. La procalcitonine est un marqueur abordable et fiable qui pourrait aider à diagnostiquer et à surveiller les patients présentant des abcès profonds du cou.

INTRODUCTION

Deep neck abscesses are potentially life-threatening infections of the cervical space that commonly arise from local extensions of infections in the tonsils, parotid glands, cervical lymph nodes, and odontogenic structures [1, 2]. Their incidence is high in countries where immunizations and/or early medical intervention for more superficial infections are unavailable [1]. Predisposing factors include immunosuppression, recent oral or dental procedures, neck or oral trauma, surgery or radiation, intravenous drug use, and diabetes mellitus. Their clinical presentation is non-specific, ranging from neck asymmetry, neck masses, lymphadenopathy, trismus, medial displacement of the lateral pharyngeal

wall and tonsil, torticollis, spiking fevers, and tachypnea/shortness of breath. Contrast-enhanced computed tomography (CT) is the gold-standard imaging modality for diagnosing the source and extent of deep neck infection. Biological findings include raised C-reactive protein (CRP) levels, erythrocyte sedimentation rate, procalcitonin (PCT) levels, and leukocytosis with neutrophilia on full blood count [1, 2]. Of these, PCT is a reliable marker in the diagnosis and follow-up of bacterial infections [3, 4]. PCT is produced by the C cells of the thyroid, with pre-PCT as its precursor. In physiologic conditions, PCT levels are very low (<0.05 ng/mL). However, extra-thyroid synthesis in the liver, pancreas, kidney, lung, intestine, and leukocytes occurs due to circulating cytokines such as interleukin (IL)- 6,

tumor necrosis factor (TNF)-alpha, and IL-1b, increasing its levels up to 100 to 1000 fold [5]. PCT levels increase steadily in the two to four hours following bacterial sepsis with a half-life between 20 to 24 hours. Moreover, PCT levels decrease by 50% over 24 hours, making it a reliable marker for sepsis follow-up [5]. Although its role has been studied in sepsis diagnosis and follow-up, its indication in ear, nose, and throat (ENT) infections remains unclear. We report two cases of deep neck abscess in which PCT was a reliable diagnostic and monitoring marker.

CASE 1

Woman 49 years old, teacher, with history of pelvic mass fibrosis and pelvic pain since one week. Received in emergency at the Central Hospital of Yaounde with Painful right side-cervical swelling, associated with Odynodysphagia, Dysphonia. Parameters: T°: 37.8 C; BP: 116=70 mm hg; Pulse = 70 beats/min, the oral examination was normal. Additional examinations CRP: 48 mg/l, CBC: leukocytosis with neutrophil predominance, HIV serology: negative, . The Diagnosis of decapitated retropharyngeal abscess was made. Intra-hospital medical treatments:- Cephalosporin 3rd: 1 g/12h IVDL- Imidazole: metronidazole 500mg/08h IVDL- Paracetamol1g/08h IVD. Evolution D2 D3: regression of clinical signs: dysphagia . D8 : appearance of a large inflammatory plaque cervical ultrasound show 2mm collection. D10 : PCT dosage 0.5 ng/ml authorized output with an oral relay D20: CRP lower 6mg/l; normal pelvic ultrasound.

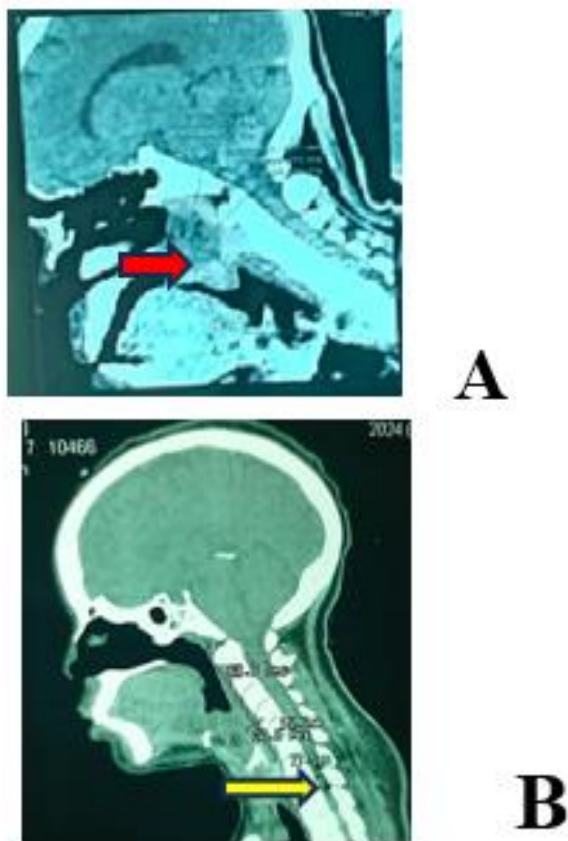


Figure 1 : CT scan of patient 1

CASE 2

42 year old man with history of dental pain + self-medication received in the emergency room for Odynophagia left cervical swelling Associated with: dysphonia with hoarse voice type Parameters: T°=36.5°C, TA: 126/81 mmhg FR: 16 cy/min Left submandibular swelling, firm, fixed deep plane Swelling posterior third of the left hard hemi-palate invading the soft palate of soft consistency pushing the amygdala downwards and inwards white puncture Nasofibroscope: normal Assessments: CRP= 170 mg/l CBC = leukocytosis with neutrophil predominance Procalcitonin: 33.80 ng/ml HIV serology: negative Blood sugar: 1.48g/l Diagnosis: Peripharyngeal abscess Intra-hospital medical treatments:- Cephalosporin 3rd: 1 g/12h IVDL- Imidazole: metronidazole 500mg/08h IVDL- Paracetamol1g/08h IVD Evolution:D2: regression of odynophagiaD5: reduction in the arch of the palate + submandibular swellingD10: almost complete regression of symptoms and discharge authorized

DISCUSSION

Deep neck abscesses are deep infections of the cervical space that are a life-threatening emergency. The clinical diagnosis of deep neck abscesses is challenging, and diagnosis is based on clinical and radiological findings, and co-morbidities must be considered. Symptoms are variable and non-specific. Some patients may be asymptomatic, especially those with immunosuppression or partially treated infections, as seen in our two cases. Deep neck abscesses are often associated to severe biological inflammatory response, but until recently, there was no biological indicator other than CRP that could reflect disease severity [6]. Our patients presented with a biological inflammatory syndrome, with elevated CRP levels, leukocytosis, and neutrophilia. Although CT is useful for diagnosis, it may not differentiate a pure infection from a superinfected or uninfected tumor (Hounsfield units). Depending on the abscess size (≥ 2 cm in children) and presence of comorbidities, antibiotic therapy and/or surgical drainage of the abscess may be considered in treating non-specific deep neck abscesses. Our patients had no comorbidities, and therefore received medical treatment.

Deep neck abscesses are associated with significant morbidity and mortality. In a study of 234 adults with deep neck infections in Germany, the mortality rate was 2.6% [7]. The cause of death was mainly sepsis with multiorgan failure. Given the high morbidity and mortality associated with delayed antibiotic initiation in deep neck abscesses, antibiotics should be started early and are therefore empirical. This leads to multiple, prolonged antibiotic use, even in patients who may not need them, with the associated risks (e.g., side effects, antibiotic resistance, and high cost). Complementary tools to improve the initial diagnosis and follow-up of infection in these patients would therefore be extremely useful.

PCT, a biomarker whose results can be obtained in less than 20 minutes, has recently been introduced in many

hospitals in Europe, America, and Africa (Cameroon 2022). The PCT assay is performed on small quantities of plasma or serum using an automated “immuno-assay” (Brahms Diagnostic, Berlin, Germany). Quantitative testing is performed via the traditional immunoluminometric method (LUMITest® Brahms) that costs averagely 35,000f CFA in Cameroon. Although its role as a sepsis marker has been widely studied in pediatrics and intensive care (above 500 publications since the mid-90s), its indication in ENT emergencies is not well codified. In a meta-analysis of twelve publications, Simon et al. concluded that PCT has a better sensitivity and specificity than CRP (88% vs. 75% and 81% vs. 67%, respectively) [8]. Other markers such as TNF, IL-6, and IL-8 have been studied, but their diagnostic utility has not been demonstrated due to their low sensitivity and/or specificity.

CONCLUSION

Use of PCT in the initial assessment of a patient

PCT levels below 0.2 ng/mL eliminate the possibility of a bacterial infection. PCT levels above 2 ng/mL predict the onset of complications and therefore guide clinicians' decision making in patient treatment. PCT levels of >1–3 µg/L are a marker of infection severity [9], as seen in our second patient. There are situations wherein increased PCT levels do not suggest bacterial infection. False positives have been identified in patients with polytrauma, burns, heat stroke, or who have undergone major surgery. It is important to exclude such conditions

to properly interpret the results. For a bacterial infection to cause a significant rise in plasma PCT levels (>1–2 µg/L), it must be associated with a systemic inflammatory response syndrome (SIRS). In the absence of SIRS (circumscribed or localized infections), PCT levels are generally lower (0.25–1 µg/L) [10].

Use of PCT in re-evaluating patients with fever

PCT levels at the time of clinical re-evaluation could help distinguish fever of unknown origin patients with an occult bacterial infection requiring continuation of empirical antibiotic therapy (PCT >0.5 µg/L) from those requiring early cessation of antibiotics (PCT <0.5 µg/L). This was the case of patient 1.

Comparison with other biological parameters

In a meta-analysis of 14 studies published in 2011, the most effective approach was a combination of CRP, PCT, and blood culture (positive probability ratio=4.92) [11].

Decision tree for plasma PCT measurement in patients with suspected sepsis

If PCT levels are above 2 µg/L and causes of false positives have been excluded (major surgery, recent polytrauma, heat stroke, or burns), the diagnosis of bacterial sepsis is highly probable. If PCT levels are above 10 µg/L, the diagnosis of sepsis (generally severe or septic shock) is almost certain. If PCT levels are between 0.5 and 2 µg/L, the diagnosis is uncertain. In this case, it is recommended to repeat PCT measurement the following day. A decision chart is shown in Figure 2.

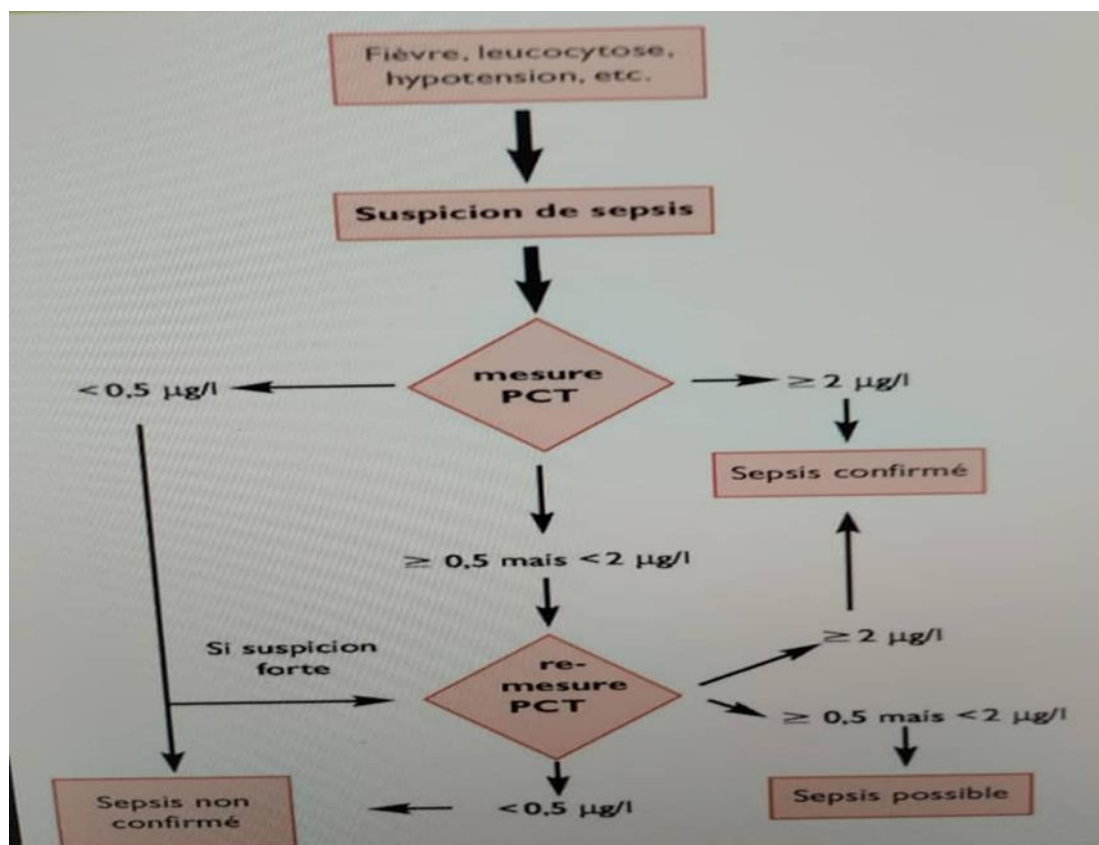


Figure 1 : Decision chart for procalcitonin measurement

PATIENT CONSENT

The patients gave their informed consent in writing.

COMPETING INTERESTS

The authors declare that they have no competing interest.

AUTHORS' CONTRIBUTIONS

All authors contributed to the writing of this article.

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