

Ultrasonographic Diagnosis of Recurrent Occipital Neuralgia Caused by Venous Plexus Enlargement

Introduction

According to the International Headache Society (IHS), occipital neuralgia is defined as a paroxysmal stabbing pain, with or without persistent aching between paroxysms, in the distributions of the greater, lesser, and third occipital nerves and sensory disturbances which usually improve with local anesthetic infiltrations of the nerve (Cho JC et al. *J Ultrasound*. 2012; 31(1):37–42).

The pain starts in the occipital region and radiates to the vertex region. It is usually unilateral and can also affect other areas like retroauricular, frontal, temporal and parietal zones.

Many etiologies that are associated with this pathology such as trauma, infections, tumors, rheumatoid arthritis, neuralgia post-surgery and vascular malformation, among others, which have been described (Samer Narouze. *Headache*. 2016,56(4): 801–7; Cesmebasi A et al. *Clin Anat*. 2015, 28(1):101–8).

It has been reported that the greater occipital nerve (GON) is affected in 90 % of cases. The GON mostly originates in C2 (in minor part from C3) and then it continues between the obliquus capitis inferior muscle and the semispinalis capitis muscle. Then, it extends to the trapezius and pierces the semispinalis capitis at the level of superior nuchal line where the nerve becomes subcutaneous in this plane. The GON is medial to the occipital artery. However, it has been described with variations in its itinerary.

Due to the subcutaneous location of the GON, ultrasound is useful to visualize it and this allows identification of abnormal structures that can produce entrapment of the occipital nerve. Apart from that, it can be useful when precision is needed for occipital nerve blocks (Samer Narouze. *Headache*. 2016, 56(4):801–7).

In this article we describe the case of recurrent occipital neuralgia in which we decided to perform ultrasonography and we observed venous plexus enlargement and entrapment of the GON, causing the headache.

Case Description

An 83-year-old woman with refractory bilateral occipital neuralgia was referred for ultrasound-guided occipital nerve block (ONB).

She had a past medical history of hypertension, hyperlipidemia and hypothyroidism. There was no previous history of neck surgery or any relevant trauma.

The patient was diagnosed 2 years ago in our neurology department with bilateral occipital neuralgia according to the IHS criteria, and was successfully treated with repeated ONB at the level of the superior nuchal line, but she required further infiltrations every few months due to recurrence.

High-resolution ultrasonography (HRUS) was performed with the patient in a seated position, and the probe was placed along the long axis of the obliquus capitis inferior muscle (OCI) for the bilateral evaluation of the GON, which is identified in a high percentage of subjects as a hypoechoic circle or oval structure in the fascial plane between the OCI and semispinalis capitis muscle (SSC) (► **Fig. 1a**).

In our patient, in the fascial plane between the OCI and SSC, an abnormal tortuous vessel was identified bilaterally, preventing identification of the nerve trunk (► **Fig. 1b**). The Doppler signal revealed low flow velocities and resistance, consistent with a venous vessel (► **Fig. 1c**). Similar findings were noted when the patient was placed in the prone position.

A contrast-enhanced CT scan of the neck was performed and confirmed the presence of bilateral tortuous venous vessels in the posterior deep cervical plane, between the oblique and splenius muscle planes, consistent with the diagnosis of venous plexus enlargement. The study also showed evidence of degenerative changes in the cervical spine with no other structural abnormalities (► **Fig. 1d and e**).

Given this finding, deep infiltrations were not performed at this level due to the possible risk of hemorrhage.

The patient continued with her habitual revisions in the neurology consults every 2–3 months to continue superficial infiltrations with similar efficacy.

Discussion

In occipital neuralgia the greater occipital nerve (GON) is affected in 90 % of cases. It is a clinical diagnosis and no specific cause is observed in most patients. However, in some patients, an etiology could be identified (rheumatoid arthritis, tumors, vascular malformations, etc.) (Samer Narouze. *Headache*. 2016, 56(4):801–7; Cesmebasi A et al. *Clin Anat*. 2015, 28(1):101–8).

The GON can be affected in several locations from its origin in C2 between atlas and axis until it becomes subcutaneous.

Ultrasonography is a safe method for examining the GON. There are several ways to do this procedure and the most important thing is to correctly identify the nerve. Taking this into account, there are studies that have correlated the findings in ultrasonography with unembalmed cadavers, confirming these findings (Cho JC et al. *J Clin Ultrasound*. 2010;38(6):299–304). Due to entrapment, the nerve could have an increase in cross-section but there is no relationship with the Headache Impact Test yet (Cho JC et al. *J Ultrasound*. 2012; 31(1):37–42).

The examination can be performed at the nuchal line or at its origin in C2. In our case, the GON was visualized in the posterior deep cervical plane and it was made to be more precise to guide occipital nerve block. It was incidentally discovered that the patient had venous plexus enlargement causing entrapment of the GON that could explain the frequent headaches despite the infiltrations.

In the literature we could only find one article describing a case of an abnormal vein with sonographic visualization of the GON and where the image is available (Samer Narouze. *Headache*. 2016;56(4): 801–7).

In our case, thanks to the ultrasound scanner, venous plexus enlargement was

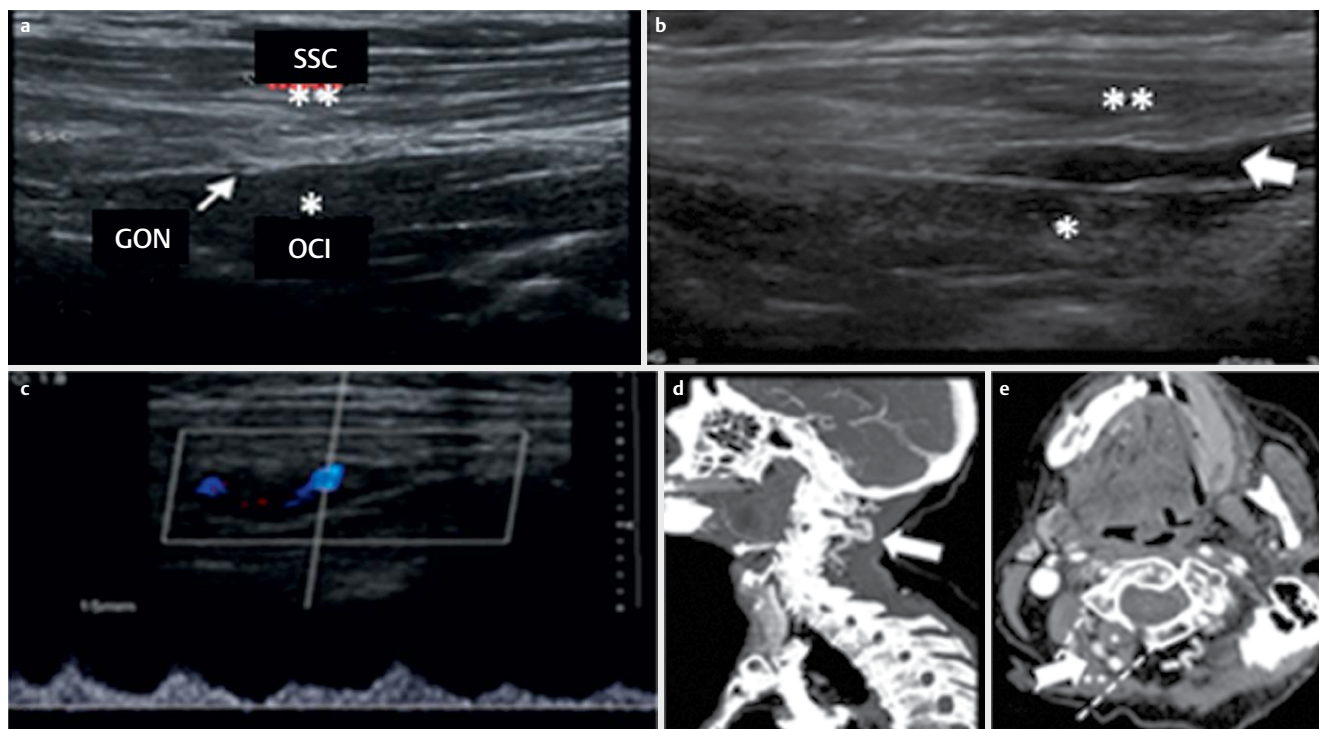


Fig. 1 **a** In normal patients the GON is identified between the Obliquus capitis inferior muscle (OCI) and semispinalis capitis muscle (SSC) (* OCI; ** SSC) as a hypoechoic round small structure (arrow); **b** In our patient there is a structure that prevents locating of the GON (arrow); **c** The Doppler signal indicates a venous vessel; **d** and **e** CT scan of our patient that confirms venous plexus enlargement in the cervical region (arrows).

discovered and we continued with superficial infiltrations due to the high risk of hemorrhage and the absence of surgical solutions.

Therefore, HRUS allows identification of the GON and serves as a guide for its infiltration in cases of occipital neuralgia it can also be useful for identifying associated structural abnormalities, thereby avoiding adverse side effects of the nerve block. However, this technique should not be done routinely because, although it is not an invasive technique, it is time-consuming and does not provide any benefits in most cases. Therefore, patient selection is recommended.

Compliance with Ethical Standards

This article does not contain any studies with human participants or animals performed by any of the authors. Informed consent was obtained from all participants included in the study. There was no external funding in the preparation of this manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

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