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Occipital neuralgia: possible failure of surgical treatment – case report

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Abstract

Surgical intervention in severe cases of occipital neuralgia should be considered if pharmacological and local nerve blocking treatment fail. The literature suggests two types of interventions: surgical decompression of the greater occipital nerve (GON) from the entrapment site, as a less invasive approach, and neurotomy of the nerve trunk, which results in ipsilateral sensation deficits in the GON innervated area of the skull. Due to anatomical variations in the division of the GON trunk, typical neurotomy above the line of the trapezius muscle aponeurosis (TMA) may not result in full recovery.

The present study discusses a case of a female treated with GON decompression as a result of occipital neuralgia unresponsive to pharmacotherapy, who thereafter was qualified for two consecutive neurotomies due to severe relapse of pain.

Key words: *greater occipital nerve, nerve decompression, operative treatment, neurotomy.*

Introduction

Occipital neuralgia symptoms are linked with the greater occipital nerve (GON) and appear on any segment of its anatomical course. The most frequent cause of them may be the entrapment syndrome of the nerve stem due to, for example, post-traumatic scarring in tissue or lack of space where the nerve perforates the trapezius muscle aponeurosis (TMA) [1,2]. Occipital neuralgia can be caused by pathological processes occurring in a close relationship with nerve roots in the upper segments of the cervical spine, and can also be caused by less frequent causes such as arterio-venous dural fistula in the cranio-vertebral junction area [9], cavernous angioma of the medulla [4], tumours [3,7] or a herpes zoster virus infection [10,15,20,23].

It is possible that an important part in the aetiology of the disease is played by a close neurovascular relationship – vascular compression of the greater

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occipital nerve (GON) – and additional factors caused by tissue injuries [12]. In situations of inefficiency of pharmacological treatment or due to frequent need of nerve blocks it is necessary to consider surgical treatment. Literature referring to the disease's aetiology states that it is possible to take firstly into consideration nerve decompression as a less invasive procedure and secondly cutting of the nerve stem, which causes loss of feeling in the occipital region [2,8,18,22,29]. It is important to realize that cutting of the nerve in the typical recommended places, i.e. very close to the nerve stem exit from the perforated TMA into the epicranium, does not always bring total elimination of the suffering. Failure of the treatment could be linked to the anatomical variability of the GON stem and the level at which it divides into the main occipital nerve branches. The schematic anatomical course of GON is presented in Fig. 1.

In this report we present a case of a patient treated with microsurgical decompression of GON and subsequent occipital neurotomy after relapse of pain symptoms.

Case presentation

A 30-year-old woman was admitted to the Neurosurgical Department due to an increase of pain in the right occipital region. After clinical examination occipital neuralgia was diagnosed. The acute symptoms of severe head pain had been treated pharmacologically without success. At first, in the outpatient department, nerve blocks were made using a 2% xylocaine solution in the place where TMA is perforated by the right occipital nerve, 20 mm laterally from the midline. Blocking the occipital nerve did not attenuate symptoms of the occipital neuralgia recurrence, but it was possible, for a short period, to achieve total anaesthesia of the occipital region innervated by GON. Administration of the anaesthetic agent in the above-mentioned way also constituted a diagnostic blockade.

Magnetic resonance imaging of the upper part of the spine and craniocervical junction were performed in order to exclude symptomatic neuralgia.

The patient was qualified for surgery. The procedure was performed using the microscopic technique. A straight incision was made 20 mm right of the midline, length of 60 mm, reaching approximately 25 mm below the horizontal line drawn in the area of the external occipital protuberance. Anatomically, GON perforates the trapezius muscle aponeurosis exactly in this place. In the first stage, the nerve was precisely localized, and it was visible that the place of the aponeurosis perforation was not the place of the entrapment; the occipital nerve was perfectly visible and movable. With the microsurgical preparation of the distal part of the nerve and its branches it was possible to detect tissue scarring into which two of the three nerve branches were embedded together with the occipital artery. Cicatricial changes and a close relation between vessel and nerves were visible over the length of approximately 20 mm. Decompression of GON and the occipital artery was performed with the microsurgical technique. The anatomical structures were separated from each other with Tachocomb pledgets. After surgery, the pain disappeared and the patient had a slight decrease of feeling in the occipital region with paraesthesia.

Relapse of symptoms occurred after one month. The patient was admitted to the Neurosurgical Department and qualified for occipital neurotomy. A number of nerve blocks were administered for diagnostic purposes. The surgical procedure was performed with the microsurgical technique; the nerve was cut slightly above the passage through the aponeurosis TMA. The entrapment changes were not visible in the place of TMA perforation by GON or, after preparation of the aponeurosis, within about 10 mm alongside the nerve. Cicatrices in the place of decompression intensified, and the Tachocomb was absorbed. The proximal end of the nerve, which was cut off, was covered with a non-absorbable suture.

Post-operatively a lack of pain in the occipital region and anaesthesia according to innervation by the right-side occipital nerve (GON) were observed; however, the patient complained about pain in the post-operative wound. She was discharged on the second day after the surgery and returned for removal of the suture. Unfortunately, return of pain of the occipital neuralgia type was observed. The pain symptoms localized on the right side, within a band 15 mm wide, close to the midline in the occipital region. The rest of anatomical innervation of GON after the nerve cutting was lost and permanent anaesthesia was obtained.

Two months after the second surgery the patient was again operated on with the microsurgical technique. Below the previous inspection place, approximately 15-20 mm below the TMA, an occipital nerve branch was localized, branching out in the medial

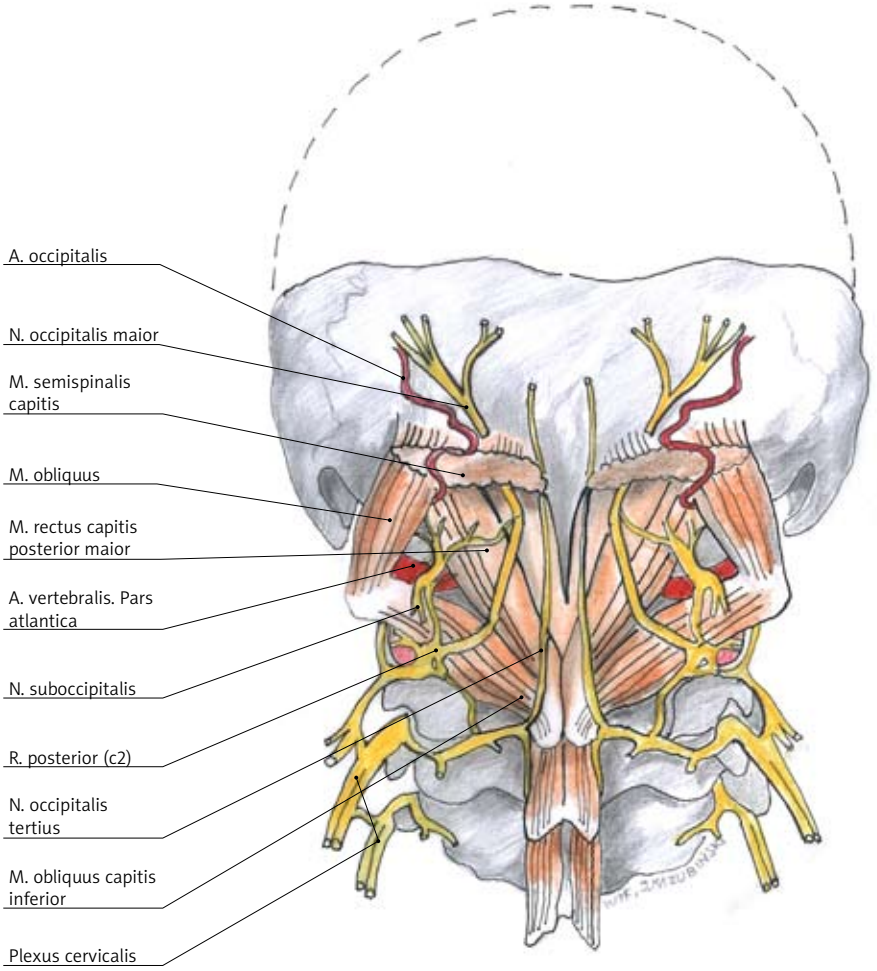


Fig. 1. Anatomical course of GON

direction, and perforating the aponeurosis approximately 5 mm from midline. The nerve was cut below the division and the stump was covered with a non-absorbable suture. After the surgery permanent elimination of pain was obtained. The patient is in follow-up in the outpatient department for 6 months.

During the last operation a sample of the GON was taken for histopathological examination.

Histologically, longitudinal sections of the surgical specimen revealed two small nerve trunks with variously advanced axonal degenerative changes, including acute Wallerian degeneration (Fig. 2), dispersed thinly myelinated or demyelinated axons and depletion of nerve fibres (Fig. 3), and focal proliferation of conjunctive tissue associated with loss and degeneration of nerve fibres (Figs. 4A,B).

Discussion

Patients with occipital neuralgia are qualified for surgical treatment after diagnostic blocks [8,12-14,21,25,29]. In the presented case, following each block, made in the above-mentioned way, an anaesthetic effect was obtained, and the pain and feeling was eliminated (for a short period) in the area innervated by GON. Since a permanent sensory loss in the occipital region means great discomfort, it is necessary to consider exactly the qualification, and, if possible, to perform vascular nerve decompression. Important here is a selective microsurgical procedure allowing identification of the nerve, localization of the possible entrapment syndrome of GON and a possible conflict between the nerve and the occipital artery [26,32].

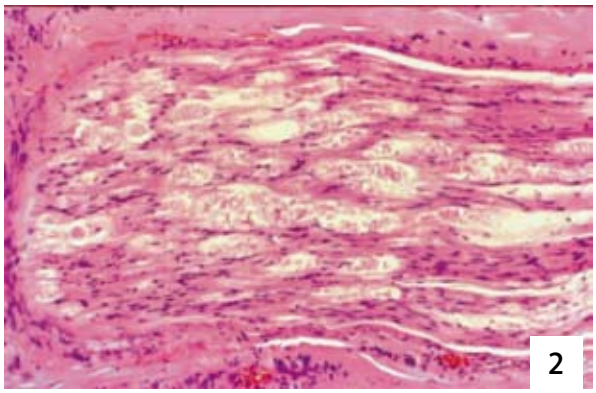


Fig. 2. Wallerian degeneration of the nerve. HE. ×200

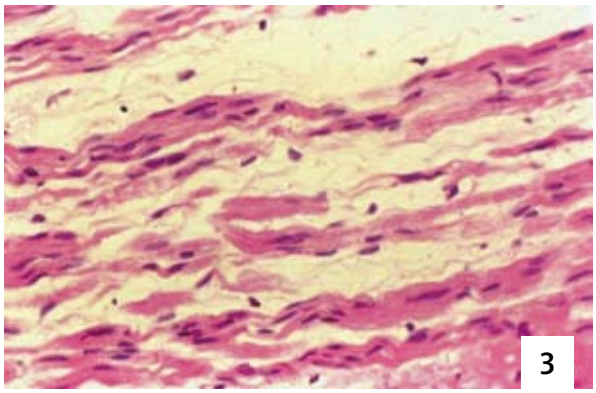
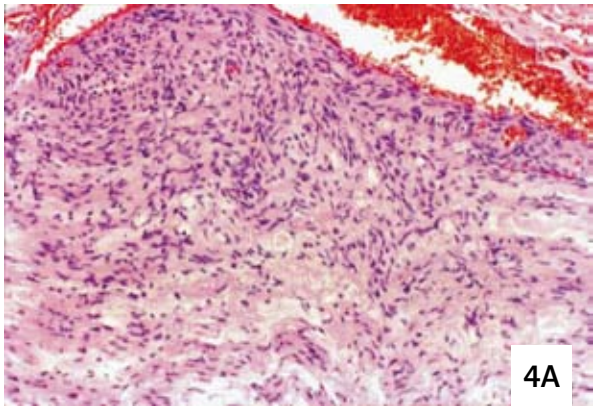


Fig. 3. Dispersed loss and demyelination or re-myelination of nerve fibres. HE. ×400



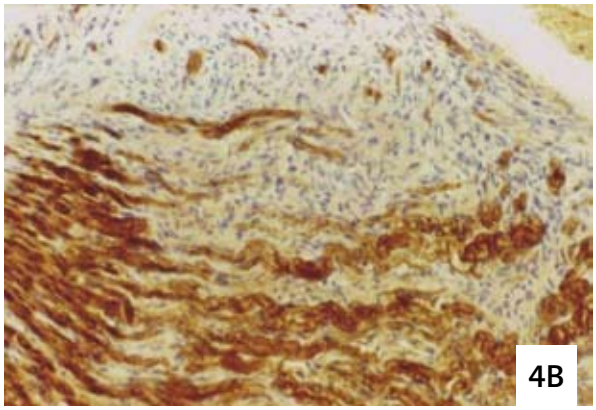


Fig. 4. Degenerated nerve fibres replaced by conjunctive tissue. A. HE. ×200; B. immunohistochemical stain for myelin basic protein ×200

It is indispensable to obtain the anamnesis about a possible injury in the occipital area, which may cause a subcutaneous tissue scar [16,27]. In the presented case histological study of the distal branches of the occipital nerve evidenced both acute Wallerian degeneration, related to recent neurotomy and, moreover, degeneration and loss of nerve fibres, presumably related to longstanding nerve injury. It could be postulated in such conditions that abnormal sensitization of the intact nociceptors, sharing innervation territory of the injured nerve, could play a role in maintaining the pain state [5,6]. It is important, in the surgical treatment, to take into consideration the kind of insulation material, since Tachocomb does not meet expectations. In cases of a neurovascular decompression of the trigeminal nerve, we use Teflon wool, pledgets or Teflon fibres in our department.

Pre-operative imaging diagnostics are very important in occipital neuralgia [11,13,19]. The above-mentioned pain symptoms can be caused by various diseases such as expansive processes, cavernous angioma, or arterio-meningeal fistula [3,4,7,9,17]. Occipital neuralgia could be pathophysiologically connected with the so-called trigeminocervical complex [27,28]. Additionally, activation of distal connections of sensory nerves in many regions in the head can possibly add difficulties to clinical diagnostics.

Precise localization of the occipital nerve from the anatomical and functional point of view is crucial for effective treatment. A transparent anatomical course is important for making a selective diagnostic nerve stem block. GON shows anatomical variability, without differences in its course in men and women [18,21,24,30,31]. Anatomical differences are connected

with the places of TMA perforation by the nerve on the right or left side, and they can reach 20 to 30 mm from the midline. Recent anatomical observation shows that in approximately 10% of the sectioned cases, the occipital nerve could be divided below the perforation of the TMA, and rejoining of it into one bundle above the perforation of TMA can occur as well [18]. Diagnostic blocks producing temporary loss of nerve function are made on the basis of the knowledge of the nerve course, and it is important to try to administer the anaesthetic agent selectively in the immediate nerve. From the point of view of reaching a good post-operative effect and the knowledge of anatomical variability of the occipital nerve, the diagnostic block has limited importance. It is essential to perform the surgical procedure with the microscopic technique and to consider performing, in the first stage, nerve decompression. An important thing is to visualize the nerve course, to localize the potential place of entrapment syndrome, since the microscopic technique allows precise identification of small sensory branches of the nerve.

The presented case supports anatomical information about the possibility of division of the occipital nerve below the line of TMA and shows the necessity of preparation of the aponeurosis and visualization of GON at the length of 15 mm below the aponeurosis line. This procedure allows one to avoid failure in the efficient treatment of occipital neuralgia.

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