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CO₂ Laser for the Treatment of Auricle Schwannoma: A Case Report and Review of the Literature

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ACDE 1 **Domenico Testa**
BCEF 1 **Michele Nunziata**
ACD 2 **Gelsomina Mansueto**
BDEF 1 **Giuseppina Marcuccio**
ACD 1 **Gaetano Motta**

1 Department of Anesthesiology, Surgery and Emergency Science, Head and Neck Unit, University of Campania "L. Vanvitelli", Naples, Italy
2 Department Pathologic Section of the Advanced Biomedical Sciences Department, University of Naples "Federico II", Naples, Italy

Corresponding Author: Giuseppina Marcuccio, e-mail: giuseppina.marcuccio@unicampania.it
Conflict of interest: None declared

Patient: Male, 23
Final Diagnosis: Auricular schwannoma (root of the helix)
Symptoms: Erythematous neoplasm
Medication: —
Clinical Procedure: Surgery
Specialty: Otolaryngology

Objective: Unusual clinical course
Background: Schwannoma, also called neuroma or neurolemmoma, is a tumor originating from the Schwann cells surrounding the nerves. It is an isolated benign tumor and its transformation into malignant cancer is very rare. Relatively uncommon, it is only the 5% of all the tumors of soft tissues. Its localization in the head and neck region accounts for up to 25–45% of schwannomas. In the outer ear, it commonly involves the external auditory canal, while auricle and tympanic membranes are very rare localizations of schwannomas.



Case Report: We report a case of a 23-year-old male with a 3-year medical history of a growing neoplasm located in the left auricle concha, which was treated with a carbon dioxide laser (CO₂ laser) under local anesthesia.

Conclusions: Using a CO₂ laser allowed us to easily remove the tumor, reduce bleeding and surgical time, and avoid sutures and thus unsightly scars on the face. No complications and no relapse at 5 years of follow-up occurred.

MeSH Keywords: Ear Neoplasms • Lasers, Gas • Neurilemmoma

Abbreviations: CO₂ laser – carbon dioxide laser; NF – neurofibromatosis; ENT – ear nose and throat; SMA – smooth muscle actin; anti-HMB45 – antibody anti human melanoma black 45; anti-Mart 1 – antibody anti melanoma antigen recognized by T-cells 1

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/916714>

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Background

Schwannoma, also called neuroma or neurolemmoma, is a tumor originating from the Schwann cells surrounding the nerves; however, the olfactory and optic nerves are excluded because Schwann cells are not present [1–3]. It is an isolated benign tumor and its transformation into malignant cancer is very rare; it can occur at any age but mostly occurs in people between 20 and 50 years old; relatively uncommon, it represents only 5% of all the tumors of the soft tissues and the localization of this lesion in the head and neck accounts for up to 25–45% of schwannomas [1–4].

The vestibular nerve is more frequently involved, even if these lesions could originate in other sites such as the middle ear, the mastoid cavities, the air sinuses, the orbit, the neck, the parapharyngeal space, and the skullbase [1–3]. Von Recklinghausen's disease or neurofibromatosis (NF) is a genetic disorder associated with Schwann cell neuroma and NF is distinguish as NF type 1 (NF1), type 2 (NF2) and schwannomatosis; in NF2, the vestibular nerve schwannoma occurs in both ears [1–3].

In the outer ear, it commonly involves the external auditory canal, while it is rarely localized in the auricle and tympanic membranes [5,6]. The majority of outer ear neuromas originate from the external auditory canal, and pinna involvement is rare [7–10]. Tumors of the outer ear typically originate from glandular tissue (20%), hypertrophic scar (12.6%), fibrous accessory ear (9.5%), chronic inflammation-nevus (7.9%), keloid (6.3%), hemangioma (4.7%), and skin tag-seborrheic keratosis (3.1%) [11,12]. These tumors occur most commonly on the lobule (44.4%) followed by the tragus (20.6%), crus of helix (11.1%), triangular fossa (6.3%), crus of antihelix-antitragus (3.1%), and scapha (1.5%) [11,12].

International literature reports only 6 cases of schwannoma of the auricle (Table 1) [7]: 4 cases of schwannoma of the concha, 1 case of schwannoma of the helix; 1 case of schwannoma of

the antihelices, and 1 case of schwannoma of the auricular tubercle [7–9]. Each of these cases was treated with traditional surgical technique [7–9]. The first case in literature was reported by Fodor et al. in 1977 [8].

We report the case of a patient presenting with a left outer ear schwannoma treated with CO₂ laser, the first case described in literature using this technique.

Case Report

A 23-year-old male from East Europe (Ukraine) with a 3-year medical history of a growing neoplasm located on the left auricle, was observed in the Ear Nose and Throat (ENT) Clinic of University of Campania "L. Vanvitelli", in May 2013. The patient gave his written consent for the study.

The neoplasm had extensively stemmed to the root of the helix and was coated by a slightly erythematous skin. It showed an oval shape with a major axis of about 3 cm and a minor axis of about 1.5 cm (Figure 1).

This lesion was painless even when palpated and reported to have a flexible bloating consistency that appeared mobile on the underlying tissues. The adjacent structures presented no alterations. The external auditory canal was patent, and the tympanic membrane had a normal appearance. At first observation, this lesion appeared like a chondroma of the outer ear.

The patient underwent surgery under local anesthesia for the excision of the lesion using a CO₂ laser (5 watts of power in super pulse mode) [13]. No systemic or local antibiotics were administered. Under macroscopic observation the neoplasm appeared to be tough, fatty, and whitish. It was excised from the surrounding structures easily and then subjected to histological examination at the Pathologic Section of the Advanced Biomedical Sciences Department of University of Study Federico II.

Table 1. Review of literature of cases of schwannoma of the auricula [7].

Year	Author	Auricula localization (outer ear)
1977	Fodor RI et al.	Concha
2001	Galli J et al.	Concha and external auditory meatus
2008	Zhonghua EBY et al.	Helix
2008	Carter JJ et al.	Antihelix
2010	Lai JC et al.	Concha
2012	Dong HL et al.	Concha
2013	Kuldeep T et al	Auricular tubercle
2018	Testa et al.	Root of the helix



Figure 1. Left outer ear lesion (auricle).



Figure 2. The tumor was well-circumscribed, and 1 cm at the major diameter and it appeared lobulated and whitish.

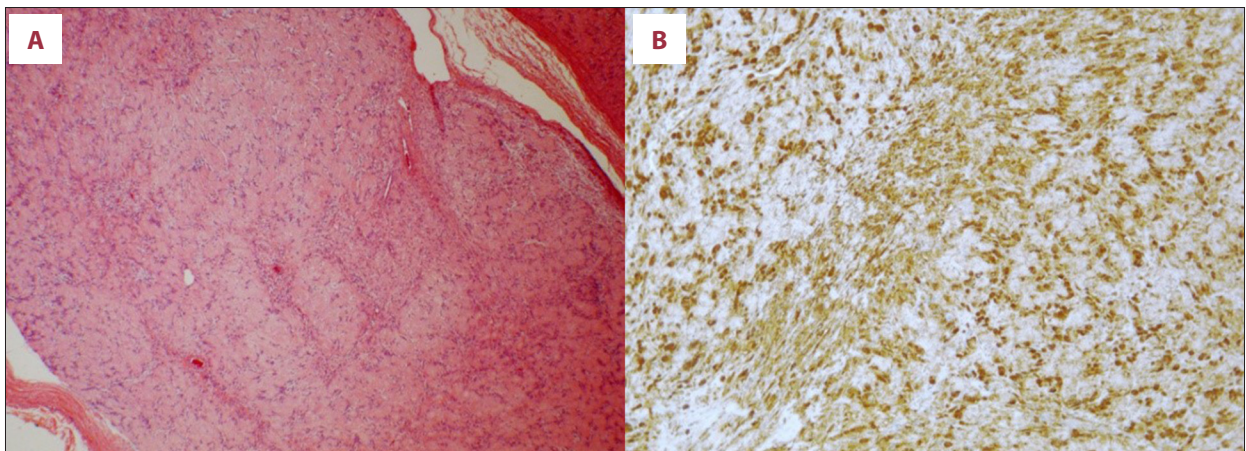


Figure 3. (A) Hematoxylin and eosin stain: well circumscribed lesion. Antoni A areas with short fascicles and focal nuclear palisading (4× magnification); (B) strongly positive to anti-S100 protein (10× magnification).

The tumor was well-circumscribed and 3 cm at the major diameter. On a cut section, it appeared lobulated and whitish (Figure 2). Microscopically the hematoxylin and eosin stain showed spindle cells, without any cytological atypia, organized in a characteristic plexiform pattern (Figure 3A). Immunostaining for anti-S100 protein was strongly positive (Figure 3B).

Our patient was subjected to total body nuclear magnetic resonance evaluation to exclude the occurrence of multiple lesions. Follow-up clinical evaluation at 6 months, 12 months, and every year for 5 years after surgery showed a favorable outcome without post-surgical complications or relapse of disease.

Discussion

Most of the schwannomas of the outer ear originate from the external auditory canal, and involvement of the pinna is rare [7–10]. These tumors are generally symptomless and slow growing; paresthesia and neuralgia are not frequent and can be found as skin lesions only in about a third of cases [11]. Their growth causes an aesthetic alteration of the auricle [7]. The occurrence of symptoms is connected to the area and the growth of these neoplasms and, when this area is in the external auditory canal and the tympanic membrane, patients may complain of hearing loss, tinnitus, vertigo, auricular fullness, and autophony [3]. Whenever the tumor grows sufficiently to block the external auditory canal, there may be conductive hearing loss or external otitis due to obstruction and

accumulation of skin debris such as ear wax or otorrhea, but rarely is bone erosion reported [13].

Schwannoma is generally a benign lesion compared to neurinomas that develop in the parotid gland and infratemporal cavity, or lesions that develop in the neurofibromatosis that might have a malignant evolution [7]. Schwannomas show a parenchymatous consistency and a smooth surface without skin lesions. The differential diagnosis includes other different soft tissues tumors such as adenoma sebaceum, eosinophilic granuloma, fibroma, chondroma, and leiomyoma [3]. However, the preoperative diagnosis is quite difficult as most schwannomas do not show neurological associated symptoms [9]. The surgical excisions of the described cases in the literature were performed with a traditional approach, separating the neoplasm from the underlying perichondrium [7]. Consequently, the classification of these lesions could be analyzed only with histological evaluation [3].

Histologically, the hallmark of schwannomas is the pattern of alternating Antoni A and Antoni B areas [7–10,14]. The relative amounts of these 2 components vary, and they may blend imperceptibly or change abruptly [7–10,14]. Antoni A areas are composed of compact spindle cells that usually have twisted nuclei, indistinct cytoplasmic borders, and occasionally, clear intranuclear vacuoles [7–10,14]. They are arranged in short bundles or interlacing fascicles [7–10,14]. In highly differentiated Antoni A areas, there may be nuclear palisading, whirling of the cells (similar to meningioma) and Verocay bodies, formed by 2 compact rows of well-aligned nuclei separated by fibrillary processes [7–10,14]. Mitotic figures are occasionally present [7–10,14]. Antoni B areas are far less orderly and less cellular [7–10,14]. The spindle or oval cells are arranged haphazardly in the loosely textured matrix, which is punctuated by microscopic changes, inflammatory cells, and delicate collagen fibers [7–10,14]. In our case, the main histological pattern was Antoni A.

Immunohistochemically, schwannomas must be differentiated by other fusiform cell tumors such as neurofibromas, leiomyomas, and desmoplastic melanomas [7–10,14]. Schwannomas are positive to anti-S-100 protein and negative to desmin and smooth muscle actin (SMA) [7–10,14]. Neurofibromas are not encapsulated and do not show Antoni-A and Antoni-B patterns [7–10,14]. Leiomyomas are positive for SMA and negative for S-100 protein [7–10,14]. Desmoplastic melanomas are positive for anti-S100 protein, plus anti-HMB45 (human melanoma black 45), anti-Mart 1 (melanoma antigen recognized by T-cells 1), anti-p16 (whereas schwannomas are negative) and they are characterized by cell atypia and a mitotic rate, while there is no Antoni-A and Antoni-B pattern that is typical of schwannomas [7–10,14].

The treatment of choice is surgical resection, and considering that the neoplasm is strictly connected to the original nerve, it is sometimes necessary to excise the nerve itself [1]. After complete resection of the neoplasm, recurrence is rare [15,17]. Nuclear magnetic resonance is useful to exclude possible multiple neurinomas associated with Recklinghausen disease [1–3].

In our patient's case, using a CO₂ laser allowed us to easily remove the tumor, reducing bleeding and surgical time, and avoiding the use of sutures, which could create unsightly scars on the face [13,15–18].

Conclusions

To our knowledge, this case is the seventh case now reported in the literature of schwannoma of the auricle; the fourth case of a schwannoma located in the concha [7]. Previous cases described in the literature were treated with traditional surgical techniques [7–9]. This is the first published case to describe treatment with a CO₂ laser. Follow-up 5 years after surgical treatment did not show any recurrence or complications.

Conflict of interest

None.

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