An unusual localization of intraosseus Schwannoma: mandibular localization and new pathogenetic prospectives.

Ann. Ital. Chir., 2011 82: 205-209

Maria Giulia Cristofaro*, Amerigo Giudice*, Giuseppe Donato**, Walter Colangeli*, Mario Giudice*

**Unit of Maxillo-Facial Surgery (Chief: Prof. M. Giudice), University "Magna Grecia", Catanzaro, Italy*
***Unit of Pathological Anatomy, University "Magna Grecia", Catanzaro, Italy*

An unusual localization of intraosseus Schwannoma: mandibular localization and new pathogenetic prospectives.

AIM: *The aim of the study is to give an explanation on the Intra-osseous Schwanoma etio-pathogenesis, based on the isto-pathological findings presented by the Authors.*
MATERIAL OF STUDY: *In a 40 years old patient with pain on the territory innervated by the third right trigeminal branch, OPT showed a like ground-glass area that involved the mandible with the mandibular canal disappearance and dental roots resorption. They removed the lesion with preservation of the vascular-neural beam on which the lesion were extremely attached; the histological examination confirmed the diagnosis of intra-osseous Schwannoma. Immunohistochemically the Schwannoma labelled with antibodies to S-100, Vimentin, Osteopontin and Osteonectin.*
RESULST: *The clinical and radiological follow-up after one year since the surgery, using OPT, showed an improvement of bone formation and the disappearance of the pain.*
DISCUSSION: *Schwannoma rarely presents as an intraosseous mass, comprising less than 1% of all bone tumors with a strong predilection for the mandible. Data like the expression of osteopontin are believed to be distinctive feature of other schwannian cell tumors such as the granular cell tumor.*
Such data might explain the prevalence of mandibular location among the rare intraosseous schwannomas and might point out that the calcified shwannoma of the skull is similar to an hamartomatous lesion.

KEY WORDS: Intraosseous, Neural crests, Schwannoma.

Introduction

Schwannoma rarely presents as an intraosseous mass, comprising less than 1% of all bone tumors with a strong predilection for the mandible [1,2]. No definitive hypothese has been yet proposed to explain this condition. We report a new case with an unusual clinical presentation and interesting pathological findings which may allow us to propose an explication about the pathogenesis of such lesions.

Materials and methods

The patient C.M., 40 years old, came to our attention on August 2008, with a secondary nerve pain symptoms of the right third trigeminal branch. This symptomatology had occurred by three months, and it was also associated to tooth mobility of 4.5 and 4.7.
The patient also referred in the last month a profile deformation of the inferior jaw on the right side, with increasement of the nerve pain and dysesthesia of the lower third of the face. The kind of the pain made us

Pervenuto in Redazione Novembre 2010. Accettato per la pubblicazione Gennaio 2011.
Per corrispondenza: Maria Giulia Cristofaro, Università "Magna Grecia", Facoltà di Medicina e Chirurgia, Cattedra e U.O. di Chirurgia Maxillo Facciale, Viale Europa 1, 88100 Germaneto di Catanzaro (e-mail: Cristofaro@unicz.it).

assuming that it was related to a secondary disease. The intraoral examination pointed out the profile deformation of the symphysis area and flattening of the right inferior fornix (Fig. 1).
The patient performed a routine screening, like OPT that showed an area similar to "ground glass" on the right mandibular body, extended up from the premolar region and to the ipsilateral molar.
The radiological examination pointed out not only the volumetric deformation of the right part of the mandible, but also the disappearance of the mandibular canal and the root resorption of 45 and 47, that confirmed the tooth mobility and the pain symptoms during chewing acts (Fig. 2).
Except for the mandibular profile deformation and for the tooth mobility, no other sign was present. The patient underwent, in local anaesthesia, the teeth extractions (45, 47) and removal of the lesion, that presented as solid and bleeding mass, and extremely attached to the neuro-vascular bundle which was preserved during the surgery (figg. 3-4-5). The histological examination of the removed lesion confirmed the diagnosis of intra-osseous Schwannoma.
The post operative course was free from any complications.

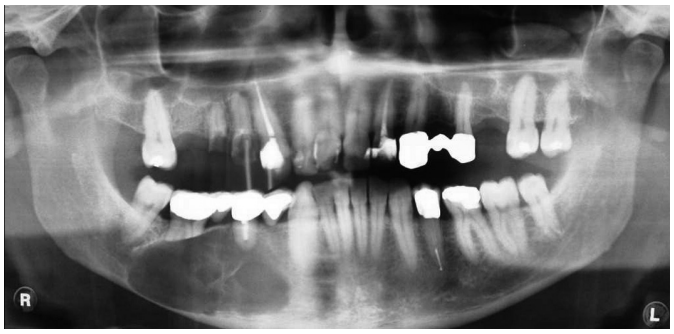


Fig. 1: Pre-operative OPT.

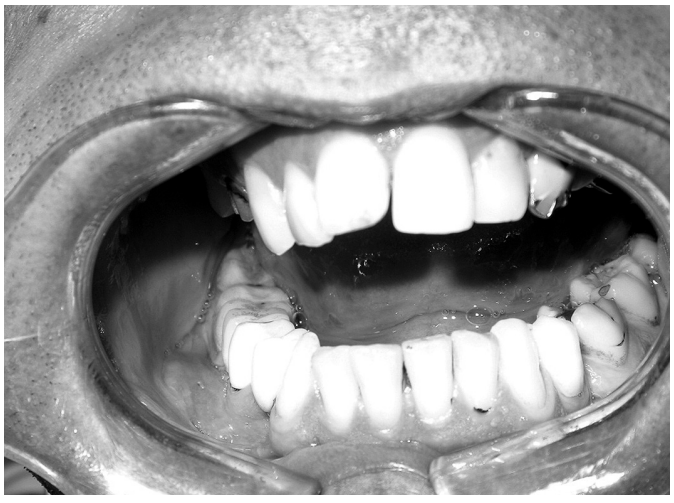
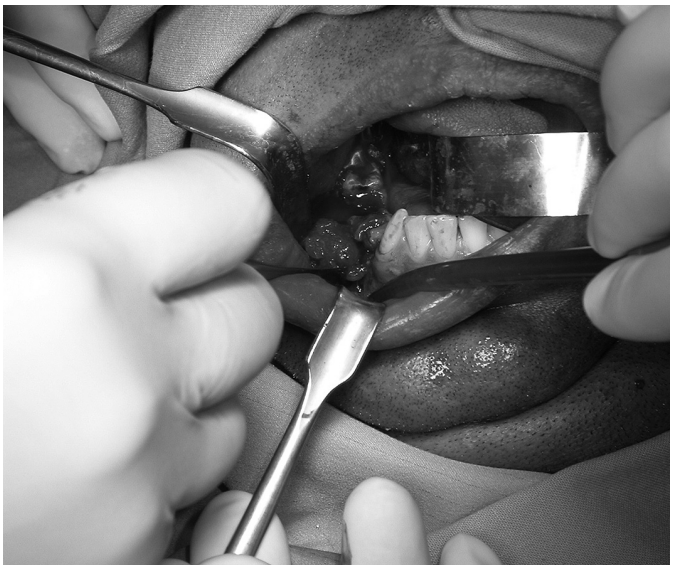


Fig. 2: Intra-oral view.



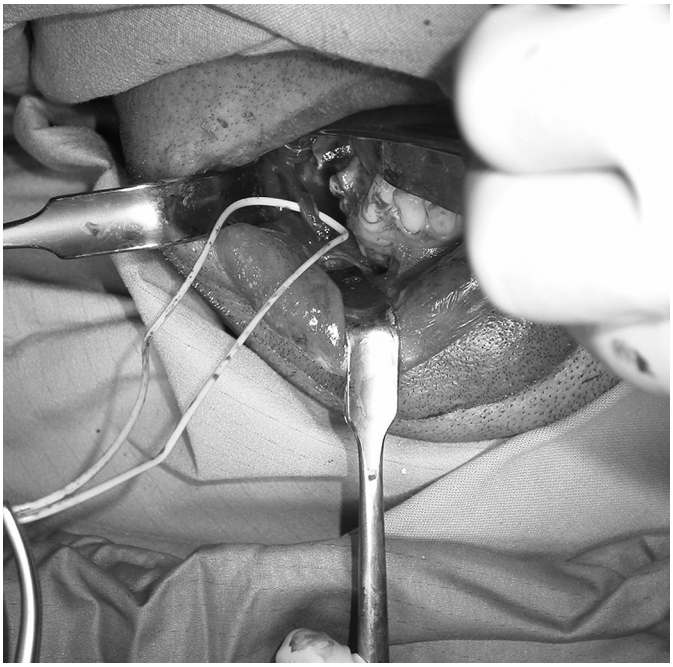


Fig. 3-4: Intra-operative view.

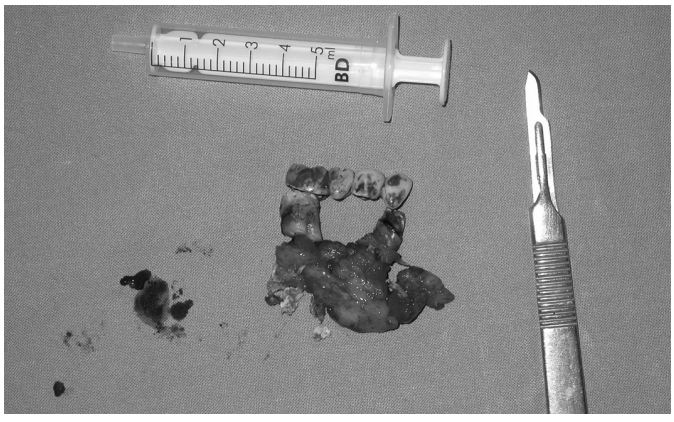


Fig. 5: Anatomical piece.

Results

The clinical and radiological follow up after three months since the surgery showed the residual bone cavity and the disappearance of the pain, but with the residual little hypoestesia at the right lower lip with sporadic sign of paresthesia.
The clinical and radiological follow –up after one year since the surgery, using OPT, showed an improvement especially of bone formation (Fig. 6) especially, and we ascertained the disappearance of paresthesia.
The tumor was a Schwannoma which showed a biphasic histomorphological pattern with spindle shaped cells arranged in compact interwining fascicles (Antoni A areas) or stellate cells loosely arranged in a myxoid stroma (Antoni B areas) (Fig. 7A, 7B). A marked preponderance of Antoni A areas sometimes containing cells with a high nuclear/cytoplasmatic ratio, hyaline vessels and stromal calcifications were evident Fig. (7C, 7D). Immunohistochemically the Schwannoma labelled with antibodies to S-100, Vimentin, Osteopontin and

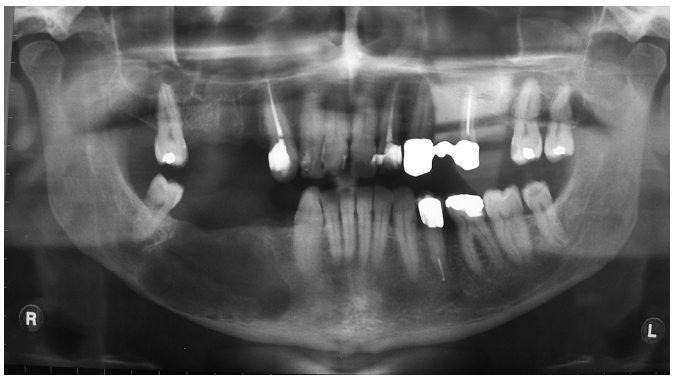


Fig. 6: Post-operative OPT.

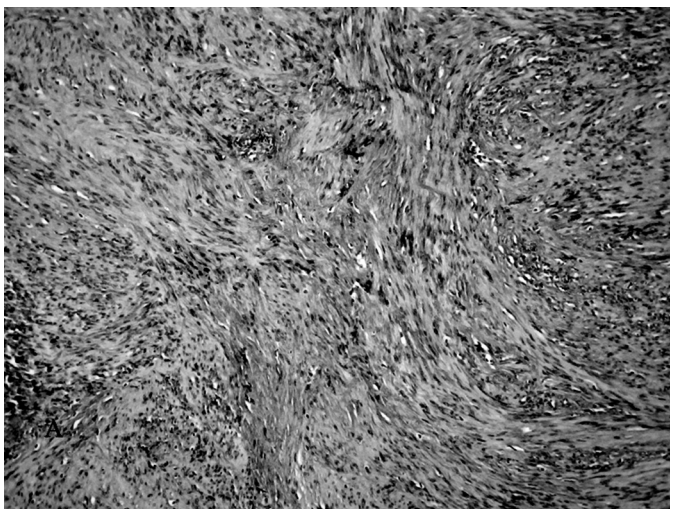


Fig. 7A: The Ematoxiline-eosine coloration shows the tumor histological characteristics of benignity and the pattern compatible with the Shwannoma diagnosis (H&B; 40X).

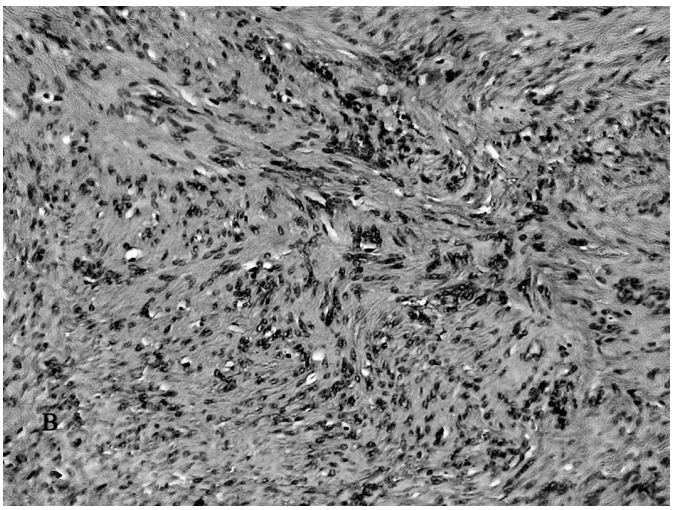


Fig. 7B: The diagnosis is confirmed by the immunohistochemical coloration positivity of the S-100 protein (20X).

Fig. 7C: Osteopontine immunohistochemical coloration: it is notable the positivity around the the calcified areas (20X).

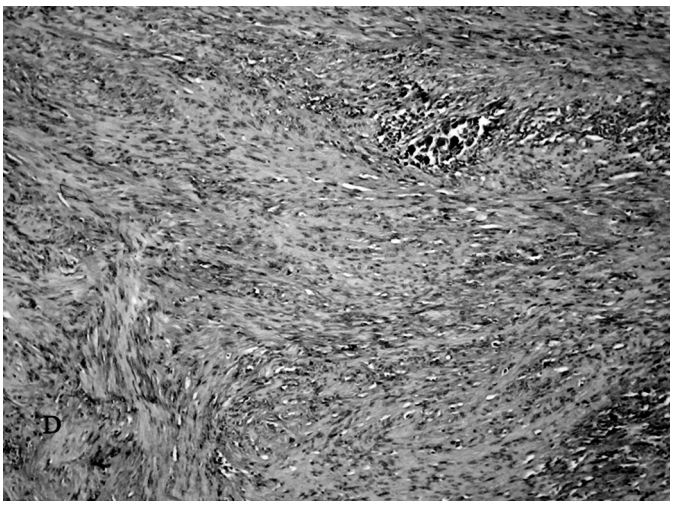


Fig. 7D: Osteonectin immunohistochemical coloration: it is notable the positivity around the the calcified areas (20X).

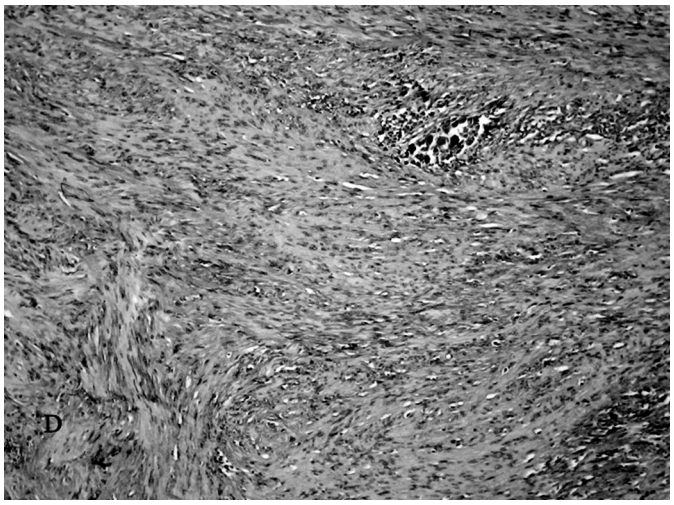


Fig. 7E: immunohistochemical staining for Osteopontin;

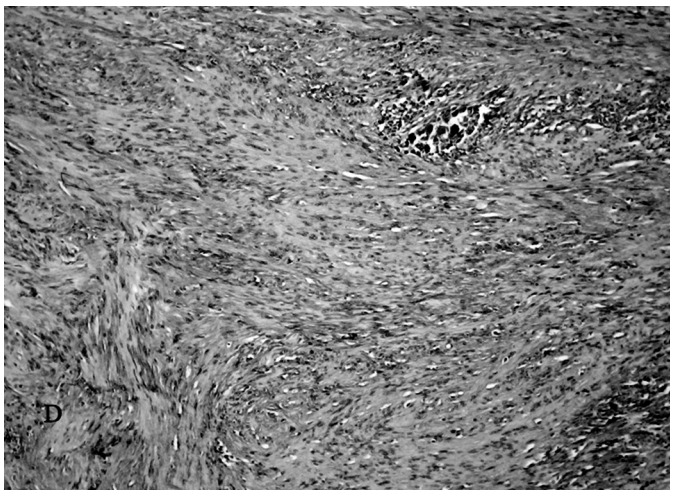


Fig. 7F: immunohistochemical staining for Osteonectin

Osteonectin (Fig. 7E, 7F). CD34 positives cells was found in Antoni B areas. Proliferative index was <1%.
Formalin-fixed, paraffin embedded tissue sections obtained after appropriate sampling of the surgically removed mass were evaluated by Hematoxylin and eosin (H&E) and immunohistochemical stains. Antibodies and protocols for immunohistochemistry are listed in Table I. All procedures were carried out at room temperature. Negative control sections for immunohistochemistry were processed without the primary antibody.
Proliferative index was evaluated using the antibody anti-Ki-67 (Dako, MIB-1) and counting 1000 nuclei at high power field.

Discussion and Conclusion

Origin of Schwannomas from the mandibular nerve has been sometimes demonstrated [3], however the tumor showed presence of calcification and expression of proteins such as osteopontin and osteonectin which play a role in ossification, also in the cranial district, that is in structures originating from cephalic neural crests [4-8]. In the head and the neck, the neural crest also yields cells that form craniofacial cartilages, bones, dermis, adipose tissue, vascular smooth muscle cells and telencephalic meninges [9]. Calcification in Schwannomas are often observed among *"Ancient"* changes in other districts, but in the skull it appear clearly as a different finding, probably linked to the particular nature of Schwann cells derived from cephalic neural crest cells [10,11]. Moreover, data as the expression of osteopontin are believed distinctive feature of other schwannian cell tumors such as the granular cell tumor [12].
Such data might explain the prevalence of mandibular location among the rare intraosseous schwannomas and might mean that the calcified shwannoma of the skull is similar to an hamartomatous lesion.

Riassunto

Gli Schwannoma sono tumori relativamente benigni; quelli intraossei sono rari e corrispondono a meno del 1% di tutti i tumori ossei, con forte predilezione per la mandibola. Gli Autori descrivono il caso clinico di un uomo di anni 40, che riferiva da circa tre mesi una sin-

TABLE I - *Antibodies and protocols for immunohistochemistry*

Antigen/Clone	Company	Dilution	Antigen retrieval	Detection system
S100/ rabbit polyclonal	Novocastra	1:1000	Citrate buffer	Bond Polymer refine
Vimentin/V9	Dako-Cytomation	1:200	EDTA	Bond Polymer refine
EMA/ E29	Dako-Cytomation	1:50	EDTA	Bond Polymer refine
CK Cocktail/ AE1/AE3	Novocastra	1:100	Citrate buffer	Bond Polymer refine
Osteopontin/OP3N	Novocastra	1:100	EDTA	Bond Polymer refine
Osteonectin/15G12	Novocastra	1:80	EDTA	Bond Polymer refine
CD34/ QBEnd-10	Dako-Cytomation	1:50	EDTA	Bond Polymer refine
Smooth muscle actin/1A4	Dako-Cytomation	1:100	EDTA	Bond Polymer refine
Ki-67/MIB-1	Dako-Cytomation	1:150	EDTA	Bond Polymer refin

tomatologia di tipo nevralgico secondaria, a carico della terza branca trigeminale di destra, con segni clinici subiettivi di vacillamento dentario del 45 e 47. Il paziente inoltre, da un mese presentava anche una deformazione del profilo emimandibolare destro con incremento della sintomatologia nevralgica e comparsa di segni diestetici a carico del terzo inferiore della faccia. L'OPT dimostrava la presenza di un'area tipo "ground glass" in corrispondenza della zona parasinfisaria e del corpo emimandibolare destro con scomparsa del canale mandibolare, rizalisi del 45 e 47. In anestesia loco-regionale il paziente è stato sottoposto ad avulsione del 45 e 47, asportazione della lesione, con preservazione del fascio vascolo-nervoso, al quale la lesione era fortemente adesa. L'esame istologico dava diagnosi di Schwannoma intraosseo. Dal punto di vista immunoistochimico lo Schwannoma era positivo alla S-100, Vimentina, Osteopontina e Osteonectina. Lo scopo del lavoro è quello di dare una ulteriore spiegazione sull'eziopatogenesi dello Schwannoma Intraosseo, partendo da dati rilevati dagli Autori, come l'espressione dell'osteopontina, che si crede abbiano caratteristiche distintive di altre cellule tumorali shwannoniane come tumore a cellule granulari. Questi dati potrebbero spiegare la prevalenza della localizzazione mandibolare tra i rari Schwannomi intraossei e potrebbe significare che lo Schwannoma calcificato del cranio è simile ad una lesione amartromatosa.

References

1) Belli E, Becelli R, Matteini C, Iannetti G: *Schwannoma of the mandibole.* J Craniofac Surg, 1997; 8:413-16.

2) Chi AC, Carey J, Muller S: *Intraosseous schwannoma of the mandible: A case report and review of the letterature.* Oral Surg Oral Med Pathol Oral Radiol Endod, 2003; 96:54-65.

3) Wirth WA, Bray CB: *Intra-osseous neurilemmoma. Case report and review of thirty-one cases from the literature.* J Bone Joint Surg (Am), 1977; 59:252-55.

4) Couly GF, Coltey PM, Le Dourain N: *The triple origin of the skull in higher vertebrates: A study in quail-chick chimeras.* Development, 1993; 117:409-29.

5) Holleville N, Mateos S, Bontoux M, Bollerot K, Monsoro-Burq AH: *Dlx5 drives Runx2 expression and osteogenic differentiation in developing cranial suture mesenchyme.* Dev Biol, 2007; 304:860-74.

6) Hoshi K: *Mechanism of bone calcification.* Clin Calcium, 2007; 17:1499-507.

7) Rath B, Nam J, Knobloch TJ, Lannutti JJ, Agarwall S.: *Compressive forces induce osteogenic gene expression in calvarial osteoblasts.* J Biomech, 2008; 41:1095-103.

8) Xu Y, Malladi P, Zhou D, Longaker MT: *Molecular and cellular characterization of mouse calvarial osteoblasts derived from neural crests and paraxial mesoderm.* Plast Recontr Surg, 2007; 1783-795.

9) Dupin E, Calloni G, Real C, Goncalves-Trentin A, Le Dourain NM: *Neural crest progenitors and stem cells.* C R Biol 2007; 330: 521-29.

10) Kao SC, Tsai CY, Tsai CC, Hsu WM: *Calcified schwannoma of the orbit and differential diagnosis of orbital calcification.* Zhonghua Yi Xue Za Zhi, 2000; 63:774-78.

11) Tosaka M, Hirato J, Miyagishima T, Saito N, Nakazato Y, Sasaki T: *Calcified vestibular schwannoma with unusual histological characteristics. Positive immunoreactivity for CD-34 antigen.* Acta Neurochir 2002; 144:395-99.

12) Hoshi N, Sugino T, Suzuki T: *Regular expression of osteopontin in granular cell tumor: Distinctive feature among schwannian cell tumors.* Pathol Int 2005; 55:484-90.