

Neurofibroma, Schwannoma or a hybrid tumor of the peripheral nerve sheath?

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Abstract

Classically, the different subtypes of the peripheral nerve sheaths tumors display typical morphological features which differentiate them from the other nervous tumors. Either schwannoma or neurofibroma have characteristic histological and immunohistochemical features. We present a case of peripheral nerve sheaths hybrid tumor which have had histological and immunohistochemical features of neurofibroma and schwannoma.

Key words: neurofibroma, schwannoma, peripheral nerve sheaths hybrid tumor.

Introduction

Schwannoma is a benign, non-recurring tumor arising in cranial nerves, bone, and gastrointestinal tract but mainly in subcutaneous tissue and muscles, with a slight predilection for distal extremities or head and neck region. Most cases are asymptomatic and the majority is less than 5 cm in diameter. Histological, is an encapsulated neoplasm having two components, known as Antoni A and B tissue, in variable proportion. Antoni A tissue is cellular and consists of monomorphic spindle-shaped Schwann cells, with poorly defined eosinophilic cytoplasm and pointed basophilic nuclei, set in a variably collagenous stroma.

These cells commonly show nuclear palisading. Parallel arrays of such palisades with intervening eosinophilic cell cytoplasm are known as Verocay bodies. Antoni B areas are also composed of Schwann cells but their cytoplasm is inconspicuous and the nuclei appear suspended in a copious myxoid, often microcystic matrix.

Solitary neurofibroma is a localized lesion arising generally in skin, as a polypoid or nodular lesion in adulthood. More rarely, solitary neurofibroma may occur in deep soft tissue, often in an axial location. Histological, solitary neurofibroma is a circumscribed but unencapsulated lesion with not clearly defined margins. It has a varied appearance but, in most cases, consists of elongated spindle cells with poorly defined, pale eosinophilic cytoplasm and tapering, wavy nuclei, admixed with more indeterminate short spindle cells, numerous small nerve fibers and frequent mast cells. These mixed components are set in a variable fibromyxoid matrix. Less commonly the stroma may be markedly hyalinized or else the tumor cells may be associated with thick collagen bundles set in a myxoid stroma-collagenous neurofibroma.

Ultrastructural neurofibroma consists of a complex admixture of Schwann cells, perineural cells and fibroblasts and is therefore not surprising that, in contrast to benign schwannoma which shows almost 100% positivity, the proportion of S-100-positive cells

in neurofibroma is usually only 30-50% [1].

The aim of our study is to present a case of hybrid tumor of the peripheral nerve sheath showing features of neurofibroma and schwannoma.

Material and methods

The surgical piece came from the Thoracic Surgery Clinic of the Hospital of Pulmonary Diseases, Iassy.

The tumoral mass was processed by usual histopathologic technique: 10% formalin (pH7) fixed, paraffin embedded, haematoxylin-eosin and Van Gieson stained. It was also immunohistochemical examined (S100, Desmin, Smooth Muscle Actin, Vimentin).

Results and discussions

We present the case of a 20 years male patient having a 4 cm diameter tumor localized on the right posterior arcade of the rib at the C9-C10 levels. The tumor was painless, mobile on the superficial planes, without tegument changes. No von Recklinghausen's disease element was detected. Surgical procedure was performed.

The tumor was polylobated, 3/5 cm diameter, well delimited, encapsulated, with firm consistency. On the cut surface was white-yellowish (Figures 1).

The microscopic examination revealed both aspects of neurofibroma and schwannoma. The tumor was well fibrous encapsulated (Figure 2).

Some areas presented short fascicles, swirls of spindle cells with dual distribution in compact, intense cellular zones (Antoni A areas) and rarefied, hypocellular zones (Antoni B areas) (Figures 3 and 4).

The tumoral cells in these areas present ill-defined cytoplasmic margins, eosinophilic, homogenous cytoplasm and spindled to oval or angulated nuclei (Figure 5). No cellular atypia was seen. These histological aspects correspond to schwannoma, according to Enzinger [2].

Some other areas presented disorganized disposition of Schwann cells and fibroblasts, with variable amount of collagen deposition (Figures 6 and 7).

Inside these areas, we could observe the elongated Schwann cells with serpentine, wavy nuclei (Figure 8) corresponding to localized neurofibroma [2]. The differential diagnostic have considered schwannoma, neurofibroma, leiomyoma, malignant peripheral nerve sheath tumor.

The tumor was immunostained for S-100 protein, Vimentin, Desmin and Smooth Muscle Actin. Areas which presented histological aspect of schwannoma were intense and diffuse positive for protein S-100 (Figure 9). Areas presenting histological aspects of neurofibroma were slight positive for S-100 (Figure 10).

Both types of areas were diffuse positive for vimentin (Figure 11), and negative for desmin and Smooth Muscle Actin sustaining the non muscular origin of the tumor.

Our histopathological diagnostic was nerve sheath tumor showing hybrid features of neurofibroma and schwannoma. Classical, the peripheral nerve sheath tumors present typical morphological aspects that make a clear differentiation between them and the other nervous tumors and classify them in the different subtypes. During the last 15 years a lot of authors reported increasing number of cases with peripheral nerve sheath tumors having hybrid aspects of a combination of two classical different types of peripheral nerve sheath tumors.

A case of unusual neurofibroma in an 18-year-old Japanese male was reported by Yamamoto *et al.* (1990) The histology of the tumor was characterized by nerve twig-like nests intermingled with fascicular bundles. In the central portion, the tumor also contained a lobular lesion showing features characteristic of schwannoma. Immunohistochemically, tumor cells in both the nests and the lobular lesion demonstrated a mostly positive reaction for S-100 protein. S-100 protein-positive and -negative cells were observed in equal numbers in the fascicular bundles surrounding the nests [3].

In 2000, Feany *et al.* reported 9 cases of rare nerve sheath tumours showing hybrid features of neurofibroma and schwannoma and have characterized them as a subset of rare nerve sheath tumours. The nine lesions were identified in the authors' files showing predominant features of neurofibroma with distinct, often nodular regions of classical schwannomatous differentiation with typical immunohistochemical reactivity. Most patients were adults; eight out of nine were male. Of the nine lesions, two were dermal, two were subcutaneous and five were subfascial. Five lesions had a plexiform architecture and one patient had overt neurofibromatosis. One out of six patients follow-up developed local recurrence [4].

Kazakov *et al.* (2005) also reported three cases of subcutaneous tumors with hybrid features of schwannoma-perineurioma (one case) and neurofibroma-perineurioma (two cases), which occurred in two women aged 50 and 52 years and one man aged 52. Locations included the scapular area, skin overlying breast and knee area [5].

Feany *et al* suggest that, despite evident and well-defined clinicopathological differences, these two lesions may be even more closely related than previously recognized. Whether this phenomenon results from a localized microenvironmental change or from a clonal genetic alteration remains unknown [4].

Molecular advances will allow a biological approach to targeted therapies for neurofibromas, malignant peripheral nerve sheath tumors and schwannomas. Knowledge of the pathogenesis of these tumors will have implications for our understanding of the neurofibromatoses and of the formation of sporadic tumors [6].

✉ Conclusion

We have presented this case because it was a challenge for us to accept the coexistence of both aspects of neurofibroma and schwannoma in the same tumor. The immunohistochemical aspects supported our diagnostic of hybrid tumor of the peripheral nerve sheath with both schwannoma and neurofibroma aspects. It seems like the two tumor types are more related than is recognized. At the present there are many unknowns concerning this type of tumor.

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Figure 1 – Gross appearance of the tumor: polylobated, 3/5 cm diameter, well delimited, encapsulated, with firm consistency, white-yellowish on the cut surface

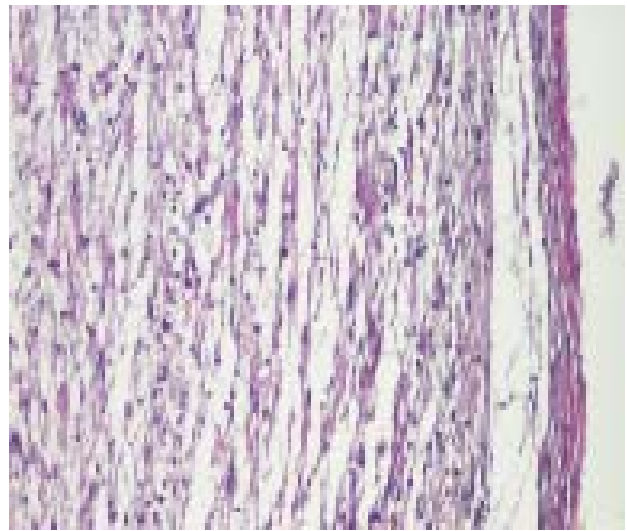


Figure 2 – Fibrous capsule (Van Gieson)

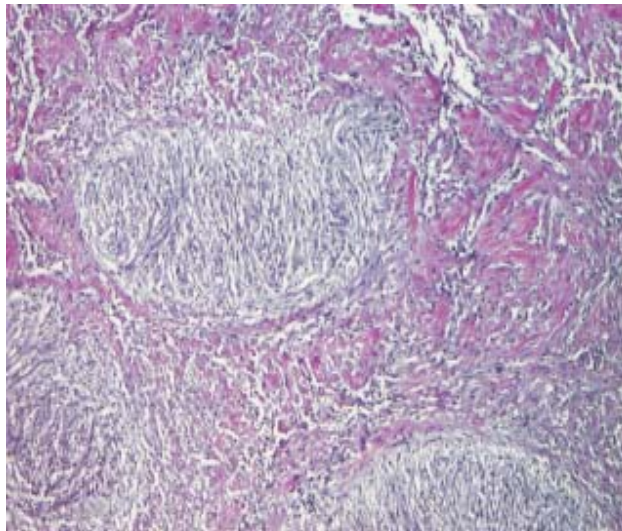


Figure 3 – Area presenting short fascicles swirls of spindle cells with distribution in compact, intense cellular zone – Antoni A (Van Gieson)

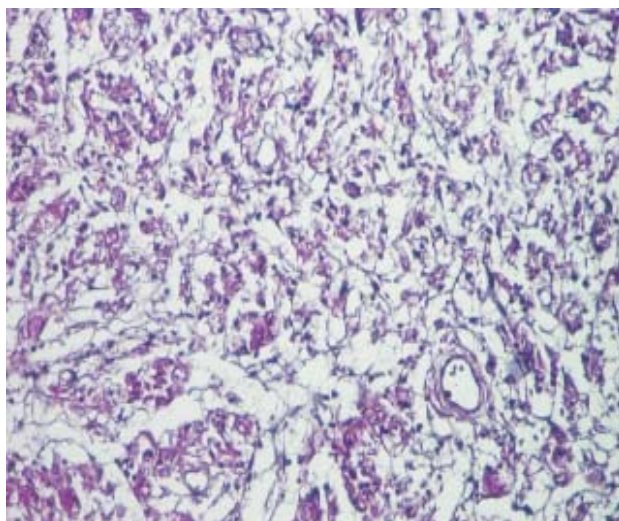


Figure 4 – Rarefied, hypocellular zone – Antoni B (HE)

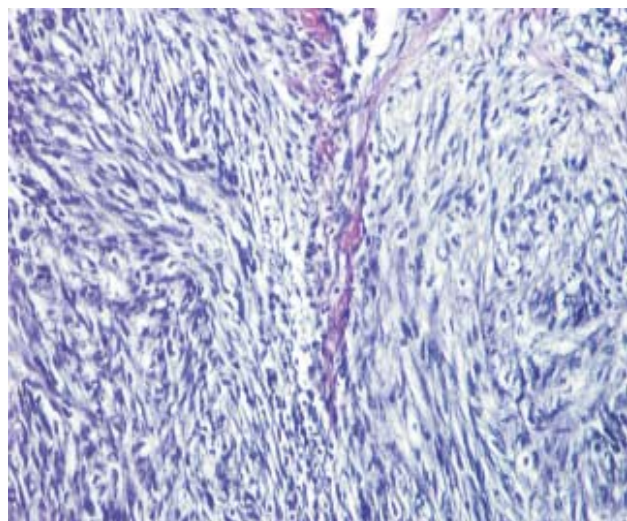


Figure 5 – The tumoral cells in these areas present ill-defined cytoplasmic margins, eosinophilic, homogenous cytoplasm and spindled to oval or angulated nuclei

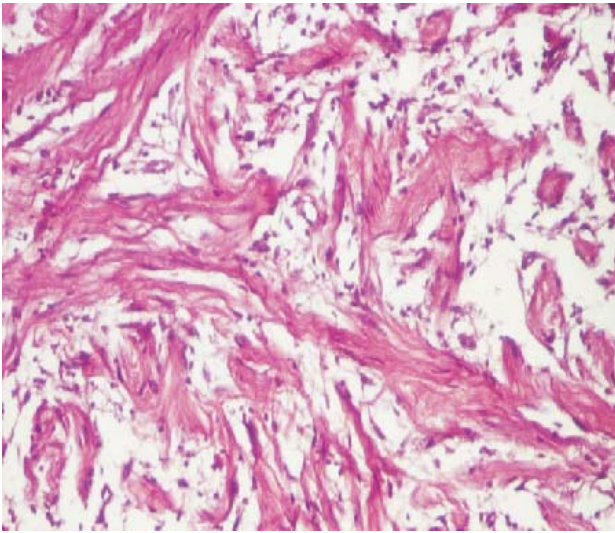


Figure 6 – Area presenting disorganized disposition of Schwann cells and fibroblasts, with variable amount of collagen deposition (HE)

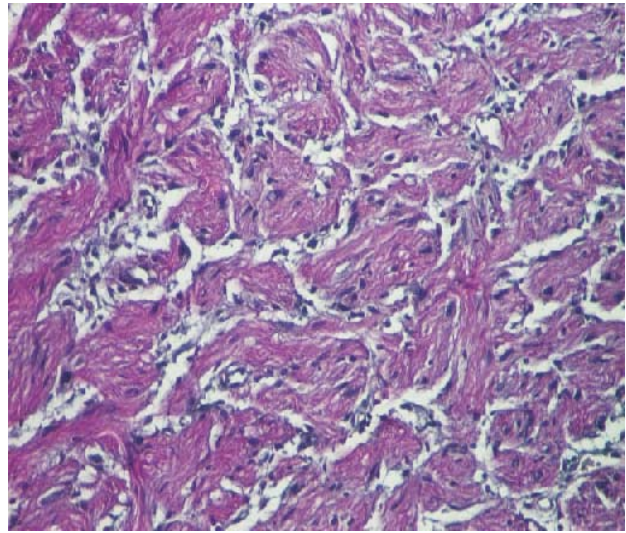


Figure 7 – Area presenting disorganized disposition of Schwann cells and fibroblasts, with variable amount of collagen deposition (Van Gieson)

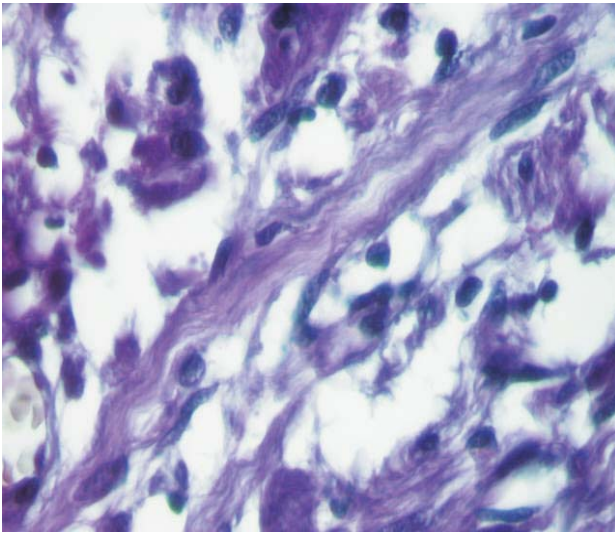


Figure 8 – Elongated Schwann cells with serpentine, wavy nuclei (Van Gieson)

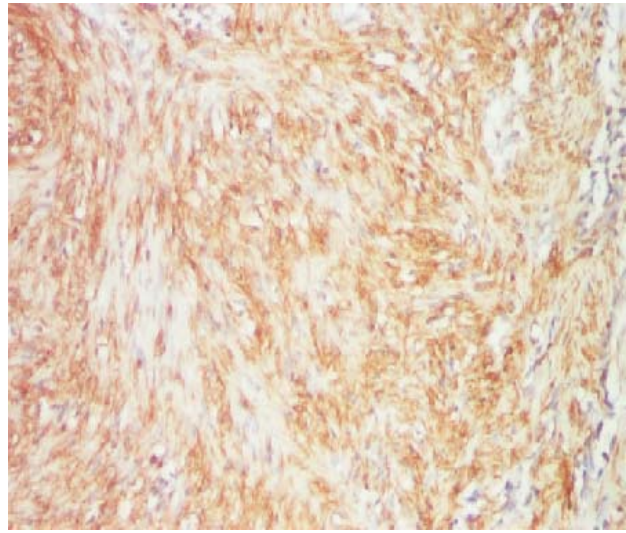


Figure 9 – Reaction for S-100 protein was intense and diffuse positive inside of schwannoma-like areas

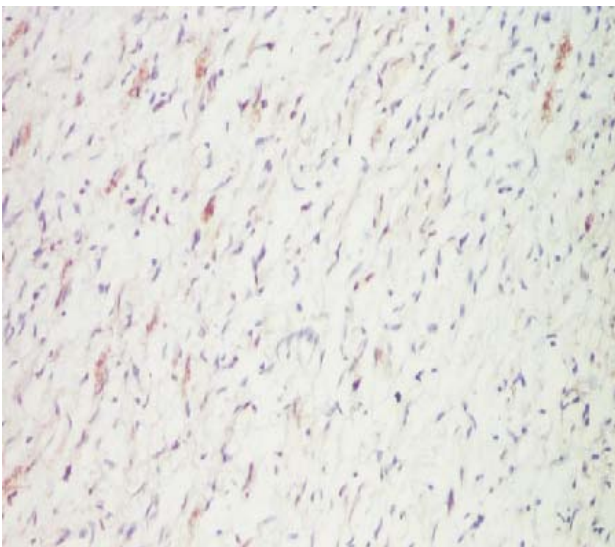


Figure 10 – Reaction for S-100 protein was slight positive inside of neurofibroma-like areas

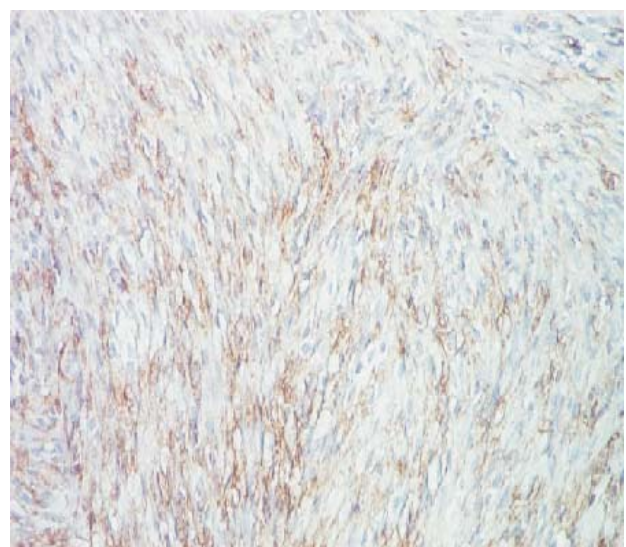


Figure 11 – Both types of areas were diffuse positive for vimentin