Original Article

Spectrum Of Neuroblastictumors : A Case Series With Review Of Literature

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Abstract

Neuroblastic tumors represent a spectrum of disease from undifferentiated, aggressive type to the well differentiated, quiescent type. Based on the degree of differentiation, they are classified by International Neuroblastoma Pathology Committee into neuroblastoma, ganglioneuroblastoma and ganglioneuroma. These tumors are mainly seen in paediatric age group with adrenal being the most common site. However their occurrence in adults and at extra adrenal location is extremely rare. This case series reports 5 cases of neuroblastic tumors reported over 18 months. Three cases were adrenal while 2 were extra adrenal. The age range was from 1 year to 47 years, three of them being pediatric cases. Male to female ratio was 3:2. Histopathology revealed 2 cases of neuroblastoma,2 ganglioneuroma and 1 ganglioneuroblastoma.

Introduction:

Neuroblastic tumors represent a spectrum of disease from undifferentiated type and aggressive nature neuroblastoma to the well differentiated and hugely quiescent like ganglioneuroma.[1]As part of the international cooperative effort to develop a complete set of International Neuroblastoma Risk Groups, the International Neuroblastoma Pathology Committee (INPC) has initiated regulations in 1994 to devise a morphologic classification of neuroblastic tumors as neuroblastoma, ganglioneuroblastoma, and ganglioneuroma.[2]

Clinical and histopathological study was conducted at the Department of Pathology at a tertiary care centre in India, retrospectively over period of 18 months (January 2021-May 2022) with 5 cases of neuroblastic tumors being reported. Clinical data of these cases was retrieved from the pathology archives and analysed.

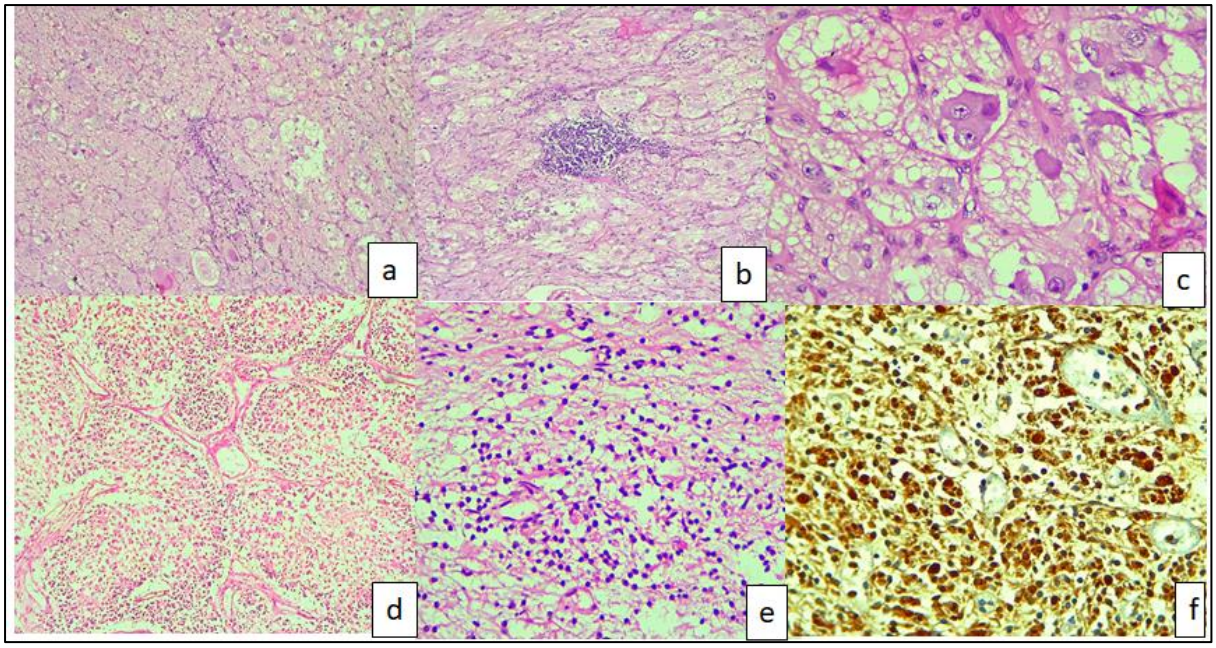
Case report:

Sr.No.	Age (years)	Sex (F – female	Clinical features	Radiology	Diagnosis

		M-male)			
1	4	F	Generalised weakness with paraparesis.	Heterogenous solid encapsulated lesion in right suprarenal region with minimal vascularity.	Neuroblastoma (poorly differentiated)
2	21	Male	Right sided weakness	Oval soft tissue attenuating lesion in cervical spinal canal through C3 and C2 ventral foramen	Ganglioneuroma (mature)
3	1	Male	H/o lump with pain in the suprapubic region	Heterogenous solid lesion in presacral region extending from L5 to S3,heterogeneouslyhyperintense,bright signalling in DWI. Mass is compressing Right postero-lateral wall and roof of bladder and displacing right common iliac vessels.	Ganglioneuroma (maturing)
4	3	Female	Headache ataxia	Weakly vascular suprarenal mass which in well marginated	Ganglioneuroblastoma (intermixed)
5	47	Male	Right flank pain with upper quadrant mass	Right suprarenal mass extending upto the hilum of right kidney	Neuroblastoma (differentiating)

Results:

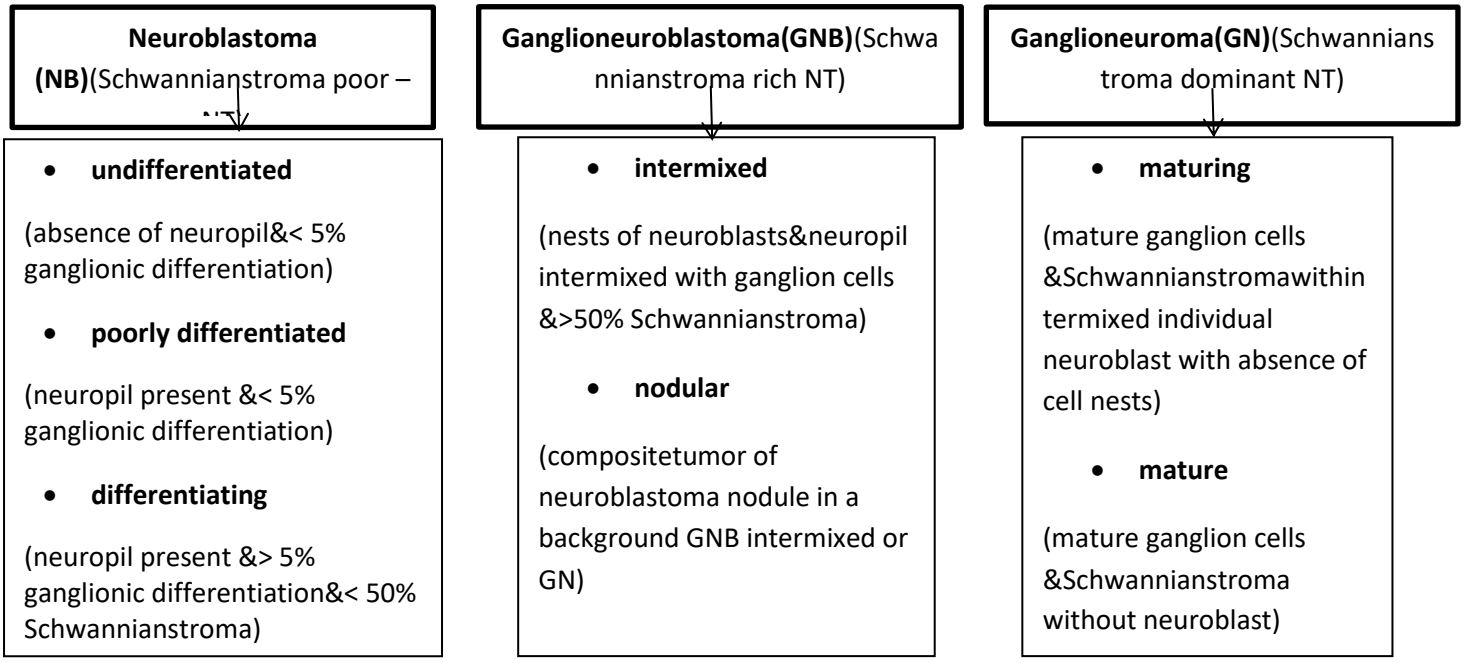
Total 5 cases of neuroblastic tumors were found over a period of 18 months (January 2021-May 2022). Of these 5 cases, 3 were adrenal while 2 were extra adrenal at paravertebral location. The age range was wide, ranging from 1 year to 47 years, 3 of them being paediatric cases. Males were affected more than females, male to female ratio being 3:2. Histopathology revealed 2 cases of neuroblastoma, 2 cases of ganglioneuroma and 1 case of ganglioneuroblastoma. Paediatric cases were neuroblastoma, ganglioneuroblastoma and ganglioneuroma, one case each.



a)Ganglioneuroma (mature) showing mature ganglion cells with Schwannian stroma and no neuroblasts (10X, H&E).b) Ganglioneuroma (maturing) mature ganglion cells & Schwannian stroma with intermixed individual neuroblast with absence of cell nests (10X, H&E). c) Mature ganglion cells (40X, H&E). d) Neuroblastoma showing nests of small round blue cells. (10X, H&E).e) small round blue cells with neuropil (40X,H&E) f)Immunohistochemical work up showing S-100 positivity in tumor cells (40X,H&E).

Discussion

Neuroblastic tumors (NT) are arising from primitive cells of the sympathetic system and include a spectrum from immature neuroblasts with poor Schwanian stroma to mature ganglion cells with abundant Schwanian stroma.International Neuroblastoma Pathology Committee (INPC) has classified neuroblastictumors as follows:



Neuroblastomas are most commonly seen as solid neoplasms in childhood accouning to approximately 15% of all neoplasms found in the first 4 years of life. They are considered as one of the protypical embryonic tumours considered to form and arise during fetal life or early postnatal life, which are developing from still immature neural crest-derived cells, and their further differentiation is already blocked.[2]Their incidence in adults, especially among elderly, is extremely low.The most common primary site of neuroblastoma is the adrenal gland (40%). The extra-adrenal sites are retroperitoneum (25%), posterior mediastinum (15%), pelvis (5%), and paravertebral region (3–5%).[6]

When embryogenesis and post natal organ development occurs, the neural crest gives rise to cells of the future adrenal medulla, neuronal cells of the autonomic nervous system, Schwannian cells, melanocytes, few types of neuroendocrine cells, even mesenchymal-type tissue in the head and neck region.[2]Hence the classification is based on the degree of differentiation of these components.[6]

The principal morphologic feature recognized to be of prognostic importance for NTs is the degree of neuroblastic maturation toward ganglion cells.Several attemptshave been done for histopathologic grading of NTs in the past decades, yet to our knowledge not one has gained universal favor and application.[5]Shimada et al. attempted a new approach with their age-linked classification and divided NTs into Schwannianstroma-rich and stroma-poor tumors. They also introduced the term “mitosis-karyorrhexis index” (MKI) as one of the prognostic indicators. Joshi et al suggested modifications in this classification stating that a high mitotic rate appears to be an unfavorable prognostic factor and tumor-associated calcification to be a favorable prognostic factor. Thelatest new risk stratification is based on the new INRGSS staging system, age (dichotomized at 18 months), tumor grade, N-myc amplification, unbalanced 11q aberration, and ploidy into four pre-treatment risk groups: very low, low, intermediate, and high.[1]

Survival in infants is very high (91%) and progressively declines to the increased age at the time of diagnosis. In a study performed on RARECARE net and involving few cases, 5-year survival was reported to be 48% in among 15–24 years and 40% in adults25–64 years.[7]About 1–2% of cases run in families with germline mutations in the PHOX2B or KIF1B gene. MYCN oncogene amplification within the tumor is a common finding in neuroblastoma. The degree of amplification shows a bimodal distribution: either 3- to 10-fold, or 100- to 300-fold.[2,3]

More treatment options are available in phases I and II clinical trials that test new drugs against neuroblastoma, but the result turns out to be very poor for relapsed disease.[1]

Conclusion

The spectrum of neuroblastictumors covers a wide range of morphology depending upon degree of differentiation. Histopathology remains the gold standard diagnostic tool for accurate histologic classification and prognostic indicator of neuroblastictumor.

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