



AN ENIGMATIC PHENOMENON OF CELLULAR CANNIBALISM IN SCHWANNOMA - PLAUSIBLE PATHOGENESIS AND HISTOPATHOLOGICAL SIGNIFICANCE - A PILOT STUDY

Pathology

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ABSTRACT

Background: Cellular cannibalism is defined as cellular engulfment with death of the internalised cell. The probable etiology for this phenomenon might be nutritional depletion of a tumor microenvironment, tumor homeostasis or immune evasion. It is a well established indicator of aggressiveness. With this view in background, the aim of the present study to deciphering the occurrence of CC in schwannoma and to ascertain its biological behaviour. Furthermore to postulate the plausible pathogenesis behind it. **Material and methods:** Hematoxylin and Eosin stained sections of four schwannoma were retrieved from departmental archives and scanned for cannibalistic cells. In addition predominance of Antoni pattern (A/B) and degenerative changes (such as hemorrhage and hyalinized blood vessels) in schwannoma were also observed. **Results:** While observing cellular cannibalism in schwannoma, with increased in frequency of cellular cannibalism there is corresponding increase in Antoni A pattern and degenerative changes. **Conclusion:** These phenomena are depicted in schwannoma and could represent the change in biological behavior of tumor. The plausible pathogenesis underlying cannibalism in schwannoma are vascular insufficiency provoked by the interrelated effect of hyper cellularity and degenerative changes like hyalinized blood vessels.

KEYWORDS

Aggressiveness, Cellular cannibalism, Degenerative changes, Nutritional demand, Schwannoma.

INTRODUCTION

Cellular cannibalism (CC) is defined as the ability of a larger cell to engulf another small living cell, eventually leading to crescent shape nucleus of host cell abide by the death of the internalized cell.¹ Tumor cells might utilise this process either as a source of nourishment in nutritionally deficient and unreceptive tumor microenvironment, tumor homeostasis or immune evasion.^{2,3} It could be a homogenous or a heterogenous process.¹ The host cell might be normal epithelial, mesenchymal, neural and hematopoietic cell types, otherwise neoplastic in origin and the engulfed cell is usually lymphocytes, RBC's and plasma cells in the heterogenous type whereas in homogenous type the host cell and the engulfed cell belong to the same population.⁴ Researches have been meticulously describing these intriguing phenomena in various pathologies which encompasses malignant lesions such as Breast carcinoma⁵, Oral squamous cell carcinoma (OSCC)^{6,7} and so on. Based on the findings of their work, Sarode SC et al suggested that cannibalism is a sign of aggressiveness, anaplasia, metastatic potential and also could predict the biological behavior of the tumor. Lately it has been reported in benign tumors like Giant cell tumor tendon of localized type⁸, Ameloblastoma⁹, Central and Peripheral giant cell granuloma of oral cavity¹⁰.

Considering the literature fact, the cannibalistic activity always associate with poor nutritional supply, similarly schwannoma shows the degenerative changes secondary to reduced blood supply histologically such as nuclear pleomorphism, hyperchromasia, areas of hypocellular tissues, calcification and hyalinized blood vessels.¹¹⁻¹⁵ Therefore, we contemplated that schwann cells in schwannoma might show the phenomenon of CC.

Hence in this present study we have made a pioneer attempt at studying the enigmatic histopathological realm of CC in schwannoma in haematoxylin and eosin (H&E) stained tissue sections and further correlating with predominance of Antoni pattern and degenerative changes in the hope that it will shed some light on its biological behaviour and tumor progression. An attempt has also been made to hypothesize the plausible pathogenesis underlying CC in schwannoma.

MATERIAL AND METHODS

The present observational study was conducted in the Department of Oral Pathology and Microbiology, PGIDS, Rohtak. We reviewed histologically proven archival cases of schwannoma in our department for cannibalistic cells. Out of 4 cases of schwannoma, 2 were conventional and 2 ancients were considered as the study sample.

Haematoxylin & Eosin (H&E) stained sections were observed under high power (100X, oil immersion) using light microscope to assess cannibalistic cells. The morphological features to describe CC are : a larger tumor cell (host cell) engulfing another smaller tumor cell (internalized cell) with oval faded nucleus inside a vacuole and peripherally pushed crescent shaped nucleus of the host cell. The counting was done in 10 random high power fields (hpf), showing maximum density of this phenomenon. The average of ten different fields was calculated and expressed as number of mean CC /Hpf.⁴ In addition, predominance of Antoni type/pattern (A/B) and degenerative changes (such as hemorrhage and hyalinized blood vessels) in schwannoma arbitrarily graded as mild, moderate and severe were also observed.

RESULTS

In the present study, the patient age ranged from 19 to 55 years, in which 3 were males and 1 female. Two conventional and 1 ancient case showed classical features of CC on H&E stained slides with a maximum of 9 and minimum 1 CC/10 hpf. (Table.1 and Fig.1) (Table.1 and Fig.2) Increased in Antoni A pattern and degenerative changes there was parallel increase in frequency of CC.

DISCUSSION

First introduced by Leydon in 1904, CC is an altered phagocytic event displayed by tumor cells all throughout the body.^{1,3,4} Since CC has been previously explored in various benign tumors like Giant cell tumor tendon of localized type⁸, Ameloblastoma⁹, Central and Peripheral giant cell granuloma of oral cavity¹⁰. Whereas CC in schwannoma is an enigmatic and uncharted territory, our sole focus is to emphasize and understand the pathogenesis underlie their occurrence and clinical significance of the same.

In the present study, there was higher frequency of CC observed with cases depicting analogous increase in Antoni type A pattern and associated degenerative changes. The above-mentioned finding has proven the fact 'lack of nutrition theory' in CC. Previous study by Vilanova JR et al. in a morphometric method showed a relationship between Antoni B tissue, tumor size and vascularity.

They orated that with increase in tumor size, the Antoni B zone increased in proportion to tumor area associated with increased degenerative changes such as cyst formation, hemorrhage and large thick walled hyalinized vessels that regularly undergo thrombosis.¹⁴

Histologically, portrayed that due to nutritional depletion the increased cellularity in Antoni A component, consequently undergo degeneration such as apoptosis and results in the formation of Antoni B.¹⁴ Thus, the peaking nutritional demand provoked by the interrelated effect of hyper cellularity and degenerative changes like hyalinized blood vessels secondary to it, which on eventual period of starvation and decisively could lead to shift in the metabolic pathway that might prompt an alteration in the cell phenotype which has the ability to endure in this caustic environment.

These altered cell phenotypes (CC) are the selected tumor cells which possess the property to engulf another cell for their endurance. All these above verdicts conclude presence of CC in schwannoma might portrays the aggressive potential within it. Since the present study is a pioneer attempt considering CC in Schwannoma, we are unable to corroborate our results with any other elaborate study.

Furthermore, we are also postulating that the exotic pathogenesis behind the presence of CC in schwannoma might be allied with vascular insufficiency (most accepted theory) on account of hyper cellularity in Antoni A and vascular degenerative phenomena.

CONCLUSION

In this pioneering study, an attempt has been made to observe the CC in schwannoma and its possible etiopathogenesis. CC is straightway evident on routine H&E sections with no need for special stains and other sophisticated molecular techniques. The existence of cannibalistic cells in certain tumors has been correlated with aggressive biological behavior.

Henceforth, detection of these cells in schwannoma and their association with Antoni A pattern and degenerative changes would depict its hostile nature and it may have effect on routine treatment protocol while treatment modalities varies for locally aggressive lesions. Further, extensive research with larger sample size and follow up is warranted for the confirmation.

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Conflict of interest

The author declares that they have no conflict of interest to disclose.

Table 1: Clinicopathological parameters and mean CC in Schwannoma.

Case.no	Age/se x	Site	Antoni Type	Degenerati ve changes	CC/10 hpf	Diagnosis
1	33/F	Right Side of Palate	A>B	+	3	Conventio nal schwanno ma
2	55/M	Right infratempo ral region	A>B	++	1	Ancient schwanno ma
3	45/M	Right infraorbita l region	A=B	++	0	Ancient schwanno ma
4	19/M	Right Side of Palate	A>>B	++	9	Conventio nal schwanno ma

t++:marked, +:moderate, -:absent.

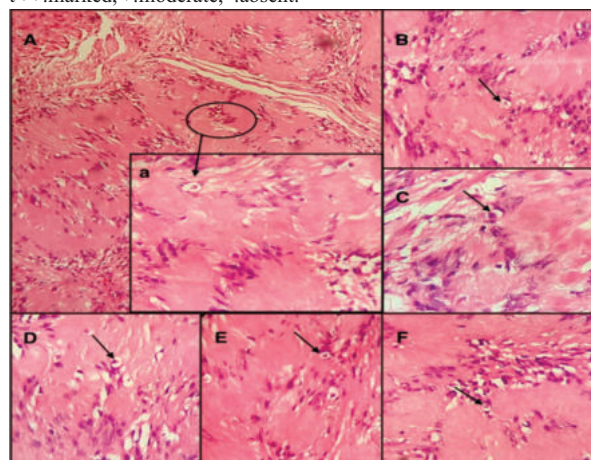


Fig.1. Photomicrograph showing cannibalism in schwannoma A) (H&E 200x); B), C), D), E), F) (H&E 400x).

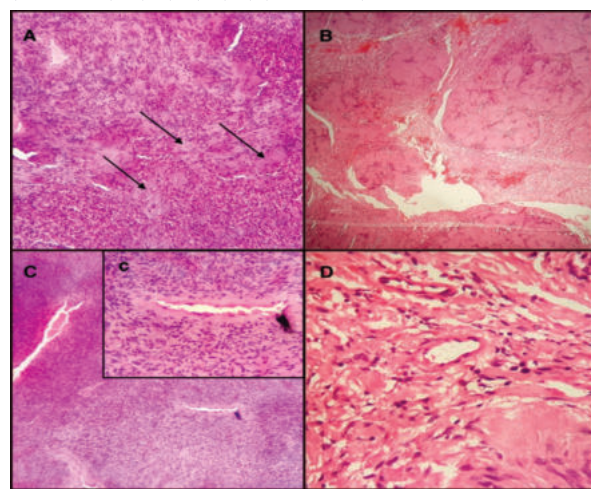


Fig. 2. Photomicrograph showing A) areas of degeneration (100x), B) areas of haemorrhage (4x), C) & D) hyalinized blood vessels (100x), (400x).

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