Role of melanin pigmentation in the pathogenesis of Oral Giant Cell Fibroma

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Abstract

Background: The role of fibroblasts varies according to the underlying pathology. They are generally omnipresent and adapt themselves to various roles. They constitute the main cell type of the connective tissue stroma. The aim of the study was to explain the giant nature of fibroblasts in giant cell fibroma (GCF).

Materials and Methods: A retrospective analysis of biopsied tissues retrieved 11 cases diagnosed as GCF during the period 2005–2013. The sections were subjected to routine hematoxylin and eosin stain and Masson Fontana (MF) stain.

Results: We found 6 cases to be positive for MF stain. MF stain was positive for melanin pigments in the cytoplasm of giant fibroblasts.

Conclusion: This could through some light on the pathogenesis of giant cell nature as a morphological adaptation.

Introduction

Giant cell fibroma (GCF) is not a completely new entity. GCF was first described by Weathers and Callihan in 1974.[1] Many studies have been done to study the origin of these giant stellate cells. Ultrastructural examination of these cells suggested unusual fibroblasts.[2] Various immunohistochemical studies[3-6] showed positivity for vimentin and negative for trypase, human leukocyte antigen-DR, α-smooth muscle actin, CD68, S-100, HHF-35, keratin (MNF 116), neurofilaments, glial fibrillary acidic protein, desmin, CD31, and leukocyte common antigen suggesting the cells are of fibroblast lineage. Cells along with vimentin were also positive for prolyl-4 hydroxylase, indicating functional fibroblast phenotype.[6] The present case series of GCF was carried out to understand the giant cell nature of the fibroblasts.

Materials and Methods

The diagnosed cases of GCF were retrieved from the histopathological archives of the Oral Pathology Department since 2003–2013. The diagnostic criteria for GCF were namely numerous large stellate cells which are mono, bi, or multinucleated hyperchromatic nucleus in a loosely arranged collagenous background which are juxtaepithelially present, and overlying epithelium is hyperplastic with thin, elongated rete pegs and the inflammatory component is minimal.[1,7,8] [Figures 1 and 2].

The 3 µm sections were cut and stained with Masson Fontana (MF). The MF stained slides were then assessed for the presence of melanin pigments which appear as dark brown granules.

Results

Of the 11 cases, 6 cases showed positivity for melanin granules in the cytoplasm of fibroblasts using MF stain [Figures 3 and 4]. Of the positive cases, 4 of them occurred in the gingiva, one each in buccal mucosa and lateral border of tongue. All the cases showed positivity for melanin in the basal layer of overlying epithelium.

Key words: Giant cell fibroma, giant cells, Masson Fontana, melanin pigment, stellate fibroblasts

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Soujanya et al. [1] emphasized the presence of melanin pigment in the cytoplasm of the giant fibroblasts.

**Origin**

There are many theories proposed for the origin of these giant fibroblasts. In 1987, Regezi et al. [11] postulated that these fibroblasts originated from primitive ectomesenchymal cells which possessed the properties of both macrophage and fibroblast. Many studies proved with the help of immunohistochemistry positivity of these giant fibroblasts for vimentin and propyl-4 hydroxylase, confirming fibroblastic lineage. Okamura et al. [10] reiterated the theory proposed by Regezi et al. [11] stating that these giant fibroblasts in GCF are of macrophage-monocytic lineage.

**Hypothesis**

Considering the following proved features:

- Most common site of occurrence of GCF is gingiva
- Gingiva being most common site of melanin pigmentation in oral mucosa [2]

**Discussion**

GCF is a nonneoplastic fibrous tumor which clinically presents as an asymptomatic pedunculated tumor. Unlike traumatic fibroma, it does not appear to be associated with chronic irritation. Lesion occurs at young age with slight female predilection. [9,10] In the present study, the mean age of patients was 30 years, 8 out of 11 patients were female (2.5:1 approximately). The most common site was gingiva followed by tongue and buccal mucosa which is in accordance with other reported literature [3,9,10]. The demographical details of the patients selected for the study are given in Table 1. Histologically, the lesion shows distinctive features such as stratified squamous epithelium with thin long rete ridges and presence of giant fibroblasts in the sub epithelium. Various theories have proposed to explain the origin and the giant nature of fibroblast.

**Morphology**

The giant cell formation was explained by Odell et al. [6] as happened due to fusion of many mononuclear fibroblasts.

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**Figure 1:** Diagnostic criteria for giant cell fibroma: Epithelium with long rete ridges and large stellate fibroblasts scattered below the epithelium (H and E, ×100)

**Figure 2:** Large stellate fibroblasts with hyperchromatic nucleus (H and E, ×400)

**Figure 3:** Subepithelial fibroblasts showing melanin pigment in the cytoplasm (Masson Fontana, ×100)

**Figure 4:** Fibroblasts showing melanin pigment in the cytoplasm (Masson Fontana, ×400)
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We put forward the hypothesis that the engulfment of melanin pigments by the fibroblasts brings about a change in their morphology, causing them to convert into giant cells. A large case series is required to confirm the hypothesis. More studies need to probe into understanding the cell characteristics due to engulfment of different substances.

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Nil.

Conflicts of interest
There are no conflicts of interest.

References

Table 1: Demographic details of giant cell fibroma case series

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Site</th>
<th>Size (cm)</th>
<th>Clinical presentation</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Female</td>
<td>Lateral border of tongue</td>
<td>1×0.5</td>
<td>Painless pedunculated growth since 3 months</td>
<td>No recurrence</td>
</tr>
<tr>
<td>35</td>
<td>Female</td>
<td>Right posterior palatal gingiva</td>
<td>2×1.5</td>
<td>Painless pedunculated growth since 3 months</td>
<td>No recurrence</td>
</tr>
<tr>
<td>27</td>
<td>Male</td>
<td>Right postero-lateral part of palatal gingiva</td>
<td>2×2</td>
<td>Painless pedunculated growth since 8 years</td>
<td>No recurrence</td>
</tr>
<tr>
<td>38</td>
<td>Female</td>
<td>Mandibular left retromolar region</td>
<td>2×2</td>
<td>Painless pedunculated growth since 7 years</td>
<td>No recurrence</td>
</tr>
<tr>
<td>14</td>
<td>Female</td>
<td>Maxillary anterior gingiva</td>
<td>1×1.5</td>
<td>Painless pedunculated growth since 2 years</td>
<td>No recurrence</td>
</tr>
<tr>
<td>21</td>
<td>Female</td>
<td>Left postero-lateral part of palatal gingiva</td>
<td>0.5×0.5</td>
<td>Painless pedunculated growth noticed during routine clinical examination</td>
<td>No recurrence</td>
</tr>
<tr>
<td>28</td>
<td>Female</td>
<td>Right mandibular posterior gingiva</td>
<td>1×1</td>
<td>Painless pedunculated growth since 8 months</td>
<td>No recurrence</td>
</tr>
<tr>
<td>30</td>
<td>Male</td>
<td>Maxillary left posterior gingiva</td>
<td>1×1</td>
<td>Painless pedunculated growth since 2 months</td>
<td>No recurrence</td>
</tr>
<tr>
<td>35</td>
<td>Female</td>
<td>Maxillary anterior gingiva</td>
<td>1.5×0.75</td>
<td>Painless pedunculated growth since 1 year</td>
<td>No recurrence</td>
</tr>
<tr>
<td>37</td>
<td>Female</td>
<td>Lateral border of tongue</td>
<td>1×1</td>
<td>Painless pedunculated growth since 4 months</td>
<td>No recurrence</td>
</tr>
<tr>
<td>42</td>
<td>Male</td>
<td>Right maxillary posterior gingiva</td>
<td>1×2</td>
<td>Painless pedunculated growth since 2 months</td>
<td>No recurrence</td>
</tr>
</tbody>
</table>

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