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Characterization of Gingival Epulis Lesions: A Histological and Morphological Approach

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Author`s Contribution

[1,3,4]Substantial contributions to the conception or design of the work; or the acquisition, [4,6]Active participation in active methodology, [2,3]analysis, or interpretation of data for the work, [2,5]Drafting the work or revising it critically for important intellectual content

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ABSTRACT

Objective: To conduct a clinical and histopathological study of Epulis at Bhittai medical and Dental College, Mirpurkhas.

Methodology: A descriptive cross-sectional study was carried out at the Bhittai medical and Dental College Mirpurkhas. Patients clinically diagnosed with gingival outgrowth, across all age groups and both genders, were included. A provisional diagnosis of epulis was made based on clinical examination. After taking a careful history, relevant clinical features were recorded, and a biopsy procedure was performed using infiltration near the lesion or regional nerve block techniques. The data was documented using a pre-designed proforma and analyzed using SPSS version 22.0.

Results: Out of 50 subjects, 30 (60%) were female and 20 (40%) were male. Most cases involved the maxillary gingiva (anterior or posterior) (62%). The majority of lesions measured between 2cm and 3cm (76%). Lesions typically exhibited a soft consistency (70%), with fewer cases being firm (8%) or hard (22%). Histologically, peripheral giant cell granuloma (PG) was most prevalent (50%), followed by fibrous epulis (42%), peripheral ossifying fibroma (4%), and peripheral giant cell granuloma with features of central giant cell granuloma (PGCG) (4%). No cases of congenital epulis or pregnancy tumor were reported. Histological evaluation revealed no significant gender differences (p-value 0.86).

Conclusion: Clinically, most epulis lesions presented as painless, soft, coral pink masses, typically measuring approximately 2-3 cm in diameter and exhibiting a sessile form and observed more commonly in females, with a predominant occurrence in the maxillary region. Histopathological examination revealed that the most frequent types were fibrous epulis and peripheral giant cell granuloma.

Keywords: Epulis, Gingiva, Giant cell, benign lesion.

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Introduction

Gingival lesions are frequently encountered and contribute substantially to the diagnostic workload in oral pathology.[1] Most of these lesions are reactive in nature, exhibiting diverse appearances. However, developmental and neoplastic conditions can also manifest in the gingiva, often leading to diagnostic challenges both clinically and histologically.[1] Epulis refers to a localized overgrowth on the gums, typically resulting from chronic irritants like dental plaque, calculus, food particles, trauma, or factors such as poorly fitting dental appliances.2 These growths are classified as hyperplastic inflammatory responses rather than tumors.[2,3] Epulis is a prevalent oral condition, with occurrence rates ranging between 5.6% and 20.6%.[2,4] This gingival overgrowth

can lead to several issues, including aesthetic concerns, functional impairments, challenges in chewing and speaking, and, in some cases, significant psychological distress.[2,5]

The overall incidence of epulis lesion varied significantly, though it is known to be higher in some population categories, particularly among females[6,7] and young adults, probably due to hormonal impacts or lifestyle related that enhance the chance of gingival irritating. On the clinical level, these types of lesions are usually not painful, appears as a smooth, sessile or pedunculated, solitary mass that varies in size from a few millimeters up to 9 cm, typically covered by a reddish, normal-looking mucosa.[7] They can have smooth or lobulated margins and are most commonly found on the maxillary alveolar ridge, however they can also be found on the surface of the tongue. Pyogenic granuloma is more commonly observed in women during pregnancy, a condition known as pregnancy epulis.[8] The color of the lesion can range from a pale pink to a vibrant bright red, and may also appear brown or the purple, depending on factors such as vascularity, inflammation, and the age of the lesion.[8] Such clinical evidence is sometimes insufficient for a clear diagnosis, because various forms of gingival lesions might present with identical features, resulting in significant overlap in their clinically and histopathological presentation.

Histopathologically, epulis lesions typically complex and include different subtypes, all of which have their own cellular properties. The main types are pyogenic granuloma, peripheral giant cell granuloma (GCG), fibrous epulis, and peripheral ossifying fibroma. Most common type of reactive gingival hyperplasia is pyogenic granuloma,[2] which is distinguished by significantly vascularized tissue of granulation and frequently includes surface ulcers. Fibrous epulis, on the other hand, appears as a hard mass made up of dense fibrous tissue and frequently has fewer vessels for blood.

It is a non-cancerous growth on the gingiva, typically found in the interdental papilla region, and is commonly caused by local irritation.[9] Characterization of large cells distinguishes peripheral, which is often caused by chronic local irritation, whereas peripheral ossifying fibroma comprises calcified material and has a proclivity for ossification or the calcification. Every subtype has distinct histological indicators that aid in separation; nevertheless, feature overlap might confound the diagnostic approach. The complexity of these cases highlights the need for histological investigation, because clinical examination alone cannot consistently discriminate between the categories. Therefore this study is intended to assess the relative incidence of various biopsied localized lesions of oral cavity at Hyderabad (Sindh) region. However present study is the first study conducted in Sindh Pakistan which proposed studies on all gingival swellings presenting as epulis. Since epulisre of different types such as fibrous epulis, PG, PGCG, POF, ameloblastoma, OSCC etc so clinically it's not possible to identify which particular type of epulis patient have and how serious it could be but histopathological results can find the right type and locate the criticalness of lesion so that it does not get more complicated.

Methodology

This descriptive cross-sectional study was conducted at the Oral Surgery Outpatient Department of Bhittai medical and Dental College Mirpurkhas from May 2023 to Nov 2023, IRB no Ref: BDMC/R&D/ERC/2023-13. Non-probability purposive sampling was used. The study included patients of all ages and both genders who presented with gingival (gum) outgrowths and received a clinical diagnosis of epulis. Patients who were taking epileptic drugs, immunosuppressants, or calcium channel blockers, as well as those who did not consent to participate, were excluded from the study. Before attending the OPD, patients were provided with written information about the study. Each subject underwent a detailed clinical evaluation, including a full medical history, to confirm the diagnosis of epulis and determine eligibility based on inclusion and exclusion criteria.

Written, witnessed informed consent was obtained from each patient. A provisional diagnosis of epulis was made based on clinical examination. Consent was obtained for the clinical examination, medical history collection, and additional biopsy procedures. After obtaining a thorough patient history, relevant clinical characteristics were recorded in a standardized proforma, and biopsies were taken from the affected sites. The biopsy procedure was performed either locally, using infiltration near the lesion, or regionally, with a nerve block method. It is critical to apply the local anesthetic injection superficially, either under or around the lesion, or directly into it to prevent distortion of the lesion and its margins, which could hinder accurate diagnosis by the oral pathologist. After achieving local anesthesia in the lesion area, tension was created by firmly retracting the soft tissues to allow precise incision margins. An elliptical incision was made around the lesion with a minimum 1 mm margin. As the initial apex of the ellipse was formed, the biopsy

specimen was gently raised using non-toothed tissue forceps. The incision extended beyond the lesion's lowest margin, and, once freed from the surrounding soft tissues, the specimen was immediately placed in a sterilized pathology specimen container containing 10% buffered formalin for fixation. Immediate fixation was essential to prevent autolysis, which could complicate or impede histological examination. Following biopsy, firm physical pressure was applied to the surgical site to promote hemostasis, using either a silver nitrate stick or electrocautery as necessary. The incision was closed with interrupted sutures, and sterile gauze was applied to the surgical area to support hemostasis and prevent the patient from swallowing blood. Patients with no history of bleeding disorders or medications affecting coagulation were observed for 30 minutes post-procedure. They were informed that mild blood discharge from the surgical area is normal and may last up to 24 hours following the biopsy. A gauze pack was provided, with instructions to replace it every 20–30 minutes as needed throughout the day, and patients were advised not to place gauze in their mouth while sleeping. Specimens, accompanied by relevant documentation, were promptly sent to the pathology lab for diagnosis and analysis.

Large specimens were processed in a plastic cassette using an automated histologic processor, typically an overnight procedure. This process involved gradually dehydrating the sample in increasing alcohol concentrations and then placing it in xylene in preparation for embedding. On the second day, samples were embedded in wax, enabling 4–5 micron-thin sections to be cut with a microtome, mounted on glass slides, and stained with histologic dyes. By the third day (approximately 48 hours after the sample's arrival), the slides were reviewed by a pathologist, and a report was generated. All relevant histological details were recorded on a proforma. Data analysis was performed using SPSS version 26.

Results

The study population was categorized by age groups, with most participants falling in the 2nd to 3rd decades of life. Among the 50 subjects, 30 (60%) were female, and 20 (40%) were male. The mean age of female subjects was slightly higher than that of male subjects (31.5 ± 9.5 years vs. 27.9 ± 8.6 years, respectively). The majority of cases (62.0%) involved the maxillary gingiva (anterior or posterior), with 31 patients affected, while the remaining 19 patients (38.0%) had lesions in the mandibular gingiva. Based on the size of lesions, the most of the cases (76%) had < 3 cm, followed by 10 cases (20%) with a size range of 3-6 cm, and 2 cases (4%) with lesions larger than 6 cm. Color analysis revealed that coral pink was the most common color, observed in 30 patients (60%), followed by red in 15 patients (30%), and pale color in 5 patients (10%). In terms of consistency, 35 patients (70%) presented with soft lesions, while firm consistency was found in 4 patients (8%) and hard consistency in 11 patients (22%). Tooth mobility was observed in 16 cases (32%). Histologically, the most common diagnosis was pyogenic granuloma (PG), identified in 25 cases (50%), followed by fibrous epulis in 21 cases (42%). Peripheral giant cell granuloma (GCG) and peripheral ossifying fibroma were each observed in 2 cases (4%). No cases of congenital epulis or pregnancy tumor were reported. There was no significant difference between genders in histological findings (p- 0.86). Table I & II.

Table I: Clinical characteristics of the lesions in patients. (n=50)

Clinical variables		N	%
Site	Maxilla	31	62.0%
	Mandible	19	38.0%
Size	<3cm	38	76%
	3-6 cm	10	20%
	>6cm	02	4%
Color	Coral pink	30	60%
	Red	15	30%
	Pale	5	10%
Consistency	Firm	04	8%
	Soft	35	70%
	Hard	11	22%
Associated with tooth mobility	Yes	16	32%
	No	34	68%

Table II: Histological diagnosis of the patients with epulis. (n= 50)

Histological diagnosis	Frequency	Percentage
Fibrous epulis	21	42%
PG	25	50%
Peripheral Ossifying fibroma	2	4%
Peripheral GCG	2	4%

Figure 1. Photograph of a patient with pyogenic granuloma.

Figure 2. Photograph of a patient with fibrous epulis.

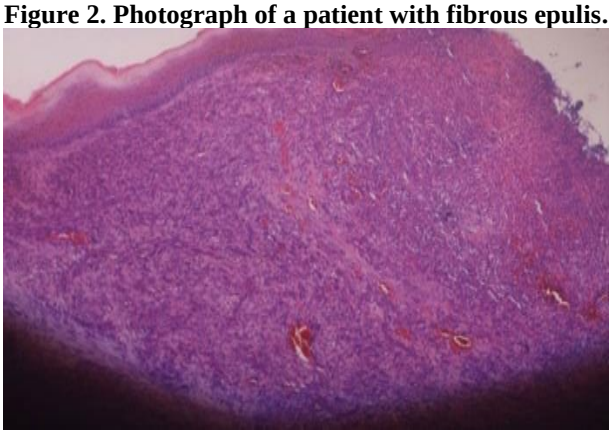

Figure 3. Hyperplastic oral epithelium, edematous and fibroblastic stroma and numerous blood vessels. (H&E X 100)

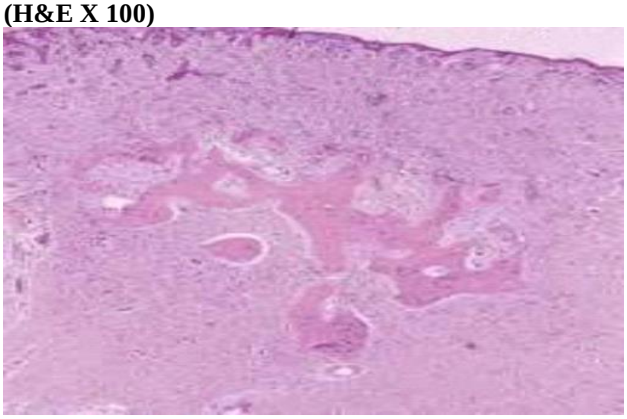

Figure 4. Hyperplastic oral epithelium, Blood vessels and Presence of fibroblasts. H&E X 100.

Discussion

Epulis is a relatively common benign lesion found in the oral cavity.[10] The term has roots in ancient Greek and serves as a specific clinical descriptor with a topographical significance, indicating a lesion located on the gingiva.[11] This study involved 50 patients with gingival swelling (epulis) and had an overall mean age of 27.46 years, with female participants having a slightly higher mean age of 31.5 ± 9.5 years compared to male participants, who had a mean age of 27.9 ± 8.6 years. Consistent with this, Molania T A et al[12] reported a mean age of 26.43 ± 7.12 years, suggesting that epulis is commonly observed in younger individuals, particularly in their second or third decades of life. In contrast, Zhao N et al2 found a higher mean age of 45.55 years, with peak incidence occurring in the third and fourth decades. Similarly, Mohammadi M et al[6] reported a higher mean age of 54.93 ± 9.99 years for epulis fissuratum, with a patient age range of 33 to 89 years, indicating that this condition is more prevalent among older individuals.

Additionally, Kadeh H et al[13] found the most common age group for reactive lesions to be 21–40 years, comprising 35% of cases. The observed differences in mean age across studies may be attributed to variations in the selected age ranges, sample selection criteria, and other factors. Additionally, differences in geographical locations, demographics, and sample sizes could also contribute to the variability in the reported mean ages.

In this study, females were in the majority, comprising 30 (60%) of the participants, while males accounted for 20 (40%). Kadeh H et al[13] reported that 60.3% of lesions occurred in females, with the remaining cases in males. Similarly, Pour MA et al[14] found the condition to be more prevalent in females, though the reasons for this remain unclear. OA Singh D et al[15] and Vandana Zhao N et al[2] also reported a female predominance in their studies.

Higher incidence of epulis lesions in females observed in several studies may be attributed to hormonal differences, particularly the influence of estrogen and progesterone, which are known to affect tissue growth and inflammation. Additionally, females may be more prone to developing these lesions due to increased use of oral contraceptives, pregnancy-related changes, or periodontal conditions. However the exact cause remains unclear.

In this study, the majority of cases (62.0%) were found to involve the maxillary gingiva, including both anterior and posterior regions. This finding aligns with previous reports by Goyal R et al[16] and Kadeh H et al[13] who also identified the gingiva as the most common site of involvement. Conversely, Tyagi et al[17] in their study, noted a mandibular-to-maxillary lesion proportion of 1:4, indicating a preference for the mandibular zone. Meanwhile, Silva MF et al. reported different lesion distributions, with other sites such as the lips (35.3%) and tongue (23.5%) also being notably affected.

In this study according to site majority of cases (62.0%) were found with Maxillary Gingiva (anterior or posterior).Similarly Goyal R et al[16] and Kadeh H et

al(2015)[51] reported that gingiva were the commonest sites of involvement. While Tyagi et al[17] in review asserted mandibular to maxillary zone tendency proportion of the lesion to be (1:4) but Silva MF et al[18] reported other sides such as lips (35.3%) and tongue (23.5%). In terms of size, the majority of cases (78.0%) in this study presented with lesions measuring 2 cm to 3 cm. This finding closely aligns with the study by Chalkoo AH et al[19] who observed lesions ranging from >1 cm to 2 cm in diameter.

Similarly, Agarwal H et al[20] reported peripheral giant cell granuloma (GCG) lesions typically measuring 2 to 3 cm. Flaitz CM et al[21] also noted variability, describing this reactive lesion as ranging from massive enlargement to small papules, indicating significant heterogeneity in size across different studies.

Most cases in this study (60%) were coral pink in color, aligning with findings from Chalkoo AH et al[19] and similar observations by Agarwal H et al[20] of reddish-pink lesions with pale pink exteriors. Flaitz CM et al[21] described gingival lesions with blue, purple, or red hues, while Kulkarni A et al[22] also noted reddish-pink growths. Collectively, these comparisons justify the study's observations within a broader clinical and research context, demonstrating consistency and recognizing variations seen in other studies.

Histological analysis in this study revealed that pyogenic granuloma (PG) was the most common lesion, found in 50% of cases, followed by fibrous epulis at 42%. These findings are consistent with Maryam SM et al[23] who also reported PG as the most prevalent lesion, and Shamim et al,[24] who found non-neoplastic lesions, with oral PG being the most frequent, representing 52.71% of cases.

Truschnegg A et al[25] identified peripheral ossifying fibroma as the most common entity (32.6%), followed by 29.3% fibroma/fibrosis, 13.1% giant cell lesions and 8.7% pyogenic granuloma (8.7%). Similarly, Vandana Zhao N et al[2] found focal fibrous hyperplasia (FFH) as most prevalent 60.92%, POF 29.32%, PG 8.08%, and PGCG 1.68%. Regarding gender distribution, PG was more common in females, consistent with the findings of Chalkoo AH et al[19] who noted a higher incidence of PG and other lesions among females. However, this contrasts with the study by Ramu S et al. which found PG and fibrous epulis to be more common in males. However no significant gender-based difference was observed in the present study p- 0.86.

Conclusion

As per study the study conclusion the clinical most epulis lesions observed as painless, soft, coral pink masses, generally measuring around 2-3 cm in diameter and typically having a sessile structure. Histopathological analysis showed that fibrous epulis and peripheral giant cell granuloma were the most prevalent types. These lesions were more frequently observed in females, especially in the maxillary region, and were most commonly found in individuals in their second and third decades of life. Supported further large scale studies recommended to evaluate the underlying causes, risk factors, and recurrence patterns of epulis lesions, promoting better prevention and management strategies.

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