

An Investigation of Odontogenic Sources of Facial Swellings in Pediatric Patients

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Introduction

An abscess is an encapsulation of purulence surrounded by granulation tissue. The most common form of a dental abscess is an acute apical abscess, and is an advancement of apical periodontitis. An acute apical abscess may develop in the absence or presence of previous chronic inflammation. Due to the acute nature of the inflammation, radiographic evidence of bone destruction may or may not be evident. Within the root canal, bacteria may communicate through the apical and lateral foramina. The bacteria involved in this abscess may travel to spaces within the head and neck, forming phlegmon or cellulitis. The suppuration from the abscess may travel through medullary or cortical bone, and into submucous or subcutaneous soft tissue, causing intraoral and extraoral swellings, and may also travel through fascial spaces of the head and neck, resulting in further complications. The most severe advancement of an acute apical abscess can result in mortality caused from sepsis or airway obstruction. Prior literature has characterized systemic features of extraoral swellings caused by dental infections, but fewer studies have characterized the tooth-level source features.

According to an annual statistical brief by Owens et al in 2018, emergency department visits for non-traumatic dental conditions were responsible for more than \$2 billion in costs at US tertiary hospitals, with an estimated 42.2% of these visits paid for by Medicaid. Another study by Hsia et al estimates that 3.9% of dental-related emergency department visits could have been avoided by earlier treatment in a dental setting. A study published in 2023 by Musa et al reports that 52.3-77.9% of pediatric emergency department visits at tertiary hospitals were for non-traumatic dental conditions, with the most common conditions being dental caries, followed by periapical abscess, facial cellulitis, gingival conditions, and oral lesions. It was also reported that among children, those in the age group of 0-5 years are more likely to present to the emergency department for dental conditions.

Research Question and Objective

In children who present to the Emergency Department (ED) with extraoral facial swellings of odontogenic origin, what are the characteristics of the dental sources of infection?

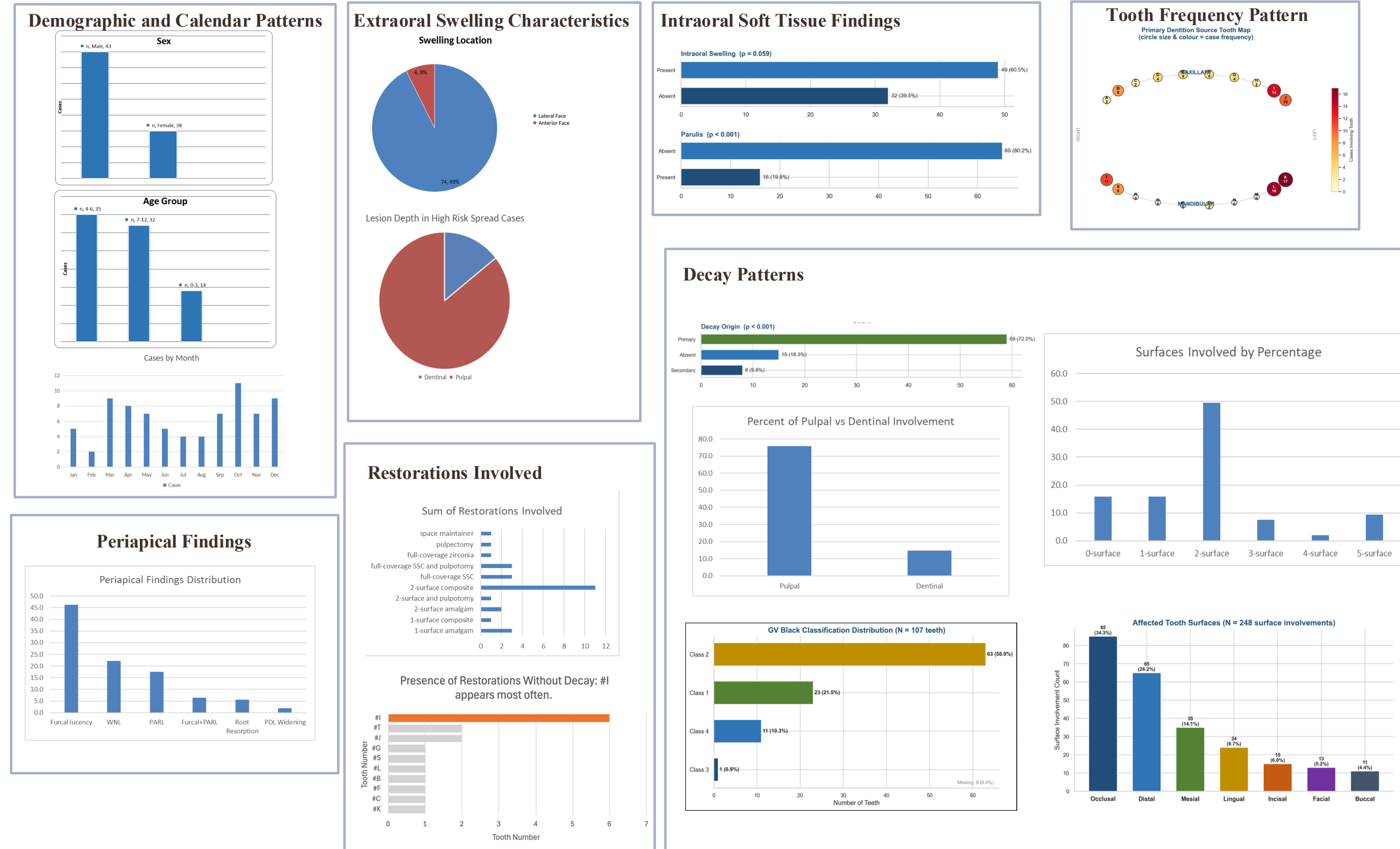
This study retrospectively profiles the odontogenic source characteristics within a swelling-only pediatric cohort over a two-year period to discern which intraoral findings, such as tooth type, decay patterns, and radiographic findings, recur most often. It also detects which odontogenic features are associated with high-risk infection spread involving the periorbital or submandibular areas.

Methods

Axiom records of the years 2018 and 2019 of patients who presented to the Connecticut Children's Medical Center Emergency Department were screened. Inclusion criteria included the presence of an odontogenic infection associated with a deciduous tooth, the presence of an extraoral swelling, and diagnostic radiographs. Exclusion criteria included the absence of an extraoral swelling, the presence of an odontogenic infection associated with a permanent tooth, the presence of a non-odontogenic extraoral swelling, and age range exceeding 17 years. The sample size was n=80. The following domains were recorded:

- Location of facial swelling
- Presence or absence of an intraoral swelling
- The specific tooth/teeth involved
- The presence and type of tooth decay involved (primary vs secondary decay, incipient decay, moderate decay, advanced decay)
- Surface characteristics of decay involved (GV Black classification and which surfaces were involved)
- The presence or absence of an existing restoration and the type of restoration
- Radiographic features (presence or absence of furcal/periapical radiolucency (PARL) or root resorption)

Results



Conclusion

Most cases involved lateral-face swelling (74 (92.5%)), while anterior-face swelling was less common (6 (7.5%)). Periorbital or neck extension was present in 16 (20.0%) cases, and intraoral swelling was documented in 47 (58.8%) cases. Presence of a parulis was reported in 16 (20%) of the cases. Multi-tooth involvement occurred in 19 (23.8%) cases, indicating that most cases were localized to a single dominant odontogenic source despite the clinical severity of presentation. The dominant tooth group was molars, accounting for 69 (86.2%) of cases, and cases were split equally in the maxilla (39(48.8%)) and mandible (39 (48.8%)). Pulpal involvement was present in 58 (72.5%) of decay, and dentinal involvement was present in 14 (17.5%) of decay. Primary decay accounted for 57 (71.2%) of the cases, and secondary decay accounted for 9 (10.0%) of the cases. Presence of a restoration with no evidence of decay was associated with 15 (18.8%) of the swellings, most of which were associated with a two-surface restoration on an upper first molar.

The dominant picture in this cohort is a posterior molar, lateral-face swelling, with no parulis, and no high-risk spread. While most of the swellings were associated with large caries, some swellings had no evidence of caries with pulpal involvement.

Weaknesses of this study include small sample size and inherent information bias due to reliance on clinical notes from several providers. Strengths of the study include that all charts were reviewed by a single researcher, which was beneficial for the consistency of data extraction.

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