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RESEARCH ARTICLE

Maxillary abnormality in the medieval Blessed friar Egidio from Laurenzana (Basilicata, southern Italy)

Ruggero D'Anastasio | **Jacopo Cilli** | **Joan Viciano** | **Luigi Capasso**

Department of Medicine and Aging Sciences, "G. d'Annunzio" University of Chieti–Pescara, Chieti, Italy

Correspondence
Jacopo Cilli, Department of Medicine and Aging Sciences, "G. d'Annunzio" University of Chieti–Pescara, Via Polacchi 11-13, Chieti 66100, Italy.
Email: jacopo.cilli@unich.it

Abstract

Blessed Egidio was a revered Catholic friar who lived in Basilicata (southern Italy) between the 15th and 16th centuries A.D. His natural mummy is preserved in the Mother Church of Laurenzana, the village where he lived. During the recent restoration and conservation of the relic, palaeopathological analysis was carried out. This revealed osteolytic lesions that affected the maxillary bones, as two injuries that were different in morphology and size that distinctly afflicted the right and left maxillae. The macroscopic and radiographic appearance of the lesion on the right maxilla and its proximity to the right premolar tooth that showed periapical granuloma suggest a diagnosis of an inflammatory odontogenic cyst (radicular cyst). The second lesion, of the left maxilla, was non-specific and might have been the consequence of an inflammatory process. Odontogenic cysts are common in modern human populations but have been poorly described to date in ancient populations. The case of Blessed Egidio represents a new and rare case diagnosed in the field of palaeopathology.

KEYWORDS
odontogenic cyst, paleopathology, radicular cyst, relic

1 | INTRODUCTION

1.1 | Historical context

The long-term preservation of relics is a priority for many religious and secular communities. Anthropologists are then involved in their restoration for conservation purposes and to collect anthropological and palaeopathological data of scientific interest (Capasso et al., 1999; Capasso et al., 2017; D'Anastasio et al., 2010). In 2017, prior to the celebrations for the 500th anniversary of the death of Blessed Egidio da Laurenzana (1443–1518), the Operative Unit of Anthropology of "G. d'Annunzio" University of Chieti–Pescara was commissioned by the Bishop of Acerenza (delegate of the Catholic Church in the Region) to check the state of preservation of the mummified body of Blessed Egidio. The aim was to plan the work that would be required for its restoration and conservation.

The oldest information on the life of Blessed Egidio dates back to the second half of the XVII century (Bonaventura di Laurenzana, 1674). Blessed Egidio was born in Laurenzana, a small village in southern Italy, where he spent his entire life. The Christian tradition says that on Christmas Eve in 1517, the devil breathed fire on the body of Blessed Egidio, burning his left arm, and poured boiling oil from the lamps onto him. The burns led to his death on January 10, 1518, despite the thoughtful care of a noblewoman named Donna Lucrezia Trara. His body was buried in a common grave in the Convent of Santa Maria della Neve in Laurenzana. During a check carried out by the friars of the Convent a few years after his death, his corpse was found to be naturally mummified (Caruso, 1982; Malatesta

et al., 2017). Subsequently, the human remains were transferred to the Mother Church of Santa Maria Assunta in Cielo of Laurenzana, where they are currently kept under a controlled atmosphere inside a new glass exhibition case (Figure 1).

During the restoration and conservation, anthropological and palaeopathological analyses were performed on the mummified body (Comune di Laurenzana, 2019). These analyses showed two lesions, on the right and left palate. For the lesion of the right palate, the morphology and size suggested the diagnosis of an inflammatory odontogenic cyst (i.e., a radicular cyst).

1.2 | Cysts of the jaws

Cysts are cavities that contain liquid or semi-liquid material. This material is surrounded by an inner membrane of epithelial tissue and an external wall of fibrous connective tissue (Devenney-Cakir et al., 2011; Dias et al., 2007; Dunfee et al., 2006; Dunlap, 2000).

The World Health Organization classifies cysts into odontogenic, non-odontogenic, and pseudocysts (Speight & Takata, 2018). Odontogenic cysts originate from the epithelial remnants after odontogenesis. Non-odontogenic cysts originate from proliferation of epithelial residues that are different from the tooth-forming organ. Pseudocysts are characterized by absence of an epithelium that delimits the cavity.

Odontogenic cysts can originate from inflammation-induced epithelial proliferation, with subsequent central liquefaction (i.e., inflammatory cysts), or from developmental alterations (i.e., developmental cysts) (Slootweg, 2009). Inflammatory cysts can be classified as radicular, residual, and paradental cysts. Inflammatory cysts generally develop at the root tips of decayed teeth, where the dental pulp undergoes necrosis, thus producing a radicular cyst (also known as periapical cyst, apical periodontal cyst, root end cyst, or dental cyst) (Alt et al., 1998; Mendonça, 1921; Prein et al., 1986). If a radicular cyst remains after extraction of the causative tooth, the cyst is then defined as a residual cyst. Inflammatory paradental cysts differ from others due to their location, which is lateral to the tooth, and usually at the cement-enamel junction (Slootweg, 2009). Dias et al. (2007) described the different stages of pathogenesis as starting from periapical dental lesions, to granuloma, and then to apical periodontal cysts. They also proposed specific bony diagnostic criteria to distinguish granuloma from apical periodontal cysts. Thus, where there are signs of infection of the dental pulp and a sub-spherical bony cavity with smooth, well demarcated walls and a maximum intra-bony diameter >3 mm, the diagnosis should be an apical periodontal cyst.

The etiology of non-inflammatory odontogenic cysts is not always clear, although they are related to defects in odontogenic development. Odontogenic developmental cysts include forms with intraosseous or soft tissue localisation and are distinguished by the different cellular structure of the lining of the cavity (Slootweg, 2009). These can be defined as six different forms, as follows: (i) dentigerous cysts, which surround the crown of non-erupted teeth while they are still within the jaw bone; (ii) lateral periodontal cysts, which are small cavities inside the bone and are located between the dental roots; (iii) botryoid odontogenic cysts, which represent a large multilocular variant of the lateral periodontal cyst; (iv) multilocular glandular odontogenic cysts, which are characterized by a complex lining epithelium that consists of partly non-keratinizing squamous cells, cuboidal or columnar cells, and mucus-producing cells; (v) odontogenic keratocysts, which appear radiologically as large radiolucent multilocular lesions; and (vi) gingival cysts, which are located in the gingival tissues.

For non-odontogenic cysts, nasopalatine duct cysts can form inside the nasopalatine canal. These are found in 1.0% to 2.2% of the population, and they represent the most common form of non-odontogenic cyst (Koseoglu et al., 2004; Ortega et al., 2007). Nasolabial cysts are another form of non-odontogenic cyst, and these are located in the soft tissue, just lateral to the nose, and they arise from the nasolacrimal duct (Slootweg, 2009).

To correctly diagnose the nature of a cyst, it is necessary to carry out histopathological analysis, to examine the composition and structure of the cell layers that surround the cavity (Slootweg, 2009). Radiographic images also contribute to correct diagnosis of cysts, whereby the radiolucency, location, shape, margins, and number of cavities of a lesion contribute to the formulation of the diagnosis and the choice of therapy (Scholl et al., 1999). In general, radiographically, odontogenic cysts appear as radiolucent cavities that are subspherical in shape and have well-defined contours. In contrast, an irregular shape and undefined margins indicate disordered growth of a lesion, as typically seen for tumors.

Uncommon jaw lesions have been described in the palaeopathological literature, although these refer to benign mandibular tumors (i.e., possible osteomas or hamartomas and ossifying fibromas or osseous dysplasia) (Bartelink & Wright, 2011), to mandibular ameloblastomas (Carrascal et al., 2013; Cilli & D'Anastasio, 2017), and

FIGURE 1 The relic of Blessed Egidio da Laurenzana (1443–1518). The face is covered with a wax mask [Colour figure can be viewed at wileyonlinelibrary.com]

to possible benign fibro-osseous lesions (Gresky et al., 2017). For odontogenic cysts, only six cases to date have been attributable to odontogenic radicular cysts: five from the late-medieval graveyard of Stara Torina (Serbia) (Djurić & Rakočević, 2007) and one from the Roman Necropolis of Quinta da Torrinha/Quinta de Santo (Portugal) (Assis et al., 2018). Indeed, odontogenic cysts have been poorly described in ancient human populations (Assis et al., 2018; Djurić & Rakočević, 2007).

The objectives are to describe a new, rare paleopathological case of a radicular cyst and to expand the knowledge of the paleoepidemiology of odontogenic cysts.

2 | MATERIALS AND METHODS

The body of Blessed Egidio is a natural mummy, and it is complete and in good condition. He was found in a supine position with his hands crossed on his pelvis. The mummy has a maximum length of 136 cm, a maximum width (at the level of the elbows) of 42 cm, and a maximum height from the support surface of 28 cm.

The restoration work and the collection of anthropological and pathological data were carried out directly on site. For X-ray analysis, a mobile digital radiographic system (12.5 kW generator, X-ray tube with adequate power) was used in a room near the tomb of the relic. The detector was positioned directly under the mummy.

Although historical documents ascertain the identity of the mummy, the anthropological profile of the relic was nevertheless reconstructed. The sex estimate was carried out by analysis of the secondary sexual features of the skull and pelvis (Bruzek, 2002; Ferembach et al., 1980). We applied the transition analysis statistical method (Boldsen et al., 2002; Milner & Boldsen, 2012) using only the cranial sutures, as the pubic symphysis and the auricular area were not visible. Moreover, the degree of cranial sutures closure and the wear of the chewing surfaces of the teeth were used to estimate morphologically the age at death (Lovejoy, 1985; Meindl & Lovejoy, 1985). The stature in life was calculated from the maximum length of the humerus (Mendonça, 2000). The oral pathologies were evaluated following the recommendations of Ortner (Buikstra, 2019) and Hillson (2008), recording them as present or absent. The lesions were measured using calipers and a probe.

3 | RESULTS

The mummified body of Blessed Egidio is complete, and after restoration, it is in good condition. The mummification process involved the upper and lower limbs, while the head, trunk, and feet were almost completely skeletonized. Of note, there was the exceptional presence of the larynx, with preservation of the hyoid bone, the thyroid and cricoid cartilages, and soft tissues (i.e., membranes, ligaments, and muscle fibers). The X-ray showed partial calcification of the thyroid and cricoid cartilages, as generally related to an adult to senile age (Heather & Garvin, 2008). The pelvis and the skull showed typically male morphological characteristics. The age at death estimated with the transition analysis method evaluating the cranial sutures only is 78 years. The degree of cranial sutures closure and the wear of the chewing surfaces of the teeth indicate an age at death of about 60 years. Although the age estimate does not give perfectly coincident results, they nevertheless suggest that the remains belonged to a senile adult individual. The estimated stature in life was 160.65 ± 8.44 cm.

Palaeopathological analysis revealed the presence of dental pathological conditions and bone lesions. In particular, the analysis showed pathological bone resorption in the anterior palatine region. Two osteolytic lesions on the right and left palate represented interesting palaeopathological cases. These were different in size and morphology and appeared to be asynchronous and the consequence of pathologies of different natures. The lesion on the left palate had irregular margins and a porotic surface and might be the consequence of a non-specific inflammatory reaction, such as from an ectopic body. The lesion of the right palate was of particular interest, with morphological and radiographic characteristics that suggested an inflammatory odontogenic cyst (i.e., radicular cyst).

A large unilocular osteolytic lesion affected the right maxillary bone. It had a round shape when observed in frontal view (Figure 2a) and an irregular pear-shape when observed in inferior view (Figure 2b). The lesion presented clearly marked margins and a smooth surface, and it lapped the right nasal opening and extended medially and posteriorly to the hard palate. The maximum vertical diameter of the bony lesion was 19.6 mm, the maximum transverse diameter was 20.4 mm, and the maximum antero-posterior diameter was 28.1 mm.

The right pre-maxilla and the anterior part of the right palatine process of the maxilla were absent, and consequently, the alveolar processes of the right incisor and canine were missing. The anterior tract of the left pre-maxilla (corresponding to the endognathion) was absent too. The absence of these bone structures is due to the pathological bone resorptions. Indeed, osteolytic lesion extended from the premaxillary bone to the anterior region of the palatal process of the right maxilla and partially penetrated the anterior region of the left palate (Figure 2b). The septum and nasal spine were intact.

In the middle of the left palatine process of the maxillary bone, there was an osteolytic lesion, which was star-shaped and had irregular margins.

The maxillary dental arch lacked dental elements, with only the first right premolar present, which had an extensive mesial carious lesion. In particular, the radiography in lateral view showed resorption of the root of this tooth and an apical periodontal cavity with well-demarcated margins (Figure 3). The second premolars and molars were lost *intra vitam*, as shown by the complete reabsorption of the alveolar processes. A periapical granuloma was seen near the alveolar process of the first left upper incisor.

The mandibular right second incisor, the canines, the first premolars, and the second molars were all in situ. The second mandibular premolars and first molars had been lost during life. The anterior and right jugal teeth showed complete wear of the enamel, with exposure of the underlying dentine, which appeared to be consequent to extra

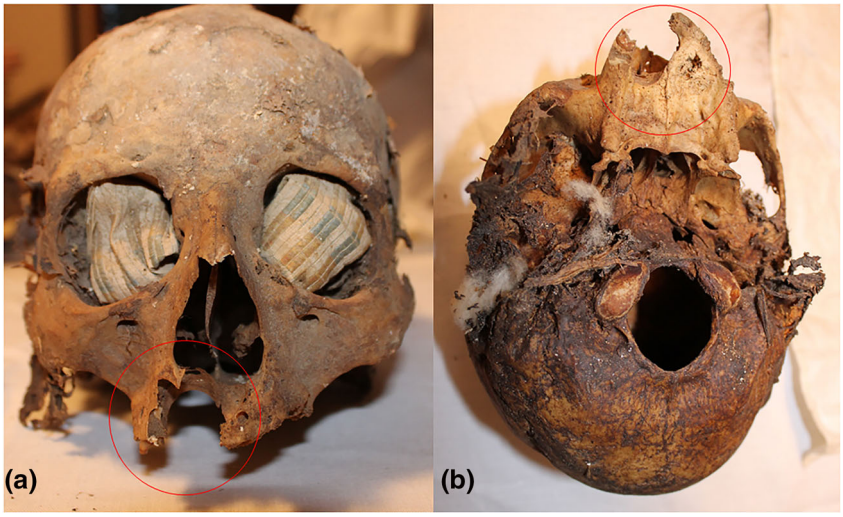

FIGURE 2 Frontal (a) and inferior (b) views of the skull of Blessed Egidio from Laurenzana (1443–1518). Red circles, bone lesion diagnosed as an odontogenic radicular cyst [Colour figure can be viewed at wileyonlinelibrary.com]

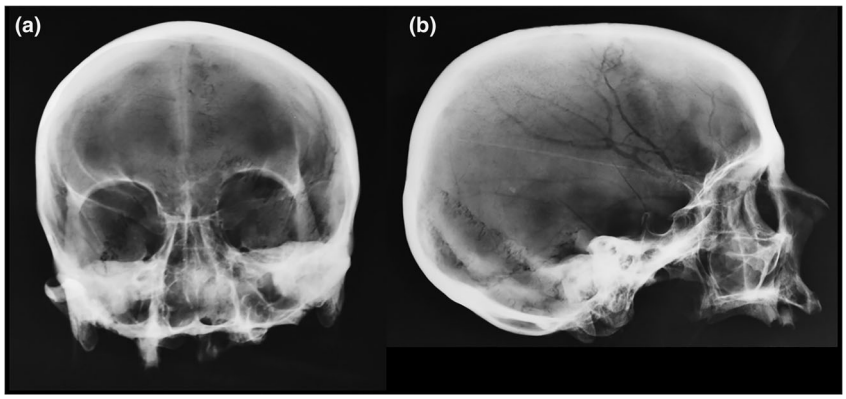

FIGURE 3 Frontal (a) and lateral (b) X-ray of the skull of Blessed Egidio da Laurenzana (1443–1518)

masticatory use of the incisors and canines. The mandible had no bone lesions (Figure 4).

FIGURE 4 Mandible of Blessed Egidio from Laurenzana. View from above [Colour figure can be viewed at wileyonlinelibrary.com]

4 | DISCUSSION

The spherical shape of the right maxillary lesion (as clearly visible in the posterior region), the regular margin, and the smooth surface suggested that the abnormality might be the consequence of a cyst. This was probably an odontogenic cyst, which derived from the odontogenic epithelium (Slootweg, 2009). The presence of the right premolar tooth that was affected by caries close to the osteolytic lesion and the periapical granuloma near the alveolar process of the first left maxillary incisor indicate that an inflammatory (non-developmental) cyst was more likely. The cyst might have developed medially, to invade the oral cavity. Soames and Southam (1998) estimated that the diameter of a cyst can increase by about 5 mm per year, so judging by the size of the lesion, it would have expanded over the last 5 to 6 years of the life of Blessed Egidio.

Maxillary inflammatory cysts are common in the adult population (Açikgöz et al., 2012; Jones et al., 2006) and particularly in human populations living under poor socio-economic conditions (Mosqueda-Taylor et al., 2002; Prockt et al., 2008). Among maxillary inflammatory cysts, radicular cysts are very frequent, also in Italy (Tortorici et al., 2008). These are inflammatory lesions of a cystic and chronic nature of the periapical tissues of the tooth (i.e., alveolar bone and periodontal ligament). Radicular cysts are located at the root tips,

where the dental pulp undergoes necrosis, generally as a result of caries (Slootweg, 2009). The sizes of these cysts tend to increase over time, and they can involve the surrounding bone tissue (Açikgöz et al., 2012). If the radicular cyst continues to develop after the extraction of the tooth that caused it, it will be called residual cyst. The paradental cyst usually develops in a different position than the previous ones, that is, lateral to the tooth, at the cement-enamel junction. The lesion of the right maxilla of Blessed Egidio was, therefore, most likely diagnosable as an inflammatory odontogenic radicular cyst.

Radiographs showed no teeth remaining in the maxillary bones and excluded the diagnosis of developmental odontogenic cysts and in particular of dentigerous cysts (Slootweg, 2009) (Figure 4). These are also known as follicular cysts, and they can develop as a consequence of the accumulation of fluid between the tooth crown and the collapsed enamel organs. For this reason, dentigerous cysts are always associated with the crown of an impacted or erupting tooth (i.e., eruption cysts) (Şen-Tunç et al., 2017; Slootweg, 2009). Other non-inflammatory odontogenic cysts, that is, lateral periodontal cyst, botryoid odontogenic cyst, multilocular glandular odontogenic cyst, and odontogenic keratocyst, can be excluded because they develop a lesion formed by several cavities of different sizes divided by thin bone walls. The gingival cyst, on the other hand, does not affect the underlying bone.

The subspherical shape and regular margins of the osteolytic lesion do not exclude the possibility that it was related to a non-odontogenic cyst (i.e., nasopalatine duct cysts and nasolabial cysts). However, non-odontogenic cysts are rare (Koseoglu et al., 2004; Slootweg, 2009). Furthermore, nasopalatine duct cysts form on the midline of the maxilla, which in the case of Blessed Egidio did not show macroscopically and radiographically visible morphological changes. Macroscopically, nasopalatine duct cysts generally develop between the two upper central incisors symmetrically with respect to the palatine suture (Oliveira et al., 2019). In our case, the cysts are asymmetrical, occupying mainly the right side of the palate. Radiographically, it appears as a well-defined unilocular radiolucent area with a round, oval, or heart-shaped image, exclusively in the midline of the anterior bony palate (Carini et al., 2012; Oliveira et al., 2019). The cysts develop within the nasopalatine duct (Slootweg, 2009). The radiographs in lateral view show a nasopalatine duct bounded by well-preserved cortical bone. For these reasons, the diagnosis of nasopalatine duct cyst is therefore unlikely.

Nasolabial cysts are located above the alveolar processes, near the base of the nose. When these cysts are large, as in the case of Blessed Egidio (judging by the size of his palatal lesion), they can grow into the floor of the nasal cavity, which can then cause obstruction, widening of the wings, distortion of the nostrils, and swelling of the upper lip (Roed-Petersen, 1970). Here, the absence of alterations in the nasal region appeared to exclude the diagnosis of a nasolabial cyst. Furthermore, the historical and iconographic sources do not refer to pathological conditions or dysfunction related to this cyst (Bonaventura di Laurenzana, 1674; Malatesta et al., 2017; Motta, 1995).

The morphology and anatomical position of the lesion of the right palate could lead to the diagnosis of an oral cleft. Oral clefts are an embryopathy that consists of a fissure that can have variable effects on the hard and soft palate (Mossey et al., 2009). They can also be isolated or found in association with other disorders within certain genetic syndromes (Cohen, 1978; Tolarová & Cervenka, 1998). Non-syndromic oral clefts are morphologically classified as cleft lip, cleft lip and palate, and cleft palate alone (Fogh-Andersen, 1942; Fraser, 1955), although they may have different etiologies and pathogenesis (Carroll & Mossey, 2012; Harville et al., 2005; Jugessur et al., 2009). The palatoschisis is generally symmetric and can show varying degrees of severity, which range from bilateral notches to full bilateral clefts (Kummer, 2001; Phillips & Sivilich, 2006). It can also be asymmetric, as a unilateral notch to a full unilateral cleft (Barnes, 1994).

It can therefore be hypothesized that Blessed Egidio was affected in particular by unilateral cleft lip with cleft palate. Oral clefts can compromise language, hearing and feeding, and increase the risk of contracting upper respiratory tract infections. It is no coincidence that children affected by this malformation have higher morbidity and mortality than healthy children (Christensen et al., 2004; Ngai et al., 2005). Furthermore, today as in the past, oral clefts have social consequences not only for the affected individuals, but also for their relatives (Berk & Marazita, 2002; Scheper-Hughes, 1990). Also, historical sources demonstrate the presence of oral clefts also in ancient Italy, such as that of the anatomist Girolamo Fabrici d'Acquapendente (1537–1619), who mentioned this pathology and the state of the affected children, who often died of malnutrition because they were unable to suck. However, considering the biographies of Blessed Egidio, there have not been any references to malformations or language dysfunction nor anecdotes related to any malformation of the palate and/or lips (Bonaventura di Laurenzana, 1674; Motta, 1995). Therefore, we would exclude the diagnosis of an oral cleft. Moreover, no iconographic images of Blessed Egidio have shown upper lip lesions (Bonaventura di Laurenzana, 1674; Malatesta et al., 2017; Motta, 1995), although artists and biographers might have deliberately omitted this aspect in their work (Figure 5).

FIGURE 5 Mural painting depicting Blessed Egidio da Laurenzana (Sanctuary of the Madonna delle Grazie in Piove di Sacco, Padua; 1694) [Colour figure can be viewed at wileyonlinelibrary.com]

Odontogenic tumors originate from odontogenic tissues, and they generally have a radiolucent appearance in radiographs, which can show calcified areas inside (Slootweg, 2009). These generally affect the mandible (i.e., ameloblastomas, calcifying epithelial odontogenic, squamous odontogenic tumors, and cementoblastomas), with the exception of adenomatoid odontogenic tumors, which develop around the crowns of embedded teeth, and can have the appearance of dentigerous cysts (Slootweg, 2009). Odontogenic myxomas generally affect the mandible, and when these occur in the maxillary, they can penetrate into the maxillary sinus and cause unilateral nasal obstruction. The bones of the nasal region and the maxillary sinuses of Blessed Egidio did not present any lesions attributable to odontogenic tumors. Morphological analysis and radiography of the skull did not show any traumatic lesions, which appears to exclude the possibility that the right palatine lesion was the consequence of a trauma.

Some infectious diseases, such as leprosy, tuberculosis, and syphilis, can cause skeletal alterations of the palate. However, with Blessed Egidio, this possibility appears to be excluded by the integrity of the nasal septum and nasal bone and aperture and the absence of skeletal lesions of the hands and feet (in terms of leprosy), and the preservation of the vertebral column, together with the lack of involvement of the orbital margin and the zygomatic bone (in terms of tuberculosis). As for leprosy, nasomaxillary syphilis implies the perforation of nasal septum and median walls of the maxillary sinuses and the destruction of the bony support of the bridge of nose. Moreover, the syphilitic infection is accompanied by severe gummy lesions of the cranial vault and limbs or, in the case of non-gummatous syphilis, by severe forms of periostitis of the limbs, and this is not the case with Blessed Egidio.

The osteolytic lesion on the left maxillary bone had a completely different appearance to that of the lesion of the right maxilla, and it might be the result of an inflammatory reaction (e.g., from a foreign body, such as a heterotopic tooth). Another possibility is that it might have been caused by a metastatic carcinoma, which generally manifest with osteolytic lesions that also affect the axial skeleton. When these involve the skull (e.g., some tumors of the oral and nasal cavity), they can cause extensive, destructive lesions with irregular contours, which affect most of the bones of the splanchnocranium (Buikstra, 2019). However, for Blessed Egidio, the absence of cranial and post-cranial osteolytic lesions reduces the likelihood that the left palatal injury was due to a tumor, although its diagnosis remains questionable.

Macroscopic and radiological analysis of the skull did not show clear connection between the left and right palate lesions. These appear to be asynchronous injuries that were attributable to different pathologies that developed in separate periods of the life of Blessed Egidio. However, Dias et al. (2007) reported similar lesion as a consequence of a palate expansion of an overlying cyst; therefore, we cannot exclude this possibility even if in Dias case both lesions are on the left maxilla. The large osteolytic lesion of the right maxilla is therefore most likely to represent a radicular odontogenic cyst (Slootweg, 2009). According to the bony diagnostic criteria proposed by Dias et al. (2007) for skeletal samples, the maxillary lesion of Blessed Egidio might be classified as an apical periodontal cyst at stage "E" (i.e., in the final stage of pathogenesis). The World Health Organization classifies these jaw lesions into odontogenic cysts of inflammatory origin (Speight & Takata, 2018).

In contemporary human populations, non-odontogenic cysts are relatively rare, while odontogenic cysts are more frequently diagnosed during clinical examinations, as >95% of cases (Grossmann et al., 2007; Koseoglu et al., 2004; Slootweg, 2009). Among the odontogenic cysts, radicular cysts represent the most frequent lesion, with markedly higher frequency than for the other forms of odontogenic cysts (Johnson et al., 2013). In southern Italy between 1986 and 2005, Tortorici et al. (2008) diagnosed 1,310 cases of odontogenic cysts, of which 1,107 were radicular odontogenic cysts (84.5%). In a study conducted on a sample of the Italian population, Carini et al. (2012) reported that almost two thirds of clinical cases were radicular cysts (63.7%), followed by residual cysts (16.8%), dentigerous cysts (14.6%), and periodontal cysts (2.9%). These epidemiological data are in line with those observed in other modern human populations (Avelar et al., 2009; Grossmann et al., 2007; Koseoglu et al., 2004; Prockt et al., 2008). Radicular odontogenic cysts are typically associated with permanent teeth and males tend to be more affected than females, and the lesions are mainly localized to the maxilla (Açikgöz et al., 2012; Avelar et al., 2009; Koseoglu et al., 2004; Nuñez-Urrutia et al., 2010; Tortorici et al., 2008). The rare cases of non-odontogenic lesions are mainly cysts of the naso-palatine duct (Carini et al., 2012; Grossmann et al., 2007).

Although odontogenic cysts are relatively common in contemporary populations, they have rarely been described in ancient human remains. The reason for this might be related to the use of the ambiguous terminology and discordant diagnostic criteria that have generally been adopted for skeletal remains (Assis et al., 2018). In the palaeopathological literature, such jaw conditions are mainly described as periapical lesions, which include abscesses, small sized granulomatas, cysts (e.g., Bonsall, 2014; Dias et al., 2007; Gibbon & Grimoud, 2014; Rufino et al., 2017; van der Merwe et al., 2011), and Stafne's defects (e.g., Lukacs & Rodríguez-Martín, 2002; Manzon & Gualdi-Russo, 2016; Masnicová & Beňuš, 2003; Vodanović et al., 2011; Wasterlain & Silvia, 2012). The cut-off points to distinguish apical granulomas from cysts based on the size of a lesion have varied from 3 mm (Dias & Tayles, 1997) to 15 mm (Goaz & White, 1994). The impossibility of applying the diagnostic tools used in the clinic and the difficulty to differentiate cystic lesions on the basis of their radiographic features alone constitute further obstacles to the identification of cysts in ancient bones.

Assis et al. (2018) reported a probable case of radicular cyst in an individual adult female from the Roman necropolis of Quinta da Torrinha/Quinta de Santo (Portugal). Radicular cysts and granulomatas were reported for five mandibles from the late-medieval graveyard of Stara Torina (Serbia), although only three were visible externally (Djurić & Rakočević, 2007). It is likely that the frequency of radicular cysts in ancient human populations is underestimated.

5 | CONCLUSIONS

The relics of Blessed Egidio da Laurenzana consist of a natural mummy of an adult male individual. Palaeopathological investigations showed a large osteolytic lesion that affected the right maxillary bone. The radiographic and macroscopic appearance (i.e., size, shape, and morphology) of the contours of the lesion are consistent with an odontogenic process of inflammatory origin, thus probably representing a large radicular cyst. The information on the life of Blessed Egidio and the iconographic sources appear to exclude the possibility that the lesion was a consequence of a developmental non-odontogenic cyst, or of other congenital pathologies, such as a cleft palate.

Although inflammatory odontogenic cysts are a relatively common pathology in modern human populations, they have rarely been described in ancient human populations, with very few cases reported to date. The radicular odontogenic cyst of Blessed Egidio adds a new case to the poor paleoepidemiological documentation relating to odontogenic cysts.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare that is relevant to the content of this article.

DATA AVAILABILITY STATEMENT

All data are available in "G. d'Annunzio" University of Chieti on request.

ORCID

Ruggero D'Anastasio https://orcid.org/0000-0001-5508-2419
Jacopo Cilli https://orcid.org/0000-0002-2030-9027
Joan Viciano https://orcid.org/0000-0001-7575-557X

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