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Chronic Disease and Disability in an 18th-Century Portuguese Nun: An Integrative Multisource Approach

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ABSTRACT

This study presents an integrative approach to chronic disease and disability in a Portuguese nun who died in 1779. The aim is to interpret her condition by combining osteopathological and burial context evidence with written sources. It offers a concise example of how bringing these sources together can enhance pathological interpretation and support the reconstruction of soft tissue disease, disability, and the lived experience of disease in past populations. This older woman was exhumed from the Convent of Jesus in Setúbal, Portugal. Her atypical burial position, also noted in the convent chronicles, indicates the remains likely belong to Michaela Archangela do Ceo. Osteopathological analysis revealed several changes, including atheromas, while the burial showed a crouched position, presumably related to stroke sequelae. The chronicles describe lifelong frailty and disease, followed in later life by a stroke with right-sided hemiplegia, pressure ulcers, and myiasis. Apart from the atheromas, which may be associated with the stroke, the skeletal changes show no correspondence with the signs reported in the account. The chronicles further document the attentive care she received, reflecting communal support within the convent, and the religious meaning of suffering. In conclusion, this case demonstrates the value of integrating multiple sources to interpret pathological conditions and the lived experience of disease, while emphasizing the relevance of soft tissue disease that leaves no skeletal trace. It also illustrates the careful application of retrospective diagnosis as an interpretive tool for historical documentation. Altogether, it highlights key methodological considerations for interpreting disease in osteoarchaeological contexts.

1 | Introduction

The study of disease and disability in past populations is enhanced by combining the analysis of skeletal remains (e.g., Buikstra 2019; Grauer 2023), burial context (e.g., Gilchrist 2022; Stutz 2018), historical records (e.g., Mitchell 2011b, 2017, 2022), and contemporary medical knowledge. Through such an integrative approach, researchers can not only interpret pathological conditions but also reconstruct the lived experience of disease and its broader impact on individuals and communities.

Skeletal remains provide the most direct evidence of disease, revealing chronic pathologies and contributing to a better understanding of the individual's health status (Buikstra 2019; Grauer 2023).

The burial context further contributes to understanding the lived experience of disease and disability, and postmortem practices related to pathological conditions. For instance, in Christian contexts, atypical burials are rare and have been linked to infectious disease, disability, or social marginalization (Gilchrist 2022; Stutz 2018).

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Written sources, including monastic records and medical accounts, enrich interpretations of osteoarchaeological findings by documenting signs, symptoms, treatments, perceptions of illness (Mitchell 2011a, 2017), and even funerary practices.

Thus, integrating osteopathological and burial context evidence with documentary sources establishes a robust framework for interpreting disease and disability in the past.

Additionally, retrospective diagnosis serves as a critical interpretative tool for historical records within this integrative approach. Nevertheless, it requires navigating epistemological tensions between biological reality, as understood by modern pathophysiology knowledge, and sociocultural interpretations of illness shaped by historical medical paradigms (Larner 2019; Mitchell 2011a, 2011b, 2022; Muramoto 2014). Applying modern diagnostic criteria to diseases described in documentary sources requires caution (Arrizabalaga 2002; Mitchell 2011a, 2022). Besides, translating descriptions into modern nosological terms must be undertaken with attention to their original sociocultural context (Mitchell 2011a, 2011b, 2022). Thus, Mitchell (2011a, 2017, 2022) provides a framework for assessing the value of this evidence.

This study employs an integrative approach to interpret the disease and disability in an 18th-century Portuguese nun, as described in convent chronicles. These records document lifelong frailty, progressive disease, and blindness, culminating in a stroke and its sequelae in later life. By combining burial context, osteopathological findings, and written records, it offers a unique opportunity to explore her condition and to examine broader implications for caregiving practices, disease burden, and the meaning of suffering within a cloistered monastic community.

2 | Material and Methods

The Convent of Jesus is located in Setúbal, Portugal. It was founded by Justa Rodrigues Pereira (1441–1524), the former wet nurse of King Manuel I, with construction beginning in 1490. By mid-1496, the convent housed nuns of the Order of Saint Clare. Documentary sources reveal that it primarily admitted daughters of wealthy families, reflecting its status and resources (Neto 2017). Currently, it houses the Museum of Setúbal and is classified as a National Monument.

The convent's cemetery, used exclusively for nuns, lay in the cloisters, with the founder's grave in the Chapter House. Before 1772, burials were in the southern gallery, and later ones in the eastern gallery. On September 3, 1867, interments in the convent were prohibited, and deceased nuns were thereafter inhumed in the public cemetery (Neto 2017).

The convent chronicles of Anna Maria do Amor Divino, written between 1796 and 1803, provide biographical data on the nuns, including occasional notes on health and grave locations. Notably, this case is the most detailed.

All 14 nuns were inhumed in a supine position, except Individual 2015.6, who was buried in a right-sided crouched position, becoming the focus of this study (Figure 1). Her



FIGURE 1 | Atypical burial of Individual 2015.6. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/oa.20093)]

upper spine exhibited an outward curvature, contributing to a hunched posture. Like the other inhumations, the grave was sealed with a stone slab and bore no inscription. The burial was oriented east–west, with the head facing west (Antunes-Ferreira and Cândido 2017).

The chronicles documented this burial, noting its location and the individual's position: *first grave in front of the House of the Vicars and her body remained curled up, just as it had been in bed, and so it was shrouded in the same position*, thereby linking the remains to Michaela Archangela do Ceo. As there are no known descendants and only her religious name survives, its use is ethically justifiable (Muramoto 2014) and enhances the osteobiographical reconstruction.

The paleopathological macroscopic analysis followed standard references, including Buikstra (2019) and Grauer (2023). Mitchell's retrospective diagnosis criteria (Mitchell 2011a, 2011b, 2017, 2022) were applied to interpret disease signs reported in the chronicles, using the confidence levels “possible example of,” “compatible with,” “probable example of,” and “very likely to represent.” These levels allow cautious integration of written narratives with osteoarchaeological evidence.

3 | Results

3.1 | Osteopathological Profile

The individual presents with complete antemortem tooth loss (Figure 2) and a healed left rib fracture. Degenerative disc disease affects all vertebrae, particularly the cervical spine. Most joints show osteoarthritis, except the left elbow, ankles, and feet. Eburnation is present on the left superior facet of the atlas, dens facet, and axis dens.

Moreover, 9th–12th thoracic vertebrae display right anterolateral osteophytes consistent with DISH, although ankylosis is absent (Figure 3). Atheromas (Figure 4) were present along the 10th–12th thoracic and 1st lumbar vertebrae; additional plaques were recovered from sieved soil in the left lumbar

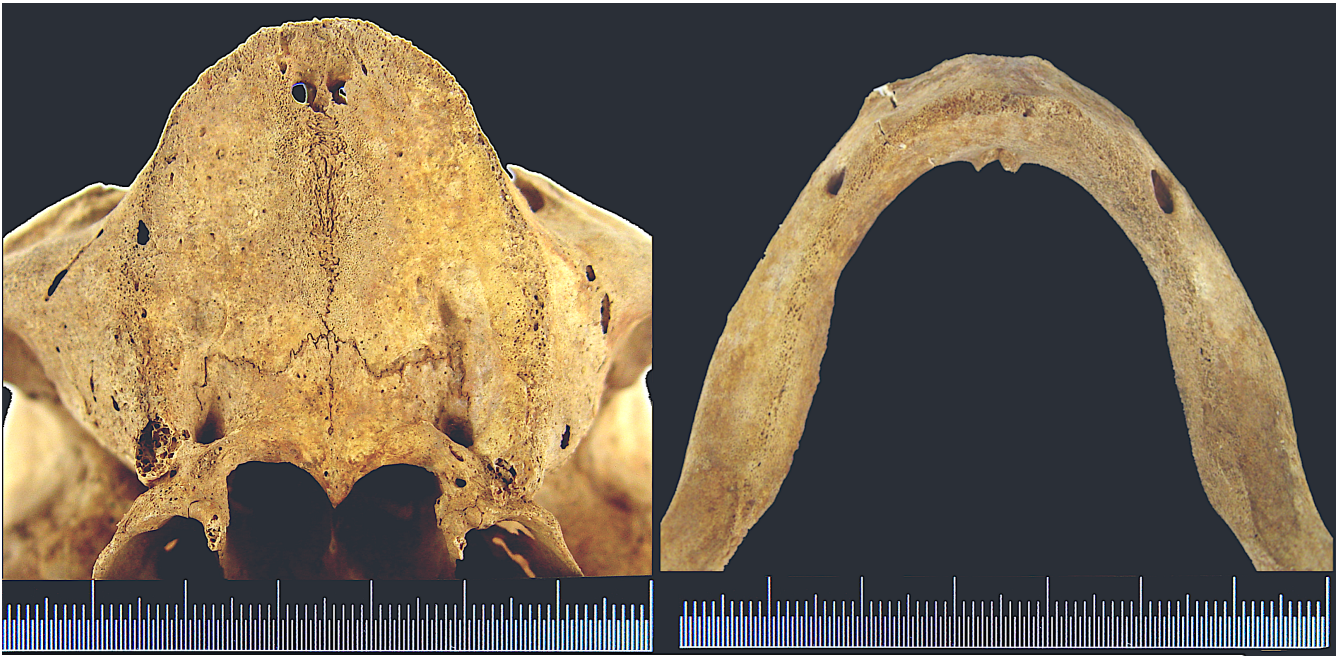


FIGURE 2 | Complete antemortem tooth loss. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]



FIGURE 3 | Right anterolateral paravertebral osteophytes characteristic of DISH, without ankylosis. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

region. These calcifications exhibit a convex–concave shape, 1–2 mm thick and 5–18 mm long, with a smooth concave and a rough convex surface.

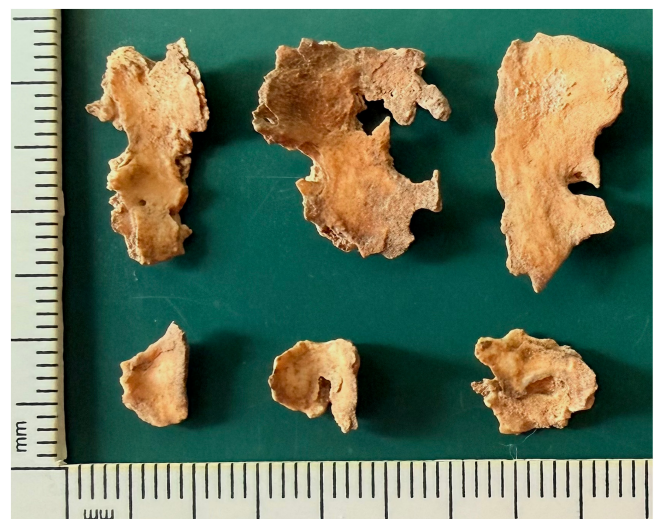


FIGURE 4 | Atheromatous plaques. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

3.2 | Written Evidence

Michaela Archangela do Ceo's health condition is documented in the chronicles: *As soon as she left the school, what little health she had completely vanished, and her life became a succession of severe illnesses. The disease progressed into a total contraction of nerves and muscles, which left her entirely crippled; to this was added complete blindness. Finally, an apoplectic attack left the right side of her body entirely paralysed. One knee became lodged against her stomach, the other nearly so, and her right hand remained half-closed and so tightly pressed against her chest that even her nails could not be trimmed. She lived in this condition for four years, during which she suffered new torments as her body became covered in sores and her bones severely protruded through the skin. From these deep sores, worms emerged and had to be*

picked out with pins. She surrendered her troubled spirit around seven o'clock in the evening on the 17th of November 1779, at the age of 76, having spent 57 years in religion and 55 years in suffering and patience.

4 | Discussion

4.1 | An Integrative Approach to Disease Diagnosis

The nun's osteopathological profile includes degenerative changes of the spine and joints, kyphosis, possible DISH, a rib fracture, and multiple atheromas.

Eburnation, the most severe manifestation of osteoarthritis, is only present in the atlas and axis. Degenerative disc disease is particularly severe in the cervical vertebrae and is likely related to upper back kyphosis. This is common in older adults and may cause neck pain, stiffness, headaches, reduced mobility, and an increased risk of falls (Koelé et al. 2020). DISH may be associated with chronic inflammation linked to metabolic disorders (Mader et al. 2021), among other factors (e.g., Buikstra 2019; Grauer 2023). The rib fracture indicates an episode of trauma. Hence, none of these pathologies suggests an incapacitating condition consistent with the chronicles. This absence is not unexpected, as many diseases primarily affect soft tissues rather than bone (Buikstra 2019; Grauer 2023).

Interestingly, the atheromas provide clear evidence of atherosclerotic disease (Biehler-Gomez et al. 2023), supporting an association with the stroke documented in the chronicles. Atherosclerosis is a chronic inflammatory disease with high morbidity and mortality, representing a major risk factor for myocardial infarction, cerebrovascular disease, and stroke (Monteiro et al. 2024; Ropper et al. 2023). It is characterized by lipid-rich plaque accumulation within arterial walls, causing luminal narrowing and arterial stiffening, and increasing the risk of thrombosis or hemorrhage. Risk factors include hypertension, hypercholesterolemia, and diabetes (Ropper et al. 2023), with emerging evidence implicating the immune system (Libby et al. 2019). In advanced stages, these plaques may calcify, forming atheromas. Their morphology reflects the affected artery, appearing concave-convex (Biehler-Gomez et al. 2023) or tubular (Monteiro et al. 2024). In this case, the plaques' location and morphology are consistent with atheromas rather than neoplasms, heterotopic, or pleural calcifications (Biehler-Gomez et al. 2023).

Accordingly, the apoplectic attack and subsequent right-sided hemiplegia documented in the chronicles are very likely to be a stroke, based on the clinical presentation (Ropper et al. 2023). Post-stroke spasticity (Chen et al. 2025) likely explains the persistent contraction of her right hand and both knees, as described in the chronicles and observed during excavation.

The chronicles record lifelong frailty and chronic illness, including "progressive contraction of nerves and muscles" and blindness. This presentation is compatible with a broad range of progressive neurological, neurovascular, neurodegenerative, or neuromuscular disorders (Ropper et al. 2023). However, these conditions do not affect the skeleton, and the description is

insufficiently detailed. Any specific diagnosis would therefore be speculative and unwarranted (Muramoto 2014). Consequently, a broader nosological interpretation is justified, as retrospective diagnosis requires linking the signs and symptoms described in accounts with the disease, and connecting the pathophysiology as understood at the time with modern medical knowledge (Mitchell 2011b, 2022; Muramoto 2014).

Bedsore covering her body and larvae emerging from the wounds are very likely to represent pressure ulcers, which develop in immobilized patients and can progress to severe infections if untreated (Mervis and Phillips 2019). When ulcers expose underlying bone, as documented in the chronicles, periosteal new bone formation may occur, occasionally accompanied by destructive lesions (Boel and Ortner 2013). However, taphonomic damage in bony prominences precluded detailed analysis, as only the scapulae, elbow bones, iliac crest, and ischium on the left side were observable, and none showed lesions. The associated myiasis, reflecting opportunistic larval infestation of necrotic tissue (Bernhardt et al. 2019), further attests to the advanced and critical state of the lesions.

The inhumation in a crouched position further supports the interpretation of her condition. The chronicles make this clear: *Her body remained curled up (...), and so it was shrouded*, strongly indicating post-stroke rigidity and prolonged immobilization. Thus, this burial offers a rare example in which postmortem position directly reflects disease, providing a unique convergence between documentary and osteoarchaeological evidence.

4.2 | Caregiving and Suffering in Monastic Institutions

Michaela Archangela do Ceo endured significant suffering, and her condition would have posed challenges even with modern medicine. Her prolonged survival, despite severe debilitation, reflects care provided in the convent infirmary (Neto 2017), highlighting the central role of communal caregiving in monastic institutions (Evangelisti 2008; Lähnemann and Schlotheuber 2024).

The chronicles indicate that basic hygiene care was provided, including fingernails trimming and larval removal from infected ulcers. It is also evident that the nuns' effort to minimize pain during routine care underscores their attentiveness and empathy.

Conversely, physical suffering is interpreted as a means of participating in Christ's redemptive Passion (Cohen 2010; Lähnemann and Schlotheuber 2024). It argues that pain, when willingly embraced in union with the suffering of Jesus, can serve a salvific purpose for both the individual and the community (Cohen 2010; Lähnemann and Schlotheuber 2024). Although the chronicles do not explicitly frame her case, the exceptionally detailed description of her state and pain suggests that her suffering was regarded as particularly meaningful or exemplary.

In sum, integrating these multiple sources yields insight into the individual experience of disease and illustrates how monastic communities perceived, managed, and narrated illness.

4.3 | Reliability of the Integrative Interpretation

After assessing the pathological conditions, it is necessary to evaluate the reliability of the integrative approach rather than propose a definitive diagnosis.

Anna Maria do Amor Divino wrote the chronicles 17 years after the nun's death. Having entered the convent in 1774, she lived with her for five years and directly witnessed both her chronic condition and the stroke she suffered in 1775. The chronicler explicitly states that the narrative is based on her own observations. This firsthand account enhances the credibility of the description, aligning with Mitchell's emphasis on the value of eyewitness testimony (Mitchell 2011a, 2017, 2022).

The description prioritizes observable signs over disease labels, in line with Mitchell's recommendations (2011a, 2022). Furthermore, when combined with osteoarchaeological evidence, these observations form a coherent evidentiary framework (Mitchell 2011b, 2017). This convergence provides strong support for interpreting the apoplectic attack as a stroke, reinforced by the presence of atheromas, thereby reducing the risk of anachronistic interpretation.

It also reports lifelong frailty, progressive contraction of nerves and muscles, and blindness, compatible with a broad range of conditions. While these terms are linguistically intelligible, the vagueness of the signs underscores the interpretive challenges inherent in retrospective diagnosis (Mitchell 2011a, 2022; Muramoto 2014). Indeed, 18th-century medicine lacked the nosological precision to distinguish among etiologies now recognized as distinct, forcing chroniclers to describe outcomes rather than diseases (Mitchell 2011b).

Furthermore, the linguistic continuity between 18th-century and modern Portuguese mitigates issues of cultural and temporal translation, reducing the risk of anachronisms (Mitchell 2011a, 2022). Terms such as *apoplexia* (apoplexy), *paralisia* (paralysis), *feridas* (sores), and *vermes* (larvae) align with modern medical knowledge, thereby enabling cautious yet reliable modern diagnostic interpretation.

Overall, this integrative approach demonstrates high reliability, particularly regarding the stroke and its sequelae, due to the convergence of eyewitness testimony, sign description in the account, osteoarchaeological evidence, and linguistic continuity. This intersection of sources exemplifies how such integration can enhance understanding of disease in the past.

5 | Limitations of the Study

This integrative approach has inherent limitations. Although the skeletal remains were well-preserved, taphonomic damage constrained the assessment of certain bone changes, compromising, for instance, the analysis of potential ulcer-related lesions. Likewise, the vagueness of the description of long-standing frailty and illness limits a specific diagnosis and precludes assessment of potential cardiovascular predisposition or risk factors.

6 | Conclusion

This study demonstrates the value of integrating burial context and osteopathological evidence with written sources to establish a more robust framework for interpreting pathology and reconstructing soft tissue disease, disability, and the lived experience of disease in the past. The convent chronicles were pivotal in reconstructing the effects of chronic disease and disability in the absence of skeletal changes, underscoring their potential for interpreting diseases that primarily affect soft tissues and the limitations of osteopathological analysis alone.

Additionally, this work illustrates the interpretive potential of combining multiple sources of evidence while acknowledging the methodological constraints inherent in retrospective diagnosis. Such an integrative approach contributes to ongoing discussions on the reliability of diagnosis and enhances the capacity to interpret disease, disability, and the lived experience of disease in past populations.

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Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the author upon reasonable request.

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