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Source: Janne Ikäheimo, Anna-Kaisa Salmi & Tiina Äikäs (eds.): Sounds Like Theory. XII Nordic Theoretical Archaeology Group Meeting in Oulu 25.–28.4.2012.Monographs of the Archaeological Society of Finland 2, 59–71

Published by: The Archaeological Society of Finland

Stable URL: www.sarks.fi/masf/masf_2/SLT_04_Salmi_Vilkama.pdf

ISBN 978-952-67594-7-0 (PDF) ISBN 978-952-67594-6-3 (hardback)

Monographs of the Archaeological Society of Finland

ISSN 1799-8611 (online) ISSN 1799-862X (print)

ISSN-L 1799-8611

Pain in the Past – Dental Pathology and Pain in the Parish of Ii (Northern Finland) in the 15th and 16th centuries

Rosa Vilkama & Anna-Kaisa Salmi

ABSTRACT **The topic of pain has been avoided in palaeopathological research because of its elusiveness and subjectivity. Lately, archaeologists have increasingly recognized the need to consider living, feeling, and fleshed bodies in osteoarchaeological research. In this paper, we discuss how the pain caused by dental diseases affected people in the parish of Ii in northern Finland in the fifteenth and sixteenth centuries. We consider what dental diseases people had, what kind of pain these diseases caused, how people reacted to pain, and how it affected their lives. We also discuss folk disease etiology and folk healing methods and how they related to the ideas people had about pain, diseases, and the relationship between the human body and the surrounding world.**

KEYWORDS

palaeopathology, dental health, pain, historical archaeology, Finland

Introduction

> *My curse upon your venom'd stang,*
> *That shoots my tortur'd gums alang,*
> *An' thro' my lug gies mony a twang,*
> *Wi' gnawing vengeance,*
> *Tearing my nerves wi' bitter pang,*
> *Like racking engines!*

Toothache can be an overwhelmingly painful experience, as the eighteenth-century Scottish poet Robert Burns (1759–1796) elaborately describes in his poem "Address to the Toothache". In the past, when dental care was undeveloped or non-existent, insufferable toothache could last for a long time and lead to a number of serious complications. Dental diseases are often encountered in the palaeopathological analysis of ancient human skeletons. These observations have an immense potential to contribute to our understanding of pain and suffering, an integral part of people's lives in the past. Moreover, archaeological observations of burial practices, healing methods, and care-giving provide information about cultural attitudes towards illness in the past (Dettwyler 1991; Fay 2006; Hawkey 1998; Kjellström 2010).

While recent approaches in palaeopathology have underscored the many ways in which the study of ancient human remains can shed light on past gender identities, ethnicities, and cultural attitudes to illness and disability (Fay 2006; Gowland & Knüsel 2006; Sofaer 2006; Knudson & Stojanowski 2008; Appleby 2010; Hollimon 2011; Roberts 2011), the pain itself caused by the diseases, its treatment, and its effect on the everyday life of people in the past have gone largely unacknowledged. The term "palaeopathology" derives from the Ancient Greek words *logia* (the study of), *pal-*

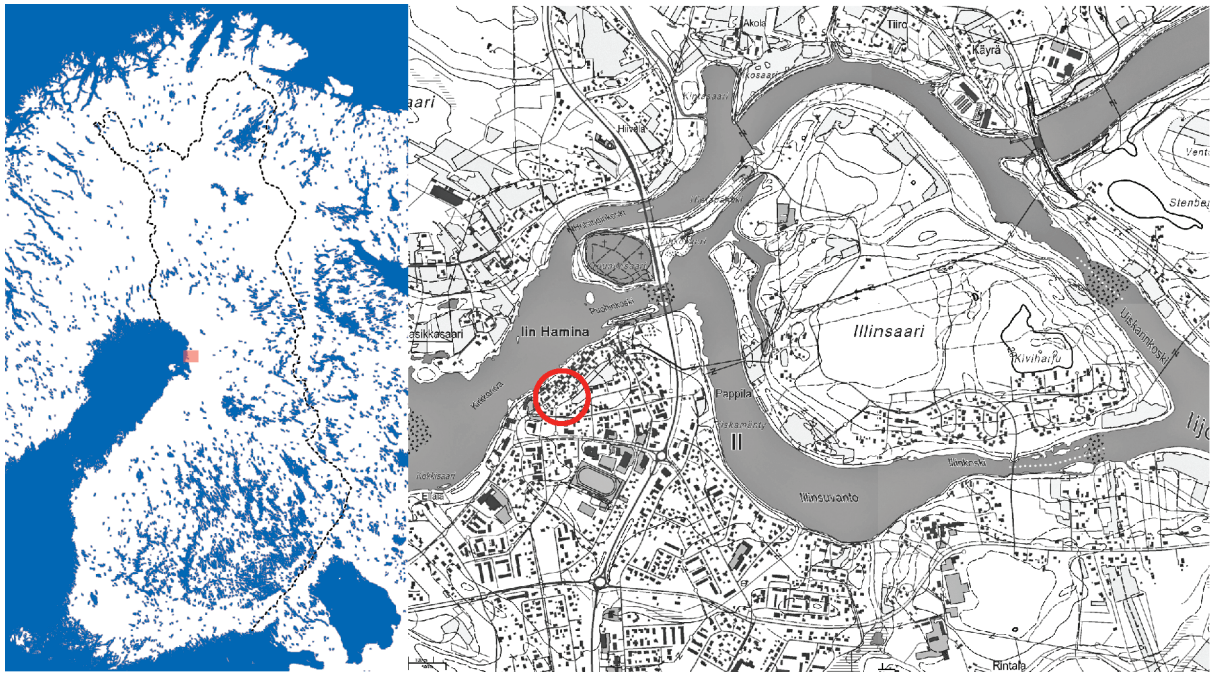

Figure 1. The location of the Old Ii Harbour on the coast of the Gulf of Bothnia in northern Finland.

aios (ancient), and *pathos* (suffering) (Roberts & Manchester 1999:1; Harper 2013). Thus even the word tells us that it is ancient suffering we are dealing with, and it would seem quite strange if the physical consequences of pain were not noted at all in the palaeopathological research and interpretation process.

This paper focuses on dental pathology in the human skeletons unearthed at the fifteenth-to-sixteenth-century cemetery at the Old Ii Harbour in Northern Finland, on the coast of the Gulf of Bothnia (**Fig. 1**). The conditions observed in the human skeletons, and in two individual case studies in particular, are used as a springboard for exploring what palaeopathological interpretations can imply about the feeling and suffering bodies of past people. Although we acknowledge that reconstructing past pain levels is close to impossible due to the elusiveness and subjectivity of pain even in modern-day clinical settings (Ong & Seymour 2004), we also maintain that the experience of pain and the physical symptoms of dental diseases have a biological basis common to all people, which sets certain limits to people's interpretations and sensory experiences (Kleinman *et al.* 1992; Neugebauer *et al.* 2009). Building on that biological basis, and combining it with archaeological, historical, and ethnographic observations, we can come one step closer to understanding how illness and pain were understood in fifteenth-to-sixteenth-century Northern Finland.

Pain and illness in cross-cultural perspective

It has to be accepted that even in clinical pain research, the sound measurement of pain intensity remains particularly problematic; attempts to measure sensations and perceptions, such as pain intensity, in a scientifically approvable way, often lead to quite variable and highly subjective results. Subsequently, this is not just a problem for palaeopathologists but a problem for all those who strive to create scientific, comparable methods for measuring human pain, a sensation which can vary considerably both across patients and within one patient (Ong & Seymour 2004). Still, the experience of pain has a physiological mechanism common to all people.

The International Association for the Study of Pain (IASP) defines pain to be "an unpleasant sensory and emotional experience associated with actual or potential tissue damage and described in terms of such damage" (Merskey & Bogduk 1994). According to Neugebauer *et al.* (2009), the neurobiological mechanisms of different aspects of pain are still not well known, but it seems that there is a network of brain structures that process pain-related information. Even though differences in pain thresholds among various ethnocultural and religious groups have been reported in clinical and experimental studies, the differences are due to cultural differences in criteria for reporting pain, and not in the sensory experience of pain itself (Ong & Seymour 2004). According to Kleinman *et al.* (1992:7), pain is "an experience that simply cannot be avoided, an experience that sets limits to the meanings given it by cultural beliefs, discourses, or practices".

How people experience pain and illness is not only dependent on the physiological symptoms but also other people's reactions, cultural interpretations, and folk beliefs (Scheper-Hughes & Lock 1987; Helman 2001). Lately, it has been acknowledged that the socio-cultural environments in which people live and the bodily experiences they have should be taken into account in osteoarchaeological research (Joyce 2005; Fay 2006; Gowland & Knüsel 2006; Sofaer 2006:1–11; Appleby 2010; Kjellström 2010). Diseases and pain caused by them are a part of the bodily experience people have of the world (Helman 2001:128). Notions of sickness, health, and pain are culturally constructed and understood in their social setting (Eilola 1999; Helman 2001:91). The folk classifications of disease etiology differ from the mechanistic view of modern medicine (Helman, 2001:91). Ideas of sickness and pain have also been related to the conceptions people had about the human body and its relationship to the surrounding world (Eilola 1999). It has been argued that while palaeopathological analysis can identify a disease, it cannot alone be sufficient for understanding how people in the past understood the illness in its social and historical context (Dettwyler 1991; Fay 2006; Knudson & Stojanowski 2008).

Material and methods

The Old Ii Harbour cemetery

Late Medieval and Early Modern Ii was a small parish with ca. 700 inhabitants (Vahtola 1988; Elo *et al.* 1998), located in northern Finland on the coast of the Gulf of Bothnia (**Fig. 1**). The site is situated on the southern bank of the Ii River. A harbour and a marketplace were located there, and also the church and the cemetery were in the vicinity (Elo *et al.* 1998). This was confirmed by archaeological excavations in 2009. The cemetery was used mainly during the fifteenth and sixteenth centuries, possibly even until the early seventeenth century (Kallio-Seppä 2010; 2011).

The excavations in the Old Ii Harbour were conducted as a rescue excavation and a surveillance of the construction work (**Fig. 2**). Altogether 70 graves were documented and 65 were totally or partially excavated during fieldwork. In addition, a pit ca. 1.9 metres wide and ca. 0.5 metres deep with secondarily deposited human bones was discovered in the cemetery area (Kallio-Seppä 2010; 2011).

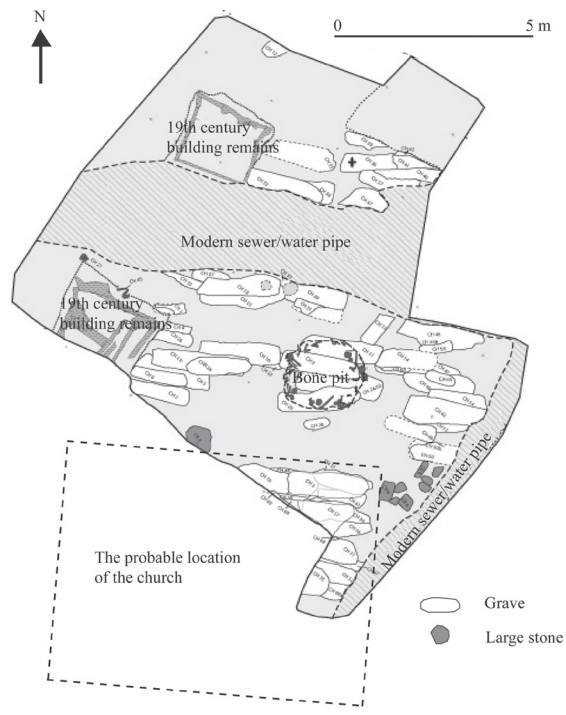

Figure 2. The excavations at the Old Ii Harbour cemetery and the probable location of the church (Kallio-Seppä 2010). Drawing: T. Tanska, National Board of Antiquities, Department of Monuments and Sites.

Osteological methods

The skeletal material of the Old Ii Harbour consists of three groups: the bone pit, the single individual burials, and the detached skulls that were collected during the surveillance of the construction work (**Table 1**). The analysis results of the skeletal material are published in detail in Atkinson (2011), Heikkilä (2011), and Kortelainen *et al.* (2011). Dental pathology and osteological methods are presented in detail in Vilkama and Niinimäki (2011) and Vilkama (2011a; 2011b). Altogether 303 specimens with 1197 permanent teeth were included in the dental analysis (**Table 1**). Bones from the bone pit were commingled skeletal fragments. The skulls collected during the surveillance of the construction work were crania and cranial fragments. In general, the bones in individual graves were quite badly preserved, and the amount of bone available for osteological analysis was small. The teeth were somewhat better preserved than the rest of the skeleton.

The sex of the adult individuals was determined using the sex-specific traits of the skull (Bass 1995). The sex was determined when the individual had a complete or nearly complete skull, a complete mandible, or a half of a mandible. Seventy-five individuals were assigned as females and seventy-two as males (**Table 1**). Age was assessed with the aid of the dental attrition chart of Varrela (1996), which is a population-specific age-attrition chart created for 16th–17th-century Finns. Sutural closure (Krogman & Işcan 1986) was used as a secondary method in case the specimen had a completely preserved skull. The specimens were grouped into four age categories according to their age at death (**Table 1**). Young individuals (10–20 years), adults (20–50 years), and elderly individuals (over 50 years) were included in the dental analysis. Since the deciduous teeth tend to preserve poorly (Baker *et al.* 2005:57), the remains of children with deciduous teeth or mixed dentitions were excluded from the analysis.

The analysed individuals featured caries, calculus, periodontitis, antemortem tooth loss (AMTL), linear enamel hypoplasia, and periapical abscesses. (Vilkama & Niinimäki 2011). Caries, calculus, and enamel hypoplasia were analysed macroscopically per each tooth and recorded either as present or absent. A periapical abscess was documented if the jawbone presented a macroscopically observable fistula or a pit around the root apex (Hillson 2003:285–286). The jawbones were also examined for signs of periodontitis and antemortem tooth loss. Initial carious lesions were not documented, as they are difficult to distinguish from postmortem colouring of the teeth due to taphonomic processes (Hillson 2003:279). In diagnosing the periodontal disease, both the outer appearance of the jawbone and the distance between the alveolar margin and cervix dentis were taken into account (Schwartz 1995:256). There could be a number of causative factors, such as persistent inflammation in the periodontal tissues, heavy attrition that exposes the dental pulp to infectious pathogens, deep carious lesions, or trauma (Miles 2001). The diagnostic criterion for antemortem tooth loss was the sign that the alveolus (tooth socket) had clearly begun to heal or had already closed

Table 1. Demographic composition of the specimens analysed for the study.

	Bone pit[1)]	Individual burials	Detached skulls[2)]	Total
Children (<10 years)	61	–	–	61
Non-adults (10–20 years)	32	2	1	35
Adults (20–50 years)	185	14	12	211
Elderly (>50 years)	40	5	3	48
Females	57	11	7	75
Males	64	3	5	72

[1)] Commingled skulls, jaws and jaw fragments from different individuals.
[2)] Individual crania collected during the surveillance of the construction work.

up. In contrast, empty tooth sockets with no signs of healing were considered as postmortem tooth loss. Missing third molars were not considered to be lost antemortem, because the third molars do not necessarily erupt at all (Varrela 1996:25), unless there was an empty socket showing signs of healing or the adjacent second molar showed wear facet on the distal surface indicating contact with the third molar.

Additionally, observations of interproximal grooves of probably artificial origin were made in some of the specimens (Vilkama 2011a; 2011b). The grooves were analysed solely from the individuals from the bone pit due to their better preservation. Interproximal grooves are horizontal, non-pathological furrows that are usually found on the mesial or distal surfaces of the crowns. Besides the crowns, they can also be situated lower on the root, or on the neck of a tooth. To be accepted for documentation, the grooves had to have distinctive margins with a clear depression in the middle. (Formicola 1988; Bonfiglioli *et al.* 2004; Molnar 2011)

Dental pathological conditions and pain in Ii

People in Ii suffered from caries, calculus, periodontitis, antemortem tooth loss, and periapical changes (**Table 2; 3**). In general, older age groups were more affected by dental diseases than the young, an observation that is supported by clinical studies (Hillson 2003:259–266). There were no statistically significant differences between the sexes, except for caries, which was more common in women (**Table 2**).

Table 2. Dental pathology at the Old Ii Harbour cemetery according to sex.

Dental pathology	Men	Women
Calculus	14 % (N=390)	12 % (N=353)
Caries**	5 % (N=390)	13 % (N=353)
AMTL	23 % (N=506)	26 % (N=480)
Periapical abscesses	3 % (N=390)	1 % (N=353)
Periodontitis (maxilla)	35 % (N=25)	23 % (N=48)
Periodontitis (mandible)	32 % (N=37)	28 % (N=25)

**Statistically highly significant difference, X^2 test, $p<0.001$

Calculus was observed in all age classes and in both sexes (**Table 2; 3**). The difference between the sexes in the Old Ii Harbour cemetery was small and not statistically significant, although clinical studies have shown supragingival calculus to be more frequent in men (Hillson 2003:259–260). The oldest age group clearly had the highest frequency of calculus. It has been shown in clinical studies that the amount and frequency of calculus tend to increase with advancing age (Hillson 2003:259–260). Accumulation of plaque and formation of calculus contributes to many other diseases of the oral cavity, such as gingivitis and periodontitis, ultimately leading to loss of teeth (Varrela 1997; Hillson 2003:254, 260). The accumulation of food residues and plaque in the interdental spaces causes irritation of the gums, especially when periodontal inflammation is involved.

All investigated age groups and both sexes were affected by caries (**Table 2; 3**). Women suffered a

Table 3. Dental pathology at the Old Ii Harbour cemetery according to age.

Dental pathology	10–20 years	20–50 years	Over 50 years
Calculus**	2 % (N=135)	9 % (N=912)	31 % (N=112)
Caries*	9 % (N=135)	9 % (N=912)	9 % (N=112)
AMTL**	0 % (N=135)	9 % (N=1005)	65 % (N=317)
Periapical abscesses**	0 % (N=135)	2 % (N=912)	13 % (N=112)
Periodontitis (maxilla)**	0 % (N=21)	15 % (N=126)	83 % (N=28)
Periodontitis (mandible)**	0 % (N=5)	17 % (N=49)	63 % (N=28)

*statistically significant, X^2 test, $p<0.01$,
**statistically highly significant, X^2 test, $p<0.001$

higher frequency of caries than men, which is a common observation and may be due to gender-specific differences in the availability or distribution of certain foodstuffs (Larsen 1999:72–76). Beneath the dentin, there is an inner zone of dental pulp, which is richly innervated (Närhi *et al.* 1982; Virtanen 1991:14; Hildebrand *et al.* 1995; Hunter & Arbona 1995), and inflammation in the pulp cavity may express itself as dental pain (Virtanen 1991:14; Hildebrand *et al.* 1995). A small, newly-formed carious lesion may stay asymptomatic, causing only some localised pain when in contact with cool or hot foodstuffs or drinks (Hirvonen 1986; Hildebrand *et al.* 1995:16; Hunter & Arbona 1995), while an advanced lesion can lead to the development of pulpitis and give rise to an intense, burning pain, which substantially reduces the quality of life. Persistent, ongoing pain in a particular tooth may also lead to the decision to remove the infected tooth.

Besides caries, periodontitis is one of the most common oral pathological conditions encountered in archaeological skeletons (Schwartz 1995:255), and it was also common in the Old Ii Harbour skeletons (**Table 2; 3**). Young individuals did not have periodontitis, adults suffered from it to some extent, and the elderly were most frequently affected. It has been shown in clinical studies that there exists a clear connection between periodontal disease and age: children before puberty are rarely affected, while adults over 30 years old suffer from it frequently (Hillson 2003:263–266).

Periodontal disease is a painful condition after developing to a certain stage (Brennan *et al.* 2007). In its early stages, periodontal disease proceeds as inflammation of the gums, in which the gum tissues become sore (Hunter & Arbona 1995; Hillson 2003:262–266). An advanced inflammation will result in eating, drinking, and speaking difficulties, as well as halitosis and an increased risk of other serious infections in the adjacent areas (Suonpää 2001; Soukka & Vähätalo 2002; Richardson & Seppänen 2010).

Both maxillary and mandibular teeth were affected by periapical changes (**Table 2; 3**). The youngest age group did not have periapical abscesses, while the older age groups were affected.

The development of a periapical abscess normally takes place in the pulp cavity of a tooth, after which the bacteria spread down the root canal and into the jaws (Dias & Tayles 1997; Soukka & Vähätalo 2002; Richardson & Seppänen 2010). Pain from pulpitis can reflect on an opposite tooth on the mandible or maxilla, or on common branches of facial nerves. If the pulp continues to be exposed to bacterial attack, the necrosis will extend and finally lead to nerve death, which will end the pain (Hunter & Arbona 1995). Pulpitis and nerve death may be followed by the development of an abscess in the jawbone (Dias & Tayles 1997). It can be said that a person suffering from acute abscessing is very sick and in pain as long the infection is acute (Dias & Tayles 1997).

One individual (265, see next chapter) probably had chronic maxillary sinusitis. An infection that spreads from the periapical region into the maxillary sinuses, or the orbit, may in turn lead to sepsis and even death (Soukka & Vähätalo 2002; Richardson & Seppänen 2010). Acute sinusitis is a painful condition. If it is caused by an infection of a particular tooth, dental pain is involved. However, acute sinusitis is a short-time condition and does not leave macroscopically detectable bone changes. Chronic sinusitis is usually not painful and may go unnoticed, although acute episodes with symptoms can occur (Panhuysen *et al.* 1997; Liebe-Harkort 2010; Sundman & Kjellström 2011).

Altogether 299 teeth were recorded as lost antemortem (**Table 2; 3**). Tooth loss was most common in the older age groups. Even though antemortem tooth loss is usually most typical in molars (Van der Merwe *et al.* 2011), in the Old Ii Harbour material it was also observed in the anterior part of the mouth, leading to the suggestion that in Ii the teeth were also used as tools (Vilkama & Niinimäki 2011; see also Larsen 1999:77). AMTL in archaeological bone material may also indicate that a tooth has been pulled out intentionally. It has to be acknowledged that an intentional tooth extraction does not leave a distinctively different trace on the jawbone than an empty space remaining from a tooth lost due to trauma, heavy wear, or infection (Lingström & Borrman 1999). However, before the development of modern-day dentistry, there were

only a few effective ways to put an end to toothache. So, by virtue of its being the only means to end the continuous pain, tooth pulling was probably also practiced in Ii.

Interproximal grooving was observed in 15 adult individuals of both sexes (**Table 4**). Of the teeth found in the bone pit, 2.6 % featured grooves. All grooves except for one were situated on the mesial or distal surface of the molar. Both maxillary and mandibular teeth had grooves, though most were observed on the upper left molars (Vilkama 2011b). These non-pathological grooves may be associated with cleaning the teeth with a toothpick or picking the infected gums to alleviate the pain. Repeated tooth picking can be forceful enough to leave a macroscopically observable trace in the dental enamel (Brothwell 1981:154–155; Formicola 1988; Bonfiglioli *et al.* 2004). Grooves in the teeth of the individuals from Ii were mostly short, sharp-edged, and pit-like, and the morphology suggests that they resulted from tooth-picking rather than from using the teeth as tools. The fact that the grooves were situated between the molar teeth, not in the anterior part of the mouth, further suggests that the grooves did not result from the use of teeth as tools.

Case study 1: individual 265 from the bone pit

Individual 265 was represented by a fragmented skull. The estimated age at death of the adult individual was ca. 45–50 years. The sex could not be determined due to the incomplete preservation of the skull. The individual had a complete maxilla with ten remaining teeth. He or she had suffered from periapical abscesses, calculus, antemortem tooth loss, and periodontitis. The upper right first molar was lost antemortem.

The periodontitis caused vertical and horizontal bone loss especially around the maxillary left molars. Near the area affected by periodontitis, between the left maxillary second and third molars, there was an interproximal groove. The groove was visible on the distal surface of the second left molar (**Fig. 3**) and the mesial surface of the third left molar. There also was a thin layer of calculus on the adjacent mesial and distal surfaces of the teeth featuring interproximal grooving.

The space between individual 265's upper left second and third molars was excessively sensitive, probably because of periodontitis. Chewing food might have caused discomfort, and food residues in the inflamed area probably caused irritation and pain. It is possible that individual 265 used some instrument

Table 4. Interproximal grooves in the dentitions of the individuals from the Old Ii Harbour cemetery bone pit.

Individual	Age	Sex	N of teeth	Teeth showing interproximal grooving*
23A	Adult	Female	7	LLM1 distally
31A	Adult	Male	7	LLM2 distally
55A	Adult	–	4	LLM1 mesially
56A	Adult	–	1	LLM3 mesially
59A	Adult	–	2	LLM2 distally
99A	Adult	–	2	LLM1 mesially
100A	Adult	–	4	LRM1 distally
18Y	Adult	–	5	ULM3 mesially
27Y	Adult	–	2	ULM2 distally
67Y	Adult	–	7	ULM3 mesially
128	Adult	Male	4	ULM3 mesially
163	Adult	Female	6	URM2 mesially, ULC distally, ULM1 mesially and distally, ULM2 mesially
238	Adult	Male	9	URM1 distally
202	Adult	Female	3	URM1 mesially
265	Adult	–	10	ULM2 distally, ULM3 mesially

*Abbreviations: First letter=Upper/Lower, second letter=Right/Left, third letter=Molar/Canine

Figure 3. Case study 1, individual 265. Interproximal grooving on the distal surface of an upper left second molar. Photograph by Rosa Vilkama.

to remove food residues and plaque from the sore space. The interproximal groove found from individual 265 indicates the repeated insertion of a toothpick or similar object between the teeth (Formicola 1988; Molnar 2011). The depth of the groove suggests that the individual did this over a long period of time.

One abscess was observed in the roots of the maxillary second left premolar, and another one in the roots of the heavily worn maxillary first left molar. The abscess near the maxillary second left premolar was drained on the cheek side, as evidenced by a macroscopically observable fistula, and the bone had begun to heal. Therefore the pain was over some time before death. The tooth itself fell out postmortem. The abscess on the maxillary first left molar was drained inside upwards into the left maxillary sinus.

A chronic maxillary sinusitis was suspected due to moderate new bone growth in the walls of the left maxillary sinus. By the time of individual 265's death, the bone growth still seemed to be active, but chronic sinusitis is usually a painless condition, apart from acute episodes with symptoms (Panhuysen *et al.* 1997; Liebe-Harkort 2010; Sundman & Kjellström 2011).

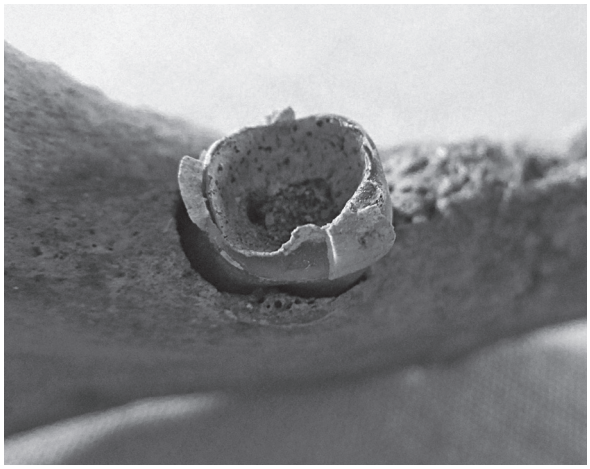

Figure 4. Case study 2, individual CH36. Lingual view of mandible showing a massive carious lesion in the lower left third molar. Photograph by Rosa Vilkama.

Case study 2: individual CH36 from an in situ grave

Individual CH36 from an in situ grave was an adult female, whose estimated age at death was around 25–30 years. She was ca. 159 cm tall, slightly above the average height of the women from the Old Ii Harbour cemetery (ca. 154 cm). She was lightly built and was probably not engaged in hard physical labour (Heikkilä 2011; Kortelainen *et al.* 2011). She had a nearly complete skull with maxilla and mandible with 25 teeth. She had suffered from caries, calculus, and antemortem tooth loss. Also hypercementosis, irregular swelling of the roots caused by overproduction of dental cement (Hillson 2003:205), was found from two molars.

Individual CH36 lost at least two teeth during life: the lower left second molar and the lower right first molar. Also the lower right third molar was missing. It is unsure whether this tooth was lost antemortem or postmortem, because the empty tooth socket was incompletely closed. Three of the remaining molars, the upper right first molar, the upper left third molar, and the lower left third molar, had caries cavities. The lower left third molar had the most severe defect, a massive cavity that had destroyed the whole crown (**Fig. 4**). It does not seem likely that periodontal disease caused the antemortem tooth loss in individual CH36, because no signs of periodontal disease were observed. It seems more plausible, looking at the remaining molars, that caries was the reason for the untimely loss of the teeth.

Some, if not all, of CH36's lost teeth may have been intentionally removed because of the pain caused

by caries. It is also possible that the infection destroyed the teeth so badly that they were lost naturally. In CH36's lower left third molar, which had the most severe carious lesion, infection already reached the inner structures of the tooth, probably making it difficult to use that tooth for chewing. There was also a thick layer of calculus on all the surfaces of the molars, including the occlusal surfaces. The accumulation of calculus on the occlusal surfaces suggests that CH36 intentionally avoided using the molars affected by caries. It is also possible that the prolonged loss of antagonists allowed the calculus to build up in the affected maxillary teeth. In contrast, the premolars, canines and incisors did not have any calculus.

In addition, the molars of CH36 were considerably less worn than the incisors, canines, and premolars. The uneven wear pattern of the dentition suggests that individual CH36 had to change her chewing style because of the dental pain. After the lesions developed, she might have preferred chewing more with her anterior teeth. Apparently, she preferred premolars and anterior teeth instead of molars. The heavily worn anterior teeth probably also affected the looks of individual CH36 during her lifetime, making her face look older.

Discussion

Palaeopathological analysis helps to understand the painful conditions commonly suffered by a community, who suffered from them, and how they affected people's lives. People in Ii had many dental diseases that caused different degrees of discomfort. They suffered dental caries, periodontal disease, periapical defects, and possibly chronic sinusitis.

There were differences in dental pain suffered by different age groups. The youngest age group had the best oral health with only small amounts of calculus and some caries that probably caused minor pain. They did not have antemortem tooth loss or periodontal disease. The degree of dental pathology increased with advancing age, so that the oldest age group was most affected by caries, periodontal disease, periapical defects, and AMTL. Most of the old individuals buried in the Old Ii Harbour cemetery had signs of severe periodontitis. They had lost numerous teeth during life and the remaining teeth were badly worn. Adults and the elderly thus had more dental pain and discomfort than the young. There were no significant differences between men and women, except for caries, which was more common in adult women.

Dental diseases may affect communication and social relations. Oral infections, especially periodontal disease and abscessing, often result in halitosis. The suppurative exudate that is caused by infections tastes bad in the mouth (Soukka & Vähätalo 2002; Richardson & Seppänen 2010). Dental diseases and changes in dentition have a direct effect on the appearance as well. Besides causing physiological symptoms, heavy dental wear, tooth loss, and ongoing infectious diseases usually make a person look older (Appleby 2010). A deteriorating dental health, combined with extreme wear and acute infections of the oral cavity, may even result in obvious swelling of the face (Hunter & Arbona 1995). AMTL and tooth wear, observed in many of the skeletons from Ii, for instance in individual CH36, have certainly affected the appearance of the people and made them look older than their real age. While one can question the significance of youthfulness in antiquity, given the poorer health and physically demanding lifestyles, deterioration of the dentition and consequent changes in facial appearance might still have contributed to the age identity of the person (Appleby 2010).

Pain and sensitivity in the mouth determine how people chew their food. Chewing on an infected tooth or on a tooth with associated abscessing causes pain (Dias & Tayles 1997). Because of the pain, the people in Ii who had caries, periodontal disease, AMTL, and other periapical defects could probably not use their teeth with the same strength as people with healthy teeth. The exposure of the sensitive dentin due to extreme dental wear or gingival recession tends to increase with advancing age, making the badly worn teeth of the elderly even more sensitive to painful sensations (Hirvonen 1986:1; Virtanen 1991:14). The chewing difficulties may have affected their diet. Maybe they preferred foods that were soft and easy to chew, for instance porridge or gruel. However, the high carbohydrate content of porridge and gruel may wors-

en oral health, as high-carbohydrate diets increase the occurrence of calculus, caries, and periodontal disease (Larsen 1995; Varrela 1991; 1997). Also premature loss of teeth is intrinsically unhealthy as such, because it complicates eating and thus causes impaired dietary absorption of nutrients (Hunter & Arbona 1995; Appleby 2010).

The case studies of individuals 265 and CH36 show that people had unique sets of oral health problems that caused different degrees of pain, discomfort, and social problems. Furthermore, we see that the individuals reacted to pain differently. Individual CH36 avoided chewing with the sore, infected teeth and possibly had teeth pulled out, while individual 265 used a toothpick to ease the pain in the area affected by periodontal disease. Palaeopathological analysis thus enables us to trace the unique pain histories of individuals and gives us an idea of how individuals reacted to painful oral conditions.

Folk beliefs and pain relief in Ii

The experience of pain is connected to cultural understanding of the cause of the pain and the relationships between the body and the surrounding world (Eilola 1999; Helman 2001). The osteological record from Ii, together with historical and ethnographic data, gives us an insight into how people thought about dental pain and tried to cure it. The ways in which pain was relieved and treated help us to understand how people thought about the cause of pain and how they understood the human the body in relation to its environment.

In many non-western ethnomedical systems, illnesses are not situated in the body alone, but are affected by the social and supernatural worlds, and this was the case also in pre-modern Finland (Lönnrot [1838] 1981; Scheper-Hughes & Lock 1987; Sarmela 1994; Eilola 1999; Helman 2001). Illnesses were also understood as tangible objects that entered the human body when it was vulnerable to such attacks, for instance during pregnancy, childbirth, menstruation, or strong emotions (Sarmela 1994; Eilola 1999). The boundaries between internal and external, as well as emotional and physiological, were thus porous and fluid (Eilola 1999).

Interproximal grooving in the dentitions of several individuals indicates pain-related tooth-picking and can thus be linked to Finnish folk healing methods and disease etiologies. According to Finnish folk belief, caries cavities and dental pain were caused by a tangible creature called the "toothworm" (Fi: *hammasmato*) (Valve 1912:3). Ethnographic and historical data suggest that probing the aching tooth or the infected gums with some instrument was a common treatment for toothache. This act could be accompanied by a spell (Valve 1912:7–12). Choosing the material of the probing instrument was significant, and it is often mentioned that an effective toothpick had to be made of something that had been in contact with a deceased body or death (Valve 1912:8–11). For instance, there was a recorded incident in northern Finland in 1763, where a man from Paltamo broke into a grave to extract a tooth from the deceased and a nail from the coffin to cure his long-time toothache (Halila 1954:634). Sometimes illnesses were cured by transferring the illness to an object (Eilola 1999). For instance, the sore part of the mouth could be treated until the toothpick was stained with blood. The toothpick with blood was then taken back to the place where it was originally collected from. It was believed that the illness would be bound to stay in the place where the toothpick was hidden (Valve 1912:15–20). Thus, the osteologically evident and documentable curing method – the tooth picking that caused the interproximal grooves – can be linked to the tangible way diseases were understood in Ii. The interproximal grooves display which pain relief methods were used and what kind of ideas people might have had about pain and illness etiology.

Conclusions

Many dental diseases cause pain ranging from mild discomfort to intolerable ache throughout the entire head and risk of death. In the past, with a lack of efficient cures and pain relief methods, dental diseases were often severe. The dental conditions of ancient human skeletons can be studied with the aid of palaeopathological analysis. However, the experience of pain is often neglected in osteological analysis because of its elusiveness and subjectiveness and difficulties

in cross-cultural comparisons. Still, we argue that the experience of pain has been an inseparable part of illnesses in the past and should be taken into account. Despite difficulties in measuring pain, it is still a physiological phenomenon that has common mechanisms in all people.

Our case study, the palaeopathological analysis of skeletons from the Old Ii Harbour cemetery in Northern Finland, shows that people suffered from many kinds of oral symptoms and pain. Their medical conditions caused many kinds of symptoms. Moreover, dental diseases affected people's appearance, their ability to chew and process foods, the smell of their breath, and their overall health. The individual case studies also show that individual pain histories and individual reactions to pain can be accessed to some extent through palaeopathological data.

It is important to remember that pain and diseases were interpreted in their social and cultural context. In addition, folk etiology and healing methods were connected to the way people understood the relationship between the human body and its surrounding environment. The interproximal grooves between the teeth of many individuals in Ii are a link to this folk healing method. They take us one step further in understanding how people in late medieval and early modern Ii might have thought about dental diseases and pain.

Acknowledgements

The writing of this paper was financially supported by the Finnish Cultural Foundation and two projects funded by the Academy of Finland: 1) Food and identity in medieval and early modern urban communities (project number 138081), and 2) The body size, body shape and skeletal robusticity of Post-Pleistocene Europeans (project number 127241).

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