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Pulp stones in chambers of permanent molar teeth

Zwapnienia w komorach stałych zębów trzonowych

Calcifications in the dental pulp can vary in size from microscopic up to concretions as large as 2–3 mm in diameter almost filling the pulp chamber. Such large concretions, called pulp stones, are evident on dental X–ray pictures. They appear as round or oval structures within the pulp chamber, sometimes in root canals or extend from the pulp chamber into the root canals. The pulp calcifications are supposed to be present in approximately half of the teeth in younger people and in almost all the teeth in over 50 years old population. Thus the aim of the paper was determination of occurrence of pulp stones in permanent molar teeth.

MATERIAL AND METHODS

There were examined 512 unselected digital intraoral radiograms of permanent molar teeth obtained in the Department of Dental and Maxillo–Facial Radiology of the Medical University of Lublin in the past two years. All the X–rays were taken using the Digora–Soredex digital radiography system and Planmeca Prostyle Intra intraoral X–ray system.

There were evaluated 880 teeth, 307 molars in 154 males and 573 molars in 358 females. The patients were in the age from 18 to 56 years, the mean age was 41.8 years.

In order to confirm the *in vivo* diagnosed presence of calcifications there were examined also 25 molar teeth recently extracted due to caries or due to orthodontic reasons. The intraoral X–ray pictures of the extracted teeth were taken in two projections and later visualised in all available options of the Digora digital radiography software.

All the radiograms were independently evaluated by two radiologists using various options of digital radiography (negative (Fig.1), single colour highlight (Fig. 2), full colour option negative (Fig. 3), full colour positive (Fig. 4), "tree dimensional" reformatting (Fig. 5) as well as densitometric analysis (Fig. 6). Only definitive shadows within pulp chambers were recognised as pulp stones.

RESULTS

The pulp stones were present in chambers of 227 out of 880 analysed molar teeth. The prevalence of pulp stones in upper and lower molar teeth was comparable and equalled 11.8% for upper molars and 13.9% for lower molars. The concretions were most often found in the group of first lower molars – in 63 teeth, that is in 7.1%. The results are presented in Table 1.

The prevalence of pulp stones was higher in the molars of males in 98 teeth, that is in 31.92% of the studied molars in men. In females the calcifications were radiologically found in 129 out of the 573 examined teeth that is in 22.51% (Table 2). The calcifications were more often encountered in older people and their number increased in older age groups. It was observed that pulp stones appeared more often in teeth with composite fillings.

Table 1. Prevalence of pulp stones in permanent molar teeth

Teeth		Number of teeth with pulp stones	Percentage of teeth with pulp stones	Total number in upper and lower molars	Total
Upper	First molars	42	4.77%	104 (11.82%)	227 (25.79%)
	Second molars	59	6.71%		
	Third molars	3	0.34%		
Lower	First molars	63	7.16%	123 (13.97%)	
	Second molars	52	5.91%		
	Third molars	8	0.91%		

Table 2. Prevalence of pulp stones in males and females

	Number of radiograms	Number of analyzed teeth	Number of teeth with pulp stones	Percentage of teeth with pulp stones
Males	154	307	98	31.92%
Females	358	573	129	22.51%
Total	512	880	227	25.79%

DISCUSSION

It is supposed that although pulp stones represent only about 20% of pulp calcifications, they are a common radiographic finding (11). They range considerably in size. They appear mostly as round or oval structures but they can also be irregular (7). Pulp stones are often found in several teeth of the

same person, but their occurrence in the entire dentition is relatively rare. There were described cases of generalised pulp calcifications in all permanent teeth in healthy individuals (9) as well as in inherited osteogenesis imperfecta (8) and in dentin dysplasia (10). Pulp stones usually do not produce clinical symptoms and do not require treatment (11). However, there were described cases of pains caused by large pulp calcifications (1). They may contribute to blocking the access to root canals during endodontic treatment (6). According to Hillman and Geurtsen (5) the pulp stones increase in frequency with advancing age in a statistically significant manner. On the other hand Al–Hadi et al. (2) stated that incidence of such calcifications was not significantly correlated with age.

In light microscopy and microradiographic studies of Arys et al. (3) 95% of primary molars contained pulp calcifications. Baghdady et al. (4) determined presence of pulp stones in 19.2% of radiologically examined teeth. Al–Hadi (2) found that 22.4% of 4573 radiographically examined teeth contained pulp stones and the distribution percentage was similar in maxillary and mandibular teeth. According to this study, the first molars were most often affected followed by the second molars which is consistent with the results of the presented own studies.

CONCLUSIONS

1. The pulp stones were most often observed in the first lower molars.
2. The prevalence of radiologically evident pulp concretions was higher in males than in females.
3. The number of molars presenting pulp stones increased in higher age groups.
4. Detailed determination of relationships between the presence of caries or dental fillings and pulp stones requires further studies of a larger group of patients.

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STRESZCZENIE

Zwapnienia w miazdze zębów trzonowych obserwowane są na zdjęciach rentgenowskich w zębach zdrowych, w zębach chorych, a nawet w zębach zatrzymanych. Zmiany te mają rozmiar od małych, niemal mikroskopijnych cząstek do dużych struktur, które obejmują prawie całą miazgę. Celem pracy było określenie częstości występowania zwapnień w miazdze zębów trzonowych u ludzi dorosłych. Przeanalizowano 512 zdjęć, wykonanych techniką radiografii cyfrowej aparatem Digora–Soredex. Do badań zebrano zdjęcia wewnątrzustne 880 stałych zębów trzonowych, wykonane w ciągu dwóch ostatnich lat (307 zębów u 154 mężczyzn i 573 trzonowców u 358 kobiet). W celu potwierdzenia uprzednio zdiagnozowanych zwapnień techniką radiografii cyfrowej wykonano zdjęcia 25 zębów trzonowych świeżo usuniętych z powodu próchnicy lub z przyczyn ortodontycznych. Wszystkie zdjęcia oceniane były niezależnie przez dwóch lekarzy przy wykorzystaniu różnych możliwości radiografii cyfrowej. Za zwapnienia uważane były tylko wyraźne zacienienia w obrębie komory miazgowej. Obecność zwapnień w komorach zębów trzonowych stwierdzono w 227 z analizowanych 880 zębów. Częstość występowania zwapnień w górnych i dolnych zębach była porównywalna i wynosiła 11,82% w górnych trzonowcach (w 104 zębach) i 13,97% w dolnych trzonowcach (w 123 zębach). Najczęściej spośród trzonowców zwapnienia były znajdowane w grupie pierwszych dolnych zębów trzonowych (7,16%). Występowanie zwapnień w miazdze było częstsze u mężczyzn (31,92%) niż u kobiet (22,51%) oraz w wyższych grupach wiekowych. Bardziej szczegółowe określenie zależności pomiędzy próchnicą lub wypełnieniami a zwapnieniami miazgi wymaga dalszych badań na większej grupie pacjentów.

Fig. 1. Pulp stones in chambers of two maxillary molars on digital radiogram

Fig. 2. Single colour highlight of a pulp stone in the first upper molar

Fig. 3. Full colour negative image
of the same tooth

Fig. 4. Full colour positive image of maxillary
molar presenting pulpal concretion

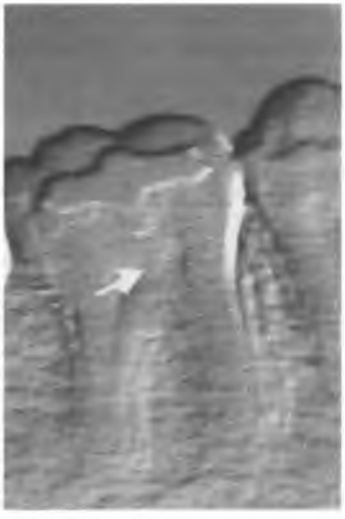

Fig. 5. "Three–dimensional" display of first mandibular molar with evident pulp stone

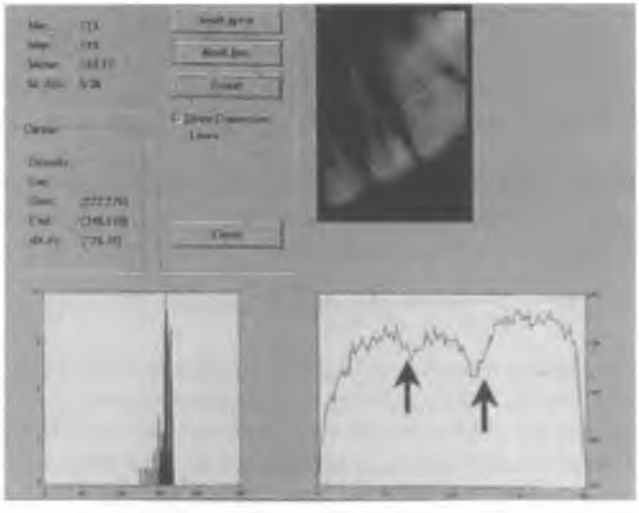

Fig. 6. Densitometric line on the level of calcification in the chamber of the first maxillary molar. Elevation of the densitometric curve in the location of the pulp stone marked with arrows