SIGNIFICANCE OF THE SIZE OF CLINICAL CROWNS OF MOLARS IN CARIOLOGY AND ENDODONTICS

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Summary. All academic tutors in the preclinical and clinical teaching are facing the problem with non accurate cavity preparations. The mistakes are related not only to dental amalgam restorations but to aesthetic restorations and endodontic cavities too. The aim of the present study was to measure the proper actual sizes of the clinical crown of molars and their variability in favour of more accurate cavity preparation in cariology and endodontics. 313 molar teeth are included in the study and following lengths were measured: mesiodistal, buccolingual, and buccal crown hight. The differences with commonly used in Bulgaria local literature sources are significant. It can be useful for the practice some of the regular terminology in lectures and operative dentistry manuals to be reconsidered. Cavities with buccolingual size up to 1/3, convergence of cavity walls in cariology, and even the possibility of convergence in endodontic cavities is essential to be carefully revisied. Respecting the decreasing of the sizes of the crowns of human molars during evolution, due to modern food industry, will lead to better clinical decisions in favour of the most important treatment task: rare restoration replacement, lower ware rates, and lower rates of secondary caries.

Key words: *clinical, crowns, molars*

All dental practitioners and teachers in dentistry are facing often the same problem called secondary caries. The most common reason for it are not accurate cavity preparations, due to regular mistakes during operative procedures, or to mistakes somewhere in dental under- and postgraduate teaching models? Unfortunately, these mistakes are related not only to dental amalgam, they increase in the aesthetic restorations era – last 25 years. Lost fillings are a major problem after endodontic treatment, because this can compromise the endodontic treatment too. Not accurate cavities in endodontics easily lead to iatrogenic errors like: instrument fractures, perforations, poor root canal preparation, etc. According to the differences in the lecture courses, students get used to prepare extensive cavities, or

very small cavities, in which the placement of restorative materials cannot be accurate enough. In both cases, the result is secondary caries [1, 2, 3, 4, 5, 6, 7, 9].

All sizes of the cavities (bucco-lingual size) are defined like parts from the intercusp distance, parts or mm from occlusal surfaces. The existing information is not quite accurate, not up to date and only in two old enough literature sources: a Manual for Preclinical Teaching in Restorative Dentistry 1976 and a translated edition of Wetzel from 1947 [8, 18].

AIM: The aim of the present study was to measure the accurate sizes of clinical crowns of upper and lower molars and their variability in favor of a better cavity preparation for the purposes of cariology and endodontics.

MATERIALS AND METHODS:

TEETH: 313 upper and lower molars were included in the study. 151 of them were first and second upper molars, 105 first and second lower molars, 7 upper third molars and 50 lower third molars. The teeth were not divided in groups as left and right, as this is useless for the aims of the study. All teeth were fully mineralized, used as sound for the preclinical undergraduate exam in endodontics.

GROUPS: Upper and lower molars, first and second molars and third molars were separated in different groups.

MEASUREMENTS: The following sizes were measured for each tooth in mm: medio-distal (MD), from the marginal ridge (MR), bucco-lingual (BL), from the top of the medio-buccal cusp to the top of medio-lingual cusp. The hight (length) of the clinical crown was measured from the buccal surface, from the enamel junction to the buccal ridge between the cusps (Fig. 1 and 2).

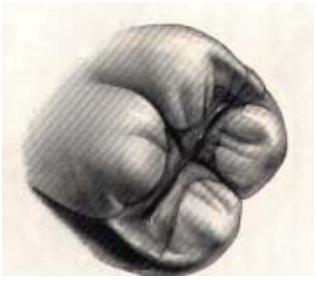

Fig. 1, 2 Different sizes of neighborr molars and fillings

EXCLUSION CRITERIA: Teeth with abrasio, where dentine is exposed, hypoplastic teeth, or with fractures of parts of the clinical crowns – walls and cusps, or with restorations bigger than a standard endodontic cavity.

RESULTS

The average measurements and their deviations are shown in tabl. 1.

Table 1. Sizes of the crowns of human molars

Type of teeth	Dimentions	Average in mm	Deviations in mm	Number of teeth
Upper 6 , 7	MD	8.4	7.7 – 9.4	151
Upper 6 , 7	VL	6.8	5.8 – 7.8	151
Upper 6, 7	H	4.9	4.4 – 6.2	151
Upper 8	MD	7.8	7.0 – 9.0	7
Upper 8	VL	6.1	6.0 – 7.0	7
Upper 8	H	4.7	4.0 – 5.0	7
Lower 6 ,7	MD	9.8	8.0 -11.0	105
Lower 6, 7	VL	5.4	4.0 – 8.0	105
Lower 6, 7	H	5.2	3.5 – 7.0	105
Lower 8	MD	10.0	8.0 – 13.0	50
Lower 8	VL	5.1	4.0 – 7.0	50
Lower 8	H	5.1	4.0 – 6.0	50

The sizes of the teeth in our fantom plastic models – Frasaco, used in the preclinical operative dentistry undergraduate course are as follows: upper molars - MD 8.5 mm, BL 7.0 mm, h 6.5, upper third molars MD 7.0 mm, BL 6.5 mm и h 6.0 mm; lower molars MD 9.5 mm, BL 5.0 mm, h 8.0 mm, lower third molars MD 9.0 mm, BL 5.5 mm и h 6.5 mm.

The average data that we found for first and second human molars of both jaws – MD and BL, are very close to the plastic ones. The main difference is in the hights, where the ones in the upper molars are 1.6 mm and 2.8 mm are the lower molars bigger than the plastic teeth. Another difference is the size of the third molars. In the upper jaw, MD and BL are smaller by 1,7 mm , c 0,3 mm, and h - 1,3 mm. In the lower third molars, the found MD size is by 1.0 mm bigger, and the BL by 0.4 smaller, h is by 1.4 mm smaller.

DISCUSSION

A difference in all sizes was found by Ruskov (1976) [8], where the MD size of upper molars is 9.3-10.1 mm, BL 11.1-11.4 mm, and MD 9.7-11.1, BL 8.9-10.3 mm of lower molars. It is clear that some of the differences are nearly twice, especially in lower molars. The case of Wetzel [18] is very similar, where upper molars are 9.8 and 11.5 mm , and lower MD 10.7 and 11.5 mm, and BL 9.8-10.4 mm. The comparison shown in tabl.1 with the fantom teeth, shows differences up to 4.5-6.5 mm in the BL size.

These findings are leading to an essential revision of some of our teaching terms. Talking about cavities with BL size up to 1/3 from the cusp distance, keeping in mind that we are talking for distances up to 5.1-6.8 mm don't sound realistic, especially in endodontics. One third will result in cavities width 1.7-1.8 mm, or 2.0-2.2 mm, which in lower third molars means 1.3 mm (fig. 3). Technically this is

nearly impossible for accurate placing of aesthetic materials and fully impossible for dental amalgam and endodontics[13, 15, 17]. Very small cavities are one of the common reasons for secondary and recurrent dental caries, due to failures in the cavity inspection and difficulties in proper application of plastic dental materials.

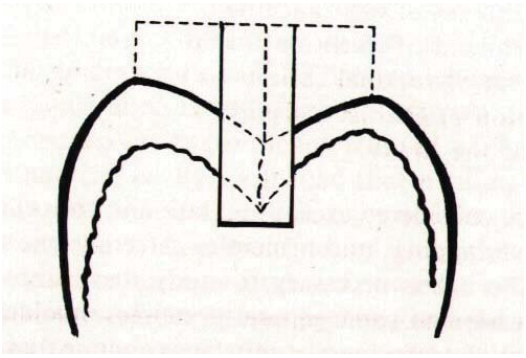

Fig. 3. One third in operative dentistry can mean 1.0-1.3-1.5 mm BL sizes of the cavities

Poor root canal fillings are often found in dental practices and not rare the reason is poor access to the orifices, via small endodontic cavities [12, 14, 16].

CONCLUSIONS

A useful approach to the practice is a terminological revision in all teaching courses of BL size up to 1/3 from the cuspal distance.

Convergency of the cavity walls is useful to be judged individually, due to the size and type of the teeth, the type of dentition and type of the filling material.

Endodontic cavities practically can't have convergency of the cavity walls.

A careful approach to the sizes of the clinical crowns of teeth, which are lowering their sizes with the evolution of the cranium and face, would lead to better clinical decisions, and more rare changes of fillings and secondary caries.

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