

Review Article

Ground sections of teeth: histopathological study modality

Suresh Motilal Yadav, Rupali Wakode, Sourab Kumar*, Abhishek Jadhav

Department of Oral Pathology, D Y Patil School of Dentistry, Navi Mumbai, Maharashtra, India

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***Correspondence:**

Dr. Sourab Kumar,

E-mail: sourab.kumar@dypatil.edu

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ABSTRACT

Ground sections of teeth or bone are considered best solutions for the study of any hard tissues in the study of histopathology. Various studies have been performed like progression of dental caries, enamel studies, dentin studies, cementum annulation studies, bone morphologies, age determination studies, etc. It is an important study part in any forensic studies where mass disasters occurring as natural phenomenon of cyclonic events, earth quakes, floods and volcanic explosions and airplane accidents, industrial accidents and terror related acts. Forensic dentistry has played a vital role and many medico-legal cases are solved by studying the teeth. Ground sections study is important in any part of research. For a dentist this phenomenon is less understood, and this article brings in limelight various methods and study pattern of ground sections of teeth. With this knowledge an understanding and performing ground sections of teeth becomes a well start for dental graduates. Various other modalities in histopathology are decalcification studies, histopathological staining procedures, special stains procedures, immunohistochemistry. All the histopathological modalities have their own importance and are used appropriately in the study of oral pathology.

Keywords: Age, Forensic, Medico-legal, Natural, Study, Teeth

INTRODUCTION

Various methods are adopted to study the anatomy of teeth, in which Ground section of teeth is utmost simple and effective technique. Several factors determine how a thin tooth section is grounded and studied including of its shape, thickness and its use. The other method, where microtome used decalcified sections of teeth is prepared with Hematoxylin and eosin staining is also effective. Ground sections of teeth are sections prepared without using any chemical and maintaining its anatomy.¹⁻⁵

REVIEW OF LITERATURE

Apparatus used for ground section of teeth are

- Extracted Teeth treated with formalin for 24hours.

- Electrical lathe machine (High and Low speed): Grounding done till 4-5mm thickness (Figure 1,2)
- Carborundum stone (Rough, Static, Fine).
- Xylene.
- DPX.^{6,7}

Method

- Teeth are first soaked in 20% formaldehyde for 24 hours.
- Washed in water.
- Tooth could be sectioned to any thickness by using Ultra-microtomes with diamond cutting blades. (Buehler Isomet low speed saw with a diamond impregnated blade).
- Using various available burs, tooth can be grounded from both sides equally, thus making a thin ground section.

- Using electrical lathe machine also grinding could be done and equally both sides grounded, thus preparing a thin ground section. Please note, continuous spray of water is required, as tooth gets heated up due to friction of grinding. Tooth is grounded at high speed until 4-5 mm thickness is done. At low speed further grinding is done till 3-4 mm thickness is achieved.
- Manually grinding can be done in two steps, first using rough carborundum stone till a section of 2-3mm is obtained and then using a static carborundum stone till a section thickness of 1mm is obtained. Grinding was further continued using fine carborundum stone till a section thickness of 0.25mm is obtained. (Alternate surfaces of Carborundum stone). Continuous water is poured on this stone, due avoid friction of heat (Figure 3).
- Finally, the grounded section is cleaned in xylene for one minute (Figure 4 and 5).
- The dried section is then mounted on microscopic slide using DPX and viewed under microscope.²⁻¹⁰



Figure 1: Armamentarium for preparation of ground section of tooth.

- Using burs have their own disadvantage: Leads to some anatomical changes when teeth are grounded.
- Electrical Lathe and hand grinding is well suited. Instruments available are low cost and easily available.
- Carborundum stone used by dental surgeon are 4-5 cm diameter. Grinding of teeth with small surface is a problem with fatigue and not possible.
- Hand grinding is really injurious to the fingers. Fingers are also rubbed on the rough surface leading to injuries.³⁻⁸

Precautions

- Teeth used for ground sections should not be allowed to dry out after extraction. (Because drying makes hard tissue brittle and enamel may chip off in the process of grinding).
- Extracted teeth should also be preserved in 10% formalin until used.⁴⁻⁹



Figure 3: Mounting tooth for preparation of ground section of tooth.



Figure 2: Armamentarium for ground section of tooth.



Figure 4: Horizontal ground sections of teeth.

Merits and demerits

- Cost Restriction: Availability of ultra microtomes with diamond cutting blades.

DISCUSSION

Customarily, ground segments of teeth have been mounted with either Canada balsam or DPX. Canada resin is usually favored in the investigation due to its

properties of lastingness and comparable refractive list (RI) as glass. Besides, highlights of veneer, for example, striae of Retzius seem better with Canada resin when contrasted with DPX because of its bigger sub-atomic size. However, there are sure natural issues related with Canada resin: it sets aside a long opportunity to set and there is a tinge yellowish stain around the ground segments and on the fringe of the coverslip.

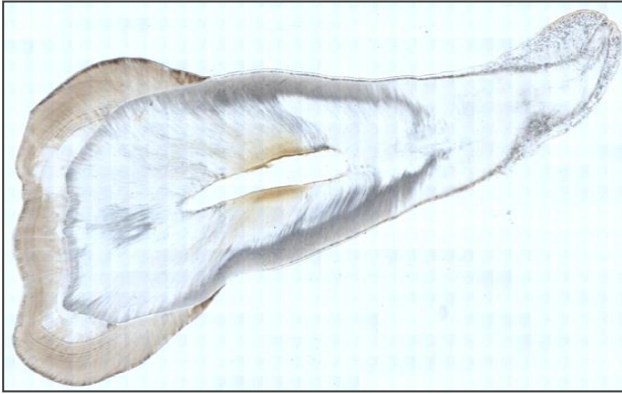


Figure 5: Prepared ground section of tooth displaying all the features of tooth.

Cyanoacrylate cement (Fevikwik™) is an ordinarily utilized family unit thing which clearly bonds anything to anything. It is implied to set quick and the bond should be very solid. Its primary part is cyanoacrylate and is accessible as little 1 ml squeezable cylinders.

The point of our examination was to see whether cyanoacrylate glue can be utilized as mounting media for ground areas of teeth or DPX and whether it is on a par with Canada resin or better. Two perspectives were looked at: perception of structures of teeth and specialized parts of use.

In spite of the fact that perception of the majority of the structures of teeth were not factually unique between the two, cyanoacrylate glue was observed to be superior to Canada resin for watching striae of Retzius, veneer lamellae, dentinal tubules, interglobular dentin, Sharpey's filaments and sclerotic dentin in transmitted just as in DPX.

This better representation could be identified with the distinction in atomic size of the parts in the two mounting media. Sound tooth lacquer has pores, the volume of which is <1%. These pores are of various sizes and relying upon their distance across, they could possibly permit entrance of the particles of the mounting media. Mounting media, for example, Thoulet's medium can infiltrate these pores on account of their little atomic size.

In the event that the sub-atomic size of the mounting medium is smaller than the distance across of these pores, they infiltrate and uproot the vaporous substance or flotsam and jetsam inside the pores and the structures

seem translucent when seen under microscope. Nonetheless, if the pores are littler than the sub-atomic size of the mounting medium, the vaporous particles are not disposed of from these pores. This absence of infiltration of mounting media is likewise in charge of the perception of striae of Retzius in lacquer as noticeable, dark colored hued steady lines on the grounds that these pores are particularly situated close to these structures. Larger pores might be entered by Canada balsam, however littler pores may not be seen. Since cyanoacrylate glue has bigger atomic size when contrasted and Canada balsam, almost certainly, there is a more noteworthy absence of infiltration and subsequently more unmistakable quality of these structures.

In Thoulet's medium - all pores are infiltrated (b) Canada resin - just bigger pores are entered, however not the littler pores (c) cyanoacrylate - all pores (substantial and little) are not entered. In DPX no variations are seen.

In addition, the distinctions in refractive records could likewise be in charge of the distinction in perceptions. The RI of polish is 1.63 and that of Canada balsam is 1.54 and near that of glass. Henceforth, odds of refraction are limited. In any case, the RI of cyanoacrylate glue is 1.45. DPX is 1.30.

The bigger distinction of RI among polish and cyanoacrylate and among cyanoacrylate and glass and the absence of entrance because of bigger sub-atomic size give more noteworthy difference to the areas and henceforth hypomineralized structures are better pictured with cyanoacrylate stick. Since steady lines of Salter are hypermineralized and more glass-like, they seem better when Canada resin (which has RI of 1.54) is utilized as mounting medium.

Concerning specialized parts of the two mounting media, cyanoacrylate cement is known to set quick which is preference to watch ground segments sooner than Canada resin. Since it sets extremely quick, it is exceedingly conceivable that the odds of air bubble capture are insignificant, however one needs to put the coverslip appropriately and at a fast pace. Another additional favorable position is the way that cyanoacrylate glue does not cause any staining, in contrast to Canada resin. Notwithstanding, on the grounds that cyanoacrylate glue results in a solid concoction obligation of the coverslip to the glass slide, it is progressively hard to evacuate. Then again, Canada resin has the benefit of not being procedure touchy, simpler to expel and being more financially savvy.³⁻¹⁰

CONCLUSION

Dental machine is valuable for the underlying crushing of tooth till the thickness of 4 to 5 mm. Unpleasant stone utilized by workman is as great substitute too modest option for crushing of tooth for making ground segment of tooth. Uneven surfaces are also formed during hand

abrasives use. Despite the fact that hand crushing is dreary and damaging strategy yet isn't replaceable with any technique. Instruments utilized are promptly accessible and also practical as well. At present research is required, where thin even sections could be produced in quite easy and well-planned manner.

Microscopic study is also important, where various structures could be easily appreciated. The microscope of high magnification power gives the clear details of anatomic structures. In the due course, use of research microscope have come in picture, where clear magnified images of ground sections of teeth are studied.

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