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Mastering of “The procedure of tooth extraction” as a practical skill by dental students

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Abstract

The last decade has brought fundamental changes to the medical industry. Dentistry becomes a high-tech industry that uses the benefits of other scientific disciplines and integrates them in order to increase the efficiency of patients' treatment. Practical skills that should accelerate and improve understanding of the learning material have been developed and introduced in the pedagogical process in order to improve knowledge acquisition by the students since the present day requires the transition of education from a knowledge-based to a competency-based model.

A device for teaching dental students has been developed and introduced into the educational process in order to achieve the objective. This device contains a tripod to be attached to the headrest of the dental chair and a training tool located on the tripod. A skeletonized lower jaw of an animal is used as a training tool. It is fixed in two clamps positioned on the frameworks located at the ends of a horizontal cylindrical bar. The frameworks have openings to base the framework on the bar and to place the clamp. The position of the frameworks and clamps is fixed with retaining screws.

The formation of tooth extraction skills was conducted at practical classes of surgical pediatric dentistry with students of the 4-5th year of the Faculty of Dentistry. Each student carried out the manipulation of tooth extraction in the following sequence: selection of forceps, their correct fixation, application, movement, fixation of forceps on the neck, luxation or rotation and direct extraction of the tooth from the alveolus. The crown part of the tooth was broken off with the subsequent use of an elevator to remove the remaining tooth root in order to simulate the complications of the tooth extraction procedure.

Keywords: Dental students, practical skills, tooth extraction procedure

Introduction

The last decade has brought fundamental changes to the medical industry. Dentistry becomes a high-tech industry that uses the benefits of other scientific disciplines and integrates them in order to increase the efficiency of patients' treatment. Practical skills that should accelerate and improve understanding of the learning material have been developed and introduced in the pedagogical process in order to improve knowledge acquisition by the students since the present day requires the transition of education from a knowledge-based to a competency-based model. The development of scientific methods and ways of practical skills learning and consolidation is important ^[1, 2]. Mastering of practical skills, in particular, performing various surgical interventions by a future doctor remains a priority for qualitative patients' treatment. The objective of the research was to improve the formation of such practical skill as “the procedure of tooth extraction” by students of the Faculty of Dentistry.

Material and Methods

A device for teaching dental students has been developed and introduced into the educational process in order to achieve the objective. This device contains a tripod to be attached to the headrest of the dental chair and a training tool located on the tripod. A skeletonized lower jaw of an animal is used as a training tool. It is fixed in two clamps positioned on the frameworks located at the ends of a horizontal cylindrical bar. The frameworks have openings to base the framework on the bar and to place the clamp. The position of the frameworks and clamps is fixed with retaining screws.

During the research, we studied available devices, in particular, a well-known device (phantom) for dental students' training ^[3]. It is made of artificial material in the form of a child's face with plates located inside. The plates are made of red plastic in the form of upper and lower jaws to which teeth models depending on a child's age are attached.

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The teeth models are made of white plastic to which a radiopaque substance is added. The models of immature teeth are positioned inside the jaws. The material of the immature teeth also contains radiopaque substance.

The disadvantages of this device (phantom) are the absence of a connective apparatus between the teeth and the jaw. Therefore, the dental students are not able to study tooth extraction procedures.

The well-known dental educational and demonstration phantom ^[4], which contains models of the upper and lower jaws with artificial teeth and pulp chambers and canals, has much more functionality. Moreover.

1. Jaws models are made of plastic covered with an elastic polymer coating in the form of an artificial mucous membrane. The teeth are set up with the possibility of removal and installation. On the ends of the upper and lower jaws there are openings for the root ends emergence, and flap doors made of high density polymer are installed with appropriate recesses on the inner surface and electrically conductive coating for contact with tooth root apices with an apex locator that has exits for connection to the endodontic instrument and electrically conductive coating of the flap doors.
2. 32 artificial radiopaque teeth are installed on the jaws. The teeth are made of composite materials similar to the natural ones, with pulp chambers and root canals of average sizes and an elastic silicone coating imitating the periodontium.
3. The teeth roots are transparent.
4. The artificial mucous membrane is made of silicone and has interdental papillae, crypts on the upper jaw and tongue on the lower one.
5. The apex locator contains a switch, light indicators of the readiness state and reaching the apex, an audible signal of reaching the apex, two electrodes for connection with the electrically conductive coating of the flap doors and an electrode with a clamp for an endodontic instrument.

The disadvantage of this phantom is the complexity of the design due to the presence of many constituent elements made of various artificial materials, which, however, cannot fully imitate the features of the mucous membrane of the oral cavity, periosteum and bone. Moreover, careless removal of artificial teeth with forceps may lead to destruction of teeth and sockets and damage to the phantom, the cost of which (given its complexity) can be significant.

Results and Discussion

The dental phantom according to L.D. Chudak is the closest in technical terms ^[5]. It consists of a head with a movable lower jaw, which is fixed on a tripod, and artificial teeth. It also contains a stand-holder on which the articulating part with jaws models is fixed with a fixing screw. The articulating part contains a dental ledge for 28 artificial teeth of permanent dentition, made of acrylic plastic, which are fixed to the dental ledges with an adhesive material. This phantom is fixed on a stand-holder and installed in a well-lit place on the work table (an analogue of the phantom is attached to the dental chair using a tripod).

This phantom provides an opportunity to perform separate educational manipulations, including tooth extraction due to the application of an adhesive system for artificial teeth fixing in the dental ledges.

However, the disadvantage of this phantom is the use of jaws and teeth models made of artificial materials which imitate natural jaws and teeth only to a certain extent and cannot reproduce the real conditions of dental procedures. The disadvantages of this phantom also include the presence of only 28 teeth in it, which makes it impossible to simulate operations of the remaining teeth removal as well as to conduct training operations on the bones.

Our device is based on the task of creating such a device for teaching dental students which would provide an opportunity to practice all types of educational operations with maximum approximation to real conditions due to the use of an animal origin agent which would ensure reliable non-destructive fixation of this agent on the dental chair in the position corresponding to the real position of a patient's jaw.

This technical result is achieved by the fact that the skeletonized lower jaw of an animal is used as a training tool in the device for teaching dental students containing a tripod for fixing to the headrest of the dental chair and a training tool located on the tripod. The jaw is fixed in two clamps positioned on the frameworks located at the ends of a horizontal cylindrical bar. The middle of the bar is fixed on a tripod. The frameworks have two mutually perpendicular openings. One of the openings is intended for basing the framework on the bar with the possibility of longitudinal movement and rotation of the framework relative to its axis. The second opening is intended for clamp placement with the possibility of its rotation relative to the framework. Moreover, the position of the frameworks and clamps is fixed with retaining screws after placing the clamps in accordance with the contour of the inner side of the jaw, and the outer side of the jaw is fixed in the clamps with the help of pointed screws. The essence of the proposed device for teaching dental students is explained by the figures. Figure 1 presents the device in the front and top projections. Figure 2 shows the device in a top view with the lower jaw of an animal fixed in it used as a teaching tool.

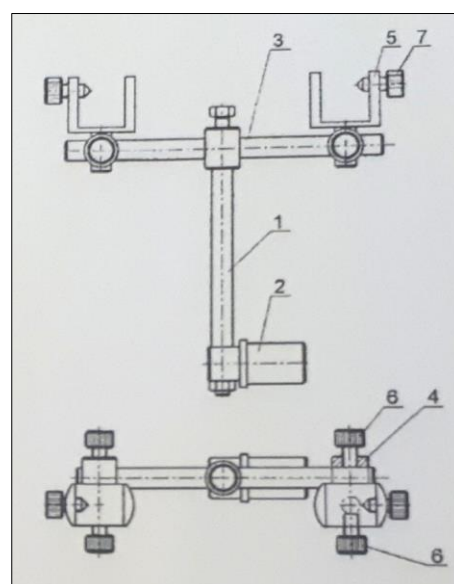


Fig 1: Schematic representation of the device for dental students teaching in the front and top projections

The device includes a tripod 1 with a finger 2 in the lower part of it to attach to the dental chair headrest in place (not shown in the figure), a horizontal cylindrical bar 3 the middle

of which is fixed on the tripod 1, two frameworks 4 with clamps 5 positioned at the ends of the bar 3. Each of the frameworks 4 has two mutually perpendicular openings, one of which is intended for basing the framework on the bar 3 with the possibility of longitudinal movement and rotation of the framework relative to its axis. The second opening is intended for clamp 5 placement with the possibility of its rotation relative to the framework. Moreover, the position of the frameworks 4 and clamps 5 is fixed with retaining screws 6. A skeletonized lower jaw of an animal 8 used as a training tool is positioned in clamps and fixed with screws.

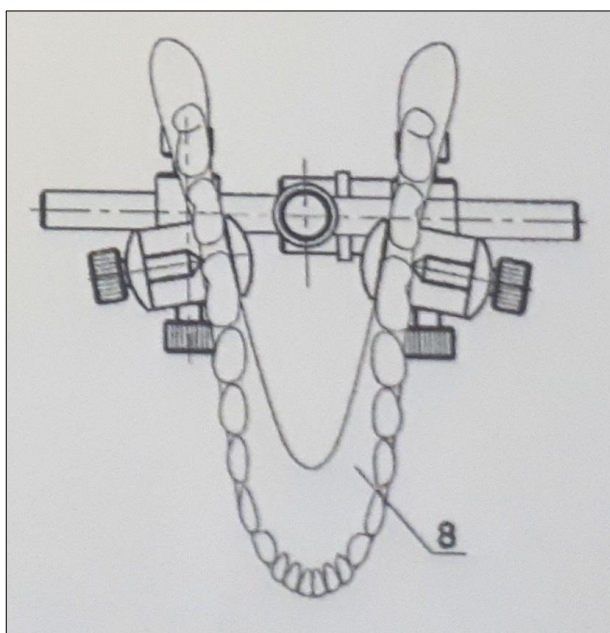


Fig 2: Schematic representation of the device for dental students teaching in the top view with the lower jaw of an animal fixed in it

The use of a skeletonized jaw of an animal, for example, a

pig, which imitates a human bone and teeth as much as possible, provides an opportunity to perform and practice all types of procedures on the lower jaw including tooth extraction. The jaw 8 is placed in the necessary position in two clamps 5 which are preliminarily located in such a way that the inner plane of each clamp is oriented in space according to the contour of the inner side of the jaw. Then the position of the frameworks and clamps are fixed with retaining screws 6, and the outer side of the jaw is fixed with pointed screws 7 ensuring the reliable attachment of the jaw 6 without its destruction.

The necessary clamps 5 orientation is ensured by their placement on the frameworks 4 that have two mutually perpendicular openings. One of the openings is intended for clamp placement with the possibility of its rotation relative to the framework. The second opening is intended for basing the framework at the ends of a horizontal cylindrical bar 3 with the possibility of longitudinal movement and rotation of the framework relative to its axis.

The middle of the bar 3 is fixed on a tripod 1 the finger 2 of which is attached to the dental chair headrest ensuring a reliable fixation of the animal's lower jaw in a position that corresponds to the real position of the patient's lower jaw.

Thus, the expected technical result is achieved due to the combination of essential features of the proposed device.

The formation of tooth extraction skills was conducted at practical classes of surgical pediatric dentistry with students of the 4-5th year of the Faculty of Dentistry. Each student carried out the manipulation of tooth extraction in the following sequence: selection of forceps, their correct fixation, application, movement, fixation of forceps on the neck, luxation or rotation and direct extraction of the tooth from the alveolus (Photo 1). The crown part of the tooth was broken off with the subsequent use of an elevator to remove the remaining tooth root in order to simulate the complications of the tooth extraction procedure.



Fig 1: Conduction of "the tooth extraction procedure" as a practical skill by dental students

Conclusion

Students mastered practical skills in teeth and tooth roots extraction under the guidance of the teacher of the group with

the help of the developed device for teaching dental students. The students demonstrated the reinforced skills directly when taking a practical test on tooth extraction at the final lesson or

Final Module Control.

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