RADIATION DOSES FOR X-ray DIAGNOSIS TEETH IN DENTAL MEDICINE

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Abstract: *X-rays are the first ionizing radiation, which are applied in medicine for diagnostic radiology and X-ray therapy. While in the beginning they are mainly used for X-ray photos of the chest / lungs and in severe fractures of the limbs, then in recent years they are widely applied in diagnostics of teeth in dental medicine. Considering that caries is a widespread disease, both in children and adults, and it requires repeated x-ray photographs of the damaged teeth for the individual, the total radiation doses, which reflect on people from the X-rays are at high values.*
In order to reduce external exposure to other organs /mainly thyroid gland/ by X-ray pictures of teeth, it should be used with special lead aprons with large coefficient of reduction.

Keywords*: doses of radiation, X-ray machines, dental, x-ray pictures of teeth, protection sources.*

INTRODUCTION

In 1895 German physicist Wilhelm Ryontgen discovered X - rays, i.e. cathode rays, which represent the flow of electrons. Later, these rays were named in his honor X-rays / Ro /. These rays emerge spontaneously in the electronic transitions in artificial substances and by altering the speed / delay, suspension / of electric charged particles circulating in a given volume. X-rays represent flow of electromagnetic quantum, which have speed of movement and range - beams / approximately 300,000 km/sec, but their energy is substantially lower - from 10 KeV to 150 KeV. The most widely distributed sources of X-rays are X-ray mechanisms, which are electro vacuum double electrodes devices, where the cathode emits electrons, and then they speed up in an electric field and purposefully fall on the other covered electrode / anode. In a sharp reduction of the speed and stopping of electrons on the anode, so called braking X-ray radiation occurs, which consists of X-ray quantum.

X-rays have great penetrating power, because the X-ray quantum do not have electric charge form. These rays ionize the air, biological tissues and other environments and pass through them in an indirect way. X-rays

are the first ionizing radiation, applied in medicine for diagnostic radiology and X-ray therapy.
The main methods of radiological diagnosis are three types: radiography, radioscopy, computed tomography.

In radiography the image on the film represents the distribution in one plain of the darkening of the film due to its exposure to the substance passed from the X-ray radiation.
Radioscopy image is observed on the monitor screen by X-ray electro optical converter and tv camera.
In computed tomography detailed image with cross-cutting form of the body is obtained using a computer, that handles a large array of data passed through the intensity of X-rays in tissue.

EXPOSE

The purpose of this study is to measure the doses of external radiation that people receive in diagnostic radiology used in dentistry, to analyze the risks and benefits of this diagnostic and basic requirements to protect patients in these examinations.

There are two main types of X-ray apparatus used in dentistry: sectional, ie. kugels - 1,2, 3 and panoramic X-ray – 4.

1 2 3 4

Fig.1: X-ray machines in dentistry

Registered devices of both types of X-ray apparatuses are X-ray films or electronic sensors. Apparatuses with electronic sensors are more advanced, where the information goes directly into the computer, the image can be increased or another processing can be applied. Furthermore, they are more sensitive and capable of reducing the exposure time, and thus the absorbed radiation dose.

X-rays are absorbed in variable amount by different organs and tissues of the human body.For example, organs that contain much larger quantities of calcium CA - bones and teeth absorb them in larger amount than the soft

tissues. In X-ray pictures of teeth one part absorbs the X rays and the other goes through them and causes exposure on the X Ray film. Thus the result is a negative image of the teeth in which, areas that less absorbed X-rays are lighter and those who absorb more are darker.

Radiation doses that people receive in the radiological diagnosis of teeth, depend on the sample of X-ray apparatus, remedies and methods of diagnosis – if this is graphs / photos / or gelt / highlight. Gelt is distinguished by high doses of radiation and is not always necessary.

Tests were conducted in the laboratory for dental X-ray diagnostics in the region of Blagoevgrad with sectional X-ray / kugel / type EndosAC.

In the first experiment patient No.1 who was sent from a dentist to make an X-ray picture of teeth, no protective equipment was used and the dose of radiation was measured using a portable digital monitor "Berthold"

Fig.2: Digital portable monitor

Monitor was placed around the neck of the patient and after making the picture he showed 13,6 µSv / h.

The experiment with patient № 2 – was made with protective apron with lead collar. Monitor was placed again around the neck, just below the collar of the protective apron. After the image was made the display monitor accounts dose of radiation in the range of 6,2 µSv / h. That means that the patient without a protective apron received 7,4 µSv more doses of radiation from X-rays, i.e. about 2 times higher dose.

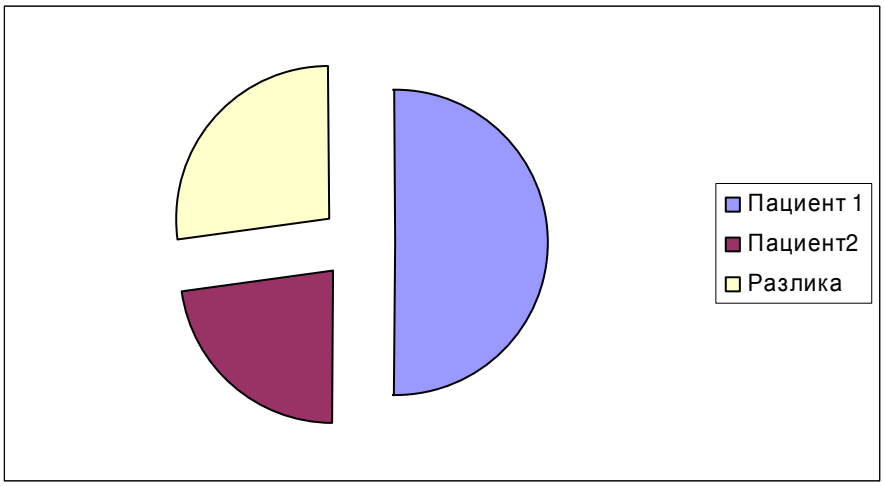

Fig.3: Distribution of radiation doses

The main factors that determine the load of rays in the human organism over time are the amount of radiation dose for each radiograph of the teeth and the frequency of exposure for one year. Up to 2008 Bulgaria is among the first 10 countries in Europe by the number of X-ray examinations. In researches conducted by the World Health Organization was found that in developed countries the main source of X-ray exposure of people are medical and dental X-ray procedures. However low doses of X-ray exposures that occur in images of teeth, can cause more lasting damage than the high doses of radiation to other organs and systems with lower average frequency.

CONCLUSIONS

1.The exposure of human body to X-ray exams with greater frequency can cause certain damage to organs resulted from distracted X-rays. To reduce the risk of damage to the human organism in the X-ray pictures of teeth,the principle of equal distribution of the absorbed dose of radiation over time should be applied.

2.For the protection of other organs in X-ray pictures of teeth, such as the lungs and thyroid, the patients should wear lead/gum aprons. This is very important for children and people with impaired thyroid function and cardio-vascular diseases.

3.Optic lens is extremely sensitive to ionizing radiation. It is determined that the optic lens accumulate impairment for long time at comparatively low levels of exposure to X-ray and other radiation. This can cause partial or

complete loss of eyesight.For the eye protection in x-ray pictures of teeth,they should be made with special protective leaded glass.

REFERENCES

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