Radiographic Exam for the Pregnant Dental Patient

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Dental radiography is a controversial area in the management of the pregnant patient. In pamphlets widely supported by most dental professional radiographers, no alteration of recommendation was given for prescribing radiographs to a pregnant patient, as the amount of radiation given during standard dental radiographic examination is so trivial that it could not cause gross anatomic malformations in the developing fetus.

The American Dental Association (ADA) recommends every precaution should be taken to minimize radiation exposure to the pregnant patient (Bosenten, 1998). No alteration of recommendation was given for prescribing radiographs to a dental patient, as the amount of radiation given during standard dental radiographic examination is so trivial that it could not cause gross anatomic malformations in the developing fetus.

The fetus of an expectant mother irradiated with high doses of radiation depend upon the management of the pregnancy. In pamphlets widely supported by most dental professional radiographers, no alteration of recommendation was given for prescribing radiographs to a dental patient, as the amount of radiation given during standard dental radiographic examination is so trivial that it could not cause gross anatomic malformations in the developing fetus.

The effects of radiation exposure during prenatal development

To understand the effects of ionizing radiation on the unborn child, it is important to understand the units of radiation measurement:

1. Exposure: The measure of radiation quantity, the capacity of radiation to ionize matter.
2. Absorbed Dose: The measure of energy imparted by any type of ionizing radiation to a mass of any type of matter.
3. Equivalent Dose: Used to compare the biologic effects of different types of radiation to a tissue or organ. Its unit is the Sievert (Sv).
4. Effective Dose: Used to predict the biologic effects of different types of radiation to a tissue or organ. Its unit is the Sievert (Sv).
5. Rem: The traditional unit of radiation exposure.
6. Sievert (Sv): The unit of radiation exposure.
7. Gray (Gy): Where one Gy = 1 joule/kg.

The effects of a dental radiograph on the unborn child

• The exposure of the universe and its industrialized world give off a certain amount of radiation per day (the average effective dose for a member of the US population is 8 mSv a year).
• If the amount of radiation in standard plain film radiographic examinations was to be compared to the radiation that an human receives from natural and artificial sources every day, it would negligible.

The amount of radiation in standard dental radiographic examination as compared to natural radiation

• The universe and its industrialized world give off certain amount of radiation per day (the average effective dose for a member of the US population is 8 mSv a year).
• If the amount of radiation in standard radiographic examination was the same as the amount of radiation in a natural source, it would negligible.

Precautions to be taken when subjecting a pregnant patient to radiation

1. Information on possible pregnancy should be obtained from the patient. A female of reproductive capacity should be considered a pregnant patient unless proven otherwise.
2. If the patient is pregnant the possibility of obtaining information from a non-radiological investigation should be considered.
3. If the radiological examination is considered essential it should be performed and due consideration should be given to optimisation.
4. Observation of the "Ten-Day Rule": Any woman of childbearing age to be subjected to diagnostic X-ray examination that may reach the abdominal or pelvic areas should be exposed only during the first ten days after menstruation.
5. Because of the widespread "fear" of radiation induced damage to the unborn child, it is reasonable to counsel the woman on level of radiation exposure and associated risks prior to performing the procedure.
6. The maxillary occlusal view or any other view that requires the X-ray beam passing down into the abdominal area should be avoided if proper shielding cannot be provided.
7. Selective radiographs should be avoided.
8. For emergency treatment, necessary radiographs should be limited to the areas in question.
9. Try to minimize errors and retakes.
10. Use of speeded or Ektas speeded film if using analog radiography: the faster the film, the less radiation exposure to the patient.
11. Switching to digital radiography (decreases the doses about 47% for full mouth series, and about 17% for panoramic).
12. Use of thyroid shields.
13. Use of lead aprons to cover the abdominal and pelvic areas.
14. Maximizing high beam energy to deliver a high quality diagnostic X-ray beam in the shortest possible time.
15. Use of a long rectangular cone for collimation.
16. Lower mA setting on CBCT to decrease dose.
17. Limitation of the field of view (FOV) on CBCT as indicated to give the necessary information for treatment planning without exposing unnecessary structures (example: narrowing the FOV for the open scan for TMJ) to include just the TMJ-structures, or limited maxillary or mandibular views for implant treatment planning.

As can be noted, most of these recommendations are an application of the ALARA rule and are the same precautions that should be taken for any patient imaging radiographically. The first five precautions are specific to the pregnant or possibly pregnant patient to avoid exposure of the abdomen.


Conclusion

The estimated fetal doses from typical radiographic examinations lend support to the conclusion that fetal risks are minimal and, therefore, radiologic examinations that may provide significant diagnostic information should not be withheld from pregnant women.

This is the position advocated by the International Commission on Radiation protection, American College of Radiology, and American College of Obstetrics and Gynecology. Needless to say, any potentially harmful factors that may affect the unborn child should be avoided, especially during the first trimester, and the As Low As Reasonably Achievable (ALARA) concept should be used as with all other patients.

References

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