Radiographic Exam for the Pregnant Dental Patient

By Alexandre Khairallah BDS: PGD, DESS. FEADMFR

Radiography is a controversial area in the management of the pregnant patient. In pamphlets widely supported by most dental professional organizations, 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. The National Council on Radiation Protection (NCRP) reports that production of congenital defects is negligible from fetal exposures of 50 mSv. Yet, in a questionnaire study of 552 dentists, almost all saw pregnancy as contradictory to radiation protection.

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The universe and our 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 dental radiographic examinations was to be compared to the radiation that an individual receives from natural and artificial sources every day, it would negligible.

The effects of a dental radiograph on the unborn child

The risk to the fetus from a few mSv of radiation exposure arising from a dental radiographic procedure is extremely small. The cancer risk to the unborn child resulting from a 10 mSv fetal dose is several thousand times less than the background risk of childhood cancer.

The risk of inducing a genetic abnormality is an even smaller fraction of the background risk of genetic disorder.

The effects of high doses of radiation on the unborn child

The adverse effects that may occur to the fetus of an expectant mother irradiated with high doses of radiation depend upon the stage of pregnancy and the dose of the ionizing radiation given. The most vulnerable time is during the first trimester.

Between 8-15 weeks (fetogenesis): a dosage of 0.2 Gy or higher is lethal, death of the embryo may occur.

The fetal dose from a dental X-ray exam has been estimated to be between 0.3 mSv and 1mSv.

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 pregnant unless proved 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. Elective 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-speed or Ektas plus speed film if using analog radiography: the faster the film, the less radiation exposure to the patient.
11. Switching to digital radiography (decreases the dose 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. Lesser mAs 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 to TMJ) to include just the TMJ’s 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 with a high risk pregnancy. The first five precautions are specific to the pregnant or possibly pregnant patient to avoid exposure to the abdomen, while the remaining precautions are most negligible amount of radiation. Radiologic examinations should be performed only when necessary, and - as with any drug or intervention in pregnancy - the dose used for the examination should be kept as low as reasonably achievable.

Conclusion

The estimated fetal doses from typical dental radiographic examinations lend support to the conclusion that the 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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