

# Radiographic exposure during pregnancy

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## SCENARIO

A 28 year old woman in her first trimester of pregnancy attends the dental surgery as a new patient. She presents with a periapical abscess on her first molar tooth and expresses concern about the numerous unfilled cavities that may cause problems during her pregnancy. She had last visited a dentist over five years ago and brought a set of radiographs taken during one of those appointments. The proposed current treatment plan was explained together with the need to update the type and number of the radiographs that were required. She said that she was worried about the risk of miscarriage and could her old radiographs not be used instead of taking new ones?

## COMMENTARY

Pregnancy induces various changes to a mother's body including the oral cavity. Pregnant women develop physical signs and symptoms that can affect their health, their perceptions and interactions with others and they may require various levels of support including medical monitoring, preventive care, and physical and emotional help.<sup>1</sup> The collective systemic changes that occur in the cardiovascular, haematologic, respiratory, renal, gastrointestinal, endocrine, and genito-urinary systems pose various challenges when providing dental care for pregnant patients with dental management requiring special attention. Dentists need to have a good understanding of the physiological changes of the body, the effects of any dental radiation and of the medications which are used in dentistry for pregnant women and lactating mothers.<sup>2</sup> Delayed elective procedures and alterations to treatment planning may be necessary.

The developing foetus has been shown to be susceptible to the effects of radiation, particularly during the first 2 to 18 weeks of development. The level of radiation will determine the damage that may result in miscarriages, birth defects or mental impairment. However, dental radiation exposure of the foetus is negligible.<sup>3</sup> The frequency of mutations and adverse effects is directly related to the dose, and the risk is augmented when higher than necessary radiation

exposures are used to compensate for any inadequacies in quality of processing. The radiations from maxillary anterior views may pass through the abdominal area, with penetration from the primary beam, as well as from scatter /radiation. Depending on the head position, a similar exposure could also occur with the posterior views.<sup>3-5</sup> A lead shield/protective apron, thyroid collar and current standards of radiation safety must be maintained to minimize harm to the foetus. In addition, the use of high-speed film, filtration and long cone rectangular collimation significantly decrease radiation exposure. Digital radiography may further decrease any potential risk.

In the above-mentioned scenario, the dentist is placed in a dilemma by the patient's request – and needs to carefully consider the ethical principles of respecting autonomy, non-maleficence (doing no harm) and beneficence (doing good). Questions the dentist may need to consider include whether it is safe to provide treatment in the first trimester of her pregnancy? How urgent is her dental treatment? Can treatment be delayed? The respect for patient autonomy is critical in obtaining valid informed consent. Autonomy refers to the right of every individual to make decisions for him/herself and this would entail allowing the patient to make the final decision regarding his/her treatment options, after having been provided with all the necessary and relevant information.

Before subjecting a patient to any diagnostic investigations, it is an ethical and a legal requirement that their agreement and consent is obtained. Consent must be voluntary and it is essential that the patient be given all the relevant information related to the procedure or treatment, and in language that is easily understandable.<sup>6</sup> The patient should be able to make a choice based on an understanding of the information given to her regarding the diagnosis, and the investigative procedures and their consequences, enabling a reasoned assessment of the proposed treatment options. To allay the patient's fears, the improved science and technology of modern day radiography should be carefully explained to the patient and the possibility that performing any treatment without current radiographs may cause more harm than good. Beneficence refers to doing good and dentists have a responsibility to provide beneficial treatment, to benefit patients by not inflicting harm, by preventing and removing harm. Whenever we try to help others, we inevitably risk harming them, but it is essential to balance the ethical

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**Table 1:** Dental management guidelines during pregnancy<sup>1</sup>

Trimester	Current recommendations
<b>First trimester (1-12 weeks)</b>	
Protect the patient from infections, avoid the use of drugs and radiography	<ol style="list-style-type: none"> <li>1. Educate patients about oral changes that occur during pregnancy.</li> <li>2. Emphasise strict oral hygiene and plaque control.</li> <li>3. Limit dental treatment to a periodontal prophylaxis and emergency treatments only.</li> <li>4. Avoid routine radiographs. Use selectively and only when needed.</li> </ol>
<b>Second trimester (13-24 weeks)</b>	
Dental treatment is best carried out in second trimester, though advanced restorative procedures are best postponed until after parturition	<ol style="list-style-type: none"> <li>1. Oral hygiene instructions and plaque control.</li> <li>2. Scaling, polishing and curettage if needed.</li> <li>3. Control of active oral diseases, if any.</li> <li>4. An elective dental care is safe</li> <li>5. Avoid routine radiographs. Use selectively and when needed.</li> </ol>
<b>Third trimester (25-40 weeks)</b>	
Supine hypotension may occur if patient is laid flat	<ol style="list-style-type: none"> <li>1. Oral hygiene instructions and plaque control.</li> <li>2. Scaling, polishing and curettage if needed.</li> <li>3. Avoid an elective dental care during the 2nd half of the third trimester.</li> <li>4. Avoid routine radiographs. Use selectively and when needed.</li> </ol>

principles to achieve net benefit for the patient. The risk-benefit ratio related to any intervention is therefore crucial.<sup>6</sup> In some circumstances it is difficult to decide what constitutes a harm and what constitutes a benefit, and there are instances when harm is caused to patients as a result of a distortion in the risk benefit assessment. When risk exceeds benefit, one needs to assess whether this unavoidable or intentional.

The “best interest” of patients means that professional decisions of proposed treatments and any reasonable alternatives proposed by the dentist must consider patients’ values and personal preferences. To do this dentists need to carefully communicate with their patients, but listening is also important. There are instances when patient desires conflict with professional recommendations. Patients must be informed of possible complications, alternative treatments, advantages and disadvantages of each, costs of each, and expected outcomes. Together, the risks, benefits, and burdens can be balanced. It is only after such consideration that the “best interests” of patients can be assured.<sup>6</sup>

## CONCLUDING REMARKS

Pregnancy is an ideal time to begin educating the mother on prevention. It is best if as much treatment as possible is postponed until after parturition and the reasons for this are twofold. Firstly, the developing child is at a greatest risk from teratogens during organogenesis<sup>7</sup>, and secondly, the risk of spontaneous abortions during the first trimester is high.<sup>4</sup> Dental treatment during the time of a spontaneous abortion may be implicated as the cause and lead to litigation. During the first trimester (1-12 weeks) of pregnancy, it is recommended that the patients be educated about the oral changes which occur during pregnancy, what changes that they should expect, how to avoid oral and dental infections that may arise from these changes. The use of drugs (especially general anaesthesia) and radiography should also be avoided. Table 1 provides a guideline for dental management during pregnancy.<sup>1</sup> Dental professionals must have a basic understanding of the underlying physiological changes of pregnancy, the influences of medications during

gestation, and how they may interact with the delivery of dental care. In addition, they must balance the diagnostic needs and evidence-based science with the desires of the patient, use tested selection criteria and maximise the efficiency of the radiographs taken.<sup>8</sup>

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