Journal of Academy of Dental Education, *26–32*

ISSN (Print): 2348-1595
ISSN (Online) : 2348-2621

Dental Treatment - a Dilemma for Pregnant Mothers – Part 1

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Date of Receiving: 11/10/14 Date of Submission: 20/10/14 Date of Acceptance: 18/11/14

Abstract

Apprehension of a dentist to treat a pregnant woman is nearly reasonable considering the vast number of changes taking place in the body. These vast changes could pose a significant risk to the health of a pregnant woman undergoing dental treatment. This makes it mandatory for a dentist to be aware of the dos and don'ts of treating such patients to ensure maximum safety to the mother and her growing foetus. It is important to fully understand the specific changes occurring during each trimester to appropriately modify the treatment approach starting from scheduling of appointments and correct chair positions to major surgical procedures. Knowledge about the pharmacological actions and limitations of drugs administered during this period is essential. Each branch of dentistry has a distinct modality of treating expectant mothers. Hence, the purpose of this article is to emphasize on the dental services that a pregnant woman can receive without hesitation and to give a complete picture to the dentist regarding the specific alterations that he needs to make in treating such patients.

Keywords: Dental Management, Pregnancy, Radiation, Trimester

1. Introduction

Recent times have seen an increase in the level of awareness for oral hygiene among adults. Such an emphasis has posed a great challenge for dentists to be able to manage patients with medical complications, drug histories, physiologic changes etc. One physiologic change is pregnancy, a wonderful gift in the lives of a female adult. A dentist should be able to provide the necessary treatment by having comprehensive knowledge of the changes and interactions specific to pregnancy.

There is a complex transformation of both her physical and mental state for a woman during pregnancy[1]. There are concerns about the potential risks associated with dental treatment during pregnancy, thereby making the patients hesitant to seek dental care. As a dentist we must clear, reassure and debunk the patient's pre-existing myths.

Hormonal, immunological, dietary and behavioral changes are associated with pregnancy. Increased level of sex hormones, estrogen and progesterone are believed to increase the permeability of the vasculatures and decrease host immuno-competence. This increases the tendency and severity of oral inflammation due to bacterial, physical and chemical irritants[2].

Routine Oral health assessment should be carried out during all the phases of pregnancy because poor oral health can have detrimental effects on both the mother and child[3].

This article aims at providing an insight to handling a pregnant patient during various dental treatments. The first part describes the systemic changes that occur during pregnancy and the concerns related to dentistry. The second part will describe the management of a pregnant patient specifically with respect to various dental procedures.

2. Systemic Alterations

In order to provide appropriate care to the pregnant patient, one must understand the systemic changes that take place during pregnancy. Table 1 describes the systemic alterations occurring during pregnancy.

Table 1. Systemic alterations seen during pregnancy[2]

System	Changes during pregnancy	Dental treatment considerations
1. Cardiovascular System	- Increase in cardiac output and increase in blood volume by an average of 50% - Anemia due to increased blood volume (20% of women) - Decrease in pulse by 10-15 beats per minute - The inferior vena cava gets compressed while patient is lying in flat supine position; the uterus compresses the inferior vena cava which decreases the venous return resulting in decreased cardiac output which leads to supine hypotension syndrome. - Sweating, nausea and weakness are common symptoms	Treatment - prevented by elevating the right hip by 10-12 cms so that the weight is taken off the major vessels and by rolling patient onto the left lateral position.
2. Gastrointestinal System	- Gastric emptying & intestinal transit times are delayed. - Heart burn/reflux is common - Nausea and vomiting	Treatment - For pregnant patient with Hyper-emesis gravidarium (excessive and uncontrolled vomiting) morning appointments should be avoided. - They should be seated in a semi-supine or comfortable position In case of vomiting, the procedure should be stopped immediately & the patient should be repositioned upright
3. Renal System	- Increased Glomerular Filtration Rate and renal plasma flow by about 50% - Nocturia - Increased frequency in renal flow and reduced bladder capacity from uterine growth.	Treatment - It is advisable to ask the patient to void the bladder just prior to starting the dental procedure
4. Endocrine Changes	- Estrogen, progesterone, human gonadotropin are increased. - Thyroxin, steroid and insulin levels are also increased. - Estrogen & progesterone are insulin antagonists, so increased levels of these hormones leads to insulin resistance. Thus insulin levels are elevated in pregnant patients. - About 45 %of women fail to produce sufficient amount of insulin to overcome this antagonist action & thus develop gestational diabetes.	
5. Hematological Changes	- Increased Red Blood Cell count, increased Erythrocyte Sedimentation Rate, decrease in Hemoglobin -Increased White Blood Cell count - Increased circulatory catecholamine and cortisol lead to leukocytosis - Increase in Coagulation factors except factor XI & XIII (anticlotting factor) - Pregnancy is a hypercoagulable state & increased risk for thromboembolism - The proximity of fetal and maternal circulations increases the risk of isoimmunization in a Rho-negative woman with a Rho-positive fetus.	
6. Respiratory System	- Diaphragm rises about 4 cm. - Decreased residual volume - Increased awareness of a desire to breathe is common- may be interpreted as dyspnea. - Increased estrogen in blood causes engorgement of the nasal capillaries and rhinitis in pregnant women. - Frequent nosebleeds & predisposition to upper respiratory infection.	

3. Trimester Wise Changes with Dental Significance

During the first trimester, routine preventive dental examinations and scaling are safe while other procedures should be postponed; however it is essential to promptly treat infections, pain and emergency situations. Second trimester is considered to be the safest to receive dental care. Through the 3rd trimester basic dental care is fine and non-essential procedures must be postponed. Dental treatment for a pregnant woman should be modified and not necessarily be with held post parturition, also the benefits of treatment must outweigh the risks involved[4].

3.1 First Trimester

3.1.1 Avoid Elective Treatment Emergency Care Only

1. Changes in progesterone influences structures with smooth muscle, example; GIT

   Result: Vomiting

   Dental Effect: Erosion of teeth

   Chair Position: Upright

2. Postural Hypotension

   Result: Syncope

   Prevention: No sudden movements

   Chair Position: Upright

3. Increased Progesterone and Estrogen

   Result: Pregnancy gingivitis

   Management: Vitamin C supplements, debridement and Chlorhexidine mouth wash

   If Untreated can lead to: Pyogenic granuloma or "pregnancy tumor"

4. Organogenesis and placenta formation period hence more sensitive to teratogens and hypoxia

   Best treatment during this trimester is maintaining good oral hygiene.

3.2 Second Trimester

Safest period of pregnancy for dental treatment is the second trimester and the first half of the third trimester[5].

1. Most cases relieved from the 13 weeks of tiredness and nausea. Due to the growing size of the uterus there is increased urgency and frequency of urination.

   Solution: Patient asked to use the restroom immediately prior to sitting in the dental chair.

   Chair Position: Left lateral position (a pillow is placed under the patient's right side to roll them towards the left).

   Patient asked to have a healthy snack prior to procedure.

2. Since progesterone is still increasing in the second trimester, patient still may be experiencing nausea and heartburn.

   Chair Position: upright.

3. Tooth formation begins during this period.

4. If dental imaging is required during pregnancy, then this can be safely done in the second trimester. Dental staff should follow the as low as reasonable achievable (ALARA) rule to minimize exposure, via lead apron and thyroid collar, high-speed film, and focused dental imaging.

Management of oral infections can be done as well as procedures (i.e. excision of granulomas) that were postponed from the first trimester; treatment plan should be discussed with her obstetric provider.

3.3 Third Trimester

1. Some pregnant women still experience nausea and heartburn in late pregnancy and along with an increasing abdominal girth.

   Chair Position: Semi-reclined position.

2. Supine Hypotension Syndrome: Occurs if a woman remains in the supine position for more than 3-7 minutes.

   Cause: Flaccid, gravid uterus compresses the inferior vena cava decreasing the venous return from the legs.

   Result: Syncope.

   Chair Position: Left lateral position.

   Precaution: Patient should change positions more slowly and/or lean towards the left side while in dental chair.

Although this trimester has a decreased chance of malformation to occur, many procedures should be postponed until after delivery due to the increased risk of preterm labor especially after middle of the third trimester.

4. Drugs for the Pregnant Mother

Main concern regarding,as to what drug to prescribe for an expectant mother would be related to the potential teratogenicity of the drug[6]. It is essential to get the consent of the mother's obstetrician before prescribing any drug. The main aim being to prevent any adverse reactions to the drug administered[7]. Care must be taken to eliminate any allergic reactions that could harm the health of the mother and the growing fetus. The U.S. Food and Drug Administration, or FDA, has established five categories for classifying drugs according to the risks they pose to pregnant women and their fetuses (Table 2). The five categories provide a guide to the relative safety of drugs prescribed to pregnant women[2].

For a dentist to be able to provide good and safe treatment to pregnant patients, an awareness of the systemic changes and their implications is mandatory. As healthcare providers we need to sensitize ourselves to multitude of health benefits as well as risks for a pregnant patient in the dental office. This article described in detail, the pregnancy related alterations of the different system and how they might affect dental treatment. Part 2 of the article will take it further and describe specific dental related concerns including usage of drugs and performing various emergency and elective procedures.

Dental Treatment - A Dilemma for Pregnant Mothers - Part 2

With an understanding of the systemic alterations in pregnancy (part 1 of this article), this article aims to elaborate on the concerns during specific dental procedures in order to provide safe dental treatment.

As described previously pharmacological agents are classified in to 5 categories based on their risks to the pregnant mother and fetus. Table 3 mentions the usage of drugs during dental therapy and the effects they may have on the mother or fetus. Table 4 shows the teratogenic effects of commonly prescribed drugs in dentistry.

5. Other Dental Considerations

5.1 Radiology

An exposure of less than 5rads is usually considered safe. A radiograph must not be advised unless necessary and adequate measures must be taken by the dentist to reduce the exposure. It appears that 10 μSv of radiation is required for a significant risk of the induction of cancer or the development of mental retardation of the growing fetus. The fetus or embryo is most sensitive to the neurogenic effects of radiation between the eighth and the fifteenth week after conception, during which time there is neuronal migration and organogenesis. However, rectangular collimators, lead screens, thyroid collars, lead aprons and high speed films must be used to minimize exposure[9]. In a full mouth series, using E speed film the average gonadal dose to females is less than 0.005μSv. The risk of reaching a teratogenic threshold dosage of radiation related to dental radiographs is less than 0.1%. This is more than 1000 times less than the anticipated risk of spontaneous abortion and malformation. In fact, there may be more risk to the fetus associated with lack of dental care than in providing treatment that includes dental radiographs[10].

5.2 Local Aanaesthetics

Local anesthetics are relatively safe when administered properly and in the correct amounts. Lidocaine and Prilocaine are category B drugs, whereas Mepivacaine, Articaine and Bupivacaine are in category C. Epinephrine is also a category C drug (Table 2). Maximum dose of Local Anesthetic that can be administered with vasoconstrictor are adjusted as follows: Lidocaine 500mg, Prilocaine 600mg and Etidocaine 400mg[11].

Table 2. Pregnancy risk categories for pharmacological agents[8]

US FDA Category	Explanation
Category A	Controlled human studies indicate no apparent risk to fetus. The possibility of risk to the fetus is remote.
Category B	Animal studies do not indicate fetal risk.Well controlled human studies have failed to demonstrate risk.
Category C	Animal studies show adverse effect on fetus but there are no controlled studies in humans. The benefits from the use of such drugs may be acceptable.
Category D	Evidence of human risk, but in certain circumstances the use of such drugs may be acceptable.
Category X	Risk of use in pregnant women clearly outweighs possible benefits.

Table 3. Drugs used in Dental Therapies with their Limitations[8]

Drugs	Use in pregnancy	Use in lactation	Remarks
Antibiotics			
Amoxicillin Metronidazole Erythromycin Penicillin			Fetal ototoxicity with gentamycin. Discoloration of teeth with tetracycline. Maternal toxicity/fetal death with Chloramphenico
Cephalosporin	Yes	Yes	
Gentamycin Clindamycin	Yes	Yes	
Tetracycline Chloramphenicol	No	No	
Analgesics			
Acetaminophen Morphine Meperadine	Yes	Yes	Postpartum hemorrhage associated with aspirin. Respiratory depression with morphine.
Oxycodone Hydrocodone Propoxyphene Pentazone	With caution	With caution	
Aspirin Ibuprofen Naproxen	Not in 3rd trimester	No	
Antifungal			
Clotrimazole Nystatin	Yes	Yes	Fetal toxicity with ketoconazole
Fluconazole Ketoconazole	With caution	With caution	
Local anesthesia			
Lidocaine Prilocaine Etidocaine	Yes	Yes	Fetal bradycardia with mepivacaine and bupivacaine.
Mepivacaine Bupivacaine	With caution	Yes	
Corticosteroids			
Prednisolone	Yes	Yes	
Sedatives/hypnotics			
Nitrous oxide	Not in 1st trimester	Yes	
Barbiturates Benzodiazepines	No	No	Spontaneous abortions with Nitrous oxide. Cleft lip/palate with benzodiazepines.

5.3 Nitrous Oxide Sedation

Research shows that nitrous oxide sedation in animals inhibits methionine synthase, hence harmful to the animal fetus, but there is no evidence to prove the same in humans, therefore if nitrous oxide sedation causes any adverse effect it is usually multi factorial. Nitrous oxide should be administered only for 30 minutes along with 50% oxygen[1].

5.4 Antibiotic Prophylaxis

According to American Heart Association (AHA) same protocol can be followed for pregnant women as for the

Table 4. Known Teratogens and their Fetal Effects[8]

Teratogens	Effects on fetus
Ethyl alcohol	Fetal alcohol syndrome
Tobacco	Low birth rate, cleft lip and palate
Cocaine	Cognitive delay, placental abruption
Thalidomide	Micromelia
Methyl mercury	Microcephaly, brain damage
Anticonvulsants	Orofacial cleft, cardiac malformations
Carbamazepine	Spina bifida
Valproic acid	Neural tube defects
Lamotrigine	Neural tube defects
Phenobarbital	Urinary malformations
Topiramate	Abnormalities in all subjects
Warfarin (Example: Coumadin)	Warfarin embryopathy (mid-face and long bone deficiency) Spontaneous abortion
Angiotensin-converting enzyme inhibitors	Oliguria, Renal dysgenesis, lung and limb abnormalities
Retinoid	Spontaneous abortion multiple malformations

regular patients and no problems have been reported so far[12].

5.5 Pregnancy Gingivitis

The hormones released during pregnancy makes the mother more susceptible to plaque and in turn bleeding gums. This is due to epithelial separation and increase in vascular permeability, aggravating response to dental plaque resulting in pregnancy gingivitis. Mistaking this to be normal, they fail to seek dental care, making it important for the dentist to inform the patient and give her instructions to improve oral health[13].

5.6 Epulis

An epulis is formed as a result of increased hormone levels during pregnancy, the main site being the maxillary gingiva. Generally it is more than 2cm in size, mainly consisting of collagen. No treatment is required as it regresses on its own after pregnancy, unless it interferes with mastication[3].

5.7 Periodontitis

Expectant mothers with periodontal problems are more susceptible to have pre-term and low birth weight delivery. The hypothesis that has been formulated, states that seeding periodontal pathogens, mainly gram negative anaerobic rods affect the fetal growth by releasing their toxins or through inflammatory mediators like IL-1Beta, IL-6, TNF-alpha which results in a low birth weight infant[13].

5.8 Restorations

Dental amalgam fillings release mercury vapor (a form of inorganic mercury) in the mouth, especially during chewing. As a result, mercury crosses the placenta through blood circulation. This fact has concerned the scientific community as to whether or not amalgam fillings should be used in vulnerable populations, such as pregnant women. Using a rubber dam and high-speed evacuation (suction) during amalgam placement or removal may significantly reduce the inhalation of mercury elements (mercury vapor). Although the amalgam fillings contain mercury, which is toxic, the amount of mercury released in the mouth is minimal (estimated to be 10 μg/d whereas, according to the WHO, the total-mercury tolerable intake is 2 μg/kg/d). Even though the Public Health Agency of Canada recommends that no dental amalgam placement or removal should take place during pregnancy, the ADA, the FDA and the WHO consider dental amalgams safe to use in dental restorations, because research has shown that there is no relation between amalgam fillings and complications during pregnancy. Filling materials that can be used instead of amalgam include glass-ionomer cement, composite resins, as well as gold or porcelain. However, amalgam fillings last longer than glass-ionomer fillings and composite resins; they

also cost less than gold or porcelain fillings. Moreover, there are no extensive studies to prove the safety of the mentioned alternative materials during pregnancy, compared to amalgam fillings. Furthermore, based on studies in animals, bisphenol-A, a component found in composite resin fillings, has been proven to cause endocrine disruptions. Consequently, when a filling is required during pregnancy, the patient needs to be informed of the different options, and, together with the dentist, they should decide on the best material to use[12].

5.9 Orthodontics

Pregnancy does not hinder a woman from receiving orthodontic treatment. Certain factors that need to be kept in mind before going ahead with braces in a pregnant woman are:

1. Pregnancy associated gingivitis and therefore the need for constant monitoring the gingival health.
2. Radiographs such as OPG and lateral cephalogram should be avoided unless absolutely necessary.
3. Hormonal changes and its effect on tooth movement.
4. Food habits and craving during pregnancy and its effect on orthodontic treatment.
5. Effects of drugs in pregnancy and orthodontic movement.

Bisphosphonates and vitamin D metabolism could cause a decrease in tooth movement and NSAIDS (Non-Steroidal Anti-Inflammatory Drugs) decrease bone resorption.

6. Conclusion

The myriad of changes taking place in a pregnant woman requires a dental practitioner to team up with a health professional and/or obstetrician at every stage to provide a comprehensive approach to management. And expectant mother should be treated as any other patient. However, it is vital that the dentist must follow certain protocol to eradicate any complications that may arise. Reluctance by a general dentist to treat a carrying woman could be justified attributing to the uncertainty of the risks that may be involved, but they needn't be dubious to perform routine examinations, preventive or emergency procedures for such patients.

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