International Dental Journal of Student's Research 2024;12(4):163–166

Content available at: https://www.ipinnovative.com/open-access-journals

International Dental Journal of Student's Research

Journal homepage: https://www.idjsronline.com/

Review Article

Endodontic treatment in pregnant women

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ARTICLE INFO

Article history:
Received 21-10-2024
Accepted 25-11-2024
Available online 10-12-2024

Keywords:
Endodontic treatment
pregnant women
radiographs
antibiotics

ABSTRACT

Endodontic treatment on pregnant women is an emergency condition to control toothache due to irreversible pulpitis and other causes. The aim of this article is to explain the endodontic management of pregnant patients. Endodontic procedures during pregnancy require special considerations due to hormonal and physiological changes, but with proper precautions, they can be safely performed. Modern techniques like apex locators, reciprocating files, and single-cone obturation improve the efficiency and comfort of treatment. Maintaining good oral health is essential, as poor dental care can lead to complications such as premature birth, low birth weight, and early tooth decay in children. By following safety protocols, endodontic care can be safely integrated into prenatal care, supporting the health of both mother and baby.

1. Introduction

Pregnancy is not considered a medically compromised condition, so pregnant women should not be refused the necessary endodontic treatment.[1] Many pregnant women are not adequately informed about dental care or the oral changes that occur during pregnancy, which can affect both their oral health and their baby's well-being. Pain, often caused by periapical or pulp infections, can increase risks for both the mother and fetus. Poor oral hygiene may lead to periodontal problems and a greater likelihood of oral infections. Although invasive dental treatments are typically recommended after the second trimester, it is essential to manage and relieve dental pain in any trimester of pregnancy.[2]

Root Canal Treatment (RCT) is performed on pregnant patients to control the spread of infection, maintain oral health, and prevent complications that could arise later in pregnancy or after delivery.[3]

Studies have explored the link between poor maternal oral health during pregnancy and outcomes such as early tooth decay, premature birth, and low birth weight in both mothers and their children.[4]

1.1. Radiographs in pregnant women

The primary biological risk associated with radiation exposure is the development of cancer.[3] However, radiographs are deemed safe for both the mother and fetus when certain precautions are taken, such as properly directing the radiograph at the mouth while avoiding the abdominal area, using high-speed film, wearing a lead apron, and utilizing a thyroid-protective collar.[3] Different interpretations surrounding the use of protective shielding can lead to confusion among practitioners striving to follow best practices. These practices are guided by radioprotection recommendations that adhere to the "as low as diagnostically acceptable, being indication-oriented and patient-specific" (ALADAIP) principle. When treating pregnant patients, dental practitioners often express concern regarding the potential harmful effects of ionizing radiation

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https://doi.org/10.18231/j.idjsr.2024.032

on the fetus. These professionals should understand the deleterious effects of cumulative radiation exposure and implement protective strategies for imaging procedures.[5] Delaying dental X-rays until after delivery is an option; however, this approach is not advised when X-rays are essential for diagnosing dental problems that could worsen or become more difficult to manage if left undetected and untreated.

1.2. Antibiotics and pregnant women

In cases such as mild cellulitis, the use of drugs such as cephalexin, penicillin and amoxicillin are considered as the first line drug of choice. However when the patient is allergic to penicillin, Erythromycin or clindamycin may be used. In emergency cases where a pregnant patient is experiencing a toothache, the dentist can make an emergency root canal opening along with eliminating the inflamed pulp or drain the pus, and can release the pain.

Intracanal drugs such as chlorhexidine/metronidazole and calcium hydroxide can be used during certain conditions but however they may have teratogenic influences on the developing fetus during pregnancy. Also the drugs used during breastfeeding can have severe effects on the health of the growing baby.[6]

The FDA has not reported any link between the use of amoxicillin during pregnancy and miscarriage, major birth defects, or adverse effects on the fetus or mother. However, certain studies have indicated that amoxicillin use during pregnancy may be associated with congenital abnormalities in the oral-maxillofacial region, such as cleft lip and palate, as well as enamel hypomineralization in teeth.

Amoxicillin combined with clavulanic acid is highly effective in treating severe odontogenic infections. Although the overall risk of infection is not substantial, it is advisable to avoid using this combination drug during the third trimester of pregnancy.[6]

Certain studies have confirmed a link between the use of cephalosporins and the occurrence of anorectal atresia and atrial septal defects in infants. While clindamycin is not associated with adverse pregnancy outcomes or fetal loss, its use has been linked to congenital cardiovascular and musculoskeletal anomalies.

However the use of metronidazole is contraindicated in the first few months of pregnancy due to its teratogenic effects.

1.3. Local anesthetic in pregnant women

Local anesthesia is essential for most dental procedures, as it helps alleviate pain during treatments such as tooth extractions, cavity preparations, root canal treatments, abscess drainage, and minor oral surgeries.[7] Local anesthetic injection in pregnancy is considered harmless because of the lack of evidence on teratogenic effects . Risk categories of drugs during pregnancy have been categorised as A, B, C, D and X. In Category B, no risk in animal studies is shown(no adequate studies in humans conducted and animal studies was found to be normal without any risk)Under Category C, it showed that risk cannot be ruled out as animal studies demonstrated a risk to the fetus.[8] But it is better to use anesthetic solutions categorized under Group B when compared to those under C.Anesthetic agents which lies under Group B include lidocaine and prilocaine while those under Group C include Mepivacaine, Bupivacaine and Articaine. Medications with teratogenic effects that cannot be avoided are classified under category C. Group D consists of drugs that have clear evidence of risk to human fetuses. Drugs in Group X are contraindicated for use during pregnancy.[4]

According to FDA table of anesthetic solutions used in pregnancy, the drug of choice during this period is lidocaine and prilocaine. Local anesthetics (LA) cross the placenta to varying degrees. The concentrations found in the fetal circulation, in descending order, are prilocaine, lignocaine, and bupivacaine. Additionally, the amount of adrenaline used in lignocaine is so minimal that it is unlikely to have a significant impact on uterine blood flow.[9]

When epinephrine is used as a vasoconstrictor, it decreases the uteroplacental blood flow when injected intravenously but when used in safe dose is not harm to the mother and child.

1.4. Analgesics and pain relief in pregnancy

Pain management during pregnancy and lactation is important, and women should be reassured that effective treatments are available. Unmanaged pain can lead to mental health issues like depression and anxiety.[10] Paracetamol is the drug of choice for pain relief during pregnancy and is safe when used in therapeutic doses. Only plain paracetamol should be used—combination preparations should be avoided.[11] It crosses the placenta but does not increase the risk of birth defects or adverse pregnancy outcomes.[10] Acetaminophen can cause liver toxicity, and due to its many formulations, pregnant women should limit their intake to no more than 4g per day. But however Acetaminophen is often preferred over ibuprofen and Novofen for pain relief, as the latter two can increase the risk of bleeding and may be associated with complications in late-stage pregnancy.

While aspirin is used for mild pain and fever, low-dose aspirin may be prescribed in certain cases, such as for women with antiphospholipid syndrome or recurrent miscarriages.[10] However, aspirin is generally contraindicated in pregnancy due to its potential to prolong pregnancy and cause fetal defects, such as oral clefts, at higher doses. Both aspirin and ibuprofen inhibit prostaglandin synthesis, which can lead to premature closure of the ductus arteriosus, resulting in pulmonary

hypertension and increased fetal mortality. Ibuprofen, a non-steroidal anti-inflammatory drug (NSAID), should be used cautiously, especially in the third trimester.

Corticosteroids may be used in certain situations, such as in surgical procedures when the treatment cannot be delayed. [11]

In summary, paracetamol is safe for pain relief during pregnancy, while aspirin and ibuprofen should be used with caution or avoided, especially in the third trimester, due to risks to the fetus. [10]

1.5. Endodontic procedures

Root canal treatment is usually avoided during the first trimester as this is the phase of organogenesis and may harm the developing foetus. So if necessary, only draining of the root canal is done.

However during the second trimester, root canal procedures is found to be safe and no harm is caused to the developing baby.

Root canal treatment in the third trimester is possible but in most cases it is postponed or delayed until the baby is born as this is the most important phase of fetal development. Any mishap during this phase can cause harm to both the baby and the mother.

Apex locators, reciprocating files, and single standardized cone obturation techniques streamline endodontic treatment in pregnant patients, reducing clinical time and increasing comfort. [2]

1.5.1. Positioning during treatment

During the procedure, care should be taken to ensure the patient is in a comfortable, safe position. Pregnancy, especially in later stages, can affect the comfort of the patient when lying back in a dental chair.

In the second or third trimester, a pregnant woman should avoid lying flat on her back for extended periods, as this can compress the vena cava and reduce blood flow to the heart, causing hypotension. Using a wedge pillow or positioning the patient in a slight left-lateral tilt or by keeping their right hips slightly raised i.e 10-12 cm can help mitigate this risk. [12]

1.5.2. Use of intracanal irrigants and root filling material

The irrigating solutions used in root canal treatment can sometimes pose risks if absorbed into the bloodstream, as some chemicals can be harmful to the developing fetus. So careful aspiration is needed.

Sodium hypochlorite is the most common irrigant in root canal therapy and is generally safe when used correctly. [11] It should be kept within a concentration of 0.5% to 5.25%, and precautions must be taken to avoid extrusion beyond the apex. While there is no conclusive evidence of harm to the fetus when used properly, pregnant women should avoid excessive systemic exposure.

Avoiding the extrusion of irrigants beyond the tooth apex is crucial, as it can irritate surrounding tissues and lead to systemic absorption, which may pose risks to fetal health during pregnancy.

1.5.3. Intracanal medicament

The primary goal of endodontic treatment is to eliminate or minimize microorganisms within the root canal system to ensure a successful clinical outcome. Intracanal medicaments play a supportive role in this process. Among all available options, calcium hydroxide is the most commonly chosen material for intracanal dressing due to its effective antimicrobial properties [13] A medicament that offers long-lasting effects and causes minimal irritation to the periradicular tissues should be used to penetrate the dentinal tubules, effectively eliminating bacteria, especially when it is not possible to complete the treatment in a single visit. [14]

Calcium hydroxide, introduced by Hermann in 1920, remains a cornerstone in endodontics due to its high pH of 12.5 and beneficial properties such as antimicrobial effects, inhibition of tooth resorption, and stimulation of hard tissue repair.

Propolis, a natural resin with potent antimicrobial, antioxidant, and anti-inflammatory qualities, also shows promise in dental applications. Its antioxidant power exceeds that of vitamin C, and its anti-inflammatory effects are attributed to caffeic acid phenethyl ester. Additionally, propolis can stimulate high-quality dentin formation, though it may cause eczematous contact dermatitis in some individuals. [13]

Ledermix is a groundbreaking glucocorticoid-antibiotic combination that plays a crucial role in managing pain and inflammation during dental treatments. By pairing a corticosteroid with an antibiotic, this formulation helps counteract any potential suppression of the immune response caused by the corticosteroid, ensuring thorough and balanced care for the patient. [15]

2. Conclusion

It is important to give attention and timely care to pregnant women in their oral health to reduce the chance of oral infections. Root canal treatment is generally considered safe during pregnancy, especially if it's necessary for dental health. However, it's best to avoid the procedure during the first trimester unless urgent. Dentists typically take precautions such as avoiding X-rays or using protective measures if imaging is required. Local anesthesia used in the procedure is generally safe, but it's always important to consult with your healthcare provider and dentist before proceeding.

Myths and misconceptions about dental care during pregnancy persist among expectant women and healthcare professionals, including dentists. Ongoing research and

clinical studies are essential to enhance knowledge and shape health policies that integrate dental care into prenatal care, promoting the well-being of both mothers and their children. [2]

3. Source of funding

None.

4. Conflict of interest

None.

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Cite this article: Shaji MM, Mooken C, Elma Sajjo T. Endodontic treatment in pregnant women. *International Dental Journal of Student's Research* 2024;12(4):163-166.