ORIGINAL ARTICLE

Rationale for Implementation of Dental Care into Existing Maternal Prenatal Care Standards

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Periodontal disease is an infectious, inflammatory disease that can be caused by infection from bacteria found to commonly exist in the oral bacterial flora. Genetics, early childhood contacts, certain systemic diseases, unhealthy behaviors, poor oral hygiene, as well as pregnancy can facilitate infection and/or progression of the disease. Periodontal disease is not uncommon among pregnant women and is correlated to adverse pregnancy outcomes, especially preterm birth and low birth weight neonates. Although there are guidelines in place for healthcare professionals to standardize prenatal care, there are currently no existing guidelines for prenatal maternal dental care. Studies have shown that most health professionals that provide prenatal care do not regularly incorporate oral examinations for pregnant mothers as part of standard prenatal care. Periodontal disease can be safely diagnosed, which could lead to positive effects on the outcome of her pregnancy.

Prenatal care is the treatment that a woman receives from a physician while pregnant until the time she delivers her baby. Generally speaking, a woman visits her doctor monthly during the first and second trimesters, biweekly during the third trimester up to week 36 and weekly from week 36 until delivery of the neonate. This results in a minimum of 13 visits to her physician during her pregnancy. Most often these visits are to a medical doctor that has specialized in obstetrics and gynecology. During these visits the overall health of the mother and baby are assessed. Blood, urine and amniocentesis tests are performed as needed. To determine the position and development of the fetus, medical imaging procedures—typically sonography—are performed. These visits assess the health of the mother but also educate her about known causes of harm to her or her baby.

In 1959 the American College of Obstetrics and Gynecology (ACOG) published the first edition of Standards for Obstetric-Gynecologic Services. This publication helped with the issues that stemmed from not having uniform practice guidelines. Later in 1983 ACOG, along with the American Academy of Pediatrics, published *Guidelines for Perinatal Care*. These guidelines are updated as necessary. The publication of *Guidelines for Perinatal Care* has provided a reference for obstetricians and gynecologists as well as pediatricians and other physicians that treat pregnant mothers and neonates.[1]

Although much as has been written about prenatal care, there is almost no mention of assessment of oral health or dental care during pregnancy in current guidelines for health care providers. Authoritative websites such as www.womenshealth.gov, which is maintained by the US Department of Health and Human Services Office of Women's Health, and www.medem.com, whose page on prenatal care bears the seal of the ACOG, do not even mention a dental exam nor recommend dental care for existing disease of the oral cavity.[2, 3] *Guidelines for Perinatal Care*, 5th Edition discusses topics that should be discussed between the physician and the expectant mother such as avoiding hot tubs and saunas and exercise guidelines.[4] While these guidelines should not be omitted, numerous studies have shown correlation between poor oral health, specifically mothers with periodontal disease, and adverse pregnancy outcomes. Possible complications linked to maternal periodontal disease include preterm delivery and/or low birth weight of the neonate. Poor periodontal health is correlated with complications in pregnancy and therefore dental exams and treatment should be implemented as an important part of maternal prenatal care.

Figure 1. Heathly gingival tissue. Source: Dr. Eric Vogel D.D.S.

PERIODONTAL DISEASE

Periodontal disease is an infectious, inflammatory disease of the gingival tissues that is caused by a bacterial infection in the oral cavity. Left untreated it will progress and can become the cause of many oral and systemic problems.

The gingival tissues (gums) surround the teeth. Healthy gingiva will lie slightly onto the anatomical crown of the tooth. This means that only the hardened enamel of the tooth is exposed to the sometimes harsh environment of the oral cavity. The periodontal ligaments, which hold the root of the tooth in the alveolus (tooth socket), are not exposed when the gingival tissues are healthy (Figure 1). The gingival sulcus is a gap where the gingiva meets the crown of the tooth. This creates an anaerobic pocket ideal for plaques and biofilms of disease-causing to colonize if proper hygiene is not practiced.

Causes of periodontal disease

Periodontal disease begins in the gingival tissues and can result in tooth loss. (Figure 2) As such, the aforementioned

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bacteria are the culprit for the disease.

These bacteria are usually the most malicious under the correct conditions. Factors including the ability for bacteria to form plaques and deposit on teeth, genetics, disease, early childhood contacts and unhealthy behaviors[5] contribute to acquisition of periodontal disease. Pregnancy can also be considered a risk factor.

When periodontal disease causing anaerobic bacteria are able to settle in the gingival sulcus where there is less oxygen, the bacteria thrive and cause disease in the gingiva. Proper oral hygiene practices, especially flossing, minimize the effects of these bacteria.[5]

Genetics and predisposing diseases each play a role in the development of periodontal disease.[5] Some diseases can be considered causative factors or at least facilitate the progression of periodontal disease in a myriad of ways. In the case of diabetes, vascularity in the oral cavity is compromised and the tissues do not receive the oxygen they need. In the case of other diseases the immune system is compromised making it difficult to fight off infection. A common side effect of many prescription medications and radiation therapy in the cranial region is xerostomia (dry mouth). Without the protective effects of saliva, the mouth is left very vulnerable to infection.[5]

Early in life the bacterial flora of the oral cavity is determined. If a child is exposed to malicious bacteria early in life it can have lifelong effects. Bacteria introduced from close contact between an infected mother and her newborn child often will colonize the newborn's mouth becoming a permanent part of the oral flora,[5] thus increasing the likelihood of periodontal disease later in life.

There are many unhealthy practices that can promote the onset and development of periodontal disease. The evidence that smoking is causative of periodontal disease is longstanding and replete. Alcohol and other illicit substances such as methamphetamine can also lead to periodontal disease.[5]

Pregnancy can also serve as a risk factor for degeneration of oral health and periodontal disease. Pregnancy brings an abundance of changes in a woman's life. Diet is one of the more obvious changes. Food intake increases especially in the form of snacking rather than three established meal times each day. These new eating habits can be the cause of decay because of the excess food particles, especially sugars, remaining in the mouth. In many cases oral hygiene practices, such as more frequent tooth brushing, do not change to compensate for these newfound eating habits, thus leading to decay and/or infection. As the bacteria metabolize sugars an acidic byproduct is produced. Increases in acidity in the oral cavity may also be due to increased vomiting and acid reflux associated with nausea gravidarum. Decreased oral pH allows for demineralization of tooth enamel leaving teeth vulnerable to decay and infection. The decline in oral health during pregnancy is caused due to new eating habits and decreased pH in the oral cavity due to indigestion and morning sickness and which can increase a woman's risk for periodontal disease.[6]

Frequency of periodontal disease

In 1999 the *Journal of Periodontology* published a study that stated at least 23% of women between the ages of 30 and 54 have periodontitis (a severe form of periodontal disease).[7] The US Census Bureau has shown a trend that women are having their first child at an average age of 25.2. This is four years later than the average age in 1970.[8] Risk of periodontal disease tends to increase with age. A significant portion of women of childbearing age are at risk for or currently have periodontal disease. If the current age trends continue to increase for age of first pregnancy, it is likely that periodontal disease will become a greater factor in pregnancy outcomes.

CORRELATION OF PERIODONTAL DISEASE TO ADVERSE PREGNANCY OUTCOMES

Dr. Gary C. Armitage, DDS, MS, professor of periodontology at University of California, San Francisco Schoool of Dentistry stated, "Opinion has nothing to do with it. There are convincing data that chronic infections have a wide range of effects on general health. Some trivial, and some not."9 The female reproductive system is not excepted from the list of systems that can be potentially harmed from periodontal disease.

It has been known for quite some time that infection in the oral cavity especially periodontal disease can be causative of systemic maladies. As early as 1891 WD Miller proposed, "…microorganisms or their waste products obtain entrance to parts of the body adjacent to or remote from the mouth."[10] Miller's theory was not readily accepted in his day due to lack of scientific evidence to support his claim.[11] It was not until the 1990s that concrete scientific evidence was shown that there are linkages to periodontal disease and systemic illness.[11] The three most researched and understood linkages are to cardiovascular disease, adverse outcomes in pregnancy and respiratory illness, respectively.

Miller's theory, in essence, is the accepted mechanism of the development of these pathologies. Bacterial components as well as bacteria can enter the blood stream via the inflamed gingival sulcus. As they enter the blood stream "immunoinflammatory mediators" are also released, causing a possible inflammatory response in other locations of the body.[12]

Low birth weight due to periodontal disease

Low birth weight is defined as a birth weight of less than 2500 grams (5lbs 8 oz).[13,14] Some of the first research to establish this linkage was done by JG Collins and colleagues in the early 1990s. Pregnant hamsters were subjected to a porphyromonas gingivalis infection in a site that was distant from the placenta to simulate the effects of periodontal disease. The results of their study were a 20% decrease in birth weight of the neonatal hamsters.[15,16] Numerous human observational studies have occurred in recent years that show decreased birth weight in humans as well. Damage done to the placenta from bacteria as well as immune response can cause blood flow and nutritional deficiencies in the fetus.[13]

Preterm birth due to periodontal disease

Preterm birth is defined as delivery at or before the 37th week of gestation.[13] The immunoinflammatory response outside of the oral cavity mediates preterm birth in several ways. This

Figure 2. Stages of periodontal diesease (progressing in severity from left to right). Source*:* Dr. Eric Vogel D.D.S.

immunoinflammatory response can irritate the smooth muscle of the uterus to promote contractions. Cervical effacement (thinning) and dilation as well as rupture of the chorioamniontic membranes also occur as a result of the immunoinflammatory response.[13] The combination of these events increases the likelihood of premature delivery of the neonate.

SUGGESTIONS FOR IMPLEMENTATION OF DENTAL CARE INTO PRENATAL CARE STANDARDS

The old adage "an ounce of prevention is worth a pound or cure" could not be truer in the case of periodontal disease. Periodontal disease is a progressive disease that takes careful monitoring, stringent personal oral hygiene practices, frequent visits to a periodontist and often eventual surgery to prevent further degeneration of the periodontal tissues and/or tooth loss. Adhering to tooth brushing and flossing guidelines as well as semi-annual dental cleanings and exams can do a great deal to prevent the development of these conditions.

Educating health professionals

A study published in the *Journal of Dental Hygiene*, conducted by Rebecca Wilder, RDH, MS and colleagues shows the disconnect currently in prenatal care and dental care. Her study included a survey sent to 194 obstetricians in a 5 county area in North Carolina. The results showed that only 22% of the obstetricians in the study looked in their patients mouth at the first prenatal visit, a miniscule 9% periodically looked in their patients mouths on a regular basis and 48% looked only when the patient made mention of a problem. Only 51% of respondents in this study recommended a dental exam to their patients.[17]

Though obstetricians are neither trained nor qualified to accurately diagnose periodontal disease the fact that such low numbers in this study even looked inside their patients mouths shows there is not much attention given to the seriousness of periodontal disease in the pregnant patients among respondents to the questionnaire. The neglect of the issue is also shown in the fact that only 51% of respondents recommended a dental exam to their pregnant patients[17] In order to see improvement in the number of infants affected by maternal periodontal disease there must be more education given to all health professionals involved with prenatal care.

The prenatal dental visit

In order for maternal periodontal health to be properly assessed it is necessary for the mother to have a thorough dental exam early in her pregnancy. When asked the question, "Do you feel that it would be beneficial to assess oral health as part of prenatal care? If so what do you think would be the most appropriate procedure?" E. Barrie Kenney, BDSc, MS, FRACDS, professor and chairman of the University of California, Los Angeles School of Periodontics responded, "All pregnant women should have a comprehensive periodontal evaluation carried out by their Dentist."[18] When others of similar positions at other institutions such as University of California, San Francisco and Harvard School of Dental Medicine were asked the same question they also agreed in a similar manner[9, 19] A survey of 1604 general dentists in Oregon showed that 91.7% felt that dental treatment should be part of prenatal care.[20]

An appropriate time for an expectant mother to also have a comprehensive periodontal examination is after her first visit to the physician that will be providing her prenatal care. Caution should be taken to ensure the pregnant mother and her unborn child are not exposed to excessive amounts of ionizing radiation in the dental office. A dental exam at this point allows proper time for diagnosis and treatment of periodontal disease if present.

Treating the pregnant patient comes with a unique set of challenges. Aside from the extra cautions that must be taken to avoid harm to the unborn child, comfort of the mother plays a large role in treatment choices. It is most comfortable for the pregnant mother if any necessary dental treatment takes place early in the pregnancy. During the latter stages of pregnancy changing body shape as well as sensitivity to the smells of the dental office and instruments in the mouth can prove to be challenges to providing treatment to the pregnant dental patient. The earlier the dental treatments take place during pregnancy, the easier it is for both the patient and the dental care provider.

Treating periodontal disease in pregnant women

Although there is not currently sufficient research to show that treating periodontal disease in pregnant women results in more favorable outcomes of pregnancy, there is nothing that shows that it is potentially harmful to the mother or her unborn child. The previously mentioned dental school professors and department chairs all feel that it is probable or possible that treatment of periodontal disease in pregnant patients would have favorable outcomes for the mother and fetus.[9,18,19] When there is a good possibility that treatment of periodontal disease can have very positive effects on a mother and her unborn child and unnecessary risk is not taken, it makes logical sense to treat the mother's periodontal disease.

Many dental procedures are completely safe for pregnant patients, however some are not. Radiographs should be avoided in pregnant patients. Consideration also must be taken in what analgesic and anesthetics are used during and after the procedure. Fortunately, there are suitable ways to treat periodontal disease in the pregnant patient.

The first step to treating any dental pathology is to correct the behavior that caused the pathology in the first place. The dentist should sit down with the patient and discuss with them what lifestyle and hygiene changes need to be made to stop/slow the progression of the disease.[5]

Scaling and root planning is a safe and effective procedure for treating periodontal disease. 96.9% of dentists in the Oregon study agree that scaling and root planning are appropriate treatment options for pregnant women.[20] This procedure typically requires no anesthetic and is not usually painful. There are also other treatments that can be performed by competent dentists that can prevent the progression of periodontal disease. Pregnant patients should discuss with their dentists all treatment options, including possible side effects and consequences of those options. Dental professionals should make sure to abide by the guidelines of informed consent before engaging in any dental procedure especially in a pregnant patient.

Perinatal considerations for mothers with periodontal disease

During the first few months of life an infant is making significant adjustments to their new surroundings. The first few months are crucial for immune system development and the development of the bacterial flora of the oral cavity. There are many complex factors that contribute to this flora that are beyond the scope of this paper. However, bacteria from the mouth of those who have periodontal disease can be introduced to the flora in the infant's oral cavity and implement itself into the developing flora. This can result in increased likelihood of the child developing periodontal disease themselves.[5] For this reason it is important that during the first few months of life parents and others that will have frequent close contact with the child that have periodontal disease use caution to not introduce the disease-causing bacteria to the infant. This can be accomplished by those coming in frequent close contact with the infant with known periodontal disease using an antimicrobial mouth rinse.[5] A competent dentist can recommend or prescribe an appropriate mouth rise.

The need for advocacy on periodontal disease and pregnancy

If changes to the current prenatal guidelines are to take place, measures must be taken to increase public awareness about the issues involved with periodontal disease and adverse pregnancy outcomes. Pamphlets must be produced that dentists can give to their patients. There must be opportunities for health care professionals (including medical and dental professionals) to increase their knowledge on the effects of periodontal disease and its systemic effects. Some of the necessary advocacy for this issue can be coupled with advertising for hygiene products that prevent or treat periodontal disease.

The prenatal dental exam will increase the cost of prenatal care. Work must be done with insurance companies and government health care assistance agencies to determine how these costs will be offset especially in low income patients. This should be quite achievable as it can be considered preventative medicine that can possibly reduce costs of a high risk delivery and neonatal intensive care.

CONCLUSION

Periodontal disease is known to be correlated to low birth weights and preterm deliveries of newborns. As such, it is necessary that dental care is implemented into prenatal care. Prenatal dental care should include a complete periodontal examination as well as treatment for existing periodontal disease, if necessary. More research will likely show the effectiveness in improving pregnancy outcomes by treatment of periodontal disease, but it is logical to conclude that treating this disease will result in a favorable response.

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