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PERIODONTAL DISEASE AND PRETERM LABOR- A REVIEW

Dentistry

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ABSTRACT

Preterm birth is defined as birth before 37 weeks of gestation period, which occurs in 5-20% of pregnancies. It is a multifactorial entity associated with a high risk of neonatal morbidity and mortality and is influenced by maternal, fetal and environmental factors. Various microbiological studies suggest that infectious pathogens may account for 25–40% of preterm birth. Infections of different sites, as genital, urinary tract infections and pneumonia are linked to the preterm labor. Few authors found periodontal bacteria in placenta's in pregnancies. In spite of a huge research done on the topic, both experimental and clinical, there are many controversial opinions about the role of periodontal infections in preterm birth. Thus, this review addresses and evaluates novel strategies of preventive and therapeutic approaches.

KEYWORDS

Periodontal pathogens, Preterm labor, Preterm birth, Periodontal disease, Pregnancy.

INTRODUCTION

Preterm labor is defined as a birth before 37 weeks of gestation and occurs in 5–20% of pregnancies.[1] It is a leading cause of newborns' morbidity and mortality, and the second cause of childhood death before the age of 5 years.[2] According to data, in the USA the preterm delivery rate is 12–13%, whereas in Europe and other developed countries is up to 9%.[3] It is estimated that around 15 million preterm neonates are born annually with the highest rates in Africa, South Asia and North America. Preterm births account for almost 75 percent of perinatal mortality and more than 50 percent of the long-term morbidity.[1,2] The most common neonatal complications include newborn respiratory distress syndrome (RDS), neural system injury, necrotizing enterocolitis, neonatal jaundice, and infections.[2] All the above-mentioned complications lead to prolonged hospitalization, which in turn increases the risk of hospital-acquired infections and death.

ETIOLOGY AND RISK FACTORS

Preterm labor is a heterogeneous condition of multifactorial origin influenced by maternal, fetal and environmental factors. Due to the multiple etiologies and risk factors involved, the prediction of preterm labor remains challenging. There are many maternal and/or fetal characteristics associated with preterm birth, including maternal demographic and nutritional status, parity and current pregnancy history, length of the uterine cervix, addictions, infection, and genetic markers.[4] The process of preterm labor is thought to be initiated by multiple mechanisms, including infection, immunologically driven processes, placental ischaemia, uterine over distension, bleeding, and other actors.[1,5] Assuming that many factors might be involved in each particular preterm birth, a precise mechanism cannot be identified in most of cases.

INFECTIOUS PATHOGENS AS A CAUSE OF PRETERM LABOR

There is very strong evidence that infection plays a major role in the pathogenesis of preterm labor. Studies suggest that infection may be responsible for 25–40% of preterm birth cases.[5,6] The relationship between infection, inflammatory response and preterm labor has been confirmed by multiple findings in preterm labor patients including intrauterine/intra-amniotic and extra-uterine maternal infections/inflammations: vaginal infections, urinary tract infections, pneumonia, and periodontal disease.[6] The link between infection and preterm birth could also be supported by the fact that antibiotics administered in asymptomatic bacteriuria prevents preterm birth.[7]

Multiple infectious agents could cause the vaginal infection and later via the above mentioned routes-the intrauterine/intra-amniotic infection: Escherichia coli, Enterobacter, group B Streptococcus (GBS)/Streptococcus agalacteae, Staphylococcus epidermidis, Chlamydia trachomatis, Micoplasma hominis and Ureaplasma urealiticum, Neisseria gonorrheae, Treponema pallidums, Trichomonas vaginalis, HIV, Hepatitis B and C, as well as bacterial vaginosis (BV). Some of them can be easily ruled out while others might remain undetected and a silent cause of infection.

The pathogens most commonly reported in the amniotic fluid are genital Mycoplasma spp., and, specifically, U. urealyticum . Women who are tested and found to be positive for U. urealyticum often have spontaneous preterm labor or preterm premature rupture of membranes (PPROM).[8] Importantly, the earlier the gestational age at preterm labor, the higher the frequency of intrauterine infection. Many researchers reported the role of BV. Although the role of BV itself remains largely unknown, a strong risk for preterm labor was confirmed. BV has shown to be a cause for spontaneous abortions, highlighting the role of genital infection for adverse pregnancy outcomes (APO).[9]

PERIODONTAL PATHOGENS AND PREGNANCY

Anatomical and Physiological Background

Gingival Changes in Pregnant Women's bodies undergo important adaptations in many organ systems and hormonal changes during pregnancy. As well as the other systems, gastrointestinal tract and the oral cavity as a part of it are also under this influence. In this period increased sensitivity to stimuli occurs in the gingiva.[10] Vomiting can negatively affect oral hygiene or may cause erosions in the oral cavity.[10] The following oral conditions have been described as affecting pregnant women to a greater degree than their non-pregnant counterparts: dental caries, gingivitis, pregnancy granuloma, and periodontitis.[11]

Gingivitis is inflammation of the superficial gum tissue.[12] Gingivitis is the most frequent oral disease in pregnancy, with a prevalence of 40–75% according to different sources.[10-12] Approximately 50% of women with preexisting gingivitis will face significant exacerbation during pregnancy due to changes in estrogen and progesterone levels combined with oral microbiota alterations and pregnancy-related physiologic immunodeficiency.[10-12] Pregnancy gingivitis could be seen very often and usually starts at the first trimester of gestation, worsens as the pregnancy progresses before reaching a peak close to the end of the third trimester and heals spontaneously after birth.[10-12] However, in the last weeks of gestation, rates of gingivitis usually decreases and immediately in the postpartum period, the gingival tissues are found to be comparable to those seen during the first trimester of pregnancy.

Factors Influencing Gingival Changes

The decline and exacerbation in oral health during pregnancy depends on multiple factors.[10] During the first trimester of pregnancy, some

women may have eating behavior changes like increased consumption of carbohydrates or even pica. Pregnant women gingiva bleeds more readily due to the elevated concentration of estrogens, therefore women may avoid brushing their teeth. However, the exact role of these hormones on the increase of gingival inflammation occurrence and deterioration was speculated.[12] Therefore, oral care becomes more important in pregnancy. Recently, a published paper associated gingival changes in pregnancy with increased vascularization and blood flow in conjunction with the pregnancy-related physiologic immunodeficiency and changes in connective tissue metabolism.[10-12]

As mentioned before, vomiting, especially during the first trimester of pregnancy, increases the acidity in the mouth. Because episodes of vomiting in cases of hyperemesis gravidarum are usually very frequent, the pregnant woman may not pay enough attention to oral care after each event.[10,11] Subsequently, if the teeth are not brushed, an acidic environment will develop in the mouth and support some pathogens overgrowth. Vomiting and dehydration will lead to decreases of the oral saliva flow and contribute to the periodontal problems as well. For these reasons, the rate of caries increases in the first trimester of pregnancy. Due to the existence of the listed risk factors, it is important to draw more attention to dental care and health during this period.

Definition, Epidemiology and Classification of Periodontal Disease

Periodontal diseases represent one of the most common chronic infections in humans with a prevalence of 10 to 60% among adult population .[5] Periodontal diseases include many different inflammatory conditions that affect the gingiva, but also the alveolar bone and the periodontal ligament that anchors the tooth to the bone. Periodontitis is a chronic multifactorial inflammatory disease associated with dysbiotic plaque biofilms and characterized by progressive destruction of the tooth-supporting tissues. It is a relatively common clinical condition, which occurs in more than 30% of people in some populations. The prevalence among pregnant women ranges between 5% and 20%.[13]

Periodontitis has been classified by different ways:
1. Based on stages defined by severity, complexity and extent and distribution (stage I, II, and III).
2. Based on grades, that reflect biologic features of the disease including evidence of, or risk for, rapid progression, expected treatment response, and effects on general health (grade A, B, and C).
There are separate classifications of necrotizing periodontal diseases, endo-periodontal lesions, and periodontal abscesses.[13]

Pathophysiologic Mechanisms of Periodontal Disease

Periodontal pathology usually begins with a localized inflammation of the gingiva, called gingivitis, caused by dental plaques, microbial biofilms that form on the teeth and gingiva. If left untreated, the inflammation in gingivitis can lead to periodontitis. The inflammatory response in periodontal diseases is found to contribute to the development of certain systemic diseases such as Type II Diabetes mellitus, cardiovascular diseases, rheumatoid arthritis, and even oral cancer.[14]

POSSIBLE MANAGEMENT

Dental Management during Pregnancy

There is no evidence-based effective guideline developed for periodontal infection treatment in pregnancy. In general population the aim of periodontal treatment is to reduce periodontal tissues infection through a careful and continuous oral hygiene education, medical and a mechanic (surgical) treatment. In the severe chronic or aggressive forms of periodontitis the treatment includes the administration of systemic antibiotics.[13]

Pregnancy related guidelines, on oral care varies from country to country. In some countries, recommendations on oral care and treatment are included in the pregnancy follow-up guidelines. In the USA, only up to 34% pregnant women consult a dentist during their pregnancy. Pregnant women, obstetricians and dentistry specialists are prudent while prescribing a specific dental treatment to avoid other possible pregnancy complications. Moreover, around 50% of obstetricians rarely recommend a dental examination unless it is suggested by country-specific guidelines. Even if pregnant women are referred to dentists, only 10% of the specialists perform all necessary treatments, and 14% of dentists are against using local anesthetics during pregnancy.

Published guidelines on oral care during pregnancy highlight that it is an underdeveloped area and the relevance of oral hygiene during pregnancy is insufficiently acknowledged by dentistry and obstetric specialists. Recently published overview of systematic reviews demonstrates strong evidence for a link between periodontal disease and APO.[15]

Treatment Modalities Based on the Gestational Age

The most important steps of fetal organogenesis take place in the first 12 weeks of gestation and is very sensitive to the influence of external factors, especially drugs. During the first trimester, only emergency dental treatment is indicated.[13] Oral hygiene should be reinforced with plaque control done by the dentist. The second trimester is the safest period for elective dental treatment if necessary.[11,13] Despite the fact that some treatment options are available during pregnancy, it is preferable to postpone extensive reconstructions or major surgical procedures after delivery.[13,15]

Regarding the systemic treatment with medications/antibiotics during pregnancy, the main concern is the possible teratogenic effect that might appear. Before prescribing a drug to a pregnant patient, the dentistry specialists follow the Food and Drug Administration (FDA) classification for the prescription of drugs to pregnant women based on the risk of adverse fetal outcomes.[13]

The Importance of Oral Care before Conception

As recommended by the recent guidelines, it is appropriate to undergo dental examination as a part of preconception counselling in order to prevent dental and periodontal diseases.[13] The main purpose and aim of prevention are to reduce the presence of bacterial plaque through motivation to proper daily oral hygiene, education in proper nutrition, a balanced diet, and low intake of sugars, and, finally, professional dental hygiene procedures. For these reasons, close interdisciplinary collaboration between obstetricians and dentists is very important.[11,13] Later, after delivery, the patient may undergo certain dental visits and dental treatment, without any risk.[13] Appropriate dental care and prevention during pregnancy may decrease number of risk factors, and reduce poor prenatal outcomes.[13]

FUTURE TASKS FOR GYNECOLOGISTS AND DENTISTS

Having the global burden of periodontal disease and the range of APO that have been associated with it, there is still a need to describe the role of local periodontal bacteria in the placenta and oral cavity in relationship to local and systemic inflammatory cytokines for the pathogenesis of preterm labor. Additionally, from the public health point of view, identification of the underlying mechanisms will enable development of preventive strategies aimed at reducing of preterm birth, as the most important APO. Thus, there is a need to establish a new preventive and therapeutic approaches at earlier stages of pregnancy, perhaps even for the period of preconceptional counselling.

CONCLUSIONS

Multiple studies provide strong evidence role of the periodontal infection in preterm labor. Furthermore, conclusions of many studies reported that periodontal pathogens can be transferred from periodontal tissues to the feto-placental site and cause an infection. However, the exact mechanisms by which inflammation disseminated from the oral cavity to the placenta contribute to adverse pregnancy outcomes remain unclear and require further investigation. Moreover, there are many pieces of evidence supporting the importance of the establishment a prevention program to minimize problems during pregnancy. Prevention means scheduling the preconception counselling visits, timely examinations and reducing the presence of bacterial plaque, through professional hygiene sessions, education, motivation to proper oral hygiene and nutrition. For these reasons, it is essential to develop a more effective interdisciplinary collaboration between obstetricians and dentistry specialist in order to achieve an optimal health for pregnant women.

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