

Dental management in pregnancy: recent trends

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Summary

This review analyzes the changes that occur during normal pregnancy and describes the main odontogenic infections, suggesting the actual best approach in dental management. Several studies support the hypothesis that periodontal disease is associated with preterm labour and other conditions complicating pregnancy, such as pre-eclampsia and fetal growth restriction. Appropriate dental care and prevention during pregnancy may reduce poor prenatal outcomes and eliminating risk factors. Dental examination before pregnancy is strongly suggested in order to act early on dental and periodontal diseases. Prevention means reducing the presence of bacterial plaque through professional hygiene sessions, education, and motivation to proper oral hygiene at home, education in proper nutrition, a balanced diet, and low intake of sugars. For these reasons, it is essential to have a more intense interdisciplinary collaboration between gynecologist and dentist in order to achieve an optimal women's health, during this particular time in their lives.

Key words: Oral health in pregnancy; Preterm labour; Dental care; Odontogenic infections.

Introduction

Pregnancy is associated with important anatomical, physiological, biochemical, and endocrine changes, which affect multiple organs and systems. These changes are essential to adapt woman's body to the pregnant state and to promote fetal growth and survival. They are largely secondary to the effects of progesterone and estrogens, which are produced predominantly by ovary in the first 12 weeks of pregnancy, and then by placenta. The progressive physiological status that occurs includes changes in the cardiovascular, haematologic, respiratory, renal, gastrointestinal, endocrine, and genitourinary systems.

The hormones induced by pregnancy determine changes in the mother's body, and oral cavity is not an exception. These modifications in the oral cavity could increase susceptibility to oral infection. Although these adaptations of maternal organ systems are normal, they require consideration and adjustments in treatment by any dentist who is providing oral healthcare and prescribing medications for the patient [1-8].

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Physiologic changes associated with pregnancy

The respiratory tract undergoes important changes as a result of maternal adaptation to pregnancy. During pregnancy, women may experience systemic disorders such as

respiratory alterations: dyspnea (in 60-70% of all the pregnant women), hyperventilation, snoring, an upper ribcage breathing pattern and chest widening, and rhinitis [9-12].

Cardiovascular and haematological changes begin as early as at four weeks' gestation and are progressive: elevation of the coagulation factors V, VII, VIII, X, and XII, and reduction of the factors XI and XIII, with an increased fibrinolytic activity to compensate the increased clotting tendency [13, 14].

Gastrointestinal disorders represent some of the most frequent complaints during pregnancy. An increased intragastric pressure and a reduction in the lower esophageal sphincter tone, which is secondary to inhibition of the production of the motilin peptide hormone (due to a rise in progesterone concentrations observed in pregnancy), determines gastroesophageal reflux disease in 30-70% of all pregnant women, and an almost two-fold prolongation of the gastric emptying time as compared to non-pregnant women [15-20]. Nausea and vomiting (hyperemesis gravidarum) are experienced by 66% of all the pregnant women, commencing at approximately five weeks after the last menstrual period, and reaching a maximum prevalence after eight to 12 weeks [21, 22].

Diarrhea occurs in up to 34% of pregnant women and the incidence rate of constipation in pregnancy is 11-38%. The etiology is multifactorial, with decreased small bowel motility, decreased motilin level, decreased colonic motility, increased absorption of water, and iron supplementa-

Table 1. — *Physiologic changes associated with pregnancy.*

Respiratory	Increased respiratory rate
	Decreased functional residual capacity
	Increased tidal volume
	Increased minute ventilation
Cardiovascular and haematological	Respiratory alkalosis
	Increased cardiac output
	Increased blood volume
	Increased resting heart rate
	Decreased peripheral resistance
Gastrointestinal	Decreased blood pressure (2° trimester)
	Decreased gastric motility
	Decreased esophageal sphincter tone
Renal	Increased renal plasma flow
	Increased glomerular filtration rate
	Increased renal perfusion
	(second half of the pregnancy)
Endocrine	Increased insulin production
	Increased insulin resistance

tion as possible contributory factors [23-27].

The dramatic hormonal and hemodynamic modifications of pregnancy could also alter renal function and these changes should be considered when assessing renal function in pregnancy and in case of medications provided through delivery. As might be expected from the increase in cardiac output, renal plasma flow and glomerular filtration rate during pregnancy increase. An increased renal perfusion, particularly during the second half of the pregnancy, gives rise to an increased drug excretion in the urine [28-30].

Endocrine alterations are also observed in pregnant women. Insulin production rises during pregnancy, but is accompanied by increased insulin resistance caused by placental hormones (mainly human placental lactogen). Maternal hyperglycaemia causes increases in fetal insulin and this can result in neonatal hypoglycemia as the carbohydrate load falls immediately after birth [31, 32]. Physiologic changes associated with pregnancy here discussed, are listed in Table 1.

Oral health in pregnancy

In the oral cavity, pregnant women may suffer a series of dental alterations such as caries, gingivitis, periodontal disease, and erosions. This increased risk is mainly due to the increase in cariogenic microorganisms produced by the nutritional changes and to a reduced attention to oral health, coinciding with a drop in salivary pH and buffer effect. These changes in salivary composition are observed in advanced-stage pregnancy and during lactation, and may temporarily increase vulnerability to both caries and enamel erosion [33, 34].

Many scientific studies have shown that saliva has multi-potential effects on oral cavity such as lubrication, anti-microbial effect, buffering, pH regulation, and protection of

teeth. Biochemical changes in saliva can lead to oral and dental tissue injury [35, 36].

Female steroid sex hormones influence oral health through different mechanisms. Gingival tissue is affected by hormonal changes during puberty and pregnancy, as shown by more pronounced subclinical signs of gingival inflammation during the ovulatory phase of the menstrual cycle and by the worsening of pre-existing gingivitis during human pregnancy. Pregnancy induces an increased response of the gingival tissues to local factors, such as plaque and tartar, through disturbance of tissue metabolism [37-40].

Gingivitis is the most common oral disorder during pregnancy, with a prevalence of 60-75%, and tends to appear in the second month of gestation. Approximately 50% of all women with pre-existing gingivitis suffer from a worsening condition during pregnancy, as result of the fluctuations in estrogen and progesterone levels, in combination with changes in the oral flora and a reduced immune response. The maximum intensity is observed in the eighth month, then gingivitis decreases. Other factors such as accumulation of dental plaque and deficient oral hygiene may be considered as causal or aggravating factors [37, 39].

Periodontitis is a relatively common clinical condition, which occurs in more than 30% of people in some populations; it has a prevalence between 5% and 20% in pregnant women. Treatment in pregnancy is safe and easily applicable and involves scaling and root planning [40, 41]. An association between periodontal disease and preterm birth has engendered much interest and despite advances in obstetric and dentistry care, this particular condition continues to be the leading cause of perinatal morbidity and mortality [42-44].

During the second trimester of pregnancy, the proportion of anaerobic gram negative bacteria increases with respect to the aerobic bacteria in dental plaque [45]. Lipopolysaccharides can activate macrophages and other cells, inducing production and secretion of cytokines, such as IL-1 β , TNF- α , IL-6 and PGE2, and matrix metalloproteinases. If these compounds reach the general circulation and cross the placental barrier, the levels of PGE2 and TNF- α in amniotic fluid may increase, and premature delivery may result [38, 44]. This suggestion has led many investigators to seek evidence in this field. Since a relation of periodontal disease with preterm birth was proposed, many observational studies have been carried out. Although the pathophysiological mechanism remains unclear, several studies support the hypothesis that periodontal disease is associated with preterm labour and other conditions complicating pregnancy, such as pre-eclampsia and fetal growth restriction. This association has also been reported by most of the observational studies, which concluded that pregnant patients with periodontal disease have a 2.8-fold increased risk of preterm birth [44, 45].

Other alterations that can appear during this period are: pyogenic granuloma and aphthae, which should be moni-

tored; salivary changes, including variations in pH and composition; an increased frequency of temporomandibular joint disorders, though these seem to be more related to dental loss, malocclusions or poorly executed fillings during this period [46-48].

Dental management during pregnancy

As recommended by the recent guidelines, it is appropriate to undergo dental examination before pregnancy, in order to act early on dental and periodontal diseases. However, this preventive approach often is not completed because, according to the literature, more than one-third of pregnancies is not planned. After delivery, the patient may undergo certain dental visits and dental treatment, without any maternal and fetal risk [41, 48, 49].

The main position of the patient's chair should be semi-reclined, as well-tolerated, with any change of position every five minutes. Supine position is absolutely not recommended, as it promotes the compression of the aorta and vena cava by the gravid uterus, causing an hypotension syndrome. The sessions should be short (20-25 minutes) and not stressful. The most challenging procedures should be postponed after delivery. A careful medical history and blood pressure control shall be made during the dental examination [41, 47].

Patients should be also motivated to perform correct oral hygiene and go to the dentist periodically [41, 47, 49], in order to reduce gingival inflammatory response to the local irritants usually associated to the hormonal changes observed during pregnancy. In addition, emphasis should be placed on the advisability to reduce the consumption of refined carbohydrates [33, 34, 39].

The use and benefits of fluoride administered during the prenatal period for the subsequent prevention of caries in deciduous teeth is subject of intense debate. Fluoride is clearly able to cross the placental barrier and is absorbed by the fetus, although its true efficacy is not clear. In this context, several studies analyzed the effect of prenatal fluoride upon the incidence of caries in deciduous teeth and on the appearance of fluorosis. When used appropriately, fluoride is a safe and effective agent that can be used to prevent and control dental caries [50-52].

Treatment modalities

Fetal organogenesis takes place in the first three months of pregnancy and is very sensitive to external factors (drugs, maternal stress, and irradiation). Over the next six months the fetus grows and becomes less sensitive – though a number of factors can still exert an influence, such as infections or certain drugs such as tetracyclines.

During the first trimester (from conception to week 14) only emergency dental treatment is indicated, avoiding elective dental procedures because of the vulnerability of

the fetus. Oral hygiene should be often reinforced with plaque control and tartrectomy, if it is necessary.

The second trimester (from week 14 to week 28) is the safest period for elective dental treatment. It is advisable to avoid X-rays during this period, though if they prove necessary, they should be obtained under adequate safety conditions (beam collimation, high-speed film, filter, lead protection, high kV setting or constant beams, in-use quality program), and only selected periapical or bitewing images should be contemplated in most cases [33, 34, 53]. It is preferable to postpone extensive reconstructions or major surgical procedures after delivery [33, 34].

Regarding drug use during pregnancy, the main concern is the possibility that fetal toxicity or teratogenicity may result if the drug is able to cross the placental barrier. Polytherapy is to be avoided and any necessary prescription should be decided administering the least effective dose for the shortest time possible. In any case, medication should be avoided in the first three months of pregnancy. Before prescribing or administering a drug to a pregnant patient, the dental professional should know the classification of Food and Drug Administration (FDA) for the prescription of drugs to pregnant women according to the risk of fetal damage. This classification contemplates five categories: A, B, C, D, and X [54]:

Category A

Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters). Example drugs or substances: levothyroxine, folic acid, magnesium sulfate, and liothyronine.

Category B

Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women. Example drugs: metformin, hydrochlorothiazide, cyclobenzaprine, amoxicillin, and pantoprazole.

Category C

Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks. Example drugs: tramadol, gabapentin, amlodipine, trazodone, and prednisone.

Category D

There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks. Example drugs: lisinopril, alprazolam, losartan, clonazepam, and lorazepam.

Category X

Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in use of the drug in pregnant women clearly outweigh potential benefits. Example drugs: atorvastatin, simvastatin, warfarin, methotrexate, and finasteride.

In this context it is advisable to prescribe drugs belonging to groups A and B. However, many group C drugs are also administered during pregnancy. During lactation it is necessary to assess the possible risk of maternal drug use for the breastfeeding infant, and to evaluate the possible safer alternatives. If medication proves necessary, however, it should be administered after breastfeeding, in order to facilitate elimination of the drug before the next feeding time and thus minimize exposure of the nursing infant [54].

In order to prevent any problem, dentist should remember that drugs are absorbed easily during pregnancy, as the serum concentration for drug binding is lower than that in the non-pregnant state. There is also a higher volume of drug distribution, a lower maximum plasma concentration, a lower plasma half-life, higher lipid solubility, and a higher clearance of the drugs. All these factors allow an easy transfer of an unbound drug across the placenta, thus exposing the fetus to the drugs. Certain drugs are known to cause miscarriage, teratogenicity, and low birth weight of the fetus [54].

Conclusion

As shown above, it is evident how easy and important it is to establish a prevention program to minimize problems during pregnancy. Prevention means reducing the presence of bacterial plaque, through professional hygiene sessions, education, and motivation to proper oral hygiene at home, education in proper nutrition, a balanced diet, and low intake of sugars. For these reasons, it is essential to have a more intense interdisciplinary collaboration between gynecologist and dentist in order to achieve an optimal women's health, during this particular time in their lives.

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