

REVIEWS

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Most Frequent Oral Pathological States Problems Occurring in Pregnant Patient

Najczęściej występujące problemy stomatologiczne u ciężarnej pacjentki

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;
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Abstract

In the research, we provide information about the most frequent oral pathological states occurring in pregnancy. We describe standards of dental and pharmacological treatment with expecting patients. Pregnancy is not a time to delay dental care. Oral health is essential to overall health in the prenatal period. In pregnancy X-rays may be performed safely with the use of appropriate shielding, as well as local anesthetic during treatment. Several studies have shown an association between periodontal disease and poor pregnancy outcomes including preterm birth. Moreover, postpartum women with poor dental health may transmit the tooth decay pathogen *Streptococcus mutans* from their saliva to their infant's, resulting in increased risk of the early childhood caries. Women's health providers should understand the importance of protecting oral health during pregnancy and educate their patients accordingly. There should also be increased understanding of the potential risks and benefits of dental care (**Dent. Med. Probl. 2014, 51, 3, 387–396**).

Key words: pregnancy, oral health, pregnant woman.

Streszczenie

W pracy przedstawiono najczęściej występujące stany patologiczne w jamie ustnej u kobiety ciężarnej. Opisano współczesne standardy postępowania stomatologicznego w przypadku pacjentki spodziewającej się dziecka z uwzględnieniem możliwości zastosowania leczenia farmakologicznego. Ciąża pacjentki nie powinna być przyczyną odroczenia leczenia stomatologicznego, gdyż zdrowie jamy ustnej jest bardzo ważne dla ogólnego stanu zdrowia kobiety i płodu. W omawianym okresie jest możliwa diagnostyka z wykorzystaniem RVG z uwzględnieniem odpowiedniej ochrony oraz znieczulenie miejscowe w czasie zabiegów. Zwrócono uwagę na ryzyko urodzenia dziecka przedwcześnie lub z małą masą ciała przy współistnieniu w okresie ciąży choroby przyzębia. Dodatkowo wiele badań wskazuje na możliwy proces transmisji bakterii próchnicotwórczych (m.in. *Streptococcus mutans*) z matki na dziecko. Poprawa stanu zdrowia i odpowiednia higiena jamy ustnej przyszłej matki mogą opóźnić, a nawet uniemożliwić rozpoczęcie procesu próchnicowego u dziecka. Leczenie stomatologiczne kobiety ciężarnej wymaga szczególnej uwagi i rozważenia, czy przewidywane korzyści są większe od możliwych działań niepożądanych. Konieczne jest wdrożenie odpowiedniego, dostosowanego do ciężarnej kobiety planu profilaktyki stomatologicznej, przeprowadzenie konsultacji żywieniowej oraz rygorystyczna kontrola płytki nazębnej (**Dent. Med. Probl. 2014, 51, 3, 387–396**).

Słowa kluczowe: ciąża, stan jamy ustnej, kobieta ciężarna.

Pregnancy is a special physiological state during which many specific changes take place in the woman's body. The development of the fetus is accompanied primarily by hormonal fluctuations and adaptive changes in individual (e.g. respiratory, hematopoietic) systems and in the blood,

which may affect the condition of the oral cavity of women and trigger the development of pathological conditions [1]. Any chronic inflammation within the oral cavity may result in microbes that can impair the woman's health [2, 3].

Due to the emerging reports of a possible as-

sociation between periodontal disease and infant premature birth or low birth weight, pregnant women require special care [4]. For this reason, both dentists and obstetricians should pay special attention to the need of maintaining good oral health in pregnant women [1, 5–7]. However, the authors of numerous studies indicate a lack of preventive dental programs associated with periodic examinations for this population group [8, 9]. The major motivations for a pregnant woman to visit the dentist include toothache caused by severe caries or periodontal disease, tooth mobility or oral malodor. Few women visit the dentist to undergo preventive examination [10].

The necessity to visit the dentist is also supported by the fact that pregnancy is a good time to instruct parents on feeding newborns and infants and on prevention of dental caries in children. Many authors point to the fact that carcinogenic bacteria may be transferred from mother to child [11]. Improving the health and oral hygiene of the mother can delay and even prevent the onset of caries in the child [1, 11].

At the same time it should be emphasized that, before starting dental treatment, it is advisable to consider whether the expected health benefits of the treatment prevail over the possible risk of pregnancy complications. Therefore, it is also necessary to prepare an individual-oriented dental treatment plan and ensure that suitable medication is used.

Oral Health in Pregnant Women

Pregnancy – as a result of modified endocrine metabolism and changed dietary habits – is often the cause of the characteristic image of periodontium.

The Most Common Changes in the Periodontium

Increased levels of progesterone and estrogen promote inflammatory changes in the oral cavity. Due to the strong affinity of estrogens to the receptors in the gum tissue, the metabolism of the hormone changes and it is decomposed into the active form, estradiol-17 β , which is thought to be one of the main causes of inflammation in periodontal tissues [12, 13]. Estradiol-17 β affects the functioning of fibroblasts, the basic gum cells. Its increased concentration in the serum results in higher proliferation of gingival cells and tissue matrix, lower keratinization of the gingival epithelium, an increase in the amount of glycogen in

the epithelium and lower efficiency of the epithelial barrier [14].

Progesterone impairs fibroblast growth in the gingival tissue; its high concentrations result in the release of a pregnancy-specific protein (glycoprotein B-1) which reduces the lymphocytic response of the immune system, leading to reduced chemotaxis and phagocytosis and impairment of the body's response to infection. The effects of progesterone also include fluctuations in the production of collagen and impaired plasminogen activation control, which is a key factor for controlling the proteolytic processes in the extracellular matrix of the periodontal tissue [15].

The elevated hormone levels cause higher vascular permeability, resulting in gingival edema and reduced keratinization of epithelium. Simultaneous weakening of the epithelial protective barrier increases susceptibility to infection. Gingival inflammatory processes observed before the period of pregnancy tend to become more severe [16–20].

At the same time, the high level of progesterone in pregnancy acts to inhibit the production of matrix metalloproteinases (MMP), which are the main enzymes responsible for the destruction of collagen fibers during periodontitis. This effect appears to be a factor that prevents transformation of gingivitis into periodontitis during pregnancy [21].

Furthermore, studies suggest that estrogen and progesterone may be used by the bacteria of the genus *Prevotella intermedia* as a substitute for the growth factor. Thus, increased concentrations of these hormones may act to increase the number of the bacteria in the subgingival biofilm [12, 13, 18].

It should also be noted that hormone fluctuations during pregnancy may lead to xerostomia. There is also an opposite reaction associated with an excessive flow of saliva (sialorrhea/ptyalism), typically appearing in the second/third week and continuing during the first trimester [22].

Gingivitis gravidarum represents one of the pathological conditions that usually affect future mothers. This is a disease of the soft tissues surrounding the teeth without loss of clinical attachment. According to some reports, *gingivitis gravidarum* affects from 60 to 100% of all pregnant women [7, 12, 22]. In contrast, periodontitis, a more destructive disease of the tissues of the mouth, is associated with loss of bone and clinical attachment. According to relevant reports, periodontitis is observed in one third of pregnant women. Factors contributing to the development of gingivitis include fluctuating hormone levels, changes in cellular metabolism, variations of the immune responses and poor oral hygiene.

The characteristics of the gums during pregnancy include bright-red interdental papilla and

gum edges. The tissue is swollen, tender, very flexible, with a smooth surface and prone to bleeding [12, 13, 22]. The swelling may contribute to the formation of pathological periodontal pockets, thus increasing the space available for the deposition of plaque and calculus. This favors the formation of subgingival microbiota [22].

The gums tend to already look like that in the second month of pregnancy, while the symptoms become more severe in the eighth month [12, 16, 17, 22]. The changes more frequently affect the periodontium of the front than the side teeth [22]. Typically, after the termination of pregnancy, when the concentrations of the hormones return to normal levels, the inflammation recedes and disappears completely within a few weeks after childbirth [12, 13, 22].

Another pathological condition characteristic of pregnancy is the presence of local gingival tumor, pregnancy epulis/granuloma, also known as angiomatous epulis or pyogenic granuloma [12, 13]. The tumor is usually located on the incisor interdental papillae or in other places that are often stimulated [13, 22]. The tumor is relatively rare, according to various authors its frequency varies from 0.5 to 5% [12, 22]. Factors enhancing the formation of the tumor include plaque-related inflammatory conditions and an overhanging filling in the teeth adjacent to the affected location. It is believed that progesterone inhibits collagenase activity with the resultant accumulation of collagen resulting in tumor growth [16]. The granuloma may also be due to an imbalance between factors that induce and inhibit angiogenesis [13]. The tumor usually grows quickly, while its diameter is typically below 2 cm [22]. It may be pedunculated or not. It is painless. Its color varies from purple to dark blue, depending on its vascularization. Its surface may be ulcerated, of different cohesion and a slight touch may cause bleeding [12, 13, 22]. Typically, the bone under the pregnancy granuloma is not lost, but the teeth may be displaced and become movable [13]. After the childbirth, the tumor recedes or completely disappears. Conservative treatment may be effective when the tumor is small and non-spontaneously bleeding. The treatment involves removal of the irritants, periodic control of plaque and anti-inflammatory measures [12]. Sometimes, however, surgery is necessary when the tumor is large and interferes in everyday life or bleeds heavily, e.g. while eating. After removal by surgery, the tumor tends to reappear, and the surgery must be repeated after delivery. As significant bleeding may occur during the surgery; methods other than surgery, such as electrocoagulation, laser- or cryotherapy may be also used [13, 16, 22].

Pregnant women may also experience generalized excessive tooth mobility. This process is associated with the stage of periodontal disease and estrogen activity producing vascular changes in periodontium that eventually result in periodontitis that causes the teeth to become loose. Typically, the teeth continue to be loose after the childbirth [1, 18, 22].

Prevention of periodontal disease, early diagnosis and, if necessary, immediate treatment should be a regular part of the professional care of the pregnant woman.

Periodontal Disease and the Risk of Preterm Birth or Low Birth Weight

Periodontitis may affect the overall health of the body. It has been proven that the periodontal pathogens present in the plaque are responsible for the development of recurrent bacteremia, which can spread to distant tissues and organs. Bacterial infection may occur through transmucosal transport or bloodstream. Additionally, passage of inflammatory mediators into the blood vessels may impair organ functions [23].

Periodontitis in pregnancy is considered by many authors to be a risk factor for preterm (before 37 weeks) or low birth weight (less than 2500 g) delivery. These pathologies often occur simultaneously and in the literature are referred to collectively as PLBW (preterm low birth weight). According to the literature data, the proportion of children with low birth weight in Poland is about 6% of the total number of neonates. The proportion of preterm children in Poland is 6.3% according to the 2001 data [1, 17, 18, 24].

The impact of existing periodontal disease on the frequency of PLBW has not been completely explained. Numerous studies confirm a strong correlation between maternal oral health and the overall condition of the neonate. According to Offenbacher [24], approximately 18% of preterm and low birth weight deliveries are attributable to periodontal disease. At the same time, studies by Shub et al. [25] confirmed the relationship between maternal periodontal disease and perinatal mortality, which was more than twice as high in children of women with periodontal disease.

One of the main mechanisms which can induce premature failure of the supporting structure is the impact of bacteria and their products (endotoxins), through stimulation of cell membranes and prostaglandins to produce proinflammatory cytokines [6]. The authors show a significantly higher prevalence of periodontitis in mothers who gave birth to a newborn with PLBW compared to a control group of mothers of infants born after 37 weeks, weighing more than 2500 g [1].

Jeffcoat et al. [6], who examined 1,313 women, showed that periodontitis in the second trimester of pregnancy increased from 2.16- to 9.18-fold the risk of preterm birth (before 37 weeks).

Other authors have shown a positive correlation between the treatment of periodontal disease during pregnancy and reduced risk of PLBW. Women who treated periodontal disease before the solution had a lower risk of preterm delivery than women who were not treated for periodontitis during pregnancy (PLBW children in the first group – 13.5%, in the group without treatment – 18.9 %; the difference is not statistically significant) [4]. Similarly, the results of the meta-analysis by Polyzos et al. [26] indicate that the treatment of periodontal disease in pregnant women reduces the risk of preterm delivery and low birth weight.

It is also true that some authors do not confirm a statistically significant association between periodontal disease and the frequency of PLBW [27]. Despite this, information about the relationship between oral health and pregnancy, fetus and childbirth should be communicated to pregnant women by the obstetrician/gynecologist, as well as by her primary care physician and, of course, the dentist.

Periodontal Disease and the Risk of Elevated Blood Pressure

Pregnancy-induced hypertension occurs in 5–10% of pregnant women and is a significant cause of mortality of mothers and children in the perinatal period. The disorder is characterized by a triad of symptoms: hypertension, proteinuria and edema. The study involving 1115 women in the United States showed that clinically diagnosed periodontal disease is a risk factor of hypertension, independent of age, race, or tobacco smoking habit [28]. A meta-analysis of six studies also showed an increased risk of hypertension in women with periodontitis compared to women without signs of the disease, OR 1.76, 95% CI: 1.43–2.18 [29].

Other authors have confirmed a positive correlation between gestational hypertension and periodontal disease. Among women diagnosed with pregnancy-induced hypertension, the advanced form of periodontal disease (assessed from pocket depth and connective tissue attachment level) was observed considerably more frequently than in healthy women [28].

Caries

The relationship between pregnancy and an increased risk of tooth decay and dental erosion

is not clearly defined and has not been confirmed in clinical trials [17]. However, in some pregnant women, we can observe an increase in the severity of dental caries [18]. The increase in caries severity is due to overlapping factors.

Pregnant women develop unhealthy, or start practicing less healthy dietary habits, such as increased intake of simple carbohydrates and more frequent meals, or intake of extra snacks between meals [18, 19, 22].

In addition, clinical studies of recent decades have revealed a relationship between the chemical composition of saliva and hormone fluctuations associated with menstruation and pregnancy. This process favors the formation of a more cariogenic oral environment in the women. Increased levels of estrogen positively correlate with the severity of caries [30].

Changes in the composition of saliva and increased dryness of the mouth, often observed in the advanced stages of pregnancy and during breastfeeding, may result in a lower buffering capacity, which favors the growth of bacteria, contributing to the susceptibility to caries [17, 19, 31, 32]. At the same time, repeated incidents of vomiting that affect about 66% of pregnant women, starting at 5 weeks of pregnancy and reaching a maximum at 8–12 weeks, causes a decrease in the pH of saliva, which results in a weakening of the tooth enamel (erosion) and increases susceptibility to bacteria [1, 17].

The significance of preserving optimal oral health by the pregnant woman is supported by the infectivity of dental caries and its correlation with early childhood caries (ECC). It is the mother who is the source of the early transfer of highly complex bacterial flora to the child, including the particularly cariogenic *Streptococcus mutans* subspecies. Research into the phenomenon of colonization of a child's oral cavity by cariogenic bacteria confirm an increased risk of dental caries in children of mothers whose oral cavity is affected by this process [11].

Modern dental terminology comprises the term “caries pre-prevention” including, in addition to some sort of education activity, a program of comprehensive dental treatment for pregnant women. Its aim is to ensure the healthy condition of the oral cavity for the unborn child as well as to provide to the mother the necessary practical information on healthy diets for infants [1]. In addition, studies show that insufficient preventive dentistry, improper diet and poor oral hygiene in the mother are associated with the risk of her child developing unhealthy habits in the future [32].

Contemporary Views on Dental Treatment in Pregnant Women

A pregnant woman is a patient in whom the interview is of particular importance. Before starting dental treatment, it is highly advisable to prepare a written request to the responsible pregnancy obstetrician/gynecologist for information about pregnancy, as well as clearly stated permission to start dental treatment and possible use of local anesthesia in an outpatient setting. Some authors consider having such an agreement mandatory before starting the treatment [3, 18].

Planning Dental Treatment

Dental treatment during pregnancy is not contraindicated; pregnancy should be a period of special care for the patient's oral health because of the higher risk and increased severity of periodontitis and/or caries. When planning to become pregnant, it is advisable to visit the dentist before the conception. This enables execution of full diagnostic and therapeutic procedures, raising the patient's awareness and implementation of necessary preventive measures.

When a pregnant woman reports to the dentist in the first trimester, her oral health and treatment needs should be evaluated and she should be instructed on the principles of healthy nutrition, and prevention of caries and periodontal disease. In the first trimester of pregnancy, it is advisable to limit the necessary treatment, as this is the period of organogenesis, i.e. particularly intensive development of the fetus, when it is extremely vulnerable to external factors [17, 20, 33]. Also during the first trimester of pregnancy, it is not advisable to plan visits in the morning because of possible pa-

tient discomfort (nausea/vomiting). Dental treatment should be performed during the second trimester and in the first half of the third trimester. At that time, the organogenesis is complete and the patient's body is "adapted" to the physiological changes. However, during the second half of the third trimester, the patient lying in the chair may feel discomfort and is likely to develop *inferior vena cava* syndrome [1, 16, 17, 20, 22]. The treatment of the patient in the supine position may be contraindicated because of the changes that occur in the digestive system and the accompanying risk of aspiration of gastric contents.

Renal plasma flow and glomerular filtration rate increase during pregnancy. Ureters are dilated. Regardless of the amount of urine, pregnant women pass urine frequently, which should be taken into consideration when planning the duration of dental visits.

Inflammation and pain in the oral cavity constitute an indication to start treatment regardless of the period of pregnancy. Postponing intervention in urgent cases may result in a rapid deterioration of the pregnant woman's health and produce adverse effects in the fetus [1, 18, 22, 33].

The algorithm developed by Lopez et al. [17] provides for more strict control of plaque and implementation of additional methods of hygiene right from the beginning of pregnancy. In the first trimester, treatment should be limited to urgent cases, while other visits should be scheduled mainly for the second trimester and the first half of the third trimester, as indicated in the diagram (Fig. 1).

The main objective of the dentist should be to restore and maintain good oral health in the patient. Implementation of an appropriate dental prophylaxis schedule tailored to the requirements of a specific patient, provision of nutritional consultation and rigorous control of plaque will help achieve these priorities [1, 17, 22].

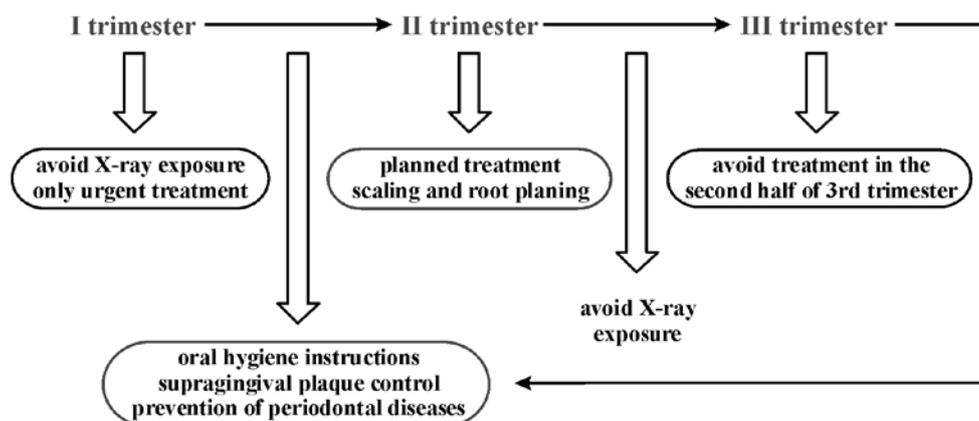


Fig. 1. Dental care algorithm in pregnant women

Ryc. 1. Algorytm postępowania stomatologicznego u kobiet w ciąży

Implementation of Professional Hygiene Procedures

Ultrasound scaling and root planning may be performed during the whole period of pregnancy [22, 34]. Regularly repeated hygienic procedures substantially reduce the total number of bacteria in the mouth, causing at the same time the biofilm to be composed predominantly of the "less aggressive" Gram-positive bacteria [36]. Before removal of dental deposits, the patient should rinse her mouth with a liquid containing a suitable antiseptic [34]. Recommended mouthwash for pregnant women is based on formulations containing chlorhexidine, cetylpyridinium, or sanguinarine [3].

According to Ulito [35], a pregnant woman should brush her teeth at least twice a day with fluoride toothpaste, use additional methods of cleaning of interdental surfaces, and report to the dentist every three months for a professional prophylaxis of oral health. In cases of advanced periodontopathy, it is advisable to undergo professional cleaning of the teeth every two months.

Optimal Diet

The quality of the human diet either enhances or does not enhance the development of decay in the teeth. Nutrition in pregnant women is very important for oral health, because due to the pregnancy it is modified, usually by increasing the number of meals and snacks between them. A patient's optimum diet should contain appropriate levels of vitamins A, C and D, protein, calcium, folic acid and phosphorus. It is important to limit the number of snacks between meals [22].

Pregnant women should not brush their teeth immediately after vomiting, since the decrease in pH of the saliva in the oral cavity due to the presence of gastric acid may cause the teeth to be more prone to damage by abrasion during brushing. In order to neutralize the acids it is advisable to rinse the mouth with water [22].

In the case of dry mouth, it is advisable to drink large amounts of water and/or chew sugar-free chewing gum.

The Use of Fluoride

Administration of fluorinated compounds to pregnant women in order to reduce vulnerability of the future child to tooth decay has not been supported by scientific evidence [3].

The advantages of fluoride intake continue to be debatable; however, when the fluorine con-

centration is below 0.3 ppm, supplementation with fluoride ions is believed to be safe for the fetus and mother [22].

In considering the issue of security of fluoride use, one should be aware of differing individual tolerances to that element. A dose quite safe to some patients may be dangerous to others. It can also lead to a cumulative effect of fluoride in the diet. Drinking large quantities of water, tea or milk and frequent intake of fluoride-rich dishes by children may lead to an excessive dietary fluoride supply. Calcium deficit or malnutrition may additionally exacerbate fluoride toxicity, particularly in patients with renal dysfunction [35].

Fluorine is responsible for many metabolic processes, including those associated with normal mineralization of hard tissues. Both deficiency and the excess of this element cause degenerative changes in the tissues. Prolonged intake of fluoride leads to osteo-skeletal fluorosis. In addition, fluorine acts to inhibit the activities of numerous enzymes and impair cellular respiration, metabolism of carbohydrates and lipids, and the synthesis of certain hormones. During pregnancy, fluoride may adversely affect fetal development, resulting in lower birth weight, reduced head circumference and premature closure of the fontanelle, as well as developmental disorders. Some authors have reported a relationship between the fluoridation of drinking water and elevated incidence of Down syndrome; the increase being even as high as a few thousand a year. Other adverse/toxic effects of fluoride include premature birth, low fertility rates and even death of infants and development of certain cancers [35].

Safety of X-ray Diagnostic Procedures

X-ray diagnostics should be limited to necessary cases and performed so as to ensure the best possible protection of the fetus from X-ray exposure by selecting appropriate techniques of recording and the use of shields for the patient [36]. The use of digital radiography significantly helped reduce the dose of radiation (one X-ray tooth image is equivalent to 2 h and 30 min of the average exposure to cosmic radiation) and prevent undue exposure that might result from improperly chosen parameters of the X-ray imaging procedure (digital radiography systems are provided with an integrated compensation function) [36]. When the pregnant woman is adequately protected by a lead apron, the radiation to the fetus is of no clinical relevance. Radiological images that are required for the proper treatment of urgent cases are permissible [3, 36]. However, despite the large margin

of security, X-ray tooth imaging in pregnant women should be avoided as much as possible. X-ray imaging in breastfeeding women is not contraindicated [16, 22, 36]. The consequences of incorrect diagnosis and the resultant improper treatment or withdrawal of therapy may pose a greater risk to the health of mother and fetus than the exposure during digital X-ray imaging [36].

Endodontic Therapy

Endodontic emergencies in pregnant women require immediate treatment. Even a short delay in the starting of the therapy of diseases of the pulp may result in a significant increase in the pain experienced by the patient. Pulp devitalization agents should not be used. In contrast, use of anesthesia during endodontic treatment is feasible and safe. During pregnancy, it is recommended to avoid X-ray imaging unless it is necessary to carry out the treatment. Therefore, an endometer is the standard tool for determining the working length. The treatment of choice includes ultimate filling of the root canals after they have been mechanically prepared and the root canal system has been properly disinfected using standard rinsing formulations [3, 20]. A delay in the closing of the canals with gutta-percha increases the risk of infection from the oral environment. Reinfection of the root canal system results from the loss of the anti-inflammatory or antibacterial activity of the intracanal dressing, as well as leaks in the provisional filler of the crown. In addition, there is a risk that after the childbirth, the patient does not report to the dentist to continue the treatment because she is too busy, decides to spend money for something else, because she does not experience dental symptoms or simply because of neglect. During that period, a rapid deterioration may occur, resulting eventually in *periodontitis chronica* [3].

Surgery

When dental surgery becomes necessary, the procedure depends on the nature of the pathology. For chronic inflammation, the visit may be scheduled for the second trimester of pregnancy, which is characterized by a stabilization of hormonal changes and adaptation occurring in the female body. Acute odontogenic inflammations require immediate treatment, the more so that at that time anesthesia and the necessary X-rays are not contraindicated [3, 20].

It is necessary to pay attention to the possible formation of blood clots in the pregnant woman after invasive procedures [3].

Administration of Drugs to Pregnant Women

The use of pharmacological treatment in a pregnant patient requires particular attention because of the altered pharmacodynamics of drugs in the female body.

Most drugs received by a pregnant woman cross the placenta through diffusion, thus it is likely that chemicals contained in the medical preparations may adversely affect the fetus. The time of organogenesis, between 4 and 10 weeks after the last menstruation, is the period of increased risk of teratogenic action of the drugs. The dentist prescribing a medicinal product should make sure that the possible harmful effects of the drug do not exceed the expected benefit to the patient [16, 20].

Many authors stress the often underappreciated value of mental “premedication” of the patient by talking to the pregnant woman before the treatment to calm her and build up her confidence [3, 20].

Pregnant patients show increased emotional lability, often accompanied by reduced discomfort tolerance. Painless and gentle treatment significantly reduces the stress of women during surgery, whereby dental treatment may be successfully completed to avoid repeated use of analgesics, anti-inflammatory drugs and/or antibiotics. Thus, it is essential that the pregnant woman receives suitable anesthesia during dental treatment [18, 20].

The most commonly used anesthetics in dentistry include: *articainum*, *lidocainum*, *mepivacainum* and *bupivacainum* [20, 37]. When choosing an anesthetic to be applied in a pregnant or breastfeeding woman, the dentist should take into consideration the ability of the drug to cross the placenta and contaminate breast milk. Almost all of *Hydrochloricum articainum* becomes bound to plasma proteins, so that almost none of it is found in the fetal circulation and breast milk. Articaine is metabolized with the participation of blood enzymes. It is metabolized in plasma but not in the liver, and thus its toxicity is significantly reduced. Some authors consider *hydrochloricum articainum* to be the anesthetic of choice. Articaine-based formulations available on the Polish market include Citocartin[®], Dentocaine[®], Ultracain[®], Ubistesin[®], Septanest[®] [20, 37, 38].

Lidocaine is also one of the most commonly used topical anesthetics. The advantages of lidocaine include its antiarrhythmic activity after intravenous administration. Like other drugs with amide-like structure, lidocaine is metabolized in the liver. The available commercial formulations include Lignocainum[®], Xylodont[®], Xylonor[®] and Xylestesin[®] [1, 20, 37].

Mepivacaine is also well tolerated by pregnant patients. Just as lidocaine, it is also characterized by antiarrhythmic activity. It is metabolized in the liver and shows a slight decongestant effect. Available mepivacaine formulations include Mepidont[®], Mepivasesin[®] and Scandonest[®] [20, 37].

Topical anesthesia using bupivacaine in pregnant women is contraindicated. Administration of this chemical may cause hypotension, signs of fetal hypoxia and bradycardia, including cardiac arrest [20].

General anesthesia is contraindicated in those pregnant women in whom the procedure can be performed under local anesthesia [3].

When a pregnant woman requires antibiotic treatment, the preparations of choice are beta-lactam antibiotics (penicillins, cephalosporins). They cross the placental barrier, but their use is considered to be safe [3].

In case of allergy to penicillin, the recommended antibiotics are macrolides (erythromycin) and lincosamides (clindamycin). Tetracyclines are contraindicated in pregnancy; these substances accumulate in the form of fluorescent deposits in the dentin and bones and are toxic to parenchymal organs. Metronidazole causes congenital defects of the lips, palate and jaw. Its carcinogenic effect cannot be completely ruled out. Chloramphenicol, sulfonamides and aminoglycoside antibiotics should not be used. During breast-feeding, cephalosporins seem to be most suitable, since they are found in the milk only in small amounts [3, 16].

Paracetamol in its pure form is the analgesic of choice when the patient is pregnant. It can be used in any stage of pregnancy at therapeutic doses for a short time. However, the combination of caffeine with paracetamol may be teratogenic [3]. The use of non-steroidal anti-inflammatory drugs (e.g. *Ibuprofenum*) or aspirin is not recommended, especially in the third trimester, due to their pro-

taglandin synthesis inhibiting effect and the ability to extend the duration of pregnancy and delay childbirth. In addition, there is a risk of excessive blood loss during childbirth when applying these medicines [16, 38]. The use of acetylsalicylic acid, which is a standard teratogen for most experimental animals, should also be avoided [3].

Among the fungicides, nystatin and clotrimazole are considered to be safe. Ketoconazole and fluconazole should be avoided during pregnancy [3].

Premedication with benzodiazepines is not advisable due to possible congenital defects in the nervous system and the risk of cleft palate [3].

Inhalation sedation with nitrous oxide should not be used during the first trimester of pregnancy. Use of N₂O/O₂ is not dangerous to the patient's life [39]. However, nitrous oxide reduces the blood supply to the uterus, while some recent reports about increased risk of miscarriage and infertility cause that its safety is disputable [3].

The effects of herbal lotions on the body of a pregnant woman is not neutral and ought not to be neglected. Rinses with sage (*Salvia officinalis*) and raspberry leaf infusion affect the contractile activity of the myometrium, while aloe formulations cause excessive congestion of the small pelvis. It is also not advisable to use lotions which contain alcohol, such as e.g. Dentosept[®] A and Listerine[®].

Conclusions

The emotional lability of women expecting a child and the deterioration of oral hygiene in combination with a lack of awareness of dental problems result in the conclusion that a pregnant woman requires special care. The dentist should always pay attention to the developing fetus, but pregnant women should without any undue delay receive dental treatment that meets modern standards.

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