Dental care for pregnant women

(Specyfika opieki stomatologicznej nad kobietą w ciąży)

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Abstract – A pregnant woman is a unique patient at the dentist’s office. Pregnancy is a period of many changes in the body. They occur in all the systems and organs of pregnant women. The changes impact: lifestyle, physical activity, mentality, hygienic habits, ways and frequency of eating and the qualitative composition of meals. Energy needs of a mother-to-be trigger an impulse of eating snacks, especially high-carbohydrate products, and this has an impact on the overall health condition of women and the state of oral cavity in particular. It appears that the presence of inflammatory foci in the mouth of pregnant women can cause medical complications during pregnancy. Therefore, health awareness of oral cavity problems and the specificity of dental care in pregnant women can have a positive impact on the course of pregnancy, women’s health and the proper development of the foetus and newborn.

Key words - pregnancy, dental care, oral hygiene, rentgenodiagnostics.

Streszczenie – Kobieta ciężarna jest wyjątkowym pacjentem w gabinecie stomatologicznym. Ciąża jest okresem wielu zmian w organizmie. Zachodzą one we wszystkich układach i narządach ciężarnej. Zmianom ulegają: sposób życia, aktywność fizyczna, psychika, zwyczaje higieniczne ciężarnej, sposób i częstotliwość odżywiania, skład jakościowy przyjmowanych posiła, potrzeby energetyczne, przyspieszenie matki wyzwala w niej odruch podjadania, często produktów wysoko węglowodanowych, co nie pozostaje bez wpływu na ogólny stan zdrowia kobiety a w szczególności na stan zdrowia jamy ustnej. Okazuje się, że obecność ognisk zapalnych w jamie ustnej ciężarnej może być przyczyną powikłań zdrowotnych w czasie ciąży. Dlatego świadomość zdrowotna dotycząca jamy ustnej i specyfiki opieki stomatologicznej u kobiet ciężarnych może mieć pozytywny wpływ na przebieg ciąży, zdrowie kobiety i właściwy rozwój płodu a następnie noworodka.

Słowa kluczowe – ciąża, opieka stomatologiczna, higiena jamy ustnej, rentgenodagnostyka

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I. TREATMENT PLANNING IN PREGNANT WOMEN

Before starting dental treatment in pregnant women, we should choose the optimal position in the dental chair. We definitely ought to avoid lying on the back, which has a double justification. Hormonal changes relax the gastrointestinal tract smooth muscles, peristalsis slows down, the intragastric pressure increases and hiatal hernia develops (1-4). All these factors can cause strong retrosternal pain or aspiration of the gastric contents (1). When planning treatment which is associated with lying on the back, we should take into account the possibility of inferior vena cava syndrome. This position can reduce the blood flow into the heart and thus suddenly decrease the blood pressure, increase heart rate, cause pale skin and the loss of consciousness (1-4). Moreover, in the supine position, venous pressure in the legs increases, causing them to swell and promoting the formation of blood clots and the development of deep vein thrombosis (1). Therefore, we should place the patient in the position of the tilt of the body about 10-15 degrees to the left.

The therapeutic management in pregnant women should be modified depending on the trimester of pregnancy. The treatment of acute inflammation and pain should be held immediately, regardless of the time of pregnancy. In the absence of acute complains and the risk of rapid disease
progression, we should choose the most favourable moment for treatment (5,6). During the first trimester of pregnancy, the dentist should thoroughly examine the condition of the oral cavity, determine individual therapeutic needs and provide comprehensive information about diet, prevention against caries and periodontal diseases (1, 7-10). Visits in this period should be shorter, we ought to avoid sudden changes in the position of the patient's body and taking into account dyspeptic problems in the morning we should plan visits in the afternoon (1,8). Treatment may be hampered by fatigue of patients, pressure drops and fainting (1,8). Therefore, it should be limited only to necessary situations, which carry a low risk and provide greater benefits than its abandoning (2,8,10). The safest period for performing dental procedures is the second trimester of pregnancy, when organogenesis is completed and the risk of provoking a premature birth is relatively small (1,8,11). At this time, women feel good and are emotionally stable. However, they can experience muscle cramps in the calves, thighs, and buttocks, which limits comfort in the dentist's chair (3,10). In the 7, 8 and 9 month, pregnant women experience increasing fatigue, mild depression, mood swings and pain in the lower back (8,10). Therefore, a visit at the office should be as short as possible. The third trimester is a great moment for the implementation of prenatal caries prevention (8,10). At this time, however, the uterus becomes very sensitive to any external influences, which might cause premature labour. Therefore, the safest management is to continue preventive treatment (11).

II. HYGIENE

It has been shown that an increase in the sex hormones serum concentration during pregnancy promotes the growth of the anaerobic bacteria titre in the mouth (7,12-16). There is a hypothesis that bacteria can travel to the uterus and initiate the release of pro-inflammatory cytokines that stimulate uterine contractions and dilation of the cervix, which in turn allows for the penetration of other bacteria, resulting in rupture of uterine membranes and preterm delivery (15, 17-19). In addition, teeth brushing can initiate bleeding from the gums and thus softer and less thorough cleaning. We should emphasize the need to pay special attention to the meticulous performance of hygienic procedures, supplemented as recommended by the topical application of disinfecting and fluorinated compounds (4, 6, 10, 20, 21), although the use of the latter is controversial (22-24). It has been proven that sucking of tablets with fluorine by the mother has an impact on the condition of her enamel, but the effectiveness of endogenous fluoridation and its impact on the teeth of developing baby is now undermined (6, 22-26). Education on the oral health during pregnancy and its influence on the health of the foetus and the child's teeth should be implemented at the time of pregnancy planning and in its early stages [6,11,16,25-28]. This applies to the techniques of teeth brushing, choosing the right hygienic equipment, rinses, varnishes and sugarless gum containing xylitol [9,11,20,26,27]. Dental preparations with chlorhexidine are especially recommended in pregnancy. Their professional use is advised at the end of foetal organogenesis (i.e. in the second and third trimester of pregnancy). Given that they bring clear benefits to the mother and child, the safety of their use should not raise concern provided that the indications are observed [1,4,6,10,14,25,29]. Approximately 50-90% of pregnant women suffer from nausea, vomiting, heartburn and other symptoms of dyspepsia, which may lead to a pH drop in the oral cavity, and the resultant enamel dissolution [3,12,13,30]. To prevent this, brushing should be avoided immediately after vomiting and we ought to recommend the patient to rinse the mouth each time with a solution of sodium bicarbonate. The demand for calcium and phosphorus increases in the second trimester of pregnancy [30]. However, calcium absorbed by the foetus does not come from tooth enamel of the mother, which is a circulating myth. As tooth enamel is built of a stable crystalline form, it is very difficult to "extract" this element out of it. There is also no evidence that pregnancy directly contributes to the increased incidence of dental caries. A growth in the activity of decay may instead be associated with an increased period of oral hygiene negligence, a sudden change of habits and diet [9,16]. It is very important to educate gynaecologists about oral hygiene during pregnancy. Bacterial tooth plaque, carious defects flora and pathological conditions of the soft tissues surrounding the tooth are a habitant of bacteria, products of their metabolism, inflammatory and immune mediators. Their very negative impact has been proven on distant organs of the body of pregnant women, other than the oral cavity [2,3,15,17-19]. They may also penetrate via the haemotogenic way through the placental barrier.

III. DIET

The buds of child's teeth begin to form in the embryonic period i.e. from the 5th week of pregnancy. Their further development and the beginnings of mineralization continue throughout pregnancy [27,28]. The properly composed diet of the mother is crucial to the proper development of the foetal teeth. We should stress a great role of vitamins A, C and D, which are involved in the development of enamel, dentin, radical cementum and blood vessels of the pulp;
proteins affecting the size of the teeth, the shape of crowns, time of eruption of molars as well as the susceptibility to decay. Maintenance of appropriate protein-carbohydrate-fat balance with the limited intake of simple carbohydrates and an increase of consumption of vegetables, fruits and dairy products create optimal conditions for the development of foetal teeth buds [4,9,11]. We should not ignore the impact of herbs on the body of pregnant women and the normal course of pregnancy. Mouthwash with sage, infusion of raspberry leaves and preparations with aloe vera should not be used. The first two affect the contractile activity of the myometrium, while the third causes the excessive congestion of the pelvic minor organs. It is also not advisable to use in the oral cavity mixtures of herbs for the topical application due to the content of alcohol [4,9,11].

IV. CHANGES IN THE ORAL CAVITY

The vast majority of changes in the oral cavity of pregnant women is the result of steroid hormones (progesterone and oestrogen) and their fluctuations and changes in diet [2,12,14,25]. The salivary glands and other gastrointestinal glands increase their secretion during pregnancy [12]. Changes involve the level of calcium, phosphorus in saliva, and the release rate and buffer capacity of saliva (leading to burning sensation and dryness). This causes a decrease in the saliva pH at rest (during pregnancy it is less than 7) and the levels of electrolytes and IgA [8,30]. The qualitative and quantitative composition of saliva also changes. Some pregnant women showed in studies an increase in the mucin content, which had an impact on the density of saliva and could promote the plaque formation [12,13]. The mucosa of the mouth is prone to oedema, which in turn makes it easier to injure and bleed [2,7,29]. Pregnant women more frequently develop mucosal changes typical of lichen planus and geographic tongue [14]. Sometimes, the teeth are more moveable as a result of periodontal tissue congestion accompanied by increased sensitivity to thermal and osmotic stimuli. These symptoms usually disappear after delivery [2,7,14]. According to the classification of periodontal diseases developed by the American Academy of Periodontology, gum diseases in pregnant women are associated with plaque and are modified by general factors. The signs of gingivitis include: changed colour, shape, texture, bleeding on probing, and brushing. If left untreated, gingivitis can progress to periodontitis [7,14]. Pregnancy gingivitis is a transient phenomenon, systemic (25 to 100% of patients), or topical. Clinically, it is manifested by severe congestion, oedema, proliferation of the gingival margin and a tendency to bleed [14,17]. The height of symptoms is noticeable in about 8 month of pregnancy and decreases with the approaching date of labour [14,19]. Approximately 5% of patients suffer from hypertrophy of the gums. Nodules on the gums are rarely larger than 2 mm and usually disappear without treatment after labour. Epulis is a special case [14]. It is usually located on the frontal surface of the alveolar process of the maxilla and appears in the second trimester of pregnancy. It easily bleeds and is usually painless. If we need to remove those changes, the second trimester of pregnancy is the best time [2,7,15,19]. After labour, the majority of changes tend to disappear. It is estimated that approximately 18% of preterm births and those with low birth weight of infants is associated with the infection in the course of periodontal disease. Chronic periodontal disease six times elevates the likelihood of premature birth, which increases with the severity of maternal periodontal disease [15,17,18]. Therefore, the correct prevention and treatment of endodontic diseases seem to be important.

V. ENDODONTIC TREATMENT IN PREGNANT WOMEN

Pregnancy is not a contraindication to endodontic treatment, and the rules of conduct are standard: enucleation of the pulp, measuring the working length with an endometer, chemo-mechanical preparation and filling of the canal: final or temporary. We should avoid devitalisation preparations in favour of extirpation under anaesthesia. Standard washing rinse agents should be used (sodium hypochlorite, normal saline, chlorhexidine, citric acid). The accuracy of filling should be radiologically evaluated after labour. We should definitely avoid the use of so-called "open treatment" which leaves the tooth chamber open without supplying the defect with dressing, because this leads to the penetration of bacteria from the mouth into the root canal system and the alveolar bone [10,11,20,31].

VI. DENTAL SURGERY PROCEDURES IN PREGNANT WOMEN

Odontogenic foci of infection, such as teeth with necrotic and gangrenousum pulp, granulomas, periapical cysts and periodontal diseases exacerbate in pregnancy due to homeostasis disorders. If left untreated, inflammation may be a greater threat to the mother than a properly conducted surgery [10,20,31]. Therefore, lesions should be removed because of the risk of acute inflammation, local and systemic complications [31]. Withdrawal from the extraction of the unpromising tooth (disqualified for
endodontic treatment) in order to protect the patient against the stress of the surgery or possible complications, is a mistake in art [31]. Surgical procedures in pregnant women should be carried out with the principles of atraumatic work, with caution and only when necessary. The second trimester is the safest time. Besides, sometimes surgeries are performed only with emergency indications [31]. Each surgical procedure should be carried out after collecting careful medical history, with particular emphasis on the obstetric past. In any case, we should consult with the obstetrician and get his/her approval for elective surgery [31].

VII. RAY DIAGNOSTICS

When performing medical procedures in pregnant women, we should consider the benefit of a specific action vs. risk. This rule also applies when taking radiographs according to the ALARA principle (as low as reasonably achievable) [32]. During pregnancy diagnostic radiology should be limited to a minimum and carried out only in absolutely necessary cases, despite the fact that the illuminated body area is located at a distance from the uterus, thus giving a relatively high guarantee of safety [32]. The estimated dose of radiation which penetrates to the foetus during a single picture of teeth is 0.01 mrad. It is assumed that a dose of less than 5 rads does not increase the risk of malformations in the foetus. The studies also show that at the pantomography picture, the dose to the uterus is less than 1CGy, which is much less than the exposure of the uterus to natural radiation [29]. We should also pay attention to the medical staff who are pregnant. There are no contraindications to operate the X-ray camera by pregnant women, provided that any precautions are taken [29,32].

Indications for diagnostic radiology include mainly surgeries and the procedures are carried out only if all auxiliary methods of clinical diagnosis have been exhausted (palpation, percussion, pulp vitality test, data from medical history). Indications can be extended to life-threatening conditions, rare in dentistry, and generalized infections resistant to treatment or post-traumatic conditions. The decision to take a radiological picture should always be very well thought out, and all the requirements of protection must be maintained during its implementation (lead shields for the abdomen and pelvic cavity, modern lamps of the radiological camera with a long tube, films with high sensitivity, the use of digital radiography) [32].

VIII. OZONE AND LASER THERAPY

Ozone affects blood cells and leads to the stimulation of aerobic metabolism. It increases cellular energy and improves microcirculation. At present, it is more and more often used in dentistry, particularly to inhibit the bacterial growth [33,34]. Destruction of pathogens is based on its strong oxidizing properties. Low doses of ozone have the activating effect on the immune system. Higher concentrations have antiseptic properties. However, there are contraindications to the use of ozone in pregnant women because of the possibility of damage to the walls of the pulmonary alveoli by the accumulation of free radicals and peroxides. In addition, high concentrations of ozone can irritate mucous membranes, cause dry mouth, asthma attacks, shortness of breath and chest pain [33,34]. The influence of laser on the foetus has not been explored yet, therefore it is not recommended in pregnant women [35].

IX. PREGNANCY AND DRUGS USED IN DENTISTRY

Often, certain drugs, such as antibiotics or painkillers cannot be avoided during pregnancy. Generally prevailing opinion that pregnant women should not take any medications and inflammation ought to be cured by home remedies is a mistake which can cause more harm than benefit [5,25]. The studies show that as many as 92.6% of pregnant women take pharmaceutical preparations available without prescription [5,36]. During pregnancy, plasma volume and creatinine clearance increase with the consequent lower concentration of chemotherapeutic agents in the blood compared to non-pregnant women. Most chemotherapeutic agents cross the placenta and have a potential impact on the foetus [5,36-38]. The US Department of Food and Drug Administration (FDA) classifies drugs into five categories (Table 1) based on the degree of harm caused to the mother and developing foetus.

Antibiotics are 37% of all agents used in pregnant women. They are the most commonly prescribed medications, just after vitamins. However, they should be used in cases of absolute necessity, in the prevention of ascending infections and newborn infections with streptococcus group B [38], making sure to choose only those with documented safety for the mother and child. It is also important to use antibiotics at a dose as low as possible, but effective. Sub-therapeutic doses may be ineffective and expose pregnant women and the foetus to the risk of adverse reactions [5]. If possible, we should avoid treatment in the first trimester of pregnancy, because it is a period when the foetus is the most vulnerable to
iatrogenic effects of drugs [38]. Most frequently administered antibiotics belong to the group of B-beta-lactam antibiotics: penicillin, cephalosporins, and macrolides [38,39]. Indications to the use of penicillin in pregnancy are extensive. In dentistry, we administer them in endodontics, implantology, surgery, and the prevention of bacterial endocarditis [37,38]. The use of amoxicillin in early pregnancy may be associated with an increased risk of cleft lip and palate in newborns, which was not observed for other penicillins and cephalosporins [36]. Some cephalosporins are contraindicated in the first trimester of pregnancy (cefdroxil, cephalaxin, cefotaxime, ceftazidime) [36]. Macrolides (category B; erythromycin) and lincosamides (category B; clindamycin) are sometimes combined with metronidazole and given in the infections in the case of root canal therapy, periapical abscess and the prevention of bacterial endocarditis. As their effect on the foetus have not been fully tested, caution should be exercised in their prescription [36-39]. They are used in allergy to penicillins and cephalosporins. Metronidazole (category B) is prescribed together with amoxicillin and used in progressive or acute bacterial periodontitis. It not recommended in the first trimester of pregnancy [37,39]. Tetracyclines (category D) are contraindicated during pregnancy. These drugs are stored in the form of fluorescent deposits in dentin and bones during their calcification causing discoloration (yellow-dark-brown) and aplasia of teeth buds (enamel defects and the increased susceptibility to decay) [39]. They are also toxic to parenchymal organs and inhibit the growth of articular cartilage in the foetus. We should avoid chloramphenicol (haematological disorders, cardiovascular collapse of newborns), sulfonamides (jaundice, neonatal aplastic and haemolytic anaemia) and aminoglycoside antibiotics (categories C and D) due to their ototoxicity, nephrotoxicity [5,37-39]. Among antifungal agents, nystatin and clotrimazole (category B) are considered safe. Ketoconazole, fluconazole and corticosteroids belong to category C and should be avoided during pregnancy [5,37-39]. Among all painkillers available and widely used in Poland only paracetamol was classified by the FDA to category B for the entire pregnancy [39]. It can be used in therapeutic doses for a short time, but we should remember about its nephrotoxicity in a dose of more than 3g per day. The combination of paracetamol and caffeine can have teratogenic effects [5,37,38]. Recent reports also indicate an increased risk of asthma in offspring, as well as the risk of premature birth, pulmonary embolism or even preeclampsia. Diclofenac (category B; category D in the third trimester), ketoprofen (category B, category D in the third trimester), ibuprofen (category B; category D in the third trimester) and naproxen (category B; category D in the third trimester) are relatively safe. Commonly known aspirin (acetylsalicylic acid) is classified as category D and is not recommended in pregnant women. It may in fact prolong pregnancy and promote the premature closure of the ductus arteriosus (with the consequent rise in the number of stillbirths). It also increases the risk of intracranial haemorrhage in the course of perinatal injuries [39]. Morphine should not be used because of the possibility of addiction, withdrawal symptoms and respiratory disorders in newborns [37-39]. Regardless of the trimester, stressful situations should be avoided by reducing pain [40]. Maternal stress associated with surgery is a major negative factor affecting the foetus. It stimulates the constriction of uterine blood vessels leading to ischemia. This can cause the contraction of the uterus and secondary foetal ischemia and, consequently, miscarriage or premature delivery [31,40]. Almost all local anaesthetics can easily cross the placenta and enter the bloodstream of the child. Local anaesthetics fall into two chemical groups: esters (quickly degraded by plasma cholinesterase) and acid amides (longer degraded by amidase). Esters are formulations of choice because of the activity of esterase enzymes in the child’s body [40]. Moreover, esters highly bound to plasma proteins, which reduces the degree of their passage through the placenta. The opinions of authors about the use of decongestants are divided [40]. Anaesthetics without decongestants appear to be drugs of choice, especially in the first and third trimester [40]. However, studies show that their addition reduces the overall drug dose, which suggests that they are safe in healthy uncomplicated pregnancy. At present, lidocaine, articaine, ropivacaine and prilocaine, which is not available in Poland, are considered safe [31,40]. General anaesthesia is contraindicated in pregnant women if the treatment can be performed under local anaesthesia. It can only be used in life-saving surgeries [31]. Premedication using benzodiazepines is contraindicated because of the risk of CNS birth defects and cleft palate in newborns. The only correct premedication is mental, calming doming of the patient and building trust to the doctor. Nitrous oxide ("laughing gas"), a drug often used by dentists especially in the treatment of patients with dental fear, was not qualify for any of the FDA categories. Its use in pregnancy is controversial. It was demonstrated that it reduced the blood supply to the uterus and increased the risk of miscarriage in the dental office workers exposed to its action over three hours per day [34]. A mixture of oxygen and nitrous oxide is safely used in the perinatal period as one of adjunctive methods and painkillers.
X. SUMMARY

A pregnant woman should be provided with extensive prenatal care covering the multidisciplinary approach to her and her unborn child. Apart from gynaecological-obstetric care and others, it includes dental care which consists of treatment, health education and prevention. Interdisciplinary collaboration between gynaecologist and dentist is a key element in care for pregnant women. Recent years have seen a distinct improvement in the possibilities of comprehensive treatment of pregnant women. However, a universally applicable model of dental care during pregnancy has not been developed yet. To sum up, dental treatment of pregnant women should take into account the following limitations:

- contraindications to X-ray pictures,
- the limited possibility of using certain drugs,
- periodic psychological and physical indisposition of patients.

Table 1. Classification of drugs by the US Department of Food and Drug Administration (FDA) [39]

<table>
<thead>
<tr>
<th>Category</th>
<th>Description of the degree of harm to the pregnant woman and the developing foetus</th>
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<tbody>
<tr>
<td>A</td>
<td>Controlled studies conducted in pregnant women did not show harmful effects on the foetus</td>
</tr>
<tr>
<td>B</td>
<td>Studies in animals showed no risk to the foetus, but this was not confirmed for pregnant women</td>
</tr>
<tr>
<td>C</td>
<td>Studies in animals showed adverse effect on the foetus, but this was not confirmed in pregnant women – used if the advantage of the drug for the mother outweighs the risk of adverse reactions in the foetus</td>
</tr>
<tr>
<td>D</td>
<td>There is a documented risk of adverse effects on the human foetus, used only in cases where the drugs from category A, B, C cannot be applied</td>
</tr>
<tr>
<td>X</td>
<td>Drugs absolutely contraindicated in pregnant women</td>
</tr>
</tbody>
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XI. REFERENCES


