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Management of Odontological Emergencies for Pregnant Women

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Abstract: The emergency treatment for women during pregnancy requires a reasonable approach.
Controlling the pharmacopoeia is necessarywhen prescribing drugs, to avoid repercussions on boththe mother and the fetus.
In this article, the authors take stock of the medicines authorized for pregnant women, and the course of action to be taken by the dental surgeon in case of an emergency therapeutic act.

MeSH: Pregnancy, pregnant woman, dental treatment, x-rays, dental anesthesia..

I. Introduction

Pregnancy is a physiological condition in which the maternal-fetal-placental unity must be considered.
Quite often, the pregnant woman represents a "therapeutic taboo" for the dental surgeon.However, bacteria in an areaif not sufficiently and quickly treated, can reach the fetus.

Moreover, the therapeutic act can be associated with a careful drug prescription by the practitioner, because the different pharmacokinetic stages will be modified by the stage of pregnancy of the mother.

Thus, unrevised drug prescription can have repercussions on the development of the fetus, and the practitioner's responsibility will then be correlated with it.

II. Drug Prescription for Pregnant Women the Different Periods of Pregnancy

Of a lipoprotein nature, the placenta is in no way an insurmountable barrier, the effects of Thalidomide have clearly demonstrated it **(1).**

The first trimester corresponds, from a biological point of view, to the segmental and embryonic periods.

During the segmental period, which extends from fertilization to the 14th day of development, the law of all or nothing (embryonic death or lack of effect) has only been shown and proven with ionizing radiations. However, owing to the weak exchanges between the mother and the embryo at this stage, it is likely that the impact of external agents is of little consequence**(2).**

The embryonic period (between the 14th and 56th day) corresponds to the organogenesis. It is during this period that a drug may be teratogenic**(3,4,5).**

The second and third trimesters correspond to the fetal period (2nd month until delivery). During this stage, the active substance of the drug may cause fetotoxicity. This can be dramatic, because some effects are difficult to detect at birth, and because they can have an impact a few months or a few years after exposure, as shown by the use of diethylstilbestrol **(6).**

Thus, before giving any prescription to a pregnant woman, it is imperative to know the stage of pregnancy she is in.

III. Medicinal Prescription During Pregnancy Antalgics

-Non-morphine analgesics: (Level 1 of the O.M.S)

+Paracetamol:

Among all level 1 analgesics, paracetamol is the active substance of choice for pregnant women **(7).**

Active substance	Specialties	Use in pregnant women	Use during breastfeeding	Possible effects
Paracetamol	Doliprane®, Efferalgan® generics	Yes, first-line patients	Yes	None
Acetylsalicylic acid	Aspégic®, Aspro®, generics	- 1st and 2nd trimester: not recommended - 3rd trimester: contraindicated	Not recommended Not recommended	3rd trimester: cardiopulmonary, renal toxicity, prolongation of bleeding time
Other NSAIDs		- 1st and 2nd trimester: not recommended - 3rd trimester: contraindicated	Not recommended Not recommended	3rd trimester: cardiopulmonary, renal toxicity, prolongation of bleeding time
Paracetamol codzine	Efferalgan®, Codéine®, generics	Possible in short and punctual treatment	Not recommended	Withdrawal syndrome in newborns
Paracetamol dextropro-poxyphène	DiAntalvic®, generics	Possible in short and punctual treatment	Not recommended	
Tramadol	Contramal®, génériques	Contraindicated	Contraindicated	
Paracetamol Tramadol	Ixprim® Zaldiar®	Contraindicated	Contraindicated	

Table 1: O.M.S level 1 and 2 analgesics (6).

In voluntary or accidental poisoning with paracetamol for a pregnant woman, the antidote, N-acetyl cysteine, has generally been shown to protect the liver of the fetus**(8).**

+**Salicylates and NSAIDs:**

Salicylates (aspirin) and NSAIDs hold the peculiarityof having a very similar mechanism of action, and side effects.

Among the NSAIDs, only a few compounds, for a given dosage, possessan indication as an analgesic. All these substances are inhibitors of prostaglandin synthesis by non-specific inhibition of cyclooxygenases (COX1 and 2).

There has never been any evidence of a teratogenic effect regarding these drugs.
The risk of fetotoxicity, essentially at the end of pregnancy, is well established. For the fetus and /or the newborn exposed in utero to NSAIDs, the toxic effects are consecutive to an inhibition of synthesis of fetal and neonatal prostaglandins.

This inhibition may be responsible for vasoconstrictor effects in certain areas, particularly the kidney and the cardiopulmonary system. In the kidney, fetal and / or neonatal renal failure, transient or definitive, which can lead to death, has been observed.In the cardiopulmonary level, the constriction in utero of the arterial canal can cause fetal death in utero, right heart failure and / or pulmonary hypertension, sometimes fatal for the newborn.

These disorders can appear when very small doses are taken (1 day), at the usual dosages, and are even moreserious when the exposure is closer to childbirth.

For all these different reasons, the use of salicylates and NSAIDs should be avoided during the first two trimesters of pregnancy, and if necessary, should be prescribed at the lowest effective doses **(9).** On the other hand, they are categorically contraindicated during the third trimester and must be systematically replaced by paracetamol.
However, some studies suggest an increasing risk of spontaneous abortion, following the taking of NSAIDs **(10).**

-Minor morphine painkillers: (O.M.S level 2)

Minor morphine painkillers are mainly central painkillers that work primarily by binding to morphine receptors **(Table 1).**

+Codeine:

The malformation risk associated with taking codeine during the first trimester has not been established**(11,12,13).** Furthermore, no fetal toxicity has been demonstrated.

The observed disorders appear during repeated and high doses takings near the end of the term, generally in female drug addicts (14). We can then observe a withdrawal syndrome in the newborn combining diarrhea, suction disorders, tremors, and agitation (Mangurten et al. 1980) **(14).**
Thus, codeine (associated with paracetamol) can be prescribed to a pregnant woman, at the usual dosages, in a punctual,short-term treatment, and only if the indication of a pain reliever level 2 is necessary.

+Dextropropoxyphene

The data on the use of dextropropoxyphene strongly suggest an absence of malformation risk or fetal toxicity (10). Like codeine, the best documented adverse reactions are withdrawal syndromes in newborns of mothers who have taken long-term, high doses of dextropropoxyphene**(15).**

Consequently, a combination of dextropropoxyphene paracetamol can be prescribed as a short-term cure during pregnancy.

+Tramadol

Tramadol should not currently be used during pregnancy as there are no data sufficiently relevant to assess the safety of its use for pregnant women**(10).**
In newborns, it can induce changes in the respiratory rate that is usually not clinically significant.

CORTICOIDS
Prednisone or prednisolone are the substances of choice to prevent the formation of post-surgical edema. Indeed, they associate with weak mineralocorticoid effects, a short biological half-life, and an anti-inflammatory effect of medium intensity (four times that of cortisone).

Thus, during treatment of a few days (five on average) at the starting treatment dose (usually 1 mg/kg/day) the side effects of these compounds are negligible.

During pregnancy, the risks to the mother (high blood pressure, excessive weight gain and diabetes) only appear during prolonged treatment. Consequently, short-term use of prednisone or prednisolone during pregnancy is possible **(7).**

ANTIBIOTICS

"If an antibiotic prescription is justified during pregnancy", we will first prescribe amoxicillin, then macrolides, metronidazole and finally the amoxicillin-clavulanic acid combination, and this, at all stages of pregnancy **(Table 2) (16,17).**

Amoxicillin is the antibiotic of choice and reference for pregnant women. It has never been described for animals or humans with a teratogenic or fetotoxic effect**(10).** Its use for many years and in a very large number of pregnant women makes its use during pregnancy almost harmless **(8, 18).**

For a pregnant woman who is allergic to penicillins, the choice should be directed towards an antibiotic of the macrolide family.We can safely use spiramycin, antibiotic of 1st intention in the treatment of toxoplasmosis of pregnant women, or erythromycin. For the others, notably clarithromycin and azithromycin, although no teratogenic effect has been demonstrated and they must be safe, their prescription should not be doneonly if the expected benefits outweigh the risks involved**(19).**

As for metronidazole (family of 5-nitro-imidazoles), its use during pregnancy is more controversial.

In the United States, for safety, the American college of obstetricians and gynecologists contraindicates the use of metronidazole during the first trimester of pregnancy**(19).** In France, the Afssaps and the transparency commission consider the use of metrodinazole possible at all stages of pregnancy as well as the metrodinazole-spiramycin combination **(20).**

The combination amoxicillin / Clavulanic acid (Augmentin® and generics) should only be used as a second intention (for pregnant women, as for other patients). Studies during pregnancy are few and relate to small numbers. However, no link has ever been made between the use of the combination and the occurrence of congenital malformations **(21,22).**

Thus, since epidemiological studies do not make it possible to definitively exclude all risks, it is recommended to prescribe the amoxicillin / clavulanic acid combination only if it is really necessary **(6, 18, 23).**

As for tetracyclines, during the first trimester, nothing is to be feared. On the other hand, they lead to the inhibition of protein synthesis and the decrease in the incorporation of Calcium and proline in mineralized tissues. This results in a decrease in bone growth and a dyschromia accompanied by an irreversible hypoplasia of the dental enamel.

Cyclins can also cause fatty degeneration of liver cells and pancreatic necrosis for pregnant women and parturients.
Cyclins should therefore not be prescribed during the 2nd and 3rd trimester of pregnancy **(24).**

Active substance	Specialties	Use in pregnant women	Use during breastfeeding
Amoxicillin	Clamoxyl® Hiconcil®, Generics	Yes first-line	Yes
Spiramycin	Rovamycine®	Yes if allergy to amoxicillin	Not recommended
Erythromycine	Ery®	Yes if allergy to amoxicillin	Not recommended
Azithromycin	Zithromax®	Contraindicated	Contraindicated
Métronidazole	Flagly®	Yes	Yes
Spramycin-Métronidazole	Rodogyl® Birodogyl®	Yes	Yes
Pristinamycin	Pyostacine®	Yes	No
Clindamycin	Dalacine®	No	Contraindicated
Amoxicillin-clavulanic acid	Augmentin® generics	Yes	Yes

Table 2: Antibiotics recommended in Odontostomatology (6).

LOCAL ANESTHETICS

All anesthetics pass through the placenta, however teratogenic effects of these compounds have never been shown. The plasma concentration of amide local anesthetics is dependent on the plasma level of the α-1 glycoprotein. This, by fixing the anesthetic molecule, allows its hepatic detoxification. For pregnant women, the relative level of these proteins is generally reduced, leading to an increase in the free fraction of the anesthetic, and consequently in the quantity likely to pass through the placental membrane.

To reduce this potential risk, short-acting molecules such as lidocaine or articaine. Thus, with these molecules there is no increase in the risk of malformation, so they can be used on pregnant women if necessary **(25).**

VASOCONSTRUCTORS

Very often, anesthetics are combined with a vasoconstrictor, adrenaline (or epinephrine) in most cases, at concentrations of 1 / 100,000 or 1 / 200,000. The harmful effects of this compound appear during the accidental intravascularinjection,starting from a dose of 15µg. In this situation, adrenaline causes vasoconstriction of the uterine arteries responsible fora decrease in blood flow. In animals, the decrease in irrigation is transient and

these effects, both in duration and in amplitude, are similar to that observed during a physiological uterine contraction.

Thus, the use of vasoconstrictors associated with anesthetic molecules is possible during pregnancy if necessary (6).

THE PARTICULARITIES OF THE EMERGENCY CARE OF THE PREGNANT WOMAN RADIOGRAPHY

As a rule, any radiation during pregnancy is dangerous for the fetus, especially during the first trimester.

However, there are therapeutic or diagnostic situations where taking an X-ray is necessary.
In such cases, the use of high-speed printing films, a high-voltage unit, a long cone and a lead apron reduces the risk of radiation.

The dose of X-rays not to be exceeded during pregnancy has been set between 5 and 10 Rads. Taking a dental check-up carried out under protection with a lead apron results in an irradiation dose of 0.00001 Rads. On the other hand, sialographic examination of the salivary glands during pregnancy is categorically contraindicated because iodine causes thyroid insufficiency responsible for the death of the fetus by asphyxiation **(26, 27).**

THE ACTS OF CARE

Prescriptions

The prevention and treatment of infections should also be one of the practitioner's concerns vis-à-vis a pregnant patient.
Finally, remember that a certain number of pharmaceutical specialties are contraindicated in the context of pregnancy:

-Drugs with a respiratory depressant effect (sedatives, analgesics mixed with morphine, psychotropic derivatives).
-Nonsteroidal anti-inflammatory drugs (NSAIDs) and acetylsalicylic acid which have a recognized teratogenic effect.
-Tetracyclines which cause dental staining in the unborn child.
-Streptomycin and gentamycin for their renal and auditory toxicities **(28).**

Anesthetics

Local anesthesia can be doneon pregnant women provided that certain rules are respected.
-Imperative suction before injection of a minimum quantity of products.
-Avoid the position in prolonged decubitus: risk of discomfort with disorientation and risk of loss of consciousness.

The "uterocave syndrome" by compression of the abdominal vascular system by the fetus is also to be feared (Figure 1).

It occurs as dizziness and a feeling of failure. This results in a reduction in the return blood flow, a decrease in cardiac output and cerebral anoxia...
-Avoid any anxiety that can cause a shock harmful to fetal oxygenation.

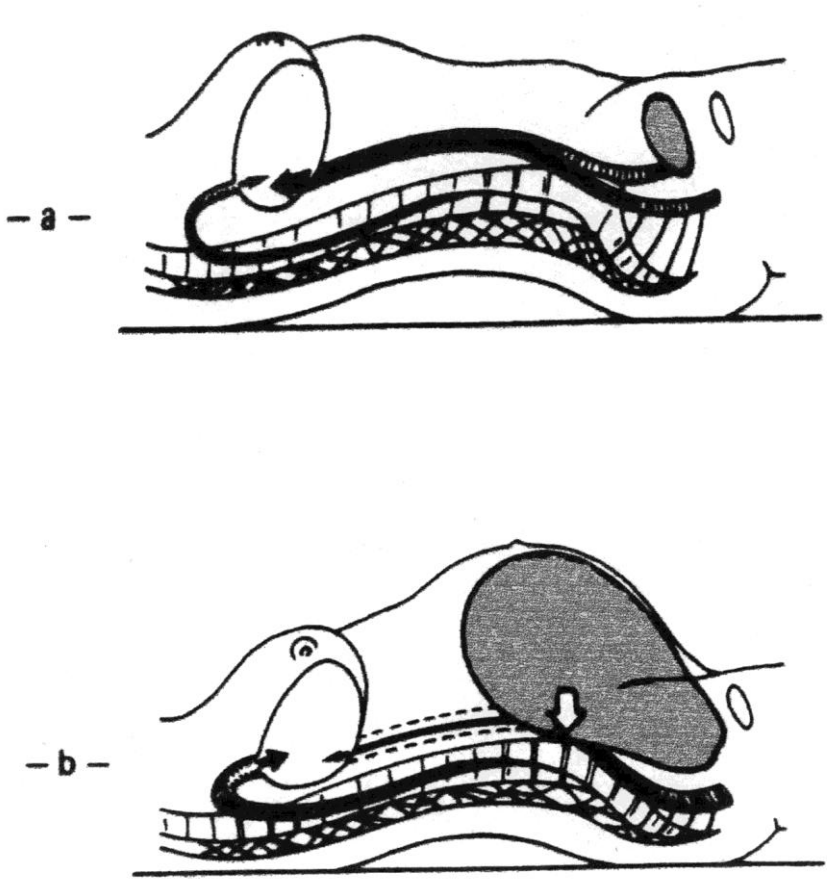

Fig 1: Compression of the inferior vena cava in supine position for pregnant women.

a-Venous return under normal conditions.

b-Venous return by the vertebral venous plexus and azygos veins in case of compression of the inferior vena cava **(2)**

Treatments themselves
Pulpitis treatment

An old adage said "a pregnancy, a tooth"; Contrary to this common idea, no study has shown that pregnancy promotes the occurrence of cavities.

In an emergency, pulpitis for example, there is no contraindication on performing the necessary gestures on pregnant women. Some simple precautions must be taken into consideration: use local anesthetics without adrenaline, limit the duration of care, especially in late pregnancy when the supine position can cause compression of the vena cava causing discomfort **(Figure 2).**

Following questions concerning the possible toxicity of mercury derivatives secondary to the release of mercury from dental amalgams, it is recommended "to avoid the installation andremoval of amalgams during pregnancy and breastfeeding". Again, a dental emergency can lead to the removal of an amalgam during these two periods **(26, 27).**

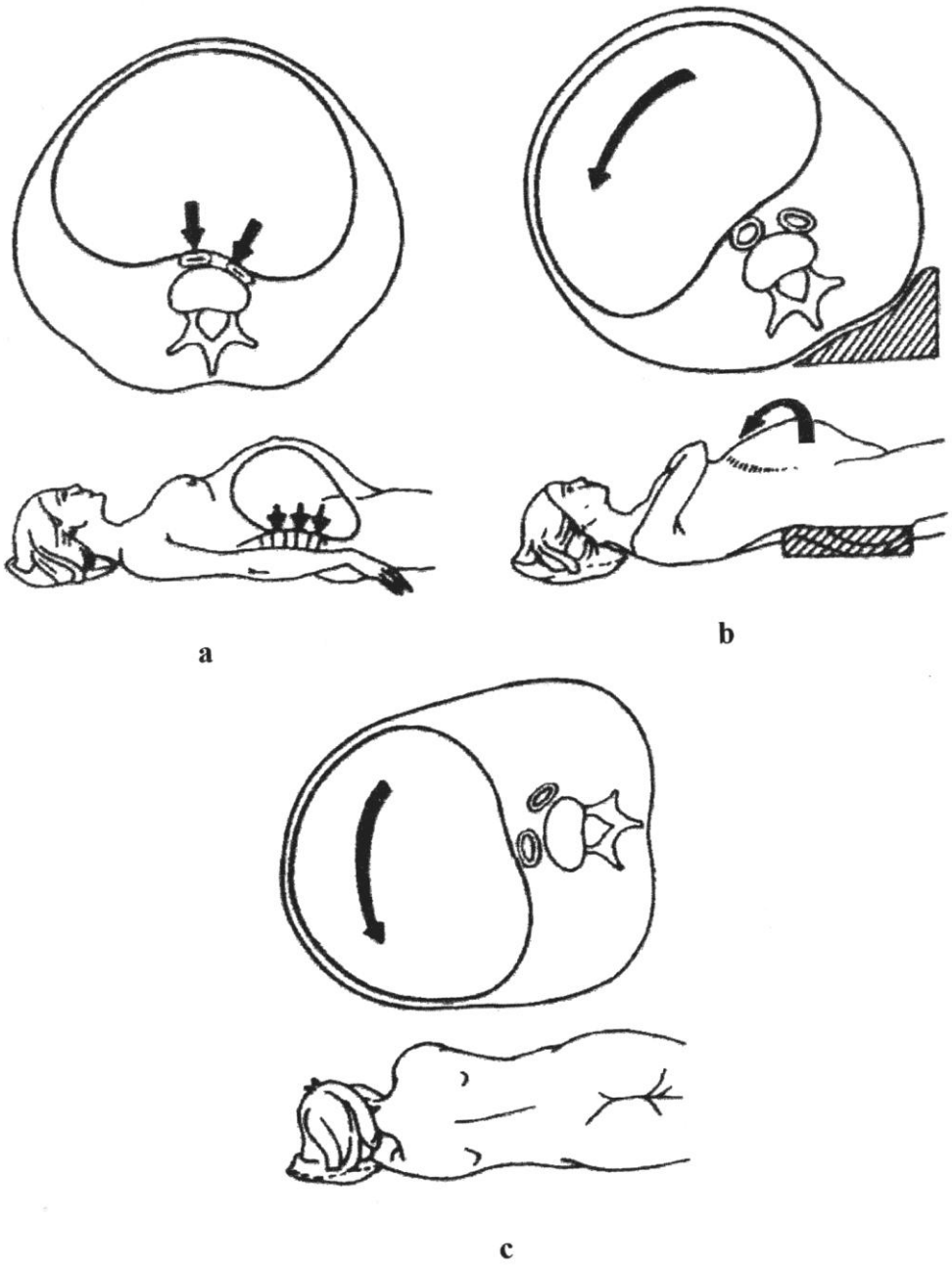

Fig 2:Position of the pregnant woman during treatment at the dentist

a-Compression of the inferior vena cava.
b-Prevention by raising the right side.
c-Treatment by setting the lateral position of left security **(2).**

Treatment of infections

Unless contraindicated, a pregnant woman can be treated like any other woman.
The general rule to adopt is to work closely with the obstetrician responsible for monitoring pregnancy. In principle, in an emergency, a pregnant woman can be treated like any other woman. Most authors currently

agree on providing pregnant women with all the necessary care, whatever the stage of progress they are in, unless if the gynecologist advises otherwise.

However, the dental surgeon must be vigilant and pre-conscious regarding certain associated pathologies (hypertension, diabetes, etc.) and / or complications which may arise, and which are inherent in pregnancy.

These complications are of two kinds:

-Some are common such as hypertension syndrome associated with the compression of the lower vena cava accompanied by nausea, bradycardia, diaphoresis, vomiting and fatigue.

-Others, rarer, such as: spontaneous abortions, manifestations of hypertension and edema after the 5th month, and convulsive, hypertensive and comatose manifestations.

In addition to the precautions that must be taken regarding the most appropriate time to perform care, anesthesia, the use of ionizing radiation and drug prescriptions, the dental surgeon must also surround himself with thosethat are specific to these pathologies, their complications and their treatments**(27,28,29,30).**

Surgical procedures

For surgical procedures (dental extractions and periodontal care), a very important element must be taken into account, that of the high bleeding risk of pregnant women, characterized by longer bleeding and coagulation times.
A hemostasis assessment would therefore be desirable before intervention.

Pregnancy exposes to a hemorrhagic risk

On the other hand, surgical procedures will preferably be performed during the second trimester of pregnancy since it is the most stable gestational period. However, in the case of an emergency, the dental surgeon can intervene at any time during pregnancy while respecting the precautions mentioned above **(27).**

Abscess and cellulite

In case of abscess and cellulite, the indication of tooth extraction can be asked for pregnant women.This therapeutic aspect is currently well codified and requires special precautions **(27).**

The care of the pregnant woman and the therapies are not developed in the same way and are adapted according to the gestation stage.

-During the first semester, only avulsions justified by urgency will be considered. Indeed, the fetus is particularly sensitive to any aggression during this period, and one must exclude any teratogenic risk or abortion. Furthermore, the woman finds herself in a period
where pain, nausea, fatigue make theact less desirable and management more difficult.

-During the second trimester, the patient and the fetus are in the least unfavorable period for the interventions. The practitioner takes care, however, to avoid acts that are too long or particularly traumatic, and to prescribe his treatments in the most economical and the least toxic way.**(27,28,29,30).**

-Beyond the first half of the second trimester, acts should be avoided outside the emergency.

In addition, extreme caution must be exercised while considering the use of ionizing radiation only in cases where imaging is required, in addition to using conventional protection methods (lead apron, exposure to low radiation : 5 to 10 rads) **(25).**

Alveolitis

In case of suppurative alveolitis, gingival curettage should be carried out, and antibiotic therapy adapted to the pregnant woman should be prescribed **(Table 2)**

CONCLUSION

The medical or surgical management of a pregnant woman is never harmless, and a neglected act or prescription can have particularly deleterious consequences.

Any intervention must be carefully considered in terms of benefit as well as risk, and it will always be advisable, as far as possible, to schedule care after the end of pregnancy. When this is not permitted and the indication of a drug therapy is essential, the choice should then be made on the drugs known to be the least "at risk" for the embryo during the first trimester and for the fetus for the last two trimesters. In general, it will be absolutely essential to know the stage of pregnancy, an essential parameter in decision-making.

The first three months correspond to the teratogenic risk period, the last three are the most sensitive to drug toxicity. Whatever the stage of pregnancy, the analgesic of reference will always be paracetamol, NSAIDs should be banned. In absolute terms, no antibiotic is formally contraindicated, the benefit always going to the mother, however in the first intention, amoxicillin will be the preferred choice, as its safety is now indisputable. It is also essential to work in close collaboration with the obstetrician gynecologist.

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