

Dermatologic surgery and cosmetic procedures during pregnancy - A systematic review

Cirurgia dermatológica e procedimentos cosmiátricos na gestação – Revisão sistêmica

ABSTRACT

Special considerations are necessary to contemplate any surgical procedure during pregnancy. Dermatologic surgeons must consider the best approach in order to minimize risks and provide optimal care to the mother and fetus. Nonemergency treatments should be postponed until after childbirth. When surgery is required, it is prudent to apply techniques and drugs that are well documented in the specialized literature.

Keywords: pregnant women; pregnancy; drug toxicity; ambulatory surgical procedures.

RESUMO

Considerações especiais são necessárias antes de qualquer procedimento cirúrgico durante a gravidez. Os cirurgiões dermatológicos devem considerar a melhor abordagem para minimizar os riscos e prestar o cuidado ideal para mãe e feto. Tratamentos não emergenciais devem ser adiados até o término da gestação. Quando a cirurgia for necessária, é prudente a utilização de drogas e técnicas bem documentadas na literatura especializada.

Palavras-chave: gestantes; gravidez; toxicidade de drogas; procedimentos cirúrgicos ambulatoriais.

INTRODUCTION

The practice of dermatologic surgery demands a careful approach that always takes into account an individualized risk/benefit analysis before planning and executing any procedure. This concept is especially important when treating pregnant patients, when the surgeon has to consider the woman's health as well as that of the fetus¹. In light of that responsibility, surgeons should always be well informed about the real necessity of performing surgeries during pregnancy and about how to conduct them appropriately should the need arise.

The authors gathered updated information to guide dermatologic surgeons regarding several themes concerning surgery during pregnancy, such as the expected changes in the pregnant woman's body, allowed medicines, techniques and recommended therapeutic options, and the controversy linked

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to aesthetic procedures.

A literature review was conducted on this topic using books as well as papers found in Pubmed, Medline, and Lilacs. The search included the following keywords, originally written both in Portuguese and in English: “dermatologic surgery,” “cosmetic surgery,” “pregnancy,” “gestation,” “surgical procedure,” “laser,” “use of drugs.” The following searched keywords were written originally in English only: “pregnant,” “botulinum toxin,” “drug toxicity,” and “microdermabrasion.” The articles reviewed were selected according to the following criteria: relevance of content regarding the implementation of surgical dermatologic procedures during pregnancy, English or Portuguese language, and publication date since January 1990. The information was selected according to its relevance and classified into themes to allow a more didactical interpretation of the results.

PHYSIOLOGICAL ALTERATIONS DURING PREGNANCY

Cardiovascular system: Hemodynamically, the cardiac output and the volume of circulating blood increase to meet the mother’s and fetus’ demand for oxygen, while at the same time occurs a decrease in the peripheral vascular resistance of the mother. The mass and volume of red blood cells also increase, however in a smaller proportion, causing a physiological hemodilution. The venous return decreases, as the gravidic uterus grows in size and compresses blood vessels^{1,2}. As maternal hypotension could rapidly compromise the uterine blood flow, the pregnant woman’s blood pressure should be carefully monitored during surgical procedures. The white cell count in the peripheral blood increases progressively during pregnancy, meaning that, in the absence of clinical signs or symptoms, it should not be misinterpreted as an indication of a hidden infection. Although the platelet count is slightly reduced, an aggregation of platelets could take place in late pregnancy and in the puerperium. Such aggregation, combined with the reduced vascular resistance and the increased production of coagulation factors, may elevate the risk of thromboembolic events. Patients with additional risk factors, such as age above 40, personal or family history of thrombosis or coagulation factors deficiency, may need prophylaxis against thrombi (such as the application of subcutaneous heparin and pneumatic compression of the legs) in the event of complex or long-lasting procedures^{1,2}.

Respiratory system: The average breathing volume and frequency increase to meet the fetus’ oxygen needs, which can induce the pregnant woman into a state of compensated respiratory alkalosis and cause heightened sensitivity to potential reductions in the arterial pO₂ (oxygen pressure). The aortocaval compression caused by the gravidic uterus when a patient is on her back leads to a reduction of approximately 6–10mmHg in the arterial PO₂^{1,2}.

Renal function: The increase in the renal flow and in the glomerular filtration rate cause an increase in urine production, and the progressive growth of the uterus increases the pressure on the bladder, contributing to a higher urinary frequency¹.

Gastrointestinal system: Progesterone reduces the tonus of the gastroesophageal sphincter, predisposing reflux symptoms.

The supine position may aggravate those symptoms^{1,2}.

Musculoskeletal system: Pauses for repositioning can relieve muscular cramps and lumbar or pelvic discomfort that in turn are related to the hormone-induced relaxation of ligaments^{1,2}.

Compression syndrome: The supine position, commonly used in surgeries, may cause aortocaval compression syndrome, with delirium, cephalgia, nausea, vomiting, intense sweating, hypotension and tachycardia symptoms. Such symptoms may occur abruptly, without prodromes, and are typically

alleviated or avoided by positioning the patient lying on her left side, with a support or pillow beneath the hip or between the knees^{1,2}.

Glycemia: The levels of glucose in the blood during the pregnancy are typically lower than usual, due to the continuous demand of glucose by the fetus. Eating light snacks frequently can help to relieve the hypoglycemic symptoms and to prevent potential ketosis although there are no studies proving that this condition may harm the fetus^{2,3}.

THE SURGICAL PROCEDURE

1. When to perform

Timing surgery on a pregnant woman is an important and individualized decision. The first 12 weeks of gestation are critical for the organogenesis and hold an increased risk of spontaneous abortion. Alternatively, conducting a surgery during the third trimester may increase the risk of a premature birth. In this way, it would be prudent to avoid performing non-emergency surgeries during the first and third trimesters, and to conduct necessary dermatologic procedures in the second trimester (13–28 weeks) or the postpartum period, thus minimizing the risk for the patient and fetus¹.

2. Preparation

Once a decision in favor of surgery is taken, the surgeon should consider several aspects, including the choice of anesthetic, type of suture thread (and its permanence in the skin), incision care, and risk of infection. As in any surgical procedure, it is important to analyze the patient’s medical history to determine the existence of any additional risk factors, such as diabetes, hypertension, or heart disease. The medical state of the pregnancy should be studied carefully on the day of the surgery. Any history of recent contractions, vaginal bleeding, swelling or other important symptoms necessitates a consult with an obstetrician and, possibly, postponing the procedure. The vital signs, including blood pressure, should be carefully monitored in order to detect hidden signs of pre-eclampsia or other medical problems. It may be necessary to monitor the fetal heart rate in order to detect fetal distress during the procedure. In such cases, it would be advisable to conduct the procedure in an operating room where an anesthetist is available to monitor the patient and fetus¹.

3. Surgical incision

The surgical incision should allow the lowest possible tension. In areas where there is any doubt about the vectors, the

excision should be circular. After the excision has been made, the vectors become more evident. The wound should then be adequately closed¹. Executing the first stitch in the central part of the wound helps to identify the lowest tension vector

4. Suture

The same basic principles, generally applied to any patient, are valid in the choice of suture thread. If the procedure is conducted, for instance, in the abdomen, the use of buried suture of slow absorption, with higher strength and firmness in the knots, is recommended. The sutures may need to remain longer, due to the slower cicatrization process associated with pregnancy. The removal of the stitches in stages could reduce the concern with dehiscences in areas of great tension, as in an expanding abdomen¹.

5. Coagulation/ablation with electrocautery or laser

There are no reports of damage to the fetus caused by the use of electrocautery or ablative laser (CO₂); however, several studies demonstrate the efficacy and low incidence of complications of the CO₂ laser in the treatment of vegetational lesions during pregnancy, such as those related to the human papillomavirus (HPV)⁴ or the carcinoma verrucosa⁵. There are some concerns regarding exposure to harmful or mutagenic aerial particles of the vaporization smoke produced by electrocautery^{2,6} and lasers. The use of aspirators and the correct placement of the mask should be observed by patients and professionals¹.

COMPLICATIONS

While any patient can suffer from postoperative complications, pregnant women seem to be more susceptible to a slower cicatrization process, post-inflammatory hyperpigmentation, and keloids⁷. Hypertrophic scars and keloids are treated safely with intralesional steroids or lasers during pregnancy, to reduce itching or erythema. In other symptomatic lesions, such as in the bleeding pyogenic granuloma, electrocoagulation or ablative laser therapy (e.g. CO₂) can be safely carried out^{1,2}.

The hemostasis is primordial in more invasive surgical procedures, since bleeding in the perioperative period may constitute a potentially dangerous situation in pregnant woman. The hemodilution, combined with the already described cardiovascular alterations, makes pregnant

women more vulnerable to episodes of acute bleeding, with possible impacts on the uterine perfusion (1).

Some women can have an increased risk of infection due to the immunosuppression associated with pregnancy, however the procedures employed in dermatologic surgery are probably of low risk because they use clean or sterile techniques. However, there are several antibiotics that can be used safely if needed¹.

TUMORS AND SUSPICIOUS LESIONS IN PREGNANCY

Most of the reports in the specialized literature suggest that the endocrinologic alterations associated with pregnancy would not stimulate the growth of cancers. However, there have been

reports of cases of tumors, such as verrucosa carcinoma on the lip⁵, protuberant dermatofibrosarcoma⁸, basocellular carcinoma⁹, and HPV lesions⁴ that have presented accelerated growth during pregnancy. One study has suggested that growth factors, which would present increased levels in multiple gestations, could possibly promote the growth of basocellular carcinomas⁹. The growth of pyogenic granulomas, glomus tumours, and hemangioendotheliomas during pregnancy reflects the stimulant effects of gestational hormones on vascular structures¹⁰.

In certain situations, as when there is suspicion of malignant lesions or in the presence of some bleeding benign tumours, most dermatologists agree exeresis or incisional biopsy would be necessary. The risk posed by not conducting a procedure, even an excisional biopsy, is greater than the potential damage caused by leaving a lesion of that type in the skin. Besides, when the histological diagnosis is known, the surgeon is more capable of discussing the propaedeutic and treatment. A patient in the third trimester, presenting basocellular carcinoma in the thorax or abdomen, could wait until after delivery for treatment. On the other hand, immediate micrographic surgery may be recommended for a patient who has an aggressive spinocellular carcinoma in the nose during the first trimester¹.

Suspicious melanocytic lesions demand redoubled attention. Benign nevi may suffer darkening or increase in size during pregnancy¹¹. This fact, combined with the hesitation in carrying out biopsies or procedures during pregnancy, could mean a delay in the diagnosis of a melanoma. Therefore, pigmented lesions that change in appearance should be approached in the same way in both pregnant and non-pregnant patients. Since aggressive or more advanced melanomas are more dangerous for the mother and fetus, suspicious lesions should be biopsied immediately to prevent a delay in diagnosis^{1,12,13}.

The staging has enormous importance for a pregnant woman with a melanoma of small thickness (less than 1mm), for she can be safely subjected to a wide excision under local anesthesia and to a complete examination of the skin and lymph nodes. For pregnant women with indication for the mapping of the sentinel lymph node, the conduct varies considerably. The evaluation and treatment recommendations for pregnant women with metastases of local or distant melanomas are not clearly defined, with an absence of specific instructions for image analyses or explanations of potential effects of the interferon- α -2b or chemotherapy on the fetus¹³. A biopsy of the sentinel lymph node can be safely conducted during pregnancy¹⁴⁻¹⁶, preferably after the first trimester, in order to minimize risks for the developing fetus¹⁶. Alternatively, a pregnant woman in the third trimester could have a simple excision, followed by a sentinel lymph node biopsy and wide excision during the postpartum period. A tumor with a thickness of 1mm or more should nevertheless be operated on immediately for a higher long-term survival rate¹.

USAGE OF DRUGS

In general, the US Food and Drug Administration (FDA) classifies drugs into six groups, according to the risk of birth

defects ^{1,2,17}:

- X: usage contraindicated during pregnancy;
- D: positive evidence of risk for human fetus, however, benefits may outweigh risks;
- C: risk cannot be excluded, for studies in humans have not been carried out. The benefit may outweigh risks;
- B: there is no risk for human fetuses, in spite of the possible risk in animals;
- A: controlled studies did not observe any risks;
- Uncertain: has not been classified by the FDA. In this case, use other options.

1. Antiseptics

Alcohol and chlorhexidine do not present an increased risk for pregnant women. Alcoholic preparations should dry completely so that they achieve their antibacterial effect and to avoid any risk of fire arising from the use of lasers or electrocautery. The absorption of Povidine through mucous membranes has been associated with fetal hypothyroidism ^{1,2}. In addition, there are reports of toxicity in the central nervous system of fetuses associated with the use of hexachlorophene ^{1,2}.

2. Anesthesia

The use of anesthesia during pregnancy has produced discussions about possible undesired effects for the fetus. Each anesthetic has the potential to cause birth defects in some species under specific conditions, and studies in humans are scarce ^{1,18}. Most dermatologic surgery procedures are carried out with local anesthetics that can be used safely; however, dermatologic surgeons should familiarize themselves with the potential side effects.

The risk of birth defects caused by medicines, as classified by the FDA, can provide guidance in the choice of anesthetics. In general, medications in categories A and B are considered safe in pregnancy, as lidocaine and prilocaine are for most dermatologic procedures ^{19,20}. The amount of anesthetic should be the smallest possible, since local anesthetics can cross the placental barrier ^{1,20}. In certain situations, as in the inadvertent arterial injection of great volumes, the fetus can be exposed to cardiac or central nervous system toxicity. ^{1,2,21}. Early signs of systemic toxicity in the mother can simulate signals of aorticaval compression: dizziness, tachycardia, sweating, and cephalgia. The appropriate positioning of the patient and an accurate control of the total volume of anesthetics can help to identify the problem swiftly ^{1,2,19}.

2.1 Epinephrine: category C substance. It is added to local anesthetics to reduce bleeding and delay the anesthetic's absorption, increasing the efficacy. It has already been demonstrated that in high doses, epinephrine provokes spasms of the uterine artery, with potential failure of the placental perfusion and premature birth risk ²². Considering the dilution used in dermatologic surgery procedures and the small amounts injected, the benefits of the vasoconstriction during the procedure seems to outweigh the potential risk ¹.

2.2 Lidocaine: category B medicine. Usually considered

safe in pregnancy. Lidocaine and prilocaine creams are probably the most widely studied topical anesthetics for use in the untouched skin ¹.

2.2.1 Lidocaine 2.5% and prilocaine 2.5% cream: Emulsion composed by eutectic blend in phase water-oil to room temperature ²³. Occlusive stickers are used on the place of application on the intact skin, increasing the depth and duration of the anesthesia. Category B medicines should only be used in pregnancy when really necessary. Potential side effects include local erythema or paleness, swelling and allergic contact dermatitis (for prilocaine) ²⁴. Chemical lesions in the cornea may occur if used close to the eyes ¹. The lidocaine-prilocaine cream holds the risk of methemoglobinemia (due to the prilocaine), particularly for the fetus ²⁴.

2.2.2 Lidocaine cream encapsulated in liposomes: category B medication. Contains lidocaine 4% encapsulated liposomal vehicle. Without prilocaine, it does not present a risk of methemoglobinemia. It works swiftly, with the dermal analgesia occurring in 30 minutes. Occlusive stickers seem to optimize its performance ^{24,25}. It is not recommended for use in mucous membranes or conjunctiva due to the risk of irritation of the cornea and the increased levels of absorption ^{23,26}. Studies have indicated that it is as effective as the lidocaine-prilocaine combination in the reduction of pain in surgical procedures ²⁴.

2.3 Benzocaine, bupivacaine, mepivacaine: Other topical anesthetics that are less employed. Benzocaine carries a potential risk of methemoglobinemia ^{23,27}. Bupivacaine and mepivacaine are relatively contraindicated in pregnancy, for they present a risk of toxicity and fetal bradycardia ^{2,23}.

2.4 allergic reactions: Allergic reactions to local anesthetics are uncommon and usually happen due to sensitivity to the anesthetics of the ester group (cocaine, procaine, benzocaine, tetracaine), associated with the production of para-aminobenzoic acid (PABA) ^{1,19}. In some patients, some symptoms do not represent a true allergy, but rather are linked to anxiety or the effects of the epinephrine added to the anesthetic. Effectively, intradermal allergic tests have been safely used in pregnant women, avoiding situations of risk in cases of true allergy ²⁸. Some preparations of anesthetics of the amide group can contain ester group preservatives ^{1,28}. Alternatives for the cases of true allergy include infiltrations of difenhidramina 1% (antihistaminic) or of saline solution, allowing superficial and short duration analgesia. They can be used for quick biopsies, but are insufficient for excisional surgeries. The difenhidramina may cause sedation, and its injection is painful. Although not ideal, this alternative is safe for use in pregnancy ^{1,29}.

3. Sedation

Very anxious patients may need sedation; the evaluation of an obstetrician ¹ and monitoring by an anesthetist play an important role.

4. Antibiotic

When the use of oral or topical antibiotics is necessary in the perioperative, medicines considered safe in pregnancy (categories A and B) should be chosen. In dermatologic surgery, cephalexin and penicillin derivatives are commonly prescribed. Erythromycin and azithromycin are safe alternatives for patients with an allergy to penicillin. Erythromycin estolate has been associated with the increased risk of cholestatic jaundice in some pregnant women³⁰, clindamycin can cause abnormalities in hepatic function tests on rare occasions, and the sulphonamides can cause neonatal

hyperbilirubinemia with kernicterus, particularly if taken during the third trimester, close to childbirth². The fluoroquinolones have been associated with cartilage defects in immature animals, tetracycline presents risks for dental enamel, and the aminoglycosides can provoke fetal ototoxicity^{2,31}. Chloramphenicol is contraindicated in reports of Gray baby syndrome and neonatal death². The antibiotic prophylaxis should be discussed carefully before planning the surgery, for it requires the obstetrician's evaluation.

5. Analgesia

Acetaminophen, used for analgesia, is a category B medicine. Although it crosses the placenta, it can be safely used in the recommended doses for a limited period. Its prolonged or high dosage use has been associated with hemolytic anemia as well as fetal and maternal renal toxicity¹. Ibuprofen and salicylates interfere in the platelets' function and increase the risk of bleeding, and therefore should be avoided in the third trimester to prevent postpartum hemorrhage; they can also cause a delay in the onset of labor or cause the constriction of the arterial duct in the fetus, through the blocking of the synthesis of prostaglandins². Salicylates can cause birth defects and delay fetal growth¹. The usage of opiates for short periods can be appropriate in cases of intense pain, however the cost/benefit analysis should be discussed with the obstetrician if it needs to be used for prolonged periods^{1,2}.

COSMETIC PROCEDURES DURING PREGNANCY

1. Botulinum toxin

There are several reports in the specialized literature on the usage of botulinum toxin type A during pregnancy, for the treatment of illnesses such as cervical dystonia, blepharospasm, and achalasia; or for aesthetic reasons³²⁻³⁴. In almost all cases, no abnormalities at birth or in the children's development were suggested.

One study presents the case of a woman who received toxin applications in four consecutive pregnancies for the treatment of cervical dystonia, with no observed alteration in the childbirths or in the children's development (one of them was accompanied for five years without presenting abnormalities)³⁴. Another study describes the case of a woman who received the application of 500 toxin units without knowing that she was in the fourth week of pregnancy. Some weeks later, an ultrasonography demonstrated gemellary pregnancy without a heartbeat. The authors considered it difficult to evaluate if there was a rela-

tionship with the use of high doses of the toxin, for the patient presented risk factors that could explain the fetal death³⁵. In addition, there are several reports of pregnant women affected by botulism who have had healthy children, with the suggestion that the toxin possibly does not cross the placenta³⁶.

Botulinum toxin type A is a drug that belongs in category C; it is not indicated during breastfeeding, since it is not known whether it could be excreted in breast milk³⁷. In spite of several reports suggesting its safety during pregnancy, the best conduct is to avoid its use for aesthetic reasons in that period.

2. Fillings

There are no studies about the usage of fillers during pregnancy. No complications were reported in cases in which pregnant women received applications of collagen or acid hyaluronic. Theoretically, there would be no risks for hyaluronic acid, given its identical composition to human hyaluronic acid; the most sensible recommendation, however, suggests that the use of those substances for cosmetic reasons during pregnancy should be avoided^{36,37}.

3. Lights and Laser

In spite of the great dissemination and popularization of aesthetic procedures with lasers or other sources of energy, there are still no scientific studies that justify their use during pregnancy. In addition, there are no reports about adverse effects associated with pregnancy. The application of lasers in the abdominal region and intravaginal regions in pregnant women should be avoided^{37,38}. However, if we consider the higher susceptibility of pregnant women to slow cicatrization, post-inflammatory hyperpigmentation and worsening of keloids, it would be more prudent if all aesthetic procedures with lights or lasers, independently of the treated region, were postponed until the postpartum period.

4. Peelings

Chemical peels are contraindicated during pregnancy, taking into consideration that topical substances such as retinoic acid, salicylic acid and sulphur are classified as category C medicines by the FDA. In spite of the absence of reports of complications caused by their topical use, the best conduct avoids those substances during pregnancy. On the other hand, the topical use of glycolic acid, as well as its use in chemical peelings, is not contraindicated and represents a safe alternative during pregnancy^{37,39}, just as microdermabrasion with aluminium crystals (physical peel)^{40,41}. However, it is worth mentioning again that, due to the slower cicatrization and increased risk of

hyperpigmentation in pregnant woman, it is recommended that very superficial procedures be chosen to minimize risks.

5. Other procedures

Electrocoagulation, cryotherapy, the use of trichloroacetic acid and the mechanical clearance of acne for the removal of blackheads (without the previous application of keratolytic substances or the use of an electric current) are procedures regard-

ed as safe during pregnancy³⁷. In any case, due to the aesthetic nature of the objective, the cost/benefit aspect should be evaluated.

FINAL CONSIDERATIONS

The dermatologic surgeon should always search for the most beneficial conduct for the pregnant woman who needs surgical intervention. Prudence, combined with knowledge of the peculiarities of pregnancy and the rational use of available

techniques and therapies, is key to guaranteeing satisfactory final results for mother and child. Conducting aesthetic procedures during pregnancy prompts serious ethical and medical-legal discussions, once most of the medicines and equipment employed are not tested (and will hardly be) for their effects on the fetus. Therefore, it is always sensible to avoid such procedures during pregnancy. It is important to note that pregnancy only lasts for nine months, whereas a complication might generate a serious burden for an uncertain period. ●

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