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Review

A review of the safety of cosmetic procedures during pregnancy and lactation

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ABSTRACT

The safety of cosmetic procedures in patients who are pregnant and/or lactating is a complex clinical question surrounded by uncertainty. Our objective is to consolidate data on the safety of commonly requested cosmetic procedures during pregnancy and lactation after a systematic review of the current literature to guide evidence-based care in the future. A systematic search of the PubMed database was conducted for articles on cosmetic procedures during pregnancy and lactation. Due to a lack of controlled trials, case reports and series were considered. Minor procedures such as shave, punch, snipping, and electrocautery are considered safe. With respect to chemical peels, glycolic and lactic acid peels are deemed safe; however, trichloracetic and salicylic acid peels should be avoided or used with caution. Although safety data on botulinum toxin A is insufficient, the procedure may be safe because systemic absorption and placental transfer are negligible. Sclerotherapy can be safe during pregnancy but must be avoided during the first trimester and after week 36 of the pregnancy. Laser and light therapies have been considered generally safe for patients with granulomatous conditions and condylomata. Epilation should be limited to waxing, shaving, and topical treatments instead of permanent procedures. In patients who are lactating, most therapies discussed above are safe but fat transfer, sclerotherapy, and tumescent liposuction are not recommended. Better evidence is needed to make concrete recommendations on the safety of cosmetic therapy during pregnancy and lactation but preliminary evidence suggests excellent safety profiles for many commonly requested cosmetic procedures.

Introduction

Background

The safety of cosmetic procedures in patients who are pregnant and/or lactating is surrounded by uncertainty. The population of women who are pregnant constitutes a significant proportion of patients who undergo cosmetic procedures because they often experience reversible and sometimes irreversible cosmetic changes during pregnancy. Dermatologists and other practitioners often defer cosmetic treatment until the postpartum period due to the lack of controlled data. (See Table 1.)

There is some consensus on the general principles with regard to cosmetic procedures during pregnancy. Patient counseling is essential because patients should be made aware of all reported and theoretical risks that are associated with cosmetic procedures during pregnancy. A thorough discussion also should include the current lack of evidence on the safety of many of these procedures.

Non-essential surgical procedures should be deferred until at least the second trimester of the pregnancy. The left lateral decubitus position is the recommended positioning during surgery because it ensures optimum dynamics of the blood circulation. Safe hemostasis during surgery can be achieved with either radiation surgery or electrocoagulation but care should be taken to minimize patient exposure to smoke during these procedures. Patients who are pregnant are generally recommended to avoid the application of certain cosmetic topical agents with unclear safety data including tazarotene

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and hydroquinone. The treatment of physiologic gestational changes that may rebound during gestation and improve postpartum such as melasma, hypertrichosis, and striae is not recommended (Lee et al., 2013).

Methods

We attempted to consolidate data on the safety of commonly requested cosmetic procedures in the population of pregnant and lactating women after a systematic review of the current literature to update the existing knowledge about the subject matter and guide evidence-based care in the future. A systematic review of the current literature was conducted with use of the PubMed database. Search terms included local anesthetics, chemical peels, botulinum toxin, fillers, laser and light therapy, pregnancy, and safety, which were included in several separate searches. The term epidural was excluded and a filter for human-only studies was applied. In combination, a total of 330 results were manually sorted to exclude articles that were unrelated to the topic. A total of 25 articles were extracted and reviewed. Due to a lack of controlled trials, individual case reports and commentaries were included in the review. Prior review literature including papers by Goldberg and Maloney (2013) and Lee et al. (2013) was also referenced.

Results

Local and topical anesthetic drugs

Injectable anesthetic drugs

The main concerns when using injectable anesthetic drugs in patients who are pregnant include the amount of placental transfer and possibility of teratogenicity (Richards and Stasko, 2002). Heinonen et al. (1977) demonstrated the relative safety of lidocaine, benzocaine, propoxycaine, and tetracaine use during the first trimester of

Table 1
Key recommendations on the safety of cosmetic procedure on the basis of current evidence

Cosmetic Procedure/Related Procedure	Key Recommendations	Key Studies
Injectable Anesthetic Drugs	Lidocaine: Pregnancy category B, considered relatively safe to use during pregnancy at doses used in dermatological procedures.	Heinonen et al., 1977 Hagai et al., 2015 Moore, 1998
	Benzocaine, bupivacaine, and mepivacaine, tetracaine: Pregnancy category C, no studies to adequately define risk during pregnancy.	Richards and Stasko, 2002
Topical Anesthetic Drugs	2.5% lidocaine/prilocaine: Pregnancy category B, considered safe. Avoid ocular surfaces.	Guay, 2009 Lee et al., 2013 (Review)
	Benzocaine: Pregnancy category C, methemoglobinemia in infants.	
	Tetracaine: Pregnancy category C, preferred for eyelid/periocular procedures.	
Minor Procedures	Snipping, shaving, liquid nitrogen therapy, removal of hemagiomas with electrocautery or radiation surgery: Considered safe, minimal blood loss/local anesthesia.	N/A
Chemical Peels	Glycolic acid peels: Relatively safe, limited dermal penetration.	Andersen, 1998 Lee et al., 2013
	Lactic acid peels: Reports of safe use for gestational acne, limited dermal penetration.	Bozzo et al., 2011 James et al., 2008
	Salicyclic acid peels: Pregnancy category C, significant dermal penetration, limit use to small areas of coverage.	Zhou et al., 2012 Schwartz et al., 1988
	Jessner's solution and TCA peel: Use with caution, Jessner's contains salicylic acid, TCA in maternal urine correlated with fetal growth retardation although TCA used to treat genital condylomata in pregnancy safely.	
Neuromodulators	Botulinum toxin A: Multiple case reports suggest no harm to fetus in either cosmetic botulinum toxin or other medical indications (migraine prophylaxis, achalasia, cervical dystonia) in majority of patients.	Tan et al., 2013 Hooft et al., 2015 Wataganara et al., 2009 Robinson and Grogan, 2014
	Miscarriages reported in two patients in two individual reports but relation to toxin injection unclear.	Bodkin et al., 2005 Newman et al., 2004 de Oliveira Monteiro, 2006
	High doses of onabotulinum toxin (>600 U) associated with systemic weakness.	Morgan et al., 2006
	Not enough evidence for concrete recommendations. If cosmetic botulinum toxin is pursued during pregnancy, consent forms should list pregnancy as contraindication.	
Fillers	No concrete evidence and no cases that report use of fillers during pregnancy. Definitive recommendations cannot be made at this time.	N/A
Sclerotherapy	First trimester and after week 36: Absolute contraindications to therapy.	Rabe and Pannier, 2010 Abramowtiz, 1973
	One study and several case reports demonstrated no adverse fetal outcomes when sclerotherapy was pursued during pregnancy.	Reich-Schupke et al., 2012
Laser and Light Therapy	No concrete recommendations can be made for use of lasers for cosmetic procedures.	Schwartz et al., 1988
	Carbon dioxide and neodymium-doped YAG lasers have been used safely to treat genital condylomata in pregnant patients in several reports.	Adelson et al., 1990 Woźniak et al., 1995 Gay et al., 2003 Buzalov and Khristakieva, 1994
	Holmium: YAG and pulse-dye lasers have been used successfully and safely to treat urolithiasis during pregnancy.	Adanur et al., 2014 Carlan et al., 1995 Lee et al., 2013
	Treatment of pyogenic granulomas with laser therapy has been pursued safely.	
Epilation	Permanent hair removal is not recommended during pregnancy because of the lack of safety data. Patients are advised to wax, shave, and use depilatory creams.	N/A

CO2, xxx; N/A, not available; TCA, tricholoracetic acid; YAG, yttrium aluminum garnet.

a pregnancy in a study that reported no increase in the rate of birth anomalies for 293 women. However, it should be noted that fetuses who were exposed to mepivacaine during the first trimester had twice the risk of congenital abnormalities compared with control subjects (Heinonen et al., 1977). Hagai et al. (2015) evaluated the rate of major anomalies in a 6-year comparative observational study of 210 patients who were exposed to dental local anesthetic drugs and of whom half of the patient group was exposed during the first trimester of the pregnancy. The rate of major congenital malformations in the group of exposed patients was 4.8% versus 3.3% in the control population (794 patients) but the difference was not statistically significant (Hagai et al., 2015).

Lidocaine is a category B drug with a long history of uneventful use during pregnancy because the fetus can metabolize lidocaine that crosses the placental barrier (Kuhnert et al., 1979, 1986). The major concerns of lidocaine use during pregnancy are the accidental arterial injection and high-dose use of the agent as these two scenarios can result in an increased risk of fetal cardiac and central nervous system toxicity. Although lidocaine is found in fillers and used in many dermatology surgical procedures, the doses that are employed are far lower than the recommended maximum subcutaneous dosage of 4.5 mg/kg or 300 mg in the United States (Lee et al., 2013). Fayans et al. (2010) noted that vasoconstrictor use can reduce the toxicity of local anesthetic drugs by localizing the agent to the area of delivery and is recommended. Concerns arise from the serious risk of uterine artery spasms with the administration of increased doses of epinephrine. However, the doses that are used in dermatologic surgeries are relatively low and have not been causally associated with this side effect (Richards and Stasko, 2002).

Moore conducted a large study in 1998 of local anesthetic drugs in patients who were pregnant and underwent dental procedures. The results of this study labeled bupivacaine and mepivacaine as category C drugs because of concerns of fetal bradycardia and preterm labor in the case of mepivacaine use (Moore, 1998; Richards and Stasko, 2002).

Topical anesthetic drugs

The most common topical agents that are used during dermatologic procedures include benzocaine, tetracaine, and lidocaine 2.5%/prilocaine 2.5% cream. Benzocaine has been labeled as a category C drug because of the risk of methemoglobinemia in the infant. This is supported by a study of 242 cases of methemoglobinemia that were linked to the use of a local anesthetic drug (Guay, 2009; Lee et al., 2013). Methemoglobinemia is also of concern when used in high doses of prilocaine. However, 2.5% lidocaine or prilocaine is considered safe as long as ocular surfaces are avoided because both agents are classified as a pregnancy category B drug (Lee et al., 2013). Tetracaine is classified as a pregnancy category C drug but is the preferred local anesthetic drug for periocular and eyelid procedures because of its lower risk of corneal irritation (Lee et al., 2013).

Minor procedures

The most common minor procedures include skin tag removal with snipping, shaving, or cryotherapy, removal of other benign lesions such as seborrheic keratoses and dermatosis papulosa nigra, shave or punch removal of nevi, and removal of hemangiomas with electrocautery or radiation surgery. These procedures have a long safety record in patients who are pregnant.

Chemical peeling

The most common chemical peels include procedures with glycolic acid, lactic acid, salicylic acid, Jessner, and tricholoracetic acid. There is also a lack of safety data with regard to this modality.

Glycolic acid peels

Peels with glycolic acid at concentrations that range from 30% to 70% induce epidermolysis and desquamation (Fabbrocini et al., 2009). Although there are insufficient safety data available, these peels are generally considered safe because of negligible dermal penetration (Andersen, 1998).

Lactic acid peels

Lactic acid peels induce keratolysis. Lactic acid 2% has been anecdotally used to treat gestational acne with no reported fetal risks and has shown negligible dermal penetration.

Salicylic acid peels

Salicyclic acid, which is classified as a pregnancy category C drug, is a beta-hydroxy acid with comedolytic and keratolytic activity (Fabbrocini et al., 2009). This acid can have significant dermal penetration of up to 25% if large areas are treated or when it is applied under occlusion (Lee et al., 2013). However, the reproductive outcomes of patients who are pregnant and treated with low doses of oral aspirin were studied and no significant effects on the health of the fetus were reported (Bozzo et al., 2011; James et al., 2008). It is recommended that if salicylic acid is used to treat patients who are pregnant, the area of coverage should be limited.

Other peels

A Jessner peel is a combination of resorcinol (i.e., a skin-lightening agent), salicylic acid, and lactic acid. Again, there is a lack of reports on Jessner peels during pregnancy. Since this peel contains salicylic acid, it should be used cautiously because of the risks mentioned previously. Trichloroacetic acid (TCA) peels should also be used with caution because of the possible dermal penetration as this agent can be absorbed through ocular and oral mucosal surfaces (Lee et al., 2013). Zhou et al. (2012) correlated high levels of maternal urinary TCA levels with low birth weight in a cohort of 398 women, which suggests that this compound may contribute to fetal growth retardation. However, TCA has been safely used to treat genital condylomata in patients who are pregnant (Lee et al., 2013; Schwartz et al., 1988).

Neuromodulators

Botulinum toxin type A has both cosmetic and medical applications (Tan et al., 2013). Current data suggest but not entirely confirm that the toxin does not attain significant systemic concentrations if correctly injected intramuscularly or intradermally. Furthermore, the size of the toxin molecule makes it unlikely to cross the placental barrier (Tan et al., 2013). There are no clinical trials on the effects of cosmetic botulinum toxin use in patients who are pregnant. However, there are a number of case reports in which the toxin has been used for various medical procedures in patients who are pregnant without adverse outcomes to the fetus. Two recent case reports demonstrated the safety of botulinum toxin A to treat achalasia in women who were pregnant.

Hooft et al. (2015) reported the administration of an intrasphincteric injection of botulinum toxin A at 14 weeks of gestation with no adverse fetal outcomes and otherwise healthy term deliveries. Wataganara et al. (2009) reported a similar case where botulinum toxin A was injected at 33 weeks of gestation to treat persistent achalasia and subsequent malnutrition. Again, no adverse outcomes to the fetus were reported and no evidence of infant neuromuscular blockade was noted at 5 days postpartum (Wataganara et al., 2009). Robinson and Grogan (2014) reported on the safe administration of onabotulinum toxin A at 18 weeks of gestation to treat migraine prophylaxis in a woman with refractory migraine headaches. No adverse effects were reported in the infant who was followed for 6.5 years (Robinson and Grogan, 2014).

Bodkin et al. (2005) reported two cases of inadvertent botulinum toxin A injection during the first trimester of pregnancy in patients who were treated for cervical dystonia. One patient who had a prior history of miscarriages had a miscarriage at 10 weeks at which time she was noted to have a twin pregnancy (Bodkin et al., 2005). Newman et al. (2004) reported the case of a woman with severe cervical dystonia who was treated with botulinum toxin injection throughout four consecutive pregnancies. No complications were reported with the delivery or health of any of her four children (Newman et al., 2004).

Two cases of cosmetic use of botulinum toxin were reported by de Oliveira Monteiro (2006) in two women at 6 and 5 weeks of gestation with no fetal adverse events. A 2006 survey of 900 physicians that was conducted by Morgan et al. (2006) ascertained that 12 physicians had experiences with incidental botulinum toxin injection in 16 patients who were pregnant. Only one patient with a history of spontaneous abortions experienced a miscarriage after injection of botulinum toxin (Morgan et al., 2006). There is concern that high doses (>600 U) of onabotulinum toxin is associated with cases of systemic weakness (Lee et al., 2013). However, doses that are used in cosmetic procedures are usually less than 100 units.

Although the above cases demonstrate the general safety of botulinum toxin A, there is still insufficient data to make concrete recommendations on whether cosmetic botulinum toxin procedures should be conducted in women who are pregnant. However, it should be noted that if patients who are pregnant are inadvertently injected with botulinum toxin during the first trimester of pregnancy, efforts should be made by the provider to alleviate patient anxiety because of the current lack of evidence on adverse outcomes on the fetus in published case literature. If patients who are pregnant request a cosmetic botulinum toxin procedure, consent forms should state pregnancy as a contraindication to cosmetic botulinum toxin A treatment.

Fillers

There are 21 fillers that have been approved by the U.S. Food and Drug Administration including collagen, hyaluronic acid, calcium hydroxylapatite, and poly-L-lactic acid (Chacon, 2015). There are no reported safety data on the use of cosmetic fillers during pregnancy. Adverse events that are associated with the use of fillers in the general population include most commonly injection site reactions and rarely delayed onset foreign body granulomas, nodule formation, vascular compromise, hypersensitivity reactions, and cellulitis (Lolis et al., 2015). Because of the lack of safety evidence in patients who are pregnant, recommendations on the use of fillers in this population cannot be definitive. Steps should be taken to avoid the adverse events as discussed previously in any patient population. The injector should consider the potential risks from inadvertent arterial injection of lidocaine mixed with the filler.

Sclerotherapy

Varicose veins that develop during pregnancy have a high probability of spontaneous improvement postpartum. Therefore, it is advisable to wait 6 to 12 months after pregnancy prior to pursuing this treatment. There are very limited data on the safety of sclerosing solutions in women who are pregnant. However, these solutions can cross the placenta and sclerotherapy is an absolute contraindication in the first trimester and after week 36 of a pregnancy (Rabe and Pannier, 2010). In 1973, Abramovitz demonstrated that there was no difference in pregnancy outcomes between 45 patients who were treated with sclerotherapy compared with 56 control patients (Abramowtiz, 1973). In 2015, Reich-Schupke and colleagues demonstrated that there was no increased risk of adverse fetal outcomes and evidenced their findings with several case reports in which common sclerotherapy agents were used inadvertently during pregnancy (Reich-Schupke et al., 2012).

Laser and light therapy

The cosmetic use of lasers has not been studied in women who are pregnant. However, lasers have been used safely to treat medical conditions in patients who are pregnant. The safety of carbon dioxide lasers in the treatment of genital condylomata in patients who are pregnant is supported by several studies (Adelson et al., 1990; Gay et al., 2003; Schwartz et al., 1988; Woźniak et al., 1995). Neodymium-doped yttrium aluminum garnet lasers have also been safely used to treat genital condylomata in patients who are pregnant (Buzalov and Khristakieva, 1994). Laser therapy for use in lithotripsy in women who are pregnant has also been safely pursued. Adanur et al. (2014) demonstrated the safety of a holmium yttrium aluminum garnet laser to successfully and safely treat ureteral stones in different locations. Carlan et al. (1995) published a case report in which pulsed dye laser was used to successfully treat symptomatic urolithiasis in a woman who was 20 weeks pregnant. Several other case reports also suggest that acne and pyogenic granulomas have been safety treated with laser therapy during pregnancy (Lee et al., 2013).

Laser therapy is relatively safe in patients who are pregnant when employed for the treatment of various medical conditions. However, laser and intense pulsed light therapy are not indicated for cosmetic procedures during pregnancy due to the lack of safety data.

Epilation

Permanent hair removal by means of laser therapy or electrolysis is generally not recommended during pregnancy due to the lack of safety data. There is a theoretical concern about electrolysis because amniotic fluid is a conductor of galvanic current. Patients are recommended to treat excess hair growth with waxing, shaving, and depilatory creams during pregnancy.

Patients who are lactating

There are very few studies and reports on the safety of cosmetic procedures in patients who are lactating. The main concern of pursuing any modality in patients who are lactating is the systemic absorption of agents and subsequent incorporation into breast milk, which can affect neonatal growth and development. Lee et al. (2013) summarized that most cosmetic procedures such as botulinum toxin A, chemical peeling, and lasers are safe to use during lactation since there is low concern for significant systemic absorption of any of the agents used in these procedures. Procedures which necessitate the redistribution or removal of fat such as fat transfer or tumescent liposuction are not recommended. Sclerotherapy should also be avoided during lactation (Lee et al., 2013). Generally, hypertonic saline solutions that are used in sclerotherapy are safe but there are no data on whether other sclerosing solutions are excreted in breast milk, which has led to the recommendation to avoid this therapy while breastfeeding. However, anecdotally, some women have pursued this therapy and continued breastfeeding with pumping and discarding the breast milk in the first 48 hours after treatment. Nevertheless, there are no reports on the outcomes and/or complications or success rates of this methodology. Therefore, the safety of this procedure during lactation cannot be meaningfully commented on at this time.

Discussion

The available evidence indicates promising safety profiles for many commonly used cosmetic procedures. Although unnecessary

surgical procedures should be avoided until the second trimester of a pregnancy, judicious use of lidocaine with epinephrine and topical prilocaine/lidocaine preparations is safe in patients who are pregnant. Minor procedures such as superficial punch and shave biopsies or lesion removal are deemed safe because of their minimally invasive nature and long safety record. Glycolic acid and lactic acid peels are most likely safe to use due to the limited dermal penetration but solutions that contain salicylic acid should be used with caution due to the higher rates of absorption. Trichloroacetic acid has been associated with low infant birth weight and these peels should be used with caution, especially because of the risk of dermal penetration. Botulinum toxin A has been used safely in patients who are pregnant for various medical conditions and cosmetic purposes as evidenced by multiple case reports and series. There is little evidence to support the safety of fillers during pregnancy. Sclerotherapy should not be considered hastily in patients who are pregnant since varicose veins may improve postpartum. Laser and light therapy seems to be safe for the treatment of genital condylomata and ureteral calculi in patients who are pregnant. However, the lack of safety evidence in a cosmetic context prevents a concrete recommendation on laser and light therapy during pregnancy. Because excess body hair growth may resolve postpartum, temporary epilation treatments are recommended during pregnancy.

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