



Pregnancy and burns: experience of a university hospital burn unit

Gestação e queimadura: experiência de unidade de queimaduras em Hospital Universitário

JOSÉ RENATO NAHLOUS FERREIRA LEITE¹
ERIKA LOPES FERNANDES¹
GUILHERME FERREIRA TAKASSI¹
ANDREA FERNANDES DE OLIVEIRA^{1*}
LYDIA MASAKO FERREIRA¹

Institution: Universidade Federal de São Paulo, Escola Paulista de Medicina, São Paulo, SP, Brazil.

Article received: September 24, 2017.
Article accepted: September 5, 2018.

Conflicts of interest: none.

DOI: 10.5935/2177-1235.2018RBCP0158

■ ABSTRACT

Introduction: The incidence of burns involving pregnant women is not well established in the literature, but is estimated to be between 3% and 7%. The management of burns in pregnancy represents a great challenge with significant impact on outcomes and maternal-fetal prognosis.

Case Report: In the present study, we report two cases of pregnant burn victims who were treated in the burn unit in the Paulista School of Medicine, Federal University of São Paulo (EPM/UNIFESP). One patient was treated in the first trimester and the other in the third trimester. **Conclusion:** In both cases, the pregnant women received specialized treatment for burns in conjunction with clinical follow-up by the obstetrics team, with good maternal-fetal outcomes.

Keywords: Burns; Burns unit; Pregnancy; High-risk pregnancy.

■ RESUMO

Introdução: A incidência de queimaduras em gestantes não é bem estabelecida na literatura mundial, mas estima-se que varie entre 3% e 7%. Os cuidados da gestante queimada representam um grande desafio com impacto significativo nos resultados e prognóstico materno-fetais. **Relato de Caso:** No presente estudo relatamos dois casos de gestantes vítimas de queimaduras que foram tratadas na unidade de tratamento de queimaduras na Escola Paulista de Medicina da Universidade Federal de São Paulo (EPM/UNIFESP), uma no primeiro trimestre e a outra no terceiro trimestre. **Conclusão:** Em ambos os casos, as gestantes receberam tratamento especializado para queimaduras em conjunto com acompanhamento clínico da equipe da obstetrícia, com boa evolução materno-fetal.

Descritores: Queimaduras; Unidades de queimados; Gravidez; Gravidez de alto risco.

¹ Universidade Federal de São Paulo, Escola Paulista de Medicina, São Paulo, SP, Brazil.

INTRODUCTION

Burns during pregnancy require greater care due to associated physiological changes. The incidence of burns during pregnancy is not well established in the literature, but is estimated to range between 3% and 7%, and primarily reflects the incidence in developing countries^{1,2}. The management of burns in pregnancy represents a great challenge, with significant impact on maternal-fetal prognosis. We report two cases treated in the burn unit of the Paulista School of Medicine, Federal University of São Paulo (EPM/UNIFESP), in São Paulo, SP.

CASE REPORTS

Clinical case 1

A 36-year-old, previously healthy woman sustained accidental burns caused by a flaming alcoholic liquid. She was injured in the 10th week of gestation, with body surface area involvement of 29%. She had 2nd and 3rd degree burns on the face, chest, abdomen, arms, hands, and legs bilaterally. She underwent tracheal intubation on admission for respiratory insufficiency secondary to likely inhalation injury, which was later confirmed with bronchoscopy.

During hospitalization, she underwent debridement and grafting of burned areas with success. The obstetrics team was involved in her care and ultrasound confirmed the gestational age. The patient was discharged from the hospital after completion of burn treatment and was referred for outpatient obstetric follow-up until full-term birth (Figures 1, 2, 3, and 4).

Clinical case 2

A 29-year-old woman was the victim of aggression by her partner at 31 weeks of gestation, with burns caused by a flaming alcoholic liquid. She had 2nd and 3rd degree burns on 15% of the body surface, involving the face, neck, anterior trunk, and right upper limb.

During hospitalization, she underwent debridement and grafting of burned areas with success. Cardiotocography was performed by the obstetrics team to monitor fetal viability. She was discharged from the burn unit and transferred to the obstetrics unit, where she remained hospitalized until full-term birth (Figures 5, 6, 7, and 8).

DISCUSSION

The percentage of body surface area (BSA) involvement is the main prognostic factor for maternal



Figure 1. Case 1 - Appearance of burns on admission. Most are 2nd degree, but areas of 3rd degree burns are present on the breasts and right arm.



Figure 2. Case 1 - 2nd degree burns in the lower limbs on admission.



Figure 3. Late postoperative Case 1 - Areas of partial skin grafting on the breasts, axillae, and right arm.



Figure 4. Late postoperative Case 1 - Patient with healing 2nd degree burns and partial skin graft donor area on the left side of the healed left thigh.

and fetal mortality, with 50% mortality when involved BSA is >40%¹. Inhalation injury is another important prognostic factor related to maternal and fetal mortality³⁻⁵. The most common complication is fetal distress, followed by spontaneous abortion and preterm labor^{3,4}.

Proper treatment is essential for success and survival of the fetus. On initial assessment, the maternal BSA and gestational age (GA) of the fetus should be calculated, preferably by ultrasound, to confirm fetal



Figure 5. Case 2 - Appearance of 3rd degree burns on the chest on admission.



Figure 6. Case 2 - 2nd degree burns on the right hand, with deep area in the thenar region.

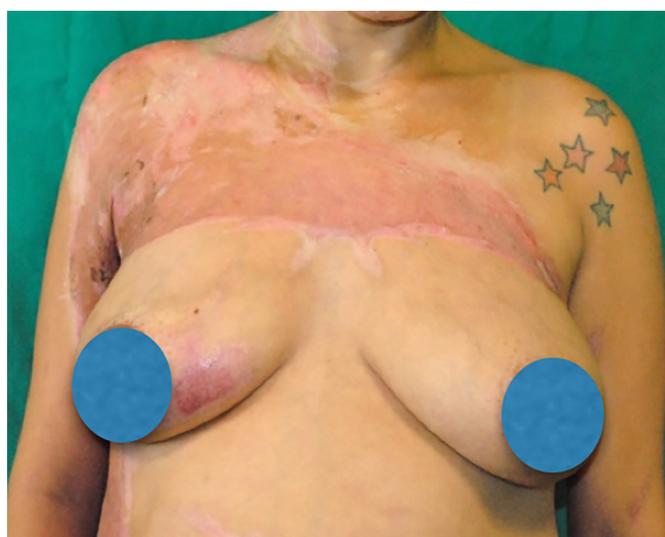


Figure 7. Late postoperative Case 2 - Postoperative appearance of partial skin graft on the chest.



Figure 8. Late postoperative Case 2 - Right hand after partial skin grafting in the thenar region in order to preserve grip function.

viability. In 2015, Parikh et al.¹ published an algorithm designed to assist in the management of pregnant burn victims (Figure 9).

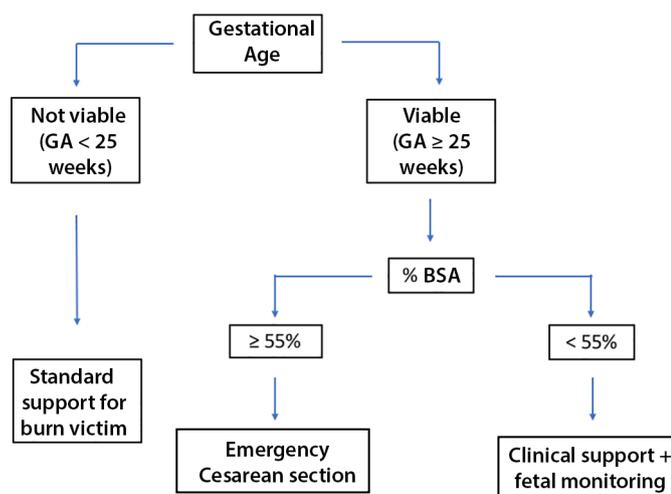


Figure 9. Algorithm for the treatment of burns in pregnancy. Adapted from Parikh et al.¹.

Pregnant patients with more than 55% BSA involvement should undergo urgent cesarean section if the fetus is viable, as this significantly improves maternal and fetal prognosis. In cases with less than 55% BSA involvement, resuscitation and support measures should continue, with continuous fetal monitoring and use of corticosteroids to induce fetal lung maturation if needed¹.

Hypovolemia is a major challenge in the treatment of burns in general. There is no guideline for fluid resuscitation in pregnant burn patients, but in general, the Parkland formula is used; the formula recommends an increase in fluid replacement by 30%, due to the physiological increase in intravascular

volume during gestation^{1,2}. In pregnancy, hypovolemia may have direct implications for the progress of gestation⁶. Fluid loss after a burn can trigger premature labor².

Another source of vulnerability in pregnant burn victims is the upper airway^{1,6}. Physiological edema that is already present in the upper airways during pregnancy can accelerate airway obstruction in cases of inhalation injury and can interfere with intubation^{1,5}.

The first clinical case describes treatment in the first trimester of pregnancy, in which the medications used most influenced decision-making. The medications commonly used for the treatment of burns were evaluated for safe use in the first trimester. In the second clinical case, the risk of premature labor due to the stress of trauma and surgery was the main determinant in management.

Chemical prophylaxis of deep venous thrombosis is strongly recommended because of the hypercoagulable state of pregnancy. Low-molecular-weight heparin was used in the first case, and unfractionated heparin in the second, both of which are considered safe for use in pregnancy¹. The use of proton-pump inhibitors or H2 inhibitors is also considered safe and recommended for pregnant women due to the risk of gastric peptic ulcer.

In both cases, ranitidine¹ was chosen. Of the antimicrobials usually used in the treatment of burns, amikacin is known to be teratogenic and its use should be avoided in the treatment of pregnant women, even in topical form¹.

Early grafting, preferably before 48 hours, has been shown to reduce maternal mortality, without negatively impact on survival of the fetus⁷. For this reason, when the conditions of the pregnant patient and fetus allow, we should not delay surgical procedures, and both intraoperative and postoperative care require special attention⁷.

Fetal heart rate monitoring using ultrasound is recommended in the intraoperative and immediate postoperative period, starting at 16 weeks, with continuous cardiotocography starting at 25 weeks⁸. Fetal Doppler ultrasound on admission and 2 weeks after the injury is recommended, due to the risk of late fetal death^{6,9}.

CONCLUSION

The reported cases illustrate the treatment of burns during two distinct phases of pregnancy, i.e., at the beginning of pregnancy and approaching term. In the first trimester, special attention should be given to the medications that will be used during treatment, due to the risk of teratogenicity.

In the third trimester, fetal monitoring with cardiotocography is more important due to the risk of fetal distress, abortion, and premature delivery. Given the unique features of pregnancy, the complexity of burn treatment is apparent. Although burns are best managed by prevention, greater knowledge of the physiology of gestation allows us to properly manage burns in pregnancy.

COLLABORATIONS

JRNLF	Analysis and/or interpretation of data; statistical analyses; final approval of the manuscript; conception and design of the study; writing the manuscript or critical review of its contents; special supplement (article submitter).
ELF	Analysis and/or interpretation of data; completion of surgeries and/or experiments; writing the manuscript or critical review of its contents.
GFT	Analysis and/or interpretation of data; final approval of the manuscript; conception and design of the study; writing the manuscript or critical review of its contents.
AFO	Analysis and/or interpretation of data; final approval of the manuscript; conception and design of the study; writing the manuscript or critical review of its contents.
LMF	Analysis and/or interpretation of data; statistical analyses; final approval of the manuscript; conception and design of the study; completion of surgeries and/or experiments; writing the manuscript or critical review of its contents.

REFERENCES

1. Parikh P, Sunesara I, Lutz E, Kolb J, Sawardecker S, Martin JN Jr. Burns During Pregnancy: Implications for Maternal-Perinatal Providers and Guidelines for Practice. *Obstet Gynecol Surv.* 2015;70(10):633-43. DOI: <http://dx.doi.org/10.1097/OGX.0000000000000219>
2. Akhtar MA, Mulawkar PM, Kulkarni HR. Burns in pregnancy: effect on maternal and fetal outcomes. *Burns.* 1994;20(4):351-5. DOI: [http://dx.doi.org/10.1016/0305-4179\(94\)90066-3](http://dx.doi.org/10.1016/0305-4179(94)90066-3)
3. Karimi H, Momeni M, Momeni M, Rahbar H. Burn injuries during pregnancy in Iran. *Int J Gynaecol Obstet.* 2009;104:132-4. PMID: 19022440 DOI: <http://dx.doi.org/10.1016/j.ijgo.2008.10.003>
4. Maghsoudi H, Smnia R, Garadaghi A, Kianvar H. Burns in Pregnancy. *Burns.* 2006;32(2):246-50. DOI: <http://dx.doi.org/10.1016/j.burns.2005.10.003>
5. Roderique EJ, Gebre-Giorgis AA, Stewart DH, Feldman MJ, Pozez AL. Smoke inhalation injury in a pregnant patient: a literature review of the evidence and current best practices in the setting of a classic case. *J Burn Care Res.* 2012;33(5):624-33. DOI: <http://dx.doi.org/10.1097/BCR.0b013e31824799d2>
6. Jain V, Chari R, Maslovitz S, Farine D; Maternal Fetal Medicine Committee, Bujold E, et al. Guidelines for the Management of a Pregnant Trauma Patient. *J Obstet Gynaecol Can.* 2015;37(6):553-74. DOI: [http://dx.doi.org/10.1016/S1701-2163\(15\)30232-2](http://dx.doi.org/10.1016/S1701-2163(15)30232-2)
7. Prasanna M, Singh K. Early burn wound excision in major burns with pregnancy: a preliminary report. *Burns.* 1996;22(3):234-7. PMID: 8726266 DOI: [http://dx.doi.org/10.1016/0305-4179\(95\)00113-1](http://dx.doi.org/10.1016/0305-4179(95)00113-1)
8. Vilas Boas WW, Lucena MR, Ribeiro RC. Anestesia para cirurgia não-obstétrica durante a gravidez. *Rev Med Minas Gerais.* 2009;19(3 Supl 1):S70-S79.
9. Einarson A, Bailey B, Inocencion G, Ormond K, Koren G. Accidental electric shock in pregnancy: a prospective cohort study. *Am J Obstet Gynecol.* 1997;176(3):678-81. PMID: 9077628 DOI: [http://dx.doi.org/10.1016/S0002-9378\(97\)70569-6](http://dx.doi.org/10.1016/S0002-9378(97)70569-6)

***Corresponding author:**

Andrea Fernandes de Oliveira

Rua Napoleão de Barros, 737 - 14º andar, Vila Clementino - São Paulo, SP, Brazil

Zip Code 04024-002

E-mail: dra.afo@gmail.com