

FULL PAPER

Pregnancy with burn injury: A case report

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Pregnancy with burn injury is both unusual and life-threatening conditions. In this study, one case of pregnancy was presented with burn injury from Dr. Soetomo General Hospital. A 28 years-old pregnant woman with burn injury was referred to Dr. Soetomo General Hospital emergency room. The examination suggested 13.5% severe burn injury superficial-mid dermal (4% at patient's face). Laboratory examination revealed anemia and hypoalbuminemia. The CXR result revealed lung inflammation. The patient was pregnant with twins in 29/30 WGA. We treat the patient with dexamethason and progesterone. At 4th day of treatment, the patient was transferred to ICU and attached to respirator. The next day, the patient was in labor, so we terminated the pregnancy by cesarean section. The first baby weighted 1300 g and the second baby weighted 1200 g. Plastic Surgery Department then resumed with debridement. The babies discharged 7 days later. The patient was treated for 23 days in Burn Unit before discharged. Pregnancy with burn injury is a life-threatening case that needs more extensive treatment. Inflammation from the injury may induce labor. Pregnant patient with inhalation trauma may have more severe breathing difficulty compared to non-pregnant women because of diaphragm shifting upwards. Resuscitation and fluid management is not different from non-pregnant patient. The pregnancy management in burn injury patient depends on the total % burn and gestational age.

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KEYWORDS

Burn injury; inflammation; pregnancy.

Introduction

Pregnancy with burn injury is both unusual and life-threatening conditions. Approximately 7% of reproductive age women are seen for treatment for major burns [1]. Most burns that occur in pregnancy are attributed to industrial accidents [2]. Multiple factors influence mortality and morbidity resulted from burn injury in pregnant patients, including the severity of the burn, the woman's age, condition, and the estimated gestational age. Furthermore, no guideline exists that specifically address how

to treat pregnancy with burn injury [3]. However, the general agreement is that multidiscipline approach and collaborative care is mandatory to improve both maternal and fetal outcomes [4]. We will be presenting one case of pregnancy with burn injury from Dr. Soetomo General Hospital.

Case report

Mrs. S, a 28 years-old pregnant woman was referred to Dr. Soetomo General Hospital emergency room (October, 19th, 2021). One hour before arrival, she attempted to turn off

the water pump in her workplace, and then the pump exploded, resulting in burn injury. Patient was then treated by Plastic Surgery Department, and because of her pregnancy, she was consulted to Obstetric Department. The examination from Plastic Surgery Department suggested 13.5% severe degree burn injury superficial-mid dermal (4% at patient's face). Hemodynamic status was stable, and laboratory examination revealed anemia, hypoalbuminemia, and the CXR result was lung inflammation due to inhalation injury. From obstetric examination, we found the patient have twin pregnancy in 29/30 weeks of gestational age. The first baby was in transverse lie and the second baby breech presentation, with monochorion and biamnion. Both have normal FHR with EFW 1100 g /1000 g. We suggested treating the patient with dexamethasone injection for lung maturation, progesterone administration before debridement treatment.

The patient was treated in Burn Unit by Plastic Surgery Dept. At 4th day of treatment

(October 23rd, 2021), the patient experienced desaturation, so the patient transferred to ICU and attached to respirator. The next day after transferred to ICU, the patient had contraction. From obstetric examination we found that the patient was in labor. Because of the patient's condition, the pregnancy was then terminated by emergency cesarean section. The first baby was born weighted 1300 g and the second baby was born weighted 1200 g. Both babies then treated at Neonatal Intensive Care Unit. After the OB/GYN closed the incision, Plastic Surgery Dept. resumed with debridement procedure. The babies discharged 7 days later with good condition. The patient shows improvement in her condition, which is her consciousness is improved, her hemodynamics and vital sign is stable, and her lesion is healed. Patient was also able to eat and drink normally. The patient was treated for total 23 days in Burn Unit before discharged, are depicted in Figures 1.



FIGURE 1. (1-3) Burn trauma on patient when she first arrived at Emergency Room. (4) The patient's abdomen before c-section and debridement. (5) The patient's abdomen after c-section and debridement surgery

Discussion

Management of pregnant patient with burn injury has same principle with other burn patient. The difference is pregnant patient has

fetus that, depending on age and severity of injury, requires intensive monitoring of fetal condition is mandatory, and if needed, termination of pregnancy. Fetal survival is

dependent upon maternal survival and gestational age [5]. If the fetus or mother condition worsens, termination may be needed. When hypovolemic shock and fetal hypoxia occur, more aggressive resuscitation is required [6]. When pregnant mother suffer from major burn injury, there are several processes occur that may cause fetal hypoxia:

- inhalation trauma causes pneumonia, which in turn causes severe hypoxia, and the older the gestational age is, shifting in diaphragm may cause even more respiratory difficulty.

- Severe systemic infection, if not treated, may cause septic shock that lowers perfusion to fetus.

- Changes in capillary permeability, causes rapid shift in systemic fluid, which leads to systemic hypotension that lowers perfusion to fetus.

While the knowledge regarding burns in pregnancy, research suggests that fetal morbidity and mortality are linked to maternal hemodynamic maintenance during emergency. Because pregnant patient has lower FRC (Functional Residual Capacity), the patient has a higher risk of developing hypoxia [6]. Likewise, smoke from fire contains CO (Carbon monoxide) that easily bonded to HbF (Fetal Hemoglobin), causes fetal hypoxia [7]. Prostaglandins, released from inflamed area due to burn and infection, induces spontaneous uterine contraction that may lead to labor. Resuscitation and fluid management is no different from non-pregnant patient.

When the patient condition is stable, the acute stage of burn care begins [8]. Acute stage treatment includes skin grafting, wound care, management of pain, prevention of infection, fluid maintenance, and nutritional support. Pain management may be divided into pharmacologic and non-pharmacologic. While the effect of medications to the fetus should be considered, in critical setting, narcotics may be used regardless of risk to the fetus [9].

Infection must be prevented, and for first 36 hours, there is a great risk of systemic infection that may lead to sepsis. The main cause of infection in burn patients is pneumonia, due to airway injury, leading to impairment of cilia movement and mucus clearance, and inflammation, and exacerbated by immunosuppression [10].

Systemic inflammation response syndrome (SIRS) may occur, regardless of infection. Early nutrition, adequate treatment or prevention of infection, avoiding corticosteroids usage, and wound care is pivotal to prevent sepsis. While silver sulfadiazine and silver nitrate are commonly used to treat burn injuries because silver is a potent antimicrobial, sulfa portion of silver sulfadiazine may cause kernicterus to the newborn. Therefore, silver sulfadiazine can only be used in emergency situations, such as extensive burn cases [11].

Burn patient is susceptible to hypovolemia due to diffuse capillary leak syndrome and exudation through the wound. Burn affecting more than 20% TBSA requires more aggressive fluid resuscitation [12]. The commonly used guideline for fluid resuscitation in burn patient is Parkland regime, which the formula is based the wound size and TBSA, 4 ml/kg/% TBSA burned, one-half for first 8 hours, the rest for the next 16 hours [11]. To estimate the loss of fluid, the formula is as follows: Hourly water loss in mL = $(25 + \% \text{ burn area}) \times \text{total BSA (in m}^2\text{)}$. Colloid administration may increase the risk of pulmonary edema due to damaged vessels unable to hold larger molecules from colloid, and has no advantage over crystalloids [13].

During pregnancy, there is general hypercoagulable state. Burn injury may activate the coagulation systems via cytokines release, and the risk of thrombosis is increased in hypovolemic condition [14]. Prophylactic heparin at 2U/kg/h intravenously with careful monitoring can be used to prevent clotting and inflammation, to

restore blood flow, and to enhance healing [15].

Severe burns cause extreme metabolic stress, which with hypermetabolic state in pregnancy, this effect may be further increased. Aggressive nutritional support will help wound healing, reduces immune responses, and prevents gastrointestinal malfunction. Continuous enteral feeding should be initiated as soon as possible, to preserve mucosal integrity, buffer gastric acid and reduce susceptibility to infection. The Recommended Daily Allowance (RDA) for pregnant patient is higher than non-pregnant patient in any nutrition, and this needs to be considered when preparing the enteral nutrition for the patient [16]. For pregnant patient, enteral nutrition of 36 kcal/kg/d is recommended, along with well-balanced diet which include proteins, lipids, vitamins, and minerals [4,17].

If the patient's condition continues to decrease despite the treatment, termination of pregnancy may be preferred. Usage of tocolytics should be avoided in case of maternal sepsis, intrauterine fetal demise, or placental abruption [11]. Otherwise, if the patient condition is stable, progesterone can be used to prevent preterm birth [18].

The rehabilitation phase focused on restoration of function and appearance of the patient. These include scar excisions, repair of burn contractures, grafts, skin substitutes and prosthetics [19]. Biologically active skin substitutes can be used in conjunction with conventional dressings to improve healing, relieve pain, and long-term effect such as function and appearance [20]. One research by Hossein Lashgari in 2019 showed that using frozen amnion in burn injury treatment may reduce the risk of infection, reduce pain, and facilitates reepithelization [21], as presented in Table 1.

TABLE 1 The management of pregnancy in burn injury patient depending on the total % burn and gestational age

Total % burn	Age of Gestation	Management
<30% TBSA	The first trimester	No obstetric interference
	The second trimester	No obstetric interference
30-50% TBSA	The third trimester, less than 36 weeks	Conservative approach and monitoring of heart rate
	The third trimester, more than 36 weeks	Induce labor/cesarean section
50-70% TBSA	The first trimester	Fetal monitoring by ultrasounds 3-4 weeks
	The second trimester	Fetal monitoring every 3-4 weeks. Tocolytic therapy
70% TBSA	The third trimester, less than 36 weeks	Careful fetal monitoring
	The third trimester, more than 36 weeks	Deliver fetus within 48 hours
>70% TBSA	The first trimester	Terminate pregnancy
	The second trimester	Terminate pregnancy
>70% TBSA	The third trimester, if the baby is viable	Induce labor/cesarean section within 24 hours
	The third trimester, intrauterine death	No active intervention up to 4 weeks/monitoring of hemocoagulation factors
>70% TBSA	The first trimester	No treatment
	The second trimester	No treatment
	The third trimester	Cesarean section as an emergency procedure at the earliest

The management of burn injury in pregnant patient is as follows [23]:

- Maintain urine output at 0.5-1 mL/kgBW/h,
- When surgery is needed, maintain urine output at 1 ml/KgBW/h and O₂ sat. at 100%,
- Half-seated position,
- Ventilator may be considered if PO₂ <60 mmHg,
- Antibiotics and other medications must be safe for pregnancy, and
- Multidisciplinary management.

Conclusion

Pregnancy with burn injury is a life-threatening case that needs more extensive treatment. Inflammation from the injury may induce labor, thus increase the risk of preterm birth. Infection from burn wound and asphyxiation from inhalation trauma also poses greater risk than non-pregnant patient. Pregnant patient with inhalation trauma may have more severe breathing difficulty compared to non-pregnant women because of diaphragm shifting upwards, lowering lung capacity. Resuscitation and fluid management is no different from non-pregnant patient. The acute phase of treatment includes skin grafting, wound care, management of pain, prevention of infection, fluid maintenance, and nutritional support. The pregnancy management in burn injury patient depends on the total % burn and gestational age. If patient condition continues to decrease despite the treatment, termination of pregnancy may be preferred.

Acknowledgements

The authors would like to thank the Burn Unit, ICU, and Obstetrics and Gynecology Department, Dr. Soetomo General Academic Hospital Surabaya.

Funding

There was no specific funding from governmental, commercial, or non-profit entities for this case report.

Author's Contributions

All authors contributed to data analysis, article preparation, and paper revision and have effortlessly assumed responsibility for all aspects of this work.

Conflict of Interest

The authors declare that there is no conflict of interest in this study.

Ethical Consideration

The ethical approval is obtained from informed consent the patient already signed, and we cover any personal information regarding patient's identity to keep it anonymous and preserve confidentiality.

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References

- [1] C.R. Graves, Thermal and electrical injury, in: G.A. Dildy, M.A. Belfort, G.R. Saade, J.P. Phelan, G.D.V. Hankins, S.L. Clark (Eds.), *Critical Care Obstetrics*, 4th ed., Wiley, **2004**, 506–511. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [2] S.S. Guo, J.S. Greenspoon, A.M. Kahn, Management of burn injuries during pregnancy, *Burns*, **2001**, *27*, 394–397. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [3] B.B. Kennedy, S.M. Baird, N.H. Troiano, Burn injuries and pregnancy, *Journal of Perinatal & Neonatal Nursing*, **2008**, *22*, 21–30. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [4] L.D. Pacheco, A.F. Gei, J.W. VanHook, G.R. Saade, G.D. V. Hankins, Burns in pregnancy, *Obstetrics & Gynecology*, **2005**, *106*, 1210–1212. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [5] P. Agarwal, Thermal injury in pregnancy: predicting maternal and fetal outcome, *Indian Journal of Plastic Surgery*, **2005**, *38*, 95–99. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [6] H. Maghsoudi, R. Samnia, A. Garadaghi, H. Kianvar, Burns in pregnancy, *Burns*, **2006**, *32*, 246–250. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [7] Z. Masoodi, I. Ahmad, A. Haq, F. Khurram, Pregnancy in burns: Maternal and fetal outcome, *Indian Journal of Burns*, **2012**, *20*, 36. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

- [8] K. Osborn, Nursing burn injuries, *Nursing Management*, **2003**, *34*, 49–56. [[Google Scholar](#)], [[Publisher](#)]
- [9] E. Greenfield, Integumentary disorders, in: M.R. Kinney, J.A. Brooks-Brunn, N. Molter, S.B. Dunbar, J. Vitello-Cicciu (Eds.), *Aacn's Clinical Reference for Critical Care Nursing*, 4th ed., Mosby, St. Louis, **1998**, 1065–1087. [[Google Scholar](#)], [[Publisher](#)]
- [10] K. Ipaktchi, S. Arbabi, Advances in burn critical care, *Critical Care Medicine*, **2006**, *34*, S239–S244. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [11] L.E. Polko, M.J. McMahon, Burns in pregnancy, *Obstetrical & Gynecological Survey*, **1998**, *53*, 50–56. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [12] P. Wiebelhaus, S.L. Hansen, Managing burn emergencies, *Dimensions of Critical Care Nursing*, **2011**, *20*, 2–6. [[Publisher](#)]
- [13] J.J. Marini, A.P. Wheeler, *Critical Care Medicine: The Essentials*, 3rd ed., Lippincot Williams & Wilkins, Philadelphia, **2006**. [[Publisher](#)]
- [14] V. Ünsür, C. Öztopçu, C. Atalay, E. Alpay, B. Turhanoglu, A retrospective study of 11 pregnant women with thermal injuries, *European Journal of Obstetrics & Gynecology and Reproductive Biology*, **1996**, *64*, 55–58. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [15] A.R. Mabrouk, A.E.H. El-Feky, Burns during pregnancy: a gloomy outcome, *Burns*, **1997**, *23*, 596–600. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [16] G.N.I. Pinatih, Healthy food for pregnant mother, *Bali Medical Journal*, **2023**, *12*, 218–221. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [17] S.E. Wolf, Nutrition and metabolism in burns: state of the science, 2007, *Journal of Burn Care & Research*, **2007**, *28*, 572–576.. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [18] K. Chaman-Ara, M.A. Bahrami, E. Bahrami, S. Bahrami, M.N. Bahrami, M. Moosazadeh, O. Barati, Progesterone therapy for the prevention of preterm labor in women with single risk-factor: A systematic review and meta-analysis, *Bali Medical Journal*, **2016**, *5*, 43. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [19] M.B. Klein, M.B. Donelan, R.J. Spence, Reconstructive Surgery, *Journal of Burn Care & Research*, **2007**, *28*, 602–606. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [20] L. DeSanti, Pathophysiology and current management of burn injury, *Advances in skin & wound care*, **2005**, *18*, 323–332. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [21] M. Hossein Lashgari, M. Hossein Hesami Rostami, O. Etemad, Assessment of outcome of using amniotic membrane enriched with stem cells in scar formation and wound healing in patients with burn wounds, *Bali Medical Journal*, **2019**, *8*, 41. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [22] R.K. Gang, J. Bajec, M. Tahboub, Management of thermal injury in pregnancy - an analysis of 16 patients, *Burns*, **1992**, *18*, 317–320. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]
- [23] D.S. Perdanakusuma, Luka bakar pada perempuan hamil, *Indonesian Journal of Obstetrics and Gynecology*, **2007**, *31*, 148–154. [[Crossref](#)], [[Google Scholar](#)], [[Publisher](#)]

How to cite this article: Pandu Hanindito Habibie, Dendy Dwi Kurniaputra, Pregnancy with burn injury: A case report. *Journal of Medicinal and Pharmaceutical Chemistry Research*, 2024, 6(11), 1677-1682. **Link:** https://jmpcr.samipubco.com/article_196339.html