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Acute Burns in Pregnancy

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Abstract

Background: Acute burns injury in pregnant women is relatively rare especially in developed countries. There is a paucity of published data on the specific problems of burns in pregnancy, despite the high mortality for both the mother and the fetus. **Aim:** In this paper we will discuss all cases of acute burns in pregnant women admitted to the Burns Department in Al-Mouassat University Hospital in Damascus during the period between October 2017 and October 2019. **Materials and Methods:** A retrospective study of records over 2 years was conducted. The study included all pregnant burn injury women who were managed and followed up at the Burns Department in Al-Mouassat University Hospital. Patients were classified according to gestational age, burn characteristics, and maternal and fetal outcome. **Results:** Eleven patients were included, with mean age of 22.5 years (range 16 - 37 years). Of the 11 pregnant patients, 4 (36%) were in the first trimester, 3 in the second trimester (27%), and 4 in the third trimester (36%). The mean percentage of total body surface area (TBSA) burned was 40.9% (range: 17% - 76%). Maternal death occurred in 2 of the cases (18%) and fetal death in 7 (63.6%). **Conclusion:** Maternal mortality is correlated to the percentage of the total burned area and inhalation injury. Burns in pregnant women have a profound effect on the fetal wellbeing, with a high rate of mortality especially in the first trimester.

Keywords

Acute Burns, Pregnancy, Mortality

1. Introduction

Acute thermal burn injuries during pregnancy are considered relatively rare in burn unites in hospitals, especially in developed countries, but they affect the fate of the mother and the developing fetus.

Burns during pregnancy are a clinical state that demands special management, treatment and approach to the mother and her fetus. However, burns sustained during pregnancy have been reported as increasing the mortality and morbidity of both mother and fetus [1].

Most of the published data on this subject in developed countries show a low incidence of acute thermal burns in pregnant women, and most of them are limited to single cases (Case Reports), while the incidence of these burns is higher in developing countries [1].

A burned pregnant woman, as well as any unburned pregnant woman, is vulnerable to the occurrence of various pregnancy complications, in addition to burns complications, especially respiratory injuries, associated infections, and fluid and electrolyte disorders [1].

This study was conducted to investigate the specificity of burn management in pregnant patients and try to modify the measures to achieve better results.

2. Materials and Methods

This was a retrospective study of pregnant burned patients over a 2-year period from October 2017 to October 2019 admitted to the Burns Department in Al-Mouassat University Hospital, Damascus, Syria.

The sources of information were the folders of patients presenting to our unit during that period.

The approval of the hospital was taken to conduct the study and withdraw the patients files, and the approval of the ethical committee of Damascus University was also taken to conduct this study and publish it through the scientific agent of the faculty of medicine of Damascus University.

The number of admitted pregnant patients was 11 patients. Obstetric consultation was sought promptly on admission for each pregnant patient. Medications and antibiotics were given according to the advice of obstetricians.

For the statistical study, the mean was relied on with the percentage.

All patients had either superficial/deep second-degree or third-degree burns with an area that requires admission to the hospital (at least 15%).

The percentage of total body surface area (TBSA) burned and the grade of the burn injury was determined clinically (Wallace rule of nines). Intravenous fluid replacement was initiated using the Parkland formula (percentage of TBSA burned × 4 mL per kg of body weight). Response was assessed by urinary output and other vital signs.

All patients received routine burn injury care (as well as non-pregnant women), including fluid resuscitation, wound care, physiotherapy, nutritional support and were co-managed by obstetricians.

The burn dressings were with Vaseline material and the antibiotic dressings were not used. No surgical procedure was done for any patient, but burns were treated conservatively to avoid exposing the fetus to anesthesia drugs, according to the obstetric consultation not to perform general anesthesia except in the case

of emergency surgery.

Patients were classified according to the gestational age at the moment of burning. Morbidity and mortality were assessed for both mother and fetus during each trimester of pregnancy.

The most important variables that were studied are the morbidity and mortality in mother and fetus as a basic determinant of the method of management used.

3. Results

During the study period, 11 pregnant women with the complaint of acute burn that required admission presented to the Emergency Department at AL Mouwasat University Hospital in Damascus.

The mean age of patients was 22.5 years, ages ranged between 16 and 37 years.

The mean percentage of total body surface area (TBSA) burned was 40.9% (range: 17% - 76%). Burns distributed over the various areas of the body and ranged between the superficial/deep second-degree to third-degree burns without accounting first degree burns in area estimation [2].

A peripheral vein input was opened for each patient at the moment of admission and infusion of intravenous fluids was started directly (ringer lactate), a Foley cather was installed to monitor the urinary output and the burned area was cleaned with normal saline.

Vaseline dressing was applied to the burn and the patien was investigated for inhalation injury to apply oxygen when needed, which was dignosed in only two patients. the patients were strictly monitored in the department, as well as the pulse and vitality of the fetus were monitored with echocardiogram by gynecologists.

Later, the dressing was changed daily by us, and splints were placed for the burned joints with encouragement of movement and high protein nutrition were applied.

7 patients were admitted to the intensive care unit directly due to the large burned area or due to the presence of respiratory injury or other associated injuries.

The distribution of patients according to gestational age was as follows: 4 patients (36.4%) were in the first trimester, 3 patients in the second trimester (27.2%), and 4 patients in the third trimester (36.4%) **Table 1**.

Fetal death occurred in 7 cases (63.6%), 4 of these cases were in the first trimester (100% of first trimester burns), 2 cases were in the second trimester (66.6% of second trimester burns) and one in the third trimester (25% of third trimester burns). The remaining four cases were discharged with the fetus alive with close follow-up by obstetricians.

Maternal death occurred in 2 out of 11 cases (18.2%). Both of them were admitted to the intensive care unit immediately from Emergency Department due to the presence of associated respiratory injury. One of the deceased patients had 70% TBSA burns, and the other had 76%.

Table 1. Distribution of patients according to the pregnancy stage, area of burning, maternal age, maternal and fetal death.

Patients NO	Age (years)	Pregnancy trimester	Percentage of TBSA burned (%)	Maternal death	Fetal death
1	20	3	30		
2	18	2	30		
3	20	1	70	√	√
4	17	1	76	√	√
5	16	1	32		√
6	31	2	17		
7	37	3	57		√
8	24	3	22		
9	25	1	34		√
10	20	3	40		√
11	20	2	42		√

Fluid resuscitation was increased in all patients of up to 150% from Parkland formula to obtain urine output of 1/ml/kg/hour.

9 patients were discharged, only two patients were contacted after discharge, one of them was in the first trimester of pregnancy, the fetus died before being discharged from the hospital, and the other was in the third trimester of pregnancy, she completed the pregnancy and a fetus was delivered naturally with normal vital signs.

No antibiotics were given to patients due to the absence of any severe infection, and on the recommendation of obstetricians not to give antibiotics unless necessary.

Burn injury was dressed with Vaseline, which is less harmful to the fetus than local antibiotics. Vaseline dressings were continued even after discharge.

Table 1 shows the distribution of patients according to the pregnancy stage, area of burning, maternal age, maternal and fetal death.

4. Discussion

Thermal burn in pregnant women is a rare medical problem, but it significantly increases the morbidity and mortality of both the mother and her fetus. Pregnancy posses some challenges in managing burn injuries. It considerably reduces the use of the common protocols for wound management while the fetus is seen as the second patient in developing a plan of care [3].

35-40% of the blood supply in the pregnant woman's body goes to the placenta and the fetus, and when there is any disturbance in this perfusion, the fetus is the first to be affected. In thermal burn during pregnancy, the peripheral vascu-

lar dilatation due to the burn leads to a decrease in blood flow to the placenta and the fetus. This hypoperfusion becomes more severe as the burn area increases [3].

Furthermore, when there is a pulmonary injury or severe infection, additional hypoxia occurs in mother and thus in the fetus, which increases morbidity and mortality in the mother and her fetus.

Thus, the most important factor in management is to maintain an effective blood volume, a good oxygenation, and to treat any infection.

Our study showed that maternal mortality was mainly related to the area of burning, while fetal mortality was related to both the area of burning and the stage of pregnancy, which means that the fetus is more sensitive to lack of blood supply the earlier the gestational age.

When compared to some international studies (**Table 2**), an Iranian study conducted by Maghsoudi *et al.* [4] in 2006 and a Turkish study conducted by Unsur *et al.* [5] in 1996, we find that maternal mortality in our study is comparable to Unsur *et al.* study (18%) and less than the study of Maghsoudi *et al.* (39.2%) with a variation in the area of the burn surface between the three studies (40.9%) in our study, (37.7%) in Maghsoudi *et al.*, (26%) in Unsur *et al.*

Fetal mortality rate was higher in our study (63.6%) compared to Maghsoudi *et al.* (45%) and (36%) in Unsur *et al.* We believe that the reason is related to the higher rate of first trimester burned women in our study compared to the Iranian and Turkish studies.

5. Conclusions

One of the drawbacks of this study is the relatively small number of patient, but due to the scarcity of cases seen even globally, the number is acceptable for taking a preliminary result, but it is preferred in future studies to take a large number or cases. Also, this study has not classified the patient according to the burn cause (flame, wet, electric, …) which is preferable to study the effect of the age of the pregnant patient on the prognosis of the burn, which has not been considered in this study.

This study clearly indicates that maternal and fetal mortality of burns during pregnancy is related to the percentage of TBSA burned.

The fetal mortality rate was associated with gestational age at the moment of burning, as it was higher in the first trimester of pregnancy (fetal sensitivity is higher for ischemia) [6].

Table 2. Comparison between our study and some studies.

Study	Patients	Maternal death	Fetal death	Mean percentage of TBSA burned (%)
Our study	11	2 (18%)	7 (63%)	40.9%
Maghsoudi *et al.* [4]	51	20 (39%)	23 (45%)	37.7%
Unsur *et al.* [5]	11	2 (18%)	4 (36%)	26%

The possibility of pregnancy must be considered when any woman of reproductive age has sustained a burn. And it is necessary to take appropriate management upon confirmation of pregnancy in cooperation with obstetricians and gynecologists [7].

Reducing the percentage of TBSA burned (in pregnant women) that is required for admission from 15% to 5% - 10% should be considered.

Increasing intravenous fluid resuscitation to 150% of the Parkland formula, especially in the first trimester of pregnancy should be considered.

Measures, cautions and awareness must be increased to protect pregnant women from all kinds of burns, especially thermal burns.

Secondary preventive measures to reduce burns severity by instituting prompt first-aid methods could also be taught.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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