



Research Article

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The Rate of Wound Infection Following Cesarean Deliveries in Different Groups of Syrian Refugees in Jordan: A Retrospective Analysis

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Abstract

Objective: To compare the rates of wound infection following cesarean delivery in patients from refugee camp and urban settings.

Methods: a population-based retrospective study comparing the rates of infection developed following cesarean section in patients from different living settings (camp and urban). The study was conducted in Sarah Specialty Hospital, in the Mafraq governorate, Jordan in 2019 – 2020.

Result: Of the 150 cesarean deliveries done at the hospital, 24 patients developed wound infection after the procedure. During our study period 19 out of 80 (23.7 %) patients who reside in refugee camps developed wound infection compared to 5 out of 70 (7.1 %) who reside in urban settings (OR= 3.3; CI, 1.1 – 9.3; $P < 0.02$).

Conclusion: Patients who live in refugee camps are more likely to develop wound infection following cesarean deliveries compared to those who live in urban settings.

Introduction

Wound infections develop following 3% to 15% of cesarean deliveries (CDs) [1]. The present study aimed to compare the rates of infection after CDs in two different patient groups from the refugee population in Jordan. It was conducted in Sarah Specialty Hospital where an average number of 1200 CDs are done annually.

This hospital serves a large obstetrical population in the Mafraq governorate, located in the northern part of Jordan. The main obstetrical population in this hospital is Syrian refugees who either reside in the Za'atari refugee camp or outside the camp in urban settings. Although Syrian refugees get financial aid coverage for health care from multiple humanitarian organizations, many of them are still living in a low socio-economic status, with a low standard of living.

Many risk factors for wound infection following CDs have been identified. Studies reported an increased infection rates in obese patients, patients with hypertensive disorders, diabetes mellitus, and premature rupture of membranes. Also, there is an increased risk following emergency CDs. Moreover, prolonged duration of surgery was also reported to be associated with increased risk [2].

Due to a multitude of risk variables present in different patient populations, the prevalence of wound infection after CS varies greatly. For hospitals in the United States, the mean rate of infection after CS was reported to be 3.15% [3]. According to a review of the literature, other sites had substantially higher rates of wound infection after CS, with rates of 8.5% [4] 16.2% [5], 19 % [6], and 25.3% [7].

Previous research has found a number of risk factors for wound infection, including younger age, obesity, diabetes, chorioamnionitis, un-booked patients, PROM, emergency delivery, greater operational time, and the absence of antibiotic prophylaxis [1], [8], [9], [10]. Patient age was not found to be a risk factor for wound infection, and there was no significant link between DM and wound infection in this investigation, which is consistent with previous research.

It is possible that the vast range of observed independent risk factors for wound infection is attributable to the diversity in the selection of prospective risk variables for study. Obesity, lack of antenatal care, and delayed delivery are three factors that greatly enhance the risk of wound infection.

Some studies have found a link between preventive antibiotics and a lower rate of endometritis and total postoperative maternal infectious febrile morbidity after CS, while others have not [11], [12], [13], [14], [15]. The American College of Obstetricians and Gynecologists' (ACOG) committee on obstetric practice recently recommended antimicrobial prophylaxis for all cesarean deliveries unless the patient is already receiving appropriate antibiotics (for example, for chorioamnionitis), and that prophylaxis be given within 60 minutes of the procedure starting.

Obesity, extended labor, and the length of the surgical procedure are all independent high-risk factors for wound infection that should be carefully incorporated into postoperative wound infection prevention and surveillance strategies. This, in turn, could aid in the preoperative identification of high-risk patients as well as the creation of wound infection prevention methods.

The camps vary in their accessibility to running water, personal bathroom, and access to electricity. The WHO has reported that 1 in 3 patients undergoing surgical procedures will have a wound infection in low-middle income countries.

Despite having access to health care, refugees continue to be plagued by ailments. The health issues that refugees experience are reflective of the general health conditions and trends in Syria and Jordan, as well as, to some extent, the rest of the world. The disease epidemiology among Syrian refugees is similar to that of many other countries throughout the world. Syrian refugees suffer from chronic ailments, communicable infections, injuries, and mental and emotional disorders, according to the conclusions of this review.

Diabetes, hypertension, cardiovascular disease, and cancer are among the main causes of death and morbidity around the world. The increased prevalence of these non-communicable diseases makes them more complex, necessitating specialized treatment. Syrian refugees have the same chronic ailments, and

they were diagnosed in the majority of cases while still in Syria. Syria was recognized to have a high burden of non-communicable diseases even before the commencement of the war.

Pregnancies and pregnancy-related problems were the focus of all studies examining women's health. These were primarily focused on the high prevalence of anemia (51%) among Syrian pregnant women, as well as chronic malnutrition (19%) and caesarean deliveries (37%). In terms of mental health research, papers focusing on psychological distress discovered that it affects 56% of refugees, while the prevalence rate for PTSD was found to be 1% [16], [17].

Methods

A retrospective population-based study was conducted in women with wound infection following CDs. The rates of infection then were compared between patients who live in a refugee camp and those who live in urban settings outside the camp. The diagnosis of wound infection was made during hospital admission and after discharge during post-partum follow up visits. The diagnosis was made by two attending physicians in the obstetric department in the hospital after a written or verbal consent from the participating patients.

We used the CDC diagnostic criteria for wound infection following CDs which include: maternal fever > 38 C, isolated organism, purulent discharge, and at least one of the following signs and symptoms of infection – pain or tenderness, localized swelling, redness or heat. Superficial incisions were opened by obstetric attending physician – unless the incision culture was negative, and the diagnoses were made by the same attending physician [18], [19]. Data were collected from hospital records and examined by attending obstetricians and general practitioners before entering them in the study database.

Statistical analysis was performed by using SPSS software package to analyze study data including: frequencies, percentages, means, standard deviation (SD). Odds ratios (OR) and their 95% confidence intervals (CIs) were calculated. $P < 0.05$ was considered statistically significant.

The study was conducted on a total number of patients of 150. Patient groups were appointed as patients living in refugee camps (Group A, with a total of 80 patient), and those living in urban settings (Group B, with a total of 70 patients).

Inclusion criteria of the study were:

- (1) Age: 18-40
- (2) Elective CDs
- (3) Syrian refugees under the poverty line

Exclusion criteria were:

- (1) Patients with BMI > 30
- (2) Patients with Diabetes Mellitus (DM) or gestational diabetes

Obstetric risk factors for wound infection including: maternal age and previous CDs were analyzed.

Table 1

	Camp (n=80)	Urban (n=70)
Mean Age, years	29.9 ± 7.0	29.9 ± 6.6
Previous CDs	1.4 ± 0.5	1.4 ± 0.5

Table 1 shows age and previous CD as risk factors for wound infection following CDs in both groups

We compared the total study population in each residence using age 3 categories. Previous CDs were also compared for each age category (Table 2). We further compared patients age and previous CDs for patients who had wound infection following CDs (Table 3).

Patient Characteristics	Camp (n=80)	Urban (n=70)
Age		
< 20	8 (10%)	5 (7.1%)
20 - 30	28 (35%)	26 (37.2%)
> 30	44(55%)	39 (55.7%)
Mean no of previous CDs by age		
< 20	1.12	1.0
20 - 30	1.42	1.38
> 30	1.56	1.56

Table 2 shows age distribution and mean number of previous CDs for each age subgroup in Camp and Urban patients

Patient Characteristics	Infected patients in Camp (n=19)	Infected patients in Urban (n=5)
Age, years		
< 20	2 (10.5%)	0
20 - 30	7 (36.8%)	2 (40%)
> 30	10 (52.6%)	3 (60%)
mean number of previous CDs by age		
< 20	1	0
20 - 30	1.4	2
> 30	1.7	1.3

Table 3 shows age distribution and mean number of CDs for each age subgroup in patients who have had wound infection in both Camp and Urban groups

Results

During the study period, 150 CDs were included in the study. Of these, 24 (16%) were followed by wound infection. Wound infections were likely to develop in patients in refugee camps rather than in urban settings.

Wound infection following CD occurred more often in pregnant women residing in refugee camps compared to those who reside in urban settings. During our study period 19 out of 80 (23.7 %) patients who reside in refugee camps developed wound infection compared to 5 out of 70 (7.1 %) who reside in urban settings (OR= 3.3; CI, 1.1 – 9.3; P < 0.02).

Obstetric risk factors for wound infection including obesity, gestational diabetes, hypertension, emergency CDs, PROM were excluded from the study population. Other risk factors for wound infection like maternal age and number of previous CDs were analyzed between the two groups. No significant difference in maternal age in both study groups was shown, with mean material age of (29.9, SD ± 7) in the camp group as compared to (29.9, SD ± 6.6) in urban group. Previous CDs did not show any significant difference between the two groups, with mean number of previous CD of (1.5, SD ± 0.5) for both study groups.

Discussion

Jordan hosted more than 672,000 registered Syrian refugees as at March 2021, but the actual total is estimated at around 1.3 million when those not registered are taken into account. Around 90% of the Syrian refugees live outside the camps in urban, peri-urban, and rural areas of Amman, Irbid, Mafraq, and Zarqa. Around 130,000 Syrian refugees live in Azraq, Emirates Jordanian Camps, and Za'atari camps [20], [21], [22].

The cost of primary health care, medications, and hospital fees does not seem to be the cause of higher rates of wound infection among the camp patients group. On the contrary, The United Nations High Commissioner for Refugees (UNHCR) now covers 100% of the cost of primary and secondary health services for refugees who are referred from camps. However, 80% of Syrian refugees live in urban areas of Jordan and must now pay foreigner's fee at government clinics. According to UNHCR, mean monthly household out-of-pocket health care spending for Syrian refugees was approximately US\$ 80 in 2014, a large sum for an average Syrian family with a monthly household income of US\$ 322. Refugees living outside of camps are more vulnerable to these costs, as only a few hospitals and clinics offer subsidized services for Syrian refugees in urban settings. [23]

Poor living conditions in Syrian refugee camps seem to be the explanation for increased wound infection following CDs in camp group. Poor personal hygiene, inaccessibility to clean water resources, shared bathrooms and crowded living units are common observations in refugee camp residence. According to the United Nations (UN) report, Za'atari camp was planned to host around 10,000 refugees. However it eventually welcomed more than 140,000 refugees in a deserted remote area at the northern part of Jordan [24].

Pre-fabricated housing units (caravans) are the most common form of housing inside refugee camps. The median number of household size is 6 for families living inside the camp. With 57% percent of household reported living in one housing unit (caravan), Syrian refugees have less space to live compared to those dwelling outside the camps. A small percentage of household inside the camp reported extending their living units with tents. These tents usually lack air conditioning and proper ventilation.

Although healthcare (including antenatal healthcare) is delivered free of charge for Syrian patients inside refugee camps, surveys show patients dissatisfaction with the quality of health care inside the camps. Some of the limitations to access healthcare providers reported by the patients include: the lack of transportation to the camp clinics or to nearby clinics (outside the camp), long waiting times due to the large number of patients and limited staffing in the camp clinics, periodic lack of essential medicines, lack of proper and thorough education about their conditions, and discrimination or inhumane attitude

of health care providers. Furthermore, healthcare providers share similar concerns regarding staffing shortages, long work hours, physician burn-out, insufficient health education programs, and lack of community health outreach programs [25].

Nutritional deficiency due to food scarcity plays an important role in developing wound infection after CDs. The 2013 United Nations International Children's Emergency fund (UNICEF) report shows that the prevalence rates of acute malnutrition in women 15-49 years of age are close in both groups with (6.3%) in the Urban refugee community and (6.1%) in Za'atri camp. The vast majority (89%) of refugee households in communities were either food insecure or vulnerable to food insecurity in December 2020 [26].

4% percent of households agreed to early marriage of children, mostly female, in order to meet households food needs. Around 71% of women aged 20 years are married compared to 43% before the Syrian war [27], [28]. In addition, only 13% of women aged 20 years and above residing in the camps have attained secondary or higher education compared to 17% of women in the same age group who reside outside the camps. [28]

In summary, we believe that the poor living standards of the housing units inside the camps, the sub-optimal care and the inaccessibility to healthcare providers, and the lower educational achievements of the camp residents might play a significant role in developing complications such as wound infection following CDs in this group.

Conclusion

Wound infection following CDs is a common complication seen in obstetric practice. Patients living in refugee camps are at increased risk of developing wound infection in comparison to those with the same risk factors who live outside the camps. Those patients should be educated more on their likelihood of developing infection after surgical procedures. More efforts should be done in regards of patient education of the importance of wound care, proper self-hygiene, and seeking medical help in their camps to prevent these complications. On a large scale, local government and non-governmental organizations should act together to improve the quality of the health care provided to Syrian refugees, put more focus on the basics health education for camp residents, provide more reliable and accessible source of clean water, as well as improving the quality of living units in Syrian refugee camps across Jordan.

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