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Major article

Surveillance of surgical site infection after cesarean section and time of notification

Júnia Leonne Dourado de Almeida Lima MSc [a,b], Regina Amélia Lopes Pessoa de Aguiar MD, PhD [c], Henrique Vitor Leite MD, PhD [c], Hercules Hermes Riani Martins Silva [d], Werlley Meira de Oliveira [d], João Paulo Tomaz da Cunha Sacramento [e], Eduarda Almeida Wakabayashi [d], Helen Cristina de Souza [d], Wanessa Trindade Clemente MD, PhD [f,g], Roberta Maia de Castro Romanelli MD, PhD [g,h,*]

[a] *Specialization in Prevention and Control of Hospital Infection, Hospital das Clínicas of Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil*
[b] *Faculdade Dinâmica do Vale do Piranga, Ponte Nova, Minas Gerais, Brazil*
[c] *Department of Gynecology and Obstetrics, Medical School of Universidade Federal de Minas Gerais. Belo Horizonte, Minas Gerais, Brazil*
[d] *Medical School of Universidade Federal de Minas Gerais. Belo Horizonte, Minas Gerais, Brazil*
[e] *Faculty of Medical Sciences of Universidade José do Rosário Vellano, Belo Horizonte, Minas Gerais, Brazil*
[f] *Propedeutics Department, Medical School of Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil*
[g] *Pediatrics Department, Medical School of Universidade Federal de Minas Gerais, Universidade José do Rosário Vellano, Belo Horizonte, Minas Gerais, Brazil*
[h] *Hospital Infection Control Committee, Hospital das Clínicas of Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil*

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Background: Cesarean section is a surgical procedure the main complication of which is surgical site infection (SSI), which is related to maternal morbidity and mortality.
Objective: To evaluate active monitoring by telephone to identify infection and time of SSI report in postpartum women and associated risk factors.
Methods: We conducted a prospective observational study from 2013-2014, at a referral service for high-risk pregnancies. Surveillance was conducted via telephone at least 30 days after cesarean delivery. Incidence ratio and time of infection occurrence (days) was analyzed. Survival analysis was conducted to assess the temporal distribution of the development of infection.
Results: Of a total of 353 patients, 14 (4%) cases of SSI were reported, and 10 (7.4%) of the reported cases occurred within 15 days after cesarean and average time of infection was12.21 days. American Society of Anesthesiologists score was the only risk factor associated with SSI after cesarean section.
Conclusions: The prevalence of SSI after cesarean section via telephone is similar to several services with different methods of surveillance, considering it could be used by services with limited resources. Superficial incisional SSI was the most common type of infection, time of infection report was mainly before the 15th day postprocedure, and American Society of Anesthesiologists score of 2 or less was protective against SSI. Telephone calls can be a viable method to identify women with infection briefly after discharge, particularly at-risk patients.

INTRODUCTION

A cesarean section is a surgical procedure the main complication of which is surgical site infection (SSI), which is related to maternal morbidity and mortality.[1] Approximately 50.0% of maternal death cases are linked to surgical procedures, and 16.0% are associated with SSI.[2]

* Address correspondence to Roberta Maia de Castro Romanelli, MD, PhD, Faculdade de Medicina, Universidade Federal de Minas Gerais, Av Alfredo Balena, 190 – 2o andar, Sala 267, Santa Efigênia, Belo Horizonte CEP - 30130-100, MG, Brazil.
E-mail address: rmcromanelli@gmail.com (R.M.C. Romanelli).
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The influence and severity of SSI have been shown to vary considerably, and SSI can be classified as superficial incisional, deep incisional, and organ/space according to the criteria of the Centers for Disease Control and Prevention (CDC).[3] The CDC recommends that institutions conduct SSI surveillance from the time of surgery until hospital discharge and that patients should be monitored after discharge for a period of 30 days from the date of surgery when no type of implantation has been performed.[3]

Such monitoring can be passive or active based on medical records, questionnaires, telephone calls, and direct inspections of surgical wounds.[4,5] However, despite the recommendations, there have been few studies of SSI in women who have undergone cesarean sections in Brazil.[5-8]

Most importantly, according to the American Society of Anesthesiologists (ASA), several factors are considered surgical risk indices for SSI, including the surgical contamination potential, the preoperative physical condition of the patient, and the duration of surgery.[9,10] Additionally, other factors influence the occurrence of SSI following cesarean sections, including the membrane rupture time, the number of vaginal exams, the type of delivery (ie, elective, urgent, or emergency cesarean sections), the surgical technique, obesity, diabetes, severe hypertension, and even the surgeon's skill.[1,11-13]

Therefore, the objective of our study was to evaluate active monitoring by telephone to identify SSI and time of infection report in postpartum women at a referral service for high-risk pregnancies in the Brazil Public Health Service and the risk factors for such infections.

MATERIALS AND METHODS

This was a prospective observational study that was conducted in a referral hospital from April 2013-May 2014. The study was conducted at a university referral hospital for secondary and tertiary care systems of the Municipal and State Health System with approximately 500 beds and an obstetric center with 5 rooms that conducts approximately 240 births per month and includes 17 beds.

The studied population was composed of women undergoing cesarean sections via this service, and the inclusion criteria included the identification of the type of birth from the obstetric ward. Women who had not been contacted by telephone within 30 days postpartum were dismissed from the trial.

To calculate the sample size, a confidence level of 95% and a precision of 5 were considered with an approximate prevalence of the studied event (ie, SSI) of 4%.[14] Thus a minimum sample of 47 patients was required.

Undergraduate students were trained and supervised by professionals associated with the Hospital Infection Control Committee via telephone contact. The data collection forms with all of the criteria of the National Healthcare Safety Network[3] for SSI reports were completed. An SSI patient was notified only if all recommended criteria were supervised and confirmed by Hospital Infection Control Committee professionals. Surveillance was conducted via telephone at least 30 days after cesarean delivery. The first contact was initiated within 15 days after discharge, and the second contact was initiated 15-30 days after delivery. Telephone calls were not successfully all times, but at least 5 calls were tried each moment. Questions included each one of the variables of SSI criteria defined by CDC.[3] No other method of monitoring was use, emphasizing that surveillance of cesarean-section procedures was not performed before. However, when women presented doubt about any question, they were recommended to schedule a medical appointment with the primary care service or at the hospital. Subsequent calls were performed to confirm information.

The analyzed variables were SSI and time of SSI occurrence (days), time of the year when the cesarean section was performed (first quarter: January, February, and March; second quarter: April, May, and June; third quarter: July, August, and September; and fourth quarter: October, November, and December), classification of the obstetrics resident physicians (first, second, third, and fourth year), time of membrane rupture (<18 hours or ≥18 hours); type of cesarian section (elective, urgent, or emergency); duration of surgery (<57 minutes or ≥57 minutes), the ASA surgical risk score (1 or 2 or 3, 4, or 5), surgical risk score (including type of cesarean section, duration of surgery, and ASA score), aspect of the amniotic fluid (clear, meconium, or bloody), number of vaginal examinations (≤2 or >2 examinations), and partogram use during labor (yes or no).

For the data analyses, the incidence ratio (monthly rates of SSI per 100 procedures) was used to assess the SSI reports. Moreover, the mean, median, and SD of the time of SSI occurrence time were calculated.

Furthermore, survival analysis was conducted to assess the temporal distribution of the development of SSI, using a Kaplan-Meier curve.[15]

The data were analyzed using the Statistical Package for the Social Sciences software (version 19.0, IBM-SPSS Inc, Armonk, NY). This study was approved by our facility's institutional review board (ETIC 476/10).

RESULTS

Five hundred twenty-eight women underwent cesarean sections that were performed by the service during the study period. A total of 175 women (33.2%) were considered lost of follow-up from the study due to the inability of making telephone contact with these patients (n = 170) or death (n = 5) after discharge. Thus, the remaining 353 (66.8%) women were included in analysis. Because all of the women were assisted at a Brazil Public Health Service, it is considered that they have similar socioeconomic status, considering the profile of populations using this service.

Of these 353 patients, 160 were contacted at 15 days and they continued to be followed, with a total of 332 women being contacted at 30 days. Fourteen (4.0%) SSI cases were reported within 30 days postdischarge. Regarding the topography of the 14 infections, the majority of infections were diagnosed as superficial incisional SSI, followed by deep incisional SSI, and organ or space SSI as illustrated in Figure 1.

In total, 10 (71.4%) reported SSI cases occurred within 15 days, and 4 (28.6%) occurred between 15 and 30 days. The average time (in days) to the appearance of surgical infections was 12.21 ± 6.97 days, the median was 10.50 days, and the range was 5-30 days. Figure 2 displays the survival curve with SSI and the postpartum occurrence times are presented.

The average length of stay for the women was 3.49 ± 2.37 days, the median was 3 days, and the range was 1-23 days. The average length of stay of the 10 women with SSIs was 3.50 ± 1.22 days, the median was 3.00 days, and the range was 2-6 days. However, the length of hospital stay did not significantly differ as a function of the time of SSI occurrence (t test = 0.22 and P = .82).

Table 1 presents the risk variables that were investigated in this study and their associations with SSI after cesarean delivery and reveals that only the presence of an ASA score of 1 and 2 were protective factors against SSI (P = .02; relative risk, 0.26; 95% confidence interval [CI], 0.074-0.90).

DISCUSSION

Using telephone surveillance, we identified an SSI after cesarean rate of 4.0%; this result is similar to those from studies conducted