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Caesarean section surgical site infection surveillance

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Summary Surveillance of surgical site infection (SSI) is an important infection control activity. The Caesarean section procedure was selected, as part of the Scottish Surveillance of Healthcare Associated Infection Programme, to monitor and report upon the incidence of SSI. Data were collected prospectively for 715 patients undergoing a Caesarean section procedure for 35 weeks during the latter months of 2002 and the first quarter of 2003. Of these, 80 (11.2%) patients developed an SSI, 57 (71%) of which were detected by postdischarge surveillance. Risk factors associated with infection were analysed. The choice of subcuticular suture rather than staples to close the surgical site was associated with a significantly lower incidence of infection ($P = 0.021$). Obese women experienced significantly more infections than women with a normal body mass index ($P = 0.028$). Dissemination of the surveillance results has made clinicians aware of the influence of body mass index and choice of skin closure in relation to SSI in this patient population. Analysis of these data has led to a review of local practice. The results also indicate the importance of postdischarge surveillance if SSIs are to be detected in this patient group. Continuous data collection and timely dissemination of the results are important factors acting as the catalyst for a review of practice.

Introduction

The significant life-changing event of motherhood places additional demands upon the reserves of all women. When coupled with recovery from major abdominal surgery and a surgical site infection (SSI), physiological and psychological well-being will inevitably be compromised.

SSI is the second most common infectious complication after urinary tract infection following Caesarean section delivery.[1] For the majority of obstetric patients, it rarely represents a threat to life. However, there are far-reaching morbidity

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and socio-economic consequences for the patient and the healthcare services,[2–4] with an estimated mean additional cost during the inpatient phase of care of £280 per infection.

The risk factors for SSI in association with Caesarean section are many, including those case-mix issues present in the surgical patient population such as age, factors such as presentation to surgery (elective vs emergency), and patient care practices such as antibiotic prophylaxis. Analysis of the combined effects of the intrinsic and extrinsic risk factors predisposing patients to SSI is necessary in order to detect the common links. The intrinsic factors are patient related and the extrinsic factors are related to management and care. Although the intrinsic factors cannot be changed, the risk they present in terms of infection is identifiable and manageable.

SSI is linked to factors associated with surgery that may influence the risk of infection. The Centers for Disease Control and Prevention's (CDC) National Nosocomial Infection Surveillance System (NNIS) risk adjustment index is an internationally recognized method of stratifying the risk of SSI according to three major factors.[5] Firstly, the American Society of Anesthesiologists' score reflects the patient's state of health before surgery. Secondly, wound classification reflects the degree of contamination of the wound. Thirdly, the duration of the operation reflects the technical aspects of surgery. Infection rate increases with increasing risk index score.[5] However, with Caesarean section, the relationship with the risk index is not established and further work is required on identification of the risk factors for SSI in this procedure category.

In a review of the literature, some Caesarean-section-specific risk factors for SSI were identified. The first of these was the presentation to theatre. There is contradictory evidence from studies regarding the association of emergency procedures with a greater incidence of infection.[1,6,7]

Another risk suggested to contribute to SSI is body mass index (BMI). A greater rate of infection associated with obese women undergoing Caesarean section surgery has been reported.[6,7]

Conflicting evidence exists regarding the ideal method of skin closure following abdominal surgery. Choice of skin closure material varies between surgeons according to experience and the patient's clinical presentation to surgery. The evidence comparing sutures with staples focuses upon speed of insertion, cost, postoperative pain and cosmetic appearance rather than infection risk.[8–11]

There is also evidence to indicate that any foreign body in the surgical site may increase the probability of infection. In general, monofilament sutures appear to be associated with a decreased risk compared with other sutures.[12] Subcuticular absorbable sutures that are buried in the wound are associated with a decreased risk of infection.[13,14]

An obstetric-related risk factor of both intrinsic and extrinsic origin is the length of time that the membranes are ruptured prior to Caesarean section. Following membrane rupture, the amniotic fluid is no longer sterile and may act as a transport medium by which bacteria come into contact with the uterine and skin incisions.[15] Research has identified an association between prolonged rupture of the membranes and an increased risk of SSI.[7]

Antibiotic prophylaxis is recommended for all operations involving entry into a hollow organ.[16] The antibiotic should be administered preoperatively, ideally within 30 min of the induction of anaesthesia. An adequate concentration of antibiotic within the serum and tissues will reduce the risk of resident bacteria overcoming the immune system during the immediate postoperative period.[12] However, prophylaxis will not prevent the consequences of intra-operative contamination. Single-dose antibiotic prophylaxis is recommended for Caesarean section surgery following clamping of the umbilical cord.[12]

The identification of risk factors for SSI within the literature is further limited by the various approaches to data collection and differing data definitions for SSI. Surveillance literature supports the use of postdischarge infection surveillance to establish accurate data collection.[17] The latest systematic review of the literature indicates that between 12% and 84% of SSIs are detected after patients are discharged from hospital.[18] There is evidence to support the use of postdischarge infection surveillance; however, consensus on the ideal method has yet to be met.[17] The gold standard is direct observation by a trained healthcare worker, ideally within the normal patient pathway to avoid any additional costs. This is possible in the case of Caesarean section surveillance if collaboration with community midwives is possible. In Scotland, community midwives have a statutory responsibility for patients following discharge from hospital. Patients are visited 10—14 days post operatively, and problems arising after this visit within the 30 days following surgery are also followed-up by the community midwife.

This study aimed to establish surveillance utilizing a gold standard approach to definitions and methods, and to identify specific risk factors for SSI following Caesarean section.