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The spectrum and outcome of pregnant trauma patients in a metropolitan trauma service in South Africa

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ABSTRACT

Introduction: Pregnant patients involved in trauma pose unique diagnostic and treatment challenges as the physiological and anatomical changes associated with pregnancy, and the need to preserve foetal well-being, result in a number of nuances in the standard resuscitation algorithms. This clinical audit within a busy developing world trauma service describes the spectrum and outcome of pregnant trauma patients.

Methods: All pregnant patients presenting to the Pietermaritzburg Metropolitan Hospital Complex following trauma were included in the study. Data were retrieved from the trauma registry and analyzed using descriptive statistics on a spreadsheet. The study ran from the 1st of July 2011 to the 31st of December 2013.

Results: During the study period, 1075 female trauma patients were admitted, with a 4% incidence of pregnant patients (42/1075). The mean age of the patients in the study was 24.9 years with an average age of gestation of 21.4 weeks. Blunt trauma accounted for the majority of injuries (57%). Trauma was by way of intentional assault in 52% of the cases. Of the cases of assault, 81% of the time, the assailant was known to the victim and in the majority of cases (55%) the assailant was the patient's intimate partner. Polytrauma predominated as the most common pattern of injury. Foetal death occurred in more than a third of cases (15/42). In 90% of the patients with an Injury Severity Score greater than fifteen, there was foetal death. Eighty-six percent (6/7) of the patients who required surgery had an unfavourable foetal outcome. In 73% of the cases of foetal death, the pregnancies were less than 28 weeks gestation.

Conclusion: In an environment with high rates of interpersonal violence, trauma in pregnancy is not an uncommon occurrence. It is most commonly due to assault and the assailant is known to the victim in the majority of cases. Blunt trauma still predominates in this setting but there is a high incidence of penetrating trauma. Foetal mortality in this group is high and reflects the severity of the trauma experienced.

Introduction

The management of the pregnant trauma patient poses unique diagnostic and treatment challenges as the physiological and anatomical changes associated with pregnancy and the need to preserve foetal well-being create a number of nuances in the standard resuscitation algorithms [1]. Almost all textbooks and trauma courses devote a chapter to the subject of managing the pregnant trauma patient. Despite this there is a paucity of clinical reports on trauma in pregnancy [2]. The objective of this clinical audit was to describe the spectrum and outcome of trauma in pregnancy in our environment and to attempt to develop guidelines and algorithms based on the data presented.

Setting

The Pietermaritzburg Metropolitan Trauma Service (PMTS) was established in 2006 with the intention of providing comprehensive trauma care to the city of Pietermaritzburg and the whole of western Kwa-Zulu Natal Province. For a number of pragmatic reasons, the PMTS could not adopt the concept of a trauma centre located in a single hospital and opted to attempt to provide care across the metropolitan complex. Hence the PMTS is a service and not a centre and this is reflected in it's vision statement, "Taking

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Care of Pietermaritzburg." Trauma patients in Pietermaritzburg are directed to one of the two hospitals within the city depending on their geographical location. This model of delivering trauma care is somewhat unique and whilst philosophically attractive does present challenges in terms of the implementation of safe and pragmatic management algorithms.

The PMTS aims to provide resources and expertise, as well as strategic and political leadership in trauma care to the city of Pietermaritzburg and the western rural health-districts of KZN. Pietermaritzburg is the capital of KZN and is the largest city in the western part of the province. It has a population of 1 001 000 people and is served by a tertiary hospital (Greys), and a regional hospital (Edendale). There are three private hospitals in the city, which function entirely independently. Western KZN is a predominantly rural province with a population of two million people, and consists of four health districts. There are two other regional hospitals in Western KZN and 19 district hospitals.

Resources

The PMTS has a complement of three sub-specialist trauma surgeons, two specialist surgeons in trauma fellowship training and one general surgeon with an interest in trauma surgery. All trainees and junior staff work under the supervision of the specialist staff. Both hospitals which the PMTS cover have twenty-four hour availability of a computed tomography (CT) scanner, and have support from a radiology service. Each hospital provides a single emergency operative theatre, which caters for the needs of all surgical specialties. The complex has 10 high dependency unit (HDU) beds (3 adult and 7 paediatric) and 19 intensive care unit (ICU) beds (12 adult and 7 paediatric), which are shared by all the surgical disciplines. ICU beds are available at both Greys and Edendale hospitals. ICU patients are managed with the Department of Critical Care in a "closed-unit" fashion. There is a specialist-led obstetric service in Pietermaritzburg, which covers all hospitals in the complex. There is no on-site neurosurgical service and all neurosurgery is performed in Durban 90 km away. We attempt to follow ATLS guidelines for the management of all trauma patients. All female trauma victims of reproductive age undergo a routine pregnancy test and all pregnant trauma patients are managed in conjunction with the staff of the obstetric service.

The Pietermaritzburg trauma registry

The PMTS has maintained a paper based trauma registry since 2006 and implemented a comprehensive electronic surgical registry (ESR) in January 2012. Ethical approval to construct and implement the ESR was obtained prior to its implementation (ethics number BCA221/13 BREC UKZN) [3]. A standardized paper-based tick box style admission document is used for the admission of all trauma patients. The data is then extracted from this document and entered directly into the ESR at the time of discharge. Data is analyzed and validated by the system administrator on a weekly basis. Omitted data sets are identified and where possible completed from the discharge summary or patient records. Registry data is manually checked on a weekly basis against morning hand-over reports, and furthermore on a three monthly basis against hospital and city mortuary records.

Methods

In addition to the ethics class approval for the ESR, (BCA221/13 BREC UKZN), this project was also covered by a separate ethics application BE 191/13. The study was conducted in the hospitals within the Pietermaritzburg Hospital Complex. All pregnant patients admitted within the service were included in this study. In addition to the data retrieved from the ESR, each pregnant trauma patient was reviewed by the primary author and a data survey sheet completed. This sheet collected all the variables relevant to the study, namely the mechanism of injury, pattern of injury, foetal outcome and in the case of assault, whether the assailant was the patient's intimate partner or not. The data were analyzed using descriptive statistics on a spreadsheet. The study ran from the 1st of July 2011 up to and including the 31st of December 2013.

Results

During the thirty-month period under review a total of forty-two pregnant trauma patients were managed within the Pietermaritzburg Metropolitan Complex. During this time the service admitted 1075 female trauma patients and treated 3000 female trauma patients in the emergency department. The incidence of trauma in pregnancy in this study was four percent (42/1075). The mean age of the group was 24.9 years (range 16–44 years). The average gestational age was 21.4 weeks. The gestational age was not recorded in 3 of the cases. Six patients were not aware that they were pregnant at the time of injury. Four of these were early in their first trimester, with the pregnancies all being diagnosed for the first time at admission. The other two were each at 20 weeks gestation and both denied being pregnant. There was an even distribution of gestational ages amongst the 39 trauma victims. The first, second and third trimeters comprising 12, 14 and 13 cases respectively. There was a single expected and unavoidable maternal death in the series. This patient sustained in excess of 70% full thickness and partial thickness flame burns.

Mechanism

Blunt trauma accounted for 57% of cases (24/42) and a combination of both blunt and penetrating trauma accounted for another two cases. There were nine (21%) cases of penetrating trauma. Burns accounted for a further five cases. There was a single case of corrosive ingestion and one case of attempted hanging. The trauma was intentional in 52% of cases. The intentional cases included assault in the form of gunshot wounds (4), stab wounds (3), blunt assault (9), a combination of blunt assault and stab wounds, (2), and assault with hot water (1). There were two cases of self-inflicted trauma, an intentional corrosive ingestion and an attempted hanging. Of the assault cases the assailant was known to the victim in over 80% of cases and in 55% of cases the assailant was the patient's intimate partner. Non-intentional injury accounted for 48% of the trauma cases and road traffic crashes (RTC) accounted for 26% (11) of the injuries. There were three falls (3), one structural collapse (1) and four burns (4). There were two animal related injuries; a snake-bite (1) and a dog bite (1). The accidental burns included a chemical burn (1) a burn from hot porridge (1) and flame burns (2). One of the flame burn victims was an eclamptic who suffered a seizure and fell into an open fire.

Pattern of trauma

Polytrauma was the predominant pattern of injury in this study, accounting for 40% (17/42) of injuries (Fig. 1). Abdominal injuries were the next major injury, accounting for seventeen percent (7/42). Head injuries accounted for just under 10% (4/42) of the cases. These were all mild head injuries with a GCS between 13 and 15. Eight of the patients had no significant surgical injuries, however three of these patients were admitted by the obstetric