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Has there been a change in peripartal maternal mortality in a tertiary care obstetric European center over the last five decades?



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ABSTRACT

Objective: Maternal mortality still remains a significant problem in obstetrics worldwide. Unchanged or even rising maternal mortality has been reported in several countries. The present study analyzed whether the pattern of maternal mortality has changed over the last five decades at the Department of Obstetrics and Gynecology of the Medical University of Graz.

Study design: Starting in 1981, a registry of maternal deaths was established and regularly updated at our institution based on retrospective data. Between 1963 and 2012, a total of 187,917 women delivered. Thirty-five consecutive maternal deaths were observed and subdivided into 10 year cohorts.

Methods: The registry of maternal deaths included deliveries after 28 + 0 weeks of gestation. Puerperal deaths were defined as deaths up to day 42 post partum.

Main outcome measures: Clinical data from maternal deaths were extracted from hospital records and autopsy reports.

Results: Maternal mortality rates declined from 35.0, 29.0, 2.4, 13.1 to 3.6 per 100,000 deliveries in the five subsequent periods, respectively. Sixty-six percent of women who died were 30 years or older. The cesarean section rate was 49%. Ninety-one percent of the 35 maternal deaths occurred in women with no significant medical history or risk factors. Seventy-five percent of deaths occurred after the 37 + 0 weeks of gestation. During all study periods, the prevalence of infections and hemorrhage was highest. The main causes of bleeding were uterine rupture and placental abruption, respectively.

Conclusion: Even nowadays, peripartal maternal deaths occur mainly due to infections and hemorrhage and also in women with no significant medical history.

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Introduction

According to the WHO, maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. Maternal death can be divided in direct and indirect maternal death [1]. Maternal mortality is an indicator of the health status for women of reproductive age and reflects the health system of a country.

Due to advances in obstetric care, maternal mortality rates declined dramatically over the past 30 years [2].

However, recent reports describe unchanged or even rising maternal mortality in several countries including France, the United States and the Netherlands [1–4].

Thus, maternal mortality still remains a significant problem in obstetrics worldwide accounting for 16/100,000 deaths in the year 2010 even in developed countries [1]. The leading causes of maternal deaths are peripartal hemorrhage (PPH), infections and thromboembolism [1–9]. Risk factors for maternal death include advanced maternal age and obesity [6,10–14]. Most of the maternal deaths are suggested to be avoidable [15].

The present study analyzed whether the pattern of peripartal maternal mortality has changed over the last five decades at the Department of Obstetrics and Gynecology of the Medical University of Graz, a tertiary care obstetric European center. In order to compare peripartal maternal deaths in recent times with earlier observation periods, the authors have arbitrarily defined the peripartal period as >28 + 0 weeks of gestation. For this purpose, maternal mortality data were extracted from the institutional registry.

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Materials and methods

Starting in 1981, a registry of maternal deaths was established and regularly updated at our institution based on retrospective data [16]. In order to analyze trends of maternal mortality over the last five decades, only deliveries after 28 + 0 weeks of gestation were included. This limit was chosen to make data comparable, although the authors are aware of a significant progress in perinatal care over the last decades which have led to an increased number of liveborns even at distinctly earlier gestational ages.

Between 1963 and 2012, a total of 187,917 women were delivered at the Department of Obstetrics and Gynecology of the Medical University of Graz, Austria after the 28 + 0 weeks of gestation. A total of 35 peripartur maternal deaths were observed during the study period. In each case, the course of pregnancy, delivery and puerperal period of mothers who died, were analyzed. Puerperal deaths were defined as deaths up to 42 days post partum. Clinical data from maternal deaths were extracted from hospital records and autopsy reports. They included the cause of death, maternal age, parity, gestational age, history of cesarean section, preexisting maternal diseases, relevant findings during the current pregnancy, mode of delivery, interval between delivery and maternal death, and neonatal outcome (Tables 1–5). The maternal mortality ratio, defined as the number of maternal peripartur deaths per 100,000 births between 28 + 0 weeks of gestation and day 42 after delivery.

Coincidental maternal deaths as, e.g., due to suicide or traffic accidents have been excluded. For study purposes, the authors arbitrarily defined five study periods between 1963 and 1972, 1973 and 1982, 1983 and 1992, 1993 and 2002, and 2003 and 2012, respectively. This study was approved by the Institutional Ethics Committee (No. 20-306 ex 08/09).

Results

A total of 35 peripartur maternal deaths were recorded among 187,917 deliveries during the last five decades (0.0186%). This corresponds to 19/100,000 deliveries. Tables 1–5 show the obstetric characteristics of maternal deaths in the respective study periods. The maternal mortality rates declined from 35.0/100,000 deliveries in the first study period to 29/100,000 in the second, 2.4/100,000 in the third, 13.1/100,000 in the fourth, and 3.6/100,000 in the fifth study period, respectively (Tables 1–5).

Twenty-three of the 35 women (66%) who died were 30 years or older and the cesarean section rate was 49%. Ninety-one percent of the 35 peripartur maternal deaths occurred in women with no significant medical history or risk factors and 75% after 37 + 0 weeks of gestation. However, this result is limited by the large number of women in whom pre-existing significant maternal diseases had not been recorded in the delivery charts (Tables 1–5).

Overall, 31 of 35 peripartur maternal deaths (89%) were due to direct obstetric causes. During all study periods, the main causes of death were infections (13 out of 35; 37%), peripartur hemorrhage (9 out of 35; 26%), and thromboembolism (three out of 35; 9%), respectively (Tables 1–5). Infections predominantly occurred after premature rupture of fetal membranes (Tables 1–5).

The causes of peripartur hemorrhage (PPH) in the first study period were uterine rupture (2 cases), placental abruption (2 cases), and placenta praevia as well as disseminated intravascular coagulopathy (one case each), respectively (Table 1). There were only two cases of PPH in the second and one case of PPH in the fourth study period, respectively. Bleeding causes were cervical laceration in two cases and uterine atony in one case (Tables 2 and 4). There were no cases of PPH in the second and the fifth study period (Tables 3 and 5).

In the first and second study period, although not causative, 5 of 29 peripartur maternal deaths were associated with preeclampsia/eclampsia. In addition, three maternal deaths occurred due to acute fatty liver (Tables 1 and 2).

Indirect causes of peripartur maternal death were uremia in two women (Tables 1 and 2), metastatic melanoma in another (Table 2), and congestive heart failure due to ventricular septal defect in a fourth woman (Table 3).

Comments

During the five study periods, a total of 35 women died during late pregnancy, the peripartur or the puerperal period. Thus, the overall maternal mortality rate was 19/100,000 deliveries. The main causes of death were infections peripartur hemorrhage, and thromboembolism. There was a declining trend in maternal mortality from the first study period to the four subsequent study periods (Tables 1–5). The latter data are in line with previous reports from Europe and the US in which mortality rates between 11.4 and 14.5/100,000 deliveries have been reported [6].

The overall mortality rate due to sepsis was 37% (Tables 1–5). During the first study period, septic complications occurred in 25% of women. During the second study period, infections were diagnosed in 46% of women, the majority of them being associated with premature rupture of fetal membranes (Tables 1 and 2). Although antibiotics have been increasingly used over time, there has been no obvious decline of deaths due to infections (Tables 3–5). These data are in line with previous reports indicating stable or even increasing numbers of maternal septic deaths [5,17,18]. The persistence of the septic complications might be associated with early development of antibiotic resistance and/or the occurrence of new pathogenic germs [2,5]. Some of the observed septic deaths may be unavoidable even nowadays since the course of disease sometimes is too short for effective intervention [5].

Between 1963 and 1972, six women died from peripartur hemorrhage (38%; Table 1). Between 1973 and 1982, two cases of peripartur hemorrhage were noted (15%; Table 2). During the three subsequent periods, only one maternal death occurred due to bleeding complications (Tables 3–5). Overall, the main causes of PPH were uterine rupture and placental abruption, respectively (two cases each). One deadly case of uterine atony was found (Table 4). In contrast, other groups have reported a recent trend towards increasing deaths from postpartum hemorrhage, mainly uterine atony. However, no specific risk factors for this trend have been identified [19,20].

Preeclampsia/eclampsia was associated with maternal mortality in six women, five of whom were observed in the first two decades (Tables 1 and 2). This apparent reduction in the subsequent periods might be due to the implementation of prophylactic mother and child examinations during pregnancy in Austria (Mutter-Kind-Pass) starting in 1974. Preeclampsia and eclampsia were not seen as primary causes of maternal death in our population. However, if acute fatty liver was added to hypertensive disorders as proposed [5], the number of deaths due to these complications would be as high as 9% (Tables 1–5). It also should be mentioned that the term HELLP-syndrome has first been described by Weinstein [21]. Thus, it might be speculated that before 1982 certain gestational conditions in our study group might have been attributed to HELLP syndrome. This applies to acute fatty liver and uremia (Tables 1 and 2).

The authors observed a total of five deaths attributed to thromboembolic events, including amniotic fluid embolism per definition, as recommended by the European Association of Perinatal Medicine [22]. Such deaths were well distributed over the five decades (Tables 1–5). Welsch et al. [23] also have reported stable rates of thromboembolism between the years 1983 and

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