GLOBAL RATIO OF HYPOVOLEMIC SHOCK IN GYNOCOLOGY PATIENTS: SYSTEMATIC CASE STUDY REVIEW

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Abstract: This work is designed to study the Hypovolemic shock and complications leading to death in the tertiary care center over the five years of period.
Method: A retrospective and prospective study of all Hypovolemic deaths from January 2012 to December 2017 was carried out.
Results: There were total 204 Hypovolemic shock deaths out of 24,620 live births giving a shock index of 828.59 per 100,000 live births. Un-registered cases accounted for 74% of other maternal deaths. The majority of deaths occurred in 21-29 years age group and 61% were multigravida. Out of 204 maternal deaths 62.06% deaths were due to direct causes. Hemorrhage was the commonest cause of death (36%) followed by toxemia of pregnancy (19%) and sepsis accounted for 135 of deaths.
Conclusion: Hemorrhage, toxemia of pregnancy and hypovolemic shock were found to be direct major cause of death. Anemia and other indirect causes like jaundice, malaria, heart disease were other indirect causes of deaths.

Index Terms -. Hypovolemic shock, Maternal death, Rupture uterus, Postpartum Hemorrhage, Sepsis, Eclampsia, Anemia.

1.Introduction:
Hemorrhagic shock is a rare but serious complication, which may occur in many obstetrical or gynecological situations. Hemorrhage is a leading cause of maternal death in the developing world. Death and morbidity secondary to hemorrhage are becoming less common due to early recognition and intervention and improved availability of medical resources. Obstetrical hemorrhage is often acute, dramatic, and underestimated. Postpartum hemorrhage is a significant cause of maternal death. A surgical procedure is the most common antecedent of acute gynecological hemorrhage, although patients will occasionally present with acute hemorrhage from a ruptured ectopic pregnancy or from a neoplasm. Risk identification is important in counselling patients prior to surgery and in preparation of the surgical team. Any process that distorts pelvic anatomy, such as endometriosis, neoplasm, or adhesions, or that leads to an inflammatory response may be associated with increased intraoperative blood loss. Identification, isolation, and rapid control of bleeding encountered during the procedure will limit the total loss. The anatomy of the pelvis and landmarks of the vascular tree must be familiar to every pelvic surgeon. Patients with delayed postoperative hemorrhage may pre-sent with bleeding from the wound or vagina or with evidence of a hemoperitoneum. Careful examination and resuscitation with definitive and prompt control of blood loss is required, which may require a return to the operating theatre.

2. Case study research:
The Hypovolemic cases were present in India 825.59 per 100,000 live births from 2012-2017 ranging from 1041.2 in year 2012 and lowest 568.94 in 2017. Most women were in poor general condition at the time of admission. 50% of deaths occurred within first 12 hours of admission. Various studies done in India in the last 15 years have shown wide variation in Hypovolemic shock ranging from 47/100000 to 625/100000 pregnancy cases. Indian health statistics has reported a very high hypovolemic shock condition of 2270/100000. The higher incidence of deaths is due to non-referral of cases from periphery. Most deaths were observed in the 25-29 yrs of age group in present study whereas deaths were in 20-29year age group in other studies. Majority of deaths occurred in multigravida, majority of deaths were due to direct causes (72.06%) comparable with study done by WHO Hypovolemic shock and sepsis were the major direct killers and were comparable to other studies. In our study, 19% deaths were due to hemorrhage condition and 19% were due to pregnant woman suffering from high blood pressure, often followed by coma and posing a threat to the health of mother and baby (Eclampsia and preeclampsia). Indirect causes of death in our study accounted for 26.96%. Out of which anemia (18.6%) had contribute the majority.

3. Global report on Hypovolemic shock gynec condition:
In the present hypovolemic shock study, there were 42 shock deaths over 10 years amongst 28,994 pregnancy condition giving a Hypovolemic global report of 144.86 per 1,00,000 pregnancy case, which is lower than the National HS report of 212 per 1,00,000 live births. Other similar studies from tertiary care institutions reported varying Hypovolemic shock report; at 302.9/1,00,000 live births

With the prevailing custom of early marriage in rural area, majority women present with their marriage in the age group of 21-30 years. Globally hypovolemic death showed that 64.29% were among age group 21-30 years, similar to that reported by Global Health survey at 68.42%.78.6% women belonged to rural background with 21.4% from urban background, comparable to study by individual countries where 89.6% hailed from rural background. 73.8% hypovolemic shock deaths were amongst women referred from outside hospitals.

As shown in report, post-natal death rate was 80.95% and included 38.1% after vaginal delivery and 42.86% after LSCS. Post-natal death rate of 73.33% was observed. 35.7% of deaths occurred within 24 hours of admission.
In the present study, common direct causes of maternal mortality were Hypovolemic death with toxemia of pregnancy and related causes (26.43%). Amongst indirect causes, in the present study, cardiac diseases accounted for 9.52% deaths and pulmonary causes for 7.14%, similar to that reported by WHO 13.15% deaths due to cardiac causes and 7.6% due to pulmonary causes.

4. Diagnosis :[1,4]

Severe sepsis or septic shock can be diagnosed on the basis of clinical as well as laboratory findings or investigations.

5. Signs and Symptoms

- Fever, temperature instability (higher than 38.0°C or lower than 36.0°C)
- Tachycardia (heart rate greater than 110 beats/min)
- Tachypnea (respiratory rate greater than 24 beats/min)
- Diaphoresis, clammy or mottled skin
- Hypotension or shock
- Oliguria or anuria

6. Scoring Systems:

There are several scoring systems like Modified Early Warning Score (MEWS), REMS score (Rapid Emergency Medicine Score) and Hypovolemic Index that have been used to identify patients at risk for sepsis and septic shock, morbidity and mortality and need for ICU admission. The sensitivity of these scores range from 80-100%, specificity is 80-99% and positive predictive value is 4.6-16%. All the scores have a high negative predictive value of 99-100%. The Modified Early Obstetric Warning Score (MEOWS) is a tool designed specifically for the obstetric population and has an 89% sensitivity and 80% specificity in predicting morbidity. MEOWS cut off >5 is critical and requires referral to an intensive care.

Hypovolemic shock index (SI): (Table:1)

Variable	**High abnormal range**				**Normal**	**Low abnormal range**			
Score	+4	+3	+2	+1	0	+1	+2	+3	+4
Temperature (OC)	>40.9	39–40.9		38.5–38.9	36–38.4	34–35.9	32–33.9	30–31.9	<30
Systolic Blood Pressure (mmHg)					>90		70–90		<70
Heart Rate (beats per minute)	>179	150–179	130–149	120–129	≤119				
Respiratory Rate (beats per minute)	>49	35–49		25–34	12–24	10–11	6–9		≤5
SpO2 (%)					≥92%	90–91%		85–89%	<85%
White Blood Cell Count (/µL)	>39.9		25–39.9	17–24.9	5.7–16.9	3–5.6	1–2.9		<1
% Immature Neutrophils			≥10%		<10%				
Lactic Acid (mmol/L)			≥4		<4				

Vasopressor therapy: Vasoactive agents are used if mean arterial pressure is lower than 65 mm Hg after fluid resuscitation. Inotropes are started if central venous oxygen saturation remains less than 70%. Vasopressin is added if vasopressor therapy is ineffective.

Modified Early Obstetric Warning Score (MEOWS): (Table:2)

Score	3	2	1	0	1	2	3
Temperature		<35°.C		35–37°.C		37.5–39°.C	>39°.C
Systolic* BP	≤80	71–79	81–89	90–139	140–149	150–159	≥160
Diastolic* BP			≤45	46–89	90–99	100–109	≥110
Pulse		≤40	40–50	51–100	101–110	111–129	≥130
Respiratory Rate		≤8		9–14	15–20	21–29	≥30
AVPU				Alert	Responds to Voice	Responds to Pain	Unconscious
Urine output (mLs/hr)	<10	≤30		Not Measured			

Antimicrobial Therapy[6]: Empirical antibiotic therapy should be started as early as possible. Therapy should not be delayed while awaiting cultures because survival differences are seen in delay of antibiotic therapy of only 1 h. If patient is in shock and blood culture reports are pending, then start Piperacillin-Tazobactam at 4.5 g intravenously every 6 h or Cefoperazone-sulbactam till the sensitivity report is available and modify as per the report. If patient has only fever, with no features of severe sepsis start amoxicillin clavulanate oral 625TDS/IV 1.2 gm TDS Or Ceftriaxone 2gm IV OD+ Metronidazole 500mg IV TDS +/-gentamicin 7mg/kg/day OD if admission needed. MRSA cover may be required if suspected or colonized (Vancomycin/ Teicoplanin)

Hypovolemic shock in obstetric patients is rare because pregnant women are younger and have less co-morbid conditions. Specific data on serious acute maternal morbidity due to hypovolemia, partly because of lack of a uniform definition of hypovolemia, but reported incidences in western countries vary from 0.1 to 0.6 per 1000 deliveries[14]. Although the incidence of Hypovolemic shock in obstetric patients is low and has been decreased throughout the years it remains a significant factor of maternal morbidity and mortality related with pregnancy. Hemorrhage continues to account for approximately 7.6% of maternal deaths in the United States[15].

WHO defines hypovolemia is any time between the onset of the rupture of membranes or labor and the 42nd day postpartum in which fever and one or more of the following are present: pelvic pain, abnormal vaginal discharge, abnormal odor of discharge, and delay in the rate of reduction of size of the uterus[16]. It is estimated that hypovolemia causes at least 75,000 maternal deaths every year, mostly in low-income countries[17]. Studies from high-income countries report incidence of maternal morbidity due to hypovolemic shock of 0.1-0.8 per 1000 deliveries[17].
Nowadays, rates of caesarean section (CS) are progressively increasing in many parts of the world. There has been an increasing tendency for pregnant women without justifiable medical indications for CS to ask for this procedure. Despite the World Health Organization's estimate that CS rates should not be >15%, in the developed world, CS rates are already above 30%. Following CS, maternal mortality and morbidity may result from a number of hypovolemia cases including endometritis, which if deep rather than superficial, increase hospital stay and cost per case[51-53]. The most common infection-related complication following CS is endometritis. A major risk factor for post-CS infection is emergency CS (compared with elective).

The rate of hemorrhage following CS is 1.1–25% compared with 0.2–5.5% vaginal birth. In antepartum patients the most common infection is asymptomatic bacteriuria with an incidence estimated at 4-7%. Recent evidence suggests that pre-incision broad spectrum medications are more effective in preventing Hypovolemia than post-clamping of the cord narrow-range antibiotics. Prophylactic antibiotics can reduce the incidence of endometritis following CS by two thirds to three quarters.

Data from Europe for the years 2003–2004 showed a range of maternal mortality ratio from 2/100,000 live births in Sweden, to 29.6/100,000 in Estonia. Direct maternal mortality associated with CS was about 0.06%. However, very few women are dying from Hypovolemic shock. Hemorrhage is the main cause of death following by thromboembolism and preeclampsia. Even though mostly in women are dying during puerperium (60%), the infection mostly started during pregnancy or delivery and only in rare cases after delivery and subsequently was not correlated with the mode of delivery.

7. Hypovolemic shock in gynecologic patients:
In Gynecology, incidence of sepsis has been increased during the last 15 years, presumably due to an aging population, an increase in the number of invasive procedures performed, and possibly due to a resistance to the current norepinephrine treatment. Hypovolemia in Gynecology can be found, in women using intra uterine devices (IUD), after untreated pelvic inflammatory disease (PID), after toxic shock syndrome provoked mainly by the use of tampons during menstrual period, and in patients with gynecological cancer. The above causes will be discussed explicitly, thereafter.

8. Conclusion:
Hypovolemic shock is one of specifically correlated with obstetrics or gynecologic conditions. Risk factors that may predispose an Ob/Gyn patient to infectious agents are essentially the same risk factors that place any patient in harm's way. In Obstetrics, a prior history of bleeding condition, prolonged rupture of membranes, or genitourinary instrumentation associated with cardiovascular instability and fever should raise the possibility of Hypovolemic shock.

Patients with obstetrics or gynecologic problems are not different in the management of Hypovolemic shock with other patients results from other organs. It is important to treat patients with shock early and vigorously. Volume expansion and correction of hypovolemia are critical. Understanding the pathways, mediators, feedback loops and interactions involved in the indication of shock and organ failure has advanced profoundly, giving us the opportunity to treat Hypovolemic shock multiple organ bleeding, and therefore, improve both survival rates and quality of life of women patients.

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