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Original Research Article

A study of post-surgical maternal morbidity and mortality in a tertiary care centre

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ABSTRACT

Background: Surgery is a lifesaving procedure. With the advances in anaesthetic services and improved surgical techniques the morbidity and mortality of this have come down considerably. Amongst all surgeries Caesarean section is most commonly performed major surgery. The study was aimed to evaluate the post-surgical maternal deaths and to examine etiology and preventability of maternal deaths and make protocol for decreasing future mortality in a series of 46102 deliveries between 2014 to 2016
Methods: This was a prospective analytical study of all post-surgical maternal deaths at Umaid Hospital Dr. S. N. Medical College Jodhpur, Rajasthan, India between July 2014 and June 2016.
Results: The total number of deliveries in 2 years (July 2014-June 2016) was 46102 and number of maternal deaths was 98. Out of this 49(50%) were post-surgical deaths. Majority of patients 57.14% were between age group of 21-30 years and 14.28% were below 20 years. Majority of patients were rural 77.55% and 22.4 belonged to urban area. 22.4 % were multigravidae and 46.9% were primigravidae. 89.7% of patients were unbooked. 20% deaths occurred within 4hrs after surgery, 53% deaths within 4-12 hrs, 8.16% deaths between 12-24 hours. Caesarean was done in (40.8%) cases. In 32% cases hysterectomy was done for postpartum haemorrhage. In one case, re-exploratory laparotomy was done. All the patients were associated with risk factors and lack of proper antenatal care, lack of knowledge, illiteracy, poor transport and late referral further increases the surgical risk.
Conclusions: Good antenatal care, high risk screening, comprehensive emergency obstetric services, hospital delivery and incorporation of obstetric drills decreases the post-surgical deaths.

Keywords: Caesarean section**,** Maternal mortality, Postoperative complications

INTRODUCTION

Surgery has always been lifesaving procedure. But it does has its own risks. With advances in anaesthetic services and improved surgical techniques, the morbidity and mortality of this have come down considerably. With surgery gaining acceptance as an essential and cost-effective public health measure across all levels of economic development, there is increasing interest in interventions to improve surgical outcomes. Without a clear strategy for measuring nationally representative perioperative mortality rates, governments cannot assess how investments in health systems affect the safety of surgical care provided.

Access to surgery remains inequitable worldwide, with 5 billion people lacking safe and affordable surgical and anaesthesia care when needed.[1] The Lancet Commission on Global Surgery was convened in 2013 to assess the state of surgery around the world, provide recommendations for improving access, and propose indicators for assessing national surgical systems.

Since Caesarean sections are one of the most frequently performed operations in women, any attempt to reduce morbidity, even with relatively modest differences for a particular outcome, is likely to have significant benefits in terms of costs and health benefits.

For this the Maternal Death Surveillance and Response (MDSR), was introduced by WHO in 2012 to provide information that can effectively guide actions to end preventable maternal mortality in health facilities and in the community.[2] It also seeks to ensure that every maternal death is counted, consequently permitting an assessment of the true magnitude of maternal mortality. With this more accurate data, we can undertake a true evaluation of the impact of interventions in maternal health.

Modern surgery has become convenient with the use of antibiotics, blood transfusion, advanced surgical and anaesthetist skills an intensive care facilities even then surgery is linked to adverse outcome. Leading causes of maternal death may be complications of preeclampsia, obstetric hemorrhage, pulmonary thromboembolism, amniotic fluid embolism, and cardiac disease.[3]

Though Caesarean section is a life-saving procedure when natural birth is not feasible as a consequence of complication of labor. Caesarean sections, generating a universal upswing that has hit both developing and developed countries. But in Indian scenario, with its economic constraints our country is hardly equipped to handle the repercussions of such an unprecedented increase in surgical interventions Over the last 20 years there has been a disturbing increase in the rate of Caesarean sections in India. It used to be a matter of pride to have low Caesarean section rates, especially in teaching hospitals.

A collaborative study done by the Indian Council of Medical Research (ICMR) in the 1980s showed a Caesarean section rate of 13.8 per cent in teaching hospitals.[4] This has risen significantly. A study in teaching hospitals in India compared the rates between 1993-94 and 1998-99, with data from 30 medical colleges/teaching hospitals.[5] This showed an increase from 21.8 per cent in 1993-94 to 25.4 per cent in 1998-99. Among them 42.4 per cent were primigravidas and 31 per cent had come from rural areas.

Because of the rise in primary Caesarean sections, there is a proportionate rise in repeat sections as well. In a study over a two-year period in an urban area of India, the total Caesarean section rates even in the public and charitable sectors were 20 and 38 per cent respectively. In the private sectors, the rate was an unbelievable 47 per cent.[6] There are 4 specific 'route of delivery' complications of vaginal birth Delivery while Caesarean surgery is associated with 33 unique ‘route of delivery’ complications which are as follow:

Hemorrhage, Hypertensive disorders, Pregnancy related Sepsis, Pulmonary Embolism, Amniotic fluid embolism Severe Anemia, ARDS, Jaundice, Heart disease.[7]

Downstream complications of C-sections include reproductive difficulties such as infertility, miscarriage or tubal pregnancy, post-caesarean sequelae in subsequent pregnancies are abnormal placentation, abruption and fetal demise, uterine rupture, emergency hysterectomy, permanent neurological damage or death of mother and/or baby. Nevertheless, a previous caesarean section certainly casts “a shadow over a future pregnancy”.

Leading causes of maternal death post surgically are complications of obstetric hemorrhage, pulmonary thrombo-embolism, blood transfusions, drug reactions, acute myocardial infarction, acute renal failure, septicemia, anaesthesia related complications. So, the aim of present study is to evaluate post-surgical deaths, their incidences, associated risk factors and to design a protocol for decreasing future deaths.

METHODS

This was a prospective study conducted in the Department of Obstetrics and Gynecology, Umaid Hospital Dr. S. N. Medical College Jodhpur, Rajasthan, India from July 2014 to June 2016 for all post-surgical maternal deaths. Data regarding patients age, parity, birth interval, antenatal care record, type of delivery, type of surgery, status of patient i.e., booked or not booked, condition in which the patient was admitted to the hospital, interventions, problems encountered, and probable cause of death as assessed by reviewing case sheet records and final death certificates were recorded.

All results were analysed in maternal mortality audit in presence of obstetricians, anaesthetist, physician, microbiologist and pathologist. The study was aimed at identifying causes of maternal death within our system and development of improved processes to prevent such events.

RESULTS

In the period, July 2014-June 2016 total number of deliveries at Umaid Hospital, Jodhpur, Rajasthan, India were 46102 and number of maternal deaths were 98. Out of this 49(50%) were post-surgical deaths.

Out of total 98 maternal deaths, post-surgical maternal deaths were 49, constituting 50% of total maternal death between year 2014 to 2016. 55.2% death occurred within 24 hours of admission and 81.2% deaths occurred within 24 hours of surgery. Caesarean was done in (40.8%) cases. In 32% cases hysterectomy was done for postpartum hemorrhage. In one case, re-exploratory laparotomy was done.

Table 5 shows that direct obstetric causes constituted 91.84% deaths. Hemorrhage was the leading cause accounts for 55.1% deaths. Pregnancy related Sepsis represents the second most common cause of death which accounts for 12.2% of deaths followed by hypertensive disorder in 10.2%, 6.12% deaths were due to pulmonary embolism and 6.12% deaths were due to anesthesia related problems. Indirect obstetric causes constituted 08.16% deaths.

Table 1: Year wise, number and percentage of post-surgical maternal mortality.

Year	Total maternal death	Postsurgical maternal death	% post-surgical maternal death
2014	36	15	41.6
2015	42	22	52.3
2016	20	12	60.0
Total	98	49	50.0

Table 2: Distribution of patients according to various demographic characters.

Demographic characters	No. of women	Percentage
Gravidae		
Primigravidae	23	46.93
Multigravidae	11	22.44
Grandmultigravidae	15	30.61
Total	49	100
Age in years		
<20	07	14.28
21-30	28	57.14
>30	14	28.57
Total	49	100
Religion		
Hindu	43	87.75
Muslim	06	12.24
Total	49	100
Antenatal care		
Booked	05	10.21
Unbooked	44	89.79
Total	49	100
environmental status		
Urban	11	22.44
Rural	38	77.55
total	49	100
Condition on admission		
Stable	12	24.5
Unstable	37	75.5
Total	49	100
Status		
Referred	40	81.6
Self-referral	09	18.4
Total	49	100

DISCUSSION

The Table 1 shows that the number of post-surgical maternal mortality rate in our study was 50%. The higher mortality rate compared to Patel et al (27.18%), Purandare et al (26.6%) etc.[8] may be attributed to the fact that our hospital a regional centre caters to the patients from a larger surrounding rural area. The patients come from referrals in serious conditions.

Table 2 shows that 46.93% were primigravidae because eclampsia is most common in this group and thus

caesarean sections are more common. 57.14% maternal deaths were between the age group of 21 to 30 years. maximum number of patients who seek obstetric care belongs to this group.

Reproductive efficacy is optimum between 21-30 years leading to maximum number of surgeries and thus causing maximum deaths in this age group. 89.7% patients were booked. Booking ensures a minimum checkup and necessary precautionary methods to anticipate high risk cases, demanding special attention. It has been proved here beyond doubt that the benefits of booking and subsequent antenatal care are enormous.77.55% patients were rural and 22.4% were from urban area.

Higher rate of mortality in rural background compared to Beena E et al (69.3%) may be due to illiteracy, poverty, poor health services infrastructure and inadequate transportation facilities.[9] 75.5% patients were unstable at the time of admission and 24.5% were stable without any comorbid condition, these maternal deaths attributed only to surgical complications. 81.6% mortality seen in referred patients may be due to: delayed referral, lack of proper antenatal care at some centres, lack of trained medical staff and lack of emergency obstetric care at these centres.

Table 3: Distribution of patients on the basis of various time intervals.

Time Interval	Number of deaths	Percentage
Between admission and death		
<4 hours	01	2.2
4-12 hours	15	30.6
12-24 hours	11	22.4
1-3 days	09	18.3
>3 days	13	26.5
Total	49	100
Between surgery and death		
<4 hours	10	20.4
4-12 hours	26	53.0
12-24 hours	04	8.16
1-3 days	04	8.16
>3 days	05	10.2
Total	49	100

Table 3 shows that 55.2% death occurred within 24 hours of admission as most of the patients were referred patients, referred in moribund state. 81.2% of deaths in this study occurred within 24 hours of surgery due to increased risk of primary hemorrhage, Basal atelectasis, pulmonary embolism, blood transfusions, drug reactions, acute myocardial infarction, acute renal failure, etc. first 24 hours after surgery is the most critical time and needs utmost care and observation. Table 4 shows that in present study caesarean section was done in 40.8% cases, laprotomy for ruptured uterus and for PPH done in 10.2% and 6.12% respectively, hysterectomy for PPH done in 32.56% of which 8.16% were after C-section and 2.04% were post molar deaths. In study by S. K. Bera caesarean was done in 17.6%.[10]

Table 4: Association of surgical procedure and maternal death.

Type of surgery	No. of deaths	Percentage
LSCS	20	40.8
Normal delivery f/b hysterectomy (PPH)	12	24.4
Laparotomy for rupture uterus	5	10.2
LSCS f/b hysterectomy (PPH)	4	8.16
Home delivery f/b laparotomy (PPH)	2	4.08
LSCS f/b relaparotomy f/b hysterectomy (PPH)	1	2.04
Normal delivery f/b B-lynch application(PPH)	1	2.04
H. mole suction and evacuation	1	2.04
Haematoma drainage under GA	1	2.04
Hysterotomy	1	2.04
Reposition of inverted uterus	1	2.04
Total	49	100

Table 5 shows that Direct obstetric causes constituted 45 (91.84%) deaths. Hemorrhage was the single most important cause of maternal deaths i.e 27 (55.1%).[11] So more prompt attention to clinical signs of hemorrhage and associated hypovolemia would also have avoided death.

In addition to it Iron supplementation to each woman in antenatal period, Correction of anemia prior to expected blood loss, Blood bank preparations including arrangement of cross matched blood and component therapy, can reduce the preventable cause of post-surgical maternal mortality i.e post-partum haemorrhage. Hypertensive disorders of pregnancy constituted 5 (10.12%) deaths.

The eclampsia patients are at high risk of developing pulmonary edema, HELLP syndrome, Cerebrovascular accidents, placental abruption and DIC. The most common preventable errors in preeclampsia management leading to maternal death involves attention to blood pressure control and signs of pulmonary edema.

These can be prevented with Regular antenatal visits to ensure early detection of hypertension in antenatal period, judicious attention to fluid balance, use of magnesium

sulphate for prophylaxis an treatment of seizures. 6 (12.2%) deaths were due to sepsis. All these deaths can be prevented by thorough investigations like complete blood count, blood culture, vaginal swab culture, c-reactive protein etc. and proper prophylactic and therapeutic preoperative and postoperative antibiotic coverage therapy. 3 (6.12%) of deaths were due to pulmonary embolism.

Table 5: Factors associated to post-surgical maternal deaths.

Cause of death	No. of death	Percentage
Direct obstetric		
Hemorrhage	27	55.12
Pregnancy related sepsis	06	12.24
Hypertensive disorders	05	10.20
Pulmonary embolism	03	6.12
Anesthesia	3	6.12
Amniotic fluid embolism	1	2.04
Subtotal	45	91.84
Indirect obstetric		
Severe anemia	1	2.04
ARDS	1	2.04
Jaundice	1	2.04
Heart disease	1	2.04
Subtotal	4	8.16

The risk factors for the development of thromboembolism are previous thromboembolism, obesity, immobilization, operative delivery and a positive anticoagulant test.so it can be prevented by preventing these risk factors and starting prophylactic heparin right from the early pregnancy in high risk patients. There were 3 (6.12%) deaths related to anesthesia. Probable Cause were high spinal anaesthesia, sudden cardiac arrest just after anaesthesia etc. The general anesthesia is associated with more risk and mortality.

There were 4 (8.16%) maternal deaths due to indirect obstetric causes. Anemia was responsible for 2.04% deaths. So, the preoperative low hemoglobin level is significantly associated with high postoperative maternal death so correction of anaemia prior to blood loss is necessary. Jaundice caused 1 (2.04%) deaths. Patients with jaundice are at increased risk for disseminated intravascular coagulation, hepatic coma, renal failure, pancreatitis, infections, electrolyte abnormality and hypoglycemia. So, all patients of pregnancy with jaundice should be hospitalised and properly investigated prior to surgery. Reduction of maternal mortality is one of the most important goals amongst the 8 goals accepted by the world community under the Millennium Development Goals (MDG).[12]

CONCLUSION

A good health care system, health education, regular antenatal care, screening of high risk pregnancies, comprehensive emergency obstetric services, good blood banking and transfusion services, early and timely referral, pre-operative evaluation, intensive care units for critically ill patients, proper antibiotic prophylaxis, early ambulation of patient to prevent thromboembolism and proper maintenance of input output chart are the recommendations strictly to be followed.

Centers carrying out caesarean sections in peripheral hospitals should have blood transfusion facilities and experienced staff, proper antibiotic prophylaxis, screening of high risk pregnancies, use of partograms to prevent prolonged and obstructed labors should be mandatory.

There is need of up gradation of health centre's, proper antenatal care, improvement of quality of emergency obstetric care, training of health staff in life saving skills, and strengthening of referral system that patients can be identified timely and referred early to tertiary centre, when premorbid signs and symptoms develop. There should be close relation between all three levels of health care system through smoothly functioning referral system by which patients can arrive timely at higher level where more specialized medical professional as well as diagnostic and therapeutic tools are available.

So, encouraging operative vaginal deliveries, incorporation of obstetric drill in the medical curriculum, a check on the caesarean delivery, family planning advises and regular meetings to discuss surgical complications and perioperative mortality are the steps that decreases the post-surgical deaths. Thus, a holistic approach including literacy, nutrition, social and economic empowerment alone can relieve the burden of maternal mortality rate from the National Health Statistics.

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