Epidemiology, Risk Factors and Outcome of Complications in Obstetric and Gynecological Surgeries—A Tertiary Center Experience from Western India

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Abstract: AIM: The aim of the study is to find out the risk factors for complications in major obstetrics and gynecological surgeries and to study their outcome. METHODS: This is a single center prospective study carried out at a tertiary care center between July 2010 and June 2013. All patients undergoing major obstetric and gynecological surgeries during this period were included. All patients were evaluated by history, detailed clinical examination, complete blood count and liver function tests. All patients were monitored intraoperatively and details regarding type of anesthesia, duration of surgery, type of surgery and intra operative vital parameters were noted. Complications either intraoperative or postoperative were studied. RESULTS: A total 1526 patients were studied. Out of these, 818 surgeries were obstetric surgeries while rest were gynecological surgeries. There were 88 (5.7%) complications among them. Age and socioeconomic status did not affect the complications, while BMI (Body Mass Index) and anemia were strong predictors for complications. Intra operative complications were more common in obstetric surgery owing to emergency status. 16.6% mortality was seen among obstetric complications mostly in cesarean section group though complications were more common after non cesarean laparotomy. Abdominal hysterectomy with oophorectomy, laparoscopic assisted vaginal hysterectomy and myomectomy were most common gynecological procedures with complications. Surgical reintervention was more common after gynecological surgery complication. Type of anesthesia did not affect the outcome. Overall, the complications doubled the duration of stay and increased the cost of surgery by 8 times. CONCLUSION: Gynecological and obstetric surgery are equally associated with complications. Age, socioeconomic factors and type of anesthesia did not increase the rate of complications while pre operative obesity, anemia and emergency indications increase the rate of complications.

Key words: Hysterectomy, laparoscopy, cesarean section.

1. Introduction

In present era, with the availability of better health care facility and understanding of health issues, women are experiencing longer life expectancy and using increasing obstetrics and gynecological services. So obviously there is increase in both obstetrics and gynecological surgeries. In addition to the generally anticipated risks of any surgery, such as bleeding, infection and anesthetic problems, surgery in obstetrics

and gynecology has the potential for many complications unique to this area of medicine. Due to the close proximity of the female genital organs to the bowel and urinary tract, gynecological and obstetrical surgery poses a risk for intra-operative injury to the bowel, bladder and ureters as well as the major pelvic blood vessels. Should such an injury be identified during surgery, the necessary steps to repair the injury will prolong the anesthetic time and also the patient's recovery. When such injuries are identified post-operatively, management often involves further surgery to correct the defect. The anatomy of the pelvic

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structures may be modified or distorted by the patient's disease thus markedly increasing the potential for vascular, bowel or urinary tract injury. This is especially seen in conditions such as pelvic cancer, endometriosis or pelvic adhesions. Therefore, we decided to study the complications of major obstetrics and gynecological surgeries.

2. Methods

This is a prospective single center study carried out at our tertiary care institute over a period from June 2010 to July 2013.

2.1 Inclusion and Exclusion Criteria

All patients undergoing major obstetric and gynecological surgeries during this period were included. The major obstetric surgeries included cesarean sections and laprotomy while gynecological surgeries included hysterectomies, sling operations, laprotomy, laparoscopic surgeries, myomectomy, tuboplasty, and vaginoplasty. Patients who denied consent were excluded.

2.2 Pre Operative Evaluation

All patients were evaluated by history, detailed clinical examination, complete blood count, liver function tests, electrocardiogram in all above 35 years of age and 2D-echo if indicated, chest X-ray, HIV (human immunodeficiency virus) antibody, urine routine and microscopy and ultrasound abdomen by an expert sonologist with an experience of more than 5000 ultrasounds.

2.3 Intra Operative Monitoring

All patients were monitored intraoperatively and details regarding type of anesthesia, duration of surgery, type of surgery and intra operative vital parameters were noted.

2.4 Complications

Complications either intraoperative or postoperative

were studied. In case of a postoperative complication, the post operative day corresponding to the complaints was looked for in the details. Total hospital stays of patients with complications were seen with arbitrary cost for it. Management of complications either conservatively or by surgical intervention were carried out.

2.5 Follow Up

Follow up of the patient was done after 2 weeks and 4 weeks of discharge and complaints, if any, were noted.

2.6 Statistical Analyses

Descriptive statistics were computed for all factors. Mean and standard deviations were calculated for continuous variables and frequencies and percentages for categorical variables. A $P < 0.05$ was considered statistically significant. Pearson's chi-square were used for categorical variables

3. Results

A total of 1526 surgeries were performed at our institute starting from June 2010 to July 2013. Out of these, 818 surgeries were obstetric surgeries, while rests of the surgeries were gynecological. There were 88 (5.7%) complications among them, 48 (5.8%) of these were in obstetric surgical group, while 40 (5.6%) were in Gynecological surgery group ($P > 0.05$).

3.1 Demographical Features and Complications

Age of the patient had no relation to complication of surgeries. Patients above age 30 years of age had no significant difference in the rate of complications as compared to those below 30 years of age ($P > 0.05$). When all patients were classified socioeconomically according to the SEC (socio-economic classification) classification, contrary to general belief there was no statistical difference between those coming from lower class as compared to those coming from the higher class ($P > 0.05$), though a higher trend was seen in

those coming from lower socio economic class attributed to their poor nutrition and hygiene. The complication of surgeries was seen in 4%, 5.7% and 6.2% in upper, middle and lower socioeconomic class respectively ($P > 0.05$). All patients undergoing surgery belonged to Gujarat, Rajasthan or Madhya Pradesh states of India. Eighty percent of patients with complications of obstetric surgeries came from rural background while just patients who had urban background had obstetric complications, stressing on the fact that availability of specialized care and delayed referral may have played an important role.

3.2 Preoperative Characteristics and Complications

Obstetric histories were taken for all patients and parity did not affect the outcome of the surgery. There was no significantly higher complications in multigravida (≥ 2) females ($n = 36$ of 600) as compared to primigravida females ($n = 12$ of 218) ($P > 0.05$). However, RANC (regular antenatal checkup) prior to the surgery significantly reduced the complications rate, as 32 of the 48 patients developing complications were not on RANC ($P = 0.021$). Multiple gestations were seen in overall 46 pregnancies. Eight of 48 complications in obstetric surgeries had associated history of multiple gestations, being significantly higher as compared to those without complications. ($P = 0.0048$). Histories of previous abdominal surgeries were obtained in 88 females and of these 11 had complications ($P = 0.01$). Pregnancy induced hypertension was seen in 76 patients overall and 20 patients developed complications ($P = 0.0001$). 2 patients developed eclampsia and both had complications.

Out of total 88 patients who had complications, 63% ($n = 56$, 36 of which were obstetric) were anemic (Hemoglobin less than 11g/dl) as compared to only 45% ($n = 647$) patients who did not develop complications ($P < 0.0001$). Fifty Four patients were overweight ($BMI = 24.99$ - 29.99 kg/m²), 10 were obese ($BMI > 30$

kg/m²). Seventy two percent of patients developing complications had $BMI \geq 25.0$ as compared to 20% of those do not developing complications ($P < 0.0001$). Liver enzymes (ALT (alanine transaminase) and AST (aspartate aminotransferase)) were elevated in 145 patients before surgery ($> ULN$ (upper limit of normal) but < 5 ULN). However there was no difference between those developing complications (8/88) and those not developing complications (137/1438) ($P > 0.05$). Low Serum albumin levels (≤ 3.5 g/dl) were seen in complications group (49/88) as compared to those with normal course without complications (346/1438) ($P < 0.0001$).

3.3 Surgical Factors and Complications

Of all complications seen in Obstetric surgery, 44 (5.5%) complications were found in LSCS (lower section cesarean section) while 4 (22.2%) complications were found in other abdominal surgeries, LSCS being statistically less significant cause of complications in obstetric surgery ($P = 0.02$). Among gynecological surgeries, complication rate was 3% in Vaginal Hysterectomy with repair, 10.9% in Abdominal Hysterectomy, 8.3% in P-sling, 20% in Laparoscopy Assisted Vaginal Hysterectomy, 6.4% in Total Laparoscopic Hysterectomy, 7.6% in tuboplasty and 14.2% in myomectomy patients. In obstetrics surgeries, 91.6% complications occurred as a result of emergency surgery (No previous identification of need for surgery on RANC). None of the gynecological surgeries were carried out in emergency. In obstetrics surgeries, complication rate in patients who were given general anesthesia (7.5%) was more as compared to those given spinal anesthesia (5.6%), though not statistically significant ($P > 0.05$). On the other hand, in gynecological surgeries, Spinal Anesthesia complication rate was 6.4% while General Anesthesia complication rate was 4 ($P > 0.05$). Operative time greater than 2.5 hours was significantly associated with complications ($P < 0.01$, 12% versus 2.2%).

3.4 Univariate and Multivariate Analyses for Risk Factors for Complications

On univariate analyses, the risk factors responsible for complications in obstetric surgeries were rural background, lack of regular antenatal checkup, multiple gestation, pregnancy induced hypertension, history of previous surgery, emergency surgery and non LSCS surgery. The risk factors common to both obstetric and gynecological surgeries were anemia, obesity, low albumin levels and higher operative time. When evaluated by multivariate analyses, the risk factors for complications were lack of antenatal checkup, multiple gestation, pregnancy induced hypertension, emergency surgery, anemia and low serum albumin levels.

3.5 Type of Complications

A total of 30 intra operative and 58 post operative complications were found. In obstetrics surgeries, 38 (79%) were post operative while in Gynecological surgeries, 20 (50%) were post operative. Obstetric surgeries were more likely than gynecological surgeries to have intra operative complications ($P = 0.03$) while there was no difference in the amount of post operative complications between the two types. Among 818 obstetrics surgeries, 800 were LSCS while 18 were non LSCS abdominal surgeries. The different types of gynecological surgeries are shown in Table 1 while the different types of complications with either type of surgery are shown in Table 2. Among postoperative complications, the day at which the complications developed are shown in Table 3.

3.6 Outcome and Management of Complications

Of all complications, 14 in obstetric and 14 in gynecological complications group required surgical management while others were managed conservatively. Among 14 surgically managed patients of obstetric complications, 4 patients of bladder injury were managed by suturing of bladder rent during LSCS, 2 patients of extension of uterine incision per operative

were managed by uterine artery ligation, 2 patients of PPH (post partum hemorrhage) were managed by obstetric hysterectomy and 6 patients of wound gap were managed by resuturing. On the other hand, of the 14 surgically managed gynecological patients, 2 patients of bladder injury were managed by suturing of bladder rent per operatively, 2 of bowel injury required diverting colostomy, 2 of serosal tear of bowel were sutured per operatively, 2 of wound gap required resuturing and 1 of VVF (vesico vaginal fistula) was managed by endoscopic fulguration.

The mortality in our study was 16.6% in obstetrics complications group. Among the 8 patients who expired in obstetric surgeries, 2 patients developed pulmonary embolism. Another two patients who underwent LSCS for previous breech expired because of ARDS (acute respiratory distress syndrome). Four DIC (disseminated intravascular coagulation) patients, anemic and septicemic, underwent LSCS (Indication-fetal distress + preeclampsia and transverselie + IUD) and expired. Median hospital stay was 13.2 days in complications group, which was statistically more as compared to those who did not develop complications ($P < 0.001$). Average increased arbitrary cost was calculated to be 4181 indian rupees (80 USD) because of complications. On follow up, one patient was diagnosed with deep vein thrombosis and came with complain of bleeding per vaginum, while one of the bowel injury patients came with complaint of skin erosion and redness around stoma site and two patients of wound gap, which were managed by resuturing came with complain of pain over stitch line.

4. Discussion

Professor Owen H Wangenstein, one of the greatest academic surgeons of the 20th century [1], said “You are a true surgeon from the moment you are able to deal with your complications.” Prompt and accurate diagnosis, as well as effective treatment, of surgical complications is one of the most important elements of surgical practice. All surgery involves a delicate balance

Table 1 (a) Rate of different types of complications in obstetric surgeries.

Obstetric Complications (48)		
	No of patients	Rate of complications (In percentage)
Intra operative complications		
Bladder injury	04	0.49
Intra operative hemorrhage	02	0.24
Anaesthetic complications	04	0.49
Post operative complications		
Pulmonary edema	02	0.24
Pulmonary embolism	02	0.24
Wound infection	08	0.73
Paralytic ileus	04	0.49
Axillary tail-Infection	02	0.24
Urinary track infections	02	0.24
Septicemia	04	0.49
Postpartum hemorrhage	02	0.24
Thrombophlebitis	08	0.98
Adult respiratory distress syndrome	02	0.24
DIC + Renal failure	02	0.24

DIC, Disseminated intravascular Coagulation.

Table 1 (b) Rate of different types of complications in gynecological surgeries.

Gynaecological Complications		
	No of patients	Rate of complications (In percent)
Intra operative complications		
Bowel injury	06	0.84
Bladder injury	02	0.28
Intra operative hemorrhage	08	1.12
Anesthetic complication	04	0.56
Post operative complications		
Deep vein thrombosis	04	0.56
Wound infection	06	0.84
Typhoid	02	0.28
Urinary tract infection	02	0.28
Vesico vaginal fistula	02	0.28
Bleeding from vault site	02	0.28
Paralytic ileus + Typhoid	02	0.28

of risk management, from the benefits and disadvantages of when a surgical option is appropriate, to the immediate post-operative care. Recognizing areas of high risk and understanding how these may be minimized, is central to the practice of safe surgery. All surgeons may encounter complications at some point, but recognizing when these occur and the most appropriate initial management is essential to prevent or minimize immediate and long-term complications.

We found a similar prevalence of postoperative mortality and complications after gynecologic surgery compared with others. In an analysis of 1,722 women undergoing hysterectomy at Veterans Affairs Medical Centers from 1991 to 1997, Erikson et al. reported the overall prevalence of all postoperative complications (including urinary tract infections) to be 9.0% and an overall mortality of 0.06%, however no preoperative predictors were analyzed in this study [2].

Table 2 Type of Gynecological surgery and complication.

Type of surgery	Total no. of surgery (708)	Total no. and rate of complications (40)
Vaginal hysterectomy with repairs	330	10(03.0%)
Abdominal hysterectomy with bilateral salpingo-oophorectomy	110	12(10.9%)
P-Sling	24	02(08.3%)
Laparoscopic assisted vaginal hysterectomy	30	06(20.0%)
Total laparoscopic hysterectomy	62	04(06.4%)
Tuboplasty	26	02(07.6%)
Myomectomy	28	04(14.2%)
Laprotomy	72	-
Laprosopic Salpingostomy/Cystectomy/PCOD drilling	10	-
Vault prolapsed	6	-
Vaginoplasty	6	-
Complete perennial tear	4	-

Table 3 Days at which complications are seen in post operative period.

Post operative day of complication	Obstetrics (38)	Gynaecology (20)	Total (58)
First day	06	-	06
2-3 days	14	04	18
4-7 days	12	10	22
8-14 days	06	04	10
≥ 14 days	-	02	02

The present study shows that there is no difference in complications occurring in obstetric or gynecological surgeries. According to Eran Hadar et al. [3], complication rate in obstetric surgery was 5.7%. While in our study, it is similar at 5.8%. Besides, age and socioeconomic factor which has been previously considered as a risk factor for complications has been shown in our study that if proper care is given, age and socio economic factors do not play a role in complications. In a large study of medical billing data from the National Inpatient Sample reviewing gynecologic procedures for pelvic floor disorders, Erekson et al. reported overall in-patient mortality risk of 0.04% for women ≥ 80 years old [2].

An important factor that plays a role especially in obstetric surgeries is rural-urban divide. The availability of facilities, lack of proper monitoring, delay in identification of complications and delay in timely decision making and referral may play a role in higher complications when patients are referred from rural area. A selection bias may also have occurred as

only patients with complications get referred to the tertiary center from rural areas.

The preoperative status of the patient plays an important role in deciding the outcome. Anemia, obesity, low albumin levels are significantly associated with complications. Both the form of malnutrition is a risk factor for complications. Anemia and low albumin which indicates a poor overall nutritional status are known factors affecting wound healing. Besides, even higher BMI which is again a type of overnutrition affects the outcome of surgery. When elective surgeries are undertaken, care should be taken to correct these factors before surgery. Oliver Ezechi et al. [4] found factors like BMI $> 25 \text{ kg/m}^2$, anemia and prolonged operative time associated with increased incidence of post operative wound infection.

All the gynecological surgeries were elective and so intra operative complications were significantly less in gynecological surgeries as compared to obstetric surgeries where a lot of surgeries were taken on emergency basis. Non LSCS abdominal surgeries

whenever required for obstetric indications were associated with a high complication rate as most of the time it was an emergency. All the obstetricians were well trained in LSCs with an experience of more than 1,000 procedures. In both obstetrics and gynecological surgeries, intra-operative complications were hemorrhage, traumatic injury to surrounding organs and anesthesia related. Wound gap, wound infection, paralytic ileus, DVT (deep vein thrombosis) and UTI (urinary tract infection) were common postoperative complications in both surgeries. PPH, septicemia, DIC, ARDS, renal failure was post-operative complications in obstetrics surgery. In gynecological surgery VVF and bleeding from vault site were post-operative complications. Raut et al. [5] found a wide range of post operative wound infection rate, 0 to 20.5% in a hospital based survey which is unlike our study (0.9%). Raut et al. [6] mentioned incidence of bladder injury in gynecological surgery was 0.5% to 1%. But the incidences of all other complications are nearly 1% or less if the patients are electively selected for surgeries. This implies the importance of planning an elective surgery in advance then to take a surgical decision in an emergency. And as described by Moir et al. [6], longer surgeries are associated with greater complications though on multivariate analyses length of surgical time was not associated with higher complications.

If the complications do develop, most of the patients in gynecological group require re surgical intervention [7]. Up to 70% in our study required re-intervention. However, obstetric complications are usually managed conservatively with surgery required only in one third of patients. But the outcome of obstetric surgery complications is worse as compared to gynecological surgical outcomes as obstetric surgery complications are associated with 16.6% mortality. We have calculated the estimated excessive stay of 13 days and an additional cost of more than 4000 rupees even in government sector where most of the medicines, injectables and intensive care unit services are available free of cost to the patient. The average cost of

a patient when admitted for obstetric or gynecological surgery in our setup is just 500 rupees and so if complications develop, the cost rises by 8 times. These finding are corroborating with studies carried out in rest of the world [7-9].

5. Conclusion

Major complications following obstetric and gynecologic procedures are rare. The risk factors for complications are lack of antenatal checkup, multiple gestation, pregnancy induced hypertension, emergency surgery, anemia and low serum albumin levels on multivariate analyses. However, previous surgery, length of operative time and rural-urban divide are additional factors responsible for complications. Complications of obstetric surgery require medical management but have higher mortality. The complications significantly increase the cost as well as days of admission. Better preoperative optimization and elective procedures can be useful in reducing the risk of complications.

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