

A Clinical Study on Acute Surgical Emergencies and Their Management in Pregnant Women

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ABSTRACT

BACKGROUND

Though most of the diagnostic and management decisions regarding pregnant patients will follow the usual tenets of surgery, there are important differences in a pregnant patient which the treating surgeon should be aware of. We wanted to study retrospectively the incidence and types of surgical emergencies treated in pregnant women in a tertiary hospital.

METHODS

Totally 52 patients with, non-gynaecological and non-obstetric surgical emergencies, or gynaecological and non-obstetric surgical emergencies were included. Patients with complaints of pain in the abdomen, vomiting and fever were included. Patients with obstetrical emergencies and medical diseases were excluded. Relevant history from all the patients was elicited, followed by clinical examination and relevant investigations. Surgical interventions performed were observed and the data was analysed using standard statistical methods.

RESULTS

52 pregnant women with acute surgical emergencies were studied. The patients were aged between 25 years and 45 years with a mean age of 33.16 ± 2.45 years. There were 23/52 (44.23%) primi gravida, 21/52 (40.38%) women were second gravida and the remaining 08/52 (15.38%) were Multipara. Pregnant women in first trimester were 18/52 (34.61%), 19/52 (36.53%) were in second trimester and 15/52 (28.84%) were in third trimester. Pregnant women with urolithiasis were 8/52 (15.38%), with appendicitis were 07/52 (13.46%), sub-occlusion intestinal obstruction were 07/52 (13.46%), with cholecystitis were 06/52 (11.53%), with intestinal obstruction were 05/52 (09.61%), with burns were 03/52 (05.76%), with incarcerated hernia were 02/52 (03.84%), with salpingitis were 01/52 (01.92%), with pelvic mass were 03/52 (05.76%), with adnexal diseases were 02/52 (03.84%), with pancreatitis were 04/52 (07.69%), with crush injuries were 02/52 (03.84%) and with intestinal perforation in 02/52 (03.84%) patients.

CONCLUSIONS

In the management of acute surgical emergencies in pregnant women, the normal anatomical and physiological changes occurring during pregnancy sometimes makes the clinical evaluation and early diagnosis as well as the use of diagnostic methods difficult. The higher complication rate in the treatment of the surgical abdomen in the pregnant patient may be due to delay in diagnosis and also because of fear of unnecessary procedures and tests. These patients require special and timely attention to details of signs, increased suspicion, serial physical examination, clinical awareness and systematic evaluation and appropriate investigations considering the risk to foetus and mother.

KEYWORDS

Pregnancy, Acute Abdomen, Surgical Emergency, foetus, Maternal and foetal Mortality

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BACKGROUND

There are many acute surgical conditions that can occur in pregnant women requiring urgent non-obstetrical surgical procedures performed each year in India. According to existing literature in the world such conditions account for 2% of all pregnancies.¹ Surgical emergency can be defined as any condition requiring a non-elective surgical procedure 'without any delay' to manage an acute threat to life, organ, limb or tissue caused by any external or internal trauma, disease process or other surgical interventions.² The term 'surgical emergency' usually denotes the severity of symptoms rather than the need of a non-elective surgical intervention. No exact time frame has been provided to define time of intervention. Though, usually a surgical emergency requires intervention within 24 hours.² Few surgical emergencies could be delayed beyond this period by conservative management for an elective surgery later on.

The incidence of emergency non-obstetrical abdominal surgeries in OBG (Obstetrics and Gynaecological) practice is 1 in 635 during pregnancy.³ The normal physiologic and anatomic change in pregnancy involves almost every organ system. The plasma volume in pregnancy increases by almost 50%, whereas the red cell mass increases by only 20%, resulting in the 'physiologic anaemia of pregnancy'. It is not uncommon to see a baseline haematocrit of 31%-33%.⁴ The increased plasma volume allows the pregnant patient to withstand a significant amount of blood loss before any overt manifestations of shock appears. Cardiac output increases beginning in the second trimester. Uterine blood flow also increases as the foetus grows, comprising 20% of cardiac output by term. This system is highly regulated and extremely sensitive to external agents such as catecholamine and maternal intravascular volume loss.

Maternal haemorrhage can be compensated by decreased uterine flow. Maternal hypovolemia may be marked by foetal distress before any evidence of maternal tachycardia or hypotension is present. Oxygen consumption and resting ventilation increase in pregnancy as a result of an increase in tidal volume caused by rising progesterone levels. These results in a respiratory alkalosis with a $p\text{CO}_2$ of approximately 30 mmHg and a metabolic compensation with bicarbonate levels in the 19–20 mEq/L range.⁵ Gastrointestinal motility is decreased, and in addition to the reduction in resting lower oesophageal pressure, pregnant patients are more likely to experience gastroesophageal reflux and have an increased risk of aspiration with general anaesthesia. Haematologically, in addition to the decrease in haemoglobin levels seen from the physiologic anaemia, there is a relative leukocytosis. Typically, the white cell count will range from 12 000/mm³ to 15 000/mm³ and can reach as high as 25 000/mm³, often complicating the diagnosis of infection.⁴ The state of relative hypercoagulability in pregnant patients is well known to increase the risk for thromboembolic complications.⁶ Anatomically, the uterus becomes an intra-abdominal organ at approximately 12 weeks of gestation. At 20 weeks the uterus can be palpated at the umbilicus, and by 36 weeks the uterus reaches the costal margin. The growing uterus can complicate invasive procedures such as port placement in laparoscopic surgery. As the uterus enlarges, maternal organs are displaced

upwards; in the late stages of pregnancy the majority of the gastrointestinal tract may be found above the inferior costal margins. The diaphragm may also be elevated by as much as 4 cms. Finally, as the pregnancy progresses, uterine compression of the vena cava decreases venous return, resulting in a 30% drop in cardiac output. This 'supine Hypotensive syndrome' can be alleviated by displacing the uterus from the vena cava by positioning the patient in the left lateral decubitus position or at least placing pillows under the patient's right side to elevate it slightly.⁶

Pregnancy is associated with reduced ureteral tone and peristalsis, which can lead to a dilated ureter and hydronephrosis. This is due in part to mechanical compression on the ureters as the uterus enlarges, with the rate of right-sided hydronephrosis significantly higher than the left side.⁷ These changes can lead to infection or urolithiasis.⁸ Radiological issues in the pregnant patient are that imaging during pregnancy results in ionizing radiation on the growing foetus. The risks of radiation include foetal death, growth retardation, microcephaly, malformations, mental retardation and childhood cancers.⁹ While the American College of Obstetricians and Gynecologists states that exposure of <5 rads has not been associated with an increase in foetal anomalies or pregnancy loss,¹⁰ clinically, the foetal dose of concern for teratogenesis is probably in the range of 10–20 rads.¹¹

A typical 'Pan Scan' (CT imaging of the head, cervical spine, chest, abdomen and pelvis) usually delivers <5 rads. An abdominal CT scan can be performed to evaluate abdominal pathology with only 0.3 rads.⁹ Ultrasound is useful in identifying appendicitis, cholecystitis and free fluid after abdominal trauma, and poses no known risk to the growing foetus. MRI is emerging as a useful test to evaluate the abdomen in pregnant patients.^{12,13} Radiation exposure during endoscopic retrograde cholangiopancreatography (ERCP) can be reduced to a level significantly below 5 rads. In this context a retrospective clinical study was conducted to review the incidence and types of surgical emergencies treated in pregnant women in a tertiary hospital of Telangana.

We wanted to study retrospectively the incidence and types of surgical emergencies treated in pregnant women in a tertiary hospital.

METHODS

The present study was conducted retrospectively in a tertiary teaching Hospital after going through the medical records between March 2018 and Feb 2020, of patients treated for acute surgical emergency conditions. Institutional ethical committee consent was obtained before conducting the study. Totally 52 patient's records were included in the analysis of acute surgical emergency situations for which the patients were treated.

Inclusion Criteria

1. Patients with Non- Gynaecological and Non-Obstetric surgical emergencies were included.

- Patients with Gynaecological and Non-obstetric surgical emergencies were included.
- Patients with complaints of pain in the abdomen, vaginal bleeding was included in this study.

Exclusion Criteria

- Patients with Obstetrical emergencies were excluded.
- Patients with medical diseases were excluded. All the patients were elicited of thorough clinical history, followed by obstetrical examination and examination by the surgeon. Investigations like ultra sound abdomen, plain X-Ray of Abdomen and chest, CT scan abdomen, MRI scan of abdomen and complete blood picture and related biochemical lab investigations were performed. Symptomatology, clinical signs and investigative results and the surgical interventions performed were observed and the data analysed using standard statistical methods.

RESULTS

In this study case records of 52 pregnant women attending the Department of General surgery with acute surgical emergencies were included. Patients were aged between 25 years and 45 years with a mean age of 33.16 ± 2.45 years. There were 23/52 (44.23%) primi gravida, 21/52 (40.38%) women were second gravida and the remaining 08/52 (15.38%) were Multipara (Table 1).

Age in Years	Primigravida- 23	Second Gravida- 21	Multigravida- 08
25 to 30- 23 (44.23%)	13	10	-
31 to 35- 15 (28.84%)	06	07	02
36 to 40- 10 (19.23%)	04	03	03
41 to 45- 04 (07.69%)	-	01	03

Table 1. Age Incidence and Gravid Nature of the Subjects (n-52)

Age in Years	First Trimester- 18	Second Trimester- 19	Third Trimester-15
25 to 30- 23 (44.23%)	11	12	0
31 to 35- 15 (28.84%)	07	04	04
36 to 40- 10 (19.23%)	-	03	07
41 to 45- 04 (07.69%)	-	0	04

Table 2. Pregnant Women in Different Trimesters (n-52)

Pregnant women in first trimester were 18/52 (34.61%), 19/52 (36.53%) were in second trimester and 15/52 (28.84%) were in third trimester (Table 2). Observation of symptoms of patients presenting with acute surgical emergencies in the patients of this study, it was noted that pain in the abdomen was observed in 41/52 (78.84%). It was the commonest complain requiring non-elective surgical intervention. The next commonest complain was vomiting which was complained by 31/52 (59.61%) patients. Fever was complained by 25/52 (48.07%) patients, Mass per abdomen by 3/52 (05.76%) patients, bleeding

from injuries in 2/52 (03.84%) patients and bleeding per vagina in 01/52 patients (Table 3).

Symptomatology	Primigravida- 23	Second Gravida-21	Multigravida - 08	%
Pain in the Abdomen-42	18	15	09	78.84
Vomiting- 31	10	13	08	59.61
Fever- 25	09	07	09	48.07
Mass per abdomen- 03	01	01	01	05.76
Bleeding from Injury-02	01	01	-	03.84
Bleeding per vagina- 01	01	-	-	01.92

Table 3. Symptoms Observed in the Subjects (n-52)

Among the different acute surgical emergencies observed in this study included Urolithiasis in 8/52 (15.38%) patients, Appendicitis in 07/52 (13.46%) patients, Sub-occlusion Intestinal Obstruction in 07/52 (13.46%) patients, Cholecystitis in 06/52 (11.53%) patients, Intestinal Obstruction in 05/52 (09.61%) patients, Burns in 03/52 (05.76%) patients, Incarcerated hernia in 02/52 (03.84%) patients, Salpingitis in 01/52 (01.92%) patients pelvic mass in 03/52 (05.76%) patients, adnexal diseases in 02/52 (03.84%) patients, Pancreatitis in 04/52 (07.69%) patients, crush injuries in 02/52 (03.84%) patients and intestinal perforation in 02/52 (03.84%) patients (Table 4).

Surgical Diagnosis	Primigravida- 23	Second Gravida- 21	Multigravida- 08	%
Renal colic- 08	03	03	02	15.38
Appendicitis- 07	03	02	02	13.46
Sub-occlusion IO*- 07	03	03	01	13.46
Cholecystitis- 06	02	02	02	11.53
Intestinal obstruction- 05	03	02	0	09.61
Burns- 03	02	01	0	05.76
Incarcerated hernia- 02	01	01	0	03.84
Salpingitis- 01	01	0	0	01.92
Pelvic mass- 03	01	02	0	05.76
Adnexal disease 02-	01	01	00	03.84
Pancreatitis- 04	01	02	01	07.69
Crush Injuries- 02	01	01	0	03.84
Intestinal perforation- 02	01	01	0	03.84

Table 4. Various Acute Surgical Emergencies Encountered in This Study (n-52) * (Intestinal Obstruction)

Among the investigations undertaken in this study the specificity and sensitivity in diagnosing the various acute surgical emergency conditions was observed and it was found that Ultrasound examination had a mean specificity of (55.52%) and sensitivity of (65.35%) in the diagnosis of intra-abdominal conditions. MRI scan had a specificity of (69.34%) and sensitivity of (77.49%) in the diagnosis of intra-abdominal conditions. CT scan abdomen had a specificity of (72.08%) and sensitivity of (72.93%) in the diagnosis of intra-abdominal conditions (Table 5). Out of 52 patients 23/52 (44.23%) were subjected to immediate surgical intervention to treat the disease as shown in Table 6. The remaining 29/52 (55.76%) patients were treated conservatively (Table 7). The overall prognosis was good in pregnant women who underwent surgery and also in those who were treated conservatively. The different procedures adopted in surgically treating the pregnant women in this study are shown in table 8. There were no post-operative complications or intra-operative difficulties in their management.

Surgical Diagnosis	Ultra Sound Exam-52		MRI Scan		CT Scan		P Value
	Specificity	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	
Urolithiasis- 08	6/8 (75%)	7/8 (87.5%)	7/8 (87.5%)	8/8 (100%)	6/8 (75%)	7/8 (87.5%)	0.031
Appendicitis- 07	5/7 (71.42%)	6/7 (85.71%)	7/8 (87.5%)	8/8 (100%)	6/7 (85.71%)	7/7 (100%)	0.024
Sub-occlusion IO*- 07	4/7 (57.14%)	5/7 (71.42%)	5/7 (71.42%)	6/7 (85.71%)	5/7 (71.42%)	6/7 (85.71%)	0.015
Cholecystitis- 06	4/6 (66.66%)	5/6 (83.33%)	3/6 (50%)	4/6 (66.66%)	5/6 (83.33%)	6/6 (100%)	0.024
Intestinal obstruction- 05	3/5 (60%)	4/5 (80%)	4/5 (80%)	4/5 (80%)	4/5 (80%)	5/5 (100%)	0.043
Burns- 03	-	-	-	-	-	-	-
Incarcerated hernia- 02	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	0.038
Salpingitis- 01	0/1 (0%)	0/1 (0%)	1/1 (100%)	1/1 (100%)	1/1 (100%)	1/1 (100%)	0.047
Pelvic mass- 03	2/3 (66.66%)	2/3 (66.66%)	3/3 (100%)	3/3 (100%)	2/3 (66.66%)	3/3 (100%)	0.035
Adnexal disease 02	1/2 (50%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	0.045
Pancreatitis- 04	3/4 (75%)	3/4 (75%)	3/4 (75%)	3/4 (75%)	3/4 (75%)	3/4 (75%)	0.037
Crush Injuries- 02	-	-	-	-	-	-	-
Intestinal perforation- 02	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2 (100%)	0.002
Mean values	55.52%	65.35%	69.34%	77.49	72.08%	72.93%	0.001

Table 5. Specificity and Sensitivity Indices for Diagnostic Methods Used in the Study. (n- 52)

Requiring Surgery	Primigravida- 11	Second Gravida- 10	Multigravida- 02	%
Appendicitis- 07	03	02	02	13.46
Intestinal obstruction- 05	03	02	0	09.61
Incarcerated hernia- 02	01	01	0	03.84
Pelvic mass- 03	01	02	0	05.76
Adnexal disease 02-	01	01	0	03.84
Intestinal perforation- 02	01	01	0	03.84
Crush Injuries- 02	01	01	0	03.84

Table 6. Acute Surgical Emergencies Requiring Immediate Surgery (n- 52)

Conservative Management	Primigravida- 12	Second Gravida- 11	Multigravida- 06	%
Urolithiasis- 08	03	03	02	15.38
Sub-occlusion IO*- 07	03	03	01	13.46
Cholecystitis- 06	02	02	02	11.53
Burns- 03	02	01	0	05.76
Salpingitis- 01	01	0	0	01.92
Pancreatitis- 04	01	02	01	07.69

Table 7. Acute Surgical Emergencies Treated Conservatively without Immediate Surgery (n- 52)

Requiring Surgery	Primigravida- 11	Second Gravida- 10	Multigravida- 02	Surgery Adopted
Appendicitis- 07	03	02	02	Appendectomy
Intestinal obstruction- 05	03	02	0	Laparotomy
Incarcerated hernia- 02	01	01	0	Hernioplasty
Pelvic mass- 03	01	02	0	Laparotomy
Adnexal disease 02-	01	01	0	Laparotomy
Intestinal perforation- 02	01	01	0	Laparotomy
Crush Injuries- 02	01	01	0	Wound Debridement

Table 8. Different Procedures Adopted in Surgically Treating the Subjects (n-52)

All the patients were followed up 2 months after delivery and no complaints received till the reporting of the study. Laparotomy was done in 12/52 (23.07%) patients, Appendectomy in 07/52 (13.46%) patients, hernioplasty in 02/52 (03.84%) and wound debridement in 02/52 (03.84%) patients in this study (table 8).

Hemoperitoneum was observed in 05/52 (09.61%) of the patients who underwent laparotomy in this study. There was no incidence of pre mature birth or abortion in this study.

DISCUSSION

Among the different acute surgical emergencies observed in this study included Urolithiasis in 8/52 (15.38%) patients, Appendicitis in 07/52 (13.46%) patients, Sub-occlusion Intestinal Obstruction in 07/52 (13.46%) patients, Cholecystitis in 06/52 (11.53%) patients, Intestinal Obstruction in 05/52 (09.61%) patients, Burns in 03/52 (05.76%) patients, Incarcerated hernia in 02/52 (03.84%) patients, Salpingitis in 01/52 (01.92%) patients pelvic mass in 03/52 (05.76%) patients, adnexal diseases in 02/52 (03.84%) patients, Pancreatitis in 04/52 (07.69%) patients, crush injuries in 02/52 (03.84%) patients and intestinal perforation in 02/52 (03.84%) patients (Table 3). Appendicitis was the second most frequent cause of non-obstetric acute abdomen in pregnant women in this study.

The general prevalence is reportedly one for every 1500 pregnancies.¹⁴ Out of the total of 07 acute appendix patients, 03/07 (42.85%) occurred during the second trimester of gestation in this study which was similar to a study by.¹⁵ The site of appendix may or may not be influenced by the growing uterus, depending on the attachment of the caecum. If it is retrocecal, the displacement of the caecal pole may cause atypical symptoms, such as flank or dorsal pain, which may be confused with infection of the urinary tract or pyelonephritis. Pregnancy is not a risk factor for appendicitis. Nonetheless, pregnancy is associated with a higher rate of appendiceal perforation, which can reach 43%.¹⁶ Ultra sound examination is universally accepted as a safe and innocuous investigation in the diagnosis of abdominal pathologies in pregnancies. Ultrasound examination provides high sensitivity and specificity in cases of acute abdomen, especially cholecystitis and appendicitis.^{17,18} But the efficacy of this test diminishes after 32 weeks, because of the technical difficulties secondary to uterine growth.

Moreover, appendiceal perforation can reduce the sensitivity of the test to 28.5%, which contrasts with the finding of non-complicated appendicitis (80.5%), or appendiceal adhesions (89%).¹⁹ If a diagnosis cannot be reached with ultrasound, the following step is to order other diagnostic imaging studies. In the present study the mean specificity of ultrasound examination was 55.52% and the sensitivity was 65.35% in the diagnosis of intra-abdominal conditions (Table 4). In a study by K.T. Baron, E.K. Arleo et al, Magnetic resonance imaging (MRI) was an excellent

diagnostic tool that presented a sensitivity and specificity of 91% and 85%, respectively. In the present study the MRI scan specificity was 69.34% and sensitivity was 77.49% in the diagnosis of intra-abdominal conditions in pregnant women.

Many studies have been done on pregnant women and there were no demonstrable adverse effects on fetuses.^{20,21} MRI scan surpasses some of the limitations of ultrasound, mainly those caused by the size of a pregnant uterus.²² The main advantage of MRI scan was that it does not subject the patient or the foetus to radiation. Computed tomography Scan (CT scan) usually has better diagnostic levels than ultrasound and MRI and it presents a sensitivity and specificity of up to 93% in cases of acute abdomen.²³ But on the other hand it poses the problem of the risk of malformations and carcinogenesis especially in the first trimester of pregnancy which makes most of the physicians uncomfortable in its use. The accumulated radiation dose and gestational age are two important factors to be kept in mind when considering a CT scan investigation.²⁴ It has been indicated that the risk of malformations is insignificant at 5rad or less and that the risk for malformation significantly increases at doses above 15 rads.²⁵

Plain X-Ray of abdomen is currently not often used in the diagnosis of acute abdomen in face of accuracy of the previous investigations by a radiologist. They are useful, however, in cases of suspected intestinal obstruction, especially if caused by adhesions. An abdominal X-ray involves a radiation exposure of 0.325 rad.²⁶ One justified rationale for the use of all the diagnostic tests available, including CT scan in this study, is the evidence of worsening foetal prognosis as the intra-abdominal infection advances. A delay in diagnosis is considered as malpractice as it would delay any possible indication for surgery.

There are extensive and diverse reports in the literature about the time at which surgery should be indicated, anaesthesia risks and the choice of approach according to the weeks of gestation. Generally surgical interventions are avoided in pregnant women and the family members usually do not accept such procedures in India. Though there are no reports of greater incidence of malformations or miscarriages^{27,28} in pregnant women with acute surgical emergencies, there does seem to be more newborns with low birth weight as well as sudden infant deaths within the first 4 months of life.²⁹ Contrarily, other authors defend the use of diagnostic laparoscopy, which they justify as a reasonable alternative to ionising radiation as it provides the ability to treat the patient at the time of diagnosis.³⁰

Certain precautions to be adopted by the operating surgeon during the intra- and postoperative management of pregnant patients are to place the patient in a slightly left lateral decubitus position, which avoids compression of the uterus on the vena cava and, therefore, a drop in venous return that could result in hypotension in the mother and foetus. Thromboembolic prophylaxis is necessary because of the Thrombophilic tendency of pregnancy itself.

Compressive measures of the lower extremities and heparin are recommended by most specialists, as well as

foetal monitoring and maternal capnography.^{31,32,33} There were no post-operative complications or intra-operative difficulties in their management. All the patients were followed up 2 months after delivery and no complaints received till the reporting of the study. Laparotomy was done in 12/52 (23.07%) patients, Appendectomy in 07/52 (13.46%) patients, hernioplasty in 02/52 (03.84%) and wound debridement in 02/52 (03.84%) patients in this study (table 8). Hemoperitoneum was observed in 05/52 (09.61%) of the patients who underwent laparotomy in this study. There was no incidence of pre mature birth or abortion in this study.

CONCLUSIONS

In the management of acute surgical emergencies in pregnant women, the normal anatomical and physiological changes occurring during pregnancy sometimes make the clinical evaluation and early diagnosis difficult as well as the use of diagnostic methods. The higher complication rate in the treatment of the surgical abdomen in the pregnant patient may be due to delay in diagnosis and also because of fear of unnecessary procedures and tests. These patients require special and timely attention to detail, to signs, with increased suspicion, serial physical examination, clinical awareness and systematic evaluation and appropriate investigations considering the risk to foetus and mother.

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