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Management of Symptomatic Gallstones in Pregnancy

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ABSTRACT

Gallstones, also known as cholelithiasis, are crystalline forms that occur in the gallbladder or biliary tract. Pregnancy causes various physiological changes that raise the chance of gallstone formation, which can lead to difficulties for both the mother and the fetus. **Objective:** To examine the safety and outcomes of conventional and interventional treatment in pregnant women with symptomatic gallstones. **Methods:** The study was longitudinal study. This study was conducted in Khairpur Medical College Civil Hospital Khairpur Mirs. The duration of this study was one Year, from Jan 2023 to Dec 2023. A total number of participant was (N=250) in this study. The age of participants was 18-35 years. There were included two treatment conventional and interventional. **Results:** The mean age of patients was 35.5 years. This study included 250 patients, had experienced gallstone symptoms. The intervention treatment group had the most participants (76%), followed by the conservative treatment group (24%). The cholecystitis participants had conservative treatment (76.3%), followed by laparoscopic treatment (53.3%). The majority participants was (66.6%) got laparoscopic therapy in the second trimester and indicate significant outcomes as compared to third trimester. The pregnant women was experienced no mortality, miscarriage during intervention therapy. **Conclusions:** This study supported prior findings that laparoscopic cholecystectomy can be performed safely during pregnancy, particularly in the second trimester. However, the third trimester brings additional obstacles, as seen by the higher prevalence of open cholecystectomy.

INTRODUCTION

Gallstones affect up to 20% of adults worldwide. The presence of gallstones does not warrant therapy, as the majority of people with stones are asymptomatic. However, roughly 25% develop symptoms and/or difficulties and are thus classified as having gallstone disease, for which the gold standard therapy is (laparoscopic) cholecystectomy (gallbladder removal) [1]. Gallstones, which originate in the gallbladder or biliary tract, are classified according to their location and composition. These stones form inside the gallbladder itself. They can range in size and quantity, from microscopic gravel-like particles to huge stones that can fill the gallbladder [2]. These stones can occur in a variety of locations in the biliary tract, including the bile ducts outside the gallbladder. Stones in the biliary tract may include: Choledocholithiasis, and Mirizzi. Gallstone pancreatitis had stones that clog the pancreatic duct, producing pancreatitis [3]. During pregnancy, maternal physiology changes significantly in order to support the developing fetus. These changes are necessary for the health of both the mother and the baby, but they can also predispose the mother to certain diseases or situations that necessitate medical intervention. During pregnancy, progesterone and estrogen hormone levels rise significantly to support fetal growth and development. They also have an impact on numerous bodily systems, such as the cardiovascular and gastrointestinal. The fetus and placenta have higher metabolic demands, thus the heart pumps more blood to fulfill them. Blood volume

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grows dramatically to meet the needs of the developing fetus and to compensate for blood loss after birth [4]. Accusations of Cholecystitis and Pancreatitis: turning into cholelithiasis challenge in antepartum, where immediate diagnoses of gallstones other affiliated complications needed for pregestationormsg. The diagnosis in time can result in complications that put both mother and baby at high risk. Untreated inflammation and infection can lead to gallbladder perforation. Perforation in patients with established acute cholecystitis results in Biliary Peritonitis (BP) where bile and infected contents escape into the abdominal cavity [5]. Peritonitis Perforation is a common cause of the extensive inflammation in peritoneum known as. This is a life threatening condition and it needs medical attention as fast as you can get. Weakened stomach aggravation, feveright case with infection. In physics throughout the pregnancy and postpartum periods, the occurrence of extreme had a triggering effect. This results in a state of physiologic stress and systemic inflammation that might lead to preterm delivery. Critically unwell mothers with severe maternal issues and systemic inflammatory reactions have a higher chance of their conceptus not surviving. Intrauterine infections and placental insufficiency, among other things, can all lead to fetal death. Furthermore, untreated gallstone symptoms can lead to extreme diseases such as sepsis and peritonitis [6, 7]. As a result, the risk of postpartum mortality in the present case is related to gallstone pain. Postpartum deaths due to these two illnesses underscore the significance of prompt detection and therapy. When pregnant, gallbladder pain can present specific issues, especially if it occurs in the third trimester. The third trimester is generally avoided for surgery because by this time, the rising uterus may crowd the operation site, making the operation more risky and pushing the date of prospective delivery even sooner [8]. Even though it may be hard sometimes, emergent surgical intervention can be necessary if there are severe complications such as cholecystitis, biliary colic or gallstone pancreatitis. It requires constant monitoring of the fetus to identify and manage any signs of distress. It is necessary to ensure that the placement is correct and it does not compress the inferior vena cava, limiting the venous return and cardiac output. When there is need, it is safe to perform surgery at the emergent/critical levels. The worst outcomes tend to occur if surgical intervention is delayed. Unfortunately, semi-urgent circumstances are rare with pregnant women suffering from symptomatic gallbladder disease [9, 10]. The surgical treatment of gallbladder disease in pregnancy specifically during the first trimester has its challenges and associated risk. Since no clinical reports exist on the efficacy and safety of such therapies, this was a cross-sectional studies inquiry whose goal was to appraise the consequences of surgery in pregnant women with symptomatic gallstones.

This study aimed to examine the safety and outcomes of conventional and interventional treatment in pregnant women with symptomatic gallstones.

METHODS

The study was longitudinal study. This investigation was carried out in Khairpur Medical College Civil Hospital Khairpur Mirs. The trial lasted six months, from Jan 2023 to Dec 2023. There were a total of 250 pregnant participants that attended various hospital wards. Participants were 26.5 years old. The gallstone symptoms were examined using the hospital's database to validate the woman's pregnancy. Inclusion criteria was pregnant women, with gallstone symptoms, and participant underwent surgical intervention. Exclusion criteria was non-pregnant women and participant underwent non-surgical intervention. The sample size formula was: $n=(P1-P2)2(Z\alpha/2+Z\beta)2\cdot[P1(1-P1)+P2(1-P2)]$. Where: n = required sample size per group, $Z\alpha/2$ = Z value corresponding to the desired level of significance (e.g., 1.96 for 5% significance). $Z\beta$ = Z value corresponding to the desired power (e.g., 0.84 for 80% power). P1 = expected proportion of success in the Conservative group was (0.70) 70%. P2 = expected proportion of success in the Intervention group was (0.50) 50%. Convenience sampling technique was used. Following stratification, participants were randomly assigned to either the conservative treatment group (n=190) or the intervention treatment group (n=60). The patient's demographics, clinical state, and laboratory findings were all reported at the time of presentation. Consent was taken from the patients. This study was validated following a permission letter from the Hospital's Ethics Committee (KMC/RERC/72). The data were statistically analyzed using chi-square tests by SPSS version 23.0. Standard deviation, mean, numerical frequencies, and percentages (%) were used to display data. There was statistical significance among the variables (p-value < 0.05).

RESULTS

This study included 250 patients had experienced gallstone symptoms. The intervention treatment group had the most participants (76%), followed by the conservative treatment group (24%). The average age of the patients was 26.5 ±4.91 years. The majority of pregnant women with gallstone symptoms (56%) were in their second trimester, with 24% in their third trimester. Table 1 showed that the majority of participants were overweight (56%), with (44%) being normal weight.

Table 1: Baseline Variables of study variables (n=250)

Variables	Total Number of Participants N (%) / (Mean ± SD)
Age	
18 -35 Years	26.5 ± 4.91

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Trimester	
First	60 (24%)
Second	140 (56%)
Third	50 (20%)
Body Mass Index (BMI)	
Normal Weight	110 (44%)
Over-weight	140 (56%)
Treatment Management	
Conservative	190 (76%)
Intervention	60 (24%)

According to these findings, the majority of cholecystitis patients had conservative treatment (76.3%), who were getting conservative care. This diagnosis was made in 32 patients (53.3%) who had undergone laparoscopic cholecystectomy in the interventional group. After an open cholecystectomy, (50%) participants experienced acute cholecystitis. P-value = 0.001 shows that there was a statistically significant difference in the frequency of acute cholecystitis between the interventional and conservative groups. 15 patients (8%) are being treated conservatively. 10% participants was in any laparoscopic cholecystectomy patients. 20 (30%) individuals who had an open cholecystectomy. Patients receiving open cholecystectomy were shown to have a higher incidence of acute cholangitis (P-value = 0.001), indicating a statistically significant difference between the groups. In the conservative group, there were 16% participants observed and 10% who had a laparoscopic cholecystectomy. 20% participants were noticed in cholecystectomy who had an open procedure. P-value = 0.0519 shows that there are notable variations between the treatment groups, as showed in table 2.

Table 2: Conservative vs Interventional Treatment (n=250)

Diagnosis	Conservative Treatment N (%)	Intervention Treatment Cholecystectomy N (%)		p-Value
		Laparoscopic (40)	Open (20)	
Acute Cholecystitis	145 (76.3%)	32 (53.3%)	10 (50%)	0.0519
Acute Cholangitis	15 (8%)	4 (10%)	6 (30%)	
Acute Pancreatitis	30 (16%)	4 (10%)	4 (20%)	

According to these findings, in the first trimester, Open cholecystectomy is less common (15%) but laparoscopic cholecystectomy is more prevalent (25%). In the second trimester, laparoscopic cholecystectomy is the most common procedure (62.5%), indicating that this is the method of choice. In the Third Trimester is a noticeable increase in open cholecystectomy (75%), suggesting a trend toward open surgery in later stages of pregnancy. Chi-square value is the 12.52, and the p-value is 0.0019. We reject the null hypothesis because the p-value (0.0019) is smaller than the conventional significance limit of 0.05. The distribution of open and laparoscopic cholecystectomy types across the trimesters in the intervention treatment group differs statistically significantly. This implies that there is a strong correlation between the kind of cholecystectomy (open vs. laparoscopic) and the trimester in which the procedure is done. To be more precise, laparoscopic cholecystectomy is more common in the first and second trimesters, but open cholecystectomy is significantly more common in the third trimester, as showed in table 3.

Table 3: Laparoscopic vs. Open Treatment across Trimesters in the Intervention Treatment Group (n=60)

Variables	Intervention Treatment Cholecystectomy N (%)		Chi-Square	p-Value
Trimester	Laparoscopic	Open		
First	10 (25%)	3 (15%)	12.52	0.0019
Second	25 (62.5%)	2 (10%)		
Third	5 (12.5%)	15 (75%)		

According to these findings, 21 participants was experienced problems. For the complications where no cases were observed in the laparoscopic group (miscarriage, bleeding, infection), indicating that these complications did not occur in the laparoscopic treatment group, see table 4.

Table 4: Maternal complication following Laparoscopic vs. Open Cholecystectomy during Pregnancy (n=21)

Variables	Number of Patients N (%)		p-Value
Complications	Laparoscopic Treatment	Open Surgery Treatment	
Preterm Labor	1 (25%)	6 (32%)	0.5991
Miscarriage	0 (0%)	1 (5.2%)	0.745
Bleeding	0 (0%)	4 (21%)	0.4815
Infection	0 (0%)	3 (16%)	0.553
Postoperative Pain	1 (25%)	5 (26.3%)	0.491

DISCUSSION

Pregnant women go through a number of physiological changes that might lead to the formation of gallstones. Gallstone formation is influenced by hormonal variables, changes in bile composition, and biliary system abnormalities. During pregnancy, estrogen levels rise, which may contribute to high bile cholesterol levels. Elevated cholesterol levels in the bile can cause cholesterol gallstone formation. Progesterone relaxes smooth muscles, including those of the gallbladder. Bile stasis is caused by reduced gallbladder movement, allowing cholesterol crystals to form and mature into stones [11]. In the current study, 250 pregnant women were identified as having gallstone symptoms. The majority of pregnant women experiencing gallstone symptoms were in the trimester. This shows that physiological and hormonal changes during this time play a significant role in the development or aggravation of gallstone symptoms [12]. Furthermore, being overweight increases the likelihood of getting gallstone symptoms during pregnancy, while normal-weight persons are not immune to this risk. This demonstrates the multidimensional nature of gallstone formation during pregnancy, which includes both physiological changes caused by pregnancy and pre-

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existing variables such as body weight. This is almost similar with the other studies. In the previous studies to found that, gallstone was formed in the second and third trimester [13, 14]. The majority of subjects with cholecystitis were treated conservatively. This shows that non-surgical treatments, including as antibiotics, pain relief, and dietary changes, are frequently successful for this disease throughout pregnancy. A considerable number of cholecystitis cases required laparoscopic intervention, demonstrating that while conservative care is frequently tried first, many cases eventually require surgical treatment to cure symptoms or prevent complications [15, 16]. The majority of patients are first managed conservatively, but a considerable percentage require laparoscopic surgery, which strikes a balance between non-invasive and minimally invasive treatments. Because of its potential severity and complications, acute cholangitis frequently demands more aggressive treatment, with a strong dependence on open surgery. Acute pancreatitis is typically treated conservatively, but surgical intervention is occasionally required, necessitating a case-by-case evaluation to decide the best course of action. In the previous studies to similar that, cholecystitis, cholangitis and acute pancreatitis was found during pregnancy [17, 18]. Based on the information supplied, we may assess the distribution of cholecystectomy interventions (both laparoscopic and open surgery) over the three trimesters of pregnancy. Interventions are uncommon in the first trimester, probably due to fears about the hazards of surgery during early pregnancy. The majority of laparoscopic cholecystectomies occur during the second trimester. This is most likely due to the relative safety of doing surgery during this era as opposed to the first and third trimesters. The third trimester has a higher frequency of open cholecystectomy than the previous trimesters. This could be related to the difficulties of performing laparoscopic treatments as the pregnancy continues, necessitating open surgery in more demanding cases. In the previous studies to found that, cholecystectomy interventions was similar during pregnancy [19, 20]. According to the research, conservative treatment is related with a higher risk of mortality, miscarriage, and low birth weight than cholecystectomy. There have been no recorded incidences of mortality or miscarriage with cholecystectomy treatment, and the prevalence of low birth weight is lower than with conservative treatment. Similar studies in the past discovered that cholecystectomy procedures were comparable during pregnancy. The findings point to a significant correlation between the kind of cholecystectomy and the pregnant trimester, with open cholecystectomy being preferred in the third trimester and laparoscopic cholecystectomy preferred in the first two. Clinical aspects like safety, practicality, and risk factors related to each surgical procedure at various stages of pregnancy may be reflected in this [21].

CONCLUSIONS

In the intervention group, the method of cholecystectomy performed (laparoscopic vs. open) differs considerably between the trimesters, with open surgery being performed more frequently in the third trimester and laparoscopic surgery more frequently in the first two. This strong correlation suggests that the decision-making process about surgery for cholecystectomy during pregnancy is influenced by the timing of the trimester. Therefore, these findings support that surgery is relatively safer for the mother and the fetus when the gastric stones are treated surgically during pregnancy.

Authors Contribution

Conceptualization: ZH
Methodology: AB, S[2]
Formal analysis: ZA, AH
Writing, review and editing: S[1]

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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