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Comparison between laparotomy and laparoscopy for the management of ruptured ectopic pregnancy

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Abstract
Ectopic pregnancy is a pregnancy where the fertilized ovum is implanted and grows outside of the uterine cavity endometrium. In Indonesia, the incidence of ectopic pregnancy is around 5-6 per thousand pregnancy. The purpose of this study is knowing the description and comparison of a few variables towards laparotomy and laparoscopy surgery for the management of ruptured ectopic pregnancy. In this study, a total of 28 samples are acquired from the medical record of KRMT Wongsonegoro General Hospital from the period of July 2018 – July 2019 with total sampling methods. 18 (64, 3%) samples underwent laparotomy and 10 (35, 7%) samples underwent laparoscopy. The majority of patients, 21 (75%) samples, are admitted to the hospital through the emergency room. The most common clinical symptoms are abdominal pain, followed by vaginal bleeding. The majority of samples are hemodynamically stable. The most common site of ruptured ectopic pregnancy is located in tubal. In this study, there is a statistical correlation between transfusion and type of surgery with a p-value of 0,008. Meanwhile, there is no statistical correlation between maternal age, parity, pregnancy weeks, hemoglobin level and duration of postoperative hospital stay with methods of surgery.

Keywords: Surgery, Laparotomy, Laparoscopy, Ruptured Ectopic Pregnancy

1. Introduction
Extrauterine pregnancy defines a pregnancy where fertilized ovum is implanted and grows outside of the uterine cavity endometrium. Based on the statistics of pregnancy, 1-2% reported cases of all pregnancies are extrauterine; and it is common in developing countries, where most of the patients present late with rupture and hemodynamic compromise [1, 2]. There are many sites of ectopic pregnancy, such as tubal, ovarian, intra-ligament, cervical and abdominal pregnancy. The most common site in the ectopic pregnancy case is tubal which around 90% [3] is. Ruptured ectopic pregnancy is an emergency condition which is the most common cause of maternal death in the first trimester of pregnancy, especially in Indonesia as a developing country, due to high mortality and morbidity rate. In Indonesia, the incidence of ectopic pregnancy is around 5-6 per thousand pregnancy. There is only 1% located in pars interstitial tuba of all tubal pregnancy. The incidence rate of double ectopic pregnancy is 1 in 15.000 – 40.000 pregnancy (there are a few cases in Indonesia). Primary ovarian and l pregnancy are very rare [4].

There are high mortality and morbidity rates of ectopic pregnancy as it is one complication of the first trimester of pregnancy [5]. The etiology of ectopic pregnancy is still not fully understood. Every risk factor must be encountered. Mostly happened in women older than 35 years old with non-white ethnicities [6]. Theoretically, every factor that disrupts embryo migration into the endometrial wall of the uterine cavity can cause ectopic pregnancy. The presence of tubal abnormality is generally caused by prior surgery, pelvic infection, endometriosis, puerperal sepsis, post-abortion sepsis, appendicitis [2, 4]. The history of tubal surgery is the highest risk factor for ectopic pregnancy. Multiple factors that also contributed to increasing rates of ectopic pregnancy, are smoking in women of reproductive age, increase use of assisted reproductive technology, exposure to diethylstilbestrol in utero, chromosomally abnormal embryo, use of progesterone pills, past abortion's history, previous ectopic pregnancy, infertility, race, and age above 35 years, awareness of the conditions, facilitated by development of specialized early pregnancy unit [1, 2]. Ectopic pregnancy before ruptured is usually asymptomatic; and sudden in onset [3, 5]. The symptoms are classified as acute or subacute,

usually occur after ruptured [2]. Clinical diagnosis is determined from the classic clinical triage, consist of abdominal pain, amenorrhea and vaginal bleeding [7]. Early diagnosis of ectopic pregnancy is very important in reducing the risk of ruptured tubal pregnancy thus early intervention can be done [8].

2. Methods

This study is a descriptive observational with a cross-sectional design. This study is conducted in KRMT Wongsonegoro General Hospital in Semarang, Indonesia. The data are obtained from the medical records of patients from July 2018 – July 2019. With total sampling methods, there are 28 samples. Data analysis for this study uses Statistical Product and Service Solutions (SPSS). Univariate analysis is done for the prevalence of every variable. Multivariate analysis is done to determine the statistical correlation between maternal age, parity, pregnancy weeks, hemoglobin level, transfusion and postoperative hospital stay with the type of surgery

3. Results

This study is conducted in KRMT Wongsonegoro General Hospital in September 2019. From the medical records of July 2018 – July 2019 there are 28 patients with ruptured ectopic pregnancy from 3721 patients who come and admitted to the hospital.

Tables

Table 1: Data of Demographics and Obstetrics of Woman with Ruptured Ectopic Pregnancy

Variable	Proportion (%) N=28		Mean; SD	Median (min - max)
Maternal Age			28,39; 5,86	27 (21 - 44)
20 – 30 years old	21	(75)		
30 - 40 years old	6	(21,4)		
>40 years old	1	(3,6)		
Parity			2,18; 0,98	2(1-4)
Primipara	7	(25)		
Multipara	21	(75)		
Pregnancy Weeks			7,29; 2,2	7(4-13)
<8 weeks	18	(64,3)		
≥8 weeks	10	(35,7)		

Table 2: Data of Administration and Surgery of Woman with Ruptured Ectopic Pregnancy

Variable	Proportion (%) N=28	
Referral		
Yes	6 (21,4)	
No	22	(78,6)
Route of Hospital Admittance		
Emergency Room	21	(75)
Obstetrics & Gynecology Clinic	7 (25)	
Surgery		
Laparotomy	18	(64,3)
Laparoscopy	10	(35,7)

Table 3: Data of Clinical Signs & Symptoms in Laparotomy and Laparoscopy of Women with Ruptured Ectopic Pregnancy

Variable	Laparotomy	Laparoscopy	Proportion (%)	
			N=28	
Clinical Signs & Symptoms				
Vaginal Bleeding	12	9	21 (72,4)	
Abdominal Pain	15	7	22 (75,9)	
Vomiting	3	2	5	(17,2)
Asymptomatic	1	0	1	(3,4)
Slinger Pain	9	2	11 (37,9)	
Shock				
Yes	2	0	2	(6,9)
No	16	10	26 (89,7)	

Table 4: Data of Perioperative Findings in Laparotomy and Laparoscopy of Women with Ruptured Ectopic Pregnancy

Variable	Laparotomy	Laparoscopy	Proportion (%)	
			N=28	
Site of Ectopic Pregnancy				
Tubal	17	5	23 (79,3)	
Ovarian	0	5	5	(17,2)
Cornual	0	1	1	(3,4)
Type of Surgery				
Salpingectomy	12	4	16 (55,2)	
Salpingectomy	2	1	3	(10,3)
Salpingo-oophorectomy	4	0	4	(13,8)
Partial Oophorectomy	0	5	5	(17,2)

Table 5: Multivariate Analysis of Correlation between Maternal Age, Parity, Pregnancy Weeks, Hemoglobin Levels & Post-operative Hospital Stay with Laparotomy and Laparoscopy

Variable	Laparotomy (%)	Laparoscopy (%)	P-Value
Maternal Age			
20-30 years old	13 (61,9)	8 (38,1)	0,733
30-40 years old	4 (66,7)	2 (33,3)	
40 years old	1(100)	0 (0)	
Parity			

Primipara	6 (85,7)	1 (14,3)	0,172
Multipara	12 (57,1)	9 (42,9)	
Pregnancy Weeks			
<8 weeks	11 (61,1)	7 (38,9)	0,703
≥8 weeks	5 (17,9)	**5 (17,9)**	
Hemoglobins Level			
<8	6 (100)	0 (0)	0,062
≥8	12 (54,5)	10 (45,5)	
Transfusion			
0	4 (14,3)	9 (32,1)	0,008
1	2 (7,1)	0 (0)	
2	8 (28,6)	0(0)	
3	1(50)	1 (50)	
4	2 (100)	0 (0)	
Post-operative Hospital Stay			
2	1 (33,3)	2 (66,7)	0,690
3	7 (25)	4 (10,7)	
4	6 (75)	2 (25)	
5	4(14,3)	1 (3,6)	
6	1 (100)	0 (0)	

A total of 22 (78, 6%) samples are not referred from clinics, community health center or other hospitals. 21 (75%) samples are admitted to the hospital from the emergency room. Every sample underwent surgery, where 18 (64, 3%) samples undergo laparotomy. The most common clinical signs and symptoms is abdominal pain which is 22 (75, 9%) samples and 15 of them underwent laparotomy. Almost every sample, which is 26 (89, 7%) samples are not in shock. 16 of them underwent laparotomy.

The most common site of ectopic pregnancy located in tubal; where 17 of them underwent laparotomy. The most common type of surgery is a salpingectomy laparotomy with a total of 12 samples.

In this study, there is a statistical correlation between transfusion and methods of surgery with a p-value of 0,008. Meanwhile, there is no statistical correlation between maternal age, parity, pregnancy weeks, hemoglobin level and duration of postoperative hospital stay with methods of surgery.

4. Discussion

In this study, there are 18 (64, 3%) samples that underwent laparotomy and 10 (35, 7%) samples underwent laparoscopy. This result is correlated with the study conducted by Kumar *et al*. [9], where laparotomy surgery is the preferred method of management of ectopic pregnancy, from a total of 63 patients, 37 (58,7%) patients underwent laparotomy while 26 (41,3%) patient underwent laparoscopy. In another study reviewed by Kumar *et al*. [9], the surgery is mostly laparotomy, from a total of 101 patients, 76 (75, 3%) patients underwent laparotomy. The result is not compatible with the study conducted by M. Nabil *et al*., where management of ectopic pregnancy through laparoscopic surgery offers more benefits than laparotomy, as it is the gold standard for direct visualization of ectopic gestation. The benefits are lesser blood loss, less need for blood transfusion, less need for postoperative analgesia and shorter duration of hospital stay [10]. However, not all are suitable for laparoscopy; this includes the contraindication of laparoscopy, the surgeon's laparoscopy's skill, and experience, or severe pelvic adhesion.

In this study, 2 (6, 9%) samples are in shock and both underwent laparotomy. In a study by Shrestha *et al*. [11], 12 (60%) patients are in shock and all underwent laparotomy surgery. The study follows the idea of the previous study conducted by Payal *et al*. [6], where patients with thermodynamically unstable are the key to converting treatment with laparoscopy to laparotomy.

In this study, the most common clinical signs & symptoms are abdominal pain which is found in 22 (75, 9%) samples, followed by vaginal bleeding which is 21 (72, 4%) samples and slinger pain which is found in 11 (37, 9%) sample. From these clinical signs & symptoms, abdominal pain is the most common sign of a patient who underwent laparotomy while vaginal bleeding is the most common complaint of patients who underwent laparoscopy. This result is conformable with Shresta *et al*. [11], the most common clinical signs & symptoms are abdominal pain which is found in all 32 patients, followed by amenorrhea which is 21 patients and vaginal bleeding which is found in 20 patients. In that study, patients who underwent laparotomy or laparoscopy mostly complained of abdominal pain. As we know, symptoms of ectopic pregnancy are classified into acute, such as short-duration amenorrhea, spotting, abdominal and shoulder-tip pain; and chronic, such as amenorrhea, dull aching lower abdominal pain, vaginal bleeding, dysuria, urine retention, and rectal tenesmus [12]. We should consider another diagnosis as presentations often mimics other gynecological disorders and gastrointestinal or urinary tract disease, including appendicitis, salpingitis, ruptured corpus luteum or follicular cysts, threatened or inevitable spontaneous abortion, ovarian torsion, and urinary tract infection [13].

The most common site of ectopic pregnancy is tubal with 23 (79, 3%) samples, followed by ovarian with 5 (17, 2%) samples. Laparotomy was done on 17 samples with tubal pregnancy, while the rest underwent laparoscopy. In ovarian and cornual ectopic pregnancy, the method of surgery is laparoscopy even though the number is few. In a study by Bahat *et al*. [14], the most common site of ectopic pregnancy is tubal which is 191 (94, 5%) from a total of 202 patients, followed by cornual which is 7 (0,03%) and ovarian which is 4 (0, 02%) patients. The study also reports that laparotomy is still the preferred method of ectopic pregnancy in any site. It is the same with the study conducted by Go Udigwe *et al*. [15], where the ectopic pregnancy mostly happened in the ampulla of the fallopian tube; this inhibits the function of the fallopian tube thus inhibits normal implantation of a fertilized ovum within the uterine cavity [6] For the type of surgery, salpingectomy is the surgery most commonly performed, with 16 (55, 2%) samples and 12 among them is done by laparotomy, while the rest underwent laparoscopy. Other types of surgeries including partial-oophorectomy (5 surgeries), salpingo-oophorectomy (4 surgeries) and

salpingostomy (3 surgeries). In laparotomy, the dominant type of surgery is a salpingectomy, meanwhile, in laparoscopy the most common type of surgery is partial-oophorectomy. In this study, all reported salpingo-oophorectomy is done by laparotomy, meanwhile all partial-oophorectomy is done by laparoscopy. In the study by Bahat *et al*. [14], salpingectomy is still dominant, either through laparotomy or laparoscopy, with a total of 174 (86, 1%) out of 202 patients. The result is also similar to the study conducted by M Nabil *et al*., where linear salpingostomy was the main procedure performed in both laparoscopy and laparotomy [10].

Based on the study, Pre-operative hemoglobin level is classified into 2 categories, <8 g/dL and ≥8 g/dL. 22 samples have a pre-operative hemoglobin level of ≥8 g/dL, meanwhile, 6 samples have a pre-operative hemoglobin level of <8 g/dL, where all underwent laparotomy. The mean pre-operative hemoglobin level in this study is 10, 09 g/dL. In other studies, preoperative hemoglobin level is rarely included for analysis. In the study by Bahat *et al*. [14], one of the variables for analysis is hemoglobin level, with a mean of 11, 09 g/dL for laparoscopy and 10, 98 g/dL for laparotomy.

In this study, there is no statistical correlation between maternal age and methods of surgery by laparotomy or laparoscopy. This result is conformable with the study by Shrestha *et al*. [11], where there is no statistical correlation between maternal age and methods of surgery. This result might be caused by the difference of mean maternal age, in this study, the mean maternal age is 28,39 years old, meanwhile based on the study by Jacob *et al*. [16], the maternal age between 36-45 years old has a higher risk for ectopic pregnancy.

In this study, there is no statistical correlation between parity and methods of surgery. This result is conformable with the study by Bahat *et al*. [14] which found no correlation between parity and methods of surgery. This might be caused by parity which is not a risk factor for ectopic pregnancy. Jacob *et al*. [16] state that a history of prior ectopic pregnancy is the main risk factor for recurrence of ectopic pregnancy, meanwhile in this study, all sample has no history of ectopic pregnancy.

In this study, there is no statistical correlation between pregnancy weeks and methods of surgery, which conforms to the study by Bahat *et al*. [14]. Pregnancy weeks couldn't affect the clinical condition and method of surgery.

In this study there is no statistical correlation between preoperative hemoglobin level and methods of surgery, this conforms to a study by Jahan *et al*. [17]. This might be caused by the majority of samples which have a stable hemoglobin level, which means the patients can undergo surgery either by laparotomy or laparoscopy [18]. There is a statistical correlation between transfusion and methods of surgery, which conforms to a study by Jahan *et al*. [17] and Synman L *et al*. [19], where it states that laparoscopy causes fewer bleeding, transfusion, postoperative analgesia, short duration of hospital stay and time returning to daily activity compared to laparotomy.

In this study, there is no correlation between the duration of postoperative hospital stay and methods of surgery. This differs from the study by Jahan *et al*. [17] which states there is a statistical correlation, where patients who underwent laparoscopy have a shorter duration of postoperative hospital stays compared to laparotomy. This might be caused by the huge difference of samples, wherein this study 19 samples underwent laparotomy and 9 samples underwent laparoscopy. Meanwhile, in the study by Jahan *et al*. [17], 70 samples underwent laparoscopy and 19 samples underwent laparotomy.

5. Conclusion

From this study, we conclude that laparotomy is still the preferred method of surgery for managing ruptured ectopic pregnancy in Indonesia. This might be caused by a lack of equipment or operator skills in managing ruptured ectopic pregnancy with laparoscopy. Laparoscopy has a smaller incision, therefore minimal bleeding and transfusion are needed compared to laparotomy. Patients undergoing laparoscopy are hemodynamically stable, so transfusion can be minimized.

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