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Evaluation of Sonographic Features of Ectopic Pregnancy at Mbagathi District Hospital

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Abstract:

Background: Ectopic pregnancy is a life threatening gynecological emergency that accounts for a significant proportion of maternal deaths in the developing world. Gynecological and obstetric Ultrasound examinations play a central role in early detection of ectopic pregnancy and its related complications in early pregnancy. Therefore, there is need to assess the pattern of sonographic findings among patients with ectopic gestation in order to raise awareness among sonographers about the salient diagnostic criteria of the scourge of ectopic pregnancy.

Aims and Objectives: Evaluate the pattern of sonographic findings among patients with ectopic gestation at the Mbagathi District Hospital. Specifically, to establish the socio-demographic characteristics of patients with ectopic gestation, determine the prevalence of ectopic gestation, and to document the most prevalent sonographic feature of ectopic pregnancy among patients at the Mbagathi District Hospital.

Methods: Three-month cross-sectional survey of 87 patients that underwent ultrasound examination and had ectopic pregnancy at the Mbagathi District Hospital.

Findings: The youngest participant diagnosed with ectopic pregnancy was 18 years old while the oldest was forty 43 years. On basis of age group of respondents there was a statistically significant difference ($p \geq 0.01$) in the distribution with the age group of 31-40 years, accounting for the largest proportion ($n= 43$) followed by age group of 21-30 years ($n=13$) while age groups of 10- 20 years and 41-50 years each had six cases. Thirty one per cent of all respondents had previous history of ectopic pregnancy. Among those with history of ectopic pregnancy, 82.45% were diagnosed with current ectopic pregnancy. The most common sonographic finding among participants diagnosed with ectopic pregnancy was extra uterine gestation sac with viable fetal pole with a prevalence of 39.7% followed by adnexal mass with 36.8%; tubal ring 14.7% and 4.4% for both Pseudo gestation sac and intraperitoneal hemorrhage.

Conclusion: The most affected age group is 31-40years with the largest proportion of patients with ectopic pregnancy at 43 out of 87. This concurs with earlier studies by Ates, Job, & Fernandez (1991) thus giving credence to the postulate that age-related changes in tubal function might delay ovum transport and result in tubal implantation in mature females.

Recommendation: Routine pelvic ultrasound in first trimester is important for early detection of ectopic pregnancy in order to reduce maternal mortality related to the same owing to the seemingly high incidence of ectopic gestations at the Mbagathi District Hospital. A further study to look at all hospital data on ectopic gestation in Nairobi County is recommended in order to come up with a realistic prevalence of ectopic gestations among pregnant women.

1. Introduction

1.1. Background to the Study

The increasing prevalence of ectopic pregnancy worldwide is associated with high maternal morbidity and mortality in the first trimester of pregnancy, especially among women in the developing world (Aired & Ekele 2005, Grimes 1994, Okunkola et al 2006). Sub-saharan hospital based studies estimate the prevalence of ectopic pregnancy at 1-6%. However, ectopic pregnancy poses critical diagnostic dilemmas in clinical practice, as patients could be asymptomatic or present with nonspecific symptoms that do not expressly distinguish ectopic pregnancy from abortion or viable intrauterine pregnancy (Arlone, Brown, Tong & Kaitu'u-Lino, 2012).

1.2. Statement of the Problem

The term ectopic pregnancy encompasses situations where there is implantation of the fertilized egg outside the fundal aspect of the uterine cavity. Ectopic pregnancy presents as an acute emergency and a life-threatening event, accounting for up to 10% of all maternal deaths especially when implantation occurs within the fallopian tube that is liable to rupture as the pregnancy progresses (Kamwendo, Forslin & Danielson, 2000). Nevertheless, evaluation of ectopic pregnancy requires population based studies that are not always easy to conduct. Another problem is that, many existing reports on ectopic pregnancy are from samples not representative of the population from which they are drawn and thus it has been difficult to determine the true incidence of ectopic pregnancy in a general population (Rajkhwa, Glass, Rutherford, Balen, Sharma & Cluckle 1991). Therefore, in order to scale down the ravages from ectopic gestations, evaluation of the sonographic features of ectopic pregnancy would go a long way enhancing early diagnosis of this life threatening disorder of pregnancy and thereby reduce maternal morbidity and mortality.

1.3. Broad Objective

Evaluate the sonographic features of ectopic pregnancy among patients at the Mbagathi District Hospital (MDH).

1.4. Specific Objectives

- i. Determine the socio-demographic factors of patients with ectopic pregnancy at the MDH.
- ii. Determine the predisposing factors to ectopic pregnancy among patients undergoing ultrasound for ectopic pregnancy at MDH.
- iii. Determine the most prevalent sonographic finding among patients with ectopic pregnancy at the MDH.

1.5. Research Questions

- i. Which are the socio demographic factors of patients with ectopic pregnancy at the MDH?
- ii. What are the predisposing factors to ectopic pregnancy among patients undergoing ultrasound for ectopic pregnancy at the MDH?
- iii. Which are the prevalent sonographic findings among patients with ectopic pregnancy at the MDH?

2. Literature Review

2.1. Socio-Demographic Factors of Patients with Ectopic Pregnancy

Smoking in women is detrimental to fertility (Baird & Wilcox, 1985), and it increases the maternal and fetal risks during pregnancy as well as the perinatal period. Recent epidemiological reviews have linked smoking in pregnancy to increased incidence of maternal complications such as placental abruption, placenta previa, ectopic pregnancy, prolonged rupture of membranes, inflammation of the umbilical cord, and amniotic fluid bacterial infections. Studies also reported 66% higher medical costs for complicated births for smoking mothers compared to non-smoking mothers (Ates, Ata, Armagan, Has & Sidal, 2004). Smoking in pregnancy is dependent on a mother's education level, maternal age, social class and lack of private health insurance (Ates, Ata, Armagan, Has & Sidal, 2004).

2.2. Predisposing Factors to Ectopic Pregnancy among Patients

2.2.1. Age

Age has long been suspected to play a role in ectopic pregnancy risk, but studies have provided conflicting results. In many studies, there is a significant relation between advanced maternal age above 35 years age and ectopic pregnancy. Therefore, it is unlikely that the higher probability of exposure to most risk factors in older women accounts for the higher risk of ectopic pregnancy. The physiologic effect on ectopic pregnancy risk of an advanced maternal age at conception remains unclear. Advanced maternal age may lead to an increase in chromosomal abnormalities in the trophoblastic tissue. However, another yet to be tested postulate alleges that age-related changes in tubal function may delay ovum transport and result in tubal implantation (Ates, Job & Fernandez, 1991).

2.2.2. Prior Spontaneous Abortions

The risk of ectopic pregnancy is especially high among women that have had three or more previous spontaneous abortions. Hence, spontaneous abortions may have a causal effect, possibly mediated by infection. However, some common risk factors for ectopic pregnancy and spontaneous abortions, like chromosomal aberrations, immunologic factors, or hormonal factors may also be at play (Bernoux, Job, & Germain, 2000).

2.2.3. Previous Use of an Intrauterine Device

In past studies, current intrauterine device use has a higher risk for causation of ectopic pregnancy than previous intrauterine device use while recent studies link previous intrauterine device use to ectopic pregnancy through an association with infection (Westorm, Bengtsson & Mardh, 1976).

2.2.4. Infertility

The incidence of ectopic pregnancy increases with the duration of infertility, and this relation persisted if the analysis was restricted to women not on ovulation induction medication. However, there is intertwined relationship between ectopic pregnancy and infertility as ectopic pregnancy is itself a risk factor for subsequent infertility (Job, Bouyer & Pouly, 1996).

2.2.5. Previous Induced Abortions

There is a debatable association between previous induced abortions and ectopic pregnancy for women with two or more prior induced abortions (Hauzard, Bajos & Warszawski, 2000; Vessey, Yeates & Flavel, 1981; Blayo, 1995; Daling, Chow & Weiss, 1985; Holt et al, 1989; Tharaux, Bouyer & Job, 1998).

2.2.6. Methods of Diagnosing Ectopic Pregnancy

Transvaginal ultrasound is the preferred method of evaluation for ectopic pregnancy. Transvaginal ultrasound should be able to demonstrate a gestational sac when β -hCG levels exceed the discriminatory level of 2000 mIU/mL while Trans abdominal US can demonstrate an intrauterine pregnancy when β -hCG levels reach 6500 mIU/mL (Levine, 2007; Morlin & Van 2006).

In normal pregnancies, transvaginal US demonstrates an intradecidual sign approximately 4.5 weeks after the last menstrual period (Levine, 2007). The intradecidual sign is a small collection of fluid that is eccentrically located within the endometrium and is surrounded by a hyper echoic ring. The double decidual sac sign consists of two concentric hyper echoic rings that surround an anechoic gestational sac in a normal intrauterine pregnancy (Morlin & Van 2006). The secondary yolk sac may be identified at transvaginal ultrasound at approximately 5.5 weeks, when the gestational sac reaches 10 mm. Embryonic cardiac activity should also be visualized at transvaginal ultrasound at approximately 5–6 weeks, when the gestational sac measures more than 18 mm or when the embryonic pole measures 5 mm or more (Paspulati, Bhatti & Nour, 2004).

2.3. Most Common Sonographic Pattern among Patients with Ectopic Pregnancy

2.3.1. Extrauterine gestational sac

Visualization of an extra uterine gestation sac containing a yolk sac, embryo, or fetal heart rate is the most definitive sonographic sign of ectopic pregnancy (Best Practice and Research Clinical Obstetrics and Gynaecology, 2009)

2.3.2. Complex Adnexal Mass

On TVS, ectopic pregnancy appears as a complex, inhomogeneous adnexal mass. The mass might represent as an early ectopic pregnancy before the appearance of gestation sac, a failing ectopic pregnancy, a ruptured ectopic pregnancy surrounded by coagulated blood or a corpus luteal cyst (www.sono.guide.com/obgyn.html).

2.3.3. Tubal Ring

Sonographically, this is an anechoic sac surrounded by a thick, echogenic wall clearly separate from the ovary. Scholars suggest that the wall of tubal ring of ectopic pregnancy is more reflective than the ovarian parenchyma or endometrium. In contrast, the rim of a corpus luteum is often less echogenic than endometrium. However, colour doppler is not useful in distinguishing between the two structures.

2.3.4. Intraperitoneal Haemorrhage

Intraperitoneal hemorrhage is free flowing blood into the peritoneal cavity secondary to rupture of the fallopian tube and its blood vessels (Coutrin et al, 2007). An unruptured ectopic pregnancy presents with abdominal pain with or without per vaginal bleeding (Wagner & Promes, 2007). In the developing world, patients usually present with the ruptured variety with attendant intraperitoneal bleeding and its clinical sequelae unlike the situation in the developed countries where up to 75 % are unruptured (Kouam et al, 1996, Morcau et al, 1995).

3. Study Methodology

3.1. Study Variables

Independent Variables include age, parity, education level, and residence whereas dependent variables are the various sonographic manifestation of ectopic pregnancy.

3.2. Data Collection Instrument

The instruments for data collection were a Questionnaire plus checklist.

3.3. Data Analysis and Presentation

Data was analyzed using Statistical Package of Social Sciences (IBM version 21). Results were presented in tables, charts and graphs. Cross tabulation of the dependent and independent variables was done to explore the interplay between them.

3.4. Study Limitations

- Time allocated to conduct the study was not adequate.
- U/S examination is subjective and based on technicians' experience.

3.5. Ethical Considerations

The departmental institutional research review committee of JKUAT granted permission and further permission was sought from the Medical superintendent of Mbagathi district hospital to carry out the study. Informed consent to participate in the study was sought from potential participant prior to enrollment in the study.

4. Data Analysis and Interpretation

4.1. Age of the Respondents

The youngest participant was eighteen years old while the oldest was forty-three years. The mean age of respondents was 33 years and at 95% confidence interval, it ranged between 31 and 34 years with a standard deviation of 6 years.

	Marital status	Frequency	Percent
	Single	30	34.5
	Married	36	41.4
	Divorced/windowed	21	24.1
	Total	87	100.0

Table 1: Marital Status of Respondent

Majority of the respondents were married (41.4%) while those who were single accounted for 34.5% and the divorced/ windowed were 24.1 %.

		Frequency	Percent
	Two	13	14.9
	Three	22	25.3
	Four	18	20.7
	More than four	34	39.1
	Total	87	100.0

Table 2: Parity of Respondent

The majority of the respondents had given birth more than 4 times.

		Frequency	Percent
	Primary	17	19.5
	Secondary	38	43.7
	Tertiary	32	36.8
	Total	87	100.0

Table 3: Level of Education of the respondents

The majority (43.7%) of the respondents had attained at least secondary level of education.

		Frequency	Percent
	Rural	30	34.5
	Urban	57	65.5
	Total	87	100.0

Table 4: Residence of respondent

The majority (65.5%) of the respondents are urban dwellers

	N	Minimum	Maximum	Mean	Std. Deviation
Age of respondents	68	18.00	43.00	32.2206	6.67328

Table 5: Age of Participants Diagnosed With Ectopic Pregnancy

The youngest participant diagnosed with ectopic pregnancy was 18 years old while the oldest was forty 43 years. On basis of age group of respondents there was a statistically significant difference ($p \geq 0.01$) in the distribution (table 6) with the age group of 31-40

years accounting for the largest proportion (n= 43) followed by age group of 21-30 years (n=13) while age groups of 10- 20 years and 41-50 years each had six cases.

	Age group of respondent
Chi-Square	54.941
df	3
Asymp. Sig.	.000

Table 6: Chi square test for age distribution

		Ectopic pregnancy		Total
		Present	Absent	
Parity	Two	13	0	13
	Three	19	3	22
	Four	12	0	12
	More than four	24	7	31
Total		68	10	78

Table 7: Cross tabulation of Parity versus Ectopic pregnancy

Respondents with parity of more than four had the highest incidence of cases of ectopic pregnancy

		Ectopic pregnancy		Total
		Present	Absent	
Place of residence of respondent	Rural	28	1	29
	Urban	40	9	49
Total		68	10	78

Table 8: Cross tabulation of Place of residence of respondent versus Ectopic pregnancy

More of the respondents diagnosed with ectopic pregnancy lived in urban area (58.85%) as compared to those who lived in rural areas (41.28%). However this difference was not statistically significant ($p \geq 0.05$) (table 9) and thus residence is not a risk factor.

Place of residence of respondent	Group 1	Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
		Group 2	Rural	28	.41	.50
	Total	Urban	40	.59		
			68	1.00		

Table 9: Binomial Test for residence of respondent

		Frequency	Percent
	Yes	21	24.1
	No	66	75.9
	Total	87	100.0

Table 10: History of Abdominal/ Pelvic Surgery

Of those currently diagnosed with ectopic pregnancy, 24.1% had history of abdominal surgery compared to 75.9 % who had no such history.

		Ectopic pregnancy		Total
		Present	Absent	
History of abdominal/ pelvic surgery	Yes	14	1	15
	No	54	9	63
Total		68	10	78

Table 11: Cross tabulation of History of abdominal/ pelvic surgery versus Ectopic pregnancy

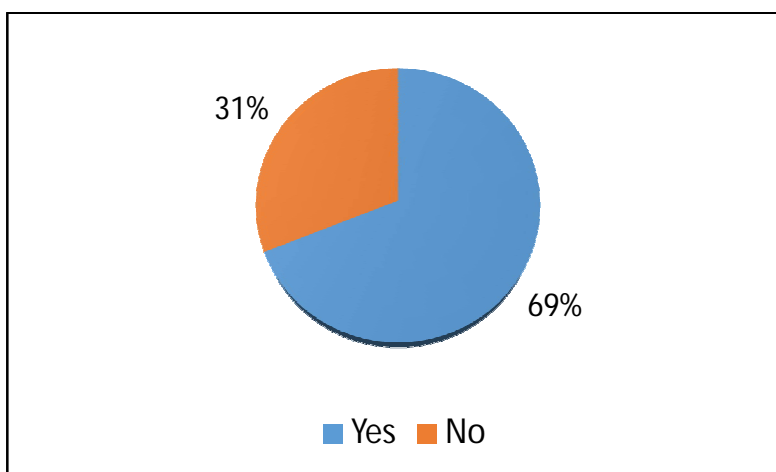


Figure 1: History of Ectopic Pregnancy

Thirty one per cent of all respondents had previous history of ectopic pregnancy. Among those with history of ectopic pregnancy, 82.45% were diagnosed with current ectopic pregnancy. This suggests that ectopic pregnancy is recurrent. However, those diagnosed with ectopic pregnancy for the first time represented 30.88%.

		Ectopic pregnancy		Total
		Present	Absent	
History of ectopic pregnancy	Yes	47	10	57
	No	21	0	21
Total		68	10	78

Table 12: Cross tabulation of History of ectopic pregnancy versus active Ectopic pregnancy

		Frequency	Percent
	IUCD	2	2.3
	PILLS	9	10.3
	JADEL	8	9.2
	OTHERS	4	4.6
	NONE	39	44.8
	Total	62	71.3
No response		25	28.7
Total		87	100.0

Table 13: Method of contraceptive used

Thirty-nine respondents (44.8%) did not use any contraceptive while the commonly used contraceptive were pills (10.3%) jadel (9.2%) and IUCD (2.3%). Twenty-five participants did not respond to this item.

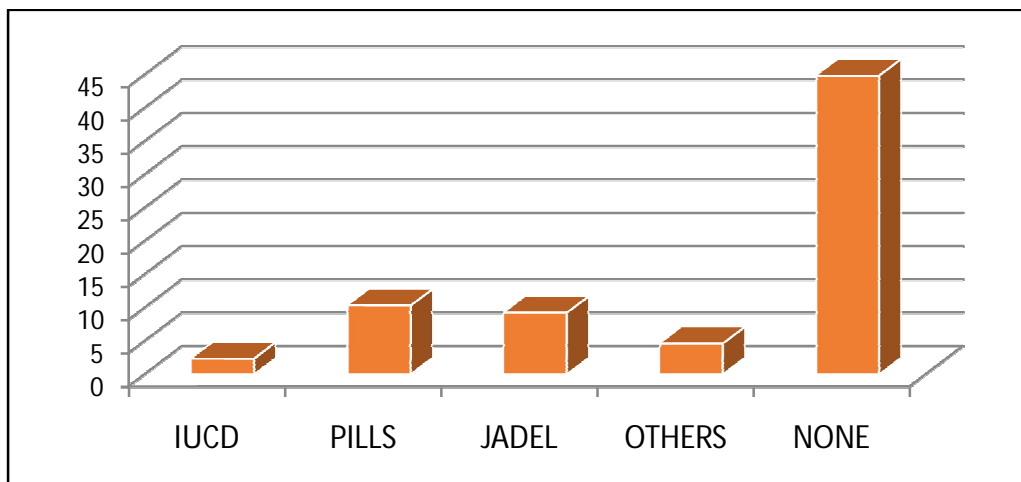


Figure 2: Percentage Use of Contraceptives

Fifty-seven participants who have ectopic pregnancy had no history of contraceptive use.

		Ectopic pregnancy		Total
		Present	Absent	
History of contraceptive use	Yes	9	6	15
	No	57	4	61
Total		66	10	76

Table 14: Cross tabulation of History of contraceptive use versus Ectopic pregnancy

		Frequency	Percent	Valid Percent
Valid	Yes	71	81.6	85.5
	No	12	13.8	14.5
	Total	83	95.4	100.0
Missing	System	4	4.6	
Total		87	100.0	

Table 15: History of PelvicInflammatory Disease

Eighty-five point five (85.5%) of respondents with ectopic pregnancy had history of PID compared to 14.5% who had no such history. Nine respondents with previous history of PID did not have an ectopic pregnancy. Five respondents without history of PID had ectopic pregnancy.

		History of pelvic inflammatory disease		Total
		Yes	No	
Ectopic pregnancy	Present	59	5	64
	Absent	9	1	10
Total		68	6	74

Table 16: Cross tabulation of Ectopic pregnancy versus pelvic inflammatory disease

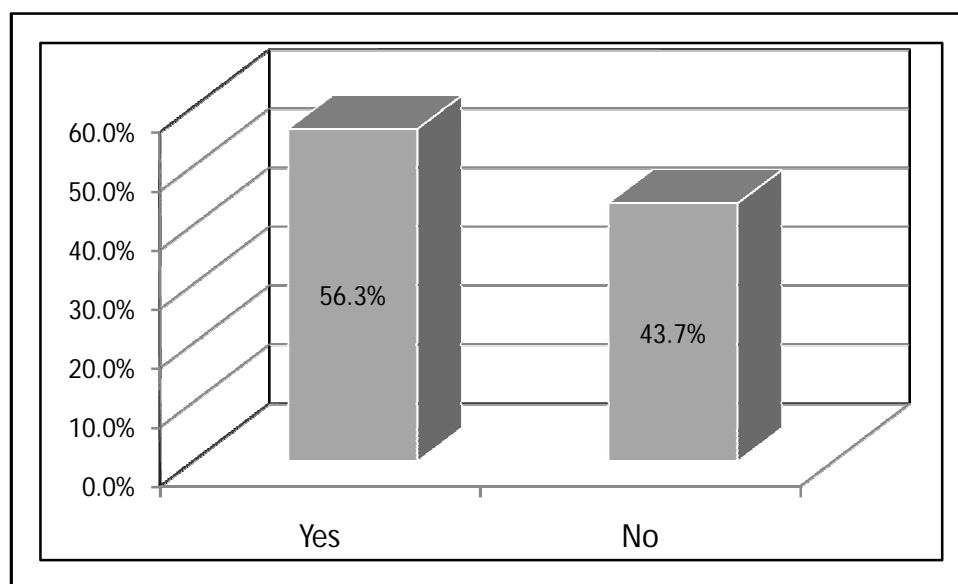


Figure 3: History of infertility

The prevalence of infertility among the participants was 56.3%. Four respondents had neither history of infertility nor ectopic pregnancy while twenty-nine respondents had ectopic pregnancy though they had no history of infertility

		History of infertility		Total
		Yes	No	
Ectopic pregnancy	Present	39	29	68
	Absent	6	4	10
Total		45	33	78

Table 17: Cross tabulation of Ectopic pregnancy versus History of infertility

		Frequency	Percent	Valid Percent
Valid	Present	68	78.2	87.2
	Absent	10	11.5	12.8
	Total	78	89.7	100.0
Missing	System	9	10.3	
Total		87	100.0	

Table 18: Prevalence Ectopic Pregnancy

87.2% of respondents with ectopic pregnancy tested positive for ectopic pregnancy. This implies that clinical diagnosis had a sensitivity of 87.2%.

Clinical symptom	Present		Absent		total
	n	%	n	%	
Extra uterine gestation sac with viable fetal pole	27	39.7	41	60.3	68
Adnexial mass	25	36.8	43	63.2	68
Tubal ring	10	14.7	58	85.3	68
Pseudo gestation sac	3	4.4	65	95.6	68
Hemorrhage	3	4.4	65	95.6	68

Table 19: Clinical manifestation of Ectopic Pregnancy

The most common sonographic finding among participants diagnosed with ectopic pregnancy was an extra uterine gestation sac with a viable fetal pole with a prevalence of 39.7%, followed by adnexal mass with 36.8%; tubal ring 14.7% and 4.4% for both Pseudo gestation sac and intraperitoneal hemorrhage.

5. Conclusions

The most affected age group is 31-40years with the largest proportion of patients with ectopic pregnancy at 43 out of 87. This concurs with earlier studies by Ates, Job, & Fernandez (1991) thus giving credence to the postulate that age-related changes in tubal function might delay ovum transport and result in tubal implantation in mature females.

The study further concurs with other scholars' findings that the previous history of ectopic pregnancy increases the risk of recurrent ectopic pregnancy as 82.45% who had previous history ectopic pregnancy had a recurrence of ectopic pregnancy in our study.

It is also evident that pelvic inflammatory disease (PID) as a risk factor for ectopic pregnancy also holds true as 85.5% of the respondents in our study at Mbagathi District Hospital had history of PID compared to 14.5% who had no such history.

The most common sonographic finding among participants diagnosed with ectopic pregnancy was at the Mbagathi District Hospital was an extra uterine gestation sac with viable fetal pole with a prevalence of 39.7%, followed by adnexal mass with 36.8%; tubal ring 14.7% and 4.4% for both Pseudo gestation sac and hemorrhage.

Eighty-seven point two (87.2%) of respondents who were screened for ectopic pregnancy tested positive for pregnancy. This is important in that in the absence of a gestational sac in utero, a positive pregnancy test can still raise an index of suspicion for ectopic gestation owing to the high relative sensitivity of the pregnancy test.

6. Recommendations

Routine pelvic ultrasound in the first trimester is important for early detection of ectopic pregnancy in order to reduce maternal mortality related to the same owing to the seemingly high incidence of ectopic gestations at the Mbagathi District Hospital.

A further study to look at all hospital data on ectopic gestation in Nairobi County is recommended in order to come up with a realistic prevalence of ectopic gestations among pregnant women.

7. References

- i. Adams EK, Melvin CL: Costs of maternal conditions attributable to smoking during pregnancy. Am J Prev Med 1998, 15(3):212-219.
- ii. Ashfaq M, Janjua MZ, Nawaz M: Effects of maternal smoking on placental morphology.
- iii. Ates U, Ata B, Armagan F, Has R, Sidal B: Acute effects of maternal smoking on fetal hemodynamics. Int J Gynol Obstet 2004, 87(1):14-18.
- iv. Baird DD, Wilcox AJ: Cigarette smoking associated with delayed conception. JAMA 1985, 253(20):2979-83.
- v. Blayo C. L'évolution du recours à l'avortement en France depuis 1976. (In French). Population 1995;50:779-810.
- vi. Castles A, Adams EK, Melvin CL: Effects of smoking during pregnancy – five meta analyses. Am J Prev Med 1999, 16:208-215.
- vii. Daling JR, Chow WH, Weiss NS. Ectopic pregnancy in relation to previous induced abortion. JAMA 1985;253:1005-8.
- viii. Holt VL, Daling JR, Voigt LF, et al. Induced abortion and the risk of subsequent ectopic pregnancy. Am J Public Health 1989;79:1234-8.

- ix. Houzard S, Bajos N, Warszawski J, et al. Analysis of the underestimation of induced abortions in a survey of the general population in France. *Eur J ContraceptReprod Health Care*2000;5:52–60.
- x. Job-Spira N, Bouyer J, Pouly JL, et al. Fertility after ectopic pregnancy: first results of a population-based cohort study in France. *Hum Reprod*1996;11:99–104.
- xi. Sontag LW, Wallace RF: The effects of cigarette smoking during pregnancy upon the fetal heart rate. *Am J ObstetGynecol* 1935, 29:77-83.
- xii. Tharaux-Deneux C, Bouyer J, Job-Spira N, et al. Risk of ectopic pregnancy and previous induced abortion. *Am J Public Health*1998;88:401–5.
- xiii. Vessey MP, Yeates D, Flavel R, et al. Pelvic inflammatory disease and the intrauterine device: findings of a large cohort study. *Br Med J*1981; 282:855–7.
- xiv. Weström L, Bengtsson LP, Mardh PA. The risk of pelvic inflammatory disease in women using intrauterine contraceptive devices compared to nonusers. *Lancet*1976;2:221–4.
- xv. Wong PL, Bauman A: How well does epidemiological evidence hold for the relationship between smoking and adverse obstetric outcomes in New South Wales? *Aust NZJ ObstetGynaecol* 1997, 37(2):168-173.
- xvi. Kirk E, Bourne T. Diagnosis of ectopic pregnancy. Best practice and research clinical obstetrics and gynaecology.2009(23):501-508