Unilateral dichorionic twin tubal ectopic pregnancy following in-vitro fertilization after a previous salpingectomy- a case report

Abstract.

The gains of invitro fertilization in alleviating the anguish of infertile couples cannot be quantified. However, despite these benefits, in-vitro fertilization increases the overall incidence of ectopic gestation. Twin tubal ectopic pregnancy occurs when two embryos or blastocyst implants in the fallopian tubes rather than within the endometrial cavity. Several mechanisms have been postulated to explain this rare occurrence. It could result from the splitting of embryos already in the Fallopian tube, or from dual implantation from multiple embryos transfer. The case report presented is that of a very rare unilateral twin tubal ectopic gestation following an in-vitro fertilization treatment which was diagnosed pre-operatively in a woman who has had a prior laparotomy with salpingectomy for ectopic pregnancy.

Keywords:**Ectopic pregnancy, in-vitro fertilization, unilateral dichorionic twin tubal ectopic pregnancy.**

Introduction

Ectopic pregnancy occurs when implantation occurs outside of the endometrial cavity [1]. Twin ectopic pregnancy is the implantation of two embryos or blastocyst outside of the endometrial lining. When both embryos implant in the fallopian tubes rather than inside of the uterine cavity, it is known as twin tubal ectopic pregnancy [2]. This could either be unilateral or bilateral [2].

Several risk factors for extra-uterine pregnancy have been outlined in literature. These include smoking, previous history of tubal damage from poorly treated pelvic inflammatory

diseases, or female genital tuberculosis or pelvic surgeries, puerperal sepsis, previous history of ectopic pregnancy, precious uterine surgeries such as caesarean section, myomectomy, polypectomy, metroplasty, dilatation and curettage or even utero-cutaneous fistula repair.[3]

Ectopic pregnancy has long been known as one of the leading causes of maternal morbidity and mortality in early pregnancy especially in low resource communities where late presentation or misdiagnosis leads to hemodynamic compromise from rupture [1,2,3]. Twin tubal ectopic pregnancies are harder to identify and also has a higher risk of rupture than singleton tubal ectopic pregnancies [2].

Ectopic pregnancy occurs in 1-2% of all pregnancies [4]. The incidence has been increasing since the advent of in- vitro fertilization (IVF) complicating 2%-11% of all pregnancies after IVF treatment [5]. It is mostly tubal in over 95% of cases [4].

Twin gestation occurs is seen in 1 in 80 spontaneous pregnancies [3,6], hence, twin tubal ectopic pregnancy becomes very rare [3]. Unilateral twin tubal ectopic pregnancy being extremely rare occurs with a frequency of 1 in every 20.000-125.000 pregnancies [1,2,3,6,7] and 1 in 200 ectopic pregnancies [1,5,8]. It Is likely underreported as less than 10 out the over 100 cases of unilateral twin ectopic pregnancies were correctly diagnosed pre-operatively leaving the diagnosis made mostly intra-operatively or at pathological examination of excised specimen [6]. The possibility of underreporting is compounded by vanishing gestation or early fetal wastage common with twin gestation especially if monochorionic [1,6,7]. While it is dichorionic when bilateral, it could be monochorionic or dichorionic when unilateral. Unilateral twin tubal ectopic pregnancies of spontaneous conception have been shown to be more monochorionic in origin [7].

Ectopic pregnancies occur in the absence of risk factors in about half of the cases. Adhesions resulting in anatomically distorted fallopian tubes from pelvic inflammatory disease more

with multiple episodes, previous pelvic surgery especially if tubal, and endometriosis are risk factors. Congenital Mullerian anomalies, assisted reproductive therapy, tumours and advancing maternal age are also risk factors [1,6,7]. All forms of ovulation induction including in-vitro fertilization which increases the risk of multiple gestations either via multiplicity of embryo transfer or embryo splitting after manipulation can in turn increase the possibility of a twin tubal ectopic pregnancy [5].

Case report.

A 43-year-oldwoman with 18-year history infertility. She had previous ruptured ectopic gestation seven years ago during which she had an exploratory laparotomy and right salpingectomy. She had donor oocyte in-vitro fertilization, and subsequently had three fresh blastocysts transferred. Embryo transfer (ET) was done under transabdominal ultrasound guidance aimed at mid-uterine placement. Pregnancy test 14 days post embryo transfer was positive. She presented 28 days post ET for her confirmatory pregnancy ultrasound scan with complaint of per vaginal spotting. Transvaginal ultrasound scan done showed an empty uterus, two gestational sacs beside each other in the left adnexa, presence of fetal poles with cardiac pulsation in one. She was counselled on the findings, implications and treatment options. Laparoscopy was adjudged not safe in the light of her prior exploratory laparotomy. Her pre op vital signs were Heart rate of 88 beats per minute, blood pressure of 110/70mmHg, respiratory rate of 18 cycles per minute and oxygen saturation of 99% on room air.

Intra-operative findings were severe bowel adhesions completely obliterating the pelvis. Extensive adhesiolysis and bowel mobilization by colorectal surgeon exposed partly the left adnexa enough to lift the left fallopian tube to view with the two separate bulges containing the products of conception clearly visible. Uterus was not mobile. Left salpingectomy was done and wound closure done. Her post op recovery was uneventful. She was discharged 4 days after surgery in a stable condition.

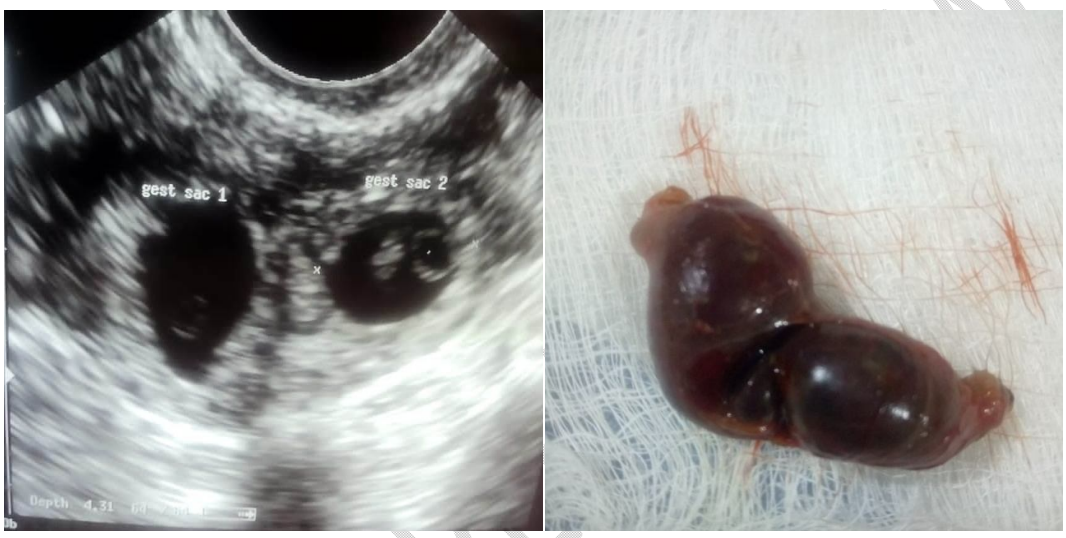

Figure 1 & 2 showing ; (1) Transvaginal sonography demonstrating a unilateral dichorionic twin tubal ectopic gestation, (2) Excised tissue containing 2 ectopic gestations. ***-Courtesy Dr Nwogu***

Discussion

The advent and increasing access to in-vitro fertilization (IVF) has led to rising cases of ectopic pregnancies which complicates 2%-11% of IVF cycles [5].The patient described had a unilateral left twin tubal ectopic pregnancy following an IVF treatment. Variability in

presentation of ectopic pregnancy has been known to pose a diagnostic and therapeutic challenge making it a major cause of pregnancy related deaths in the first trimester [1,3].

The relative risk of death from ectopic pregnancy is 10 and 50 times more than that encountered at childbirth and induced abortion respectively [3]. The situation is made worse as unilateral twin tubal ectopic pregnancy is harder to identify and has a higher risk of rupture which occurs in 30-50% of cases [2].

Early diagnosis reduces the associated mortality from ectopic pregnancy from as high as 72 to 90% three decades ago to as low as 0.14% [9]

As much as 95% of ectopic pregnancies are tubal in location [4] as in the case above, a few are found at uncommon sites such as; uterine cornua, peritoneal, cervical, ovarian and prior caesarean section or myomectomy scar defect [1]. Twin ovarian [10], abdominal wall [11], caesarean scar [12], cornual [13] and cervical [14] ectopic pregnancies have on also been documented. There exist more unilateral twin tubal pregnancies compared to fewer bilateral tubal pregnancies.

The early application of transvaginal sonography as employed following IVF conceptions allows for early diagnosis of ectopic pregnancies in general and detection of rare types with consequent prompt intervention [1,5]. Such was the case in the patient presented who presented 4 weeks after her embryo transfer.

Half of ectopic pregnancies have no predisposing or risk factors identifiable in the patients. Fertility treatment by IVF in itself is a risk fact for tubal ectopic pregnancies. Other common risks are commonly those that may possibly hinder or alter the easy transit of embryo(s) to the endometrial cavity by distorting tubal anatomically or physiologically. Such factors

include; previous episode of pelvic inflammatory disease, endometriosis, previous pelvic and tubal surgeries, tumours, smoking and congenital Mullerian anomalies. Other factors of lesser risk include; previous abortion, use of intrauterine device, increasing age, defective embryos or abnormal hormonal milieu [1,5,6].

The patient presented is of advanced age with effect of ageing on tubal cilia, has had a previous pelvic surgery which was itself an open laparotomy with salpingectomy for a prior tubal ectopic pregnancy before her IVF treatment all of which are risk factors for ectopic pregnancy.

In the setting of IVF, procedural trauma to the blastocyst such as assisted hatching may lead a higher possibility of monozygotic embryo splitting [15]. Multiple embryo transfer during IVF apart from increasing the possibility of multiple gestations may also translates to ectopic pregnancies involving multiple gestations as was seen in the patient presented that had 3 blastocysts transferred. Fundal placement of embryos as against mid uterine placement, fresh as against frozen embryo transfer and transfer of cleavage stage embryos as against blastocyst transfer are other IVF related risk for ectopic pregnancy [16]. The larger diameter of the blastocyst is logically believed to be less capable of migrating into the fallopian tubes [16]. The cleavage stage embryos apart from being smaller and more capable of migration into the fallopian tube is also less suited for immediate implantation and could migrate to the fallopian tube, a more natural habitat meant for a cleavage stage embryo [16].

The possibility of an embryo returning back into the uterine cavity for implantation will be impaired by a pathological fallopian tube. [17].

Diagnosis of twin ectopic pregnancy entails a summation of clinical features, laboratory investigations and radiological imaging. Definitive diagnosis is by either by ultrasound

demonstration and or pathological confirmation after evaluation of removed tissues at laparoscopy or laparotomy [2].

The commonest symptoms of twin ectopic pregnancy are similar to those of singleton ectopic pregnancy which comprises the triad of pain, amenorrhoea and abnormal vaginal bleeding respectively [3,5]. These may sometimes be insufficient for diagnosis [3]. The patient presented had vaginal spotting.

The high sensitivity and a specificity of transvaginal ultrasound makes it the imaging modality of choice for the diagnosis of ectopic pregnancies [1,6]. Detailed care should be employed in the setting of stimulated ovaries which are much larger and could mask ectopic implantation or allow for erroneous diagnosis of multiple gestational sacs especially when follicles are haemorrhagic [18]. This patient presented had no form of ovarian stimulation but rather had a donor egg IVF occasioned by her advanced age. Diseased adnexa with hydrosalpinx or endometriosis more prevalent amongst infertility population also make ultrasound diagnosis of ectopic pregnancies and its variations difficult [19]. Tranvaginal ultrasound demonstrated two gestational sacs in one adnexa of the patient clearly. Differential diagnosis of unilateral twin ectopic pregnancy includes; a singleton ectopic pregnancy in the presence of an ipsilateral haemorrhagic corpus luteum and a singleton ectopic pregnancy in the presence of a haemorrhagic follicle post IVF treatment. A haemorragic corpus luteum has been known to simulate a gestational sac both clinically and sonographically [20]. Both differentials were not applicable in the patent present as she had a donor cycle IVF, hence, no follicular growth.

Traditionally, an ectopic pregnancy is usually suspected when a transvaginal sonography fails to demonstrate intrauterine gestational sac with a serum ß-hCG level of 1500 IU/L or more [1,3]. The larger trophoblastic tissue in a twin tubal ectopic pregnancy gives a serum ß-hCG

higher than the same gestational age of singleton ectopic or intrauterine pregnancy. A rise in ß-hCG comparable to a normal singleton uterine intrauterine gestation by a twin ectopic pregnancy could be misleading[2,5,8,21]. Magnetic resonance imaging is expensive but can be used to resolve difficult cases [22].

The management of unilateral twin tubal ectopic pregnancy follows the same the guidelines provided for singleton ectopic pregnancies. Surgical and medical management options are dictated by the haemodynamic status of the patient and available expertise with both yielding similar success rates in properly selected patients [1,23].

Our patient had an urgent laparotomy and left salpingectomy considering the presence of previous pelvic surgery and risk of adhesions for a laparoscopic approach at close of working hours on a weekend when she was seen. Close in-patient monitoring for medical treatment was not guaranteed during the period and motivation for out-patient medical therapy was a problem as she lived a far distance away at the outskirts of the city especially in the setting of presence of fetal cardiac activity and larger trophoblastic tissue which carries a higher failure rate for medical therapy.

In conclusion, we described a very rare condition, a unilateral twin tubal ectopic pregnancy after an IVF treatment in a woman who has had a previous laparotomy for tubal ectopic pregnancy on her contralateral fallopian tube. The early application of transvaginal sonography after IVF conceptions helps identify and initiate favourable intervention for ectopic pregnancies at an early stage. The diagnosis of an ectopic gestation does not exclude the possibility of another gestation in the same location or elsewhere. Conscientious attention should be employed where the sonography involves diseased or distorted adnexa caused by endometriosis, hydrosalpinx, haemorrhagic corpus luteum cyst and partially drained follicles of hyperstimulated ovaries which could all simulate gestational sac in inexperienced hands.

Routine single embryo transfer at IVF could be an option to reducing iatrogenic twin gestation and thereby reducing the commoner dichorionic variety of twin tubal ectopic pregnancy.

Pathologist documentation of specimen of unilateral twin tubal ectopic pregnancies could help raise more awareness and sensitization as more cases could be detected if all excised samples from ectopic pregnancies are sent for pathological examination.

In conclusion, extrauterine pregnancy is a life-threatening gynaecological emergency. The incidence of all forms of ectopic gestation is rising since the advent of assisted conception. It is therefore imperative for gynaecologists to insist on continued pregnancy confirmatory ultrasound scan post embryo transfer to help early detection and prompt management.

Ethical approval

This study was approved by the research committee of the Kingswill advanced fertility center Lagos, where this patient was managed.

Guarantor

The corresponding author will act as the guarantor for this manuscript.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)- We hereby declare that no generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during writing or editing of manuscripts.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms for the data to be published.

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Conflict of interest

None

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