UNIVERSITY OF ILORIN

THE ONE HUNDRED AND EIGHTY-FIRST (181ST)
INAUGURAL LECTURE

"DELAY IS NOT DENIAL: INVISIBLE MADE VISIBLE, GIVING HOPE TO THE HOPELESS THROUGH MEDICAL IMAGING IN MANAGEMENT OF FEMALE INFERTILITY"

By

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Distinguished students of College of Health Sciences,
Gentlemen of the Print and Electronic Media,
Distinguished invited guests,
Great Unilorites, Ladies and Gentlemen

Dedication

I dedicate this Inaugural Lecture to the Lord Jesus Christ and to all women in Nigeria who are facing the problems associated with infertility. Being fruitful is the Divine Design (Biblical Injunction) for them.

Introduction

The inspiration for the topic of this inaugural lecture was got from two scriptural passages in the Holy Bible: First the Book of Hebrews, 1:1-2 says " Long ago, God spoke in many different ways to our fathers through the prophets (in visions, dreams, and even *face to face*), telling them little by little about his *plans*. But now in these days He has spoken to us through His son, to whom He has given everything, and through whom, He *made* the world and everything there is." That is talking about the knowledge of God and His plans for His creations.

Second, Deuteronomy 29:29 says, "The secret things belong to God and the revealed things are for our benefits and the benefit of our Children". I believe there is a synergy or co-operation between divinity and humanity as reflected in one of my publications which examined the impact of Jesus' Teaching on humanity and science **(Oguntoyinbo, 2005).** It showed that when our scientific knowledge or successes are divinely initiated or powered, their applications to human needs are better appreciated. As it is, I believed that if the invisible God had not become visible (as revealed by Jesus and other holy prophets) our knowledge of Him would have remained very limited.

Mr Vice Chancellor sir, it is for this reason that my research focussed on the desire to unravel the causes of many diseases that plague the human body.

Similarly, from the time I chose to specialise in radiology after graduation from Medical College I have been driven by this one desire or passion. That is, the need to overcome the limitations arising from non-visibility (undetectable nature) of major causes of diseases or structural damages produced in the human body by diseases

and injuries. I accept as true that when the root of a problem is known, half of the problem or sometimes the entire problem is solved.

I remember that some of my family members, especially some of my in-laws (from the maternal side), wondered then why i should specialise in radiology. Why not some other specialities such as obstetrics and gynaecology and surgery which were perceived to be or are more lucrative? But instances or stories of some unfortunate women who go into the labour rooms, full of hopes of bringing forth live babies but who ended up dead (it could be the mothers or the unborn babies or sometimes both), as their lives were snuffed out prematurely, through uncontrollable post-partum haemorrhage; cases such as those with assumed normal placental implantation sites, who eventually lost their lives thus increasing the incidents of maternal deaths made me more determined to unravel these twists of fate. **(Oguntoyinbo *et al.*, 2003).** I pondered on what could have gone wrong? So using ultra sound scans, we were able to show that with normal delivery, blood loss was not affected by normal placenta implantation site, except when abnormally located (in the lower segment of the uterus, which is referred to medically as placenta praevia) and can be diagnosed at ante-natal visits **(Oguntoyinbo *et al*., 2003).**

Furthermore, since the discovery of X-ray in 1895 and its application in modern medical practice coupled with the use of other medical imaging modalities or devices such as Magnetic Resonance imaging (MRI), Radio-isotopic Scan, Ultrasound Scanning, Computerised tomography etc., problems involving the human body are better managed or treated. They are better treated because those hidden causes

of diseases and their complications hitherto non-visible to human eyes are now visible for direct evaluation or assessment. This is unlike in the past when only symptoms and signs were assessed, based mainly on the visible physical changes outside the human body. Such physical assessments are prone to human errors of interpretations or are rather subjective. They do lead to wrong diagnoses and faulty management of cases.

Scientific Facts Supporting the Idea that invisible Causes of Diseases are Made Visible via Medical Imaging Methods:

Based on these observed advantages of seeing more than what the ordinary eyes can see by using imaging modalities, I decided to specialise in clinical radiology in my post-graduate studies from which many of my research works, and ideas were designed through the help of Almighty God.

For instance, the following studies were done in line with the above desire:

1. A study to evaluate the sonographic features of malignancy of the liver was carried out and a specific sonographic sign, characteristic of hepatic carcinoma was documented as shown in the image below, **(Oguntoyinbo *et al.*, 2013):**

Fig 1: Halo sign (A) around a Hyperechoic lesion in the liver

Fig 2: An isoechoic mass within the right lobe of the liver with a

A retrospective analysis of 119 Sonographic reports of patients diagnosed clinically to have hepatic masses or hepatomegaly from January 2000 to December 2004 was carried out, knowing that a palpable mass was one of the commonest manifestations of liver diseases. It could be the first sign of a primary or secondary hepatic lesion. The aetiology might vary with age, sex, occupation and even geographical location.

The objective of the study was to establish the Sonographic and clinical characteristics of undetermined mass lesions in the liver and assess for correlations among similar findings in proven cases of liver pathology with the hope that from future study, histological or cytological confirmation or correlations will be available. Among the variables analysed were age, sex ,occupation, pattern of distribution of masses and their echo-pattern; presence of lymphadenopathy, ascites, splenomegaly or related lesions at other sites.

Analysis was done with computer software SPSS version 11.5.

Results: Out of 119 patients reviewed, only 113 had analysable data. The mean age was 42.91 with a standard deviation of 21.9 years. 63.0 %(75) of the cases were males and 37.0% (44) were females. Civil servants, students, and traders were the most affected, contributing 13.4% (16), 17.6% (21) and 18.5% (22) respectively.

A greater proportion 61.3 %(73) of the masses occurred in both lobes, while the right and the left lobes each had 16.8% (20) and 15.1% (18) respectively. Masses with hyperechoic pattern accounted for 48 .1% (58) of all patients, occurring more among the male patients 37.0% (44), while the highest incidence was found among the 40-

49 age group, contributing 11 cases out of 58 patients diagnosed with hyperechoic lesions.

Most of the lesions in this group were associated with disorganised liver parenchyma echo-pattern and pathological changes in other sites in the body, such as the breast or skeleton. When lesions were found at other sites or organs in association with disorganised hepatic masses, it suggested malignancy, especially with those in the 4th-5th decades of life, while those with well-defined margins, having minimal echo-pattern disorganisation and acute onset of symptoms favour benign lesions.

2. The characteristic chest radiological features of undetected HIV disease, especially for patients who do not want to be identified as carrier of the disease and therefore will not make themselves available for treatment because of fear of stigmatisation **(Oguntoyinbo *et al*.,** 2006). The following changes ranked high as common radiological features between the known HIV infected patients and the unconfirmed cases and these were: (i) Bilateral pleural effusions (33.33%), (ii) unilateral pleural effusions (30.77%), (iii) focal consolidation (segmental or lobar), (27.78%), (iv) patchy opacities (24.14%), (v) cases of Tuberculosis (TB) with classical features like cavitation (23.53%), and all of these can be used as radiological screening points. Patchy opacities were common radiological features at CD4 count of less than or equal to 200 cells/ microliter and between 200-350 cell/ micro-litre.
3. The pattern of damage to the spines or the back bones in relation to an individual occupation was investigated **(Oguntoyinbo** *et al.,* 2006**).** The study

revealed that traders were more affected, followed by civil servants. It was explicable because these two groups operate a sedentary life style or work schedules involving back muscles and joints most of the time. Also the risks of back pain might be greater in sedentary workers because of pressure within the vertebral discs in the sitting position.

4. The variation in the size of the hearts of individuals in this environment in comparison with the standard used for Caucasians was evaluated using the imaging method. In the study we assessed the hearts of both sexes, young and old in order to establish the average value for an individual of Nigerian roots. Having a standard value for each age-group was to allow for early detection or departure from normal and was to draw attention to those who may be having hypertension, which is regarded as a silent killer! **(Oguntoyinbo *et al.*, 2016).**
5. Knowing that intestinal perforation from typhoid enteritis could constitute a diagnostic dilemma for clinicians or surgeons, this researcher was able to use ultrasound to develop a sign to detect evidence of perforation, instead of using the popular x-ray radiation which is usually associated with harmful side effects. (**Oguntoyinbo *et al.*, 2002).**
6. Mr Vice Chancellor sir, according to World Health Organisation (WHO), 14 million women are affected by post-partum haemorrhage (PPH) every year and this is the leading cause of maternal death worldwide causing approximately 70,000 deaths per year. It remains a major cause of maternal death in Nigeria **(Oguntoyinbo *et al,* 2003).** In view of the

scourge, we did a study which showed that PPH was not related to normal placental implantation site but could be due to other abnormalities or causes. In other words there was no significant relationship between PPH and normal implantation of placenta.

7. Hip pain is one of the recurring health challenges suffered by humans, especially among the aged. Among the causes of hip pains, are age-related degenerative changes, which are not visible clinically to physicians. However our study was able to radiologically grade this damage to the joint in order to determine the severity of the condition, **(Oguntoyinbo *et al*., 2002).**
8. Other diagnostic errors that were corrected through some of our imaging studies or investigations include situations in which a purportedly pregnant woman or one with a tumour (fibroid), was shown to be a hernia (umbilical) on ultrasound examination. **(Oguntoyinbo *et al*., 2012).**
9. Chijioke, **Oguntoyinbo** and others (2010**)** were able **to** diagnose a case of tuberculosis of the chest masquerading as fever of unknown causes through chest radiograph and CT imaging studies.

   Mr Vice Chancellor sir, all these cases are listed in order to highlight the importance of radiology in the evaluation of diseases in human beings and to further give a background to the main topic of this discussion i.e. making the invisible visible in the management of female infertility.

Cultural Misconceptions, Beliefs, Issues, Challenges, and Attitudes Related to Infertility

We all know the implication of a woman who is deemed to be barren or infertile. There are many cultural beliefs, norms and attitudes towards infertility; the views or reactions vary from culture to culture and the level of development of the society involved. A woman tagged to be barren is regarded and labelled as an outcast giving her another title or name. There is continuous harassment from both the in-laws and out-laws (society). Infertility is a serious socio-medical problem in our setting. Reports suggest that fear of infertility in both single and married couples may be the reason for low contraceptive use in Nigeria. (Eke et al., 2003) In fact, some men prefer to get their intended partners pregnant before marriage. Mr Vice Chancellor sir, my advice for intending couples with such a fear is to take advantage of imaging evaluation which makes the invisible visible.

The thrust of the inaugural lecture is to let couples know that delay is not denial because of the results that I have got from some of my research and observations on infertility.

For instance, a young woman who married at the age of 30 years could not conceive for seven years. She had tried so many methods, from the spiritual to medical interventions. Sometimes she would miss her period for 2-3 months and thinking that she was pregnant, she would go for gynaecological /obstetric intervention anytime she started bleeding, and was wrongly diagnosed to be case of missed abortions. She had dilatation and curettage (D and C) done or according to her, in local parlance, the womb

was flushed. The procedure was done for her more than three times.

Later, she had proper medical imaging evaluation done when she missed her period again and it was discovered that she had never been pregnant at any time at all. This was because ultrasound scan revealed that both ovaries were filled with immature follicular cysts. This situation is known as Polycystic Ovarian Syndrome (PCOS), a condition in which a woman will miss her period without being pregnant due to failure of ovulation associated with hormonal deficiency. In PCOS, there is increased levels of male hormones (androgens), resulting in increased number of small cysts in the ovaries, infertility and also menstrual irregularities. It is commonly linked to obesity and metabolic syndrome.

She was advised to go for hysterosalpingography (HSG) examination, for total evaluation of the reproductive tract which was found to be normal. Through a combined effort of a gynaecologist and an endocrinologist, she was scheduled for follicular tracking (using ultrasound scan) and medication to prime or cause maturation of the eggs or follicles.

Eventually at the seventh year of her marriage, the egg matured as confirmed on ultrasound scan. This was achieved after three years of patiently tracking the follicles for maturation, plus the perseverance of the couple as well as the team work of the professionals, who were engaged in the management of the case. The woman got pregnant and gave birth to a bouncing, healthy baby 2-3 years ago. This was a practical experience, although not reported then or published.

A second instance was the story of a patient, a 50+ years old woman who believed that the environment where an infertile patient finds herself matters a lot. After being married for a long time without any child, and with the pressure from her husband's family, it always felt as if all eyes were on her.

Also she said that the way Nigerians see infertility is quite different from those in overseas (UK or United States). After she was divorced by the first husband, she had to remarry and moved to the United States where there was no stigmatisation. Whenever she was asked how it felt like to be childless, she claimed that her response was that she had no special feeling since she had never experienced motherhood then. Eventually through *in-vitro* fertilization, she gave birth to a baby boy recently (he is like a grandson to her now).

What is infertility?

Infertility is defined as the inability of a couple (male/female unit) to achieve pregnancy after one year of regular unprotected sexual exposure. (Garrey, et al., 1978; Oguntoyinbo et al., 2003)

Types of Infertility: 1. it may be primary and 2. It may be secondary. It is primary if the woman has never been pregnant before and secondary if she has had pregnancies in the past, irrespective of the outcome.

Infertility has multiple causation including disorders of ovulation, defects in the seminal fluid especially low sperm count, and anatomical abnormalities of the female genital tract. It affects 10 % to 15% of couples, and affects older couples (especially with older female partners) more commonly. **Infertility** is a major reproductive health

problem in many countries in Sub-Saharan Africa. In Nigeria, infertility is the commonest reason for gynaecological consultation, (**Oguntoyinbo** *et a*l**,** 2012, 2014) and most gynaecologists agreed that a considerable proportion of their time is spent attending to individuals/couples who have primary or secondary infertility. Studies in sub-Saharan Africa indicate that both primary and secondary infertility are commoner in this region than in Europe and the United States of America. Whereas high fertility rates are found in women in the Sub-Saharan African zone, higher infertility rates are seen compared to Caucasian countries **(Oguntoyinbo 2006;** Orazulike *et al.*, 2006).

Causes of Infertility in the Female

Mr Vice Chancellor sir, I want my audience to know that infertility is a symptom not a disease. It simply indicates a diseased or disordered state of the female reproductive organs. So the real causes of the infertility symptom are as follows:

1. **Age**. There is a natural decline in fertility from the age of 35 years. Fertility in the female is limited by age. Women are fertile between the ages of twelve years when puberty occurs, and the mid to late forty years when the ovaries cease to mature their eggs and menopause occurs. Progressive wastage of developing eggs (ova) starts in the ovary before the baby is born. This wastage leads to reduction in the natural female fertility by age 35 years, to termination of the ability to conceive by age 45-46 years, and finally to menopause with inability to

produce ova and even menstruate around age 50 years.

2. **Coital factors**. Ovulation time may be irregular, and frequent intercourse is necessary. Conditions preventing this include the causes of dyspareunia, and a personality defect may be present which interferes with normal libido. Also couples working apart, in faraway locations can be a cause.
3. **Congenital or Acquired Anomalies of the Genital Tract**. Such as cervical stenosis, acquired defects in endometrium or myometrium which may be associated with primary infertility or pregnancy wastage and premature delivery. Abnormalities or damage to the fallopian tube which may be congenital or acquired.
4. **Pelvic infections/Peritoneal adhesions (chronic) and adnexal masses**:
   Several studies, including those by the broad based World Health Organisation indicate that most cases of female infertility in Africa are caused by infection acquired from miscarriages and induced abortions, labour and delivery, and sexually transmitted infections **(Oguntoyinbo** *et al***.,** 2014**;** Harrison K.A 1996)**.** Damage to the male reproductive tract following sexually transmitted infections adds to the problems. The end result of infections aggravated by multiple sexual partners, poor health facilities and inadequate treatment of affected individuals is infertility. The most important disorder of the fallopian tubes is the bacterial infection known as **salpingitis** (Murray, 1976) which may lead to two important complications. Firstly, obstruction of the

tubes resulting in the sterility and secondly formation of pockets in which the fertilized ovum may embed leading to tubal pregnancy.

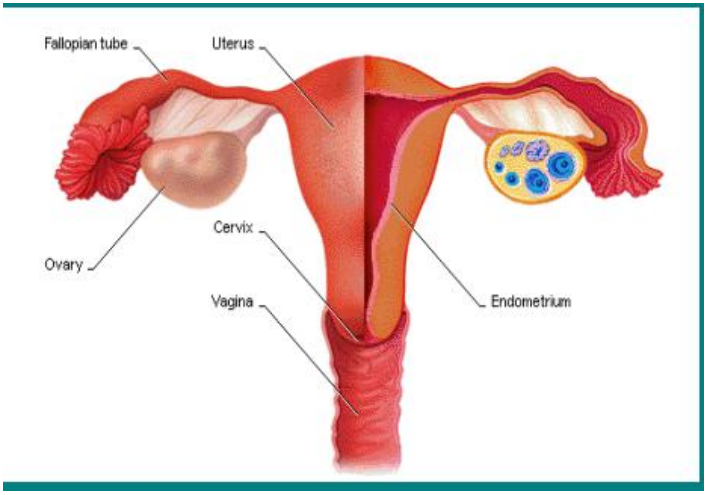


Fig 3: A diagram of the normal female reproductive tract

Salpingitis is classified as follows:

(a) Endosalpingitis: when infection occurs by direct surface spread from the endometrial cavity as in gonorrhoea, or more rarely from the peritoneum via the abdominal ostia in acute peritonitis.

(b) Interstitial salpingitis: when infection spreads from the uterine wall via the lymphatics and blood vessels as in post-abortal and puerperal myometritis. On other hand tuberculosis of the fallopian tubes is blood-borne.

Endosalpingitis: In acute gonorrhoea the mucosal surface is primarily involved by gonococci spreading upwards and a catarrhal and purulent condition, commonly bilateral results. The tubes are only slightly swollen but greatly congested, and purulent exudate may escape from the frimbrial end, occasionally there is some fibrinous exudate on the frimbrial and peritoneal surface. The inflammation is initially catarrhal, the epithelium is denuded in patches from the surface of the plicae, the stroma of which is engorged and infiltrated with polymorpho-nuclear leukocytes, while the lumen is filled with exudate.

Interstitial salpingitis: The acute state is mainly the result of spread of pyogenic infection from the uterine wall after inexperience abortion or less commonly other forms of instrumentation. The chief feature is gross enlargement of the tubes due to inflammatory oedema and cellular infiltration of the interstitial tissue of the whole wall and adjacent mesosalpinx, while the mucosal surface may show little involvement.

Both forms of infection can result in chronic salpingitis but interstitial salpingitis is more likely to resolve without serious permanent effects.

Mr Vice Chancellor sir, I have gone into detail about the pathological changes in the fallopian tubes that can lead to female sterility because the tubes are the bridges between the female eggs and the sperms for fertilisation to occur and once disconnected, the alternative option is to use *in-vitro* method of conception and this is still very expensive.

Other causes of female infertility are:

1. **Endocrine Dysfunction**. Ovulation requires a hypothalamo-pituitary axis and normal thyroid and adrenal glands as well as normal ovaries,

(see fig 3). The development of accurate radio-immunoassay techniques for estimation of various hormones has considerably increased the understanding of the physiology of ovulation and has made more possible a more balanced system of investigation and treatment of infertility. The endocrine conditions most likely to cause infertility are Follicular Stimulating Hormone (FSH) or Luteinising Hormone (LH) deficiency, and hyper-prolactinaemia, sometimes instigated by prolonged use of oral contraceptives.

2. **Endometriosis** .This is a situation in which endometrial-like tissue is found outside of the endometrial layer of the uterus in other parts of the body or reproductive tract. Lesions are characterised as oestrogen-dependent, benign, inflammatory, stem-cell driven and at times progressive with diffuse fibrosis, deep infiltration and resistance to apoptosis (cell death) and progesterone. This tissue which normally lines the uterus is associated with monthly menstruation and is often characterised by abnormal, painful and heavy periods as well as pelvic pain, severe cramps, and painful sexual activity or inter-course. (Dyspareunia). It is a recognised cause of infertility.
3. **Uterine fibroids or endometrial polyps**. Fibroids that indent the endometrial cavity and endometrial polyps can impair how the endometrium (the lining of the uterus) and embryo interact to lower implantation and

pregnancy rates. These masses can also cause irregular bleeding between menstrual cycles. Evaluation should be carried out by 6 months of attempted pregnancy in women with a known history of these abnormalities or a history of bleeding between menstrual cycles.

4. **Immunisation**. Circulating antibodies to spermatozoa can be found in both men and women. Recent work has suggested that such antibodies impair sperm penetration of cervical mucus, known as cervical hostility. (Garrey, MM *et al*. 1978)
5. **Idiopathic (No Cause):** That is no cause is found, and this depends on the extent of the investigation. About a third or more of patients who seek advice do ultimately conceive, (Garrey, MM *et al*. 1978).

Fig 4: An Ultrasound Machine

The imaging workup of patients with infertility often starts with Ultrasound Scan (USS) and Hysterosalpingography (HSG). They provide a caveat of utility to assess for congenital anomalies, structural defects, or presence of masses within the lower abdominal cavity where the female reproductive organ is located (see figures 3 & 4).

Ultrasound Machine (US) is inexpensive, widely available, and one of the common initial modalities of choice for evaluation of gynaecological/ early pregnancy complaints **(Oguntoyinbo, 2017**). The lack of ionizing radiation and real-time imaging are the most important advantages of US. Another important advantage of US examination is the possibility to correlate the US findings with that of the physical and clinical observations. For example, in cases of adnexal masses or point of maximal tenderness in patients with lower abdominal pain during fertility workup, Ultrasound is very useful in evaluating pelvic organs especially for gynaecological complaints or pathologies. Presence of masses like fibroid, ovarian cyst or foreign bodies within the pelvic cavity are easily evaluated with ultrasound scan. Also the maturation of female eggs can be monitored. This is otherwise known as follicular tracking, (See figure 5) which can be used to know the time of ovulation and to assess the causes of menstrual irregularities.

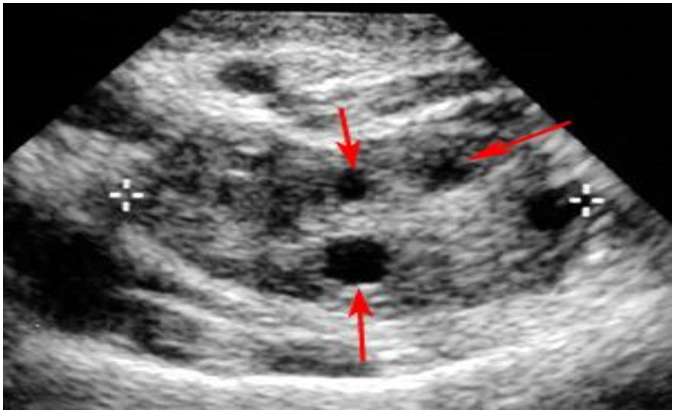


Fig 5: Maturing ovarian follicular cysts, in a normal ovary (Arrowed)

Disadvantages of US are the fact that it is operator dependent, including inter-observer variability, and there could be lack of tissue penetration in obese patients (Trans-vaginal scan (TVS) can be useful in such cases).

Hysterosalpingography (HSG):

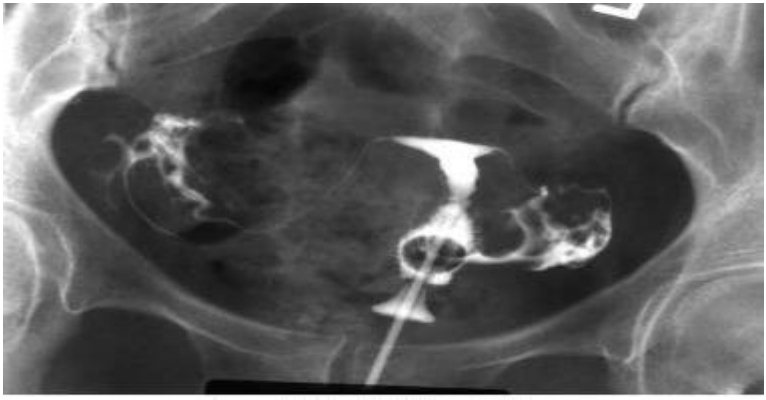
After excluding social and anti-social factors, lack of sex education and family taboos (social errors), HSG is the next imaging method for evaluation of female infertility. The ultrasound form of it is known as Sono-HSG.

HSG is radiological visualisation of the female genital tract by the injection through the cervix of radio-opaque fluid. This provides information about the intra-uterine abnormalities or non-abnormalities. See figure 6 below. It is an almost completely reliable indication of tubal patency or blockage (see figure 7); but laparoscopy (a non-radiological method) is more useful in assessing pelvic adhesions. Indications for HSG:

i. If tubal insufflation and dye injection at laparoscopy have failed to demonstrate patent tubes.
ii. It will demonstrate the site of blockage.
iii. If any intra-cavitary anomaly is suspected, e.g. adhesions.
iv. If the patient is unsuitable for laparoscopy.

There are contraindications for the investigations such as ongoing vaginal bleeding or pelvic infection; purulent vaginal discharge and suspected pregnancy. History of allergic reaction to contrast medium is a rare contraindication.

Hysterosalpingography demonstrating normal findings with bilateral spillage. (Figure 6)



The pools of contrast medium on both sides of the pelvic cavity demonstrating peritoneal spillage.

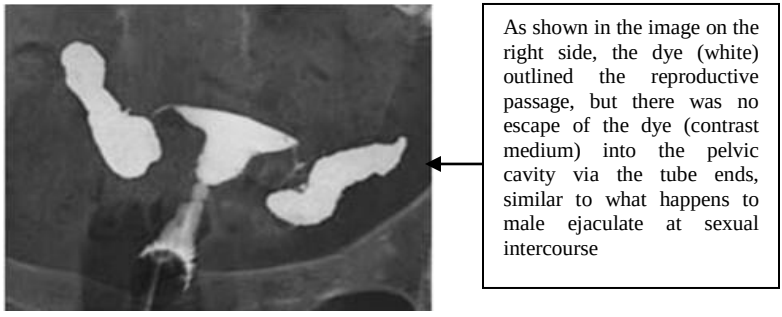


Fig 7: A Patient with Bilateral Hydrosalpinges which is consistent with bilateral tubal blockage.

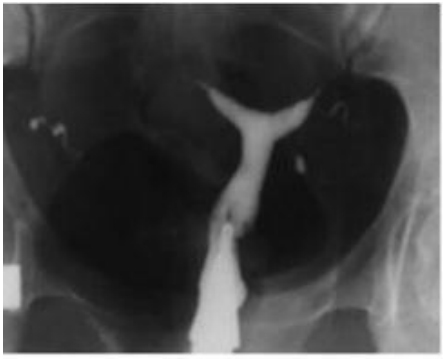


Fig 8: HSG showing a depression of the uterine fundus consistent with an arcuate uterus. Such abnormality may result in non-implantation of the fertilized eggs or some other errors of procreation and if detected early through HSG, appropriate interventional procedures can be taken

.

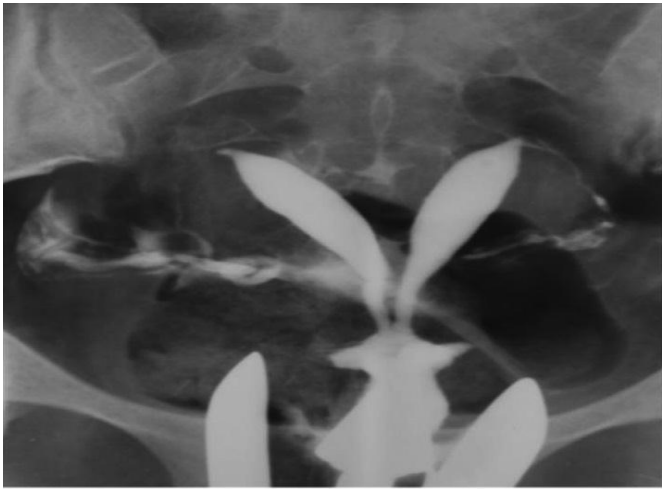


Fig 9: A 28-year-old woman with caesarean scar defect at the isthmus of the long septated uterus: The distortion can be a source of secondary infertility. However the patient is fortunate that both fallopian tubes are still patent and surgical intervention to relieve the adhesions can be carried out (adhesiolysis).

Mr Vice Chancellor sir, from the foregoing, it shows that it is very important to know the integrity of the reproductive tract of the female presenting with symptom of infertility i.e. a woman of child bearing age.

Therefore, my first research work was to know the value of the sonographic evaluation of tubal patency in Ilorin (**Oguntoyinbo, 2001)**. The traditional method (regarded as gold standard) for confirming tubal patency is through x-ray HSG, and without the tube being open or patent on either sides, the sperm cannot cross to meet the egg (ovum). It was noted that radiation hazards was associated with the x-ray form of assessment. Therefore, along with my co-researchers we considered using ultrasound for evaluation. That is to see if it would be as sensitive as the x-ray form of evaluating tubal patency. Our result showed that Sono- HSG was as good as x-ray HSG (96.8%). The advantages are that there is no radiation hazard, it is less expensive and it can be done as out-patient study (easily done) in the consulting clinic.

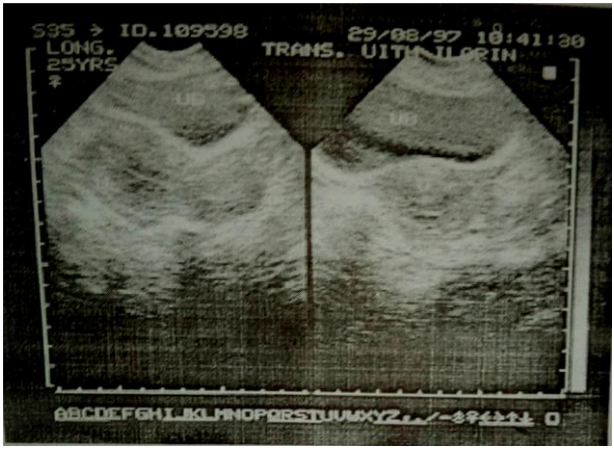


FIGURE 10: Pre-injection Sonogram (UB= urinary bladder, U= uterus).

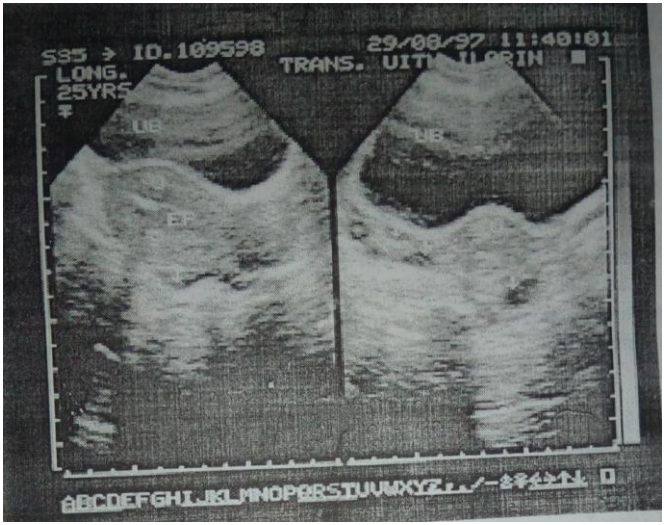


FIGURE 11: Post-injection Sonogram with Arrows indicating Intra-peritoneal Spill (UB= Urinary bladder, EP = endometrial plate, U=Uterus)

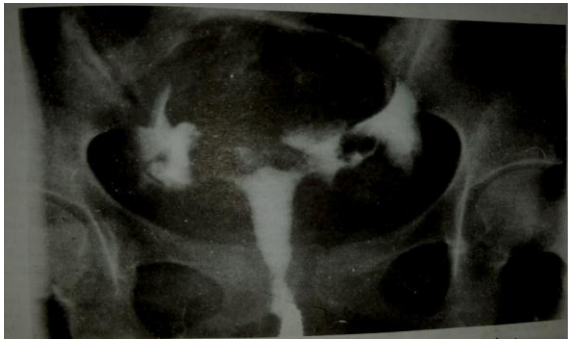


Figure 12: Bilateral spill on HSG in the same patient

Another study was on the need to ease the discomfort or pain associated with the routine HSG; there are fears and anxieties associated with the procedure by patients. The fears are ignorantly initiated by former patients and this discourages the potential patients who would have benefited from the investigation. This is because without a channel of communication for the sperm and the ovum, it is like pouring water into a basket. To allay this fear, we conducted a study in which we gave patients pain relieving injection using pentazocine **(Amole & Oguntoyinbo, 2001),** and we found out that a higher number of patients, apart from being free of pain, also had a higher number of tubal patency. This was significant because, naturally, there is a physiological blockage of the tube due to tubal spasm and which was relieved by the anxiolytic drug given prior to the test.

A further study was carried out to find out if there was a relationship between the duration of infertility and the type of fertility (**Oguntoyinbo, 2006)**. It was discovered that the secondary type of infertility had a longer duration and it was more frequent. The inference from this research was that the longer duration associated with secondary type of infertility was due to many of the damages sustained either during deliveries, unsafe abortions, and infections from the un- hygienic environment. It is assumed that a person who has been pregnant before should not have a delay in getting pregnant again but the result proved otherwise. Out of the four hundred and three (403) records examined, only one hundred and six (106) of the patients had the duration of their infertility documented. Secondary type of infertility was higher with 66.3 percent (66.3%). The author advised that all women of child bearing age should

subject themselves for immediate evaluation of their reproductive tracts, both primary and secondary, without delay, once the period of infertility is beyond 12 calendar months. The fallopian tube which was mainly affected, was what the follow up study sought to know, (**Oguntoyinbo *et al.*, 2012)**. The study showed that the right tube was more involved than the left. The conclusion was that closeness of the appendix and some adhesions related to post appendectomy cases might be responsible for that finding.

Management of Infertility

This requires a team approach (Medical/Surgical/ Radiological). The clinicians follow the sequence of history, physical examination, laboratory and imaging Investigations. These steps are critically evaluated and are followed by initiating appropriate treatment measures or options.

Infertility is a problem that involves both partners. Diagnostic testing is unnecessary if the couple has not attempted to conceive for at least 1 year. A complete infertility evaluation is performed according to the woman's menstrual cycle and may take up to 2 menstrual cycles before the aetiology is determined.

History Taking: There is a need to obtain the following medical history and information from the couple: Copy of previous medical records; Details regarding the type of infertility (primary or secondary) and its duration; History of previous pregnancies and their outcomes; pregnancy intervals; and detailed information about pregnancy loss, pregnancy duration, human chorionic gonadotropin (hCG) level, ultrasonographic data, History of previous infertility evaluation/treatment (for secondary type of infertility),

including details about frequency of intercourse, use of lubricants (e.g., K-Y gel) that could be spermicidal, use of vaginal douches after intercourse, and presence of any sexual dysfunction. Records about the menstrual history, frequency, and patterns since menarche, as well as history of weight changes, hirsutism, frontal balding, and acne must be documented. On the other hand, the husband's medical history, including previous semen analysis results, history of impotence, premature ejaculation, change in libido, history of testicular trauma, previous relationships, history of any previous pregnancy in female partners, and the existence of offspring from previous female partners are to be noted.

Couple's history of sexually transmitted diseases (STDs); surgical contraception (e.g., vasectomy, tubal ligation, IUCD insertion for spacing of pregnancies); lifestyle; consumption of alcohol, tobacco, and recreational drugs; occupation; physical activities; current medical treatment (if any), reason; any history of allergies; and a complete review of systems to identify any endocrinology or immunologic issue that may be associated with infertility are also to be noted.

Physical Examination: This includes the following: Routine records of blood pressure, pulse rate, and temperature (when relevant); Height/weight findings to calculate body mass index; measure arm span when indicated; Head and neck assessment: The presence of exophthalmos which can be associated with hyperthyroidism; chromosomal abnormalities; and exclusion of thyroid gland enlargement/nodules which may indicate thyroid dysfunction. The Breast evaluation includes, its development and looking for any abnormal

masses or secretions, especially galactorrhea; the abdomen is examined for presence of abnormal masses in pelvic region and a thorough gynaecologic evaluation will assess for hair distribution, clitoris size, Bartholin glands, labia majora/minora, and any *condylomata acuminatum* or other lesions that could indicate the existence of venereal disease.

Speculum examination will be carried out for a Papanicolaou test and culture, Gonorrhea, Chlamydia, and *Mycoplasma hominis* will be needed as well as assessment for any cervical stenosis or abnormalities. In actual fact, a study carried out by **Oguntoyinbo*, et al.*, (2014),** showed that genital infections in women play a pivotal role in the development of fallopian tube disease in infertility. Approximately 35% of women with infertility suffered from post infectious sequel affecting the fallopian tube or the peritoneum.

Bimanual examination: will be carried out to assess the direction of the cervix plus size/position of the uterus to exclude the presence of uterine fibroids, adnexal masses, tenderness, or pelvic nodules indicative of infection or endometriosis; and congenital defects (e.g. absence of vagina and uterus, vaginal septum)

As part of total evaluation of the patient, the overall integrity of the fallopian tubes and the pelvic peritoneal cavity are assessed by laparoscopy and hysterosalpingography as mentioned earlier in the discussion under radiological evaluation. Also the ovarian status is evaluated by determining the serum levels and/or serial ultrasonography to assess ovulation through follicular tracking method. For the male partner, the semen is analysed for volume, pH level, concentration, motility, morphology, and WBC count. In addition Sperm function

tests namely: (1) The acrosome reaction test with fluorescent lectins or antibodies (2) computer assessment of the sperm head (3) computer motility assessment (4) hemizona-binding assay (5) hamster penetration test, and (6) human sperm-zona penetration assay are done

On the other hand, imaging studies will confirm and differentiate, and sometimes initiate appropriate treatment. These days, the intervention radiologists are re-canalizing blocked fallopian tubes. The most frequently used diagnostic tools to assess endometrial cavity of course is HSG. Pelvic ultrasonography; saline infusion Sonography; pelvic magnetic resonance imaging; hysteroscopy; endometrial biopsy are the alternatives.

Medical and Surgical Treatment Options or Plans: These are based on the diagnosis, duration of infertility, and the woman's age. Management of any underlying female and/or male factors affecting fertility may include medical treatment (pharmacotherapy and counselling), surgical intervention, (or both) or assisted Reproductive Technologies. Whatever the outcome of the findings or results of the various investigations, the couple must agree with any chosen treatment option(s). Sometimes, couples are advised or may wish to adopt a baby because of the complexities of the infertility challenge or outcome. The situation is made more complex when single individuals (mostly the women) present with Infertility, or as is seen in sub-Saharan Africa, when the male partner refuses to be interviewed, investigated, or treated on the premise that he is fertile, **(Oguntoyinbo *et al.*, 2006;** Orazulike *et al.*, 2006.) Options that are available for assisted reproductive technologies include the following:

IN VITRO FERTILIZATION (IVF): sperm are placed with unfertilised eggs in a petridish where fertilization can take place. The embryo is then transferred into the uterus to begin a pregnancy. Sometimes the embryo is frozen for future use.

INTRACYTOPLASMIC SPERM INJECTION (ICSI) – A single sperm is injected into an egg to achieve fertilisation during an IVF procedure. The likehood of fertilization improves significantly for men with low sperm concentrations.

INTRAUTERINE INSEMINATION (IUI): at the time of ovulation, a fine catheter is inserted through the cervix into uterus to place a sperm sample directly into the uterus. The sperm is washed in a fluid and the best specimens are selected. The woman may be given a low dose ovary stimulating hormones. IUI is more commonly done when the man has a low sperm count, decreased sperm motility, or when infertility does not have an identifiable cause. It can also help if a man has severe erectile dysfunction.

GAMETE INTRA FALLOPIAN TRANSFER (GIFT)

ZYGOTE INTRA FALLOPIAN TRANSFER ZIFT)

Essentially, infertility is a serious socio-medical problem in our setting. Reports suggest that fear of infertility in both single and married couples may be the reason for low contraceptive use in Nigeria. In fact some men prefer to get their intended partners pregnant before marriage. My advice is for intending couples with such fear to take advantage of imaging evaluation which makes the invisible, visible.

Recommendations

First, **government** should promote policies that will improve health standards with better health facilities. Adequate public enlightenment or education should be given to the populace in order to reduce or eliminate activities of quacks or charlatans in medical practice. Allowance must be made for wife and husband to work and live together through provision of more Job opportunities and other incentives.

Second, **the patients**, are to be hopeful and stay within the ethical/medical provision available for each case

Third**, relations** are to be more tolerant with infertile couples. Patience is a virtue in such cases.

Fourth**,** religious leaders are to allow their followers to benefit from up to date Medical facilities while praying for and with them.

Conclusion

Mr Vice Chancellor sir, I want to conclude that many of the causes of infertility are either preventable or treatable if appropriately investigated. Many cases of infertility are not due to evil work or satanic attacks or angry gods; causes of infertility have been highlighted in the course of this lecture. There are causes which can only be identified or made visible through medical imaging and must be recognised as such. For instance, bilateral tubal blockage can only be confirmed through imaging, there is no way a woman can know if her tubes are blocked unless a form of imaging is done. However, there is hope for the non-ignorant patient because once this problem is identified, alternate treatment methods can be adopted. On the other hand, where the reproductive tract or the tubes are found to

be normal like in the case referred to in the lecture, imaging studies such as Trans-vaginal scan to access the ovary (Follicular activities) can be done. The cutting edge is to investigate early once there is a delay in conception because **DELAY IS NOT DENIAL, THERE IS HOPE FOR ALL WOMEN OF CHILD-BEARING AGE TO HAVE CHILDREN.**

THANK YOU FOR LISTENING

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