

Full Length Research Paper

Interventions in women with one blocked oviduct, lessons learnt and recommendations: A case report

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Women can still conceive naturally or through *in vitro* fertilization (IVF) with the one oviduct that is properly functioning if only one oviduct is blocked, however, the chances are decreased particularly if the blockage is close to the ovary (hydrosalpinx) because of wash out phenomena and toxic fluid produced by the fallopian tube that is blocked. In situations where only a single tube has hydrosalpinx specialists should advise patients appropriately and must be given options, to choose between undergoing salpingostomy, a surgical process that involves tubal reconstruction to expand their odds of getting pregnant naturally by removing the blockage or IVF treatment. For women with one working oviduct specialists must be on the lookout for ectopic pregnancy. This will enable early diagnosis of ectopic pregnancy and a treatment technique that spares the tube can be utilized. The patient is a woman of African origin with blood group O staying at Manyame Park Harare. She has never married before and has been trying to get pregnant from 2005. She eventually got a successful pregnancy in 2014 and delivered first child in 2015 after several interventions. Her infertility was initially due to the presence of hydrosalpinx on the left fallopian tube, scarring in the fimbriae of left tube, high prolactin level and was subsequently due to loss of the only working tube after ectopic pregnancy. The patient got pregnant whilst she was on bromocriptine, unfortunately the pregnancy did not last to full term. Clomiphene was later added to her drug regiment and after six cycles she had an ectopic pregnancy which destroyed her only working tube. The patient then tried IVF treatments to achieve pregnancy. She underwent two IVF treatment cycles which failed to achieve pregnancy. The patient finally underwent tubal reconstruction microsurgery which enabled her to have two successful natural pregnancies. Gynaecologists must be vigilant in diagnosis of infertility factors and should give enough appropriate information to female patients when making decisions concerning fertility interventions.

Key words: Fertility, *in vitro* fertilization (IVF), salpingostomy, hydrosalpinx, prolactin, fimbriae.

INTRODUCTION

Tubal blockage is a usual cause for inability to conceive among women (Banu et al., 2009). Basic comprehension

of infertility associated factors is imperative in clinical practice as well as in successful fertility interventions.

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Upper genital tract disease causing endometritis, salpingitis, tuboovarian ulcer and peritonitis in the pelvis including pelvic inflammatory disease may contribute in tubal infertility (Hoof, 2007)). Sexually transmitted diseases are associated with high incidences of tubal blockage especially sexually transmitted infections (STIs) caused by *Chlamydia trachomatis* and *Neisseria gonorrhoea* (Hoof, 2007; Akande et al., 2010). Immuno-allergic reactions may take place in the tube, leading to permanent tubal alterations and possibly infertility (Judlin, 2009). Furthermore, there are numerous different reasons for tubal infertility which incorporate surgery, past ectopic pregnancy, inborn abnormality, endometriosis and hydrosalpinx (Ginter, 2009). In patients with tubal blockage, conception can only be achieved through costly and complex treatments, for example, *in vitro* treatment or surgery. The live birth rates achieved through (IVF) has now increased from 24 to 39.3% in some centres due to improved current clinical practice (Heitmann et al., 2015). Birth rate measures after microsurgical procedure had been found to be 29.2% are lower than *in vitro* treatment rates that have been reported in other centres (Chu et al., 2015). Although the birth rates of IVF treatment are higher than those achieved by microsurgery, most specialists are generally biased towards *in vitro* fertilization leading to a decline in tubal surgery. Microsurgery has the advantage of correcting damage resulting in long-standing restoration of fertility. There is no straightforward prognostic grouping of tubal blockages, however, the health of the tubal mucosa and the extent to which the tube is damaged is the key which determines the outcome.

When diagnosing tubal damage visualization should be done by laparoscopy instead of using hysterosalpingography (Nomonde, 2010). Laparoscopy has the benefit of examining the tube and shows the relation of the tube to other pelvic organs. Distinguishing between anatomical blockage and tubal spasm can be done using selective salpingography and tubal catheterization (Rawal et al., 2005). If skills are available Laparoscopic Microsurgery should be done, where cannulation has not been successful (Vlahos et al., 2007) Laparoscopic microsurgical tubal opening ought to be performed utilizing a robot system that is remote-controlled (Watrelet, 2007). In the investigation of tubal patency transvaginal hydrolaparoscopy and fertiloscopy appears to be second line alternatives to hysterosalpingography which is the first line procedure. Fertiloscopy is a method of choice in the assessment of reproductive tube health because it is less intrusive. Fertiloscopy incorporates hydrolaparoscopy, dye hydrotubation for testing tubal patency and salpingoscopy (Marana et al., 2003). Where the mucosa is unhealthy and surgery is not a justified option; the patient should then undergo IVF. The role of salpingoscopy in laparoscopic operation for tubal factor infertility has been confirmed in terms of reproductive

outcomes (Papaioannou et al., 2004), however the prognostic significance of microsalingography needs to be validated in clinical trials (Papaioannou et al., 2004).

In the management of tubal infertility, selective salpingography plays a unique role and should be performed for selected patients before IVF (Allahbadia et al., 2009). Tubal cannulation can be utilized successfully to re-establish patency in instances where there is proximal tubal blockage to avoid the need of costly IVF (Allahbadia et al., 2009). Another alternative for women with tubal factor infertility and hoping to become pregnant naturally is utilization of endoscopic fallopian tube recanalisation; the method is more successful with proximal tubal blockage and is used together with Laparoscopic Tactile Cannulation (Rodgers et al., 2009). There are a wide range of surgery techniques for unblocking fallopian tubes and the techniques used depend on length and position of blockage (Ozmen et al., 2007). Tubal opening includes the entire removal of the blocked part of the tube producing two healthy ends which are then joined. This technique is normally done either with Laparotomy or Laparoscopy.

Salpingectomy is a surgical procedure in which the fallopian tube that is blocked or infected is removed. It is generally done on women with a hydrosalpinx to increase their chances through IVF (Tsiamia et al., 2016). This surgical method is favoured over salpingostomy, another surgical method that can be utilized for managing hydrosalpinges (blocked fallopian tubes filled with fluid) (Tsiamia et al., 2016). Salpingostomy involves the incision of affected tube to create an opening. In neosalpingostomy, an opening is created towards the ovary. The purpose of these openings is to release tubal blockage. The drawback of this strategy is that blockage removals are only temporary because scar tissue normally grow and seal the opening and blockage is achieved again. If there is partial blockage due to scarring in the fimbriae, Fimbrioplasty is a method of choice to remove scar tissue with the end goal that drifting movement of the fimbriae is re-established. All these surgical mediations are being supplanted bit by bit by assisted reproductive technologies.

CASE PRESENTATION

The patient is an African woman with blood group O living in Manyame Park Harare, Zimbabwe. The patient was not married before and has been attempting to conceive since 2005. The patient eventually got a successful pregnancy in 2014 and delivered her first baby boy in April 2015 after many failed interventions.

Medical history

The patient and her husband visited the doctor for assessment and treatment after trying to accomplish pregnancy with unprotected intercourse over a long period. A fertility assessment was done to evaluate the capacity of the wife to ovulate, tubal patency and the

Table 1. Semen analysis results.

Test	Result	Normal range/ Inference
Sperm count	45 million per ejaculate	20-200 million/ml
Shape	48% normal	40-100%
Motility	57%	> 30%
Volume	2.8 ml	2-7 ml
Liquefaction time	25 min	15-60 min
Appearance	Grey	Normal
pH	7.2	7- 7.5

Table 2. Hormonal tests.

Test	Result	Normal range
FSH	7.1	1.7-21.5 IU/L
LH	6.3	0.16-16.3 IU/L
Oestrodiel	172	19-164 pg/ml
Prolactin	46	5-30 IU/L

husband's sperm quantity, quality and mobility. The patient was a 24 year old woman who had never been married before and had no miscarriages or pregnancies from previous relationships. The patient did not have any difficulties during sex with her husband. The patient and husband never had any sexually transmitted diseases before and both were not taking any pharmaceuticals or any illicit drugs that can compromise fertility. The patient was consistently having periods and never experienced any bleeding during sex or between periods.

Tests for husband

Men are fertile if their testicles can produce enough health sperm, and that the sperm is discharged successfully into the lady's vagina and swims to the egg. Men infertility tests are merely done to determine if any of the fundamental properties of sperms is impaired. The husband had a general physical examination of his genitals that involved the checking for any lumps in testicles, any distortions in penis shape and structure and any other abnormalities. The doctor also collected the semen which was then sent for analysis.

Tests for patient

Patient's fertility depends on ovaries which discharges healthy eggs into the oviduct. The oviduct allows the egg to move along until it fuses with the sperm. The egg that has been fertilized must be able to travel to the uterus where implantation will take place. Infertility tests for the patient attempted to figure out where there is any impairment in any of the processes. Infertility tests that were carried out for the patient include ovulation test, to determine whether the patient was ovulating and Pap smear to determine the health of cervix. The Pap smear can detect cervical cancer, including other diseases such as sexually transmitted diseases which may interfere with getting pregnant. Hysterosalpingography was performed to assess the state of the wife's uterus and fallopian tubes and to

search for blockages or other different issues such as fluid spills out of fallopian tubes.

A transvaginal ultrasound scan was performed to check the nature of womb, ovaries and fallopian tubes. The scan was carried out to determine if there are womb conditions such as fibroids which can prevent pregnancy and to check the health status of ovaries including any blockages in the fallopian tubes. When all the test results were out, the doctor then refereed the patient to the gynaecologist who explained all the test results to the patient and his husband.

RESULTS AND COURSE OF ACTION

The patient had never married before and she had never been pregnant and lacked any signs of infection (Table 1). Pap smear results showed that the cervix of the patient was healthy. The patient had high prolactin level and oestrogen (Table 2). Ultrasound scan demonstrated that the patient had ovarian cysts and Hysterosalpingography, an X- ray examination demonstrated that one of the tubes was blocked. The main guilty party for the couple's infertility was the patient's high prolactin level, despite the fact that one tube was blocked it was still possible for the patient to become pregnant since one of the tubes was not blocked and also X-ray methods are also associated with false positives. Bromocriptine was then prescribed for the patient to reduce blood prolactin levels.

The patient became pregnant after a year, the time when she was considering ceasing to take bromocriptine, but unfortunately the pregnancy did not last to full term. She miscarried when the pregnancy was just four months. After miscarriage the patient continued with

bromocriptine and after a year whilst the patient was still on bromocriptine the doctor further prescribed clomiphene. The patient eventually got pregnant after six cycles of clomiphene whilst she was in South Africa. She started to bleed heavily after two months and was taken to Greytown hospital where an ultrasound scan was taken which showed that the wife had an ectopic pregnancy. She was then taken from Greytown hospital to Grey's a referral hospital for surgery to get rid of potentially life threatening ectopic pregnancy. Due to initial misdiagnosis the time when it was recognised the ectopic pregnancy had already ruptured the tube.

After ectopic pregnancy

After ectopic pregnancy the patient and husband went back to Zimbabwe to consult their gynaecologist in order to get the best advice, because ectopic surgery had destroyed the only working tube. The patient and husband suggested if the gynaecologist could reconstruct the other tube after the wife had healed. The gynaecologist was against that and he advised the couple to go for an IVF. He advised the patient and husband to go to South Africa for IVF since such a service was not offered in Zimbabwe. The patient and husband used internet to search for clinics which offer IVF service and found one in Durban Kingsway Hospital and St August Hospital, both centres being operated by Dr Naidu. In the first cycle only four eggs were harvested, all the eggs were implanted and failed to achieve pregnancy. The patient and husband were told to wait for three months for them to do another cycle. In second cycle 12 of the harvested eggs were successfully fertilized. Six eggs were implanted and others were frozen for future use. For the second time IVF failed to achieve pregnancy and the couple then pinned their hopes on six frozen embryos. The gynaecologist then advised the patient to wait for three month, and then come back for implantation. After three months the patient went back for implantation. After a month the patient tested for pregnancy, which was found to be negative. The couple decided to stop carrying out further cycles because they could not afford further IVF treatment cycle.

The patient went back to their gynaecologist to inquire as to whether he can open or reconstruct the tubes surgically with the goal that the couple can accomplish pregnancy naturally. The gynaecologist carried out a laparoscopic procedure to determine the extent of blockage. After the procedure it was discovered that the tube that had ectopic pregnancy cannot be reconstructed because it was badly damaged during surgery. However, the patient was assured that the blocked tube can be open by reconstructive microsurgery. The blocked tube had blockage towards the ovary and had scar tissue on

fimbriae. The kind of blockage is known as hydrosalpinx. The patient was then booked for laparoscopic surgery. The patient came back for salpingostomy and fimbrioplasty, which was successfully done. The couple did not have sex until the patient was fully recovered, that is at least after a month. Bromocriptine was prescribed for the patient to suppress prolactin. The patient got pregnant naturally at six months after surgery, unfortunately she miscarried again. After this miscarriage the patient and husband tried again for year without success. The patient decided to stop taking bromocriptine because of side effects and the husband was in agreement with her. Four months after quitting bromocriptine the patient got pregnant, fortunately this time the pregnancy was viable up to full term. She gave birth to the couple's first baby boy on 18th of April 2015. The couple never expected to have another baby because normally reconstructed tubes close again rendering the patients infertile and unable to conceive naturally. Due to that the patient and husband never tried to seek for any specialist intervention for them to have the second child, because they knew that it was costly and the intervention outcomes are normally unpredictable. When the wife had fully recovered three months after delivery, that's when the couple started to have unprotected sex. After one year four months when the couple was reviewing possible options for them to have a second child, the patient discovered that she had become pregnant naturally. She got pregnant whilst she was breast feeding, when prolactin level is expected to be high. The couple's second girl child was delivered 3rd of May 2017. All the two successful pregnancies were delivered by scheduled caesarean surgery.

DISCUSSION

Medical history

Medical assessments are important because they help to predict women's plausibility of pregnancy; accordingly, if a tubal factor is recognized during assessment of a couple, tubal surgery may be recommended if it is established that the woman can ovulate, the husband is producing enough high quality sperm and the woman's uterus is normal. When evaluating females for fertility age is very important. Fertility in woman decreases as they grow older. Significant decrease in female fertility starts at about 35 years. Advanced age is associated with decreased fertility including increased risk of complications during pregnancy and miscarriage. Menstrual history is also important in the evaluation of role of ovulatory factor in infertility. The obstetrical history is essential it helps in knowing if the woman has been able to conceive and whether the woman has experienced any pregnancy complications such as post

partum endometritis including ectopic pregnancy, which may have damaged her reproductive system. The gynaecological history uncovers problems associated with reproductive organs that affect fertility and pregnancy outcomes. For instance, women with history of Asherman syndrome associated with extensive damage of the endometrial surface may block the likelihood of embryonic implantation.

The presence of malformations in the reproductive tract which include bicornuate/unicornuate uterus and malformations secondary to diethylstilbestrol exposure affects the uterine cavity preventing successful implantation of the foetus. Medical history may also establish some causes of ovulatory dysfunction which is usually secondary to malfunctioning of ovaries or hypothalamic/pituitary disorders. Medical conditions which prevent pregnancy such as diabetes and hypertension should be controlled. Woman with history of operation in the pelvis should be checked for tubal damage. Physical examination should confirm well developed normal secondary sexual characteristics. Hormonal disorders that affect fertility should be evaluated and possibly corrected. Medical history is essential in determination of fertility intervention that can be used to treat infertility. Tubal reconstructive surgery is useful in women younger than 39 years trying to achieve pregnancy provided that the woman have proven tubal infertility, normal uterine cavity, is able to ovulate and husband produces large quantities of viable sperms.

Role of hydrosalpinx on the patient's IVF pregnancy outcome

Tubal factors account for approximately 25% of all female infertility factors (Gautam, 2008). A hydrosalpinx refers to a fluid filled fallopian tube blockage of the end that is close to the ovary which can affect two fallopian tubes. This condition may go for years unnoticed though in some cases women may have symptoms such as abdominal pain. Most women become aware of this because of infertility. According to studies women with one tube that is open have reduced chances of getting pregnant if there is a hydrosalpinx on the other tube (Gautam, 2008). IVF has been a method of choice where there is tubal factor infertility; however, new evidence shows that women with severely damaged tubes have reduced chances of success (Dimitrios et al., 2008).

There is converging evidence from several studies (Noventa et al., 2016; Zhang et al., 2015) which shows that women with hydrosalpinges have significantly reduced rate of implantation and pregnancy than women with other types of tubal impairment (Tulandi and Akkour 201). Other studies found that the presence of hydrosalpinges was associated with increased risk spontaneous abortion (Wessam et al., 2014) and ectopic

pregnancy (Richana et al., 2006). The negative association of hydrosalpinx and pregnancy have also been demonstrated by D'Arpe et al. (2015). The causes of implantation failure is not completely understood, however most theories suggested that embryo toxicity of the fluid that leaks from the tube into uterus cause endometrial deformations which prevent implantation and there is possibility of embryo washout as the fluid flows down (Strandell et al., 1999).

IVF is a method that bypasses tubal blockage. Eggs are extracted directly from the ovary and are allowed to fuse in the laboratory. The embryos formed are then transferred into the uterus. The success of IVF has increased in recent years and women with hydrosalpinx can also make use of IVF however, in a randomised clinical trial it was found that for women with hydrosalpinx pregnancy chances are significantly reduced. These days there is increased use of IVF, salpingostomy is now rarely performed whilst salpingectomy is common and there is evidence that using salpingectomy in patients with hydrosalpinges doubles IVF chances of success (Noventa et al., 2016; Johnson et al., 2010).

Effect of hydrosalpinx to the patient's ability to conceive naturally with one viable tube

Woman who have one blocked fallopian tube with hydrosalpinx and one normally functioning tube have reduced chances of getting pregnant (Chanelles et al., 2011). In one of the studies in which twenty five women with one open tube and one hydrosalpinx were enrolled, Salpingectomy was performed in eighteen women and tubal ligation was performed in seven. At the end of the study it was found that 22(88%) women accomplished pregnancy after the surgeries without the utilization of IVF. There were no multiple birth and ectopic pregnancies. The two procedures increased the chances for getting pregnant; however, women who underwent salpingectomy tend to get pregnant more quickly as compared to those who had tubal ligation (Noventa et al., 2016). The two techniques appeared to increase the probability for getting pregnant. Strikingly, the ladies who had a salpingectomy got pregnant more rapidly when compared with the ladies who had a tubal ligation (Noventa et al., 2016).

Although the research is one sided, but it shows that a one sided hydrosalpinx can cause infertility and its effects can be reversed. Women enrolled in study did not need further treatment and they took an average time of 5.6 months to get pregnant. Another alternative which conserves the tube is to perform salpingostomy followed by trial to conceive naturally. Then if pregnancy is not achieved within a reasonable amount of time IVF may then be offered with sterilizing surgery (Chu et al., 2015).

Role of surgery (salpingotomy and fibrioplast) in restoring the patient's tubal viability

A fallopian tube blockage prevents fertilization to take place because the sperm will not be able to fuse with the egg. Surgical intervention can correct tubal blockage which is a common cause of infertility. The type of surgery to correct tubal blockage depends on the location and the degree of fallopian tube blockage. Some tubal surgical procedures are done utilizing microsurgical techniques using laparoscopy through a small incision. The surgeon must have undergone unique specialist training in microsurgery procedures and laparoscopy. Microsurgical techniques incorporate salpingectomy, salpingotomy and fibroblast.

Salpingectomy is done to enhance IVF success when there is a hydrosalpinx on fallopian tubes. Hydrosalpinx reduces the success of IVF by half. Salpingectomy is a method of choice for treating a hydrosalpinx before IVF. Salpingostomy procedure is done when the fallopian tube with hydrosalpinx needs to be preserved. This strategy makes another opening on part of the tube nearest to the ovary. This treatment is temporal due to formation of scar tissue after a salpingostomy, reblocking the tube in 3-6 months.

Fimbrioplasty can be recommended in women with damaged fimbriae. This technique involves reconstruction of fimbriae. In selected cases fimbrioplasty can be recommended over salpingostomy and has a pregnancy success rate of 20- 30%. However, there are very few surgeons who can perform fimbrioplast (American Society for Reproductive Medicine and Society of Reproductive Surgeons, 2008). According to Chu et al. (2015), in 22 studies that were done it was concluded that women who undergo salpingostomy for hydrosalpinx have increased chances for spontaneous pregnancy. Salpingostomy can be utilized in selected women with blocked tubes who wish to conceive naturally, however, women with severe hydrosalpinges may be advised to undergo salpingectomy and IVF treatment since the success of salpingostomy is limited (Chu et al., 2015).

Recommendations

Ectopic pregnancy is a serious health problem which is likely to happen in women with inflammatory hydrosalpinx. Tubal ectopic pregnancy is caused by fertilized egg which fails to travel to the uterus. The fertilized egg stays and grows in the fallopian tube, causing the tube to rupture if not detected early. The woman with ectopic pregnancy may die due to internal bleeding and the only tube that is working can be destroyed leading to female infertility. Therefore it is recommended that gynaecologists should be vigilant in

diagnosis of both hydrosalpinx and tubal pregnancy.

Pregnant women should quickly report to gynaecologists if they experience irregular vaginal bleeding and pain in the abdomen. However, if the tubes are badly damaged when tubal pregnancy is diagnosed late infertility treatments such as IVF may be offered to help women to get pregnant.

It is very difficult to choose the best way to treat tubal infertility, due to hydrosalpinx. The decision to choose the best option is affected by several factors including social, emotional, economic, surgical and medical factors. Salpingostomy is normally a demanding undertaking that requires certain unique scarce surgical skills and should be offered to those women who need it. In view of the above, if hydrosalpinges have been confirmed, it is unwise to treat female tubal infertility without at least trying at least one IVF cycle.

The gynaecologist should give women all the information about fertility treatments so that they can make informed decisions about whether to choose surgery or other treatment methods such as IVF. If surgery is chosen hysterosalpingography may be performed six months after surgery to check if the tubes are still open. If pregnancy is not achieved within twelve to eighteen months after surgery, IVF may be offered to help women to get pregnant. IVF is now frequently used to treat infertility as first line method due to the fact that it is a less invasive method. The use of IVF is heightened by the fact that tubal reconstruction teaching and practice is now reduced in most medical schools and slowly the credible surgical option is being eliminated (Gautam, 2008). The choice of salpingostomy for tubal infertility treatment should be based on correct diagnosis and severity of hydrosalpinx. Salpingostomy is contraindicated if the tubal factor coexist with male factor abnormality and again if the tubal disease is severe, surgery may not be effective and such women should undergo IVF treatment.

However, although there is evidence demonstrating that IVF has improved with bilateral salpingectomy in the case of hydrosalpinx, this is not a useful strategy if there is extremely limited access to IVF. In poorly resourced countries like Zimbabwe where there is limited access to IVF, the useful strategy that gives a couple best chance of achieving pregnancy is salpingostomy because pregnancy can be achieved without the need for IVF.

Women who have failed to achieve successful pregnancy via IVF may still have the opportunity to become pregnant spontaneously after salpingostomy. The main objective of infertility treatment is to achieve successful pregnancy and live birth. The two treatment methods should complement each other to achieve this objective. If IVF treatment has been chosen as first line, salpingostomy can still be considered if it fails. The gynaecologists should discuss with patients about the possibility of surgery prior to starting of IVF.

Conclusion

Basically, for any woman with hydrosalpinx on one tube who is trying to conceive naturally or through IVF, her chances of getting pregnant are significantly reduced when compared to an average woman who do not have hydrosalpinx. While the likelihood for pregnancy is still there in these women, they need counselling so that they know that their chances for live birth are reduced due to the presence of hydrosalpinx. Fertility treatment should be individualized, in light of the findings of the tubal examination, the couple's interests, the associated costs and the age of the female. IVF may be offered as first line because it associated with high birth rate as compared to salpingostomy. In spite of that salpingostomy remains a very important female infertility treatment method to complement IVF and has the advantage of allowing multiple cycles to achieve conception and pregnancy naturally.

Ethics approval and consent to participate

The study was approved by Harare Hospital ethics board.

Abbreviations: FSH, Folicle stimulating hormone; IVF, *In vitro* fertilization; LH, Leutenizing hormone.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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