A new classification for female infertility

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Summary

Infertility is defined as the inability of a couple to conceive after 12 months of regular, unprotected intercourse. However infertility is a clinical presentation and not a disease. Thus to be able to offer a new classification, it is necessary to apply a clinical presentation (philosophy) suggested by the University of Calgary in 1991. In recent years several classification algorithms have been proposed which apply key predictors of clinical, imaging, or morphological types to determine the diseases that can cause infertility. On the other hand, an algorithm is a product of an expert's mind after many years of practice and experience, which is too difficult to understand by a medical student. However there has not been any simple schematic classification based on a logical justification applying integration of etiologies with basic science to break down etiologies into categories, subcategories and disease classes of this clinical presentation. Because etiology has also become an important criterion for the characterization of causes of infertility, a classification proposal is presented here that attempts to include all relevant (basic science) features of the causative diseases of this clinical presentation.

Key words: Infertility; Clinical presentation; Etiology; Classification.

Introduction

Infertility is defined as the inability of a couple to conceive after 12 months of regular, unprotected intercourse. So infertility is not a disease with a particular etiology. In recent years several classification schemes have been proposed which focus on the clinical, imaging, or morphological features of the diseases that can cause infertility but all the classifications were based on a diagnostic approach to female infertility. Today based on our research there is one accepted etiologic classification of infertility that is used in almost all textbooks with minor changes and also one other accepted approach that could be an approved classification if simplified. We will discuss them and discuss our proposed etiologic scheme, justified by completely using basic scientific concepts.

Causes of female infertility are a combination of several factors that reflect the complications of different aspects of the diagnosis.

According to an accepted classification by many reputable clinical textbooks [1-4], it divides female infertility into amenorrhea/ovulatory dysfunction (46%), tubal defects (38%), endometriosis (9%) and others (7%) and then divides amenorrhea/ovulatory dysfunction into four subcategories including hypothalamic pituitary causes (51%), polycystic ovarian syndrome (30%), premature ovarian failure (12%) and uterine or outflow tract disorders (7%). As can be noted in this classification the authors' emphasis is on epidemiology and prevalence of predisposing factors of female infertility, and mechanism of disease is inconspicuous.

Another classification approach is presented in Novak's textbook of gynecology [4]. Although at first view this is not a classification but an approach, if we simplify it and omit suggested diagnostic ways, we can find a classification. In first line it divides female infertility into anovulation, tubal factor, unexplained infertility ± endometriosis, and uterine factor. After that it divides anovulation into hypothalamic disorders, thyroid diseases, hyperprolactinemia, and panhypopituitarism. Ovarian disorders in this approach are studied separately. There are no further subclasses for tubal factors.

Methods

In 2007 in the Research and Clinical Center for Infertility (Yazd University of Medical Sciences, Iran) we decided to make a simple etiologic classification for female infertility. We recruited a research team combined of four medical students, a professor in infertility, and medical educator. During the study phase we also benefitted by consultations with other members of the Gynecology and Infertility Department, Faculty of Medicine at Yazd University of Medical Sciences. We started with a watchful study on basic physiology and anatomy of the female reproductive tract. After that we made a primary classification based on all possible disorders in this physiologic and anatomic system. Then we tried to match all known diseases that might alter this system and cause infertility.

Making the scheme was based on the clinical presentation curriculum (CPC) which was the latest medical education curriculum generated by the University of Calgary in Canada [5]. We consulted with an authority from the University of Calgary, which is the pioneer in designing the schemes, and our medical educator.

Revised manuscript accepted for publication January 11, 2011

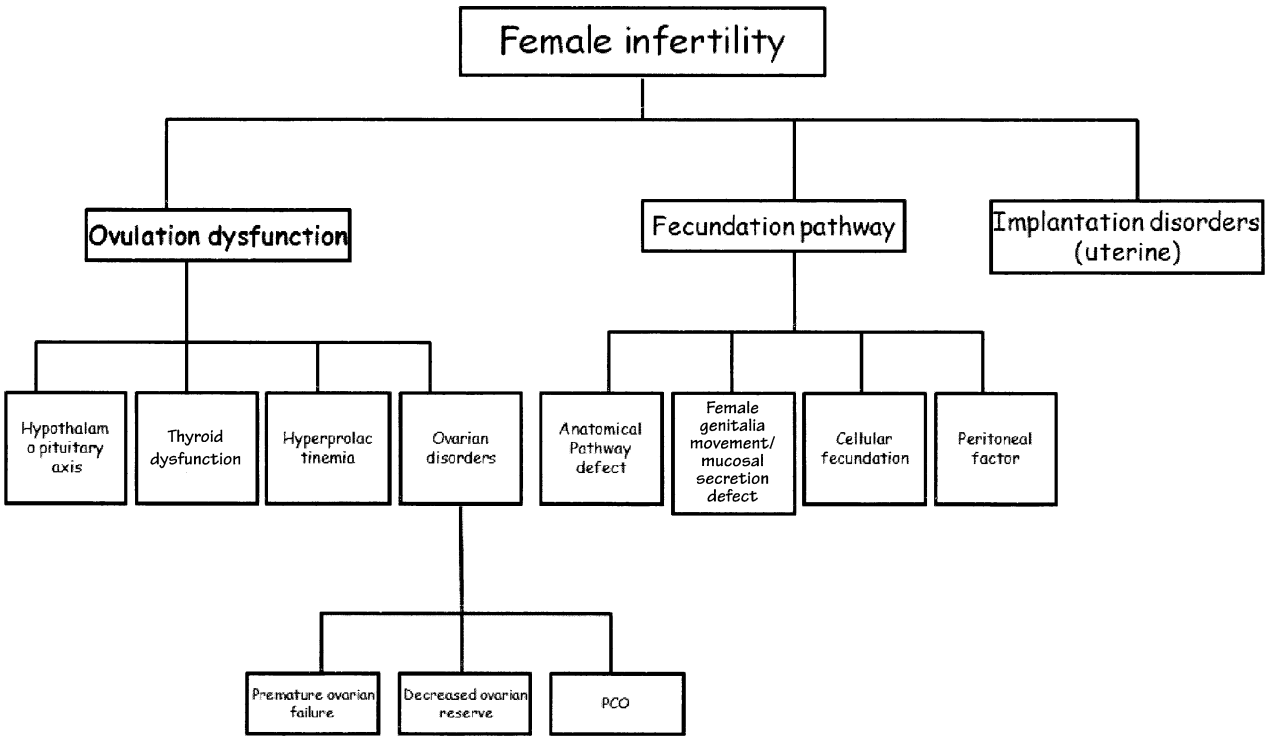

Table 1. — Finalized schematic classification of female infertility.

Results

We divided female infertility into three main causes (category): ovulation dysfunction, fecundation pathway and implantation disorders (uterine). The fecundation pathway is a new term that we devised to make the first line of our scheme on the same level with the other two main categories. The fecundation pathway means the way that sperm must transfer from external genitalia to ovum and fecundate.

Ovulation dysfunction was divided in four subcategories: hypothalamic-pituitary axis disorders, thyroid disorders, hyperprolactinemia and ovarian disorders. Ovarian disorders were divided into polycystic ovarian syndrome, premature ovarian failure and decreased ovarian reserve.

The fecundation pathway was divided into anatomical pathway defects, female genitalia/mucosal secretion defects, cellular fecundation and peritoneal factors.

Implantation disorders did not have a subcategory.

In this scheme we started with the main causes (categories) of female infertility and then put each category into subcategories. We tried to put the main etiology into detailed categories with each of them including a group of categories. It is note-worthy that after the last sub or sub-sub category we had some diseases whose mechanisms in infertility are the same.

In other classifications endometriosis has a separate category but endometriosis is a disease that we considered as a disease in the category of peritoneal factors.

There is no limitation in placing a disease under more than one subcategory because the same diseases have several mechanisms that cause infertility. For example TB can cause infertility by causing tubal defects or implantation disorders (Table 1).

It is encouraging when we know that based on this classification we can make a simpler diagnosis because we have a main key predictor for each category. To diagnose ovulation dysfunction from the fecundation pathway and implantation disorders our key predictor was the menstrual pattern. Menstrual irregularity gave us a diagnosis of ovulation dysfunction with high sensitivity and specificity. For differentiation of ovarian disorders from the hypothalamic-pituitary axis, thyroid dysfunction and hyperprolactinemia we found some key paraclinical signs. For example, in ovarian disorders in our prototype for diseases we found a normal FSH and LH/FSH ratio of more than 2. However in thyroid dysfunction we found specific lab data for hypo or hyperthyroidism. Also we could differentiate anatomical pathway defects from other disease classes in the same level by detecting obstruction in hysterosalpingography (HSG), hysteroscopy or laparoscopy. Every disease class has specific key predictors. For example, IVF failure is the key predictor of the cellular fecundation category (if other diseases are ruled out).

We tried to make this classification (Table 1) as a broad picture for all causative diseases of infertility and justify every part of it with anatomy and physiology of female the reproduction system. This may help medical students

to memorize and also categorize etiologies of female infertility better than previous classifications and even approaches.

Conclusions

In comparison with our new classification and previous ones, it is notable that ours is more detailed. In all other classifications we can see an unknown word "unexplained infertility". In fact when authors could not justify the cause of infertility they used this word. Nonetheless it is obvious that anything is not without cause. Thus we decided to approach this problem via physiology and anatomy of reproduction. Based on this approach we can claim that we included all causes (explained or unexplained causes). In Novak's classification ovarian disorders are separated, whereas the mechanism is by anovulation.

We believe that the new classification of female infertility can provide better concepts about all causative etiologies of female infertility. However the authors are not free of competing ideas and revisory suggestions that could improve it.

Acknowledgment

Special thanks to Prof. Peter Harasym for his guidance, and to all scientific members of the Research and Clinical Center for Infertility (Yazd University of Medical Sciences, Iran) for their consultations. We also must thank the Ministry of Health and Medical Education of I.R. Iran and WHO for their financial support.

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