SESSION TWO: CONTRACEPTIVE METHODS

Modern Methods of Contraception

Dr. J. Githiari

Introduction

Like most ideas which seem very new, fertility control is in fact very old. It was mentioned in an ancient Egyptian papyrus written 4,000 years ago and was a topic of lively discussions among Greek philosophers at least 2,400 years ago [1]. The urge to limit family size appears to be almost as old as mankind itself.

Presumably the first men and women to practice fertility control had the same motive as do many couples today; they wanted to be relieved of the constant confinement of pregnancy, and the burden of properly feeding and caring for a new baby each year.

In modern societies fertility control is needed for reducing the estimated 500,000 maternal deaths related to child birth which occur each year. Most of these deaths occur in the developing world where maternal mortality is about 300-1,000 per 100,000 live births as compared to 2-9 per 100,000 live births in the developed world [2].

The early methods of fertility control were, of course, primitive and not very effective, as they remain today in parts of the world where modern contraceptive methods have not been introduced. These methods included the use of charms, herbs, roots, teas, seeds and others. For example in Egypt eating the seeds of the castor oil plant the day after child birth was thought to provide a one-year protection against pregnancy.

As we know now, the search for some substance which could be taken by mouth by a woman to prevent unwanted pregnancy eventually became successful in 1955 when the pill was formulated following extensive research, experiments and toxicological studies. Modern scientific research has also lead to the introduction of other contraceptive methods including injectables, Norplant implants, intrauterine contraceptive devices (IUCD), condoms, cervical caps, diaphragm, spermicides, natural methods (coitus interruptus, abstinence, symptom-thermal), and the voluntary surgical contraception.

Efficacy and Safety of contraceptives

The modern contraceptive methods are fairly safe and very effective when used correctly. One of the goals of the Birth Control Investigation Committee (BCIC) which was established in 1927 was to ensure quality of contraceptive products being offered in the market. The BCIC developed laboratory techniques for the assay of vaginal contraceptives, elaborate statistical formulae for the measurement of contraceptive efficacy and developed new spermicides. The BCIC established the Population Investigation Committee which publishes the international Journal Population Studies.

The vaginal spermicides must be non-toxic and non-irritant to the vagina and must be effective in inmobilizing sperms.

Rubber products are used extensively in the production of condoms, caps and diaphragms. The properties of these appliances as well as the effect upon them of storage, lubricants and chemical spermicides are of considerable significance. The plastic which forms the body of the IUCDs must be of a high and uniform quality to prevent fragmentation of the IUCD in utero. The quality of pills and injectables which are systemically active is essential and samples from a production line are regularly tested for hormonal assay, tablet strength and bacteriological sterility for parenteral medications.

Effectiveness

The theoretical or biological effectiveness of a method measures the pregnancy rate experienced when the method is used in ideal conditions and excludes pregnancies that are due to failure to use the method or to errors in its use. This differs from the use-effectiveness which measures the pregnancy rate when the method is used under real-life conditions and includes failures due to error in its use.

The use-effectiveness of a method is the failure rate per 100 woman-years of exposure. The basis for calculating this failure rate is the Pearl Pregnancy rate which is expressed as:

$$\text{Failure rate per HWY} = \frac{\text{Total accidental pregnancies X 1200}}{\text{Total months of exposure}}$$

ORAL CONTRACEPTIVES

In 1952 the orally active progestagens norethynodrel and norethisterone and mestranol which has oestrogenic effects became commercially available. These steroids paved the way for the formulation of the "combined" pill which first appeared about 1960. In the combined pill a progestogen is combined with an orally active oestrogen (mestranol or ethyniloestradiol) in varying doses. The most commonly used combined pills in Africa are the combined preparations of ethynodiol diacatate and ethyniloestradiol.

The dose of the combined pills has fallen dramatically from a high of 10 mg of progestogen per tablet (OrthoNovum, 1962) to 1 mg in many contemporary preparations and from 1 mg of oestrogen (Enavid, 1964) to as little as 0.02 mg. Improvements in oral contraceptives since 1960 have been in the direction of lowering the dose.

The minipill or the progestogen only pill is poorly accepted mainly because of its reduced contraceptive effect and irregular bleeding.

Mode of action

The pill inhibits ovulation by a direct oestrogenic effect on the hypothalamus, resulting in pituitary suppression. There is no mid cycle increase in oestrogen, follicular stimulating hormone (FSH), and the pre-ovulatory luteinizing hormone (LH) surge does not occur. The progestogen also makes the cervical mucus hostile and impervious to spermatozoa.

Effectiveness

The theoretical effectiveness of the pill is almost 100%. The use-effectiveness, however, is about 0.34 pregnancies per 100 woman years.

Systemic effects

The steroids contained in the oral pills have various systemic effects which include cardiovascular changes, changed carbohydrate metabolism, alterations of the liver functions and increased tendency of blood clotting system. Because of these changes clients who request oral pills must be screened to exclude pre-existing diseases in these areas.

Side effects

During the first three months of use clients may experience nausea, vomiting, breast tenderness, weight gain, fluid retention, headaches, irritability and loss of libido. The combined oral contraceptives reduce the volume of breast milk as well as its constituents. It is therefore not recommended for breast feeding mothers.

Contraindications

Absolute contraindications include thromboembolic disorders, cerebrovascular and coronary diseases, impaired liver function and hepatic adenoma, tumours of the reproductive system and breast, pregnancy and lactation. Relative contrain-

dications are over 35 years of age, undiagnosed vaginal bleeding, diabetes and severe headaches.

NORPLANT

Norplant is an effective, long-acting reversible contraceptive that provides protection for 5 years. The system consists of six flexible silastic capsules. Each capsule is 34 mm long, with a diameter of 2.4 mm, and contains 36 mg of levonorgestrel. The capsules are inserted just under the skin in the upper arm. Levonorgestrel diffuses through the silastic membrane at a steady, slow rate. Within 24 hours after insertion, levels of levonorgestrel in the blood plasma are high enough to prevent ovulation. The daily release averages 50-80 micrograms per day over next five years. In the first year, this is about the same as the daily dose of levonorgestrel in progestin-only pill and about 0.25-0.5 of the dose in combined pills.

Effectiveness

Norplant is very effective and provides almost complete protection. The chances of pregnancy are less than one per 100 women per year, which is lower than for oral pills, IUCD and barrier methods.

Heavier women over 70 kg have a higher failure rate than lighter women after the second year. Effectiveness decrease after 5 years and in the sixth year about 30% of users will conceive. Thus replacement after 5 years is recommended. A slight and gradual decrease in the daily release of levonorgestrel over time probably accounts for the increase in pregnancy after 5 years.

Mode of action

Precisely how Norplant prevents pregnancy is not fully understood, but like the other progestin-only contraceptives, probably it works through several ways. Norplant suppresses ovulation in 50% menstrual cycles. Even if ovulation occurs in the remaining cycles, levonorgestrel makes cervical mucus thick and scanty which hinders sperm transportation into the uterus. Levonorgestrel also suppresses the cyclic endometrial development in 50% of the users.

Contraindications

Norplant may be used by almost any woman in her fertile years who wants to space births for up to 5 years. However, because of the systemic effects of levonorgestrel thromboembolic disorders, undiagnosed genital bleeding, acute liver disease, tumours of the liver and cancer of the breast are medical contraindications for this method. These are in addition to the traditionally accepted contraindications for hormonal contraceptives including pregnancy, pregnancy hepatosis and hormone dependent cancers.

INTRAUTERINE DEVICES (IUCD)

It is not fully understood how IUCDs act, but the most commonly accepted mechanism of action of IUCDs involves the foreign body reaction which occurs in the uterine cavity following IUCD insertion. When IUCD is introduced in the uterine cavity biochemical changes and cellular reaction take place which is characterized by increased vascular permeability, oedema, infiltration of leukocytes and production of prostaglandin.

Addition of copper to the IUCD produces increased morphological changes, affects endometrial enzymes, glycogen metabolism and oestrogen uptake by the uterine mucosa. Steroids added to the IUCDs suppress proliferation of glands and increase decidual transformation of the stroma.

The changed uterine environment interferes with sperm transportation and is also hostile to implantation. High levels of prostaglandin increase tubal motility which may interfere with ovum transportation [3] These changes combine together to provide the contraceptive effect of the IUCD.

Types of IUCDs

There main two types of IUCDs: the inert or non-medicated IUCDs and the biologically active or medicated IUCDs. The non-medicated IUCD commonly used in Africa is the Lippes loop, but this device is no longer in production.

The medicated IUCDs include the copper-bearing devices Cu T 380 A, Cu T 200 and the multiload. The Cu T 380 A is the same size and shape as the Cu T 200, but has small copper bands on both arms of the T thus increasing the exposed surface area of 380 mm sq. of copper. This extra copper increases the contraceptive effectiveness of the device. The copper IUCDs have been approved for use up to 8 years.

Hormone-releasing IUCDs constantly release small amounts of steroid hormone into the uterus. Progestasert, the only available hormone-releasing IUCD contains 38 mg progesterone and release 65 micrograms per day. The device is active for one year.

IUCDs are commonly inserted six weeks after completion of a pregnancy, but recent studies have shown that the IUCDs may also be inserted after non-septic abortion, after delivery of the placenta or at the caesarean section. The providers skills and experience are very important in reducing expulsions and other complications of postpartum IUCD insertion.

Effectiveness and complications

The IUCD is one of the most effective contraceptive methods. Most devices have a pregnancy rate of 1-3 per 100 women per year. The pregnancy rate for the new Cu T devices is less than 1 per 100 women per year [4].

Possible complications of IUCDs use include perforation usually during insertion, increased risk of infection, bleeding, pelvic pain, expulsion and ectopic or intrauterine pregnancy. Most of these complications can be reduced if providers are well trained.

INJECTABLE CONTRACEPTIVES

The two formulations available for parenteral contraceptive use are Depot medroxy progesterone acetate (Depo Provera, DMPA) and Norethisterone enanthate (Noristerat). Depo provera is more widely used in Africa.

150 mg of DMPA is given as intramuscular injection every 3 months. Pregnancy rates have been comparable to those reported with oral contraceptives, ranging from 1.0 to 1.2 per 100 woman-years [5].

Mode of Action

Injectables act primarily by inhibiting ovulation. Levels of FSH and LH are lowered, and the LH surges do not occur. Pituitary response to exogenous gonadotrophin-releasing hormone remains intact, suggesting a hypothalamic rather than pituitary site of action.

In addition DMPA has other anti-fertility effects on the reproductive system which enhance its contraceptive action. The endometrium becomes shallow and atrophic with inactive glands, the stroma becomes oedematous and decidualized, the sperm penetration of the cervical mucous is decreased and the motility of the fallopian tubes is decreased.

Side Effects

The main medical problems of the injectable contraceptives include unpredictable bleeding pattern, weight increase and subjective complaints of headaches, dizziness, abdominal discomfort, fatigue and sometimes nausea.

Weight increase is considered to be associated with increased fat deposition, which may simply be due to increased appetite and food intake.

The unpredictable bleeding pattern is the major drawback of this method. Polymenorrhea and prolonged bleeding and spotting are more frequent after the first injection and are gradually replaced by longer cycles, less bleeding and amenor-

rhoea after repeated injections. A WHO multicentre study showed that the percentage of users with total amenorrhoea gradually increased from 13.4% after the first injection to 35% after four injections [5].

The return of menstruation and fertility after discontinuing DMPA follows the return of ovulation. The return of ovulation and fertility is related to the persistence of DMPA in the user's circulation. After a 150-mg injection of DMPA, the mean interval before ovulation returns is 4.5 months. In a large study comparing conception rates in women discontinuing various methods, conception was delayed in former DMPA users when compared with women discontinuing oral pills and IUCDs during the first 9 months following discontinuation. Almost 70% of DMPA users, however, had conceived within the first 12 months following discontinuation [6]. The delayed return of fertility has important implications for counselling candidates for injectable contraceptives.

Injectable contraceptives appear safe for use immediately postpartum and have not been associated with problems of infant nutrition or development when used by lactating women [6]. Different studies have shown increased milk production, but no significant changes in the concentrations of lactose, protein or lipid.

References

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Dr. J. Githiari
P.O. Box 57964
ABC Place, Fifth Floor
Waiyaki Way
Nairobi
Kenya

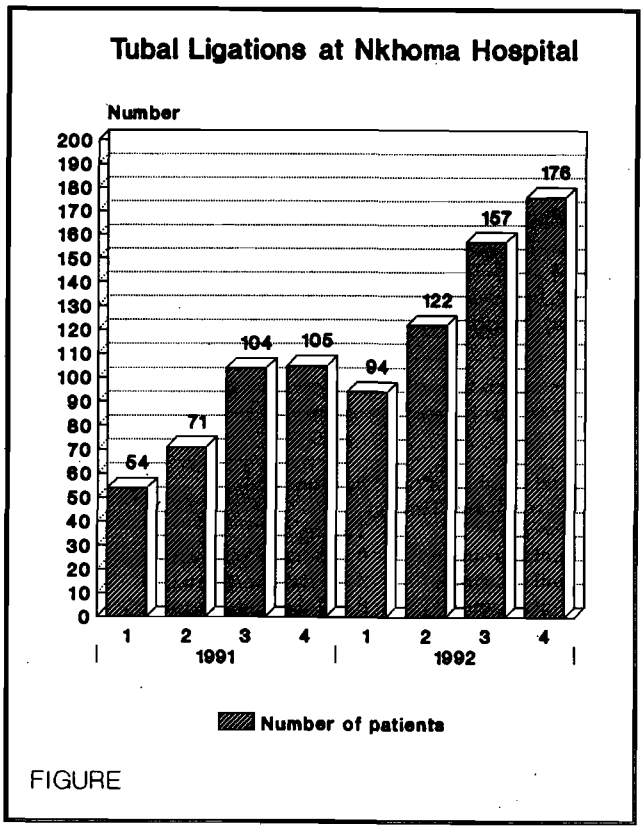
Surgical Contraception Programme at Nkhoma Hospital

Dr. N. van Velden, Dr. P.J. Blignaut

For the last few years at Nkhoma Hospital we have been giving special attention to Child-Spacing and in particular to surgical contraception. With the help and encouragement of the Association for Voluntary Surgical Contraception (AVSC) we increased the number of tubal ligations from 54 in the first quarter of 1991 to 175 in the 4th quarter of 1992.

The most important part of the programme is the counselling and selection of the patients. Because tubal ligation is a permanent procedure, the patient must be well informed and the spouse and parents must also be involved in the decision making.

AVSC is an international organisation with its regional headquarters in Nairobi. They support any hospital that wants to participate in their programme. The support consists of training of staff, supplying equipment and reimbursement of expenses. In return they require that their technique is adhered to and any complications reported. A uniform consent form must be used and all counsellors and surgeons must attend one of their workshops.



FIGURE

The Surgical Procedure

For women, this procedure can be done either after delivery (post partum tubal ligation) or on the non-pregnant uterus (interval tubal ligation).

The post partum Tubal Ligation (TL)

This is very easy to perform and has few complications. A small (1.5 - 2 cm) incision is made just under the umbilicus. Once the abdomen has been entered, the skin is manipulated with retractors until the tubes can be seen. A Pomeroy procedure is done and the wound is closed. The patient goes home the same day.

The Interval Tubal Ligation

This needs a bit more skill but is easy to do once the technique is mastered. First, an uterine elevator is inserted into the uterus through the cervix (just as one would insert a IUCD). Later this will be used to bring the uterus in contact with the anterior abdominal wall and to manipulate it from side to side. The abdominal wall is now cleaned and draped. A small (2 - 5 cm) incision is made under local anaesthesia in the midline of the lower abdomen. Once the abdomen has been entered, the patient is put in the Trendlelenburg position. This, together with deep inspiration will help to move the bowel away from the pelvic organs. Now the uterine elevator is used to bring the tubes in sight near the incision. Again a Pomeroy Procedure is done and the wound closed.

With both techniques the patient must be well informed and cooperative. Preferably the counsellor nurse should be present to calm and comfort the patient.

Obesity, previous scars or infection and distended bowels make the procedure more difficult, but there are no absolute contra-indications. Complications of these procedures are bleeding, visceral injuries and infection.

If the procedure cannot be completed under local anaes-