INTRAUTERINE CONTRACEPTIVE DEVICES (IUCDs)

ESSAY
Submitted for Partial Fulfillment of The Master Degree
in Obstetrics and Gynecology

By
Sally Mohamed El Zanaty
(M. B. B. ch)

Supervised by

Prof. Dr. **Mohamed Abdel Halim Aly Mehana**
Professor of Obstetrics and Gynecology
Faculty of Medicine - Ain Shams University

Dr. **Jehan Allam Hamed Saad**
Assistant Professor of Obstetrics and Gynecology
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
1993

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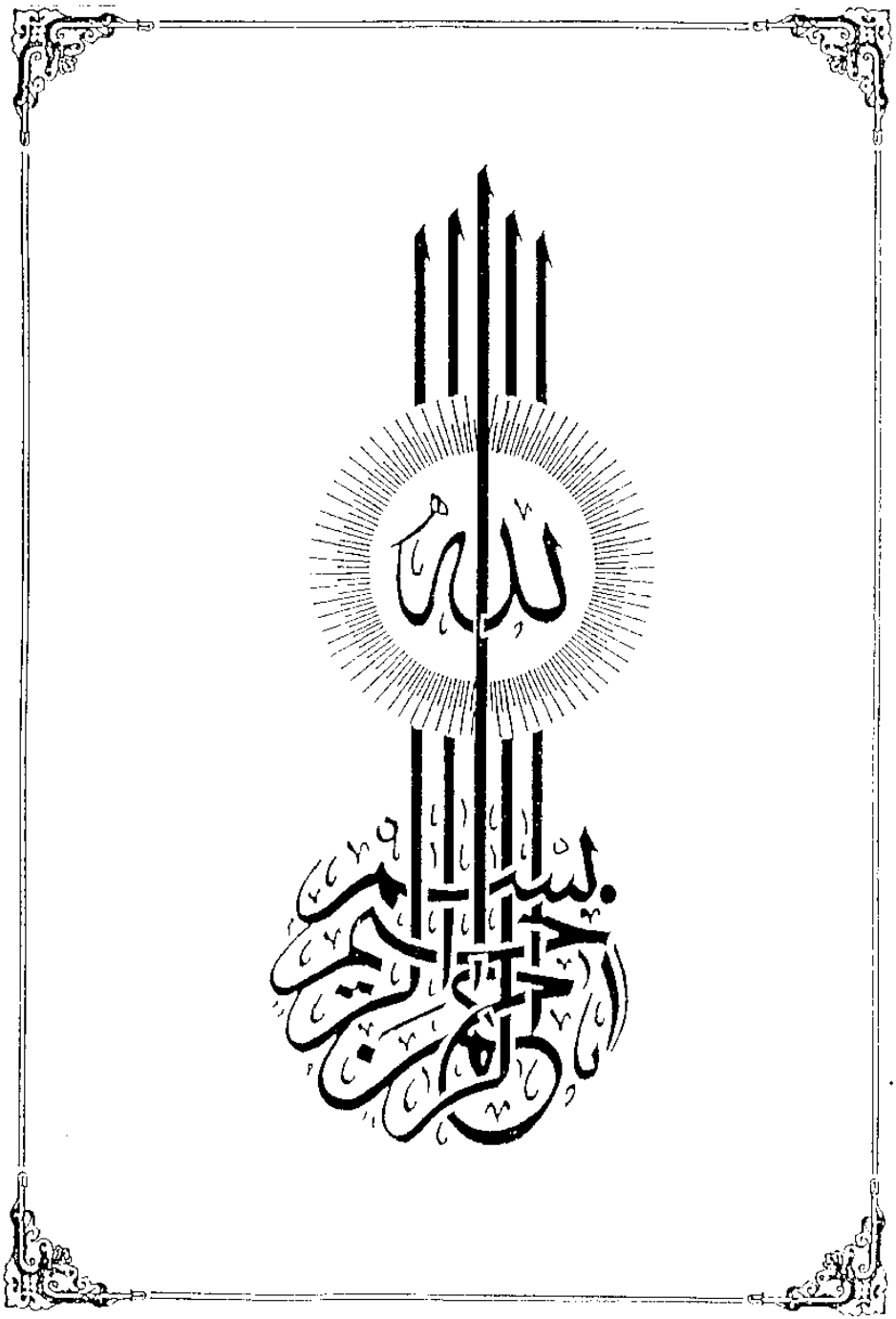

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Acknowledgement

I would like to express my sincere gratitude to ***Prof. Dr. Mohamed Abdel Halim Mehana,*** *Prof. of Obstetrics and Gynecology, Ain Shams University, For his whole hearted support, and experienced advice.*

I am also indebted to ***Assist. Prof. Dr. Jehan Allam Hamed Saad,*** *Assist. Prof. of Obstetrics and Gynecology, Ain Shams University, for her valuable, and close supervision and whose great help and constant guidance contributed to the successful conclusion of this work.*

CHAPTER ONE

HISTORICAL REVIEW OF INTRAUTERINE CONTRACEPTIVE DEVICES

There is considerable debate as to when and where intrauterine devices (IUDs) were first used. For centuries, Arabian and Turkish camel owners have used intrauterine contraception to prevent pregnancy in their saddle animals. Their technique was simple. A small stone (pessary) was inserted into the uterus through a hollow tube ***(Cauvet, 1925)***. Undoubtedly a similar method had been applied to women at or about the same time.

The first mention of intrauterine pessaries in ancient medicine occurs in the Hippocratic writings on "Diseases of Women". A hollow lead sound was passed into the uterus and used for their insertion ***(McKay, 1901)***.

The immediate antecedents of the modern IUD were the cervico-uterine stem pessaries used in the 19th and early 20th centuries. These were small buttons or caps which covered the opening of the cervix and were attached to stems extending into the cervical canal. In some models the stem extended even further into the uterine cavity in the form of a bulb or flexible arms or wings***(Davis, 1971)*** Made from a variety of materials such as ivory, wood, glass, silver, gold, ebony, pewter, and diamond-studded platinum, these pessaries were ostensibly used for many different purposes including support of the uterus, prevention of irregular or delayed menses, and a cure for dysmenorrhea and infertility ***(Southam, 1973)***. Before 1890 there was no published reference to the contraceptive effect of pessaries although they were very likely also used for that purpose ***(Symmers, 1973)***.

In 1902 a wishbone-shaped pessary which extended into the uterus was patented by Dr. Carl Hollweg in Germany. Hollweg reported that the pessary had been inserted in 700 women for the prevention of pregnancy ***(Hollweg, 1902)***.

One of these pessaries known as "Sterilette" was advertised for regulation of menstruation and was sold complete with instructions for self insertion. Many of these early stem pessaries were apparently used not only as contraceptives, but also in some cases as abortifacients. This use caused serious medical complications such as hemorrhage and pelvic infection sometimes resulting in death ***(Siddall, 1924)***. In a period when antibiotics were not available, the hazards of infection were great. Cervico-uterine pessaries were

therefor promptly condemned by the medical community. This early condemnation retarded medical acceptance of other intrauterine devices introduced later.

The first completely intrauterine device designed specifically for contraception was a ring made of silkworm gut. Richter, a German physician, described the device in a two page article in the Deutsche Medizinische Wochenschrift in 1909 (Fig. 1-1) ***(Richter, 1909)***.

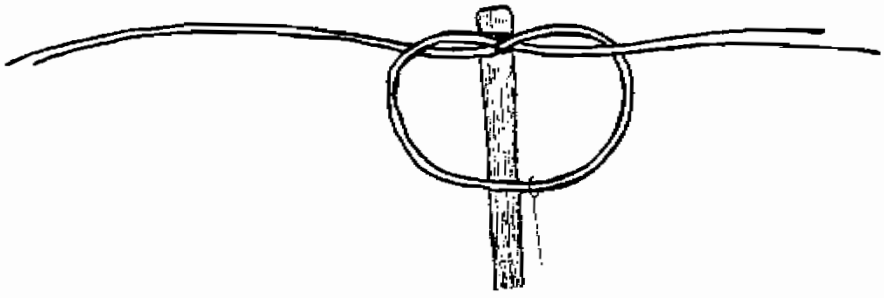

Fig. (1-1): The Richter IUD, here shown with its inserter, was first described in 1909 and made of silkworm gut.

Pust designed a cervical button attached by a stem to intrauterine silkworm threads in the 1920s (Fig. 1-2). It combined Richter's silkworm ring and the older stem pessary. No pregnancies or serious complications occurred among the 453 women in whom he inserted the device. He distributed over 23,000 of these devices for insertion by other interested physicians ***(Pust, 1923)***, but many still protested their use, claiming that the devices would cause pelvic infection ***(Siddall, 1924)***.

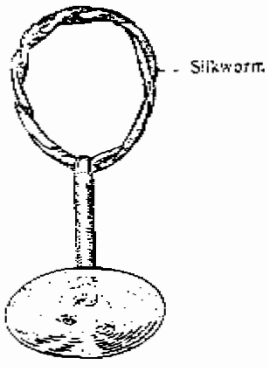

Fig. (1-2): The Pust cervico-uterine device combined Richter's silkworm ring with the older stem pessary.

A significant event in IUD history occurred with the ingenious and daring studies of Graefenberg, as reported in 1928 ***(Graefenberg, 1928)***. His first device consisted of a six-pointed star made by tying three pieces of silkworm gut together at the center (Fig. 1-3,A). Initially the central tie was of silkworm gut also. Graefenberg soon found that he could not easily detect the presence of the star within the uterine cavity by means of a probe or sound. He attempted to correct this structural deficiency by substituting a center tie made of thin silver wire for one gut (Fig. 1-3,B). The wire permitted detection with the uterine probe, and also rendered the star partially radiopaque. The star was so soft, however, that it was readily expelled from the uterus. Although the star has relatively low retention rate, Graefenberg thought that the silver-bound device was somewhat more effective as a contraceptive than the original silver-free star.

Fig. (1-3,A &B), A: Graefenberg star, all silkworm gut, B: Graefenberg star, center tie of "silver" wire.

In order to increase the retention rate, Graefenberg conceived of and made the first intrauterine ring. This device consisted of several turns of silkworm gut making a ring approximately two cm in diameter having a cross section of about two mm (Fig. I-4,A). The rings were then made more rigid as well as radiopaque by binding them with fine silver wire (Fig. I-4,B). It was soon replaced by a ring made by joining the two ends of a tightly wound spiral of silver wire (Fig. I-4,C). The spirally wound ring possessed moderate spring properties, and hence could be compressed into a smaller and oblong configuration for insertion through the cervical canal. Its inherent resiliency then caused it to return to the original circular ring shape when it was released within the more spacious endometrial cavity.

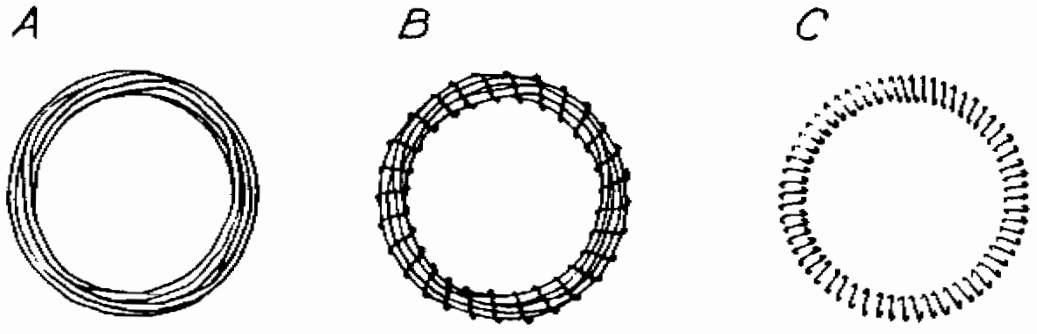

Fig. (I-4,A,B &C), A: Graefenberg ring; all silkworm gut, B: Graefenberg ring; silkworm gut wound with "silver" wire. C: Graefenberg ring; tightly wound spiral of "silver" wire.

Both Graefenberg and Pust stressed the fact that neither device should be used in women with pelvic inflammatory disease (PID). There was some disagreement between Pust and Graefenberg about design. Pust felt that the simple cervical extension on his silkworm ring was an advantage. Graefenberg insisted that any cervical extension was ill-advised. This question concerning our modern devices was raised by ***Anna L. Southam in 1964***. In recent years the connection has been clinically studied, Nova T and TCu-200 Ag IUDs were inserted with or without a tail in order to study the occurrence of PID. The results indicate a lower risk of genital infection if the device is inserted without the tailstrings ***(Batar et al., 1991)***.

In 1934 Tenrei Ota, working in Japan, introduced the ring that bears his name (Fig. 5). Ota claimed that his gold or gold-plated silver ring, which had a small disc attached in the center of the ring by three spokes, yielded fewer failures (one pregnancy among 73 users), than Graefenberg's (five pregnancies among 51 users) ***(Ota, 1934)***.

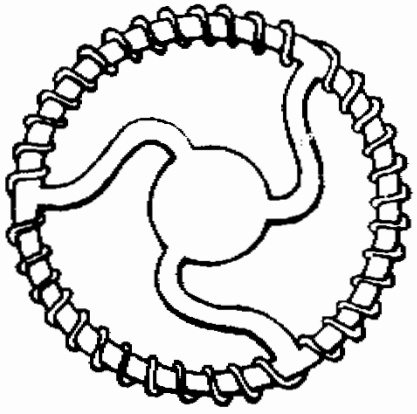

Fig. (1-5) : Ota ring.

The enthusiasm which these IUDs produced in the early 1930s was followed by another wave of protest which branded them inefficient and dangerous. In 1936 the Japanese government prohibited their use. Although Graefenberg claimed his ring had a pregnancy rate of only 1.6 percent, European physicians who had no practical experience with the devices but opposed them on theoretical grounds forced Graefenberg to abandon his device.

The favourable reports by Oppenheimer in Israel and Ishihama in Japan on IUDs quickly led to the modern era of IUD development. In 1959 Oppenheimer reported on his many years of experience with modifications of the Graefenberg ring. His series included 1,500 cases and he encountered no serious complications***(Oppenheimer, 1959)***. Ishihama, also in 1959, reviewed the results obtained with the use of the Ota ring in 20,000 Japanese women ***(Ishihama, 1959)*** These two reports renewed interest and stimulated further research. Seen in the light of the alarming rate of population growth, the need for a simple, effective method of birth control demanded reevaluation of this old technique.