

CONTRACEPTIVE DEVICE
~~METHOD OF CONTRACEPTION~~

TECHNICAL FIELD

5 This invention relates to contraception. More particularly, this invention relates to a ^{contraceptive device} ~~method of contraception~~ involving the placement of a filament in the vas deferens of a male mammal.

BACKGROUND ART

10 Mammals reproduce by sexual intercourse. During sexual intercourse, the male inserts his penis into the female's vagina and ejaculates millions of sperm. Conception occurs if one of the sperm fertilizes an ovum (the female egg). After fertilization, the embryo becomes implanted in the female's uterus and begins to develop. Sperm are produced in the testes and travel through a number of ducts before leaving the body. Upon leaving a testis, sperm first travel through the epididymis, a coiled duct lying on the lateral edge of the testis. Sperm then travel through the vas deferens, a tube having a relatively small lumen (internal passageway) and a thick muscular coat which runs upward to a location just above the prostate gland. The vas deferens contains an enlarged section, known as the ampulla, near the point where the seminal vesicle joins. The common duct formed by the union of the vas deferens and seminal vesicle is known as the ejaculatory duct. The two ejaculatory ducts open into the urethra. The urethra runs the length of the penis and opens at its tip. Sperm continually enter the epididymis and, to a lesser degree, the vas deferens. During ejaculation, peristaltic muscular contractions force the sperm to flow through the vas deferens and the urethra.

25 It is sometimes desirable to prevent conception during sexual intercourse. In the case of certain livestock, man often wants to control which male animal fertilizes a female. In the case of man himself, one or both partners may want to prevent conception and pregnancy. There are many methods of contraception currently practiced. One of the most effective methods is to prevent the flow of sperm through the vas deferens. In a surgical procedure known as a vasectomy, the vas deferens is cut, a section is removed, and the two loose ends are sealed shut. This procedure is relatively safe and is performed relatively easily. Unfortunately, a vasectomy suffers from one very serious disadvantage — it usually cannot be successfully reversed.

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pressure increases upstream of the plug and the vas deferens enlarges and eventually ruptures.

Valves and filters are other types of intra-vasal devices which attempt to control the flow of sperm through the vas deferens and yet provide reversibility. Bucalo, U.S. Pat. No. 4,024,855, issued May 24, 1977, discloses a valve which completely shuts off the flow of fluid when closed. Bucalo, U.S. Pat. No. 3,991,743, issued Nov. 16, 1976; and Bucalo, U.S. Pat. No. 4,013,063, issued Mar. 22, 1977; disclose filters which are mounted in the vas deferens and which retain sperm, but let other parts of the fluid pass. None of these valves or filters has achieved any widespread usage. It is believed that all these devices plug relatively quickly and eventually lead to a rupturing of the upstream portion of the vas deferens.

Accordingly, a demand still exists for a ^{contraceptive device} ~~method of contraception~~ for males which is as effective as a vasectomy, but is easily and successfully reversed.

DISCLOSURE OF INVENTION

The general object of this invention is to provide an improved ^{contraceptive device} ~~method of contraception~~. A more particular object is to provide an improved ^{device} ~~method~~ for reversibly preventing the ejaculation of sperm from male mammals. Other objects are to provide a ^{device} ~~method~~ which does not require the vas deferens to be cut in two and which does not result in a necrosis or rupturing of the vas deferens.

I have invented < Claim 1 >

~~I have invented a method of contraception for mammals having a vas deferens for carrying sperm from a testis to a urethra. The method comprises:~~

(a) providing a filament having a length at least about one-fourth the length of the vas deferens, the filament having an outside diameter about equal to the inside diameter of the vas deferens, the filament being of a material inert to tissue, and the filament having an enlargement at one end; (b) making an incision in one wall of the vas deferens near the epididymis, the incision having a length greater than the outside diameter of the filament and less than the width of the enlargement so that the filament, but not the enlargement, can fit through the incision; and (c) inserting the filament into the vas deferens through the incision so that the filament extends from the incision toward the urethra, so that the enlargement remains outside and adjoining the vas

~~deferens, and so that the incision remains open around the filament to permit sperm to escape from the vas deferens.~~

This ^{device} ~~method~~ effectively prevents the emission of sperm from male mammals during ejaculation and yet ^{the associated procedure} ~~is~~ highly reversible. Three factors contribute to the high reversibility. First, the vas deferens is not cut in two so there is no need for a reconnection. Second, the vas deferens does not necrose because the blood supply and nerves remain intact. And third, the vas deferens near the epididymis does not enlarge, necrose, and rupture because sperm are permitted to escape through the incision.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a perspective view of an elongated filament being inserted into the vas deferens in accordance with the ^{device} ~~method~~ of this invention.

Fig. 2 is a perspective view showing the elongated filament fully inserted into the vas deferens.

MODES FOR CARRYING OUT THE INVENTION

This invention is best understood by an initial reference to the drawings. In Fig. 1, a section of the vas deferens 10 near the epididymis of a human male is shown. An incision 11 has been made in one wall of the vas deferens. One end of a section of filament 20 is inserted through the incision and into the lumen of the vas deferens and then fed in the direction of the urethra. The other end of the filament has been formed into a loop 21 and tied into a knot 22. The knot is secured with a dab of rubber glue 23 which completely surrounds the knot. In Fig. 1, the filament is shown in the process of being inserted into the vas deferens. In Fig. 2, the filament is shown fully inserted. It can be seen that the loop and the rubber-encased knot remain on the outside of the vas deferens at all times and that the incision remains open. The open incision around the filament provides a vent for sperm to escape, thereby preventing an enlargement and rupturing of the vas deferens. The portion of the filament inside the vas deferens blocks the flow of sperm. The muscular contractions of the vas deferens and other tissue impart movement in the direction from the testis to the urethra so that the filament tends to be pulled tightly against the incision rather than being expelled. Accordingly, the filament remains in place indefinitely until surgically removed.

object (the filament or earring) is in place, the tissue (the vas deferens or ear lobe) remains open. But when the external object is removed, the tissue eventually closes. The opening in the vas deferens contributes to the reversibility of this method of contraception. Sperm are continuously being forced into the upstream end of the vas deferens. Without a vent, pressure builds and the vas deferens enlarges and eventually ruptures. But with a vent, sperm flow out of the vas deferens into the scrotum and are absorbed by the surrounding tissue.

With the filament in place in accordance with this invention, the number of sperm emitted during ejaculation is insufficient to present any appreciable chance of conception. There is virtually no damage to the vas deferens over time with the filament in place. The upstream portion of the vas deferens does not rupture because the sperm are vented outside the vas deferens. The downstream portion of the vas deferens remains healthy because the small incision causes minimal disruption of nerves and blood supply.

If and when the fecundity of the male is to be restored, the reversal procedure is even simpler than the original procedure. An incision is made in the scrotum, the enlarged end of the filament is grasped, and the entire filament is removed. The incision will shut over time or, if an immediate closure is desired, the incision may be sutured. In either case, fecundity is restored immediately because the entire vas deferens remains intact and functional while the filament is in place.

EXAMPLE

This example illustrates the contraceptive effectiveness of the ^{device}~~method~~ of this invention on sheep. The experiment contained four parts. First, three male sheep ("rams") were given a unilateral vasectomy (a vasectomy of only one vas deferens). Second, the continued fertility of the males due to their remaining functional vas deferens was established. Third, the rams were subjected to the contraceptive method of this invention. Finally, it was confirmed that the males would not impregnate female sheep ("ewes").

Three rams having an age of approximately seven months were selected. They were given a light dose of xylazine analgesic by intra-muscular injection to induce a general anesthetic state. They were then restrained on their backs in a cradle and their scrotal and groin areas were scrubbed and disinfected. A small incision of less than one cm was made on the anterior

CLAIMS

5 1. A contraceptive device for mammals having a vas deferens for carrying sperm from a testis to a urethra, the device consisting of a single filament having a length at least ~~about~~ one-fourth the length of the vas deferens of the mammal in which the device is to be used, the filament having an outside diameter about equal to the inside diameter of the vas deferens of the mammal in which the device is to be used, the filament being of a material inert to tissue, and the filament having an enlargement at one end.

2. The device of claim 1 wherein the filament has a length of about 0.5 to 0.9 times the length of the vas deferens.

3. The device of claim 2 wherein the filament has a length of about 4 to 9 cm and a diameter of about 0.25 to 2.5 ^{mm} ~~cm~~.

4. The device of claim 3 wherein the filament material is nylon.

5. The device of any of claims 1 to 4 wherein the enlargement comprises a knot.

6. The device of claim 5 wherein the knot comprises a bowline knot.

7. The device of claim 6 wherein the knot is embedded in a gelling compound.

8. The device of any of claims 1 to 4 wherein the enlargement is formed by pressing and/or melting one end of the filament.

9. The device of any of claims 1 to 4 wherein at least part of the length of the filament is hollow or porous.

10. The device of claim 9 wherein the filament contains a spermicidal or antiviral agent.

① which is sufficiently stiff to enable it to be fed into the vas deferens and sufficiently flexible to enable it to conform to the curved shape of the vas deferens,