

[54] DEVICE FOR EFFECTING TEMPORARY STERILISATION

[76] Inventor: Kurt Semm, Hegewischstrasse 4, 2300 Kiel, Germany

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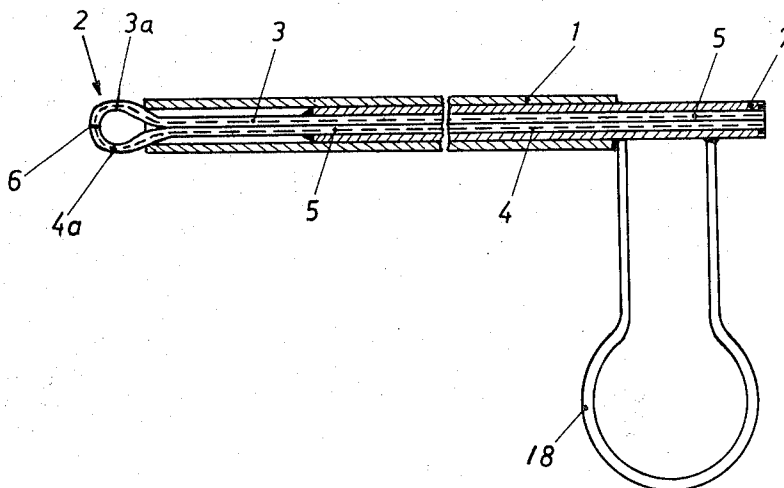
Primary Examiner—Aldrich F. Medbery

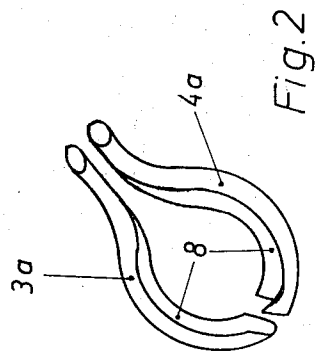
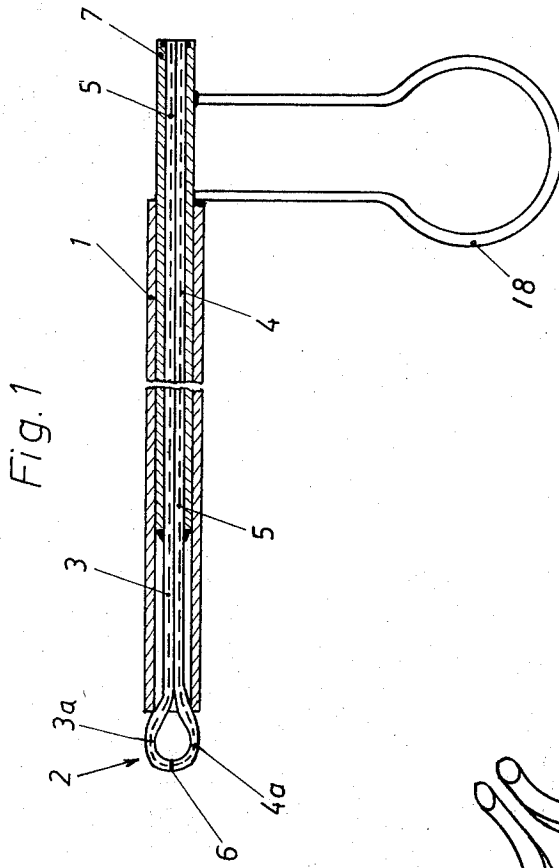
[57] ABSTRACT

A surgical device for effecting temporary sterilisation of females by binding the Fallopian tubes is described, which instrument comprises a barrel and an implement at the distal end thereof and which can be operated from the proximal end thereof.

In accordance with the invention, the implement referred to consists of a pair of grips which have arms openable and closable and curved so as to be able to surround a Fallopian tube: a passage is provided through the barrel to receive a binding element such as a thread or other filament, or a strip, and this binding element passes through the gripping arms when they are in their normally closed state. Preferably, although not necessarily, the passage referred to begins and ends in the proximal section of the instrument.

7 Claims, 2 Drawing Figures





DEVICE FOR EFFECTING TEMPORARY STERILISATION

The invention relates to devices for effecting temporary sterilisation of females by binding the Fallopian tubes, of the kind comprising a barrel and an implement provided at the distal end of the device which may be operated from the proximal end. Hereinafter such device will be referred to as "of the kind described."

In devices of the kind described, the implement is used to grasp clips made of silver alloy, tantalum or similar material and to convey these to the area in which the operation is taking place so as to place the clips around the Fallopian tube which is to be blocked and finally to make a tube ligature by pinching the Fallopian tube by closing the clips.

In practice it has proved that, due to the fact that the diameter of the Fallopian tubes may differ widely from case to case, one size of clip is not sufficient to deal with all the cases which may arise and that therefore clips of various sizes must be held in readiness in order to have a suitable size of clips available to match the dimensions of the Fallopian tube to be tied off. Of course, the use of clips of different sizes leads to the further disadvantage that appropriate appliances or grips are required for each size of clip. It will be appreciated that the result of this is a large and costly kit of instruments.

A considerable difficulty is caused by the fact that the clips must necessarily be applied to the Fallopian tubes in a position where it is hard to see them and that it is therefore extremely difficult in the course of the operation to estimate the position of the clips at any given time relative to the Fallopian tube, even when using endoscopic techniques. Therefore, it is not usually possible to check before the tube ligature is actually made whether the clips will, in fact, completely surround and shut off the Fallopian tube. It is thus self evident that a sterilisation operation of this kind is unable to offer optimum protection against unwanted pregnancies.

It is, therefore, an object of the invention to remove or minimise the disadvantages referred to and to provide a device with which it is possible to make a reliable ligature on the Fallopian tubes in a simple manner.

Accordingly, the invention consists in a device of the kind described, wherein said implement consists of a pair of grips the arms of which are curved so as to be able to surround a Fallopian tube, and wherein a passage is provided to receive a binding element which passes through the normally closed arms of the grips. The passage preferably begins and ends in the proximal section of the device. The binding element may take any desired form, for example it may be a thread or a strip.

The passage for the binding element may be formed in the interior of two similar or substantially similar tubes passing through the barrel of the device, the distal ends of which are curved to form the arms of the grips. When the implement is closed, the arms exert an outwardly directed tension and are displaceable in relation to an annular part which partly encloses them and which bears against them externally. As a result of the construction, depending on the direction of movement, it is possible to open and close the implement as a result

of moving the annular part in relation to the arms of the grips.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings showing two embodiments thereof by way of example and in which:

FIG. 1 shows a partial longitudinal section through a complete device according to the invention, and,

FIG. 2 shows a second embodiment, to an enlarged scale, of implement provided at the distal end of the device.

Referring now to the drawings, the device shown consists of an elongated barrel 1 the outer diameter of which is such that it can be inserted into the abdomen through a trocar cannula, in pelviscopy for example. At the distal end of the device is situated an implement referred to generally at 2, which is in the form of a pair of grips which are shown in the drawings as normally closed grips and having two arms 3a and 4a which are curved such that any Fallopian tube encountered in practice can be completely surrounded by the arms. To this end, the two closed arms form approximately a semi-circle at the outer end and pass from this pronounced curvature into a parallel configuration in the barrel 1 so that, seen as a whole, the implement when closed has somewhat the shape of a noose.

The ligature on the tube is to be constituted by a binding element such as a thread, or strip, which poses the problem of bringing such element to the point at which the operation is performed, without excessive complication if possible. For this purpose the device is provided with a passage 5 into which and through which the binding element may be drawn. The passage 5 is indicated in FIG. 1 by a broken line. It extends through the device from the proximal end thereof, then through the normally closed gripping arms 3a and 4a and finally terminates back at the proximal end of the device.

In the embodiment the passage 5 is formed in the interior of two similar or substantially similar tubes 3, 4 which extend through the barrel of the device 1 and whose distal ends are curved to produce the gripping arms 3a, 4a. The closed gripping arms may rest flat against one another or, for better mutual guidance and alignment, they may also partly inter-engage. Whatever else happens, it should be ensured that the cavities in the gripping arms which form part of the passage 5 are aligned with one another at the point of division 6. As will be explained below, the gripping arms must be capable of being spread apart or opened after the introduction of the binding element into the passage 5.

This may, for example, be readily and simply achieved mechanically. One relatively simple possibility, applicable to the device shown, may be for the gripping arms to be made to exert an outwardly-directed tension, and, in relation to the drawing in FIG. 1 upwards and downwards, which may be achieved in a preliminary operation by appropriate deformation of tubes 3 and 5. It is then necessary for there to be a circular member which encloses at least part of the gripping arms externally and which can be displaced relative to implement 2 so as to close the implement when displaced in one direction and to open the implement with the assistance of the spring-loading when displaced in the other direction.

In the present case the distal end of the barrel 1 forms the annular part which bears against sloping faces on

the gripping arms 3a, 4a, while the movement of the barrel 1 relative to the implement 2, which is required for the implement to operate, is achieved by fixing both tubes 3, 4 in a mounting 7, which may be cylindrical for example, and which is movable telescopically inside the barrel 1. It may readily be seen from the view shown in FIG. 1 that when the mounting 7 is moved to the left the implement 2 is opened and that when the mounting is moved in the opposite direction the implement closes.

In the embodiment shown, the displacement mentioned may take place in opposition to a spring 8, one end of which is fastened to the barrel 1 and the other end of which is fastened to the mounting 7 and which is pre-tensioned such that in its normal position it attempts to withdraw the tube-mounting 7 from the barrel 1. It is thus automatically ensured that the implement 2 is in the closed position in this normal state, since the gripping arms which bear internally against the distal end of the barrel are pressed towards one another.

The spring 18 is made of spring material in strip form and is formed into a gentle curve with parallel or approximately parallel sides, as a result of which it can, at the same time, be used as a handle for opening the gripping arms. The opening of the implement is achieved simply by pressing the two sides of the spring together. When the spring is released it automatically returns the implement to the normal, closed position.

The procedure for making a ligature on the Fallopian tubes with the device described is as follows. The device is inserted into the abdomen through a trocar cannula and its distal end is brought up to the Fallopian tube to be provided with the ligature. The implement 2 is opened by compressing the spring or handle 8. The Fallopian tube is then completely surrounded by the gripping arms when the handle is subsequently released. This process may be continuously monitored through an endoscope which is introduced into the abdomen through a second incision. A non-absorbable, surgical binding thread is then drawn through the passage 5, the beginning and end of which are situated outside the body, by means of a suitable path-finding probe. After the insertion process, the thread runs, for example, through tube 3, through gripping arm 3a into gripping arm 4a and thence finally back through tube 4 to the proximal end of the device. The thread thus also runs around the Fallopian tube enclosed by the gripping arms. If the device is now withdrawn from the trocar cannula after the implement 2 has been opened, the binding thread is held back by the part of the thread which is now looped directly around the Fallopian tube and which causes the thread to be extracted from tubes 3 and 4. The two ends of the binding thread hanging from the trocar cannula may be used as a guide for a pinching member, such as a deformable ring for example, which is to be conveyed to the point of operation and by which the thread surrounding the Fallopian tube is so secured after it has been drawn tight that the Fallopian tube is securely tied off and sealed. To conclude the operation the superfluous ends of thread are cut off and removed.

The device according to the invention provides a considerably higher degree of reliability as regard effective tube ligature in comparison with the clip method mentioned initially. This degree of reliability is comparable with that achieved in a conventional oper-

ation where the abdomen is opened. Furthermore, the temporary sterilization can be stopped at any time as desired by removing the loop of thread closing off the Fallopian tube.

As a modification to the tubular gripping arms shown in FIG. 1, they could alternatively be so designed as to be dished in cross-section as in FIG. 2 and to have their openings, which are shown as longitudinal grooves 18, opposite one another. With this embodiment, the binding thread could be drawn against the Fallopian tube around which it was to be bound without the appliance being opened beforehand.

It is possible to use relatively thick thread material in the form of a strip or the like as the binding element. With elements of this type the loop surrounding the Fallopian tube is generally secured with a special pinching member. Thread materials may, of course, also be considered with which the binding loop is secured simply by knotting.

The previously mentioned path-finder probe for threading through the binding element may for example consist of a nylon thread to which a woven binding thread is secured. On the other hand, probes may also be considered in the form of metal coils or flat steel strips.

Finally, it is pointed out that, in the context of the invention, various departures may be made from the embodiment described above. In this way, the passage 5 need not begin and end directly at the extreme proximal end of the device since the beginning and end of the passage may also be located in, amongst others, the side of the mounting 7. In this case the thread would be introduced into the passage from the side, either directly or via an auxiliary device.

Furthermore, the gripping arms may also be of any other desired shape besides the enclosed configuration in FIG. 1 and the half-open configuration in FIG. 2, in which case an open configuration, that is to say one with an outward facing concavity, has the advantage that it is easy to withdraw the gripping arms over the Fallopian tube and the two runs of thread. The opening could also be used for severing veins. When the inner sides are, in fact, open, the gripping arms may remain in the closed state while the inserted member, i.e. a thread or possibly a thin steel strip, is drawn out from the proximal end in order to perform the separation.

It should also be pointed out that it is not absolutely necessary for the free ends of the gripping arms to rest against one another when the device is in its normal state; they could rather be at a certain distance from one another. In this case the thread passage would thus be interrupted in the vicinity of the grips.

The possibility also exists of equipping the device with the binding element prior to the operation. Instead of a single element it would also be possible to use two separate ones, each of which is introduced into one of the two tubes which form the passage 5. A portion of the thread or other elements which projects from a gripping arm could then be connected to the adjacent thread by fusion or the like after the Fallopian tube has been surrounded when the grip is closed, which, in principle, again produces a single continuous thread with a distal point of connection.

I claim:

1. In a surgical device for effecting temporary sterilisation of females by binding the Fallopian tubes, which device comprises a barrel and an implement slidingly

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enclosed and received in said barrel comprising two resilient passage-defining means having a rearwardly extending operating portion and forwardly extending curved gripping arm portions with ends opposing each other when in an extended position, and in contact with each other when in a retracted state, said passage means being coextensive with the means in said arms to receive a binding element which passes through said gripping arms in their normally closed state.

2. A device according to claim 1, wherein said passage begins and ends in the proximal section of said device.

3. A device according to claim 1, wherein, when said implement is closed, said gripping arms exert outwardly directed tension and are displaceable in relation to an annular part which partly encloses them and bears against them externally.

4. A device according to claim 3, wherein said pas-

sage means are outwardly biased end include two tubes fixed in a mounting which is axially movable within said barrel in opposition to a spring mounted on said rearwardly extending portion, and the distal end of said barrel, which forms said annular part, bears against inclined faces on the said gripping arms.

5. A device according to 4, wherein said spring is secured on the one hand to said barrel and on the other hand to said tube mounting.

6. A device according to claim 4, wherein said spring is formed from strip material into a gentle curve with at least approximately parallel sides, and forms a handle for opening said gripping arms.

7. A device as claimed in claim 1, wherein said gripping arms are dished in cross-section and their openings take the form of longitudinal grooves and are situated opposite one another.

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