GRAVES (S.C.)

A NEW METHOD OF PEDICLE-LIGATION IN ABDOMINAL SURGERY.

BY

SCHUYLER C. GRAVES, M.D.,

OF GRAND RAPIDS, MICH.,

VISITING SURGEON TO THE U. B. A. HOSPITAL, AND SURGEON TO THE CHILDREN'S HOME, GRAND RAPIDS, MICH.

FROM

THE MEDICAL NEWS,

January 12, 1895.

[Reprinted from THE MEDICAL NEWS, January 12, 1895.]

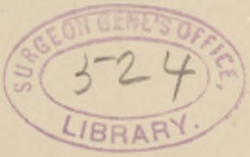
A NEW METHOD OF PEDICLE-LIGATION IN ABDOMINAL SURGERY.

BY SCHUYLER C. GRAVES, M.D.,
OF GRAND RAPIDS, MICH.,
VISITING SURGEON TO THE U. B. A. HOSPITAL, AND SURGEON TO THE CHILDREN'S HOME, GRAND RAPIDS, MICH.

THE death of a patient from hemorrhage due to faulty pedicle-deligation during the course of an abdominal operation is a catastrophe sufficient to cause the cheeks of any surgeon to pale. When all else in the technique has been perfect; when asepsis has had full sway; when there has been no particular bleeding, no shock, no complication; when the danger of subsequent peritonitis is practically *nil*, and everything bespeaks a favorable outcome, the death of a patient from the slipping of a thread is an awful calamity, and any method by which the possibilities of such a *denouement* may be narrowed is a matter of vital interest to both patient and surgeon.

It is my purpose to put on record, for the use of the profession, a new method of applying a pedicle-ligature in abdominal surgery, by which the same not only *will not* but simply *cannot* slip.

The ligature has been employed in actual practice, with perfect satisfaction and ease of application, and has been exhibited to the members of the Grand Rapids Academy of Medicine at a recent meeting of that body.



There are four sources of danger from intermediary hemorrhage in the application of a pedicle-ligature: 1. The employment of the wrong knot. 2. The lack of sufficient force in tying the loop or loops. 3. The application of apparently sufficient force upon a pedicle while held in a state of tension. 4. A defective method of application.

1. No surgeon to-day needs to be told that the sailor-knot (also known as the reef, or square, or unslipable knot) is the one to be employed whenever even an isolated artery is to be tied. Comment on this point is unnecessary.

2. The lack of sufficient force in the tying of a ligature-loop is a real danger that should be carefully guarded against. If thought best, when a consideration of this point is under discussion, the pedicle can be ligated in sections sufficiently small to insure the operator's ability to compress adequately the included tissues.

3. Deaths have occurred from pedicle-hemorrhage after surgeons have used all the force they deemed necessary; but such force having been applied to the pedicle while rendered rigid by too great traction, the result, after the withdrawal of this traction, has been the same as when too little force has been exerted upon a lax pedicle, viz., the liberation of vessels, with the escape of blood.

4. The method heretofore employed in the application of pedicle-ligatures has been faulty in that it has always rendered possible a subsequent intermediary hemorrhage as the result of the slipping of a loop.

Even the Staffordshire knot, which was said to be

perfect, has slipped, and thus permitted hemorrhage to occur.

In my opinion the Staffordshire method is vastly inferior to the one ordinarily used in this country, viz., central transfixion, linking, and tying both ways, as much more power can be employed in the latter than in the former. Of course, I am not discussing ligature-material in this contribution.

Geometrically speaking, a line (in this instance a diameter) is determined by two points, and, therefore, no looped ligature, single, double, or of the chain-variety, is safe, which is not fixed at two opposite points on the periphery of each loop, or, to be more explicit, at opposite extremities of their long diameters.

It can be said that such a condition obtains in the Staffordshire ligature, for such is, indeed, the case; but the weak point of that ligature in this connection is the fact that, in securing the two fixed points on the periphery of the main loop, two subordinate loops are made, the lateral diameters of which are almost certain to be longer than the opposite diameter of the main loop. Those familiar with the Staffordshire method will comprehend the force of this statement. The subordinate loops of this ligature are just as dangerous as the loops fashioned after the American plan, if not more so.

It is not my belief that the so-called American ligature is particularly unsafe. It is not. Deaths therefrom are rare. But it is certainly dangerous enough to warrant improvement, if improvement be possible. That it is possible I leave the reader to judge.

The old method is strong in this respect: that the ligature can never slip entirely away from the pedicle, for it has a fixed point at the center of the same; and this can also be said of the Staffordshire ligature, for I am now discussing the ordinary, double-looped ligature as described; neither can it slip when the distance from the loop to the section is greater than, or even the same length as, the diameter

FIG. 1.

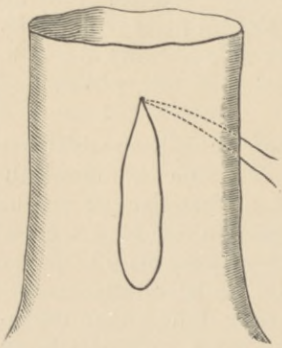
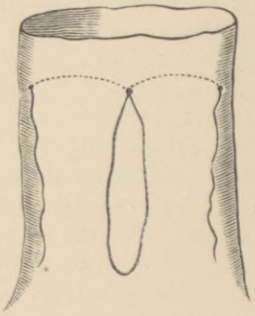


FIG. 2.



of the loop. These considerations, however, could have no weight with a single-looped ligature, and they are not simple enough, not accurate enough, for universal use. The security of a pedicle-ligature should not depend upon the distance, long or short, from the planes of its loops to the point of section.

The accompanying drawings are self-explanatory. The loops, it will be seen, are fixed by passage through the substance of the pedicle at points on

opposite ends of their long diameters, viz., in the center and circumference of the pedicle.

FIG. 3.

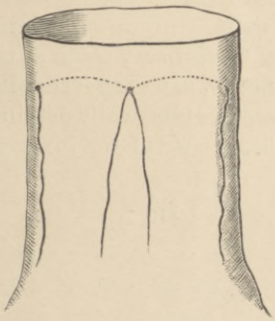
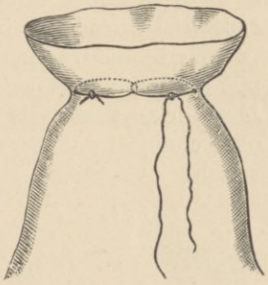
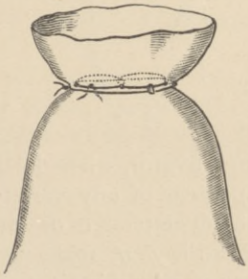


FIG. 4.



Any bleeding from the transfixions, and some does occur, may be disregarded, for all vessels of respectable size are included in the loops, or it can

FIG. 5.



be readily checked by throwing a loop from one of the remaining ligature-threads around the entire pedicle and tying the same, as per drawings.

This long loop would, of course, have only *one* fixed point, and, therefore, might possibly slip; but such an accident is not at all likely to occur—not as likely as with the loops of the old ligature—because the thread lies in natural grooves rendered possible by the traction of the primary loops at the points of peripheral penetration, and even if slipping *should* occur, the danger would be practically nothing, on account of the insignificant size of the involved vessels.

FIG. 6.

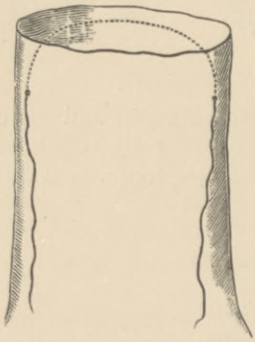
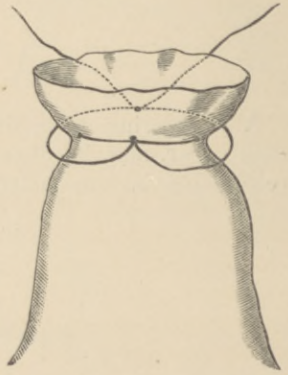


FIG. 7.



Finally, if an operator, when he has occasion to deal with the pedicle of any variety of tumor, or with the bases of degenerated or suppurative tubo-ovarian masses, will, *first*, make use of the reef-knot in connection with his ligature; *second*, employ sufficient compressive force in his application of the same; *third*, be sure that the tissues to be ligated are lax when the knot is drawn, and, *fourth*,

apply the method here described, he will, in my opinion, be doing all that it is possible for man to do in the prevention of one of the saddest accidents incident to the practice of surgery.

The principle that underlies this new method, viz., that of peripheral fixation, is applicable in different ways. For instance, when a pedicle to be secured is slender or composed of soft tissues which are easily compressible and not too bulky, as is often the case, especially in the slighter forms of tubal and ovarian disease, there is no need of central transfixion. If the ligature-ends be simply drawn through the two peripheral points—opposite each other—and a single loop thus made, the ligature cannot slip. The ends of the ligature may then be passed around the entire pedicle as ligated and tied, to prevent the puncture-point bleeding, if thought advisable.

That central fixation is not necessary in the tying of slender pedicles is shown in Figs. 6 and 7. The abandonment of central transfixion in proper cases will save time.

I desire in this connection to acknowledge the artistic services of Dr. James Orton Edie, of this city, in the preparation of the drawings illustrative of the text.