

THE USE OF THE HEMOSTATIC SCALPEL IN OPERATIONS UPON THE BREAST

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CAREFUL HEMOSTASIS is one of the principles of operative surgical procedures, together with gentle handling of tissue, avoidance of contamination and dead space, respect for vascular supply to reconstructed tissues and deliberate but expeditious intraoperative planning compatible with an optimal result in a given patient. While the need for prevention and control of potentially catastrophic hemorrhage is rather obvious in some operative procedures, in many others, the insidious but continued loss of blood from small vessels and capillaries could become significant if "oozing" is tolerated for a prolonged period of time. In the extreme, this may result in a serious threat to the recovery of the patient and in most instances, blood transfusions will be required with all the known hazards and risk of blood replacement, as well as the somewhat prodigal use of a valuable resource. Failure to respect the various technical surgical principles—including careful hemostasis—will also lead to an increased rate of complications of the wound and delayed healing. Often, the decision is made to drain and stage unnecessarily in order to avoid preventable complications, compromising a smooth post-operative course which often results in prolonged hospitalization.

On performing a mastectomy, the potential for an accumulating blood loss exists with the development of two large skin flaps; the excision of highly vascular structures, such as the breast itself, and possibly the pectoralis muscles, depending upon the type of mastectomy. Hemostasis, even as the incision and dissection are in progress, would, therefore, aid in reducing the over-all blood loss to a minimum. For the past three years, we have used the Shaw Hemostatic Scalpel (Oximetrix) with satisfaction and have been impressed with reports from other surgical specialties (1-3). Our experience is presented herein.

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DESCRIPTION

The hemostatic scalpel is comprised of a controller unit, a handle and disposable blade. The controller unit (Fig. 1) which operates with standard electrical power (115 volts, 60 megahertz) supplies energy to the blade, provides various automatic calibration, sensing and control functions, as well as visual and audible indications of the functional status of the system.

The reusable handle is connected to the controller with light flexible cable; handle and cable can be gas or steam sterilized (Fig. 2). The disposable blades (Fig. 3) are similar to the conventional scalpel blades in shape and are available in size 10, 11 and 15. They are made of steel and are coated with a layer of copper and nonstick coating. Placed between these layers there is electrical microcircuitry which, when activated, heats the blade and senses the temperature of the blade. Hemostasis is induced by the direct transmission of heat from the side of the blade to the tissues. The scalpel may also be used as "cold knife." The

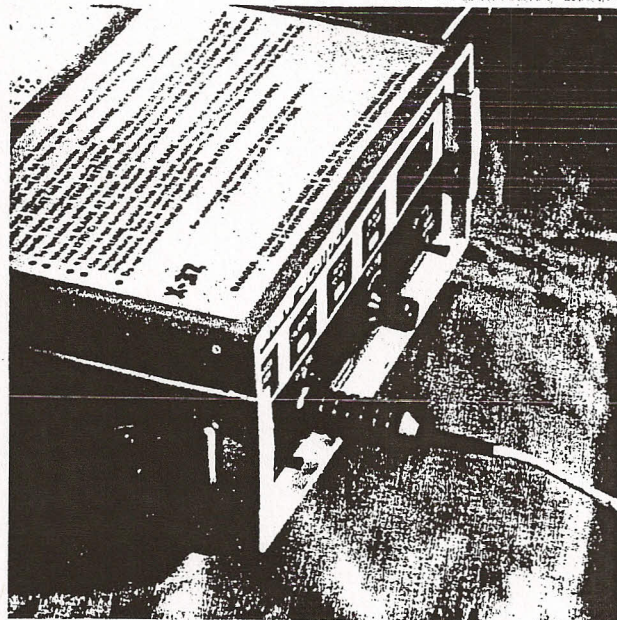


FIG. 1. The controller unit of the hemostatic scalpel.

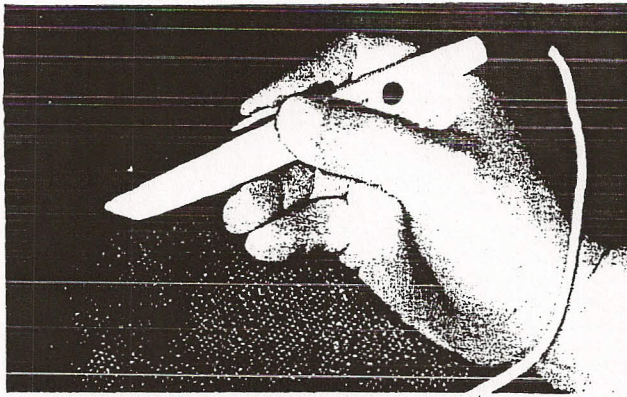


FIG. 2

FIG. 2. The reusable hemostatic scalpel hand and cord. Note the disposable scalpel.

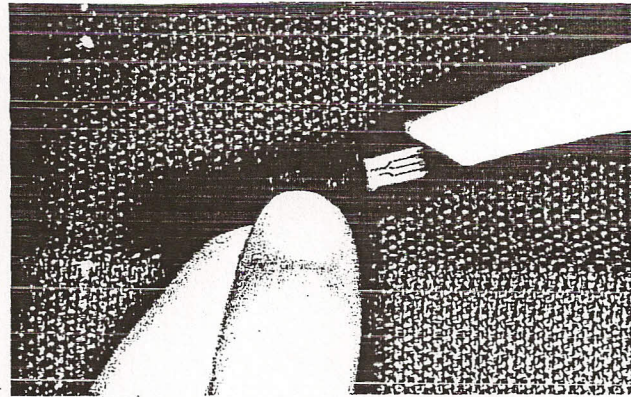


FIG. 3

FIG. 3. Blade showing electrical microcircuitry.

copper and nonstick coating permits easy cleaning of minor tissue debris and coagulated blood.

The power unit monitors and maintains the temperature of the blade, using feedback from the temperature-sensing microcircuitry. The temperature range extends from 110 to 270 degrees C. and can be controlled by a button enclosed on the handle which permits the surgeon to raise the temperature of the blade in increments of 10 degrees C. The on and off control switch of the unit is also located on the handle (Fig. 4). Just behind this switch, there is another one which when activated, will raise the temperature instantaneously to 270 degrees C. (Fig. 5).

By releasing this switch, the temperature of the blade returns almost instantaneously to its original status. At this temperature, larger vessels can be sealed and coagulated. Unlike electrocautery, the hemostatic scalpel does not generate electrical current; therefore, grounding is not necessary. There is no interference with other electrically powered monitoring equipment and muscles do not contract and fibrillate.

TECHNIQUE

After mapping of the skin, the incision is made with the temperature set at 110 degrees C. Individual preference may vary, but we have found that the degree of hemostasis obtained during the incision of the skin is related to the speed with which the surgeon moves the blade. Long, deliberate strokes allow hemostasis to be achieved without overexposing the skin to heat. This requires a readaptation of the conventional technique which can be learned swiftly. The sealing of vessels below the incision of the skin is accomplished with temperature settings varying from 210 to 270 degrees C. Sealing the vessels larger than 2 millimeters, such as those in most perfora-

tor vessels, is carried out in the conventional way of clamping and ligating. During the elevation of the skin flaps, the dissection of the breast from the pectoralis major muscle, the transection of the muscle and the axillary dissection (except for the axillary vein), we use the temperature setting of 190 degrees C.

DISCUSSION

Thermal instruments for coagulation of blood have been used for the past 1,500 years, since Galen favored cautery. With the hemostatic scalpel, the heat is conducted through all the layers of the blade, by direct contact with the cutting edge. From January 1981 to July 1983, we have performed 155 mastectomies using the hemostatic scalpel. None of these patients received blood transfusions. In a few patients, a drop in the hematocrit level did occur which was always easily corrected with the use of supplemental iron. There has not been an increase in the amount of serous drainage, and only in seven patients—most of them obese—did seromas develop.

We include the use of the Hemostatic Scalpel to excisional biopsies of the breast in patients with clinically or roentgenographically suspected carcinoma who specifically requested a period of review between the biopsy and the definitive procedure. In addition to hemostasis, we believe that the scalpel may seal the dermal and intraparenchymal lymphatics as well. The incidence of local and regional recurrence is reported to vary from 6.0 to 17.5 per cent (4). Cancer cells spread through lymphatics and veins by either permeation into the vessels and growth by contiguity or by embolization through the lymphatic stream to regional nodes (5). The use of the hemostatic scalpel in excisional biopsies may contribute, by sealing lymphatic vessels, in re-

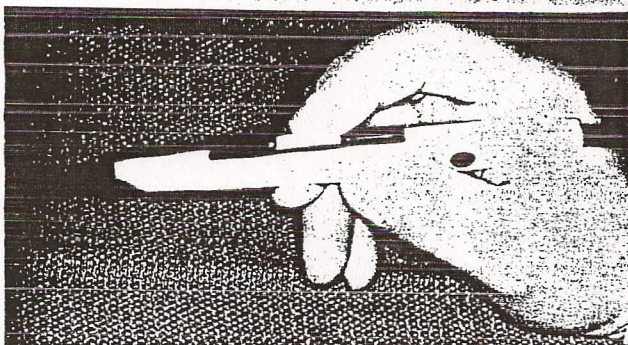


FIG. 4

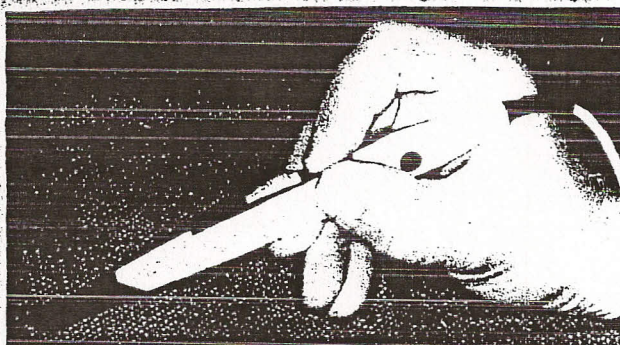


FIG. 5

FIG. 4. The scalpel handle, on and off switch and temperature setting button are shown.

FIG. 5. The temperature control switch, which is used to increase momentary temperature of the blade to its maximum capacity, is shown on the handle of the scalpel.

ducing the incidence of local and regional metastases. A study is currently being conducted and its results will be reported at a later date.

Based upon the experience with biopsies of the breast done with the hemostatic scalpel, we believe that the heat radiated to the tissues by the scalpel does not alter the histochemical values of the hormone receptors, would they be present in the tumor. We compared the values of intratumoral hormone receptors of patients operated upon with the hemostatic scalpel during the 36 months of this study (155 patients) with those done with the cold knife during the preceding 36 months (134 patients). We observed no significant changes in the patients in the premenopausal and postmenopausal groups in either series.

In the premenopausal group, hormone receptors were positive in 34 per cent when cold knife was used, versus 32 per cent when the hemostatic scalpel was used. In the paramenopausal and postmenopausal groups, the difference was also not significant: 45 and 63 per cent, respectively, when the cold knife was used and; 44 and 62 per cent, when the tumors were excised with the hemostatic scalpel. Since there is not enough evidence to support the value of tumor hormone receptors in relation to the response of advanced

carcinoma of the breast to endocrine therapy, this study will be continued.

SUMMARY

Advantages of the hemostatic scalpel include: 1, decrease in blood loss from small vessels; 2, minimizes damage to the tissue as compared with other thermocoagulating instruments and, thus, improved healing of the wound; 3, eliminates muscle stimulation and, by maintaining a dry surgical field, shortens the operative procedure, and 4, may seal lymphatic vessels and, therefore, lower the incidence of local and regional metastases.

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