

The Shaw Scalpel

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ARTICLE

Hemostasis is an important but frequently time-consuming and tedious part of dermatologic surgery. Most dermatologists perform surgical procedures on ambulatory patients who spend only a short time in the office. Long periods of observation are neither desirable nor feasible; simple and effective establishment of hemostasis is critical. We have long supported the use of a Gomco-type vacuum apparatus with a Birtcher hyfrecator for control of bleeding. We have found simultaneous use of aspiration with pinpoint electrofulguration most effective for controlling bleeding in all types of dermatologic surgery. We have recently been introduced to the Shaw Scalpel which is a sharp surgical blade that incises in the traditional fashion but simultaneously seals small blood vessels with heat conducted from the blade which can be maintained at a steady temperature.^{1,2}

DESCRIPTION

The new scalpel was invented by Robert Shaw, M.D., and is manufactured by Oximetrix, Incorporated, Mountain View, California (Fig. 1). The scalpel blade is heated to temperatures ranging between 110 and 270°C and is controlled by a unit using standard power (115 V, 60 Hz). This controller unit supplies a pulsed DC current. Although the blades are shaped and sized in conventional fashion (#15 and #10),

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when they are heated they speed cutting and at the same time seal small- to medium-sized vessels. This is an important advance in the design of this instrument in that the power unit monitors and maintains the temperature of the blade within extremely narrow limits. This permits the surgeon to maintain careful control over the degree of thermal injury produced in the tissue.

The blades are constructed with surgical steel and coated with copper and a Teflon outer coating, except for the beveled cutting edge (Fig. 2). There are three individual heating and sensing units along the blade and cutting tip of each blade (Fig. 3). The blades come in standard size, #10 and #15, and plans are underway to develop #11 blades. The blades are disposable and the handle and the cord to the controlling unit can be gas-sterilized. The Teflon coating is important since a thin coagulum of blood tends to collect on the scalpel. With the Teflon coating, the blade can be easily cleaned by gently wiping on a sterile gauze or the sterile drape surrounding the operative field.

The controlling unit has settings for temperature between 110 and 270°C. The temperature can be controlled on the control unit or may be raised in increments by using a small button enclosed in the scalpel handle. The on-off control for the blade is conveniently positioned where the index finger normally rests on the scalpel handle. When the blade is turned on, it reaches the desired temperature within a few seconds and when it is turned off, it cools very rapidly so that there is little chance of having the blade inadvertently hot. Also, located on the handle convenient to the index finger is a switch that immediately raises the temperature of the blade to 270°C. At this temperature the blade can be used either along the belly of the cutting edge or at the tip as a standard

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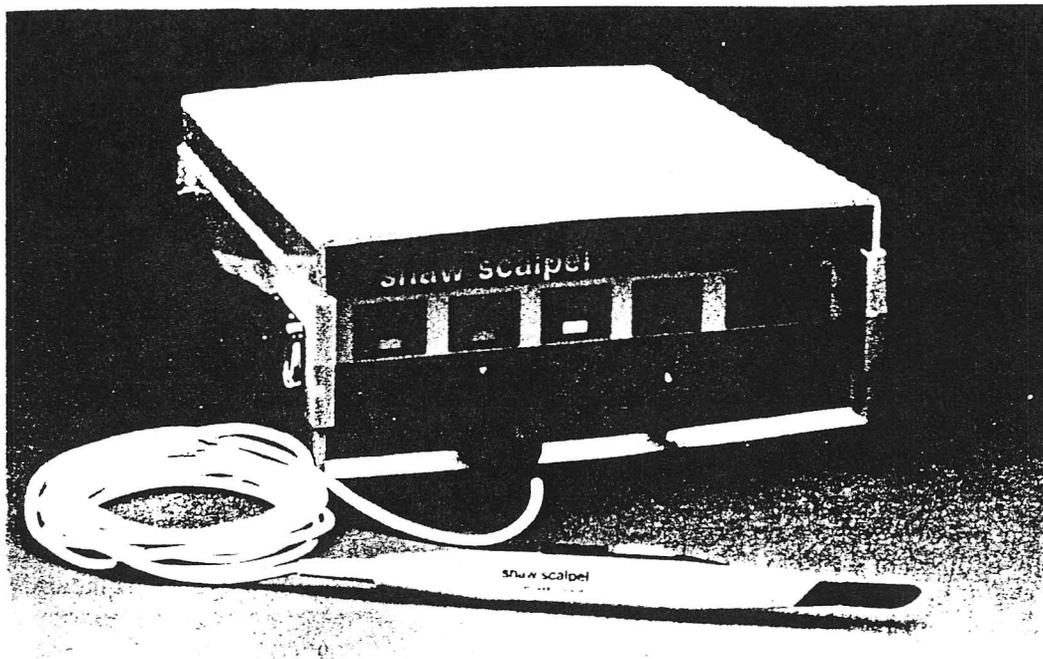


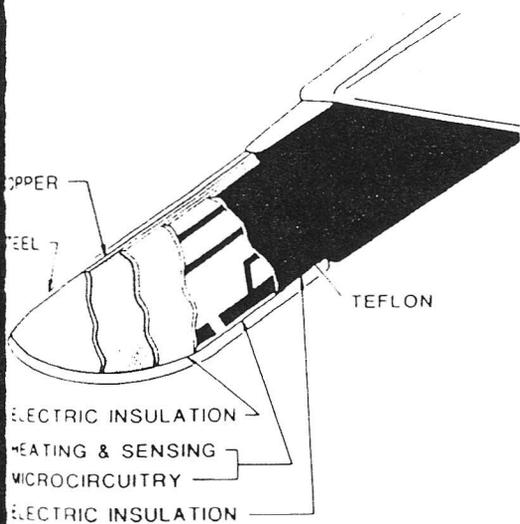
FIGURE 1. Shaw Scalpel showing the controller unit and the blade holder with the blade in place.

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cautery instrument to sear larger vessels. The set-
ings between 130 and 180°C seem to coagulate most
the vessels encountered in dermatologic surgery. If
a larger vessel is transected, the cautery switch may
be depressed to raise the blade temperature immedi-
ately to 270°C and the bleeding vessel may be
sealed with the scalpel tip and sealed.

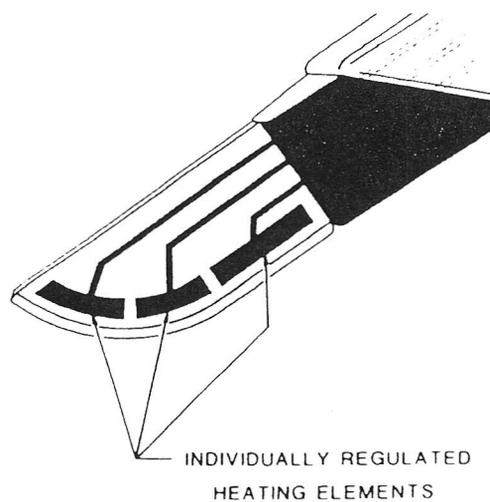
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The instrument sells for approximately \$3,000 and
blades are approximately \$6 apiece, but they can be
resterilized with ethylene oxide gas. The reusable
handles and cords are \$40 apiece and may be simi-
larly gas-sterilized. The company will provide a
trained representative who can give technical instruc-
tion in the design and proper use of the instrument.



ELECTRICALLY INSULATED

FIGURE 2. Various components of the blade.



CONSTANT UNIFORM TEMPERATURE

FIGURE 3. Three individually regulated heating elements.

USES IN DERMATOLOGIC SURGERY

We have used this instrument in routine office surgery, cosmetic dermatologic surgery, and in our chemosurgical practice. In chemosurgery, where it is essential to provide good histopathologic sections of all layers of the skin, we cut through the epidermal layer with the blade turned off and then cut dermal and subcutaneous layers with the setting between 130 and 150°C. This blade is capable of cutting tangentially through tissue as easily as perpendicularly. It appears to have advantages over other thermal knives such as the plasma scalpel, the electrosurgical knife, and the carbon dioxide laser, by providing a narrow zone of tissue destruction and a reasonable similarity to a standard scalpel in terms of design and appearance. The price compares favorably to some of the most costly equipment we have examined.

There is a slight mechanical drag on the proximal end of the scalpel handle because of the cord, but this can easily be overcome by attaching the cord to the front of the surgeon's gown or the surgical drapes. With experience, the surgeon compensates for this small amount of mechanical drag. When used for microscopically controlled excision (fresh tissue technique chemosurgery), the tissues show little or no heat damage from the middermis to lower structures. The epidermis occasionally shows heat separation (Fig. 4). If the blade were set higher than 110°C for the initial cut through the epidermis and if left in contact with the tissue for too long, some coagulation of the epidermis is apparent. This is less critical in routine dermatologic surgery but becomes important in chemosurgery.



FIGURE 4. Skin transected with the Shaw Scalpel, showing heat separation of the epidermis. Otherwise the architecture is all clearly identifiable. (H&E)

When the scalpel is used to cut deeper into the skin where the vessels are larger, the temperature of the blade can be increased with control of most bleeders. We find it necessary to have the blade set about 150°C for most of our work since this allows a quick, easy cut through the skin and subcutaneous tissue and at the same time coagulates almost all bleeders encountered. The cautery switch can be pressed to raise the blade temperature quickly to 270°C and cauterize the few larger vessels encountered in skin surgery.

Although this instrument does not totally eliminate the need for a suction apparatus, it greatly reduces the amount of electrocoagulation needed to achieve hemostasis (Fig. 5). For cyst excisions, incision of benign dermal and epidermal lesions, scalp reduction, tattoo removals, etc., this hot knife combined with minimal heat coagulation of the larger vessels is all that is necessary to provide adequate hemostasis.

TECHNIQUE

The amount of destruction in the skin and the success of the cautery of the vessels is related to the heat setting of the knife and the speed with which the surgeon moves the knife blade through the skin. The



FIGURE 5. Epidermal cyst excision showing the almost bloodless field so that the dissection can be carried out under full visualization.

the deeper the blade is left in contact with the skin, the greater the heat destruction but also the higher the percentage of vessels cauterized. We have found that individual preferences may vary as to exact temperature setting and degree of speed used to draw the knife through the tissue. However, even moderately experienced dermatologic surgeons establish their own degree of dexterity and feeling for the instrument in a short period of time.

ADVANTAGES

The rapid, simple, one-step control of hemostasis makes this instrument of immense value in office dermatologic surgery. For those dermatologists who wish to operate on larger lesions with minimal bleeding, this unit serves both as a hot cautery and cutting knife and eliminates the need for aspiration with a vacuum apparatus. The amount of time it takes the physician and/or the physician's assistant to obtain complete hemostasis is markedly reduced.

This blade retains the precision of surgical steel which makes it preferable over some of the other thermal knives available today.³ It gives the surgeon the ability to use cold steel with great precision and to add the thermal cutting and cauterization as desired.

The use of the Birtcher Hyfrecator, a long-time favorite of many dermatologic surgeons, has the problem of involuntary muscle stimulation around the surgical field. This can often be a distracting and frightening sensation to the patient. Also, electrodesiccation current passes several millimeters beyond the point of contact of the spark. Often this current will pass into a nonanesthetized area and cause the patient pain and surprise. This frequently can lead to scope and requires more local anesthesia. The hot cautery does not extend as far into the surrounding tissues. Thus, if the field has been adequately anesthetized for scalpel cutting, it will be adequately anesthetized for the use of hot cautery as a hemostatic technique.

SPECIFIC APPLICATIONS

We have used the Shaw Scalpel in approximately 100 cases, including microscopically controlled excision (chemosurgery) fresh tissue technique around the eyes, nose, ears, cheeks, and forehead. We have used the scalpel in mobilizing flaps and excising be-

nign and malignant lesions, cartilage excision, and axillary surgery. In one case of axillary vault resection as a treatment of hyperhidrosis a standard scalpel was used under one arm and the Shaw Scalpel under the other. At the time of surgery, the dissection and control of bleeding was infinitely easier with the Shaw Scalpel. One month after surgery the two sides had healed similarly and the scars were not perceptibly different.

When using the Shaw Scalpel to excise large epidermal cysts on the trunk, the dissection is much easier because of the control of bleeding. It is often helpful to remove the cyst without breaking into the sac wall, but this dissection is difficult because of the bleeding. With the Shaw Scalpel, almost all of the bleeding is controlled and the dissection can be carried out under full visualization.

The scalp-reduction technique for treatment of male pattern alopecia is also simplified with the scalpel, since all but the largest bleeders are controlled at the same time as the incision. The heated knife makes a deep cut through skin easier because not only is the knife sharp, but also the burning action of the blade facilitates its flow through the tissues. Where the small heat separation of the epidermis is not as an important factor as in a scalp reduction, the incision can be made more quickly, cleanly, and without terracing, while at the same time part of the hemorrhage is controlled.

SUMMARY

The Shaw Scalpel is a new relatively inexpensive electric scalpel that produces cold-steel scalpel accuracy with instant coagulation of most blood vessels encountered in dermatologic surgery. It surely will become a favorite instrument for dermatologic surgeons.

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