Use of the Shaw Scalpel in Ophthalmic Surgery

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SUMMARY

A resistively heated scalpel (Shaw scalpel) was used in ten patients for orbital and lid surgical procedures. The blade temperature is set from 110° to 270°C producing a remarkable hemostatic effect with minimal thermal damage to the incision margins. The instrument has proven useful in preserving a good view of the anatomy during dissection and specifically it simplifies excision of orbital fat in blepharoplasty and orbital decompressions for Graves' orbitopathy. Significant shortening of surgical procedures was appreciated in all cases.

INTRODUCTION

A resistively heated scalpel invented by Robert F. Shaw, M.D., is manufactured by Oximetrix, Inc., Mountain View, California. The instrument (Figure 1) is similar in use and appearance to an ordinary surgical scalpel (Huntingdon Research Center, Baltimore, File #791732, May 1, 1971 and Biotechnics Laboratories, Inc., Los Angeles, Report #1-2-20456-1, January 17, 1979.), except that the blade can be heated, and the temperature controlled[1] in 10° steps (110°C-270°C). The surgeon selects the desired heat range, lower temperatures for skin, higher temperatures for vascularized muscle and deeper tissues. A coagulating button temporarily raises the temperature of the blade when depressed to its maximum of 270°C. This allows the coagulation of larger vessels 1.5 mm and up that may have been cut without adequate heat sealing initially.

This blade has been used for over a year in other surgical fields and has been reported as being satisfactory and useful.[1,2]

The purpose of this paper is to introduce the Shaw scalpel to the oculoplastic surgeons and general ophthalmologists for lid and orbital procedures.

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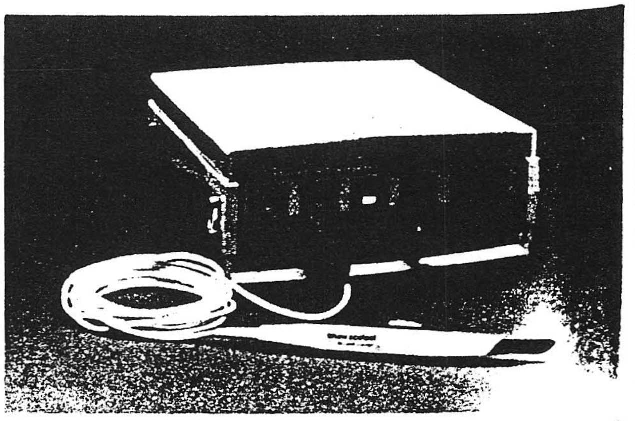

FIGURE 1: Overall view of the scalpel, control handle, and power supply.

METHODS AND MATERIALS

The Shaw scalpel blade was used in ten surgical procedures. At this time, three different scalpel blade configurations are available in a #10, #11, and #15 profile (Figure 2).

The temperature used for skin incision is recommended at 110°C. For subcutaneous and muscle tissues higher temperatures were used, depending on the vascularity of the tissue (Figure 3). The cutting movement with the blade is made somewhat more slowly than with a standard

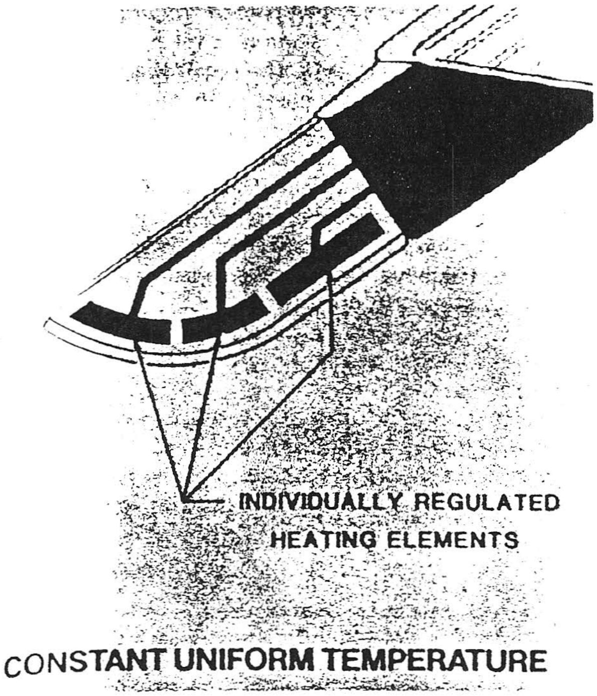

FIGURE 2: Shaw scalpel blade is available in three configurations, #10, #11 and #15 profile. Heating elements are present adjacent to the cutting edge.

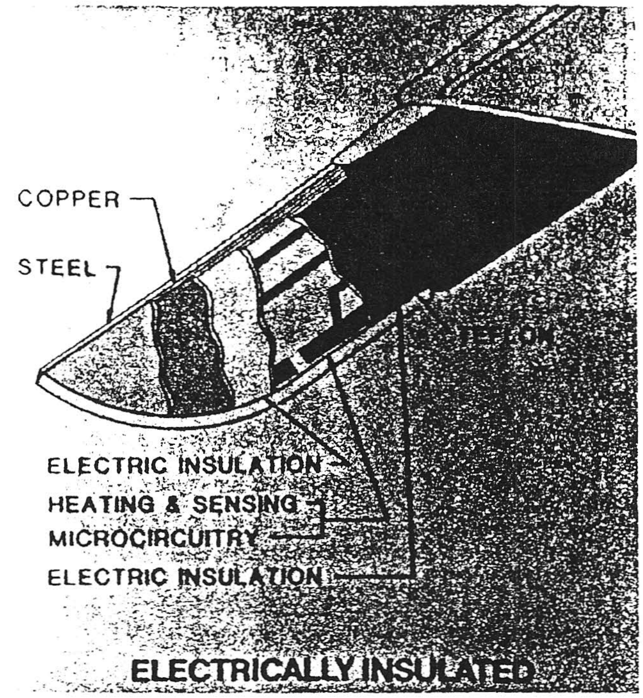

FIGURE 3: Both heating and sensing microcircuitry are contained within the electrically insulated blade. Copper sheathing allows rapid stabilization of the cutting edge temperature.

scalpel blade to allow hemostasis to occur during the incision. Avoidance of damage to the incision margins is helped by using as low a temperature as possible. For vessels not sealed when cut, the blade is heated to maximum with the coagulating button and light pressure with the flat side of the blade edge satisfactorily controls most bleeding areas. The unit is controlled entirely from the handle with three controls: 1. on-off switch, 2. temperature control button which sets temperature at 10° increments, and 3. a coagulation button which raises the blade temperature to a maximum of 270°C when pressed.

RESULTS

Ten patients underwent orbital or oculoplastic procedures using the Shaw scalpel instead of a conventional scalpel blade. The procedures were as follows: three blepharoplasties, three lateral orbitotomies, two lid tumor excisions, one orbital decompression, and one orbital exenteration. The hemostatic effect of the instrument was satisfactory except for medium-size arterial bleeders. For these larger vessels, the maximum temperature (270°) was needed, using the coagulation function of the blade. It was particularly efficient in cutting orbital fat during blepharoplasty as no charring or bleeding accompanied fat excision. The follow-up period was at least two months. There was no evidence of post-op hemorrhage, infection, or wound dehiscence. The cosmetic results of healed incisions were satisfactory, and did not appear different from usually healed surgical wounds made by cold scalpels.

DISCUSSION

Willard E. Fee[1] in 1981 performed 58 head and neck operations on 50 patients with an age range from one to 97 years. He included a study of subjective equipment evaluation by a number of surgeons. The resultant mean score was 3.8 (scale: 1=worthless; 5=excellent) for effecitveness of hemostasis and 4.1 blade sharpness. He concluded that the Shaw scalpel makes a significant contribution to surgical technique 70% of the time. Specifically, it was found excellent for raising flaps and for use in precise surgery where small capillary bleeding typically obscures visibility (i.e., parotid surgery).

Animal studies by Stanley M. Levenson during 1978 and 1979 on postoperative wound breaking strength was measured in paramedial abdominal incisions made in male rats with an ordinary scalpel, the Shaw scalpel, and conventional electrosurgical units. (Progress Report: Studies with a New Scalpel for "Bloodless" Surgery by S.M. Levenson, April 1979. Data on file at Oximetrix, Inc., Mountain View, California 94043.) Wound healing and breaking strength was tested at seven to 42 days, and were highest in the incision made with the conventional scalpel and the Shaw scalpel. The only statistically significant difference between the Shaw scalpel and the conventional scalpel was noted at 21 days in favor of the conventional scalpel. Wound resistance to infection was not significantly different among different blade types.

In vivo and *in vitro* toxicologic studies have been performed by Huntingdon Research Center in Baltimore

TABLE

ADVANTAGES OF THE SHAW BLADES

- Simpler hemostasis.
- Better visibility at incision site.
- No ground plate necessary.
- No electric current through the patient.
- Ability to cut muscle tissue without excitation and presence of tactile sensation when cutting.
- Replacement of disposable pack on electrosurgical units.
- Reduction of operating time.
- Simple fat excision without clamping or bleeding.

DISADVANTAGES OF THE SHAW BLADES

- Expense to the patient of disposable blade.
- Not useful for larger arterial bleeders (greater than 1.5 mm).

and Biotechnics Laboratories of Los Angeles, and have shown the Shaw scalpel blade materials to be both non-toxic and non-hemolytic.

A more recent study by Levenson[2] on burn debridement and skin graft after excisions with the heated scalpel, had excellent rates of success. The result was similar to those grafts applied after excisions with the standard scalpel blade.

Our observations indicated that lid and orbital incisions could be made with minimal bleeding into the field. In particular, the temporalis muscle could be cut without bleeding and orbital fat was readily and simply excised in a dry field. The advantages and disadvantages of the Shaw blade are shown in the Table.

The Shaw scalpel replaced other diathermy units completely when dealing with orbital fat. In fact, its ability to precisely cut fat, without bleeding or charring, simplified this task and shortened the surgical procedure without encountering bleeding at the site of fat excision. Wound healing appeared unimpaired with satisfactory cosmetic and functional results noted postoperatively.

REFERENCES

1. Fee WE: Use of the Shaw scalpel in head and neck surgery. *Otolaryngol Head Neck Surg* July-August 1981; 89:515-519.
2. Levenson SM: A hemostatic scalpel for burn debridement. *Arch Surg* February 1982; 117:213-220.

LETTER TO THE EDITOR

TO THE EDITOR

Dr. Gates Murphy's excellent article (OPHTHALMIC SURGERY, January, 1983) on traumatic dislocation of a J-loop lens 31 months postoperatively, with his discussion on the pathophysiology, was very interesting. I have reported, (AIOIS meeting, Los Angeles April, 1982, and Welsh Cataract/IOL Congress, Houston September 1982) but not published, a similar case wherein the same type straight J-loop lens was subluxated approximately one year post-operatively when the patient briskly rubbed his eye. Dr. Murphy referred to "modifications of the Shearing J-loop implant such as the Sinskey (IOLAB) or Simcoe (CILCO) lenses." This is a common and understandable error, but the C-loop lens is not a modification of the J-loop lens. It evolved two years prior to and independently of that lens. I first implanted unsutured flexible C-loop lenses in animals in 1974 and humans in 1975 and, after showing films of this to colleagues in 1976, was encouraged to report this at the Welsh Cataract/IOL Congress in February 1977, which I did. Their correspondence concerning this and that of the hospital nurses who assisted this 1975-76 surgery are enclosed. The J-loop lens, by its author's statement, was first implanted later in 1977. I also designed, for CILCO and IOLAB, a curved version of the J-loop in early 1979 (a blueprint is also enclosed) but abandoned it because I felt that retrieval of a hook-shaped loop from the vitreous in the event of subluxation would injure vitreous and retina whereas a C-loop could be atraumatically dialed out. Versions of this curved J-loop lens were later introduced by Precision Cosmet (Kratz) in November 1979 and by IOLAB (Sinskey) in 1980.

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