Use of the Shaw Scalpel in Plastic and Reconstructive Surgery

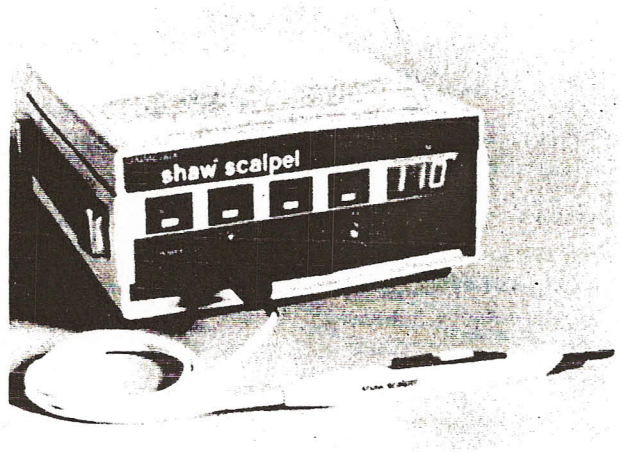

Fig. 1 The Shaw scalpel with its controller unit. (Invented by Robert Shaw, M.D., and manufactured by Oximetrix, Inc., Mountain View, California)

H. Alan Matarasso, M.D., Michael L. Lewin, M.D.

INTRODUCTION

Hemostasis poses a major problem in plastic surgery. Significant blood loss often requires transfusion, with added risk to patients. Traditionally, hemostasis has been achieved by dessication of bleeding vessels (electrocautery) or by tying off bleeders.

Dr. H. Alan Matarasso, formerly chief resident, Division of Plastic Surgery, Albert Einstein College of Medicine and Montefiore Medical Center, Bronx, New York, is now in private practice in New York City. He is a clinical instructor in plastic surgery at the Albert Einstein College of Medicine and an attending at the Manhattan Eye, Ear, Throat Hospital in New York. Dr. Michael L. Lewin is a professor emeritus, Division of Plastic Surgery, Albert Einstein College of Medicine.

We report on our positive experience with a new hemostatic scalpel that combines the sharp surgical blade of a conventional cold steel scalpel with heat maintained at variable temperatures to seal small blood vessels.

MATERIALS AND METHODS

The Shaw scalpel is similar in appearance to the standard surgical scalpel except that the blade can be heated, gradually or immediately, to temperatures between 110-270°C via a controller unit or handle switch (Fig. 1).

Clinical reports on the use of this instrument in

scapular angle, and lower rib attachments with the temperature set at 270°C. The sealing of collateral vessels was accomplished with almost the same setting. The collateral vessels larger than 1.5 mm arising intercostal arteries were ligated during dissection of the distal part of the flap. After the flap was freed of its distal attachments, the superior neurovascular bundle was identified and preserved carefully, mainly with scissors, and with the hot-knife (Fig. 2). The latissimus dorsi humeral tendon was then severed with the hot-knife.

Histological evaluation

The surface of the latissimus dorsi muscle flap was coagulated with the hot-knife or with conventional electrocautery. Macroscopic and microscopic histological findings were evaluated.

Results

Hemostasis was completely accomplished during dissection of the muscle flap. The major difference from electrocautery was the lack of muscular and nervous twitching throughout the hot-knife dissection. The degree of hemostasis obtained during the incision was related to the speed with which the surgeon moved the blade. Long, deliberate strokes of the skin allow hemostasis to be achieved without overexposing the skin to heat. It was easy to dissect subcutaneous fat tissue from the muscle surface. There was no bleeding from the distal attachment of the muscle flap. The hot-knife was especially useful in dissecting the proximal muscle insertion at the humerus because the other muscles did not twitch (Fig. 2).

Macroscopically, the muscle surfaces coagulated by the hot-knife were shallower than those coagulated by electrocautery (Fig. 3a). Microscopic findings showed that muscle fibers were much more preserved in hot-knife than those in electrocautery (Fig. 3b).

Discussion

We demonstrated the hot-knife dissection of the LDM. The hot-knife was very useful and easy to handle during the muscle flap dissection because the muscle never twitched. Histological findings revealed that hot-knife dissection was superior in preserving muscle fibers.

Heart transplantation is radical therapy for patients with end-stage heart failure. This operation, however, is limited by the shortage of donors or complications. Since the first clinical report in 1985 (1), dynamic cardiomyoplasty has been developed as a bridge or a substitute to heart transplantation. There are great advantages to avoiding resection and other problems because autologous tissue is utilized in this surgery. For these reasons, many experiments have been reported about circulatory assistance utilizing skeletal muscle.

The overall purpose of these studies using skeletal muscle is to carry out the most efficient application of muscle power. As one of the techniques to optimize muscle contraction, we reported the linear actuator that could preserve collateral blood flow to the LDM (5,6). From the histological viewpoint, we presented hot-knife dissection of the LDM to preserve muscle tissue in this study. Chachques et al. (2) reported that the muscle flap dissection must be conducted carefully, mainly with scissors; electrocautery is used with great care and with low intensity to minimize injury to the vascular supply. Hot-knife dissection could achieve complete hemostasis of collateral vessels smaller than 1.5 mm. Handling of the hot-knife was similiar to regular surgical blades. We believe that the technique may reduce annoyance of the operators, and, therefore, shorten the operation time.

References

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