A Brief History of Minimally Invasive Plastic Surgery

Geoffrey G. Hallock, M.D.¹

ABSTRACT

It could be argued that a basic principle establishing plastic surgery as a distinct specialty always has been minimal invasive surgery. Although perhaps lagging behind the other surgical specialties specifically in adopting the surgical endoscope, this merely is a new tool to better achieve just that objective. Outcome enhancements initially predominated in aesthetic applications, but widespread use also in reconstructive endeavors has proved that there is indeed today a broad role for minimally invasive plastic surgery.

KEYWORDS: Minimally invasive plastic surgery, endoscope

The goal of what today would be considered minimally invasive surgery may be to even surpass the outcomes possible with traditional open techniques, with diminished patient morbidity including accelerated recovery times; and, at the same time, preferably by reducing overall health care costs. Initially conceived as a means to allow the direct examination of internal organs while avoiding large incisions, the origins of the clinical application of this concept can be traced back to Hippocrates in ~400 BC who used a rectal speculum to examine hemorrhoids.¹ The centuries to follow fostered slow, incremental improvements in instrumentation and light sources that would eventually allow the requisite access as well as proper illumination of the operative field. However, not until the 1950s did the advent of fiber-optic technology permit the transmission of light from an external light source along long, flexible glass or plastic threads so that a clear image could be obtained, yet now without risk of thermal injury.¹

By the 1970s, gynecologic surgeons routinely used laparoscopy not only for pelvic examination but also for relatively simple operative procedures such as tubal ligation. This author, then a budding “general surgeon,”

recalls borrowing their now crude instrumentation to rule out acute appendicitis in the hopes of potentially avoiding the need for a diagnostic laparotomy. Unfortunately, any insight to realize the great potential to come was sorely lacking. In retrospect, this primarily was because the available equipment was relatively primitive. The typical rigid scope had a single eyepiece that restricted vision, was awkward to manipulate, and limited assistance by others. That all changed with the introduction of the solid-state or chip camera in 1982. Miniaturized video cameras could maintain a sharp, clear image that was magnified, and, when seen on a TV monitor, permitted involvement simultaneously by all operating room personnel to help with the procedure. The laparoscopic revolution truly was “kick started” by the French surgeon Phillipe Mouret in 1987 who performed the first laparoscopic cholecystectomy.²

The impetus to further refine tools and procedures with ever innovative applications rapidly spread to all specialties as virtually all organ systems could now be approached using an endoscopic technique. Plastic surgery as a group may have lagged behind the rest probably because unlike the other specialties that could

¹Division of Plastic Surgery, The Lehigh Valley Hospitals and Sacred Heart Hospital, Allentown, Pennsylvania; and St. Luke's Hospital, Bethlehem, Pennsylvania.

Address for correspondence and reprint requests: Geoffrey G. Hallock, M.D., 1230 S. Cedar Crest Blvd, Suite 306, Allentown, PA, 18103.

Frontiers in Endoscopic Plastic Surgery; Guest Editor, Geoffrey G. Hallock, M.D.

Semin Plast Surg 2008;22:5–8. Copyright © 2008 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662.

DOI 10.1055/s-2007-1019136. ISSN 1535-2188.

take advantage of an existing or potential space in some body cavity, unique methods had to be devised to develop and/or maintain a satisfactory subcutaneous optical cavity.³ As a footnote in our history, though, Teimourian and Kroll did report the use of subcutaneous endoscopy to evaluate the tissue residue as affected by suction lipectomy in 1984.⁴ Chow soon thereafter presented his two-portal method for carpal tunnel release.⁵ By 1990, ongoing research efforts at the University of Alabama at Birmingham culminated in reports of a broad clinical experience in endoscopy including endoscopic browlift.⁶ Concurrently, the industrious group from Emory swiftly found indications for other facial and breast surgeries.^{7,8} Nowhere were the early demands for minimally invasive surgery so prevalent than in cosmetic surgery.⁹⁻¹¹

The interest in aesthetic endoscopic plastic surgery still predominates today,¹²⁻¹⁷ but even in spite of our tardiness, there was a concomitant explosion of novel applications in reconstructive surgery. An early thrust of the latter included relatively simple maneuvers such as the removal of benign lesions,^{18,19} decompressive fasciotomy for extremity compartment syndrome,²⁰ or retrieval of spare body parts such as tendon,²¹ vein,²² or nerve^{23,24} grafts. Congenital deformities such as torticollis²⁵ or others, especially in the pediatric age group,¹⁹ have been well suited to endoscopic correction, as the cosmetic result often is a major consideration. Acquired defects like facial fractures²⁶ may be directly or indirectly repaired. More complex indications for various tissue manipulations have included the safe placement of tissue expanders^{27,28} or harvest of local²⁹ or free adipofascial, muscle, and visceral flaps³⁰⁻³² using endoscopic assistance. The realm in the future may be endoscopic robotic surgery for even greater precision, including not just the difficult and safe dissection of the vascular pedicles of all flaps but also the performance even of the micro-anastomoses themselves!^{33,34} The capability for all these tissue manipulations could someday then be routinely performed in any distant land or even on another planet, where the immediate availability and skills of a plastic surgeon will no longer be a concern!

REFERENCES

- Bernard D. The origins of minimally invasive surgery. *Outpatient Surg* 2006;Mar.:6-7
- Rosen M, Ponsky J. Minimally invasive surgery. *Endoscopy* 2001;33:358-366
- Narayanan K, Liang MD, Chandra M, Grundfest W. Experimental endoscopic subcutaneous surgery. *J Laparoendosc Surg* 1992;2:179-183
- Teimourian B, Kroll SS. Subcutaneous endoscopy in suction lipectomy. *Plast Reconstr Surg* 1984;74:708-711
- Chow JC. Endoscopic release of the carpal ligament: a new technique for carpal tunnel syndrome. *Arthroscopy* 1989;5:19-24
- Core GB, Vasconez LO, Graham HD III. Endoscopic browlift. *Clin Plast Surg* 1995;22:619-631
- Eaves FF III, Price CI, Bostwick J III, et al. Subcutaneous endoscopic plastic surgery using a retractor-mounted endoscopic system. *Perspect Plast Surg* 1993;7:1-22
- Bostwick J III, Nahai F, Eaves FF III. Combined endoscopic brow lift, deep-plane face lift, and neck lift. *Perspect Plast Surg* 1994;8:54-83
- Ho LCY. Endoscopic assisted transaxillary augmentation mammoplasty. *Br J Plast Surg* 1993;46:332-336
- Johnson GW, Christ JE. The endoscope breast augmentation: transumbilical insertion of saline-filled breast implants. *Plast Reconstr Surg* 1993;92:801-808
- Ramirez OM. Endoscopic full facelift. *Aesthetic Plast Surg* 1994;18:363-372
- Ulusal BG, Cheng MH, Wei FC. Simultaneous endoscope-assisted contralateral breast augmentation with implants in patients undergoing postmastectomy breast reconstruction with abdominal flaps. *Plast Reconstr Surg* 2006;118:1293-1302
- Guyuron B. Endoscopic forehead rejuvenation: I. Limitations, flaws, and rewards. *Plast Reconstr Surg* 2006;117:1121-1133
- Iglesias M, Bravo L, Chavez-Muñoz C, Barajas-Olivas A. Endoscopic abdominoplasty an alternative approach. *Ann Plast Surg* 2006;57:489-494
- Momeni A, Padron NT, Bannasch H, Borges J, Stark GB. Endoscopic transaxillary subpectoral augmentation mammoplasty: a safe and predictable procedure. *J Plast Reconstr Aesthet Surg* 2006;59:1076-1081
- Serra-Renom JM, Guisantes E, Yoon T, Benito-Ruiz J. Endoscopic breast reconstruction with intraoperative complete tissue expansion and partial detachment of the pectoralis muscle. *Ann Plast Surg* 2007;58:126-130
- Chen SHT, Gedebo T, Chen PHH. The endoscope as an adjunct to correction of nipple inversion deformity. *Plast Reconstr Surg* 2007;119:1178-1182
- Hallock GG. Endoscope-assisted suction extraction of lipomas. *Ann Plast Surg* 1995;34:32-34
- Huang MHS, Cohen SR, Burstein FD, Simms CA. Endoscopic pediatric plastic surgery. *Ann Plast Surg* 1997;38:1-8
- Hallock GG. An endoscopic technique for decompressive fasciotomy. *Ann Plast Surg* 1999;43:668-670
- Hallock GG. Tendon-graft harvest using endoscopic guidance. *Plast Reconstr Surg* 1996;97:1057-1061
- Hallock GG, Rice DC. An endoscopic subcutaneous dissector for obtaining vein grafts. *Ann Plast Surg* 1998;41:595-599
- Hallock GG. Endoscopic retrieval of the sural nerve. *J Reconstr Microsurg* 1995;11:347-350
- Lin CH, Mardini S, Levin SL, Lin YT, Yeh JT. Endoscopically assisted sural nerve harvest for upper extremity posttraumatic nerve defects: an evaluation of functional outcomes. *Plast Reconstr Surg* 2007;119:616-626
- Swain B. Transaxillary endoscopic release of restricting bands in congenital muscular torticollis—a novel technique. *J Plast Reconstr Aesthet Surg* 2007;60:95-98
- Lee CH, Lee C, Trabulsy PP. Endoscopic-assisted repair of a Malar fracture. *Ann Plast Surg* 1996;37:184-186
- Serra JMR, Benito JR, Monner J, Zayuelas J, Parraga A. Tissue expansion with endoscopy. *Ann Plast Surg* 1997;38:101-108

28. Toranto JD, Yu D, Cederna PS. Endoscopic versus open tissue expander placement: is less invasive better? *Plast Reconstr Surg* 2007;119:894–906
29. Hallock GG. Adipofascial flap harvest using endoscopic assistance. *Ann Plast Surg* 1997;38:649–652
30. Miller MJ, Robb GL. Endoscopic technique for free flap harvesting. *Clin Plast Surg* 1995;22:755–773
31. Hallock GG. Minimally invasive harvest of the gracilis muscle. *Plast Reconstr Surg* 1999;104:801–805
32. Saltz R. Endoscopic harvest of the omental and jejunal free flaps. *Clin Plast Surg* 1995;22:747–754
33. Katz RD, Taylor JA, Rosson GD, Brown PR, Singh NK. Robotics in plastic and reconstructive surgery: use of a telemanipulator slave robot to perform microvascular anastomoses. *J Reconstr Microsurg* 2006;22:53–57
34. Gulamhuseinwala N, Rose V. An alternative device for illuminated retraction in augmentation mammoplasty. *J Plast Reconstr Aesthet Surg* 2007;60:101–110