

## Career Resources

# Minimally invasive surgery

### KEYWORDS:

Laparoscopic surgery;  
Minimally invasive  
surgery;  
Endoscopy;  
Fellowship

**Abstract.** Minimally invasive surgery (MIS), or laparoscopic surgery, plays a vital role in residency training in a number of surgical disciplines including general surgery, surgical oncology, colorectal surgery, pediatric surgery, and thoracic surgery. The tremendous patient demand for MIS over the past 2 decades has resulted in surgeons rapidly embracing this technique. Many general surgery residencies cover basic laparoscopy within their residency program; however, the experience with more advanced cases is more variable. This career resource guides the interested medical student and physician to opportunities for fellowship training in MIS. It includes a discussion of the specialty, training requirements, grant funding, research fellowships, and pertinent societies.

© 2010 Elsevier Inc. All rights reserved.

Minimally invasive surgery (MIS), or laparoscopic surgery, plays a vital role in residency training in a number of surgical disciplines including general surgery, surgical oncology, colorectal surgery, pediatric surgery, and thoracic surgery. Because of the limitation in tactile sensation, the lack of 3-dimensional visualization, and the distance separating the surgeons' hands from the target organs, MIS requires a completely different skill set than open surgery. Acquiring laparoscopic skills remains a formidable challenge.

Most general surgery residencies include basic laparoscopic procedures within their residency case repertoire including diagnostic laparoscopy, laparoscopic cholecystectomy, and laparoscopic appendectomy. The experience with more advanced laparoscopic cases such as antireflux surgery, inguinal and ventral herniorrhaphy, solid organ surgery, colorectal surgery, gastric and intestinal resections, and donor nephrectomy is more variable.

Because of the tremendous patient demand for MIS over the past 2 decades, many surgeons have rapidly embraced this technique, including those with scant training in MIS. Unfortunately, significant complication rates have been reported from surgeons performing MIS procedures early in their learning curve.<sup>1</sup> Therefore, a structured curriculum that combines didactic teaching with MIS skills training is essential.

Many residency programs currently use laboratory training, both inanimate and animate,<sup>2–5</sup> as well as sim-

ulation<sup>5</sup> in their MIS curriculum. In 2005, the Residency Review Committee revised the laparoscopic and endoscopic minimum case requirements for graduates of surgical residencies.<sup>6</sup> These requirements now include 60 basic laparoscopic surgeries, 25 advanced laparoscopic surgeries, 35 upper endoscopies, and 50 colonoscopies. Furthermore, certification in the Fundamentals of Laparoscopic Surgery (FLS) program is now required for certification by the American Board of Surgery.<sup>7</sup> FLS, a joint program of the Society of American Gastrointestinal and Endoscopic Surgeons and the American College of Surgeons, features a web-based module and measures both cognitive knowledge and technical skills.

Surgeons interested in further training in MIS may wish to consider pursuing a fellowship in MIS. This career resource guides the interested medical student and physician to opportunities for fellowship training in MIS.

## Training Requirements

### Residency requirements

Most minimally invasive surgery fellowships require that completion of a general surgery residency program and be board eligible in general surgery.

### MIS fellowship

The Fellowship Council was created to promote high-quality fellowship training in minimally invasive surgery,

\* Corresponding author: Tel.: +1-412-641-2080; +1-412-641-7878.

E-mail address: hamadg@upmc.edu

Manuscript received May 20, 2009; revised manuscript May 28, 2009

gastrointestinal surgery, hepatobiliary/pancreatic surgery, and flexible endoscopy. It represents 130 programs that have received accreditation from the council. A fellowship match process managed by the National Resident Matching Program (NRMP) was instituted in 2004. The application deadline is in September, and the match list submission deadline is in November.

A wide variety of fellowship programs are available. Most are 1 year in duration. Some programs combine a year of research with a year of clinical training. The clinical experience may include flexible endoscopy, colorectal surgery, solid organ surgery, thoracic surgery, foregut surgery, and bariatric surgery.

Residents who are considering a career in laparoscopic bariatric surgery should strongly consider pursuing fellowship training. The learning curve is steep; for full competence for laparoscopic gastric bypass, for example, the learning curve is reported to be approximately 100 cases.<sup>8</sup> Therefore, it is difficult to receive adequate training during a general surgery residency to perform laparoscopic bariatric surgery safely.

### Board certification

At present, there is no board certification in minimally invasive surgery.

### MIS Research Opportunities and Funding

Medical students interested in MIS should identify a faculty member at their medical school who has a background in minimally invasive surgery and an interest in mentoring. The medical student's adviser or dean may be helpful in identifying MIS faculty. The student should meet with the MIS faculty member to discuss shadowing in the operating room and possible research opportunities.

Surgery residents interested in a career in MIS should approach MIS faculty members at their institution to find research opportunities. Their mentor, adviser, or program director may provide guidance. In addition, grants are available for research from a number of surgical societies (discussed below). Other intramural funding opportunities may be available at their institution.

There are several funding opportunities for research in minimally invasive surgery. SAGES offers research awards annually for study support. The Association of Women Surgeons, in conjunction with Ethicon Endo-Surgery, Inc., offers a grant that may be applied to research in innovative minimally invasive surgery flexible GI endoscopy, and related emerging technology. The Association for Surgical Education provides funding to support educational research. Other possible sources of funding include the American College of Surgeons and the Society of University Surgeons. State and local public health departments and local charitable organizations may also offer research support.

## Professional Societies for Minimally Invasive Surgery

### SAGES

SAGES was founded in 1981 primarily as an organization for surgeons performing flexible endoscopy. Since then, SAGES has embraced both endoscopy and MIS. In the early 1990s, SAGES assumed a leadership role in defining standards for emerging technologies in general surgery. The society's missions include educating residents and practicing surgeons, providing guidelines for training and granting of privileges, evaluating emerging technologies, developing standards of practice, and supporting endoscopic and laparoscopic research. SAGES presents an annual scientific session and postgraduate courses in basic and advanced laparoscopic procedures are available to surgical residents who are candidate SAGES members. Candidate SAGES membership status for residents and fellows is available through the SAGES web site.

### Society of Laparoendoscopic Surgeons

The Society of Laparoendoscopic Surgeons (SLS) is a multidisciplinary organization that was established to ensure the highest standards for the practice of laparoscopic, endoscopy, and MIS. Its members represent many MIS specialties, including general surgery, gynecologic laparoscopy, and endourology. SLS disseminates information to its members through its website, publications, videos, conferences, and other electronic media.

### Society for Surgery of The Alimentary Tract

The objectives of the Society for Surgery of the Alimentary Tract (SSAT) are to educate and investigate the diseases and functions of the alimentary tract; to present a forum for presenting such knowledge; and to provide training opportunities, funding for research, and scientific publications. SSAT holds its annual meeting during Digestive Disease Week, and abstracts are published in the *Journal of Gastrointestinal Surgery*.

### Contact information for surgical societies

The information for the aforementioned surgical societies is as follows:

1. American College of Surgeons  
633 N Saint Clair St  
Chicago, IL 60611  
Telephone: 312-202-5000  
E-mail: [postmaster@facs.org](mailto:postmaster@facs.org)  
Web site: <http://www.facs.org>
2. The Fellowship Council  
1300 West Olympic Blvd, Suite 600

Los Angeles, CA 90064  
 Phone: 310-437-0555-102  
 E-mail: [yumi@fellowshipcouncil.org](mailto:yumi@fellowshipcouncil.org)  
 Web site: <http://www.fellowshipcouncil.org>

3. Association for Surgical Education

Department of Surgery  
 Southern Illinois University  
 PO Box 19655  
 Springfield, IL 62794-9655  
 Telephone: 217-545-3835  
 E-mail: [skepner@siumed.edu](mailto:skepner@siumed.edu)  
 Web site: <http://www.surgicaleducation.com>

4. Association of Women Surgeons

5204 Fairmount Avenue, Suite 208  
 Downers Grove, IL 60515  
 Telephone: 630-655-0392  
 E-mail: [info@womensurgeons.org](mailto:info@womensurgeons.org)  
 Web site: <http://www.womensurgeons.org>

5. SAGES

11300 West Olympic Boulevard, Suite 600  
 Los Angeles, CA 90064  
 Telephone: 310-437-0544  
 E-mail: [webmaster@sages.org](mailto:webmaster@sages.org)  
 Web site: <http://www.SAGES.org>

6. Society of Laparoendoscopic Surgeons

7330 SW 62nd Place, Suite 410  
 Miami, FL 33143-4825  
 Telephone: 800-446-2659  
 E-mail: [Info@sls.org](mailto:Info@sls.org)  
 Web site: <http://www.SLS.org>

7. Society for Surgery of the Alimentary Tract

900 Cummings Center #221 U  
 Beverly, MA 01915  
 Telephone: 978-927-8330  
 E-mail: [ssat@pri.com](mailto:ssat@pri.com)  
 Web site: <http://www.SSAT.com>

8. Society of University Surgeons

341 N Maitland Avenue, Suite 130

Maitland, FL 32751  
 Telephone: 407-647-7714

E-mail: [info@susweb.org](mailto:info@susweb.org)

Web site: <http://www.susweb.org>

Giselle G. Hamad, M.D., F.A.C.S.\*  
*Division of Minimally Invasive Bariatric  
 and General Surgery  
 University of Pittsburgh Medical Center  
 3380 Boulevard of the Allies, Suite 390  
 Pittsburgh PA, USA*  
 Myriam Curet, M.D.  
*Department of Surgery  
 Stanford University Medical Center  
 Redwood City, CA, USA*

## References

1. Podnos YD, Jimenez JC, Wilson SE, et al. Complications after laparoscopic gastric bypass: a review of 3464 cases. *Arch Surg* 2003;138:957-61.
2. Fried GM, Feldman LS, Vassiliou MC, et al. Proving the value of simulation in laparoscopic surgery. *Ann Surg* 2004;240:518-25; discussion: 25-8.
3. Fried GM, Derossis AM, Bothwell J, et al. Comparison of laparoscopic performance in vivo with performance measured in a laparoscopic simulator. *Surg Endosc* 1999;13:1077-81; discussion: 82.
4. Swanstrom LL, Fried GM, Hoffman KI, et al. Beta test results of a new system assessing competence in laparoscopic surgery. *J Am Coll Surg* 2006;202:62-9.
5. Ahlberg G, Enochsson L, Gallagher AG, et al. Proficiency-based virtual reality training significantly reduces the error rate for residents during their first 10 laparoscopic cholecystectomies. *Am J Surg* 2007;193:797-804.
6. Residency Review Committee. Available at: [http://www.acgme.org/acWebsite/RRC\\_440/440\\_policyArchive.asp](http://www.acgme.org/acWebsite/RRC_440/440_policyArchive.asp). Accessed September 20, 2009.
7. Fundamentals of Laparoscopic Surgery. Available at <http://www.flsprogram.org>. Accessed September 20, 2009.
8. Schauer P, Ikramuddin S, Hamad G, et al. The learning curve for laparoscopic Roux-en-Y gastric bypass is 100 cases. *Surg Endosc* 2003;17:212-5.