

Advanced Hysteroscopic Surgery Training

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ABSTRACT

Hysteroscopic surgery is pivotal in management of many gynecological pathologies. The skills required for performing advanced hysteroscopic surgery (AHS), eg, transcervical hysteroscopic endometrial resection (TCRE), hysteroscopic polypectomy and myomectomy in the management of menorrhagia, hysteroscopic septulysis in fertility-related gynecological problems and hysteroscopic removal of chronically retained products of conception and excision of intramural ectopic pregnancy ought to be practiced by contemporary gynecological surgeons in their day-to-day clinical practice. AHS is a minimally invasive procedure that preserves the uterus in most cases. Whilst the outcome is of paramount importance, proper training should be adopted and followed through so that doctors, nurses, and institutions may deliver the highest standard of patient care.

Key Words: Hysteroscopic surgery, Transcervical, Polypectomy, Myomectomy, Training.

INTRODUCTION

Hysteroscopic surgery is pivotal in the management of many gynecologic pathologies. The skills required to perform advanced hysteroscopic surgery (AHS)—for example, transcervical hysteroscopic endometrial resection (TCRE), hysteroscopic polypectomy, and myomectomy in the management of menorrhagia¹; hysteroscopic septolysis in patients with fertility-related gynecologic problems²; hysteroscopic removal of chronically retained products of conception (placenta accreta)³; and excision of intramural ectopic pregnancy⁴—ought to be practiced by contemporary gynecologic surgeons in their day-to-day clinical practice. AHS is a minimally invasive procedure that preserves the uterus in most cases.⁵ We suggest a logarithm of training in workshops, including virtual reality (VR), before embarking on operations in the operating room (**Figure 1**).

TRAINING

Good training is conducive to sound clinical practice; this is particularly true in AHS because the margin for error is rather narrow. There is a learning curve; the operating time decreases as one goes through the learning curve so that, ultimately, the gynecologic surgeon will grasp knowledge, manual dexterity, and training to enable him or her to perform AHS competently in both emergency and elective settings to the benefit of the patient.⁶

REGISTRAR TRAINING

The term *registrar* in Australia and United Kingdom is a synonym of *resident* in the United States, that is, a trainee in the obstetrics and gynecology integrated training program accredited by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.⁷ Many aspects of the integrated training program in Australia are shared by other countries in the Western world because there is a constant effort to internationalize and update the integrated professional training programs in Australia.^{8–10}

Hysteroscopic operations are a primary component of gynecologic surgery in many teaching hospitals around the world. However, opportunities to perform advanced hysteroscopic procedures vary widely among gynecologic training programs, as well as trainees.^{9,11} The required

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DOI: 10.4293/JSLS.2014.00396

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Figure 1. Logarithm showing progression of new techniques from conception in workshop to implementation in operating theaters. VR = virtual reality.

skills are not more difficult to acquire during registrar (residency) training than conventional surgical procedures.^{12,13}

It is the duty of the consultant (specialist) gynecologist to be in the operating room to personally monitor the progress of the operation and demonstrate leadership skills in the operating room in a teaching capacity.¹⁴ Failure to do so may enhance the risk of litigation if the patient sustains any intraoperative or postoperative complications.^{15,16}

Before contemplating AHS, the registrar has to be familiar with assembling the elements of the operative hysteroresectoscope; with the power sources, as well as their effects and limitations; and with the use of uterine distending fluids and their possible complications, in addition to being on the alert for any intraoperative or postoperative complications.¹⁷ Being aware of the registrar's own limits is important. Technically difficult operations such as division of intractable intrauterine synechiae (adhesions),¹⁸ excision of intramural myomata,¹⁹ and hysteroscopic excision of abnormally invasive placenta residuals²⁰ should be carried out only by an experienced gynecologic endoscopist.

MAIN EDUCATIONAL COMPONENTS

The main educational components are as follows:

1. Anatomy of the female pelvis.²¹
2. Thorough knowledge, both theoretical and practical, regarding hysteroscopic use of energy sources, as well as their physics and different effects on human cells and tissues.²²
3. Pathophysiology of disease and diagnoses including differential diagnoses, for example, recognizing myomata and adenomyosis as causes of menorrhagia and uterine enlargement; obtaining magnetic resonance imaging preoperatively to differentiate among the different pathologies²³; and understanding that adenomyosis may decrease the amenorrhea rate after TCRE.²⁴
4. Operative indications, contraindications, limitations, and possible complications of every AHS, together with full knowledge of the prevention, early recognition, and management of complications.²⁵⁻³¹

5. The relative advantages and disadvantages of AHS as opposed to conventional laparotomy and vaginal approaches.

SKILLS

There are skills required to perform both simple hysteroscopic surgery and AHS. These skills are often acquired by attending 2- or 3-day courses that comprise didactic lectures and hands-on components.³² However, registrar training has at least 2 main problems pertaining to training and its adequacy or otherwise in training programs: First, there is often limited AHS teaching in operating rooms during residency and sometimes at the level of fellowship training.³³⁻³⁵ Second, there are no universally accepted standards to accredit registrars.³² A well-planned structured training program is probably superior to ad hoc opportunity.^{9,36-45}

Perusal of the aforementioned and other teaching principles in gynecologic endoscopy and related specialties will inevitably lead to the question, Which is the best program? This is a good question to which there is no easy answer.^{9,36}

One way around this problem is for each hospital's accreditation committee to set several realistic criteria of training and accreditation, in accordance with the broad recommendations of professional bodies, such as the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, and recognized conclusions of risk management in national and international settings.³⁷

WHAT SKILLS NEED TO BE LEARNED AND WHERE?

Advanced Level

Satisfactory performance of AHS, such as combined hysteroscopic myomectomy and endometrial resection, hysteroscopic septolysis, and excision of pathologically adherent placenta (accrete), requires the expertise and manual dexterity of an experienced endoscopic surgeon. The logical sequence of events is that one has to crawl before he or she can walk; basic skills need to be per-

formed well and practiced before one contemplates performing AHS. However, advanced hysteroscopic skills are required for most advanced procedures, and experience in a specific operation enhances the acquisition of skills necessary to perform others. Hence it is the combined experience in advanced procedures that should be emphasized during training rather than the excellent command of any one individual procedure.³⁸

Hasson and Getzels³⁹ suggested a workable and easy-to-implement system of credentialing physicians in AHS. Physicians are certified by the Accreditation Council for Gynecologic Endoscopy on receipt of completed documentation and proctorship. The system has stood the test of time and is practicable, and many units worldwide adopt the same.

Where

Training in operating theaters is a feasible option because it allows interaction with valuable one-to-one practical tuition in real-life situations. For example, a simple procedure may be chosen (eg, laparoscopic sterilization), and different aspects, alternatives (eg, hysteroscopic sterilization), indications, complications, and technical aspects of occlusive device application may all be tested. Trainees' learning curve for hysteroscopic tubal sterilization showed a shorter procedure time in the operating room.⁴⁰ The procedure offered a high efficacy.⁴¹ It has been concluded that knowledge of a specific gynecologic endoscopic procedure can be measured and that a carefully calculated and structured learning package can be effective.⁴² Office hysteroscopy includes, but is not limited to, TCRE under local infiltration anesthesia and hysteroscopic sterilization.^{43,44}

Supervision and subjective assessment by the consultant endoscopist in the operating room have their perceived problems:

1. There is a discrepancy between subjective in-training evaluations of surgical performance and an objective assessment using a simulation.⁴⁵
2. In a busy gynecology unit, the registrar may be temporarily sleep deprived and this may be perceived to negatively affect his or her surgical endoscopy performance. However, short-term sleep deficits do not appear to hinder the acquisition of endoscopy skills, even after registrars have been on call the night before.⁴⁶
3. Pregnancy during gynecologic registrar training does not seem to have a negative impact on the surgical experience,

especially when the attending endoscopist is supportive of the registrar and her pregnancy status.⁴⁷

4. With the gradual implementation of "safe working hours" of junior doctors in public hospitals in the Western world, our trainees have incurred a decrease in the number of gynecologic endoscopy operations they have performed.⁴⁸ Morbidity and mortality rates are lowest when procedures are performed by physicians who perform the procedures frequently and in centers that have large volumes of these procedures.^{49,50} The clinical and educational implications of these changes in working hours for registrars to gain experience need to be further elucidated. However, there is evidence that teaching registrars in the operating room is expensive in terms of operating time and financial cost.^{51,52} What then is the alternative?

PREPARATION FOR OPERATING ROOM TEACHING

Workshops

Workshops with objective goals of improving theoretical knowledge, enhancing clinical judgment, and initiating and up-scaling manual dexterity must be an integral part of professional development of the trainer and trainee alike in gynecologic endoscopic surgery in any teaching hospital with a respected national and international standing.^{53,54}

The theoretical knowledge of registrars may surpass that of the practicing gynecologic endoscopist.⁵⁵ This is a serious drawback that may well negate the value of registrars' learning curve. One possible explanation for this may be that busy practicing gynecologists have very little time available to them to update their professional knowledge because they would rather concentrate on practical aspects of patient care. By so doing, their current knowledge may "decay" at an exponential rate, hence the crucial importance of continuous professional development strenuously advocated by major professional bodies worldwide (eg, Royal Australia and New Zealand College of Obstetricians and Gynaecologists⁵⁶).

Animal Laboratory

Animal laboratory teaching is best performed on inanimate tissue and readily available animal tissue (eg, sow uterus⁵⁷ or pig bladder⁵⁸). Eye-hand-foot coordination can be developed and assessed in this setting.⁵⁹ However, this approach does not exactly simulate the *in vivo* human

condition in that there is little demonstration of injury, such as that shown by bleeding.⁶⁰

Visual Reality Simulators

Simulations have been used by the airline industry and military, as well as our colleagues in other medical specialties, to educate, evaluate, and prepare for life-threatening scenarios.⁶¹ The gynecologist goes through specific training to develop a different level of psychomotor skills than that required for conventional (laparotomy and vaginal) surgery.⁶²

To reduce the need for experimental animals and the more expensive operating-room hands-on learning, bench models were introduced to improve not only endoscopic skills from the technical standpoint but also the operative performance of trainees.⁶³ Objective structured assessment of technical skills is a multistation performance-based examination of surgical skills.⁶⁴ It uses visual reality (VR) simulators and has been successfully used in many institutions worldwide to objectively score candidates.⁶⁵ These tools serve to objectively validate teaching methodologies.⁶⁶ The findings of these programs could well be used in the selection of appropriate training methodologies.^{66,67}

VR simulations are valuable not only in education but in objectively assessing the trainee's learning curve with good reliability, validity, and cost-effectiveness.^{68–70} VR simulation is a feasible system that the trainee may choose to use regularly. However, many current, qualified advanced hysteroscopic surgeons have not been taught the fundamentals through an organized curriculum that included VR training.⁶²

Endoscopic surgical competency may be judged by gynecologists experienced in the field of operative endoscopy. Because the definitive criteria for assessing competence in gynecologic endoscopy remain elusive, attempts to streamline the objectivity of assessment were made. Trainees were tested on multiple tasks, involving clinical judgment, dexterity, serial/simultaneous complexity, and spatial orientation. The assessors then assessed overall subject competence for each procedure on simulation. Point-biserial correlational analysis and cluster analysis were performed to ascertain the relationships among the different scales. The cluster analysis showed that the surgeon assessors shared a common perception of competence.^{65,71} However, VR provides a more objective means for evaluating the psychomotor skills needed to perform endoscopic surgery.⁷² In addition, medicolegal and finan-

cial constraints of training and evaluation in operating rooms have enhanced the use of VR endoscopic surgery.⁷³

Hysteroscopic surgery is a relatively new technique used to surgically manage uterine pathology in many leading centers of gynecologic endoscopy worldwide.⁷⁴ It requires special surgical skills for handling the operating hysteroscope and remote instrument control.

In general, VR simulators seem to enrich education in gynecologic endoscopy, in addition to clinical education and active learning in operating rooms.⁷⁵ Nevertheless, these systems have been criticized as not being able to lend themselves to the realistic surgical environment.⁷⁶ It has been suggested that this method lacks standards defining performance-based endpoints, with neither a predetermined training duration nor an arbitrary number of repetitions of tasks being adequate to ensure endoscopic proficiency after simulator training.⁷⁷ However, the Royal College of Obstetricians and Gynaecologists, London, has recommended that surgical training systems, such as VR hysteroscopy, be evaluated, piloted, and introduced into basic surgical skills courses.⁷⁸ In addition, skills acquired during VR operative hysteroscopy sessions can be effectively transferred to the patient's care in the operating room.^{79–81} International multicenter studies objectively comparing VR systems and their potential impact on the practice of gynecologic endoscopic surgery are awaited with interest.

RECOMMENDATION

Before operating on patients, trainees should be assessed in workshops, including animal laboratories if available; during VR simulation exercises; and in the operating theater. The results of objective assessments are recorded in trainees' log books.

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