

REPORT FOR THE 2005 SSAT TRAVELING FELLOWSHIP FOR SURGEONS IN ACADEMIC PRACTICE

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Fellowship Period: September 10-24, 2005

Preceptors:

- 1) Paul Swain, MD, Professor of Gastrointestinal Endoscopy, Imperial College School of Medicine, London, UK
- 2) Ara Darzi, MD, Chairman, Department of Surgical Oncology and Technology, Imperial College School of Medicine, London, UK

Associated Meeting: Association of Upper Gastrointestinal Surgeons (AUGIS) of Great Britain and Ireland, Dublin, Ireland, September 23-24, 2005

First, I must thank the SSAT for this outstanding opportunity. Second, I must thank my preceptors and their talented and overwhelming kind colleagues for hosting my fellowship and making it such a worthwhile experience.

As a young academic surgeon (in practice for 3 years), with clinical interests in advanced laparoscopic general and bariatric surgery and research interests in new technologies and surgical education, it was a natural fit for me to pick these two preceptors. Paul Swain is a world renowned gastroenterologist, holding over 50 international patents for endoscopic inventions, including the Endocinch® device and capsule endoscopy technology; he is leading the pack in the field of therapeutic endoscopy, especially in techniques for performing transgastric flexible endoscopic surgery, as was my interest in seeking his tutelage. Ara Darzi is a surgeon bigger than life, having been Knighted by the queen of England and working closely with the UK's health ministry; he is a talented clinician, known for pioneering advanced laparoscopic techniques, and a gifted researcher, leading a large team of physicians, engineers, and other professionals to refine methods for surgical education using simulation, as well as investigating new technologies for robotics and basic science related to tumor biology. In particular, Prof. Darzi has worked extensively in developing competency-based teaching methods for new surgical techniques, as evidenced by his involvement in the creation of a national curriculum for the Royal College of Surgeons of England. As I compiled my application and contacted Prof. Swain and Prof. Darzi, both of these distinguished individuals greeted me warmly and welcomed my visit.

Needless to say, when I received my award letter in February, I was ecstatic. I had the whole trip planned starting September 10th, to spend two weeks in London at the Imperial College of Medicine and then a few days in Dublin to attend the Association of Upper

Gastrointestinal Surgeons (AUGIS) of Great Britain and Ireland Annual Meeting. All of the arrangements had been made, including flights for my wife, Sarah, a dermatologist in private practice, and our then, five month old daughter, Alexis, to join me on the trip. Of course, no matter how hard you try, sometimes you cannot plan everything. Case in point, on August 29th, Hurricane Katrina struck New Orleans, and displaced us far from home. Fortunately, our families were safe, and most of our belongings survived, although at the time, we had very little reliable information. Two weeks later, having not yet been home to survey the damage, and having re-outfitted ourselves with the necessary business attire that one does not usually pack while evacuating for a hurricane, we proceeded as planned to London.

Upon our arrival, we were greeted most warmly by Paul Swain, and his wife Frances, who is also a dermatologist. They helped us overcome our jetlag with a home cooked meal of lamb and garden vegetables, and we took a luxurious walk in their London neighborhood (Figure 1). The Swains became quite fond of our daughter and we got to know them relatively well in a short amount of time, having several outings together, including visiting the National British Museum and the Guy's Hospital Old Operating Theatre Museum, as well as a memorable lunch at the 16th century George Inn. The Swains were truly great host.



Figure 1. From left to right, Paul and Frances Swain, Sarah, Daniel, and Alexis Scott.

Just as I had imagined, Paul is a master endoscopist (Figure 2). He graciously had me meet him, and his engineering colleague, Sandy Mosse, at the Royal Veterinary College for three 1-day lab sessions. While the environment was quite relaxed, the work was

cutting edge. Paul's lab is actively working on numerous aspects of transgastric flexible endoscopic surgery. Using this approach, he has successfully performed cholecystectomies and anastomoses in animal models. The number of "tricks" that I got to see was astounding. Innovation is the central theme in this lab, as Paul and Sandy work closely with industry and also fabricate devices themselves. The spirit of collegiality was remarkable, and I was afforded a tremendous opportunity to observe and assist during experiments including capsule endoscopy imaging and propulsion, gastrotomy creation with needle knife and sphincterotome techniques, gastrotomy closure with sutures, abdominal exploration and visualization, and anastamotic techniques for jejunojejunostomy and gastrojejunostomy (Figure 3). Paul's genius is authentic, and I benefited greatly from several informal brainstorming sessions with him and Sandy (Figure 4). We had especially common interests in bariatric surgery, discussing ways in which Roux-en-y gastric bypass or sleeve gastrectomy procedures could be performed endoscopically. Paul also went out of his way to review videos of his past experiments with me; this one-on-one mentoring was invaluable.



Figure 2. Paul Swain at work in the endoscopy lab.



Figure 3. Daniel Scott assisting Paul Swain during an endoscopic experiment.



Figure 4. Sandy Mosse, Paul Swain, and Daniel Scott.

Prof. Darzi's team was also most impressive. With my interest in surgical simulation, I was paired primarily with Raj Aggarwal and Julian Leong, registrars pursuing fellowship training and doctorate degrees in this area (Figure 5). Raj gave me a tour of the St. Mary's Hospital facilities (the famed location of Alexander Fleming's discover of penicillin, Figure 6), and provided me with hands-on demonstrations of their skills lab equipment, including the ICSAD motion tracking device, which this group has used extensively to measure performance (Figure 7 & 8). Raj has spearheaded very important work in simulation, working closely with Prof. Darzi in establishing national standards for the Royal College of Surgeons of England, as well as fundamental validation work on virtual reality simulators, bench models for Roux-en-Y gastric bypass, and operative assessment using global ratings. Raj and I had numerous discussions focusing on these topics, and exchanged a wealth of ideas, including plans for collaborative studies. Raj was also a very gracious host, having arranged much of my itinerary prior to arriving, and making my family feel most welcome (Figure 9).



Figure 5. Raj Aggarwal and Julian Leong.



Figure 6. Alexander Fleming Museum at St. Mary's Hospital.



Figure 7. A surgical trainee wearing motion-tracking sensors for the ICSAD system.



Figure 8. Raj Aggarwal demonstrating specialized software for interpreting ICSAD performance data.



Figure 9. Raj Aggarwal hosting a dinner for the Scotts.

Julian Leong gave me a tour of the Imperial College campus (Figure 10) and a personal introduction to numerous researchers (physicians and engineers) of the Visual Information Processing Laboratory and their projects. Besides the hands-on demonstrations, I heard detailed progress reports during the group's biweekly research conference, led by Prof. Yang. Research topics included eye-tracking, wearable sensors, wireless motion tracking, shadow-enhancement (to improve laparoscopic depth perception), and gaze-contingent robotics, where a robotic system moves a camera (analogous to a laparoscope) to maintain correct view of the operative field based on the eye movements of the surgeon (Figure 11). Julian's work involving eye-tracking was particularly interesting, as he is investigating automated measurements as a means of determining the pattern of eye movements associated with expert performance for tasks ranging from radiograph interpretation to laparoscopic skills.



Figure 10. Julian Leong at the Imperial College of London main campus.



Figure 11. Gaze-contingent robotic system.

I very much enjoyed spending time with Prof. Darzi's entire department, including seeing the work of many of his fellows. During the department's weekly research conference, I heard the oncology group's work on intraperitoneal tumor adhesion properties and strategies for altering tumor biology on this basis. Dr. Nawar Alkhamesi, shared with me his work on an aerosolized delivery system for tumor protection strategies using heparin, with an additional application using local anesthetic for improved postoperative pain control. Dr. Steve Black, shared with me his work on team training using a carotid endarterectomy model (Figure 12) and an extremely well equipped virtual operating theatre (Figure 13) that incorporated actors as patients, simulated physiologic parameters (heart rate, blood pressure, etc), nurses, an attending surgeon, an anesthetist, and a surgical trainee who had to perform the simulated procedure using the model under normal and stressful (the patient stroked) conditions. The appropriateness of the trainee's response and that of the team, along with the quality of the operation, were measured using ceiling mounted cameras monitored in a separate control room (Figure 14).

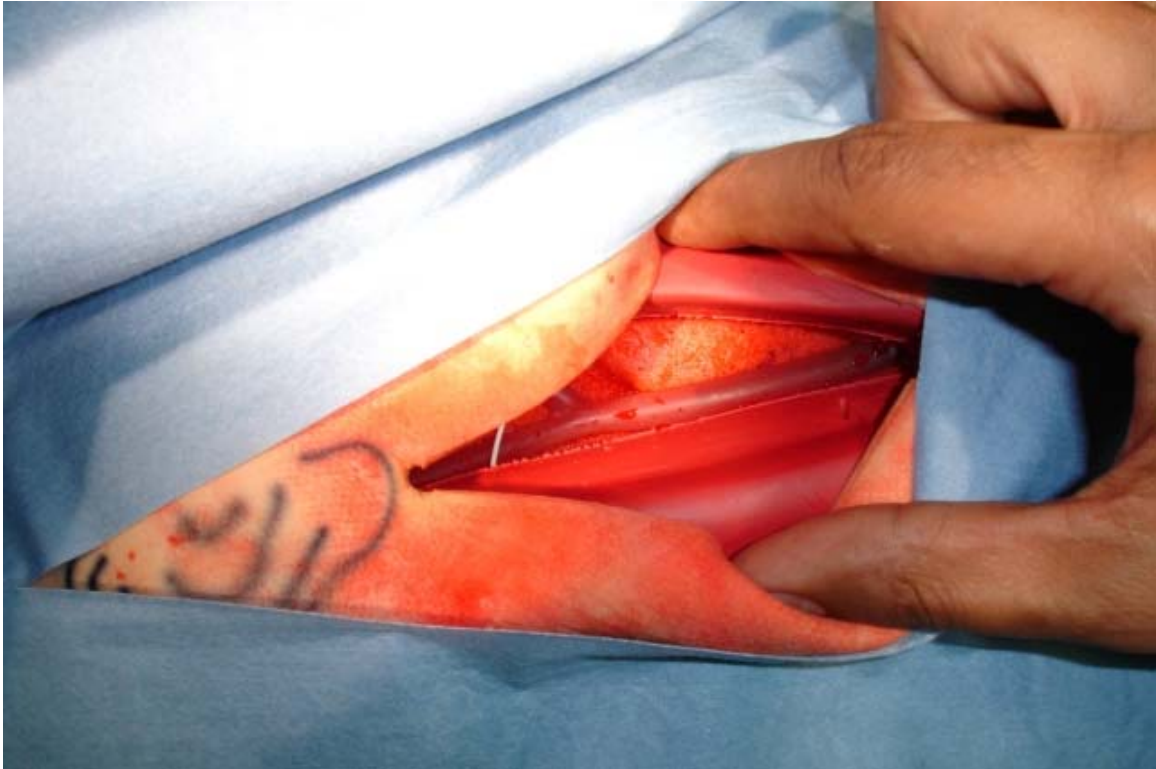


Figure 12. Carotid Endarterectomy model using latex tubing and pulsatile fluid flow that allows arteriotomy, removal of plaque, and patch closure.



Figure 13. The Virtual Operating Theatre at St. Mary's Hospital during a simulation training and assessment exercise.



Figure 14. The Virtual OR control room used to monitor progression of the operation and team interactions.

I was also afforded the opportunity to share some of my work with the department, as I gave a grand rounds talk at the weekly research conference on the topic of “Obesity Surgery in the United States.” Interestingly, the United States is about a decade ahead of the UK in this field, as obesity surgery is just now growing in popularity there. Although these operations are paid for by the national health service, very few surgeons are currently trained in bariatric surgery, which underscores the need for curricular development, as championed by Prof. Darzi’s group. Given the significant novelty of this topic, there was great interest in my talk amongst the faculty and registrars.

I also very much enjoyed my time with Prof. Darzi. Ara is incredibly busy, but I got the opportunity to watch him skillfully guide a trainee through a laparoscopic Nissen fundoplication (Figure 15) and enjoyed our exchange of ideas on laparoscopic training, reflux disease, laparoscopic colon surgery, bariatric surgery, and numerous other topics of mutual interest (Figure 16). Much to his credit, Ara has amassed an incredible group of talented individuals, and it was my privilege to spend such quality time with him and his group. They were all exceptionally cordial.



Figure 15. Ara Darzi teaching during a laparoscopic Nissen fundoplication.



Figure 16. Ara Darzi and Daniel Scott.

After thoroughly enjoying the camaraderie, as well as the sightseeing in London, we moved on to Dublin for the last few days of the trip, so that I could attend the Association of Upper Gastrointestinal Surgeons (AUGIS) of Great Britain and Ireland Annual Meeting. Since 1996, the AUGIS has been the premier gastrointestinal surgical society in the UK, and this organization is surprisingly analogous to the SSAT, except for its focus solely on foregut disease. I had contacted the society prior to my trip, and the leadership and administration were overwhelmingly hospitable. The two-day meeting was held at the Royal Hospital Kilmainham, a 17th century building originally used as a hospice for soldiers and now home to the Irish Museum of Modern Art. Needless to say, it was a beautiful place for a meeting. More importantly, the meeting content was outstanding. Featured talks included the presidential address by Prof. Mike Griffin, an excellent review on Barrett's esophagus by the local organizer Prof. John Reynolds, cutting edge lectures and video footage of laparoscopic liver resections (including formal right lobectomies) by Paris surgeon Daniel Cherqui, and invited presentations on paraesophageal hernias and minimally invasive esophagectomy by America's well-known surgeon Jim Luketich. There were several aspects of discussions that came from a different viewpoint than we normally have in the United States, such as constraints within the national health service on obtaining suitable pancreatic or hepatic imaging, as well as other subtleties in disease management strategies. I found this exposure very enlightening and my personal interactions with John Reynolds, Mike Griffin, and Jim Luketich were especially enjoyable (Figure 17).



Figure 17. Daniel Scott, John Reynolds, Mike Griffin, and Jim Luketich at the AUGIS Annual Meeting.

In summary, this was an incredible experience. In a very short amount of time, my family and I met a wide variety of genuinely kind and extraordinarily warm people, and I had the tremendous opportunity to share ideas, exchange information, and see the work of others in fields highly pertinent to my own. Being abroad allowed me to see things from a different perspective, which I found quite rewarding. Undoubtedly, through the relationships established, collaboration will be fostered and I look forward to applying the new knowledge I acquired into my own practice. Again, I would like to thank the SSAT and all of the individuals who made this exceptional fellowship possible; I am grateful.