Art of surgery dates as far back as the history of human civilization is known. Archaeologists have found evidence that surgery, in the form of trepanning (making holes in the skull to relieve pressure), has been performed in the ancient Inca civilization since as long ago as 10,000 BC. Since that time surgeons have been striving to reduce the pain and the trauma associated with surgery. Initially, progress was made through development of surgical skills, (e.g. a limb amputation done in only 30 seconds prior to the introduction of anaesthetic techniques), and then to the technological advances such as the introduction of ether to surgery in 1846.

Throughout the ages, the advancement of both surgical techniques and technology has continued in unison to allow surgery to be performed with less resultant trauma. Still, it was vital to visualise and safely reach the surgical field. “The bigger the incision the better the surgeon” remained the accepted dogma for the surgical apprentices until recently. But, the introduction of minimally invasive techniques has changed the face of surgery forever.

It was a German gynaecologist, Conrad Langenbeck who performed the first minimally invasive procedure, a vaginal hysterectomy in 1813. But, the modern development of minimally invasive techniques started with the move from open to laparoscopic surgery using multiple small incisions. Gynaecologists pioneered this, describing laparoscopy in the 1950. The first general surgical procedure performed laparoscopically was an appendectomy, again by a gynaecologist. One of the most revolutionary advances in recent times was the application of laparoscopic techniques to cholecystectomy, initially described by Erich Muhe in 1985. First video assisted cholecystectomy performed by Phillipe Mouret in 1987 in Lyon, France, changed the face of surgery forever. Since, then, multiple port laparoscopic surgery has developed to enable a range of procedures to be undertaken and remains in widespread use in the modern era.

As laparoscopic techniques evolved, surgical robots were developed to facilitate complex procedures by addressing the problems of visualisation and instrument manipulation. The perceived benefits of these robotic devices are 3-D vision, improved ergonomics, better operator comfort and ease of instrument manipulation. Although there is continued interest among surgeons to use robots but it is the prohibitive cost as well as limited evidence of their benefit to patients that has limited its widespread use.

As surgeons are always in the quest of better techniques and improved outcome for the patients, interest developed around a novel concept of surgery with minimal or no scars. Hence, from multiple incision laparoscopic surgery came the development of lesser invasive techniques called Natural Orifice Transluminal Endoscopic Surgery (NOTES) and Single Port / Incision Laparoscopic Surgery (SPILS).

Concept of performing surgery via natural orifices achieves the ultimate goal of totally scarless surgery. Natural orifice surgery uses external orifices for introduction of instruments but has to perforate hollow viscus (stomach, vagina etc.) to gain entry to the abdominal cavity. A lot of research work has gone to further explore the potential of this novel idea. Although the Russian gynaecologist Demitri Ott performed a vaginal laparoscopy, or “ventroscopy” using rigid instruments in 1901, the birth of modern NOTES using flexible instruments was seen when Kalloo and colleagues showed transgastric laparoscopy to be feasible in animal models in 2004.

Following successful animal studies, the first human procedures were performed and techniques for appendectomy and cholecystectomy amongst others are currently being described. Although, the perceived benefits driving the development of NOTES are lack of visible scarring, reduced surgical trauma, reduced pain, and improved recovery times but, there is minimal available evidence to confirm these claims. The concerns surrounding NOTES, limiting its uptake relate to th access and orientation within the abdomen, secure closure and infections associated with opening up the hollow viscus and training. Still, extensive research is in progress addressing access problems and orientation issues. In future, we hope to see further technological advances to help address these difficulties.

Concerns over the limitations associated with NOTES have resulted in a recent surge of interest in SPILS. This was initially perceived to be a backward concept primary from the novel concept of NOTES, but it gained
rapid acceptance within the surgical communities. It is based on the established principles of laparoscopic surgery and surgeons have found this concept more adaptable to their ongoing surgical practices. This concept also remains more acceptable to the patients than natural orifice surgery.\(^8\)

The first single incision laparoscopic procedure was performed in the 1960s (again by a gynaecologist) performing sterilization. More complex procedures followed later. The first SPILS appendectomy, another first by a gynaecologist, was performed in 1992 and cholecystectomy (performed by a surgeon this time!) in 1997.\(^9\)

Proponents of SPILS claim that by using only one incision the potential patient benefits of NOTES are maintained while eliminating the infection risk associated with deliberate visceral puncture.

The usual transumbilical incision used for most SPILS techniques conceals the scar giving effectively a "virtually" scarless surgery. The use of umbilical access also affords a view of the peritoneal cavity familiar to surgeons experienced in traditional laparoscopic work thus reducing the problems with disorientation associated with NOTES. But there are inherent potential problems with this technique. The close placement of instruments in SPILS has the potential disadvantage of leading to sub-optimal views and clashing instruments while operating hence, resulting in development of various parallel techniques without standardization.\(^10\)

We are currently seeing rapid development of better optics and instruments to overcome these problems.

Despite high level of interest and increasing uptake of SPILS, initial concerns were raised over the lack of quality evidence proving the perceived benefit of SPILS to patients when compared to established practice.\(^11,12\)

But, surgical community is very quick to react to provide quality evidence.\(^11,12\) There are currently around 40 registered randomized control trials (RCTs) in progress (www.clinicaltrials.gov) and 7 RCTs have now published their results providing vital data to help guide future practices. In the meantime, SPILS continues to develop with the description of both new procedures and introduction of new innovative techniques. Whatever is the outcome of the current trials, the future of surgery is sure to be driven by the continued desire to reduce the pain and scarring associated with surgery, just as it has always been.

The art of surgery began from the ancient Incas civilization, and continued to develop in the medieval ages. Initially, emphasis was to master the art of surgery but, in the past century, the marriage of science and surgery has revolutionized it for the betterment of our patients. Now, the aim is to perform more complex procedures, safely and effectively, hence extending the quality of offered treatment by minimally invasive methods. Hence, in the past few decades emphasis has shifted to how we can inflict minimal trauma in surgery to achieve our goal effectively and safely. Aim is to “do less and achieve more” as long as the results are similar, if not better.

REFERENCES