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PIONEERS OF KEYHOLE SURGERY

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If you have an operation in the UK to remove your gallbladder for gallstones today it will almost certainly be done by keyhole surgery. The procedure is done through a tiny incision in your abdominal wall and you'll probably be home by the following day. When the scar has healed you can hardly see it.

Yet surgery hasn't always been like this. In the 1970s, when I started my training in general surgery, removing the gallbladder (cholecystectomy as it's called) involved an incision under the ribs on the right side, a prominent scar and a hospital stay of several days or even weeks while you recovered from major surgery. For the surgical team, getting access to the gallbladder entailed cutting through the layers of the abdominal wall, moving various organs out of the way and dissecting the delicate structures which attach the gallbladder to the liver. Similar procedures were used to access other parts of the body such as the kidney, and removal of even a small kidney or ureteric stone required a long incision which caused discomfort and required a long recovery. This was still the case in the mid 1980s, when I completed my surgical training as a consultant. Less than a decade later the landscape had changed beyond recognition.

Laparoscopic cholecystectomy (the technical name for removal of the gallbladder by keyhole surgery) is now so widespread that it's easy to forget that minimally invasive (keyhole) techniques are a relatively recent development. Over that time a procedure that was radically innovative when it started has become absorbed into the mainstream. That and other techniques that seemed like science fiction until relatively recently have become routine. In this lecture I will explore how the 'new' rapidly becomes the 'normal', then turns into the 'old' as it is supplanted by a new 'new'.

By the early 1990s, minimally invasive surgery had arrived. In the years that followed, more and more procedures were carried out by these techniques. Early examples were removal of the appendix and extraction of stones from the urinary tract. Since then the surgery of almost every part of the body has been transformed. Yet the adoption of keyhole surgery was not a straightforward process. Even after it was demonstrated that this approach could be carried out safely by experts, an explosion of uptake by inadequately trained surgeons led to numerous instances of error, complication and even patient deaths. The very concept of minimally invasive surgery was controversial from the outset and professional opinion was sharply divided.

Now, over thirty years later, keyhole surgery is so firmly established that it is easy to lose sight of how tumultuous the events surrounding its introduction were. One of the problems is that publications in medical journals give little insight into what actually happened at the time. History, it is often said, is written by the victors, and little remains in the documentary record of the many procedures and techniques that briefly flourished before being supplanted by those that came up behind.

In this lecture I draw on research I have carried out into those early days of keyhole surgery, working with the pioneers of the time to understand the social and professional context within which innovation flourished and mapping the challenges and arguments which were current at the time.



The lecture starts by setting the surgical scene, using open cholecystectomy as an example. At the start of my surgical career it seemed that gallbladders had always been removed by this orthodox approach. For decades the technique had been almost unchanged, and film at the Wellcome Collection from the 1920s shows a procedure that had hardly altered at all by the time I learned how to do it. Forty years later, a 1980s educational film for medical students made by the eminent surgeon Professor Harold Ellis outlined similar steps. But despite this apparent stability, surgery in the 1980s was undergoing convulsive change. New technologies were sweeping into medicine, with imaging breakthroughs such as CT scans and ultrasound, fibre-optic light sources and new energy delivery systems. Pioneering clinicians and researchers recognised these opportunities and started pushing the boundaries of what was possible.

One of these was the consultant urologist Mr John Wickham, who died in 2017 at the age of 90. Throughout John's professional career he was an innovator, and he became a pivotal figure in the introduction of keyhole surgery in the UK. John's contribution lay not only in recognising and seizing the potential of new technologies for the benefit of his patients, but also in transforming surgical teamwork. In his role as Director of the Institute of Urology in London, John Wickham established and inspired a uniquely creative team of clinicians and researchers. Far ahead of his time in many ways, he brought surgeons, nurses, interventional radiologists and instrument manufacturers together on equal terms to achieve his vision of a surgical philosophy which would cause as little damage to patients as possible. It was John Wickham who coined the term 'minimally invasive therapy'.

Thirty years after these events I began to document the operating theatre as a social, educational and pedagogic space. I had the idea of using simulation to capture activities now long superseded. I brought together teams who had worked together in the past, many of them long retired, and invited them to 're-enact' surgical procedures. With the generous support of the London Science Museum and a group of historians and experts from the social sciences I was able to document this research to create an audiovisual record.

Our initial focus was to recapture routine open surgery. Professor Harold Ellis (surgeon), Sister Mary Neiland (theatre sister) and the late Professor Stanley Feldman (anaesthetist) had worked together for many years at the Westminster Hospital. I invited them to re-enact open cholecystectomies in the Science Museum's life-sized replica of a 1980s operating theatre, augmented by objects from the Museum's reserve collection. This allowed us to document the unconscious co-ordination of a long-established expert team, exploring how instruments were passed between surgeons and nurses and shedding light on interactions within the group.

We then worked with Mr John Wickham and his team to re-enact events at a time of convulsive change. By recreating pioneering procedures such as the UK's first percutaneous nephrolithotomy (when Wickham with interventional radiologist Dr Mike Kellett succeeded in removing a stone from a patient's kidney through a narrow tube under X-ray control without having to make a major incision) the project reanimated dormant memories. Prompted by re-enactment, Wickham and his colleagues began to recollect other procedures that were attempted at the time and to describe the social and professional context within which these events took place.

Some techniques were successful and persisted, gradually morphing into what we recognise as keyhole surgery today. Others were less successful or were overtaken by the speed of events at a time of rapid technical development, both in the UK and internationally. Still others (such as laparoscopic cholecystotomy - extracting gallstones without removing the gallbladder) enjoyed a brief moment of prominence but were then eclipsed when it was demonstrated that the gallbladder itself could be safely removed (laparoscopic cholecystectomy), thereby eliminating the danger of gallstone recurrence. These 'dead ends and blind alleys' are poorly documented in the medical literature, and simulation-based re-enactment provided a means of capturing them. John Wickham was a lifelong pioneer. His restless drive to improve surgical outcomes and minimise patients' distress led to a stream of disruptive innovations. These were often controversial, especially within the profession. In the years that followed, Wickham continued to challenge boundaries. His work with



extracorporeal shockwave lithotripsy reshaped the treatment of urinary tract stone disease, and his work on surgical robotics continues to reverberate today. Yet John Wickham's influence extends far beyond technical innovation. He and his colleagues changed the landscape of surgical practice forever, with their visionary sense of how patients' experience could be transformed through innovation and how the concept of the surgical team could be refashioned for the needs of a constantly changing world.

The first part of this lecture will outline the events described above. In the second part I will be joined by Dr Mike Kellett (interventional radiologist) and Mr Stuart Greengrass (surgical instrument designer and manufacturer), both close colleagues of John Wickham and key members of that creative team. The conversation will explore in greater depth some of the issues around surgical innovation and ask how current developments are shaped by events in the recent past.

Further reading

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