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REVIEW ARTICLE

25 years of SMIT: The past, the present, and the future of minimally invasive therapy

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Abstract

A quarter of a century has passed since the Society of Minimally Invasive Therapy (SMIT) was founded in 1989 with the aim to provide a platform to promote the development of minimally invasive therapy and the new instruments and devices needed to carry out the new surgical techniques. Both the founder of the society, British urologist John EA Wickham, and the German surgeon Gerhard F Buess, who was one of the leading members from the beginning, conceived SMIT as an interdisciplinary forum to promote the cooperation between physicians from various surgical specialties, but also medical engineers, resp. medical device manufacturers, whose expertise was needed to build the instruments that had to be developed to carry out the new concept of surgery. In this paper we outline the history of SMIT over the past 25 years in order to highlight both the ideas behind the society and the dedication of the people who shaped it.

Key words: *Minimally invasive therapy, medical innovation, minimally invasive surgery, history, image-guided procedures, technology*

Introduction

A quarter of a century has passed since the Society for Minimally Invasive Therapy (SMIT) was founded in 1989 by the British urologist John EA Wickham and a number of colleagues from various other clinical specialties. At that time, surgeons had started to explore the possibilities of developing innovative procedures with the aim to reduce surgical invasiveness, pain and other adverse effects for the patients. This new concept of "keyhole" surgery, or "minimally invasive surgery" could only be realized when adequate tools necessary to perform the new procedures could be developed. As John Wickham realized, this could only be done in close cooperation between surgeons from various disciplines who knew what they needed, and medical engineers who would understand these needs and be able to build the instruments envisioned by the practitioners. Thus it was John Wickham's aim to create a platform where these people could get together, discuss their ideas, and develop innovative procedures and technologies.

Since that time a lot of surgical treatments previously performed through a "major incision" have been replaced with a variety of modalities of minimally invasive treatment, requiring only small skin incisions or even no incision at all. The history of SMIT can be seen as a mirror reflecting the progress of medical technology; at the same time, it has always been a driving force of this progress. We think it is meaningful now to look back at the footprints of SMIT, which might excitingly inspire us again to conceive further new technologies that will contribute to make surgical interventions even safer, even less invasive, and more beneficent for the patient.

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A short history of SMIT

The ideas behind the society

The 1980s were a special decade that saw remarkable developments in industrial technology. Computers, installed only in sizable companies in the 1970s, appeared on our desks, were called personal computers and became the tools with which we learned to work (1). Wireless telephones, installed only in the cars of the rich in the 1970s, were miniaturized and became available and affordable for everyone; today's cell phones are the result of a true revolution of human communication (2). It was also in the late 1980s that a prototype of what we call "digital camera" today was introduced (3).

Those groundbreaking developments in industrial technologies that characterized the 1980s consequently stimulated medical technology development, which resulted not only in novel devices, but also in novel medical treatments. Flexible endoscopy e.g. was no longer just a diagnostic tool in the1980s. It became a therapeutic tool, offering a chance of complete resection of lesions in the GI tract (4). The role of rigid endoscopes also expanded enormously in the field of treatment, thus creating a new concept of surgery. A symbolic event of this development, and a trigger for further innovation, was the first laparoscopic cholecystectomy performed in 1985 (5). Another example of a fundamental change of the approach route in the treatment of vascular stenosis and occlusion also took place in the 1980s: With the use of specially designed catheters and balloons, the approach route to treat coronary heart diseases "from outside" was replaced by treating them "from inside" through the advent of angioplasty (6). It was also in the 1980s that "no touch" fragmentation of kidney stones inside the human body was clinically introduced. The application of the new industrial "focused shockwave" technology was the key to invent the extracorporeal shock wave lithotripter (7).

The 1980s were thus a decade characterized by an atmosphere of departure and optimism, and those involved were firmly convinced that technological innovation could be put to work for the benefit of the patient.

The people behind the society

John EA Wickham. John EA Wickham (Figure 1) was one of those who were inspired by the technology revolution in the 1980s. At that time, he was a urologist in London and was dedicated to the spirit of progress. Among a variety of his activities his interest was focused on a method of treatment that reduces patient trauma arising from traditional surgical operations. Due to the lack of ideal devices for those new treatments, he dedicated himself to design and develop, in cooperation with medical device manufacturers, the instruments he envisaged in order to realize less invasive procedures in urology (8–10). In 1984 he coined the term "minimally invasive therapy", which would eventually give the society its name.

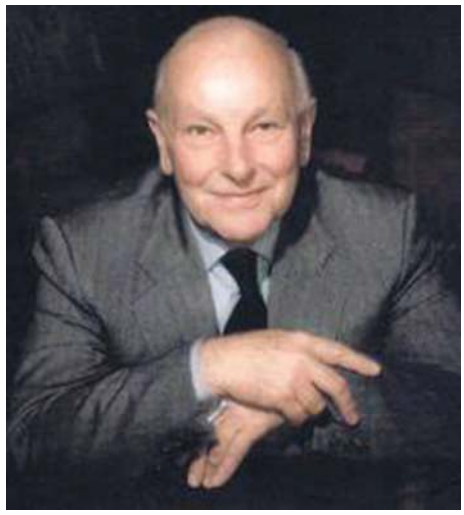

Figure 1. John EA Wickham. The founder of SMIT.

In 1989 John Wickham finally founded a society to accommodate all colleagues dedicated to the innovative therapy without major skin incision. This was the birth of the "Society of Minimally Invasive Therapy", or SMIT. The first international conference of SMIT was organized by Wickham himself and was held in London in the same year. Physicians form a variety of disciplines gathered together, including urologists, general surgeons, gynecologists, vascular surgeons, orthopedic surgeons, interventional radiologists, and many more, dedicated to minimally invasive therapy. In tune with the realization that the aim to further minimal invasiveness could only be reached in cooperation with experts in medical engineering and manufacturing, this and all subsequent meetings have always been attended by engineers and manufacturers as well.

In addition Wickham founded an international journal called "Minimally Invasive Therapy" two years later.

Gerhard F Buess. Gerhard F Buess (Figure 2) was a general surgeon endowed with both enthusiasm and an enterprising spirit. In 1983, when working in

Figure 2. Gerhard F Buess. The former Editor in Chief of MITAT.

Cologne, Germany, he started the first clinical trials of transanal endoscopic microsurgery (TEM) (11). Due to the lack of equipment available to realize his innovative concept, Buess developed the TEM system and its equipment himself in cooperation with a German medical company that supplied the necessary technical know-how (12). TEM is indeed a very unique method of treatment for rectal neoplasms. It is not only an endoscopic surgery procedure, but at the same time constitutes single port surgery and also endoluminal surgery through a natural orifice. From today's vantage point it is surprising to realize that TEM was invented as early as 30 years ago, i.e. before the first laparoscopic cholecystectomy was even performed (5). During the development of TEM Gerhard Buess became aware of the importance of creating a forum where the communication between physicians and medical engineers could be further promoted.

In this context it was almost logical that Gerhard Buess and John Wickham met and eventually pooled their resources. Very soon Buess was invited by Wickham as a leading member of SMIT and came to play an important role during the growth of the society.

Buess' enthusiasm for endoscopic surgery was strong enough to found an international journal "Endoscopic Surgery & Allied Technologies", which was first published in 1990 (13). One of the unique features of this journal was the quality of the graphics and illustrations, published in excellent quality and often in color. Moreover, as the name of this journal implies, subscribers and authors involved were not only physicians from various surgical disciplines but also engineers in the technology field.

Growth and development of SMIT

SMIT experienced a period of constant growth during the first years of its existence and was joined by a number of young scientists interested in the development of new technologies, who came to play an increasingly important role in the society.

In the beginning of the 1990s, Gerhard Buess was appointed as the director of the section for Minimally Invasive Surgery at Tuebingen University, Germany. In tune with the technological developments of that time, two of his co-workers, Andreas Melzer and Marc O. Schurr, were equally fascinated by the idea of applying the newest technologies to medical use. Inspired by working with Buess and his group, they started to conceive their own new ideas in terms of minimally invasive therapy (14–17). Their enthusiasm led to their increased involvement in the activities of SMIT and they continued their innovative scientific research in cooperation with colleagues from various disciplines and professionals in the field of medical engineering, who also joined SMIT in growing numbers. Their work within the society was recognized, and in the late 1990s they became leading members of SMIT.

After ten years of SMIT, the meeting held in Boston in 1999 proved to be a turning point in the history of the society. After much discussion, at times controversial, it was decided to further strengthen the focus on the innovative, interdisciplinary, and technology-oriented aspects of SMIT and to try to attract new members dedicated to the innovative potential of emerging medical technologies.

As a result of this partial reorientation, at the annual conference of SMIT in Gelsenkirchen organized by Andreas Melzer in 2000, John Wickham decided to hand over his responsibility, and Andreas Melzer (Figure 3) was appointed as secretary general. Marc Schurr became the treasurer of the society (18). On the occasion of this "hand over", and to fully reflect the focus on innovation, the name of the society was changed to "Society of Medical Innovation & Technology", the acronym SMIT was kept. Any innovative work which involves collaboration between technology specialists and medical practitioners has since found a platform in SMIT, and the society - alive as ever - can now celebrate the 25th anniversary of its founding,

The official journal - MITAT

The official journal of the society was initially founded by John Wickham in 1991 and was called "Minimally Invasive Therapy". From the start, Wickham made it clear that the journal was meant to reflect the

Figure 3. Andreas Melzer. The present Secretary General of SMIT.

interdisciplinary approach that had led to the founding of SMIT. In his first editorial, he stated that the journal should "act as a catalyst for the exchange of information and techniques of mutual interest between the existing specialties, i.e. to enable a gynaecologist to appreciate the work of the gastroenterologist or the urologist to understand and learn from the expertise of the otorhinolaryngologist" (19).

In 1996, the journal was merged with "Endoscopic Surgery & Allied Technologies", the journal that had been founded by Gerhard Buess in 1990, and Buess and Wickham became the co-editors of the new journal. The name of the journal was changed to "Minimally Invasive Therapy & Allied Technologies" (MITAT). This fusion enhanced the link between technology and physicians. MITAT started publishing papers on both innovative technologies in medicine and their application in clinical procedures. What makes MITAT unique is the publication of special issues, one or two each year, in which a topic is selected and specialists and experts relevant to each topic are invited to contribute. For example, the special issue "Stem cell technologies", published in January 2008 as No. 2 of Volume 17, had a considerable impact on readers and has been well cited up to now.

In 2005, John Wickham retired from the position of editor-in-chief and has since been credited as the journal's founding editor. Eiji Kanehira was promoted to the position of co-editor-in-chief, reflecting both his longtime active involvement with the journal and its widespread distribution in Japan. Some years later, in 2010, Gerhard Buess, the editor in chief, passed away, and it became necessary to restructure the operation of MITAT (20). Eiji Kanehira became the new editor in chief in 2011, and the composition of the editorial board was also substantially changed by adding new members, while others retired after many years of fruitful cooperation. From about 50 board members, three longtime board members of MITAT, Marco M Lirici, Marc O Schurr, and Andreas Melzer were appointed as associate editors, while Elisabeth Hermann-Decker, the editorial assistant, was promoted to the position of editorial manager. In 2011 Marco M. Lirici's efforts made it possible for MITAT to also become the official journal of the "Italian High-Tech Surgery Club", thus further underlining the broad scope and the international orientation of both the society and the journal.

Eiji Kanehira and the entire MITAT team carry on the principles of the journal and the work of John Wickham and Gerhard Buess (21). Enthusiastic activities of the board members and peer reviewers make sure that MITAT is still growing.

Today

The rationale of having a forum that enables discussion between the technology side and the clinical scene is now well recognized world-wide. This trend has been making the existence of SMIT more and more meaningful. The annual international conference of the society is held at a different location each year. The venue of the conference has traveled to Europe, America, and Asia, and it will continue to travel around the world in the future (Table I). In recent years the annual conference has also played an important role as an opportunity for the representatives of large-scale projects, such as the European VECTOR project (Versatile Endoscopic Capsule for gastrointestinal TumOR Recognition and therapy) and FUSIMO (Patient specific modeling and simulation of focused ultrasound in moving organs), I3 OS (integrated interventional image operating system), and others, to report their progress. Moreover conjoined conferences with other relevant societies have been organized frequently. In those ways SMIT has influenced innovative medical activities in each hosting country, which has convinced an increasing number of people of the aims of the society. In 2012 a collaboration with the Society of Laparoendoscopic Surgeons, chaired by Paul Wetter, was started.

In 2012 the name of the society was slightly modified. It is now called i-SMIT, which stands for "International Society for Medical Innovation & Technologies" and a new logo has accordingly been created for the society.

Table I. List of meetings and presidents.

Location	Year	President
1. London, UK	1989	John Wickham
2. Vienna, Austria	1990	Michael Marberger
3. Boston, MA, USA	1991	Bruce McLucas
4. Dublin, Ireland	1992	John Fitzpatrick
5. Orlando, FL, USA	1993	Peter Mueller
6. Berlin, Germany	1994	Gerhard Buess
7. Portland, OR, USA	1995	Josef Rösch
8. Milan (Ancona), Italy	1996	Enrico Pisani
9. Kyoto, Japan	1997	Osamu Yoshida
10. London, UK	1998	John Wickham
11. Boston, MA, USA	1999	Stephen Dawson
12. Gelsenkirchen, Germany	2000	Andreas Melzer
13. Berlin, Germany	2001	Marc O. Schurr
14. Oslo, Norway	2002	Erik Fosse
15. Amsterdam, the Netherlands	2003	Kees Grimbergen
16. Rome, Italy	2004	Marco M. Lirici
17. Naples, Italy	2005	Nicola di Lorenzo
18. Monterey, CA, USA	2006	Rick Satava
19. Sendai, Japan	2007	Eiji Kanehira
20. Vienna, Austria	2008	Joachim Kettenbach
21. Sinaia, Romania	2009	Calin Tiu
22. Trondheim, Norway	2010	Brynjulf Ystgaard
23. Tel Aviv, Israel	2011	Amir Szold
24. Barcelona, Spain	2012	Enric Laporte
25. Baden-Baden, Germany	2013	Uwe Spetzger

Future

As long as technology progresses, innovation in medicine will never end.

People were surprised by four-port laparoscopic surgery 20 years ago, while today the same operation is carried out through a tiny single incision or through a natural orifice (22,23). Interventional radiology will be applied to more challenging procedures such as complicated heart valve surgery (24,25). Imaging technology will demonstrate increasingly surprising pictures on the monitor. High definition 3D will be the standard in the near future (26,27). Cameras casting high-quality images will be miniaturized into small capsules and will be able to navigate inside the human body (28). Image-guided navigation in interventional radiology and endoscopic surgery is also more and more accelerated today (29–33). As minimally invasive therapy generally tends to focus on the microscopic spot, it would be risky when the site of the procedure is disorientated. In this context image-guided navigation should play an even more important role in the future. The technology of focused ultrasound is progressing rapidly today (34,35). The accuracy with which it brings its maximal energy to the target will become amazingly high. Robotic surgery is no longer a dream for the future but a stable tool for everyday activities in the OR. It will be miniaturized and put into the abdominal cavity or even into the stomach lumen without being connected with a wire (36–38). Those devices and instruments will make the procedures so easy that physicians can perform them without the necessity to acquire special dexterity. Thus an increasing number of conventional surgical procedures will be replaced by minimally invasive procedures. This is exactly what John Wickham predicted when he founded SMIT in 1989 (39). The trend towards minimally invasive therapy will continue and further innovations are sure to come. And what we call "minimally invasive" today may be called "invasive" in the near future.

It is surely the role of SMIT to think about how to apply new technologies to medicine and to meet the challenge to create more beneficial methods of diagnosis and therapy. Frequent conversation between specialists of technology and clinical practice is still needed, just as it was 25 years ago.

i-SMIT will go on as far as technology progresses. i-SMIT will try to touch the future as long as medicine needs innovation

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