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THE PALGRAVE HANDBOOK OF THE HISTORY OF SURGERY

Edited by
Thomas Schlich



The Palgrave Handbook of the History of Surgery

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Editor

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Introduction: What Is Special About the History of Surgery?

Thomas Schlich

In his autobiography, surgeon Richard Selzer characterized the surgical knife as being ‘like a slender fish’ that ‘waits, at the ready, then, go[es].’ He continued by describing its actions on the patient’s body: ‘It darts, followed by a fine wake of red. The flesh parts, falling away to yellow globules of fat. Even now, after so many times, I still marvel at its power—cold, gleaming, silent ... for a most unnatural purpose, the laying open of the body of a human being.’¹ Unnatural as it may be, surgery is an extremely common contemporary practice, cutting into the living body to fix a problem is done thousands of times every day, all over the world. Harvard surgeon Atul Gawande estimated in 2012 that the repertoire of conventional surgery encompassed over 2500 different procedures, and that the average American can expect to undergo seven operations during his or her lifetime.² According to Eurostat, the most common procedure in the European Union, cataract surgery, was performed 3.6 million times in 26 member states in 2013. Tonsillectomy, as another common form of surgery, reached a prevalence of 170 per 100,000 inhabitants in some of the EU states in that year.³ For most of history this was unthinkable. Before 1800 operative surgery was for the most part limited to the body surface and to emergencies. Today the planned and controlled intervention into the living body has become a realistic therapeutic option for many medical conditions. Surgery is a universal, safe, and to a certain extent even popular way of solving a whole variety of medical

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(and some non-medical) problems. The question is how historians can explain and understand this dramatic change. Surgeons themselves have shown a long-standing and vivid interest in their history and have produced numerous valuable accounts of the technical history of their art.⁴ Their work is helpful for orientation and as a rich source of information on the technical aspects of surgery. However, considering its central place in the history of medicine, surgery has not yet received the attention it deserves from professional historians.⁵ The history of surgery is a relatively young thematic field with many open questions. Surgery has come up as part of other topics, such as the history of cancer treatment, or the history of germ theory,⁶ but less so on its own. The last comprehensive attempt at examining the conceptual, cultural and social basis of modern surgery is Christopher Lawrence's collected volume of 1992, especially his introductory chapter.⁷

This handbook is meant to address the gap in historical attention to surgery. It covers fundamental developments in the technical, social and cultural history of surgery, but it also offers wider perspectives on the subject. The individual entries function as starting points for anyone who wants to obtain up-to-date information about the respective topic or area, be it for purposes of research or just for general information. Thus, each of the chapters reflects state-of-the-art historical research on its specific topic. The contributions deal with the approaches other researchers have taken, discuss their strengths and weaknesses, and situate them in the context of past and ongoing historiographical discussions. They point to the significance of their specific topics for the history of surgery and, if applicable, for the history of medicine and other areas of history too. Even though the handbook's emphasis is modern surgery, it also takes a longer perspective by including pre-modern medicine in some of its chapters. Tracing modern surgery's roots back to an older tradition in this way both contextualizes the practice within Western medicine and helps to define its special character.

The strategy of choosing specific topics among the potentially unlimited number of subjects for the handbook has been fourfold. Some areas are basic for any historical account on surgery. Subjects such as wound disease, anaesthesia, abdominal surgery, and instruments have been part of surgical historiography for a long time. They are covered by acknowledged experts who bring up new perspectives in examining these themes. In addition, there are topics that are relatively new in the history of medicine (such as women, patients, animals, clinical trials, images, art) and which take on a specific dynamic if examined in the context of the history of surgery. A third category consists of subjects that help open up new thematic perspectives in the historiography of the field and link it to emerging areas in history, such as the history of popular culture and the history of emotions. The discussion of such topics also shows that, on the one hand, the history of surgery can benefit from other areas of historical scholarship; on the other hand, the history of surgery can provide new insights and stimulation for these domains. Finally, there are

entries about circumscribed techniques or areas of application of surgery, for example neurosurgery or transplants. These have the character of case studies that serve to explore some more general issues: minimally invasive surgery is used as a historical examination of technical innovation, neurosurgery as a node for the various ways historians can investigate disciplines or specialized fields of activity. The handbook's purview thus goes beyond taking stock of what has been done in the field to include new directions and approaches in the history of surgery.

The geographic focus of the chapters on Europe and North America reflects both the history and the historiography of surgery. As to its history, modern surgery originated in Western medicine. As I will discuss later in this introduction, it is specific to the Western world, and only subsequently spread to other areas of the globe. Similarly, its predecessor, traditional surgery, uniquely developed in the Western world. This Western traditional surgery was the starting point for the rise of modern surgery. As to historiography, the global spread of modern surgery in the past 200 years has been a relatively neglected topic so far. Much of the existing historical work has been focussed on a few national contexts, mostly Britain, North America, France and the German-speaking countries. This is in part due to the fact that much of the dynamism of late modern surgery originates in these regions. While many of the individual chapters counterbalance the cases from the Anglo-American sources with examples from outside the UK and North America, there is still a tendency to favour the English-speaking world in many (but not all) of the chapters. This is partly because this handbook is written in English, but it also reflects the current overrepresentation of English-language historiography in the field.

In this introduction, I discuss what is special about surgery as a historical topic and a theme for a handbook. For this purpose, I give a definition of surgery from a historical point of view and lay out to what extent it is specific to the West and to the modern period. As an introduction, this chapter does not provide a detailed survey of the research literature. This can be found in the handbook chapters themselves. Instead I draw the threads of the different chapters together and point out in which ways they address the specificity of surgery.

DEFINITION AND SPECIFICITY OF SURGERY

Surgery is not only very common in the modern world but also specific to a particular historical and geographical context. The idea of opening up the living body with instruments to restore its health is rather unique. Most cultures don't have it. Erwin Ackerknecht has pointed out that the reason for the absence of surgery in other cultural and historical settings is not a lack of anatomical knowledge or technical capability but a different understanding of health and disease.⁸ In many cultural contexts, it is not obvious to intervene

into the body's structure to solve a health problem. A comparative study by Shigehisa Kuriyama has shown that even the idea that the body's structure matters for health and disease can be traced to a Western origin in Greek antiquity. Chinese medicine, by contrast, has emphasized dynamic balances and energies rather than structural anatomy.⁹ Additionally, in some cultures, the body's integrity was so valued that even a simple tooth extraction met with opposition. Intervention into the body's structure was often not used in situations that look obviously surgical to us today—bone fractures or open wounds, for example, were treated with herbal potions or with some form of magic. However, interventions into the living body were performed in non-surgical contexts, for example as ritual or judiciary mutilations, as they can be found in various historical and cultural contexts. Moreover, many cultures did not clearly distinguish between medical and non-medical manipulative interference, as we do today, and often, such interventions were performed by practitioners who are not equivalent to our Western definition of a doctor. Thus, speaking of 'surgery' or 'surgeon' outside the Western medical tradition can easily lead to misinterpretations. The existence of a specialized group of doctors in charge of what we understand as the field of surgery is a specific historical phenomenon. In other cultures and at other times, the division of labour worked in different ways. Practices that we today define as being surgical were often divided up among various groups of practitioners. Broken bones, for instance, were, until quite recently, treated by specialized bonesetters in many contexts.

Surgery is thus a very specific and very special practice. Its history is in many ways different from the general history of medicine. As one of its defining features, it consists of manual practices performed with instruments on a living body. While medicine in general typically deals with bodily problems too, surgery is particularly close to bodily concerns. It makes a difference whether one gives a pill or cuts into the patient's flesh. The living body is quite literally the surgeon's working material. Moreover, in modern surgery, under anaesthesia, the patient as a person is in significant ways absent during the operation. What is present is the patient's body—again a situation that is untypical for medicine, but quite typical for surgery. Intervention into the intact body, as it is routinely performed in modern surgery for many different purposes, makes surgery a distinct and special activity. This fact has lent surgery a very special character, leading some surgical authors such as Selzer to a certain form of hyperbole when they call the 'the ritual of surgery', 'at once murderous, painful, healing, and full of love'.¹⁰ In such accounts, the surgical incision, the moment the integrity of the body is violated, has often been identified as a key event, as in the introductory quote from Selzer's book.¹¹

Once the patient's body is opened, it becomes vulnerable to an unparalleled extent. Stripped of its capacity for self-regulation and preservation, many of its functions have to be controlled or substituted artificially. A whole range of control technologies must be mobilized in order to stave off the dangers that arise from that first intervention into the integrity of the body: haemostasis,

pain control, maintenance of respiration and circulation, as well as defence against the body's invasion by microorganisms all become necessary.¹² Many specificities of the history of surgery have to do with this exposure of the patient's body to various dangers and the management of the associated risk. It is a risk that has affected the operating surgeon too. Because of the perceived immediacy of the effects and dangers of surgical intervention, it jeopardized the surgeon's reputation each time he or she operated on a patient. The question is how such a remarkable, risky and, for most of history and for cultures outside the West, unthinkable approach to treating disease could become so wide-spread, so seemingly normal and, in a word, so incredibly successful.

KNOWLEDGE

One dimension of this question is the knowledge on which surgical practice is based. At a general level, the history of knowledge about the body and disease is, of course, central to the history of all medicine. But surgical knowledge is specific in important ways. It takes the structures of the body as its basis. There is a long and varied history of surgery's relationship with anatomy as the domain that produces knowledge about the body's physical structure. A structural, anatomical approach has been a distinguishing characteristic for surgery for a long time. As Michael McVaugh has pointed out, in the Middle Ages, when learned surgeons tried to carve out a niche in the medical marketplace for their manual kind of treatment, they conceptualized illness in terms of localized, anatomy-based pathology (while physicians tended to adopt an individualized, physiological pathology).¹³ Surgical interest in body structures included particular concepts and ways of speaking about the body and its disorders. According to Owsei Temkin and the historians who have followed his lead, this structural or 'localist' approach became dominant in modern medicine more generally. It is based on the assumption that the body is a composite of organs and tissues with particular functions and that disorders affect these at the structural or functional level. Surgery can rectify these disorders by removing the diseased structures or restoring their function. With the emergence of pathological anatomy in the eighteenth and early nineteenth centuries this 'surgical point of view', as Temkin called it, became one of the defining characteristics of modern medicine. It also made modern surgery possible and desirable because, according to this approach, localizing a disease allowed performing the appropriate treatment.¹⁴ As Christopher Lawrence has pointed out, the emergence of modern surgery in the nineteenth century can be understood to a large degree through the redefinition of previously internal diseases as surgical problems. Thus, Lawrence explained, the localist approach is not a timeless or value-free way of describing the body and disease. As natural as it looks to us today, it is still a partial perception, influenced by particular interests and practices which shaped this knowledge in a particular way. In any case, the rise of the surgical point of view turned the

interior of the body into the rightful domain of the surgeon and made the living body a surgical object *in potentia*.¹⁵

Historians of medicine have followed the further developments of the surgical rationale and have described how, subsequent to surgery's focus on structure, a new generation of doctors and scientists turned towards body function. This was a move that was crucial for the further expansion of surgery, for example in the direction of organ transplants and neurosurgery. It was combined with surgeons' increased orientation towards experimental laboratory science, which in the 1880s had become a resource not only for supporting the surgical rationale but also for finding new surgical healing strategies.¹⁶ These trends form part of the history of how surgery related to different varieties of science, a theme that comes up in many of the chapters of this handbook.

The various versions of the surgical healing strategy have certain points in common. They consist of a manual–technical intervention performed locally on a specific body structure by a highly qualified expert. Their use favours repair of an already existing damage over other strategies such as prevention—an attitude that puts them in opposition to traditional medical strategies of maintaining or reconstituting a balance within the body or between the body and its environment through complex, often systemic measures which frequently concern the patient's way of living. Surgery, by contrast, can be characterized as following the strategy of a technological fix. What is important is that this rationale is, once more, neither natural nor self-explanatory. It has a history. Its emergence and further development can be situated in time and space, and in different social and cultural contexts. Part of that history has been the rise of modern surgery, changing not only medicine but also ideas about the body in modern societies more generally. Thus, surgery provided technical solutions to problems that were originally not understood as being medical, let alone surgical, for example deviant behaviour and traffic accidents.¹⁷ The mutual influence of surgery and widespread body concepts is one way in which the history of surgery is also part of the history of the body, a flourishing thematic field since the 1980s, which has not been fully exploited with regard to surgery, even though the theme runs through most of its history.¹⁸

TECHNOLOGY

Knowledge is only part of the story. The rationale for surgery developed in tandem with the technical capabilities of its application. How did doctors learn to intervene successfully into the human body? What did surgeons do with their hands, their bodies and their tools to make their interventions work out? After all, surgery concerns not only the patient's body. The surgeon's body (and in modern surgery, the bodies of the whole surgical team) is involved in surgical work in significant ways too.¹⁹ Surgery requires bodily knowledge that is situated in the practitioner's body in the form of skill and know-how.²⁰ This means that physical skill and the specific conditions

of knowledge acquisition and transmission are of primary importance to the history of surgery. This goes with the fact that, historically, surgery has strong roots in craft traditions, whereas internal medicine tended to base itself in academic learning. Surgeons themselves sometimes characterize their work as ‘handicraft at the highest level’.²¹ Know-how and skill have their place in the history of medicine more generally. They also have been particularly pertinent for a number of decades in history of science as well as in science and technology studies. In both fields scientists’ skills have been put in close relationship to the knowledge they produce. In the history of surgery, material practices—what practitioners do with their hands and instruments, and how such practices can be recorded, passed on, or evaluated—play a prominent role indeed.

Surgery can, in fact, be described and analyzed as a technology. Under the comprehensive definition proposed by scholars in science and technology studies, the term ‘technology’ has three layers of meaning.²² First, there is the physical level. In surgery, this involves the instruments, the operating room and so on. Second, technology can be seen as an activity, as a means to accomplish a specific goal. This refers to what the surgeons do in the operative procedure. Finally, technology is what people know: having instruments and starting to use them on bodies was not enough for successful surgery; surgeons also had to know how to apply the tools and the techniques within their sphere of activity. A surgical technology cannot be spread without the relevant knowledge, know-how and practical skills. Looking at surgery as a technology shifts the focus from theory to practice. It is more about how it has been possible for modern surgery to emerge and to expand, and not why it was seen as desirable in the first place. This aspect includes the question of the effectiveness of surgical measures (including technologies around surgery such as anaesthesia, antiseptics and asepsis), which confronts historians with the problem of how to evaluate the achievements of practitioners in the past. Part of the answer lies in looking at how people at the time assessed the effects of surgical treatment, how they defined success and failure in their historical context.

It is obvious that surgery as a technology has gone through major change. It is equally obvious that the analysis of such technological change is crucial for understanding how modern surgery in its present form developed.²³ To deal with this question, in the past few decades many historians have used the concept of innovation as a framework. Originally, the idea of innovation was introduced to overcome historians’ exclusive focus on discovery and invention and to avoid naïve and teleologically charged views of ‘progress’ and ‘advance’. Looking at technological change as innovation has helped to investigate the wider conditions of successful new practices and knowledge in the context of the prevailing social, political and economic conditions.²⁴ More recently, scholars have viewed the innovation framework more critically. Sally Frampton has argued that the model only works well if technologies remain identical over time, but this is often not true in surgery, where

practices shift continually.²⁵ One can claim that the usefulness of the distinction between innovation, invention and diffusion is questionable in a situation where ‘both the context and the technology of a surgical innovation are liable to change.’²⁶ The whole notion of a linear development of surgical innovation runs the risk of making the acceptance of new techniques look inevitable, over-simplifying its often complex and convoluted character. It is rare, for example, that the idea of a new procedure leads directly to its use. Normally the ‘relationship between theory and practice in the construction of a “new” operation’ is ‘complex and circular’.²⁷ In many cases, there is no clear direction of innovation pointing from scientific theory to surgical practice. In the introduction of antisepsis and asepsis, for example, scientific research in the laboratory and surgical practices stood in complicated mutual relationships.²⁸ Moreover, many new techniques in surgery were first used in practice and only later justified by scientific research, for example, osteosynthesis (the operative treatment of broken bones with metal implants, such as plates and screws). Instead of a linear development, one can use a metaphor from science and technology studies and think of the rise of modern surgery as the emergence of a network of various and heterogeneous technologies of control. Thus, the introduction of a technology like osteosynthesis can be analyzed as ‘the building of a complex network of specific practices, actors and objects linked to different localities’.²⁹

SOCIAL HISTORY

The focus of historical research on surgery has not always been on its technical and material aspects. Since the rise of the social history of medicine from the 1970s onwards, historians have turned towards a wide range of social groups involved in surgery—practitioners and their patients, the patients’ families, nurses, manufacturers and dealers of instruments, regulators and legislators and so on—as well as to the various institutions—hospitals, schools, colleges, universities, professional organizations—that played a role in its history.

Some of the research has focused on patients’ roles in surgery. The people whose bodies undergo surgery were, of course, central to the development of the field. And the rise of modern surgery was only possible to the extent that patients were interested in it and trusted practitioners enough to undergo it. Along these lines, more recent work has tended to emphasize the active role that patients took in decision-making, showing, for example, that in many situations, the patients rather than the doctors pushed for surgery. Moreover, it has been established that the surgeon-patient dyad is too narrow. Patients’ families and friends, but also the wider public, have played into these decisions in important ways.³⁰ Seen from a history of technology point of view, in surgery, the provider–user relationship tends to be more complex than in most of the history of medicine. The primary user of surgical technology is the surgeon, but the surgeon applies the technology to another participant

in the setting, a patient, who thus becomes in a way the end-user of surgical technology and, in certain instances, an active participant in the employment of new tools and techniques.³¹ In this handbook, patients figure as central agents in several chapters, for example the ones on popular culture, on emotions, on women, on cancer and on bariatric and cosmetic surgery.

The theme of patients and, related to that, of public opinion lends itself to taking a cultural-history perspective and explore the dimension of meaning in surgery. The examination of cultural interfaces between surgery and other spheres of life is a common topic in history, as evident in this handbook not only in the chapters on emotions, art, popular culture but also in the neurosurgery chapter, for example. Many historians of surgery have aimed at a cultural contextualization and examined how cultural conditions have shaped surgery and vice versa, often in relationship to a particular cultural topos with connection to other areas of life, for example the idea of conquest, which can be found in colonialism as well as in surgery, as Christopher Lawrence and Michael Brown have described it in a recent paper.³²

Most of the social history of surgery, however, has focussed on occupational history and, in most cases, has used the framework of professionalization theory to this purpose. This perspective makes the professional and economic interests of the various groups involved in medicine visible. Its use was very much a critical reaction to a traditional medical historiography that seemed to centre too much on the triumphal progress of medical science brought about by supposedly heroic and selfless doctors and scientists.³³ The emphasis on the profession is not specific to surgery. Much of the history of medicine deals with the history of the occupational groups providing medical services. The standard narrative starts with pre-modern and Early Modern medical pluralism, which, in the course of the eighteenth and nineteenth centuries, was replaced by the dominance of one united medical profession. In the setup of medical pluralism, there was not one medical profession but a whole range of occupational groups, often with fuzzy boundaries.³⁴ Social historians such as Roy Porter have looked at Early Modern healthcare as a consumer-driven marketplace, in which providers were competing for economic advantage.³⁵ In much of this work, distinctions between the different groups of health practitioners have not been taken for granted but examined as to their social and economic dynamics.³⁶ Within this framework, practitioners who performed surgical acts can be found in many different contexts and cannot be easily subsumed under one general term. Capturing this heterogeneity requires a perspective that goes beyond medicine in a narrow sense and includes a whole range of occupations and businesses, encompassing activities such as barbering and musical instrument making, which were both sometimes combined with surgery. In this way, the history of surgery can provide a broad perspective helpful for re-interpreting the history of health care provision more generally. However, despite this heterogeneity, it is possible to describe a long-standing tradition of surgery in the West, a tradition that could later be adopted by modern surgeons as their own.

The subsequent sections of this introduction present the different chapters and provide a brief characterization of their contribution to the overall topic of the history and historiography of surgery with particular emphasis on what is special about the history of surgery. For practical reasons, the chapters are grouped into three parts. Part I: ‘Periods and Topics’ contains chapters on basic themes in the history of surgery. Part II: ‘Links’ is about approaches and subjects from outside the history of surgery that are applied to this field. Part III: ‘Areas and Technologies’ includes examples from the history of particular topics and how they can be examined through novel approaches.

PERIODS AND TOPICS

Among the scholars of various backgrounds who have approached the history of surgery from different angles, surgeons probably represent the group with the longest tradition. Since antiquity, surgical authors have documented, described and evaluated their predecessors’ techniques and theories. In his chapter ‘[Surgery and Its Histories: Purposes and Contexts](#)’, Christopher Lawrence analyzes how surgeons in the past have written their own history. For the longest time, this was not done for conducting historical research in our sense of documenting and explaining how things were in the past and how further developments led up to what we have in the present. It was done for the purpose of providing information about technical points in a direct way. However, at the same time, evoking surgeons from the past and their work was often a way of claiming particular identities for surgical practitioners. Practitioners could thus use history to form an identity distinct from that of their colleagues who did not cut into their patients’ bodies; they could also use history conversely, to emphasize the commonalities they had with different groups of practitioners, thus claiming surgeons’ membership in the medical profession. Thus, starting with the Hippocratic texts, surgery has been repeatedly identified as a special mode of treatment that medicine has to offer. However, the idea that surgery as an identifiable and comprehensive field of knowledge and practice can only be traced back in the West to the twelfth and thirteenth centuries. At that time there were also groups of healthcare providers who specialized in surgical work and made their living by performing some form of surgery. They varied widely in terms of education and social and economic status. In the milieu of towns, over time a distinct hierarchy of surgical practitioners developed, ranging from university-trained learned surgeons to part-time practitioners and itinerant specialists for particular interventions.

In the late Middle Ages and Early Modern period surgery as field of activity was dominated by a craft tradition, which unfolded a strong, expansive dynamic in the medical marketplace. The field of surgery parted ways with medicine, participated in the specialization of trades and differentiated itself as a craft organized in the form of guilds. Such surgical guilds, with their specific form of training through apprenticeship, appeared in many towns and cities in various parts of Europe during the fourteenth and fifteenth centuries.

These craft surgeons, often joined by the more numerous barbers, became the specialists for external diseases and emergencies. They played a central role in the provision of general healthcare services at a larger scale in most parts of Europe until the second half of the nineteenth century. Within this general trend there was a great deal of fluidity and diversity, and the separation of medicine and surgery remained partial and incomplete. Often professional status was linked with particular practices. Thus, surgeons' status suffered from their association with bodily work and in particular with cutting and the shedding of blood. Their variable identity and their often-contested status was reflected, claimed or challenged in histories of surgery, with their various claims about the genealogy and social place of surgery.

The chapter on surgical historiography can be read side-by-side with Faith Wallis' chapter on traditional surgery, '[Pre-Modern Surgery: Wounds, Words, and the Paradox of "Tradition"](#)'. This chapter puts the focus on the production and transmission of surgical knowledge through texts from the Hippocratic corpus to the end of the eighteenth century, discussing the methodological issues associated with this approach. One of the methodological challenges consists of the changing definitions of surgery in varying historical contexts. Thus, surgery can, for example, be defined as either an activity or a professional field. For a long time, as we have seen, surgery was indeed a practice performed by various kinds of health practitioners. When medieval surgeons started becoming visible as an occupational group in craft and in academic contexts, the written tradition provided the opportunity for the crystallization of surgery as a subfield within medicine.

In the chapter '[Medicalizing the Surgical Trade, 1650–1820: Workers, Knowledge, Markets and Politics](#)', Christelle Rabier looks at the changing occupational positioning of surgeons in the context of Early Modern medical pluralism up until the early nineteenth century. Recent historiography on this topic has taken its cues from the history of occupations and examined the labour market and practitioners' careers as well as changing patterns of consumption of medical services and goods in the population. In doing this, historians transcend the limits of the field of medicine, taking into account the multiplicity and variability of practitioners who offered surgical services. Along with this new orientation and in accordance with the material turn in history, practices and objects have been taken more seriously for their role in defining not only the field but also the identity of practitioners. These new approaches, as Rabier points out, offer less teleological and present-centred accounts of surgeons' professional status than do the studies conducted within the framework of professionalization theory.

Peter Kernahan's chapter, '[Surgery Becomes a Specialty: Professional Boundaries and Surgery](#)', deals with how surgery, once it was part of the medical profession, went on to become a special field of activity within this profession, and how, subsequently, this field underwent further sub-specialization. Using Andrew Abbot's concept of jurisdiction as an explanatory tool to understand these processes, he looks specifically at surgical associations and other organizations that claimed authority over the regulation of surgical

practice. Thus, once more, the identity of surgery was not determined by the nature of things; it was an object of negotiation. Major operations, for example, which characterize the domain today, became constitutive for the field of surgery only in the course of the nineteenth century. The examination of different national contexts, in this case the UK, France, Germany and the USA, emphasizes the contingent nature of such defining criteria.

One other boundary, between surgeons and veterinarians, was to determine which kind of patients practitioners treated. However, even this seemingly clear delimitation was subject to negotiations, as described by Abigail Woods in her chapter ‘[Between Human and Veterinary Medicine: The History of Animals and Surgery](#)’. Thus, some practitioners treated both humans and animals; others were specialized in certain animal species, usually horses; moreover, some lay practitioners performed only very specific interventions, for example spaying. In general, animals figure in surgery in at least three different roles: first, they can be patients; second, they can be used as animal models in experimental science, where they stand in for humans; third, they can be the source of organs for xeno-transplants. The last two roles are predicated on the fact that animals are physically close enough to humans to replace them for experiments or organ retrieval but, at the same time, different enough in their ethical status to be used against their own interests in such ways—an arrangement that the philosopher Philippe Descola has called ‘naturalistic ontology’.³⁷ With regard to surgery, these examples also raise the question of categorical limits: to what extent can we call animal experiments surgery, or, for that matter, castration or organ retrieval? Besides being of interest for the history of surgery, the examination of the contradictory roles of animals in this domain provides fascinating insights into the history of the human–animal relationship more generally, representing its changes and contradictions in a condensed manner.

Boundaries created by inclusion and exclusion of practitioners are also central for the study of women in surgery. In the chapter ‘[Women in Surgery: Patients and Practitioners](#)’, Claire Brock discusses the history of women as practitioners and as patients. Until quite recently, operative surgery has been considered a practice that women were incapable of performing. Women were, however, very much deemed suitable objects of surgical intervention. Consequently, in many historical accounts the female patient figures as the narrative counterpart of the male surgeon—the passive victim of male aggression. As Brock argues in this chapter, it is worth overcoming this dichotomy and reconstituting women’s agency in both roles, surgeon and patient, without however, losing sight of the real limits set for women in their role as practitioners and as patients.

The importance of gender in the history of surgery also becomes obvious if one looks at the role of nurses in the development of modern surgery, as Rosemary Wall and Christine E. Hallett do in the chapter ‘[Nursing and Surgery: Professionalisation, Education and Innovation](#)’. The emergence of modern surgery was not just a result of surgeons’ activities. It was dependent on a whole range of other actors who are less visible in most histories of surgery. Nurses took on various crucial tasks in connection with surgery

and were thus of particular significance. Unlike surgery, nursing has for a long time typically been a female occupation. It is, therefore, interesting to see in which ways women as nurses were integrated into the male-dominated domain of surgery. They were, for example, kept away from the cutting part of surgery—the intervention into the integrity of the body. Instead they were relegated to supposedly feminine tasks associated with household chores, such as cleaning and tidying. In the surgical division of labour, nurses were attributed functions of assistance and of caring, passing instruments to the surgeon and looking after the needs of the patient. However, with the growing importance of technology in surgical practice, the range and number of the nurses' duties increased too. They took on new jobs, tending not only to the increasingly sophisticated armamentarium of surgical instruments but also to anaesthesia, antisepsis and asepsis, as well as to the act of monitoring the patient's vital functions, thus contributing centrally to the further development of surgery in general.

The expansion of surgery can be examined particularly well by looking at abdominal surgery, arguably the most important example of surgery's broadening domain of activity within the body. The ability to perform surgery in the abdomen was crucial for the new function of modern surgery of treating internal disease. Many of the bread-and-butter operations in general surgery, such as cholecystectomy and appendectomy, are interventions into the abdominal cavity. In the chapter '[Opening the Abdomen: The Expansion of Surgery](#)', Sally Frampton discusses the various conditions—technical, conceptual, professional—that made abdominal surgery possible and desirable as a routine intervention and looks at how, in turn, this new practice shaped the identity and self-image of surgery as being progressive and modern.

It is well known that anaesthesia was one of the technologies that contributed most to the growth and special character of modern surgery. As Stephanie Snow discusses in her chapter, '[Surgery and Anaesthesia: Revolutions in Practice](#)', surgery was already on a trajectory of expansion when anaesthesia was introduced in the 1840s. Interestingly, suitable substances had already become available decades before, but at the time using them for anaesthesia was not within the scope of imagination because pain and consciousness were seen as inseparable from life. The space for painlessness without dying only opened up with new ideas about the physiology of consciousness and death in the nineteenth century. In addition, at that time, surgery had become more sophisticated. This often meant that operations took more time than before, so the need for suppressing operative pain had increased. The use of anaesthetics, in turn, changed the character of surgery in significant ways. As mentioned earlier, with anaesthesia, the patient as a person was in many ways absent during the operation. Surgeons no longer needed to interact with their patients while operating. More than ever, the patient's body could be treated as the working material of the surgeon's art. On the one hand, this made operating easier. On the other hand, the patients' unconsciousness increased their susceptibility to failure of their vital functions and thus required more

attention to monitoring the organism's condition during the operation. All of this made surgery even more different from other forms of medical therapy.

In the mid-nineteenth century, shortly after the introduction of anaesthesia, surgeons' attention was drawn to another source of danger for the patient's opened-up body. They noticed an increase of post-operative mortality caused by wound disease: some time after the surgery itself, wounds would start suppurating, patients would get very sick and feverish and many of them would die. The phenomenon seemed to be somehow related not only to the conditions of the wound but also to the operative environment and the operator's cleanliness. As a reaction, many surgeons, in particular in the UK, developed special technologies of cleanliness aimed at preventing such wound complications. Some of them turned to the emerging germ theory of disease and made the presence of microscopic life forms responsible for the problem. The most important surgeon to do that was Joseph Lister, who developed antiseptics as a special technique for eliminating germs in the wound by applying carbolic acid. This strategy remained controversial for a long time. It was eventually supplemented by asepsis, a method of keeping wounds and the surgical environment germ-free in the first place. In the chapter '[The History of Surgical Wound Infection: Revolution or Evolution?](#)', Michael Worboys describes the emergence of these key technologies of modern surgery and discusses their various genealogies as well as their reception and spread in surgery. Like other cases, this example raises the question of how technical change occurs in surgery, why some technologies get accepted while others are rejected and how they changed surgery as a result. In addition, the topic is a good example for the difficulties of determining the success of treatments in the past. Did antiseptics really work? Historians have, in fact, been able to identify a significant decrease of surgical mortality following the introduction of the technology. But was antiseptics the cause of that improvement? Mortality might have decreased because other factors changed at the same time. Maybe surgical patients were better nourished and healthier than before. Maybe concurrent, but independent, improvements in cleanliness in hospital wards and operating venues are to be credited for change. Maybe mortality dropped because the use of antiseptics led to more conscientiousness and cleanliness in operations, so that what we see is in a way an unintended side effect of antiseptics. These issues are not limited to the problem of wound disease. They come up whenever historians try to determine the effects of medical measures in the past, but they are particularly obvious in surgery.

The most basic elements of all surgical techniques are instruments. As surgeon-historian John Kirkup has noted, surgery requires tools for cutting, grasping, holding and connecting living tissues.³⁸ Without such technological means, practitioners would not be able to make cuts in a precise and controlled way, see and manipulate body structures efficiently, keep the patient's organism from bleeding to death and restore its contiguity by closing it up after the surgery. The history of instruments illustrates the central importance of the material dimension in the history of surgery, a dimension that Claire L. Jones discusses in her chapter, '[Surgical Instruments: History and](#)

Historiography’ and which is of interest for all of medicine, especially for surgery. Jones’ chapter discusses different approaches to material history and how they can be made useful for understanding the evolution of surgery. This approach raises the question of what role objects themselves can have in such a history—not just in terms of the invention of new instruments but also in their everyday use, their multiple connections to different practices, to other objects and to various historical actors, and how these multifaceted links can be represented in historical accounts, for example as elements of heterogeneous networks.

LINKS

One dimension of the material history of surgery is the history of the development of the built environment for surgery. In the chapter **‘Surgery and Architecture: Spaces for Operating’**, Annmarie Adams discusses how surgery, more than other medical practices, has had a specific relationship to the spaces in which it has been performed. The spaces for surgery can be conceptualized as nodal points in the network of control technologies of modern surgery. They have been set up to enable control in various ways: they provide good lighting (and often imaging technology to enhance visual control), clean air and a calm, closed-off space, free of dirt and germs, equipped not only with instruments but also with operating tables and other means of enabling manual accessibility. The development of such spaces can be seen as reflecting the technological advances of modern surgery; but they can also be seen as producing such advances. Accordingly, surgeons come into the picture not only as the users of these spaces but also as their designers. However, practical functionality is only part of the story. Architecture always has a symbolic dimension too, which is closely connected to developments outside of surgery, for example the rise of modernism as a style in architecture. The symbolic side in material history is of considerable significance, since it also shaped, in its own way, the conditions for the rise of modern surgery.

Harriet Palfreyman and Christelle Rabier discuss, in their chapter, **‘Visualizing Surgery: Surgeons’ Use of Images, 1600–Present’** another aspect of surgery’s material history: the production and use of images by surgeons. Surgery as a practice has a strong visual and tactile dimension, which is difficult to convey in words. Therefore, practitioners have often attempted to use pictures in order to describe their practices and pass them on to their colleagues. At the same time, as this chapter emphasizes, images helped to construct a special surgical identity associated with the use of sharp instruments and the knowledge of anatomy. In this way, images participated in the process of characterizing surgery as a specific branch of medicine, as a physical craft in charge of manipulating the patient’s body.

In terms of visual media, surgery has also been a subject of the visual arts for a long time. Works of art have showcased the bodily dimension of the field, focussing in different ways on surgeons’ interventions into their patients’ bodily integrity, often depicting the patient as a passive object of

intervention in contrast to the active surgeon. In such representations, the surgeon's body, in particular his (it's mostly men who have been represented) hands, frequently take centre stage. In the chapter '[Art and Surgery: The Expert Hands of Artists and Surgeons](#)' Mary Hunter describes these features and draws the parallel between art and surgery, characterizing both as visual and haptic practices, equally centred on the hands as their primary tool. Visual art thus represents the special character of surgery as well as the special role of the surgeon—often idealized in a variety of ways. Surgeons are portrayed not only as competent and in control but also as empathetic and caring. However, as the chapter clarifies through its focus on three different cases, art reflects and creates surgeons' identities differently in different historical contexts.

Emotions are one of the main subjects of surgical representations in art. In his chapter '[Surgery and Emotion: The Era Before Anaesthesia](#)' Michael Brown draws the connection between the history of surgery and the history of emotions. He focusses on the pre-anaesthetic period and situates the emotions elicited by surgery within the 'emotional regime' of the time period, contextualizing the expression of feelings and the discourse about them within the standards and expectations of the time and its specific culture of sentiment. The way emotions were talked about also needs to be linked to other aspects of the contemporary context, such as, in this case, professional politics within surgery. This explanatory strategy is also applicable to other time periods up to the present. What is specific to surgery are the emotions associated with the violation of the body's integrity, be it by cutting into someone's body or by being operated on as a patient. Thus, surgery's transgressive character as well as the high stakes involved in its performance are often seen as requiring a special emotional set-up on the surgeons' part. Operators have to distance themselves emotionally from what they do. This chapter shows that this notion is by no means straightforward. Whether, and in which ways, emotional distance was seen as a positive attitude depended very much on the context. At a more general level, discussing emotions in history raises the fundamental question to what extent feelings are universal and time-independent or contingent and shaped by the environment of their time. This issue is particularly striking in the context of surgery because of the field's proximity to bodily concerns.

Emotional reactions to surgery have also shaped the popular culture around the domain, as discussed by Susan E. Lederer in the chapter '[Surgery and Popular Culture: Situating the Surgeon and the Surgical Experience in Popular Media](#)'. What has made surgery interesting to the wider public is its transgressive quality—the cutting into the body—and its potential healing effect, which gives it an almost miraculous aura. This is also why some domains in surgery have been of particular interest to the lay public—usually operations that went beyond the limits of what is normally done in medicine. Transplantation, for example, as a practice that involves removing a body part or organ from one organism and letting it grow in another one, has been perceived as a direct assault on commonly accepted notions of personal identity.

Popular culture has expressed this kind of conflict through fantasies about chimaeras and composite beings made out of different species by crazy-scientist-type surgeons. Surgery on the heart and the brain elicited similar fears, since both organs were seen as the centre of life and the seat of personal identity. However, for the most part, popular culture has portrayed surgeons as heroes of modernity and has linked the field to ideas of progress. In the US context, popular media also cast the patients in the role of consumers who are looking for the best product and the best service for their money.

A very different context was present in the colonial settings outside the European and North American centres of modern medicine. Examining these settings provides historians with the opportunity to investigate the conditions of the world-wide spread of Western surgery and describe how, in the process, it was reinterpreted and modified. Such research is of particular interest in a world of ongoing and accelerated globalization, with medicine and surgery as important arenas. In the chapter ‘[Surgery, Imperial Rule and Colonial Societies \(1800–1930\): Technical, Institutional and Social Histories](#)’, Kieran Fitzpatrick turns to India in the nineteenth and early twentieth centuries as one setting of colonial medicine. He shows how this context shaped both the performance and the perception of modern surgery and discusses ways in which historians can capture and analyze this phenomenon. This chapter can only be a first foray into the potentially extremely rich research field of the global spread of modern surgery beyond the Western world, an area which has been so far sorely neglected by medical historians.

Another special context of surgery is war. In historical discussions, particularly in lay circles, but also among surgeons and sometimes among historians too, warfare is often associated with innovation in surgery. It is common to claim that surgery among all medical fields owes much of its development to war. In the chapter ‘[Surgery and War: The Discussions About the Usefulness of War for Medical Progress](#),’ Leo van Bergen takes a critical look at this claim with regard to World War I, tracing it back to its origins and analyzing the controversial discussions around it. The most convincing objection against the benefit of war for surgery concerns the specificity of innovations made in times of war. Many of them don’t carry over easily into peacetime surgery. Moreover, the conditions in wars are usually unfavourable for research and innovation: lack of time, lack of resources and flagrant violation of ethical principles all make wars bad breeding grounds for new techniques that would be of value in times of peace.

AREAS AND TECHNOLOGIES

Among the various technologies of modern medicine, transplant surgery is arguably one of the most spectacular. As Sibylle Obrecht discusses in her chapter ‘[Transplantation Surgery: Organ Replacement Between Reductionism and Systemic Approaches](#),’ transplantation, like no other surgical practice, embodies the promise of modern surgery to offer a technological fix for complex

medical problems. But at the same time, the treatment method has raised particularly urgent concerns about modern surgery. One reason is that transplant surgeons intervene into more than one body; as mentioned earlier, they need to obtain tissues or organs from another body, which in the case of living donors is completely intact. In addition, for critics, transplant surgery often stands for a mechanized view of the human body as a kind of machine repairable through the use of spare parts. The rationale of this technology is based on the concept that the body can be fragmented into exchangeable elements. However the biological limits of exchangeability have forced surgeons and scientists to re-conceptualize the organism as a holistic system that possesses and defends its own individuality. To deal with these contradictory aspects, surgeons have needed to enter into close collaboration with other specialists, such as immunologists, with the result that the surgical act itself has become just one element in the transplant procedure. In this chapter Obrecht argues that a differentiated investigation of these complex matters helps to better understand the history of such spectacular interventions as transplantation beyond simplistic stories of conquest and mechanization of the body.

Neuro- and brain surgery has been another taboo-breaking area. Like the abdomen, the interior of the skull was a long-standing forbidden zone for surgeons. Delia Gavrus analyzes how, in the North American context, those practitioners who ventured into this zone subjected themselves to special professional norms. For one, these norms required highly developed skills and technical precision as well as knowledge based in experimental science. But they also demanded superior ethical standards. American neurosurgeons created a specific group ethos of restraint and responsibility for their practice. This ethos was strictly enforced in order not to jeopardize the trust that the public had set in the new discipline of neurosurgery. This rigour became even more necessary, as public imagination about brain surgery tended towards extremes of both enthusiasm and anxiety. By including the multiple dimensions of the establishment of such a specialized group of doctors, Gavrus' chapter, '[Opening the Skull: Neurosurgery as a Case Study of Surgical Specialisation](#)', exemplifies how specialties, sub-disciplines or areas of practice can be examined at the various levels of practices, knowledge, institutional organization and cultural meaning.

As stated earlier, the rise of modern surgery depended crucially on its acceptance by patients. The history of patients in surgery is the main focus of David Cantor's chapter '[Cancer: Radical Surgery and the Patient](#)'. Because of its physical character, its often stark consequences and the risks involved, surgery is a particularly suitable field for exploring the changes in the role of patients in medical decision-making. This is even more true in the case of radical surgery for cancer. There, historians can study the extremes of, on the one hand, the complete marginalization and exclusion of patients from therapeutic choices and, on the other hand, more recent attempts to have the patient take on the whole burden of therapeutic and diagnostic responsibility. This example also shows the importance of the wider context for examining the history of patients and the need to go beyond a dyadic and idealized doctor–patient relationship to properly understand the patient's role in medicine. As the