The Third Dimension of SURGERY

Role of technology in surgery is ever expanding and this book aims to elevate the readers' understanding of technology in surgery so that they are able to derive maximum benefit in terms of better clinical outcomes.

This book covers technologies like energy sources, medical lighting, medical vision, metals in surgery and technologies for future of surgery.

Each chapter is well structured, starting with simple concepts and builds on it to progressively. The language is simple and the comprehension is supported by apt illustrations. All the recent advances in the field have been covered. The book contains many practical tips and troubleshooting guides that are of immediate help.

Sudarshan Nagaonkar is an MTech from IIT Bombay with passion for life and technology. He is active in surgery technology space for more than a decade. He has presented to more than 800 surgeons and 1,000 biomedical engineers on various surgery technologies. He is certified for Fundamental Use of Surgical Energy (FUSE) by Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). He is currently serving as a committee member of FUSE Committee of SAGES. He is currently Director, Precious Life Medical Technologies Private Limited, Bengaluru.

Girish Gangan is a MS from Georgia Tech, Atlanta, USA. He is passionate about metallurgy and mechanical engineering, He is active in surgical instruments for close to two decades and has served more than 10,000 surgeons. He is currently Director, Uma Surgicals Private Limited, Mumbai.

This book will help you to make the right choice of technology in surgical practice.
—Dr. G Siddesh, Past President, ASI

"All the advances in medicare enhancing patient safety and physician comfort in the past few decades are a projection of advances in Technology/ Engineering ..."
—Dr Roopesh N
Lead Consultant-
Gynecologic Onco-Surgeon and Peritoneal Cancer Surgery Specialist,
Sparsh Hospitals, Bangalore

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CBSPD
CBS Publishers & Distributors Pvt Ltd
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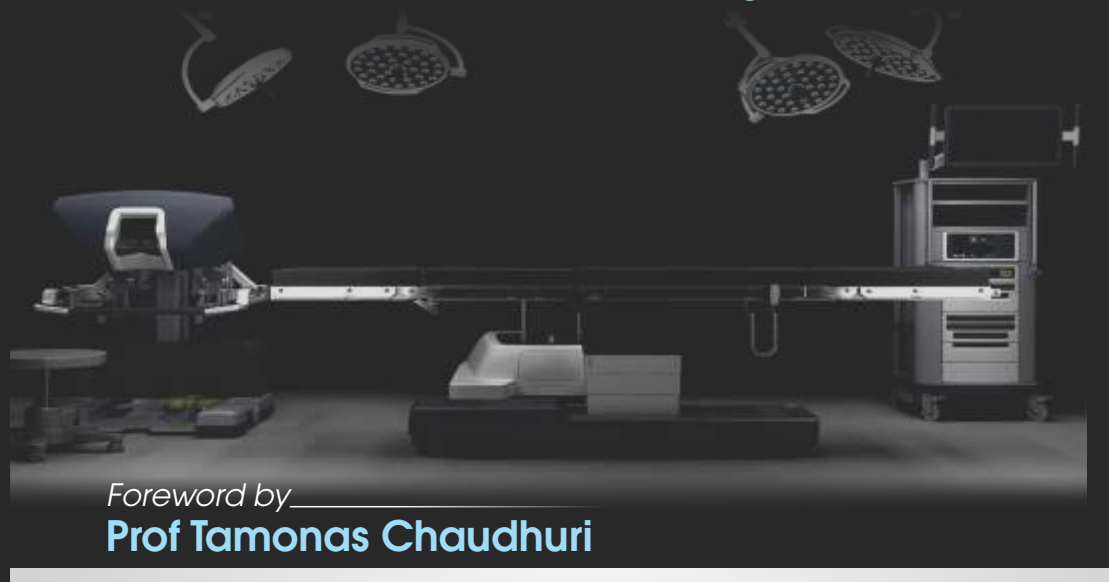
Five Critical Technologies Demystified for Safer and Easier Surgery



Foreword by
Prof Tamonas Chaudhuri

Sudarshan Nagaonkar
Girish Gangan

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Sudarshan Nagaonkar
MTech (IIT, Bombay)
Director
Precious Life Medical Technologies Pvt Ltd.
Bengluru
email: ceo@preciouslife.co.in

Girish Gangan
MS (USA)
Director
Uma Surgicals Pvt Ltd.
Mumbai
email: girish@umasurgicals.com

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Ph: 011-23289259, 23266861 e-mail: delhi@cbspd.com Website: www.cbspd.com

Corporate Office: 204 FIE, Industrial Area, Patparganj, Delhi 110 092, India
Ph: 011-49344934 Fax: 011-49344935 e-mail: publishing@cbspd.com;
publicity@cbspd.com

Branches

- **Bengaluru:** Seema House 2975, 17th Cross, KR Road, Banasankari 2nd Stage, Bengaluru 560 070, Karnataka, India
  Ph: +91-80-26771678/79 Fax: +91-80-26771680 e-mail: bangalore@cbspd.com
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- **Kochi:** 42/1325, 1326, Power House Road, Opposite KSEB, Power House, Ernakulum 682 018, Kochi, Kerala, India
  Ph: +91-484-4059061–67 Fax: +91-484-4059065 e-mail: kochi@cbspd.com
- **Kolkata:** 147, Hind Ceramics Compound, 1st Floor, Nilgunj Road, Belghoria, Kolkata 700 056, West Bengal, India
  Ph: +91-33-25330055/56 e-mail: kolkata@cbspd.com
- **Lucknow:** Basement, Khushnuma Complex, 7 Meerabai Marg (behind Jawahar Bhawan), Lucknow 226 001, UP, India
  Ph: +91-522-4000032 e-mail: tiwari.lucknow@cbspd.com
- **Mumbai:** PWD Shed, Gala No. 25/26, Ramchandra Bhatt Marg, Next JJ Hospital Gate No. 2, Opp. Union Bank of India, Noorbaug, Mumbai 400 009, Maharashtra, India
  Ph: +91-22-66661880/89 e-mail: mumbai@cbspd.com

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Foreword

It is my pleasure to introduce you *The Third Dimension of Surgery*. This book is a comprehensive guide to the technological advancements in the field of surgery, starting with the most common technologies like energy sources to the most promising technologies in the field.

The book is divided into six chapters, each of which focuses on a specific technology, the fundamental concepts and its applications in surgery. The book is authored by an expert in this field, who has provided a detailed overview of the technology, its current state of development and potential impact on the future of surgery.

Being a surgeon and as an interested person in the technological aspects in the field of surgery, I am particularly excited about the potential of these technologies to revolutionise the field. From robot-assisted surgery to 3D printing, these technologies have the potential to improve patient outcomes, reduce complications, and make surgery safer and more efficient.

I hope that this book will serve as a valuable resource for anyone who is interested in learning about the latest technological advancements in surgery. I would like to thank Mr Sudarshan for his sincere contribution and effort to this book, and I hope that entire surgical fraternity finds it informative and engaging.

Prof Tamonas Chaudhuri
MBBS, MS. FAIS, FMAS, FACS
Professor
Department of Surgery
Burdwan Medical College
Purba Bardhaman, West Bengal, India
Consultant
ILS Hospitals, Kolkata
West Bengal, India

Preface

Congratulations on buying this book. This shows your commitment to learning about technologies related to surgery and you have already separated yourself from others.

Success in surgery depends on understanding of anatomy, surgical hand and the technology. Anatomy is mastered by the surgeons as part of their graduate and postgraduate studies; the surgical hand gets better with practice. It is the technology part that is less emphasised even though its role in surgery is expanding ever. This book exclusively focuses on the technology aspect of surgery and that is why title of the book is *The Third Dimension of Surgery*.

This book has been written for surgeons to help them in two ways viz. (i) when they buy a technology product, they are better equipped to have meaningful discussion with the vendors and select the right product for them and (ii) use their technology assets in safe and effective manner. The practicing surgeons can use this book as a reference to understand a specific technology deeper either because of an impending buying decision or the need to train their staff on a specific topic is felt.

This book is also useful to the postgraduate students, to get them headstart in surgery technology domain. They will be able to apply this understanding during their postgraduation and also start their surgery practice on a more sound footing.

Some biomedical engineers may find this book useful. This book is recommended to them only after they have some exposure to surgery, and they have keen interest in a particular product.

The first two chapters cover energy sources, which is probably the most important piece of technology in the surgeon's life. The chapters cover electrosurgery, including monopolar, bipolar, vessel sealer, saline bipolar, ultrasonic scalpel and laser.

The third chapter covers medical lighting with special emphasis on OT light.

The fourth chapter covers medical optics. It covers laparoscopic camera, medical grade monitors and other related technologies for vision.

The fifth chapter covers the role of metals in surgery. This chapter covers the metallurgy in surgery, types of surgical instruments, selection criteria for instruments, tips for effective use of them and storage and handling instructions.

The sixth chapter covers the upcoming technologies, which are likely to have big impact on practice of surgery in the next few decades. The chapter covers robotic surgery, artificial intelligence with emphasis on machine learning, virtual reality, augmented reality and 3D printing.

Each chapter gets the reader familiar with the basic terms, explains the fundamental technology concepts, covers the practical tips for safe and effective surgery. Some chapters also have basic troubleshooting guide for some common problems.

The book is intended to become more practical than academic. Hence, simplicity has been prioritised against technical accuracy.

I am thankful to all the professionals from whom I have learnt these concepts and there are too many to enumerate. If the book has come out well, the credit goes to them. If there are errors or scope for improvement, those are because of my limitations. Please bring them to my notice and I will try to improve the content in the next edition.

My heartfelt thanks to my family members, who supported me in my pursuit of knowledge at the cost of family time. I thank Vibhor Anand for suggesting the book title. I also thank the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) for lightening the quest for knowledge in me.

Sudarshan Nagaonkar

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