



A Users Guide to Holmium Laser Lithotripsy Settings in the Modern Era

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INTRODUCTION

Endoscopic stone surgery has gone through rapid technological advances in the last decade with the development of next-generation holmium lasers. These systems allow the user to adjust multiple parameters that can optimize fragmentation efficiency during ureteroscopy (URS). Parameters include an increased range in pulse energy (PE), frequency (Fr), and manipulation of the pulse duration (PD). More recently, introduction of pulse modulation with the Moses Technology™ provides pulse modulation with energy delivered over two pulses. In light of these developments, it may be difficult for the urologist to understand how to best utilize laser settings in the modern era. We provide an overview of how PE, Fr, and PD affect three different aspects of laser lithotripsy performance: (A) Fragmentation, (B) Stone retropulsion, and (C) Laser fiber-tip degradation (Table 1).

PULSE ENERGY

PE is the optical energy emitted from the laser fiber-tip during one pulse and is measured in joules (J). The PE can vary from 0.2 to 6.0 J and is dependent on the power of the holmium system. Low-power systems (e.g., 20 W) have traditionally had more limited PE power ranges than high-power systems. Factors that influence the selection of PE include stone density, location, and desired fragment size, with commonly utilized settings during URS ranging from 0.2 to 2 J. (A) Fragmentation: Increasing the PE leads to more fragmentation, with hard stones like calcium oxalate monohydrate usually requiring greater PE (1). Higher PE settings such as 1.0 J are ideal for lithotripsy followed by active basket retrieval. Low PE (LoPE) is employed when utilizing a dusting technique to create very small fragments that are left *in situ* for spontaneous passage. An *in-vitro* study found that using a LoPE setting of 0.2 J leads to the smallest fragment sizes (1) but harder stones such as calcium oxalate monohydrate may require higher PE. In our practice we start dusting settings at 0.2 or 0.3 J and increase the energy accordingly based on how much powder is coming off the stone. (B) Stone retropulsion: On activation of pulsed laser energy, the surrounding fluid evaporates and expands, leading to the formation of a vapor bubble. Collapse of this bubble leads to unwanted movement of stone debris, known as retropulsion. PE has a considerable effect on retropulsion, with higher PEs leading to a proportional increase in retropulsion (1). This decreases fragmentation efficiency and increases procedure time by requiring repositioning of the fiber-tip to maintain contact with the stone, and in the worst-case scenario, a ureteral stone may migrate

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Holmium Laser User Manual

**Prokar Dasgupta, John M.
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Handbook of Photomedicine Michael R. Hamblin, Yingying Huang, 2013-10-22 Providing the most comprehensive up to date coverage of this exciting biomedical field Handbook of Photomedicine gathers together a large team of international experts to give you a complete account of the application of light in healthcare and medical science The book progresses logically from the history and fundamentals of photomedicine to di *Arthroscopic Laser Surgery* Allen T. Brillhart, 2012-12-06 Arthroscopic Laser Surgery Clinical Applications is designed to introduce the use of lasers to the orthopaedic surgeon who performs arthroscopic surgery and is the first text of its kind entirely devoted to the unification of these two exciting technologies This groundbreaking work examines the following subjects the basic sciences of laser arthroscopy as well as the history of its development techniques for arthroscopic laser applications in the knee for carpal tunnel release ankle shoulder and much more practical clinical guidelines on its advantages disadvantages and complications technical overview of the laser systems currently in use in the United States and worldwide important safety measures and administrative issues glossary of terms and reference sources Each chapter is written by an arthroscopic laser surgeon distinguished in both his knowledge of the topic addressed as well as by his expertise with that specific laser arthroscopic system Over 120 full color illustrations enhance the presentation The definitive text of arthroscopic laser surgery applications and technique this volume is a must have information source for all orthopaedic surgeons [Handbook of Lasers](#) Marvin J. Weber, 2019-04-30 Lasers continue to be an amazingly robust field of activity Anyone seeking a photon source is now confronted with an enormous number of possible lasers and laser wavelengths to choose from but no single comprehensive source to help them make that choice The Handbook of Lasers provides an authoritative compilation of lasers their properties and original references in a readily accessible form Organized by lasing media solids liquids and gases each section is subdivided into distinct laser types Each type carries a brief description followed by tables listing the lasing element or medium host lasing transition and wavelength operating properties primary literature citations and for broadband lasers reported tuning ranges The importance and value of the Handbook of Lasers cannot be overstated Serving as both an archive and as an indicator of emerging trends it reflects the state of knowledge and development in the field provides a rapid means of obtaining reference data and offers a pathway to the literature It contains data useful for comparison with predictions and for developing models of processes and may reveal fundamental inconsistencies or conflicts in the data

Handbook of Laser Wavelengths Marvin J. Weber, 2018-10-08 This volume represents the most complete up to date compilation of wavelengths of lasers in all media Divided by type solid liquid and gas and listed in order of increasing wavelength Handbook of Laser Wavelengths includes crystalline paramagnetic ion lasers glass lasers color center lasers semiconductor lasers polymer lasers liquid and solid state dye lasers rare earth liquid lasers neutral atom ion and molecular gas lasers extreme ultraviolet and soft X ray lasers free electron lasers nuclear pumped lasers lasers in nature lasers without

inversion Brief descriptions of each type of laser are presented followed by tables listing the laser wavelength lasing element or medium host transition and primary literature citations A special section on commercial lasers is an added featured Handbook of Laser Wavelengths singularly serves as the essential reference for scientists and engineers searching for laser sources for specific applications as well as a survey of the developments that have occurred since the advent of the laser

Biomedical Photonics Handbook Tuan Vo-Dinh, 2003-03-26 A wide variety of biomedical photonic technologies have been developed recently for clinical monitoring of early disease states molecular diagnostics and imaging of physiological parameters molecular and genetic biomarkers and detection of the presence of pathological organisms or biochemical species of clinical importance However available in Handbook of Urology Mike Benjamin Siroky, Robert D. Oates, Richard K. Babayan, 2004 This handbook is a practical easily accessible guide to the diagnosis and treatment of urologic disorders In an outline format that is ideal for rapid on the spot reference the text covers all medical and surgical aspects of urologic practice including endoscopic and laparoscopic surgery This edition includes current information on upper and lower genitourinary tract endoscopy laparoscopic procedures medical treatment of benign prostatic hyperplasia and diagnosis and management of sexually transmitted diseases The text has been reorganized into separate sections one on presenting symptoms and diagnosis and one on medical and surgical treatment of diseases New Technologies in Urology Prokar Dasgupta, John M. Fitzpatrick, Roger Kirby, Inderbir S. Gill, 2010-01-13 Technology seems to be an integral part of modern living Urologists have over the years embraced new technological advances for patient benefit On some occasions however the initial enthusiasm in something new has failed to endure rigorous scientific scrutiny Thus while being technological leaders we urologists know better than most other surgical specialties that what is new is not necessarily good This textbook is aimed at urologists and surgeons at all levels and has contributions from international experts The topics vary from robotics to lasers to single port laparoscopy The comprehensive chapters should be of equal interest to uro oncologists and those involved in treating benign urological diseases While the contents are meant to bring the reader up to date with technological advances the authors have attempted to balance their enthusiasm with basic science translational research and clinical outcomes It will be obvious that some of the subjects mentioned here such as nanotechnology are still evolving and it will be a while before they undergo clinical trials that establish their position in clinical medicine We hope you enjoy reading this book as much as we have enjoyed creating it London UK Prof Prokar Dasgupta Dublin Ireland Prof John Fitzpatrick London UK Prof Roger Kirby CA USA Prof Inderbir S Gill vii Acknowledgements The editors thank all authors for their time and valuable contributions We are also grateful to our developmental editors Joni Fraser and Barbara Lopez Lucio Oxford Handbook of Urology John Reynard, Simon F. Brewster, Simon Brewster, Suzanne Biers, Naomi Laura Neal, 2019 This reference provides a comprehensive summary of urological disease and its management in a concise form While the description of urological conditions is comprehensive the emphasis is on the practical approach to the conditions which are likely to be

encountered Handbook of Laser Technology and Applications Colin Webb, Julian D.C. Jones, 2020-09-29 The invention of the laser was one of the towering achievements of the twentieth century At the opening of the twenty first century we are witnessing the burgeoning of the myriad technical innovations to which that invention has led The Handbook of Laser Technology and Applications is a practical and long lasting reference source for scientists and engineers who work with lasers The Handbook provides a comprehensive guide to the current status of lasers and laser systems it is accessible to science or engineering graduates needing no more than standard undergraduate knowledge of optics Whilst being a self contained reference work the Handbook provides extensive references to contemporary work and is a basis for studying the professional journal literature on the subject It covers applications through detailed case studies and is therefore well suited to readers who wish to use it to solve specific problems of their own The first of the three volumes comprises an introduction to the basic scientific principles of lasers laser beams and non linear optics The second volume describes the mechanisms and operating characteristics of specific types of laser including crystalline solid state lasers semiconductor diode lasers fibre lasers gas lasers chemical lasers dye lasers and many others as well as detailing the optical and electronic components which tailor the laser s performance and beam delivery systems The third volume is devoted to case studies of applications in a wide range of subjects including materials processing optical measurement techniques medicine telecommunications data storage spectroscopy earth sciences and astronomy and plasma fusion research This vast compendium of knowledge on laser science and technology is the work of over 130 international experts many of whom are recognised as the world leaders in their respective fields Whether the reader is engaged in the science technology industrial or medical applications of lasers or is researching the subject as a manager or investor in technical enterprises they cannot fail to be informed and enlightened by the wide range of information the Handbook supplies *Handbook of Transurethral Resection Techniques* M

Anandan, 2019-02-28 Transurethral resection is a surgery used to treat urinary problems due to an enlarged prostate The procedure involves cutting away a section of the prostate This book is an introductory guide to transurethral resection techniques for postgraduate medical students Divided into fourteen sections the text begins with discussion on the history of uroendoscopy and endoscopes and resection instruments The following chapters cover endoscopic anatomy anaesthesia and patient preparation and different surgical techniques for transurethral resection The book concludes with advice on post operative care and potential complications and their management The text is enhanced by clinical photographs diagrams and tables Key points Introductory guide to transurethral resection for postgraduates Provides detail on instruments anaesthesia and different surgical techniques Discusses post operative care and management of complications Includes clinical photographs diagrams and tables to enhance learning **Handbook of Solid-State Lasers** B Denker, E

Shklovsky, 2013-02-20 Solid state lasers which offer multiple desirable qualities including enhanced reliability robustness efficiency and wavelength diversity are absolutely indispensable for many applications The Handbook of solid state lasers

reviews the key materials processes and applications of solid state lasers across a wide range of fields Part one begins by reviewing solid state laser materials Fluoride laser crystals oxide laser ceramics crystals and fluoride laser ceramics doped by rare earth and transition metal ions are discussed alongside neodymium erbium and ytterbium laser glasses and nonlinear crystals for solid state lasers Part two then goes on to explore solid state laser systems and their applications beginning with a discussion of the principles powering and operation regimes for solid state lasers The use of neodymium doped materials is considered followed by system sizing issues with diode pumped quasi three level materials erbium glass lasers and microchip fiber Raman and cryogenic lasers Laser mid infrared systems laser induced breakdown spectroscopy and the clinical applications of surgical solid state lasers are also explored The use of solid state lasers in defense programs is then reviewed before the book concludes by presenting some environmental applications of solid state lasers With its distinguished editors and international team of expert contributors the Handbook of solid state lasers is an authoritative guide for all those involved in the design and application of this technology including laser and materials scientists and engineers medical and military professionals environmental researchers and academics working in this field Reviews the materials used in solid state lasers Explores the principles of solid state laser systems and their applications Considers defence and environmental applications

The Physics and Engineering of Solid State Lasers Yehoshua Y. Kalisky, 2006 This text explains the mutual influences between the physical and dynamic processes in solids and their lasing properties It provides insight into the physics and engineering of solid state lasers by integrating information from several disciplines including solid state physics materials science photophysics and dynamic processes in solids The text discusses approaches to developing new laser materials and includes data tables of basic parameters that can be applied to laser design Novel materials and techniques used in recent developments are also covered

Handbook of Laser Technology and Applications: Laser design and laser systems Colin E. Webb, Julian D. C. Jones, 2004

Radiological Safety Handbook United States. Army. Ordnance Center and School, Aberdeen Proving Ground, Md, 1975

Oxford Textbook of Urological Surgery Freddie C. Hamdy, Ian Eardley, 2017 A comprehensive textbook mapped to the curriculum for urological training as approved by the General Medical Council This core text will be essential reading for both the trainee and specialist in urology in the UK and abroad

Smith's Textbook of Endourology Arthur D. Smith, 2007 Endourology is a dynamic subspecialty involving closed controlled manipulation within the genitourinary tract In the past decade the creative efforts of many urologists radiologists and engineers have vastly expanded endoscopic technique to the great benefit of patients with stones obstruction cancer diverticula cysts adrenal disease varices and diseases of the bladder This definitive text addresses every aspect of endourologic procedure including methods of access operative techniques complications and postoperative care The reader is taken step by step through cutaneous surgery ureteroscopy extracorporeal shock wave lithotripsy laparoscopy and lower urinary tract procedures The principles and function of state of the art endourologic instruments are outlined for each

procedure The authorship reads like a Who's Who in endodurology The breadth and depth of their experience is evident throughout the text *Oxford Handbook of Ophthalmology* Alastair Denniston, Philip Murray, 2014-10-23 Fully revised for its third edition the Oxford Handbook of Ophthalmology is a concise systematic guide to all aspects of diagnosis assessment and ongoing management of ophthalmic diseases and conditions Closely aligned with the curriculum for the ophthalmic postgraduate exams and containing the most up to date clinical guidance and practical advice this is the essential resource for all those caring for ophthalmic patients Covering the key information for both trainees and specialists from clinical methods and the use of ophthalmic instruments to basic perioperative care and advanced life support protocols It includes new chapters covering laser procedures and theatre notes as well as new sections on emerging technologies such as adaptive optics and gene therapy for retinal diseases With expert advice the latest clinical guidance and its easy reference format this unique resource provides immediate access to the information you need when you need it **Oxford Handbook of Ophthalmology** Alastair K. O. Denniston, Philip I. Murray, 2018-10-25 Fully revised and updated throughout the fourth edition of the Oxford Handbook of Ophthalmology now includes free access to the ophthalmic online media bank a selection of high quality clinical images and videos for a wide breadth of key ophthalmic diseases Clear concise and practical this handbook provides immediate access to the detailed clinical information you need in casualty clinic theatre and on the wards The core of the book comprises a systematic synopsis of ophthalmic disease directed towards diagnosis interim assessment and ongoing management Assessment boxes for common clinical conditions and algorithms for important clinical presentations illustrate this practical approach The information is easily accessible presented in a clear format with areas of importance highlighted Key sections for the trainee include Clinical Skills Aids to Diagnosis Investigations and their Interpretation Perioperative Care Theatre Notes and Therapeutics The wider practise of eye care is supported by expanded chapters on Refractive Ophthalmology Vision in Context Evidence Based Ophthalmology and Resources for Ophthalmologists Now including newer treatments across a range of specialities such as SMILE gene therapy and retinal prostheses as well as greater emphasis on the evidence underlying current clinical practice and guidelines this handbook has never been more essential for all those working in eye care Whether you want to learn about patient reported outcomes identify a surgical instrument interpret a statistical test or diagnose and treat ophthalmic emergencies you will find it here Whatever your role in caring for patients with eye disease ophthalmologist optometrist orthoptist ophthalmic nurse or other health profession discover for yourself why this handbook has become the go to resource for tens of thousands of eye care professionals around the world **Handbook of Chronic Total Occlusions** George D. Dangas, Roxana Mehran, Jeff Moses, 2007-08-22 Chronic total occlusions CTO are common and found in approximately one third of patients with significant coronary artery disease who undergo angiography CTO constitute one of the main criteria when selecting between angioplasty and bypass surgery Angioplasty for CTO is intricate and requires excellent operator skill but even when perfor Benign Prostatic Hyperplasia

and Lower Urinary Tract Symptoms in Men Alexander Bachmann, Jean de la Rosette, 2011-11-24 The diagnosis and treatment of Benign Prostate Hyperplasia BPH is considered to be one of the most important topics in urology and afflicts millions of older men world wide This pocketbook will cover the entire background diagnostic process and treatment options available to patients suffering from lower urinary tract sumptoms due to BPH

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