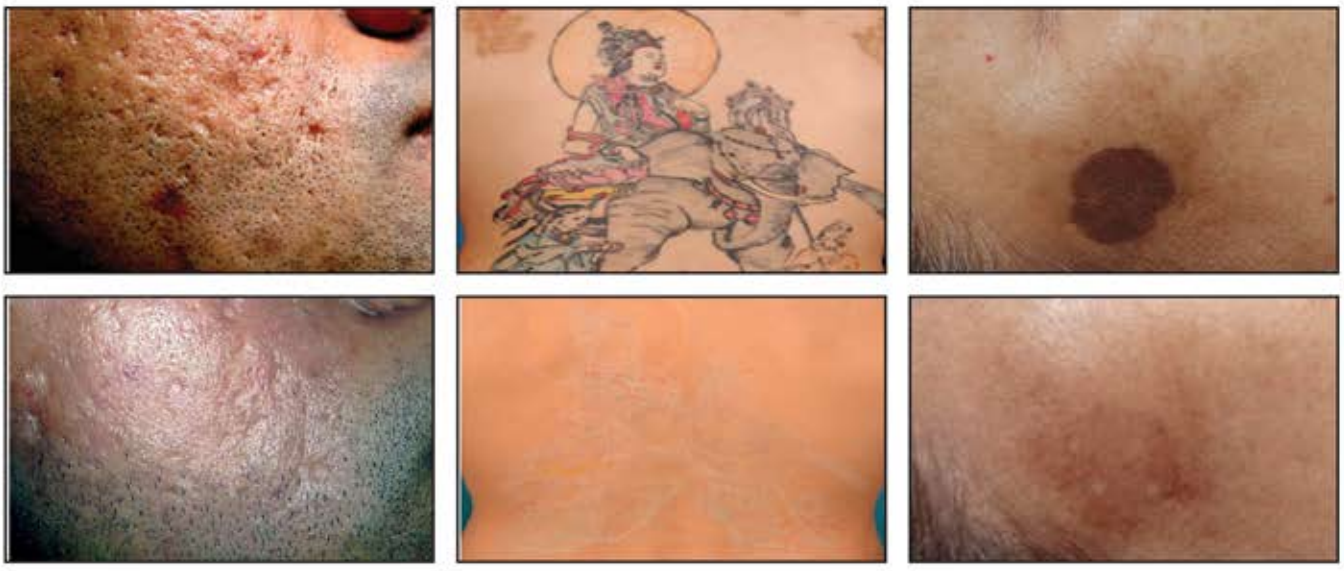
brothers.com, for detailed information on dermatology books, visit our website www.jaypeebrothers.com, for detailed information on dermatology books

Koushik Lahiri • Abhishek De • Aarti Sarda

Textbook of
Lasers in Dermatology



Forewords
Thomas Ruzicka
Jorge Ocampo-Candiani

JAYPEE

Contents

1. **Advent and Evolution of Lasers in Dermatology** 1
   Anurag Tiwari
2. **Physics of Light and Laser-tissue Interactions** 4
   Shekhar Neema, Manas Chatterjee
3. **Setting up a Laser Practice** 9
   Sathish B Pai, Sudhir Nayak UK
4. **Ethical Issues in Laser Practice** 14
   Nilay K Das, Amrita Sil
5. **Pre- and Postoperative Care in Laser Surgery** 18
   Sirisha Singh
6. **Anesthesia in Laser Practice** 21
   Sunaina Hameed, Warren B Seiler III
7. **Cooling Devices in Laser Practice** 34
   Amal H Al Salmi, Yousuf M Al Washahi
8. **Ablative Carbon Dioxide Lasers in Dermatology Practice** 37
   Krupa Shankar DS, Chakravarthi M Ravindran
9. **Treatment of Benign Tumors of Skin With Carbon Dioxide Laser** 44
   Krupa Shankar DS, Chakravarthi M Ravindran
10. **Laser- and Light-assisted Hair Reduction: Principles and Options** 48
    Deepti Ghia, Ahmed Al Issa, Abdullah Al Eisa, Sanjeev V Mulekar
11. **Intense Pulsed Light Therapy** 54
    Mukta Sachdev, Archana Samynathan
12. **Laser Hair Removal: Diode Laser** 59
    Mukta Sachdev, Gillian R Britto
13. **Laser Hair Reduction with Neodymium Doped Yttrium-aluminium-garnet Lasers** 66
    Anil Ganjoo
14. **Evidence Based Approach in Hair Reduction** 71
    Biju Vasudevan, Samipa S Mukherjee, Chandrashekar BS
15. **Lasers and Light for Pigmented Lesion: Opportunities and Limitations** 77
    Sanjeev J Aurangabadkar

16. **Evidence Based Approach for Hyperpigmentary Diseases by Laser** 93
Aparajita Ghosh, Saumya Panda

17. **Lasers for Tattoo Removal** 123
Chee-Leok Goh, Stephanie G Ho

18. **Laser and Light Treatment of Acne** 134
Shehnaz Z Arsiwala

19. **Principles of Vascular Lasers** 143
Abhishek De, Manmit K Hora

20. **Pulsed Dye Laser for Vascular Lesions** 149
Marisa Pongprutthipan

21. **Intense Pulsed Light for Vascular Lesions** 159
Dhepe Niteen Vishwanath

22. **Long-pulsed Neodymium Doped Yttrium-aluminium-garnet Laser for Treatment of Vascular Malformations** 166
Abhishek De, Manmit K Hora

23. **Evidence Based Vascular Laser Treatment** 171
Imran Majid

24. **Scar Reduction: The Principles and The Options** 177
Dhepe Niteen Vishwanath

25. **Nonablative Laser for Scar Reduction** 187
Malavika Kohli, Banani Choudhury

26. **Fractional Carbon Dioxide Lasers for Scar Reduction** 198
Koushik Lahiri, Ishad Aggarwal

27. **Erbium Doped Yttrium-aluminium-garnet Laser Treatment for Scars** 206
Rajetha Damisetty

28. **Evidence Based Approach to Laser Scar Reduction** 217
Vijay P Zawar, Madhuri H Agarwal

29. **Excimer Lasers** 224
Atul Taneja, Tolongkhomba Potsangbam

30. **Endovenous Laser Ablation in the Treatment of Varicose Veins** 233
Ankur Talwar, Kshama Talwar

31. **Laser Lipolysis** 238
Jayashree Venkataram, Venkataram Mysore, Aniketh Venkataram

32. **Cryolipolysis: Hype or Hope** 244
Ankur Talwar, Kshama Talwar

33. **Lasers in Onychomycosis** 249
Aarti Sarda, Nidhi Sharma

34. Laser Training in India and the World **254**
Rashmi Sarkar, Bhawna Wadhwa

35. When Lasers Go Wrong! **256**
Chakravarthi R Srinivas, Muthuvel Kumaresan

36. Purchasing a Laser: Tips and Tricks **260**
Abhishek De, Aarti Sarda, Anupam Das

37. Ethical Promotion on Social Media of Laser Facilities Offered by a Dermatologist **264**
Emily M Altman

38. What is New in Lasers? **270**
Vandana Mehta

Appendices

***Appendix 1:* Consent Forms and Patient Record Sheets** **277**
Asad Ansari, Projna Biswas

***Appendix 2:* Glossary of Terminologies in Laser** **297**
Samujjala Deb

Index ***307***

CHAPTER 3

Setting up a Laser Practice

Sathish B Pai, Sudhir Nayak UK

JAYPEE BROTHERS

INTRODUCTION

Laser technology has revolutionized treatment procedures in dermatology and lasers are almost an integral part of a dermatologist clinic. It is very vital that the laser set-up is given due attention. This article gives a basic idea in setting up of a laser unit. The need of each dermatologist tends to vary and same needs to be followed. Make sure local, state, and national permits and regulations are followed. All safety, fire, building, and sanitation regulations should be met before starting a laser clinic.[1] The setting up of laser clinic involves not just buying a laser system. Various factors play an integral part in the proper and successful running of a laser like location of clinic, decor, front desk, auxiliary support staff, safety measures, etc.

PURCHASE OF A LASER MACHINE

This is perhaps the most important part in setting up a laser clinic. The main indication for which you need a laser decides the type of laser machine which needs to be purchased. The most common laser usually purchased initially are the hair removal laser and then, the fractional ablative laser.[2] Discuss with colleagues using a laser which you are planning to buy, and the merits and demerits of the laser machine. Assess the different types of laser machines available before buying one. It is prudent to decide whether you want to purchase a single machine or a platform device. While cost is the most important consideration in purchasing a laser, there are numerous other factors that need to be considered while purchasing a laser machine. These include the warranty, the make, availability of service center nearby, and availability of spare parts.[2] Signing of a contract with the manufacturer or dealer covering warranty, annual service, prompt inspection in case of machine breakdown etc. will be a good idea.

Always remember that a good laser machine is always better than a cheap imitator. You want your laser procedure to be a walking advertisement for your practice. Any complication or an unsatisfactory result is bad publicity for you.

LOCATION OF CLINIC

Laser clinic should be located at popular and easily accessible areas of the city or town. While changing of location may not be realistic for an already existing dermatological practice, dermatologists venturing into a new clinic may benefit from having a clinic here. Make sure adequate parking facilities exist or valet parking can be arranged.

LASER ROOM

The construction of a laser room should predate the purchase of a laser machine. The laser room should

enforce confidentiality, safety, and convenience. The ideal dimension of the laser room should be 3.65 × 3.65 m (12 × 12 feet)[2]. The laser room needs to accommodate one procedure chair, one doctor chair, cooling device, treatment trolley, emergency trolley or tray, hand wash area, at least one laser machine, one cabinet, one doctor, and one assistant. In teaching institutes, the dimensions of the room needs to be increased accordingly. The door of the laser room should be wide and opaque to prevent transmission of laser rays. The door should be fitted with lock from inside to ensure privacy of patients. Avoid windows in laser room and if present should be opaque, especially, if facing outside or to the corridors. The floor of the laser room should be easily cleanable with mop. Reflective surfaces should be avoided in the laser room.[1] The lighting in the room should be bright and uniform. The cabinet in the laser room can be divided into compartments to store eye protection goggles, prescription pads, topical medications, preparatory material like disposable razors, surgical masks, gloves, marking pens, and other stationaries like post-treatment instructions. It is preferable to keep waste bins in a closed area. Separate waste bins for sharps, plastics, general, biological, and plastic wastes are required. It is also desirable to have a small table with lockable compartment for keeping patients belongings and valuables like jewelry. This is to ensure that patients do not complain of missing things. Providing a table for keeping things shows that the doctor is concerned about the storage of patient's belongings. If possible, a space for small refrigerator to store cooling gels and ice packs is desirable. Mirrors used for grooming of a patient postlaser should be kept in cabinets or drawers as they are reflective.

If you are constructing a laser clinic, make sure you have space for another machine in future.

TRAINING

Learning the basics of laser physics plays a vital role in the usage of a laser. Get yourself adequately trained in the laser you are planning to purchase. Read the instruction manual supplied with the laser machine before starting practising laser.

ELECTRICAL REQUIREMENTS

The electrical supply and portals are very important. Make sure there is adequate number of electrical sockets in the room. It is necessary to discuss with your clinic constructor at the initial stages itself where you want your electrical points, especially, for laser setup. The sockets needs to be located neither too high nor too low on the ground. Labeling of the uninterrupted power supply (UPS) sockets is a must. Electrical panels are best fitted in all walls of the laser room as sometimes you may decide to shift the machine to a different place in the same room. It is necessary to avoid wires running across the floor. Grounding or earthing of the socket board is to be done. It is vital to have a UPS for the laser machine. The ideal UPS requirements are minimum of 3 kVA with 16 batteries of 60 A each.[1,2] Check the requirements of your machine before plugging it to the socket. Discuss with the laser manufacturer and your electrician about the needs of the laser machine in advance.

External cooling systems like Zimmer are required as per the machine which you have purchased. If you have only a hair removal laser with an inbuilt cooling system, then, it may not be necessary. Lasers which do not have an inbuilt cooling system will require adequate cooling devices.

AIR CONDITIONING

Invest in a good air conditioning system. After having invested in a good laser, you do not want your laser to malfunction due to inadequate cooling of the room. Make sure the room is kept at an ambient temperature as instructed in the laser manual. Most lasers require about 18–22°C of ambient temperature.[2,3] Avoid keeping the laser room door open when not in use. Air conditioning the laser room usually ensures that it is dust free, which is needed for every laser machine.

TREATMENT CHAIR

Make sure the treatment or laser chair is comfortable. The chair should be minimum of 6 feet long and 22–24 inch wide.[3] Wider the chair, better would be the comfort of the patient. The increasing trend of obesity in India necessitates the purchase of wider chairs. The surface of the chair should be easily washable. It is advisable to lie down on the chair and see whether the chair is comfortable or not. Do not purchase a chair looking at the brochure.

WAITING AREA

Decorum of your laser clinic is necessity. Make sure it is appealing to the eye. Jarring colors are best avoided. The

JAYPEE BROTHERS

waiting area in the laser clinic should be well-ventilated and illuminated. Furniture should be comfortable. Magazines, papers, and patient information leaflets should be kept. Television for entertaining patients or for demonstration of common procedures may be kept. Ensure cleanliness of the waiting area as well as laser room. It is worthwhile to make sure that a separate area for keeping wet umbrellas and rain-coats is there in the waiting area and that patients do not carry these to the laser room.

PREPARATORY ROOM

Separate preparatory room, especially for hair removal lasers are desirable as you do not want your laser room being wasted for preparation. Interconnectivity between laser room and preparatory room as well of these rooms to the corridor will be useful in patient management.

STORAGE ROOM

A separate storage room to hold consumables, like towels, sheets, stationary etc., is a requisite. Disinfectants and other chemicals should be separately stored. The storage room should be as far as away from the laser room(s). In places where large storage rooms cannot be constructed in view of cost, then overhead cabinets or compartments may be constructed in rooms to store daily consumables.

RECORD KEEPING

Documentation is very vital in laser procedures. Records of the procedure and the consent forms needed to be stored safely. So, make sure you have adequate storage space for files you plan to maintain, if you are the one who prefers hard copies. Alphabetical storage of files is to be done for easy retrieval of files. For practices where multiple dermatologists work, storing files as per doctor will be useful. For those who are computer savvy, good backup of your files is necessary.

CONSENT FORM

Prepare a well-written consent form, preferably in English, Hindi, and the regional language(s) of the state or city. A standard dermatological consent form may be modified and adequate copies may be stored. If photography being taken and same is planned for publication or presentations, separate consent is required.

INSURANCE

Insurance for lasers from fire, breakdown, theft, etc., needs to be taken especially when laser devices are handled by multiple personnel. Try getting an extended warranty for your machine and spare parts. Clarify with your laser manufacturer beforehand what all are covered in both the warranty and extended warranty. If you are planning to shift laser machine in between different clinics, separate insurance clause may be needed.

EYE SAFETY MEASURES

Make sure you purchase adequate number of appropriate eye protecting glasses for the laser being purchased. The laser manufacturer is likely to give additional sets of glasses at the time of purchase as a complimentary one rather than later, when you will have to pay extra for that. This is very essential in institutes and medical colleges where teaching is conducted. Opaque eye protective wear are a must for patients and are usually provided along with the laser machine. In practices with more than one laser machine, storage of physician eye protective goggles needs to be separately stored and ensure that appropriate eye wear used for each laser. Any cracked or discolored goggles needs to be replaced as per laser machine guidelines.[4]

SMOKE EVACUATOR

For lasers generating smoke, it is desirable to have a smoke evacuator to filter irritants and viral particles.[5,6] Smoke evacuator may be purchased as per the recommendations of the laser manufacturer.

FIRE SAFETY MEASURES

Fire extinguishers should be placed at easily located areas and your staff should be adequately trained in using fire extinguishers. Fluorocarbon fire extinguishers are preferred over carbon dioxide fire extinguishers as they are unlikely to damage laser components.[6] Periodic checking of the fire extinguisher should be done.

SAFETY OF LASER MACHINE

Make sure one or two personnel are entrusted with the handling and daily maintenance of your laser machine. Instruct all your staff not to take water (cleaning and drinking purposes) near the laser machine.

JAYPEE BROTHERS

SAFETY BOARDS

The required safety boards need to be installed on the laser room door. Light on top of the door, as in operation theatres, indicating that a procedure is going on, is desirable.

EMERGENCY TROLLEY

An emergency tray or trolley with necessary resuscitation medication and instruments should be kept handy.

PEST PROTECTION

Make sure the laser room is free from cockroaches and rodents which will damage the laser machine. Avoid cluttering in the laser room as this attracts rodents and other pests.

RECEPTIONIST

A good receptionist fluent in English and in the local language is needed. It is very important that there is no miscommunication between your laser patient or client and your clinic, especially with regard to timings of the laser sittings.

STANDARD OPERATING PROCEDURE

Standard operating procedure (SOP) may be developed when technicians are entrusted with using a laser machine. It is imperative that technical staff is well-versed in the SOP and periodic assessment of the technical staff in SOP and practice is done by the dermatologist.

PHOTOGRAPHY

As with all aesthetic procedures, good photography is needed for laser procedures. Invest in a good camera, preferably single-lens reflex (SLR). Have a separate photography room (if space permits), lest it interferes with your procedure or your consultation. Photography should be done in standardized condition with respect to illumination, background, position, distance etc.[1] It is preferable to have the same person take photograph for all the visits of the patient. It is necessary to have a plain background for photography. Storage and retrieval of pictures should be safe, confidential, and easily retrievable. Photographs before each setting are needed. Make sure you take pictures after marking area to be lased, especially in hair removal laser. Patients often tend to increase the borders of the laser area.

REST ROOMS FOR PATIENTS

Clean toilets for the patients are necessary. Some of your patients may be coming from far and some sittings of laser may go for few hours. Absence of toilet should not be a factor which a patient forgoes undergoing laser at your clinic.

AUXILIARY STAFF

The auxiliary staff should be preferably fluent in English, Hindi, and the regional language(s). It is best that all laser procedures are done by adequately trained dermatologist. In instances where technical staff is employed in performing laser procedures, it is the onus of the dermatologist to ensure that the technical staff is adequately trained and procedures are supervised. Regular evaluation of the procedures being performed by the technical staff should be done.

LINEN

Clean laundered linen like toilet sheets is an important requisite. Replacement of dirty and shabby is prudent. Contracts with local cleaners for laundering and ironing of towels may be done.

WASTE DISPOSAL MANAGEMENT

Appropriate waste disposal measures should be ensured. Separate bins for segregation of waste generated. Contracts with local waste disposal agencies need to be done.

CONCLUSION

While purchase of a laser machine maybe of prime importance, it is necessary to pay almost equal attention to other aspects in setting a laser unit. This chapter aims to suggest the basic requirements for setting up a laser unit. Modifications as per the needs of a dermatologist needs to be done. Safety, confidentiality, record keeping, convenience, and efficacy are some of the essential requirements of a laser unit and due attention to these is needed while establishing a laser unit.

JAYPEE BROTHERS

REFERENCES

1. Aurangabadkar SJ, Mysore V, Ahmed ES. Buying a laser-tips and pearls. J Cutan Aesthet Surg. 2014;7:124-30.
2. Dhepe N. Minimum standard guidelines of care on requirements for setting up a laser room. Indian J Dermatol Venereol Leprol. 2009;75: 101-10.
3. Dheepe NV. Setting up a Laser theatre. In: Venkataram M (Ed). ACS (I) textbook on cutaneous and aesthetic surgery. New Delhi: Jaypee Brothers Medical Publishers Pvt Ltd; 2012. pp. 763-70.
4. Association of surgical technologists. AST Standards of Practice for Laser Safety. [Online]. Available from: http://www.ast.org/uploadedFiles/Main_Site/Content/About_Us/Standard%20Laser%20Safety.pdf [Accessed March 2016].
5. Centers for disease control and prevention. The National Institute for Occupational Safety and Health (NIOSH). [Online]. Available from: http://www.cdc.gov/niosh/docs/hazardcontrol/hc11.html [Accessed March 2016].
6. Oberoi C, Parasramani SG. Laser basics. In: Sacchidanand S, Oberoi C, Inamadar A (Eds). IADVL textbook of Dermatology, 4th edition. Mumbai: Bhalani Publishing House; 2015. pp. 2535-50.

JAYPEE BROTHERS

for detailed information on dermatology books, visit our website **www.jaypeebrothers.com,** for detailed information on dermatology books, visit our websi

Textbook of
Lasers in Dermatology

Key Features

- The book is a comprehensive guide covering theoretical and practical aspects of lasers used in the fields of dermatology and cosmetic surgery
- Provides in-depth knowledge of the most appropriate choice of laser for the treatment of particular conditions
- The book begins with detailed chapters on latest understanding of lasers physics, advent and evolution of lasers, setting up of laser practice and ethical issues with laser practice
- Subsequent chapters cover laser treatment of vascular lesions, laser treatment of pigmented lesions and tattoos, laser removal of unwanted hair, ablative and non-ablative fractional resurfacing, and use of laser treatment for medical purposes
- With more than 200 images, the book provides a good idea of various disease conditions that can be treated with lasers application and the results that can be expected post laser therapy
- Written by leading experts in this field
- In summary, a practical guide for dermatologists, cosmetologists, and surgeons to gain a full understanding of all aspects of use of lasers in dermatology.

Koushik Lahiri
MBBS DVD(CAL) FIAD FFAADV MRCPS(Glasgow) FRCP(Edin)
Senior Consultant Dermatologist
Apollo Gleneagles Hospitals and WIZDERM
Editor, Indian Journal of Dermatology
Director, International Society of Dermatology
Immediate Past President, Association of Cutaneous Surgeons (I)
Kolkata, West Bengal, India



Abhishek De MD FAGE
Associate Professor
Calcutta National Medical College
Deputy Editor, Indian Journal of Dermatology
Convenor of ACADEMY, Association of Cutaneous Surgeons (I)
Member, SIG Lasers and Aesthetics, IADVL
Kolkata, West Bengal, India



Aarti Sarda MD FAGE
Senior Resident
Department of Dermatology
KPC Medical College
Kolkata, West Bengal, India



Available at all medical bookstores
or buy online at www.jaypeebrothers.com

JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com

Join us on facebook.com/JaypeeMedicalPublishers

Shelving Recommendation
DERMATOLOGY

ISBN 978-93-85999-62-8