I. Equipping and Organizing an Ophthalmic Surgical Suite

J. Draeger and M. Kirchner
With the Cooperation of R. Winter

CONTENTS

1 Definitions ........................................ 1
2 Space Requirements: The Division and Characteristics of Space in a Surgical Suite ............. 2
2.1 The Operating Rooms ................................ 2
2.2 The Scrub Rooms ................................... 2
2.3 Preparation and Recovery Room .................... 3
2.4 Holding Area ....................................... 3
2.5 Space Requirements for the Personnel ............. 3
2.6 Sterilization and Disinfection; the Care for the Instruments and Equipment .................. 3
2.7 Central Stations for the Machinery ................. 4
2.8 Research and Teaching ............................... 4
2.9 Space Requirements for an Ophthalmic Operating Suite ................................. 5
3 Technical Equipment, Instruments and Devices .................................................. 5
3.1 Microsurgical Equipment .............................. 5
3.1.1 The Surgeon's Stool ............................... 6
3.1.2 The Operating Table ............................... 9
3.1.3 Ceiling Suspension ................................. 10
3.1.3.1 A Ceiling Mounted Carrier Primarily Designed for the Suspension of the Microscope .... 10
3.1.3.2 A True Microsurgical Unit ..................... 10
3.1.3.3 The So-Called Universal Unit ................... 11
3.1.3.4 The Microscope Attached to the Surgeon’s Stool ................. 12
3.1.4 The Operating Microscope ......................... 12
3.1.4.1 Optical Prerequisites ......................... 13
3.1.4.2 Illumination Systems for Ophthalmic Microsurgery ................ 15
3.1.4.3 Laser-, Xenon- and YAG Coagulation ......... 16
3.1.4.4 Additional Instruments ......................... 17
3.1.4.5 Magnets ....................................... 19
3.1.4.6 Television Equipment ......................... 20
3.1.4.7 Anesthesia ................................... 21
3.1.4.8 Care of the Instruments ...................... 22
3.1.4.9 The Intercommunication System ............... 24
4 Conclusions .......................................... 24
References ............................................ 25

1 Definitions

The specific characteristics of ophthalmic surgery make it advisable to dedicate a special chapter to the technical aspects, the organization and the equipment of an ophthalmic surgical suite.

The delicacy and the transparency of the tissues require the use of a microscope. The surgical field is rather small and – with few exceptions – the direction of observation and the plane of the operation remain constant. These factors demand a specific and for ophthalmic surgery characteristic arrangement so that the surgeon can work comfortably and efficiently. Most operations last only a short time and therefore it should be possible to keep the turnover time at a minimum. This rapid change of patients has to be considered when the organization and the spatial arrangement of the operating suite are considered.

Since 1966 a great number of devices have been developed which can be used for more delicate and subtle procedures. These and their technical support systems need not only more space, but the appropriate cables and pipes to supply energy, gases, air pressure, vacuum, water, heat and cryo applications. Remote controls become necessary as the surgical methods and techniques become more precise. For teaching and documentation purposes television facilities, cine-camera and photo attachments have to be considered.

A number of operations are performed under general anesthesia. This leads to definite spatial and technical requirements. It also may influence the sequence of the surgical schedule.

A large, highly specialized eye clinic will meet these requirements differently than a general or a community hospital.

In a large eye clinic the requirements of subspecialties, e.g. for the operations on the anterior segment, retina and vitreous, strabismus and oculoplastics have to be met.
2 Space Requirements: 
The Division and Characteristics of Space in a Surgical Suite

2.1 The Operating Rooms

The space requirement for an ophthalmologic operating room is approximately 30-35 square meters. The division of the space should be the following: The main axis of the room should be through the center of a sliding door which is at least 1.70 m wide and electrically controlled. This axis should correspond to the axis of the patient lying on the table. The table base is placed on this axis so that the headrest of the table plate is at least 1.80 m from the closest wall which runs at 90° to the room axis.

The room axis and the axis running at 1.80 m parallel to the opposite wall (i.e. at 90° to the room axis) will cross each other. This is the macroreference point for the ceiling-suspended unit and for the operating table base. The microreference point lies on an axis which goes through the eye of the lying patient at right angles to the room axis. This is at the same time the microscope axis.

The exact site for mounting the table base and the ceiling unit depends upon the microscope axis (vertical) and the room axis (horizontal). The dimensions of these two depend upon the manufacturer construction.

It should be possible to move around the microscope axis at an excursion radius of approximately 1 m. The various attachments even need an excursion of up to 1.80 m.

The work area depends upon the arm length of the surgeon, the freedom of movement of the surgeon's stool and the excursions around the microreference point.

Depending on the construction and the arrangement of the windows in the building as well as the system of built-in closets, we have an axis length relative to the table base of approximately 5.50 to 6 m.

The height of the operating room should be at least 2.80 m; the height of the entire story should be 3.50 m thereby giving sufficient space for wires, tubes, etc. in the sunken ceiling.

It should be possible to darken an ophthalmologic operating room completely and to change the illumination with a rheostat. The color of the light should be even and "white". It should not produce any glare. The temperature and humidity of the room should be adjustable (air conditioning with lamellar flow). It should be possible to disinfect the air ducts and these should have sufficient valves. The floors should be conductive and covered with a sealed plastic material. The walls also should be completely sealed and covered with a smooth panel. Walls, floors and ceiling should be washable. Doorframes, window frames and handles should be made out of V2A steel or covered with lacquer.

The operating room needs to be wired for various electrical currents and tubes have to be provided for oxygen, gases used in anesthesia and for producing a vacuum. Heating units can be mounted on the wall and can be reset so that there are no open seams or slits (they should not be placed into the floor or the ceiling). The walls should be light gray, the ceiling white and the floor light to dark gray.

2.2 The Scrub Rooms

It is customary for the scrub areas or the scrub rooms to have windows through which the operating room can be observed. Previously it was the obligation of the surgeon to supervise the induction of general anesthesia while he changed clothes or washed his hands. These conditions have changed with the introduction of a central locker room for changing clothes, with improved methods of disinfection and with the anesthesiologists taking over these responsibilities. Future changes may be anticipated.

It is therefore nowadays not mandatory to have a direct view from the scrub room into the operating room, though it is desirable to have the two rooms adjacent to each other.

In general, the scrub room has at least three sinks for a single operating room. The space for each scrubbing place is approximately $1.50 \times 1.80 \, \text{m} = 2.70 \, \text{sq. m}$. Each sink should have its own dispenser for the disinfectant material. There should be additional space for washing and cleaning the gloves and a place for sterile sheets and towels, i.e. an additional 8–16 sq. m.

If there are several operating rooms close to each other, then it is recommended to have one single scrub room between two operating rooms, perhaps with a small work area and a flash sterilizer. Under these circumstances two scrub places suffice per operating room.

The characteristic features of these rooms are similar to those of an operating room. It should be possible to control the sinks without touching anything with a hand; the faucets should be turned on either by a knee lever, by arm levers or by a light beam.