Equipment

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Contents

2.1 Devices

Phacoemulsification Machine

The modern phacoemulsification machines have an excellent phaco mode and a weaker vitrectomy mode. In most cases the vitreous cutter is 20-G and the cutting frequency 500 cuts/min. In a modern vitrectomy machine, the cutting frequency is ten times higher.

A vitreous prolapse after a posterior capsular defect is usually removed with a vitreous cutter from the limbus. The disadvantage of this technique is that it is not possible to remove the complete anterior vitreous because the iris and the lens capsule are in the way.

We will describe an anterior vitrectomy from pars plana, which can be performed with a phaco machine. A trocar is inserted through the sclera and then the anterior vitreous is removed from pars plana through the trocar. This method functions with a 20-G vitreous cutter as well as with a 23-G vitreous cutter. The infusion is at its usual place in the anterior chamber through the paracentesis.

The phaco machine from Alcon (Infinity) allows after installation of a pump the use of a 23-G vitreous cutter. This results in a much higher cut rate of 2,500 cuts/min and a smaller vitreous cutter. In addition, this 23-G vitreous cutter fits through a paracentesis, whereas a regular 20-G vitreous cutter only fits through the main incision.

But posteriorly dislocated nuclei or intraocular lenses can only be operated with a vitrectomy machine and a BIOM (= visualisation device).

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Vitrectomy Machine

For some of the complications that are described in this book, you need a vitrectomy machine. For the extraction of a dropped nucleus, you require a fragmatome (=endo-phacoemulsification handpiece) which can only be used with a vitrectomy machine.

The new generation of vitrectomy machines such as the Constellation of Alcon, Stellaris PC of Bausch & Lomb and Eva of DORC have an excellent phaco function and an outstanding vitrectomy function. The average cutting rate is 5,000–7,500 cuts/min (Fig. 2.1). This is technically possible because high-speed vitreous cutters cut with a high flow rate (fluidics) in the central vitreous (i.e. vitreous cutter port is fully open) and with a low flow rate in the periphery (i.e. the vitreous cutter port is minimally open).

All vitrectomy machines have an integrated light source. Some devices have in addition an internal laser module.

Binocular Indirect Ophthalmo Microscope (BIOM) Systems

To obtain a sufficient view of the posterior segment, one needs either a plano-concave contact lens which is directly placed onto the cornea or a highly refractive lens (60D, 90D, 120D) which is placed in front of the lens of the surgical microscope comparable to indirect ophthalmoscopes. This results in an inverted image. By flicking a reversal system (so-called inverter) into the parallel beam path of the operating microscope, an upright image is created (Fig. 2.2). The inverter has to be turned on or off every time one switches between anterior segment and posterior segment view. It is useful to integrate the inverter function in the foot pedal of the surgical microscope.

We have experience with the BIOM system (Binocular Indirect Ophthalmic Microscope) of Oculus, the RESIGHT system from Zeiss and the EIBOS system from Moeller-Wedel (Figs. 2.2, 2.3 and 2.4).

All systems offer excellent optical images with a variety of different magnifications and fields of view. Based on our personal experience, the BIOM and the RESIGHT offer more flexibility and a better view of the retinal periphery. The EIBOS system is extremely robust and has the additional advantage of a built-in inverter that avoids the need for manual inversion when changing from the posterior segment to the anterior segment view during the surgery (Fig. 2.3).

The RESIGHT (Zeiss) system contains two fixated lenses (128D and 60D) that can be rotated into the light beam (Fig. 2.4). The handling is easy.

The Oculus BIOM system comes with different types of lenses: 120D for a wide peripheral view, 90D as a standard lens for most applications and a 60D high magnification lens for macular surgery. We recommend as a standard lens the wide-angle lens (WiFi HD), which comprises of a very good resolution and a peripheral vision. The BIOM requires a longer learning phase.

As lens I recommend regardless of the provider a wide-angle lens between 120 and 132D. This lens is sufficient for all operations described in this book.

Fig. 2.1 A high-speed vitreous cutter for vitrectomy machines allowing a cutting frequency of 5,000–8,000 cuts/min. A vitreous cutter used for phacoemulsification machines enables a cut frequency of only 500–800 cuts/min

Fig. 2.2 The BIOM system from Oculus can be used with all microscopes. The BIOM system requires some learning time, the lens change is easy

2.2 Standard Instruments for Anterior Segment Procedures

It is essential to know about a broad variety of ophthalmic instruments. Especially if you operate outside the routine cataract procedure, you may need other instruments – in case of a complication or a secondary IOL implantation. The most common instruments used in anterior segment procedures are listed here (Figs. 2.3–2.29). Special instruments are listed separately in the surgical chapters.

Fig. 2.3 The EIBOS system from Leica, which can be used with Leica and Möller-Wedel microscopes

Fig. 2.4 The RESIGHT system from Zeiss can be only used with Zeiss microscopes

Knives

Fig. 2.5 15º knife. Indication: Paracentesis. Alcon. 8065921501

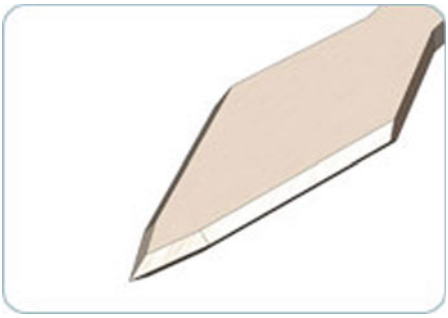

Fig. 2.6 Tunnel incision knife, 2.4-mm wide. Indication: Main incision. Slit knife. Alcon. 8065992445

Fig. 2.7 Crescent bevel up blade. Indication: Dissection of a frown incision. Crescent-angled bevel up. Alcon. 8065990002

Fig. 2.8 V-lance. 1.3-mm-wide scleral and corneal diameter. Indication: Paracentesis and 20-G sclerotomy. 20-G V-lance. Alcon. 8065912001

Forceps

Fig. 2.9 Capsulorhexis forceps. Geuder No.: 31299 or 31308

Fig. 2.10 Fragment forceps. Fragment forceps Gaskin. Geuder, No: 31624; fragment forceps Kelman-McPherson, G-31623, Gaskin fragment forceps to Kansas. B & L. E-2030

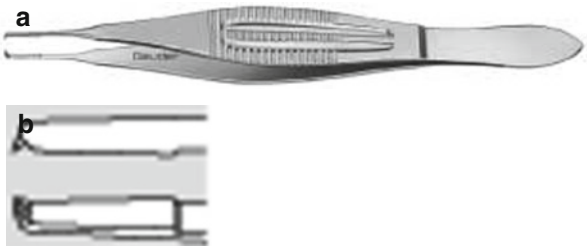

Fig. 2.11 (**a**, **b**) Suturing forceps. Indication: Manipulation of suture or iris retractor. Castroviejo suturing forceps, Geuder, 19023

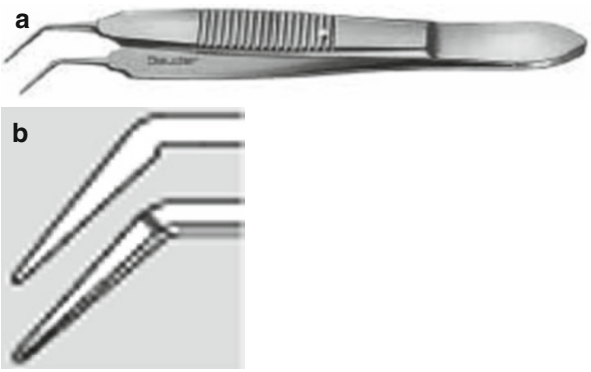

Fig. 2.12 (**a**, **b**) Tying forceps. Indication: Manipulation of suture or iris retractor. Tying forceps, Geuder, 19032

Fig. 2.13 Intravitreal serrated jaws forceps. 23G. Indication: Grasping of tissue in anterior or posterior chamber. DORC: 1286.C06

Manipulators

Fig. 2.14 Sinskey hook. Indication: Manipulation of IOL. Geuder: 16167

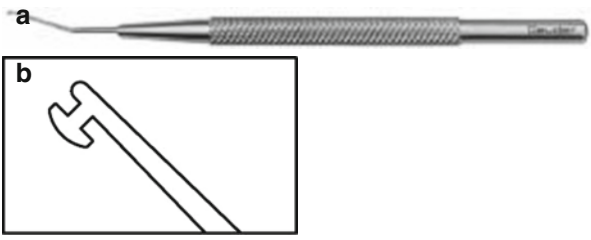

Fig. 2.15 (**a**, **b**) Push-pull after Dardenne or after Kuglen. Indication: Manipulation of IOL and iris, Geuder 16175 or Katalyst

Fig. 2.16 Iris spatula. Indication: Manipulation of nucleus or IOL. Geuder 31975

Scissors

Fig. 2.17 Westcott scissors. Indication: Limbal peritomy. Geuder G-19750

Fig. 2.18 Regular capsulotomy scissors. The instrument fits only through a main incision. Geuder 19776

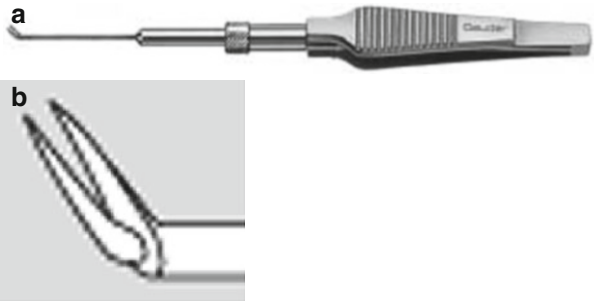

Fig. 2.19 (**a**, **b**) Capsule scissors after Kampik**.** The instrument fits through a paracentesis. Indication: Cutting of capsule or iris. Geuder 38215

Fig. 2.20 (**a**, **b**) Intravitreal scissors. 23G. Indication: Cutting of tissue in anterior or posterior chamber. DORC 1286.J06

Vitrectomy

Fig. 2.21 Calipers, Castroviejo Geuder No.: 19135

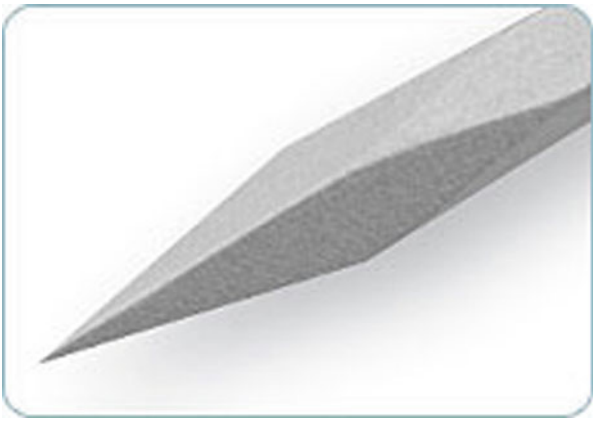

Fig. 2.22 Stiletto 23G. Indication: Lamellar sclerotomy for insertion of trocars. Beaver Visitec

Fig. 2.23 Valved trocar system by Alcon: 23G, 8065751657

Fig. 2.24 Valved trocar system by DORC: 23G, 1272.ED206

Fig. 2.25 Fragmatome: Alcon (Accurus fragmentation handpiece), DORC fragmatome 3002.M and 20-G or 23-G phaco fragmentation cannula DORC 3005.F106

Miscellaneous

Fig. 2.26 Capsular tension ring with injector: CROMA, DORC, Morcher, Arcadophta

Fig. 2.27 Iris retractors: Alcon/Grieshaber: Flexible iris retractors REF 611.75

Fig. 2.28 Triamcinolone acetonide (Volon A®): Pfizer

Fig. 2.29 Acetylcholine (Miochol, Novartis). Indication: Pupil constriction

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