Preparation for the Surgery: Preoperative Measures

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Abstract

Preoperative management constitutes a cornerstone in the treatment of pediatric retina patients. The complete plan includes a checklist with integral management, discussion with the parents or the caregivers, explaining the realistic results, potential complications, and all the follow-up needed to avoid amblyopic problems, rehabilitation, and quality of life. Having informed consent for each surgical and non-surgical procedure, special pediatric instrumentations, and ancillary tests.

Keywords

Preoperative · Pediatric surgery · Vitreoretinal surgery · Presurgical · Examination under anesthesia

Introduction

Checklists are a must when the picture is tough. Many aspects need to be put at ease just before entering the operating room to perform an interventional procedure on a baby. Having a complete plan for the comprehensive management of the pediatric retinal patient includes extensive discussion with parents or caregivers, explaining realistic results, possible complications, and follow-up. Sometimes, in the pediatric retina, gaining function is generally better than quantifying vision. If a procedure does not offer the possibility of improving the functional status of a child, it should

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be considered whether this is necessary. As this is one of the many reasons why the pediatric retina is not an easy task, having a clear presurgical plan is mandatory for everyone who will face pre, trans and postoperative complications as intrinsic traits of pediatric retinal pathologies [1–3].

The entire first section of this book includes specific topics that range from embryological aspects that lead to decisions on how to approach a pars plana by age, when to operate or not, anesthetic characteristics, equipment and pediatric instrumentation. This chapter is intended to provide the reader with an easy way to keep many relevant aspects together.

Informed Consent in Pediatric Patients

In pediatrics, patients are not legally allowed to consent to medical procedures and treatments. Parents or caregivers are often the main decision-makers for their children. In some cases, when children are old enough to understand medical procedures, they may be asked to consent to care. The ophthalmologist should involve pediatric patients in making decisions about their medical care, providing information about their disease and options for diagnosis and treatment in a developmentally appropriate manner and seeking consent for medical care when appropriate [3, 5]. Before any procedure, the ophthalmologist will maintain a broad and careful conversation with parents or caregivers about the procedure to be performed, the risks involved, and the necessary follow-up for their children. Parents should recognize those who make the appropriate legal and ethical decisions for the treatment of their children. If a surgical decision is to be made during EUA, it should be clearly stated that there is the possibility of surgery or an interventional procedure if the current status of the examination requires it [5, 6].

In addition to the need for a pediatric retinal specialist, these patients tend to be challenging preoperatively, perioperatively, and postoperatively, as more than half of patients with low vision will have at least one other disability, so we need an anesthesiologist and an anesthesiologist. pediatrician who is comfortable working with challenging pediatric patients, especially those with very low birth weight [7, 8, 15].

Types of Interventions in an Operating Room

First, there are two major types of interventions that are done in the operating room: *non surgical* and *surgical* procedures.

Non-surgical interventions

Exam under anesthesia (EUA)

An EUA serves both for an initial diagnosis in an uncooperative child and for the follow up where treatment can be given based on the current status of the eye. It is advised that even when scheduling an EUA there is a pre-interventional plan to maximize the duration of the anesthesia, especially in kids that require multiple EUAs (i.e. retinoblastoma). Refraction, intraocular pressure, biomicroscopic exam, and dilated fundus exam with or without pictures are mandatory [7, 8] (Fig. 5.1).

Ablative therapies

Different types of lasers are used for various purposes. As a general rule, an 810 nm laser is useful for developmental vascular disease (ie, FEVR), retinopathy of prematurity, vascular tumors, and retinoblastoma. Some 810 nm and 577 nm lasers have micropulse configurations. The 810 nm laser allows the pediatric glaucoma specialist to perform external cyclophotocoagulation. In some cases, it is helpful to have a 532 nm laser available in the operating room. Cryotherapy is the second frequently used ablative tool in pediatric pathologies [3, 7].

Intravitreal or periocular medications

Whether the drug is readily available upon request or must be requested ahead of time will depend on local regulations and this should be prepared in advance.

Fig. 5.1 Examination under anesthesia. (*Note*: The fundus camera with FA, and electroretinogram displayed on the picture)

Ancillary testing

Equipment availability is often a limitation for many centers. However, if most tests can be performed on a child who does not otherwise allow an in-office examination, it is recommended [9]. Fluorescein Angiography [FA] requires knowledge of the infant's current weight, the recommended dose by our group is 8 mg/kg, however, different doses can be consulted elsewhere since they all seem to work in different ways. FA protocols are discussed in a different book chapter. Other tests that can be done are: OCT, OCT-A, B-scan, A-scan, UBM, AS-OCT, autofluorescence (AF), electroretinogram (ffERG, EOG), VEP and autorefraction keratometer. B-scan, A-scan and keratometries are useful when planning intraocular lens implantation in a child [9, 10].

It should be noted that most of the ideal equipment is not available in all operating rooms, however it is recommended to build a fully equipped operating room for best results in children.

Surgical interventions

Vitrectomy

After an examination has been performed in the office or under anesthesia, the best approach to a vitrectomy should be clearly defined in the mind of the surgeon just prior to entering the eye. In general, Pars Plana Vitrectomy (PPV) or pars plicata should be performed in children where preservation of the lens is preferred (most cases) and where there is little evidence of anterior retinal pathology. For the latter purpose, the preoperative B-scan and UBM guide is the best area to insert the trocars (i.e. avoiding the cyclitic membrane in pars planitis), as well as transillumination of the sclera to place the trocars below the limbus [11, 12].

When the lens is going to be removed, presence of extensive anterior retinal pathology, cyclitic membranes, persistent fetal vasculature, anterior choroidal detachments, and/or trauma, limbal approach is highly recommended. Usually, iatrogenic injury to the retina or membranes is avoided with this maneuver and moving backwards to the pars plana is always a secondary option [11, 13].

Scleral buckle

Even in the presence of extensive proliferative vitreoretinopathy (PVR), scleral buckling is an excellent first step in the repair of retinal pathologies in children. Therefore, a good understanding of the forces and dynamics of the vitreous by a skilled surgeon, coupled with a good preoperative examination, can lead to a good justification for a buckle. Ideally, the type of buckle should be decided prior to surgery in order to have the instrument available. Also, some surgeons advocate sutures and others for tunnels. For both scenarios, having sutures and the scleral blade is helpful in making intraoperative decision making feasible [12, 13].

Combined procedures

Most pediatric retinal surgeons will agree with combined surgeries: scleral buckle and vitrectomy. Importantly, there is a subset of patients who require combined glaucoma-retina or glaucoma-cornea procedures. The multidisciplinary preoperative approach has improved our results as a center [3, 12, 13].

Phacoemulsification with or without IOL implant

As mentioned earlier, in young children sometimes the IOL calculation in the operating room is more accurate. There is a subset of older children or adolescents who will also allow this calculation in the office so that the precise IOL is available before surgery. Otherwise, whoever makes the IOL available in the operating room must be notified in advance that a possible special IOL will be required at the time of surgery [13].

Tamponade

SF6, C3F8 and silicone oil (1000cs, 5000cs or heavy silicone oil) should be available ahead of time in the OR.

Planning the Follow-Up

Once a patient is discharged from the hospital, it is essential to have a clearly defined plan for follow-up care in these complex cases. Integrated management starts from the preoperative plan with a multidisciplinary approach. From the outset, a pediatric retinal patient in need of surgical treatment, the findings, prognosis, and management plan should be discussed extensively with the parents/caregivers. Ideally explained by a pediatric ophthalmologist or pediatric retina specialist trained to describe the problems associated with visual impairment, the approach to treatment, amblyopia management, drop instillation, and the support system that parents can trust [3, 6, 13].

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The low vision support centers and the visual rehabilitator, supported by the pediatric ophthalmologist, are essential to prevent the factors that generate amblyopia and provide stimulation to promote maximum visual development. The

window of time to acquire good vision can be short and therefore it is important to start training without wasting time, usually starting earlier and continuing immediately after the surgical procedure [15].

Finally, parents play an important role in every moment of our treatment and rehabilitation process, they will support us with postural compliance, treatment application, transportation to the rehabilitation centers and, put into practice the therapy every day [6] (Fig. 5.2).

Clinical case scenario

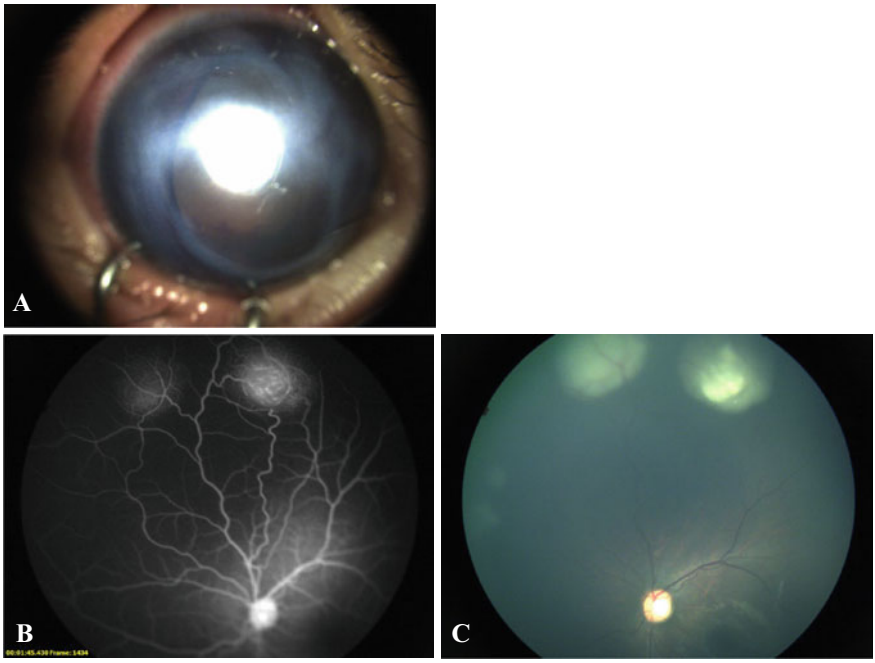

Fig. 5.2 11 month old male with OD leukocoria since 6 months of age noted by the mother. OD showed a buphthalmic eye with a vitreous hemorrhage and a possible mass touching the lens **A**. On the office exam it was not clear if the OS was normal or not. The following day an EUA with a B-scan confirmed bilateral retinoblastoma with peripheral OS tumors **B** and **C**. MRI was performed and treatment was discussed with the retinoblastoma multidisciplinary team. On a second EUA, TTT was placed on the left eye to the peripheral masses and primary enucleation was done OD before systemic chemotherapy. This exemplifies the importance of informed consent and multiple modalities of treatment within the same anesthetic event

CHECKLISTS

Complete EUA instruments

1	Tonometer	
2	Caliper	
3	Portable slit lamp	
4	Indirect ophthalmoscope	
5	Lenses (28D, 30D, 20D)	
6	Speculum	
7	Scleral depressor	
8	Dilating drops	
9	Anesthetic drops	
10	Fluorescein strips	
11	Retinoscope and test box or plates	

Ancillary testing

1	Fluorescein angiogram [FA] and IV fluorescein 10–20%	
2	Optical coherence tomography [OCT]	
3	OCT Angiography [OCT-A]	
4	B-scan	
5	UBM	
6	Anterior segment OCT [AS-OCT]	
7	Electroretinogram (ffERG, EOG) and visual evoked potentials (VEP)	

Ablative therapies

1	Laser	
	•532 nm	
	•810 nm	
	▪Indirect ophthalmoscope	
	▪Glaucoma cyclophotocoagulation probe	
	•577 nm	
2	Cryotherapy	

Intravitreal injections

1	Anti-VEGF	
2	Steroids	
3	Immunomodulators	
4	Implants	
5	Antibiotics	
6	Chemotherapy	

Surgical Procedures

1	Vitrectomy	
	Pars plana vitrectomy	
	Pars plicata vitrectomy	
	Limbal vitrectomy	
2	Scleral buckle	
3	Phacoemulsification ± Intraocular lens implant	
4	Combined procedures	
5	Tamponades	

Conclusion

There are many complex factors that play a star role in the management of pediatric patients with retina pathology. Checklists are offered in this chapter to the reader. Although there are many considerations in the management of pediatric retinal patients, including management during surgery and follow-up, preparing for surgery with a detailed plan increases the chance of a positive outcome after surgery and improves quality of life of these patients.

Review Question

1. What is the most important feature of an EUA:

a. The informed consent stating the possibility of surgical or non-surgical interventions at the time of anesthesia
b. Refraction
c. VEP
d. None

Answer

1. (**A**) If a surgical decision is to be made during EUA, it should be clearly stated that there is the possibility of surgery or an interventional procedure if the current status of the examination requires it.

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