CASE REPORT

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PENETRATING KERATOPLASTY IN CHILDREN

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Abstract. *Keratoplasty is one of the most common tissue transplants. However, its application in children remains a high-risk procedure. The child eyeball is smaller, the cornea and sclera are more elastic, a higher pressure on the vitreous body and often other malformations of the anterior eye segment are present, all of which makes it a significantly more difficult intervention than that in adults. The aim of the report is to present a case of keratoplasty in a child with corneal perforation due to trauma. A 7-year-old child, who fell off a bicycle 4 days ago and hit their eye area, was admitted to the eye diseases clinic. In the clinic, an examination was performed under general anesthesia; a foreign body was removed from the left eye and a perforation of the cornea was established. A penetrating keratoplasty was performed. Two months after the surgery, loosening of the sutures began, and scarring and their gradual removal became necessary. 18 months after the operation, the eye is completely calm and the transplant is transparent. Penetrating keratoplasty in children remains a major challenge for most surgeons. A good collaboration with the parents is necessary to preserve the transparency of the transplant and improve visual acuity.*

Key words: *pediatric keratoplasty, penetrating keratoplasty, trauma, corneal perforation*

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INTRODUCTION

Corneal pathology is one of the leading causes of blindness, and the only way of treatment is surgical – transplantation. It is one of the most common tissue transplants. Advances in surgical technique, operating microscope, suture material, storage of donor material, and medications used in the postoperative period have greatly improved the results of this surgery. However, its application in children remains a high-risk procedure. The child eyeball is smaller and the cornea and sclera are more elastic; a higher pressure on the vitreous body and often other malformations of the anterior eye segment are present, all of which makes it a significantly more difficult intervention than that in adults [1]. The postoperative period is also different – more frequent follow-up examinations are required, which are performed under general anesthesia [2-4]. Indications for keratoplasty in children are divided into three main categories: congenital, traumatic and acquired non-traumatic. And for visual acuity, it is decisive whether there is an involvement of the corneal endothelium and the presence or absence of glaucoma. The more centrally located and denser the cloudiness, the sooner it should be operated on to prevent the development of amblyopia [5-

7]. In the clinical case report, keratoplasty in a child with corneal perforation due to trauma is presented.

CASE PRESENTATION

A 7-year-old child, who fell off a bicycle 4 days ago and hit their eye area, was admitted to our eye diseases clinic. The child was examined on an outpatient basis by an ophthalmologist, and therapy was given, but the swelling of the eyelids increased, and a purulent discharge appeared. Therefore, the patient was referred to the clinic for additional treatment.

After the admission, clinical examination was performed under general anesthesia. The eyelids have expressed swelling and purulent secretion. After introducing the lid speculum, a plastic foreign body of approximately 2 cm size was found. When removed, corneal perforation and purulent keratitis was found (Fig. 1, 2). Visual acuity of the left eye was PPLC. A decision favoring penetrating keratoplasty was made. The donor material was provided by a local tissue bank. A standard penetrating keratoplasty technique was applied in the condition of uneventful surgery. A 7.0 mm trephine was used for the recipient and 7.5 mm for the donor (Fig. 3). The graft was adapted with an interrupted manner sutures (Fig. 4). No postoperative complications were observed.

From the first postoperative day, treatment with tobramycin/dexamethasone (5 times daily), artificial tears (qid), atropine (qd), methylprednisolone s.c (qd) was started, which was continued for additional 10 days, then only tobramycin/dexamethasone and artificial tear continued as regular therapy. On the second month following the operation, the sutures began to loosen with expressed corneal scarring and it was necessary to remove them step by step. By the end of the fourth month all sutures were removed. Again, all procedures of suture removal were performed under general anesthesia (Fig. 5).

18 months after the operation, the eye is completely calm and the transplant is transparent. Visual acuity cannot be tested properly because of the difficult collaboration with the child, but it was fluctuating around 0.2 (Snellen) for the operated eye (Fig. 6).

Fig 1. Trauma with plastic foreign body (part of a bicycle)

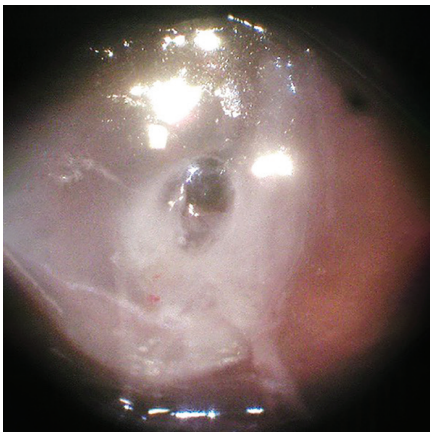

Fig 2. Corneal perforation after trauma

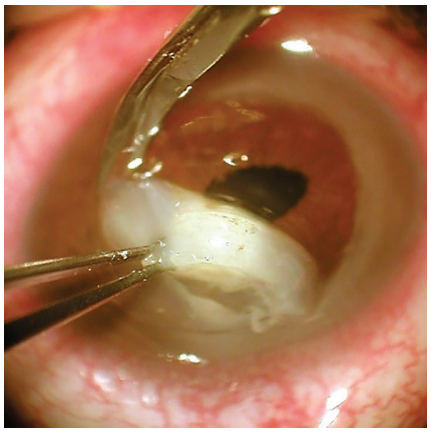

Fig 3. Penetrating keratoplasty – removal of the damaged cornea

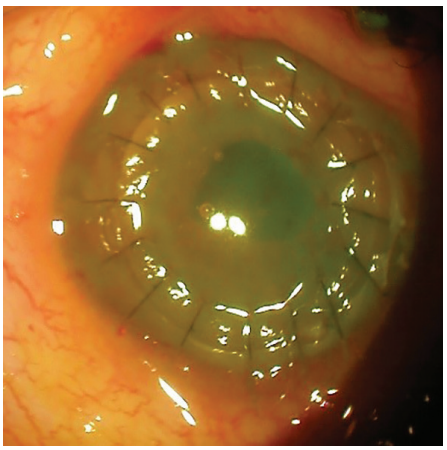

Fig 4. Penetrating keratoplasty with interrupted suture

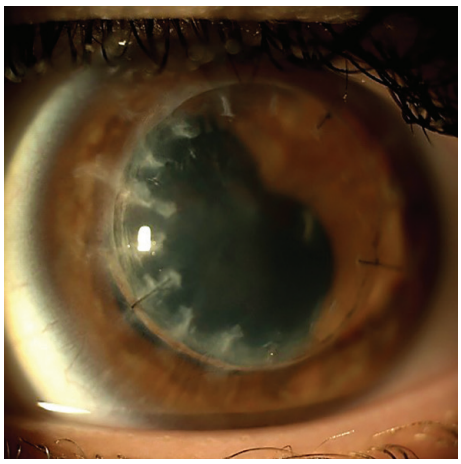

Fig 5. 3 months after surgery

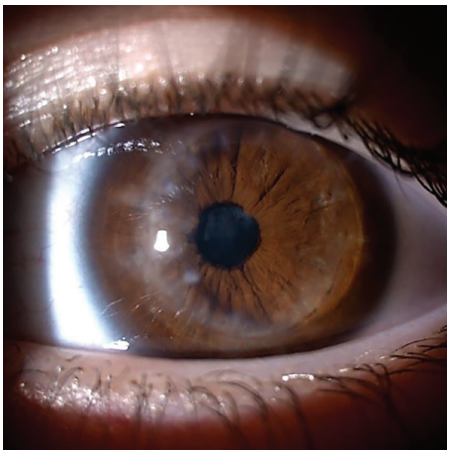

Fig 6. 18 months after surgery

DISCUSSION

Before 1970, keratoplasty in children was used only for bilateral corneal pathology. In 1977, Waring and Laibson reported a success rate of 60% in congenital opacities and 87% in a mixed group of keratoplasty in children [8]. A multicenter study by Dana et al. showed a similar success rate – 80% preserved transparency in the first year and 67% in the second year [9]. According to some studies, intervention in children under 1 year old has a low survival rate, and according to others, no dependence on age is reported [4, 10, 11]. Our experience is not so great, but in the specific clinical case the success rate is very high.

The role of the parents is of utmost importance in this type of surgical treatment. It is necessary to have a good collaboration with them, because the operation and every follow-up examination afterwards are carried out under general anesthesia. In the postoperative period, they must protect the eye from rubbing and injury so the wound does not open.

The surgical technique is standard, similar to that in adults, but the particular thing is that the children are hyperopic – the anterior chamber is shallow, and the cornea is elastic, so the trepanation of the recipient must be done very carefully. The donor cornea is always larger than the recipient; in our case it was 0.5 mm; thus, the anterior chamber is deeper, and we reduced the risk of anterior synechiae and increased intraocular pressure in the postoperative period [12-14].

We think it is preferable to adapt the graft with an interrupted suture because there is less risk of dehiscence if one of the sutures breaks, and it allows for gradual removal, as in our case. Their removal begins much earlier than in adult patients. In adults, suture removal starts around the 9th-12th months after the procedure, while, in children under 1 year old, this happens by 4-6 weeks; in children 4-6 years old – 12-16 weeks, due to the rapid healing process.

CONCLUSION

Penetrating keratoplasty in children remains a major challenge for most surgeons. Improvements in surgical technique and postoperative monitoring and treatment have greatly improved the results of this intervention. A good collaboration with the parents is necessary to preserve the transparency of the transplant and improve visual acuity. When penetrating keratoplasty is the only option to help the patient – we should not hesitate to use it.

Statement of Ethics. *The study was conducted in accordance with the principles for human experimentation as defined in the Declaration of Helsinki, local Good Clinical Practice guidelines and local Medical University of Pleven institution guidelines (Ethics Committee approval No. 716-KENID/12/01/2023).*

Informed Consent Statement. *Written informed consent was obtained from the patient's parents for publication of the details of their medical case and any accompanying images.*

Conflict of Interest Statement. *The authors have no conflicts of interest to declare.*

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