

Successful management of iatrogenic tear in vitrectomy for retinopathy of prematurity-related retinal detachment: a case report

Tratamento bem-sucedido de rotura iatrogênica em vitrectomia para descolamento de retina por retinopatia da prematuridade: relato de caso

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Medina FM, Makita LS, Albuquerque LM, Motta MM. Successful management of iatrogenic tear in vitrectomy for retinopathy of prematurity-related retinal detachment: a case report. Rev Bras Oftalmol. 2024;83:e0029.

How to cite:

doi:

<https://doi.org/10.37039/1982.8551.20240029>

Keywords:

Retinopathy of prematurity;
Vitrectomy; Retina; Retinal
detachment; Aphakia

Descritores:

Retinopatia da prematuridade;
Vitrectomia; Retina;
Descolamento retiniano; Afacia

Received on:
Dec 19, 2023

Accepted on:
Mar 26, 2024

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Conflict of interest:
no conflict of interest.

Financial support:
no financial support for this work.



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ABSTRACT

Retinal detachment related to retinopathy of prematurity is a surgical challenge, and vitrectomy can directly release transvitreal traction resulting from fibrous proliferation. The presence of iatrogenic breaks is a poor prognostic factor and has been considered a dismal prognosis. We report a case of premature female baby that underwent a 3-port 23-Gauge pars plana vitrectomy for stage 4A retinopathy of prematurity, with intraoperative progressive rhegmatogenous detachment complication. Lensectomy, extensive membrane dissection and vitreous shaving, followed by a posterior retinotomy, fluid air exchange, extensive peripheral photocoagulation and C3F8 15% injection were performed. Successful anatomical result was obtained.

RESUMO

O descolamento de retina relacionado à retinopatia da prematuridade é um desafio cirúrgico, e a vitrectomia é um procedimento capaz de romper diretamente a tração vitreoretiniana resultante da proliferação fibrosa. A presença de roturas iatrogênicas é um fator prognóstico ruim e tem sido considerada como prognóstico sombrio. Relatamos um caso de bebê prematuro do sexo feminino que foi submetido à vitrectomia via *pars plana* (23 Gauge; três incisões), para retinopatia da prematuridade estágio 4A, complicada por descolamento regmatogênico progressivo intraoperatório. Foram realizadas lensectomia, dissecação extensa da membrana e aspiração vítrea, seguidas de retinotomia posterior, troca fluido-ar, fotocoagulação periférica extensa e injeção de C3F8 a 15%. O resultado anatômico bem-sucedido foi obtido.

INTRODUCTION

Despite the success of laser photocoagulation, 5 to 10% of the eyes, especially those with aggressive retinopathy of prematurity, progress to tractional retinal detachment (RD) requiring surgical management. Retinal detachment related to retinopathy of prematurity (ROP) is a surgical challenge, but acceptable visual outcomes can be achieved if timely vitreous surgery is performed.⁽¹⁾

For stage 4 ROP, both scleral buckling and vitrectomy have been used to treat RD. Scleral buckling is limited by a high incidence of induced refractive errors and the need for additional procedures to dissect or remove the buckling material. Recently, vitrectomy has become popular for the treatment of stage 4 ROP because of the ability to directly release transvitreal traction resulting from fibrous proliferation.⁽²⁾

Improved instrumentation for vitreous surgery has made it possible to perform lens-sparing vitrectomy earlier during the evolution of ROP-RD. The relief of vitreous traction can interrupt the evolution of RD, which begins around the ROP ridge and tends to extend circumferentially, as well as anteroposteriorly from that ridge.⁽³⁾

The vectors that involve tractional forces on the retina are dissected until the surgeon determines that the forces are relieved by the vitreous cutter. Retina flattening can take several weeks because of the exudative component in the subretinal space.⁽⁴⁾

The major factors affecting the anatomical and functional success rates are preoperative treatment status, presence of preoperative plus disease, postoperative hemorrhage, lens sparing, and iatrogenic tear formation.⁽⁵⁾

The presence of iatrogenic breaks in patients with ROP-RD during surgery is an especially poor prognostic

factor; patients experienced a reattachment rate of 0% in a study conducted by Lakhanpal et al.⁽⁶⁾

We report a case of ROP intraoperative progressive RD due to peripheral break successfully managed with extensive membrane dissection, fluid air exchange, internal drainage, retinal photocoagulation, and long-acting gas tamponade.

Case report approved by the Ethics Committee of the Hospital Universitário Pedro Ernesto, no. 5.617.080.

CASE REPORT

A 2-month-old premature female baby born at 28 weeks of pregnancy weighing 800g and hospitalized for 1 month due to respiratory distress presented with stage 3 zone 2 + ROP in both eyes. The baby underwent laser photocoagulation to avascular retina in both eyes because of florid extraretinal vascularization and traction; the patient still progressed to peripheral tractional RD with fibrosis. The patient underwent lens-sparing vitrectomy in the left eye when she was 2 months old. Traction relief was adequate after a 23-G bimanual surgery with no complications.

The right eye was submitted to vitrectomy when she was 3 months old. During core vitrectomy, the patient presented a progressive subretinal fluid accumulation in the superior nasal quadrant of the retina, adjacent to a peripheral tear. We decided to perform lensectomy, extensive membrane dissection and vitreous shaving, followed by a posterior retinotomy, fluid air exchange, extensive peripheral photocoagulation, and C3F8 15% injection (Figure 1).

The patient maintained attached retina in both eyes, one year after surgery with aphakic correction with glasses in the right eye. (Figure 2)

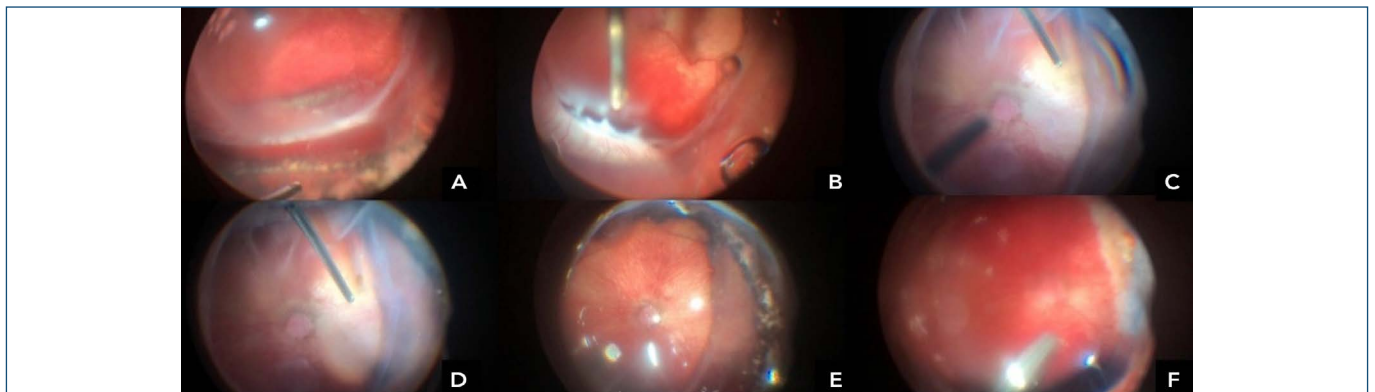


Figure 1. Intraoperative view of vitrectomy for retinal detachment related to retinopathy of prematurity. (A) Tractional retinal detachment sparing the macula. The contracture of abnormal blood vessels forms an elevated ridge of scar tissue. (B) Membrane peeling and delamination are performed. (C) Progressive bullous retinal detachment is noted in the upper nasal quadrant. (D) Extensive membrane dissection and vitreous shaving, followed by a posterior retinotomy, are performed. (E) Subretinal fluid is aspirated through the retinotomy. (F) Peripheral photocoagulation and C3F8 15% injection are applied.

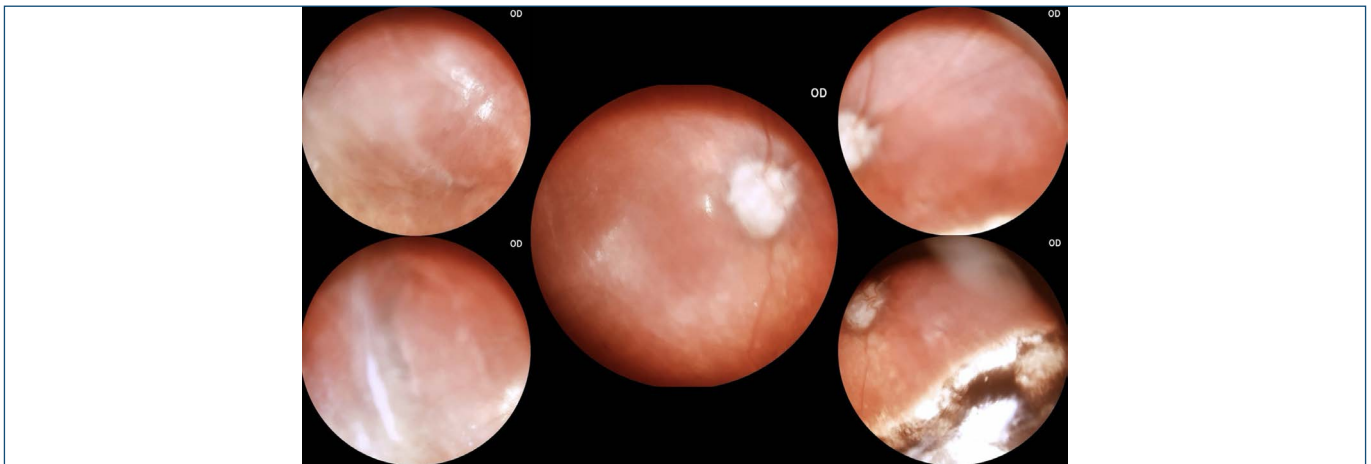


Figure 2. A fundus image obtained one year after successful management of an iatrogenic tear in vitrectomy for retinal detachment related to retinopathy of prematurity shows complete retinal reattachment.

DISCUSSION

Performing vitrectomy in an infant has its unique set of challenges. Because pediatric ocular anatomy has not only some dimensional or proportional difference, but also structural ones compared to the adults, the surgical approach is different. Most importantly, the chance to amend undesirable complications is much slimmer.

In our reported case, progressive RD was located adjacent to left-hand sclerotomy and the retinal break was probably related to entry site. A critical decision in ROP-RD surgery is to choose the appropriate site of entry for gaining access to the vitreous cavity. The important anatomic considerations in these eyes are the poorly developed pars plana, lower scleral rigidity, and limited working space due to the lens and the anteriorly lifted tractional RD. A pars plicata approach is preferred, and a simple recommendation for distance of entry from the limbus has been suggested by Gan and Lam for these eyes. Children under 1 year old are best approached through sclerotomies that are 1 mm behind the limbus, with 1 mm being added to this distance per year, until the age of 4 years old. The area with the least amount of retinal dragging is selected as the infusion site.⁽⁷⁾

Second, the lens is more globular and occupies a larger proportion of the eyeball. Both these reasons, together with the shorter axial length and anteriorly pulled up retina, lead to a reduced working space and higher chances of iatrogenic lenticular and retinal injury. Shorter instruments have been developed keeping these eyes in mind, but they are not available in our region.⁽⁸⁾

Our patient has been previously submitted to extensive peripheral retinal photocoagulation. Luna et al. reported that peripheral retinal laser photocoagulation before lens-sparing vitrectomy for stage 4A ROP eyes affected surgical outcomes. Without laser photocoagulation before surgery,

the organized vitreous was easier to cut and the retina was less rigid and could be smoothly flattened. Conversely, with pre-surgical laser photocoagulation, the organized vitreous became more difficult to manipulate, and the retina became more rigid, increasing the risk of iatrogenic tears.⁽⁹⁾

The size and location of the iatrogenic break in a vitrectomy for stage 4A or 4B ROP surgery are most critical for success. If it is large and in an area of prominent fibrovascular proliferation and traction, reattachment is unlikely. A reattachment in iatrogenic breaks in ROP-RD can be achieved using a surgical paradigm that includes meticulous removal of the hyaloid from the disc to the break, extension of the break to a relaxing retinotomy, or an encircling buckle to support the remaining periphery, and gas tamponade.

Recently, Imaizumi et al. advocated the short-term use of perfluoro-n-octane in cases of ROP with retinal breaks. However, there is a risk of perfluoro-n-octane getting trapped in residual vitreous and traction in other areas.⁽¹⁰⁾

In conclusion, we demonstrated in this case report a rescue strategy for a retinal break that complicated a 3-port 23-Gauge vitrectomy for stage 4A ROP surgery. Although eyes with ROP and retinal breaks have been considered with dismal prognosis, a modern surgical approach may result in anatomic salvage of specific cases.

REFERENCES

1. Capone A, Trese MT. Lens-sparing vitreous surgery for tractional stage 4A retinopathy of prematurity retinal detachments. *Ophthalmology*. 2001;108(11):2068-70.
2. Lakhanpal RR, Sun RL, Albin TA, Holz ER. Anatomic success rate after 3-port lens-sparing vitrectomy in stage 4A or 4B retinopathy of prematurity. *Ophthalmology*. 2005;112(9):1569-73.
3. Gadkari S, Kamdar R, Kulkarni S, Kakade N, Taras S, Deshpande M. Vitreoretinal surgery for advanced retinopathy of prematurity: presentation and outcomes from a developing country. *Can J Ophthalmol*. 2015;50(1):54-60.

4. El Rayes EN, Vinekar A, Capone A. Three-year anatomic and visual outcomes after vitrectomy for stage 4B retinopathy of prematurity. *Retina*. 2008;28(4):568-72.
5. Choi J, Kim JH, Kim SJ, Yu YS. Long-term results of lens-sparing vitrectomy for stages 4B and 5 retinopathy of prematurity. *Korean J Ophthalmol*. 2011;25(5):305-10.
6. Lakhnpal RR, Davis GH, Sun RL, Albin TA, Holz ER. Lens clarity after 3-port lens-sparing vitrectomy in stage 4A and 4B retinal detachments secondary to retinopathy of prematurity. *Arch Ophthalmol*. 2006;124(1):20-3.
7. Gan NY, Lam WC. Special considerations for pediatric vitreoretinal surgery. *Taiwan J Ophthalmol*. 2018;8(4):237-42.
8. Dogra MR, Singh SR, Katoch D, Dogra M, Moharana B, Jain S. 'Stop-and-Slide' technique for trocar insertion during lens-sparing vitrectomy for retinopathy of prematurity. *Indian J Ophthalmol*. 2020;68(10):2209-11.
9. Luna JD, Caribaux LJ, Reviglio VE, Juarez CP. Lens-sparing surgery for retinopathy of prematurity. *Ophthalmology*. 2003;110(8):1669.
10. Imaizumi A, Kusaka S, Noguchi H, Shimomura Y, Sawaguchi S. Efficacy of short-term postoperative perfluoro-n-octane tamponade for pediatric complex retinal detachment. *Am J Ophthalmol*. 2014;157(2):384-9.e2.