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Spontaneous delayed closure of macular hole secondary to rhegmatogenous retinal detachment

Spontaniczne późne zamknięcie otworu w plamce współwystępującego z przedarciowym odwarstwieniem siatkówki

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Summary:

We present a case of a full thickness macular hole secondary to a complete retinal detachment in which a spontaneous delayed closure was observed in spectral domain optical coherence tomography six months after pars plana vitrectomy with silicone oil tamponade and without internal limiting membrane peeling.

The authors hypothesize that prolonged silicone oil tamponade and silicone oil emulsification induce inflammatory response within the retina, which enables initiating a delayed healing process of a full thickness macular hole, which did not close in short time after the surgery.

Key words:

macular hole, vitrectomy, silicone oil.

Streszczenie:

Prezentujemy w obrazach spektralnej optycznej koherentnej tomografii przypadek opóźnionego zamknięcia się pełnościennego otworu w plamce współwystępującego z całkowitym przedarciowym odwarstwieniem siatkówki u pacjenta poddanego witekтомii z tamponadą olejem silikonowym, bez usunięcia błony granicznej wewnętrznej.

Stawiamy hipotezę, że przedłużona tamponada olejem silikonowym oraz emulsyfikacja oleju silikonowego powodują stan zapalny siatkówki, który opóźnia gojenie pełnościennego otworu w plamce.

Słowa kluczowe:

otwór plamki, witekтомia, olej silikonowy.

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Introduction

Full thickness macular hole (FTMH) secondary to retinal detachment (RD) is a typical finding in eyes with high myopia, usually with no peripheral retinal breaks to cause RD. Pars plana vitrectomy aimed to close the causative FTMH is the method of choice in these cases (1). It is not usual though, to observe macula-off rhegmatogenous RD (RRD) coexistent with FTMH in emmetropic patients. Until now, there are no clear management guidelines applicable to this rare condition (2–8).

We present a case of a complete RRD with additional feature of FTMH treated with pars plana vitrectomy (PPV) with silicone oil tamponade and without internal limiting membrane (ILM) peeling monitored using a spectral domain optical coherence tomography (SD-OCT).

Case report

A 68-year-old woman presented with severe visual loss in the right eye (RE) for 30 days. The best corrected visual acuity (BCVA) in the RE was hand movement. Ophthalmic examination showed incipient cataract formation and a complete RRD with a single peripheral retinal break at 12 o'clock, and a mo-

derate proliferative vitreoretinopathy classified as C2 PVR. Additionally, the presence of FTMH was noticed and confirmed using the SD-OCT (Spectralis; Heidelberg Engineering, Heidelberg, Germany) (Fig. 1a). Having obtained a written informed consent of a patient, a 23 gauge (23G) PPV with 1000-centistokes silicone oil tamponade without ILM peeling and with phacoemulsification with intraocular lens implantation was performed, achieving retinal reattachment.

One week later on the central retinal SD-OCT scan, the macular edges were flattened and completely attached to the underlying retinal pigment epithelium (RPE) (Fig. 1b). This is referred to in the literature as Type 2 (flat open) FTMH closure. One month later, a full thickness defect was observed again with the exposed edges underlying the RPE (Fig. 1c). In the third postoperative month, the FTMH diameter decreased and some small cystoid oedema was noted (Fig. 1d). Six months after PPV, a central continuity of the photoreceptor layer, known as Type 1 FTMH closure (Fig. 1e) was visible on the SD-OCT scans. It was accompanied by the presence of small intraretinal cysts. Subsequent appointments revealed a complete resolution of cystoid oedema. In the ninth postoperative month, silicone oil

was removed (Fig. 2a). Finally, one year after silicone oil removal, BCVA was 0.1 and FTMH was completely closed (Fig. 2b).

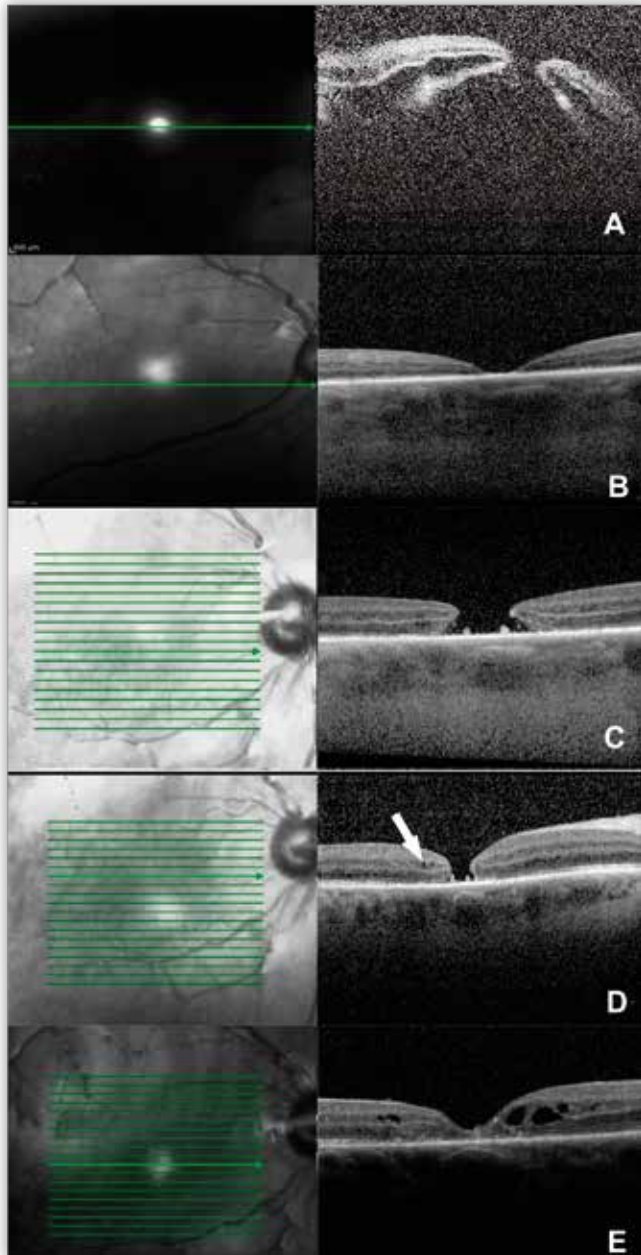


Fig. 1. SD-OCT images of the presented patient. Preoperative image showing elevated retina with a full thickness macular hole (FTMH) (a). Retinal reattachment with persistent photoreceptor layer defect at one week after PPV (b), Retinal reattachment with a FTMH one month after PPV (c), FTMH diameter decreases, its edges thicken, small cystic macular edema seen along the edges (arrow) at three months postoperatively (d), Attached retina with the continuity of the photoreceptor layer and some perifoveal edema at six months after PPV (e).

Ryc. 1. Obraz SD-OCT: przed operacją – uniesiona siatkówka z pełnościanowym otworem w plamce (FTMH) (a), po tygodniu od PPV – przetrwały ubytek fotoreceptorów w przyłożonej siatkówce (b), po miesiącu od PPV – siatkówka przyłożona z FTMH (c), po trzech miesiącach od PPV – zmniejszenie wymiaru, pogrubienie brzegów FTMH, widoczne drobne cysty obrzęku (strzałka) (d), po sześciu miesiącach od PPV – przyłożona siatkówka, ciągłość warstwy fotoreceptorów z towarzyszącym obrzękiem w plamce (e).

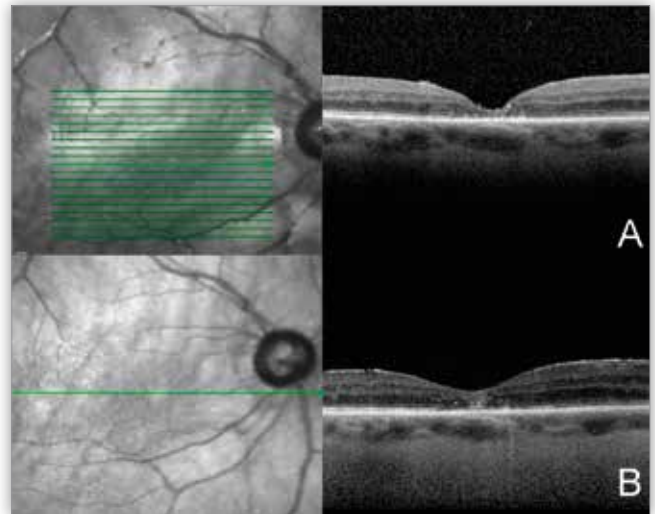


Fig. 2. Nine months after PPV, silicone oil tamponade is maintained. In SD-OCT, the attached retina with nearly normalized macular contour is shown with the continuity of external retinal layers and a complete resolution of cystic macular edema (a). One year after silicone oil removal: FTMH in Type 1 is completely closed (b).

Ryc. 2. Po dziewięciu miesiącach od PPV, tamponada olejem silikonowym; w badaniu SD-OCT są widoczne przyłożona siatkówka z praktycznie prawidłowym konturem plamki, ciągłość zewnętrznych warstw siatkówki i całkowite ustąpienie obrzęku (a). Po roku od usunięcia oleju silikonowego: całkowite zamknięcie FTMH o typie 1 (b)

Discussion

To the best of our knowledge, ours is the first report to describe the delayed spontaneous closure of FTMH concomitant with a complete RRD after vitrectomy without encircling procedure and without ILM peeling.

In non-myopic RRD, macular hole development may depend on the vitreomacular interface disorders preceding the RD and is usually associated with the presence of an epiretinal membrane (2). The second possible mechanism is when the posterior vitreous detachment causes peripheral retinal breaks, leading to RRD and contributing to the progression of the FTMH (6).

Some authors postulate that the treatment should focus on the peripheral retinal breaks, showing that macular reattachment after single scleral buckling procedure may induce FTMH closure postoperatively (3). Nevertheless, the most common approach is to combine the encircling and intraocular surgery. This results in good to excellent reattachment rates (87–100%) with variable rates (29–92.9%) of FTMH closure in cases with and without ILM peeling (4, 5, 7, 8). Visual outcomes presented in several small study groups differed, as well.

We decided not to remove ILM, because there was no epiretinal membrane visible in SD-OCT and no traction was visible during the vitrectomy. Furthermore, in a prospective, comparative trial, Shukla demonstrated not only higher closure rates, but also improved apposition of hole edges and significantly better BCVA in eyes treated without ILM peeling (4). Additionally, Type 2 FTMH closure was seen significantly more often in the group with ILM peeling than in patients with intact ILM (57% vs. 23%). In our case, SD-OCT performed in the first postoperative week revealed Type 2 FTMH closure (Fig. 1b).

One month later, a full thickness defect could be observed with exposed edges underlying the RPE (Fig.1c). In the third postoperative month, we visualized development of intraretinal cysts using SD-OCT.

We have recently reported that silicone oil emulsification and its migration into the ocular structures may occur after PPV with silicone oil tamponade (9). This phenomenon was visible three months after vitrectomy in 5 of 24 patients, presenting in SD-OCT as small hyperreflective round-shaped droplets at the edges of the cystoid spaces. Errera et al. also noted the presence of tiny hyperreflective spherical bodies in cystoid spaces and on the edges of retinotomy sites, which were also edematous (10). In both studies, silicone oil droplets were incorporated into the retina both after ILM peeling and with intact ILM. Interestingly, cystoid oedema was always noted.

In the reported case, small cysts always appeared intraretinally in the third month postoperatively, which is consistent with the onset of silicon oil emulsification. We decided not to remove silicone oil as it is usually suggested. We hypothesized that in the presented case, the emulsified silicone oil induced limited retinal inflammation and allowed to bring the MH edges closer to each other promoting the healing process. Six months after vitrectomy, we could observe central continuity of the photoreceptor layer, known as Type 1 FTMH closure (Fig. 2b) in SD-OCT scans. The intraretinal cysts were also present. In the ninth month postoperatively, silicone oil was removed (Fig. 2c). Finally, one year after silicone oil removal, the BCVA was 0.1 and FTMH was completely closed with normal foveal contour without cysts.

We conclude that prolonged silicone oil tamponade may be effective in the treatment of FTMH secondary to a complete RRD which did not close or closed to flat open configuration. For the first time, the SD-OCT image of delayed healing from FTMH to Type 2 and secondarily to Type 1 closure was reported. When no side effects of silicone oil are observed, we suggest to maintain the tamponade over three months. Intraretinal cysts, in our opinion, develop due to silicone oil emulsification and facilitate macular hole healing.

References:

1. Li X, Wang W, Tang S, Zhao J: *Gas injection versus vitrectomy with gas for treating retinal detachment owing to macular hole in high myopes*. Ophthalmology. 2009; 116: 1182–1187.
2. Ah Kiné D, Benson SE, Inglesby DV, Steel DH: *The results of surgery on macular holes associated with rhegmatogenous retinal detachment*. Retina. 2002; 22: 429–434.
3. Mennel S, Kicova N, Callizo J: *Scleral buckling in rhegmatogenous retinal detachment with concomitant full-thickness macular hole*. Acta Ophthalmol. 2012; 90: 590–591.
4. Shukla D, Kalliath J, Srinivasan K, Neelakantan N, Rajendran A, Naresh KB, et al.: *Management of rhegmatogenous retinal detachment with coexisting macular hole: a comparison of vitrectomy with and without internal limiting membrane peeling*. Retina. 2013; 33: 571–578.
5. Ryan EH Jr., Bramante CT, Mittra RA, Dev S, Bennett SR, Williams D, et al.: *Management of rhegmatogenous retinal detachment with coexistent macular hole in the area of internal limiting membrane peeling*. Am J Ophthalmol. 2011; 152: 815–819.
6. O'Driscoll AM, Goble RR, Kirkby GR: *Vitrectomy for retinal detachments with both peripheral retinal breaks and macular holes: an assessment of outcome and the status of the macular hole*. Retina. 2001; 21: 221–225.
7. Shukla D, Rajendran A, Maheshwari R, Naresh KB: *Early Closure of Macular Hole Secondary to Rhegmatogenous Retinal Detachment With Internal Limiting Membrane Peeling*. Ophthalmic Surg Lasers Imaging. 2008; 39: 81–85.
8. Singh AJ: *Combined or sequential surgery for management of rhegmatogenous retinal detachment with macular holes*. Retina. 2009; 29: 1106–1110.
9. Odobrina D, Laudańska-Olszewska I: *Analysis of the time and location of the silicone oil emulsification by spectral-domain optical coherence tomography after silicone oil tamponade*. Biomed Res Int. 2014; 2014: 372045.
10. Errera MH, Liyanage S, Elgohary M, Day AC, Wickham L, Patel PJ, et al.: *Using spectral-domain optical coherence tomography to identify the presence of retinal silicone oil emulsification after silicone oil tamponade*. Retina. 2013; 33: 1567–1573.

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