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Ann. Acad. Med. Siles. (online) 2024; 78: 108–112
eISSN 1734-025X
DOI: 10.18794/aams/177201
www.annales.sum.edu.pl

OPIS PRZYPADKU
CASE REPORT

Micropulse laser therapy in chronic idiopathic central serous chorioretinopathy in right eye of 38-year-old patient – case report

Terapia laserem mikropulsowym w przewlekłej idiopatycznej centralnej chorioretinopatii surowiczej oka prawego u 38-letniego pacjenta – opis przypadku

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ABSTRACT

INTRODUCTION: Central serous chorioretinopathy (CSC) is a disease characterized by idiopathic serous elevation of the sensory layer of the retina in the proximity of the macula. This phenomenon predominantly manifests unilaterally, particularly in young males who exhibit increased susceptibility to stress. The optimal treatment strategy for CSC remains questionable due to a diverse range of symptoms, variable clinical courses, an overall limited understanding of CSC's pathophysiology and a lack of consensus on classification systems. Recently, there has been growing adoption of micropulse laser therapy in CSC treatment, allowing targeted action on retinal pigment epithelium, without causing damage to nearby photoreceptors. The aim was to evaluate the use of micropulse laser therapy in chronic CSC.
DESCRIPTION AND RESULTS: A 38-year-old patient with recurrent CSC in the right eye, previously treated locally with eye drops and oral medication for over a year, underwent evaluation. At the time of diagnosis, the patient exhibited a visual acuity of 0.63, intraocular pressure of 19 mmHg, and a central retinal thickness of 530 µm, as measured by optical coherence tomography (OCT). Fluorescein angiography (FA) confirmed the diagnosis, leading to the qualification for retinal micropulse laser therapy. Following the treatment, a subsequent FA test revealed improvement in the patient's clinical condition, with a vision acuity of 1.0 and intraocular pressure reduced to 17 mmHg. Additionally, the central retinal thickness measured by OCT decreased to 299 µm.
CONCLUSIONS: The use of micropulse laser therapy demonstrates the potential to achieve sustainable clinical effects in patients with recurrent CSC.

KEYWORDS

micropulse laser, central serous chorioretinopathy, retinal macula

Received: 09.08.2023 **Revised:** 25.10.2023 **Accepted:** 18.12.2023 **Published online:** 30.04.2024

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Publisher: Medical University of Silesia, Katowice, Poland

STRESZCZENIE

WSTĘP: Centralna chorioretinopatia surowicza (*central serous chorioretinopathy* – CSC) jest schorzeniem charakteryzującym się idiopatycznym surowiczym uniesieniem sensorycznej warstwy siatkówki w okolicy plamki, które najczęściej występuje jednostronnie, głównie u młodych mężczyzn ze zwiększoną podatnością na stres. Definiowanie optymalnego leczenia CSC jest skomplikowane ze względu na szeroki zakres objawów choroby, zmienny przebieg kliniczny, słabo poznaną patofizjologię CSC oraz brak konsensusu co do systemu klasyfikacji. W leczeniu CSC coraz częściej znajduje zastosowanie laser mikropulsowy, który działając selektywnie na nabłonek barwnikowy siatkówki, nie powoduje uszkodzeń fotoreceptorów. Celem pracy była ocena zastosowania terapii laserem mikropulsowym w leczeniu przewlekłego CSC.

OPIS I WYNIKI: Pacjent 38-letni leczony od kilkunastu miesięcy z powodu nawracającego CSC w oku prawym, leczony miejscowo kroplami oraz lekami doustnymi. Ostrość wzroku pacjenta w chwili rozpoznania wynosiła 0,63, ciśnienie wewnątrzgałkowe 19 mmHg. Centralna grubość siatkówki w optycznej koherentnej tomografii (*optical coherence tomography* – OCT) wynosiła 530 µm. U pacjenta wykonano angiografię fluoresceinową (*fluorescein angiography* – FA) potwierdzającą rozpoznanie oraz zakwalifikowano go do laseroterapii siatkówki z użyciem mikropulsów. Podczas kontroli w badaniu FA uzyskano poprawę stanu klinicznego. Ostrość wzroku pacjenta wynosiła 1,0, ciśnienie wewnątrzgałkowe 17 mmHg. Uzyskano spadek centralnej grubość siatkówki w badaniu OCT do poziomu 299 µm.

WNIOSKI: Zastosowanie lasera mikropulsowego umożliwia uzyskanie trwałego efektu klinicznego u pacjenta z przewlekłym nawracającym CSC.

SŁOWA KLUCZOWE

laser mikropulsowy, centralna chorioretinopatia surowicza, plamka żółta

INTRODUCTION

Central serous chorioretinopathy (CSC) is a relatively rare retinal disease featured by a high recurrence rate. Its exact cause and pathogenesis mechanism are still not wholly understood. It was first described in 1866 by the German ophthalmologist Albrecht von Graefe. The highest incidence of CSC occurs in the fifth decade of life, and men are affected 2.7–7 times more often than women. According to population-based studies conducted in Olmsted County, Minnesota, the annual incidence of CSC is 1.7 cases per 100,000 women and 9.9 cases per 100,000 men. CSC is usually confined to a single eye, however, bilateral involvement may be observed in 14–40% of cases. In the literature, two main types of CSC are typically distinguished: acute and chronic, although there is no universally accepted classification system. The acute form usually resolves idiopathically within 3–4 months, while the chronic type may persist for more than 4 months. Male gender also seems to be a risk factor associated with an increased likelihood of CSC recurrence. Over the years, several risk factors have been identified, including psychological stress, type A personality and the influence of corticosteroids, both endogenous and exogenous. Currently, the choroid and retinal pigment epithelium (RPE) are two pivotal agents in the pathogenesis of CSC. Increased vascular permeability in the choroid leads to elevated hydrostatic pressure, which can weaken the function of the RPE barrier and promote the accumulation of fluid between the retina and RPE. Elevated hydrostatic pressure can result in decompensation by pigment epithelium separation and ultimately lead to neurosensory retinal detachment. Other theories of CSC pathogenesis include hormonal factors (such as the impact of glucocorticosteroids), *Helicobacter pylori* infection, genetic factors, as well as the influence of cytokines [1,2].

CSC is characterized by serous elevation of the sensory retina in the macular area. Consequently, patients may experience blurred vision, image distortions (*metamorphopsia*), a sense of size alteration where visible objects appear smaller than in reality (*micropsia*) and abnormal color perception (*dyschromatopsia*) [3]. The optimal treatment for CSC remains controversial, owing to a lack of clear guidelines. To date, several therapeutic strategies have been established, including laser therapy, intravitreal injections of vascular endothelial growth factor inhibitors and the use of mineralocorticoid receptor antagonists [4]. Micropulse laser therapy is increasingly being chosen in the treatment of CSC, selectively targeting the RPE while minimizing damage to the photoreceptors [5].

The aim of this study is to evaluate the micropulse laser treatment in a 38-year-old patient with chronic central serous chorioretinopathy who was hospitalized in the Department of Ophthalmology at the University Clinical Center of Kornel Gibinski in Katowice.

CASE REPORT

A 38-year-old patient was admitted to the ophthalmology clinic with decreased visual acuity, color perception disturbances and *metamorphopsia* causing central image distortion. Diagnostic tests were performed to assess the patient's condition, including visual acuity examination, intraocular pressure measurement, evaluation of central retinal thickness using optical coherence tomography (OCT) and fluorescein angiography (FA). The results of the analysis were as follows: the visual acuity was 0.63, intraocular pressure equaled 19 mmHg. Central retinal thickness measured by OCT showed a visible elevation of RPE against the remaining layers of the retina, caused by accumulating fluid and equaled 530 μm (Figure 1). FA revealed a progressively increasing hyperfluorescent lesion with contrast leakage in the inferonasal part of the macula, corresponding to the active site of CSC (manifested by an "inkblot"; Figure 2). The patient received pharmacological treatment for eight months, including topical administration of brinzolamide, bromfenac, troxerutin and oral eplerenone, which collectively proved to be ineffective. The FA examination confirmed the diagnosis of CSC and alongside the duration of the disease, classified it as chronic. The afflicted person was then scheduled for micropulse laser retinal therapy. The procedure was performed at the Department of Ophthalmology, University Clinical Center of Kornel Gibinski in Katowice. An EasyRet 577 laser by Quantel Medical, which utilizes a 577 nm yellow wavelength laser, was used for the procedure. During the follow-up examination with FA, improvement in the patient's clinical condition was observed. The patient's visual acuity elevated to 1.0 and the intraocular pressure was reduced to 17 mmHg. The OCT central retinal thickness decreased to 299 μm (Figure 3).

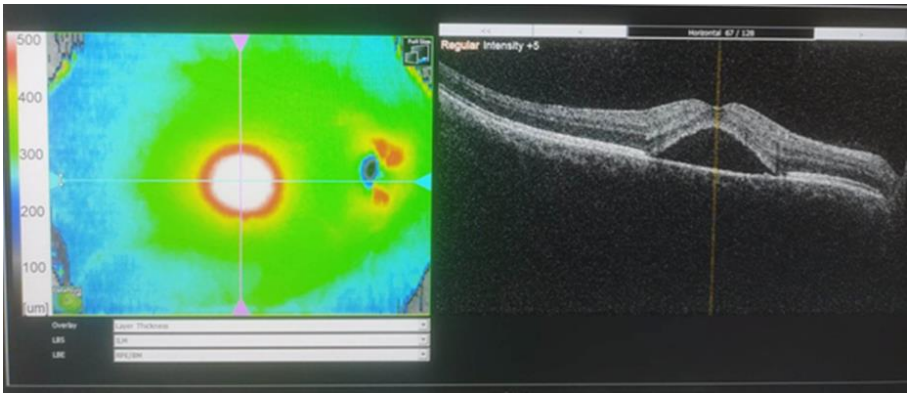

Fig. 1. Optical coherence tomography (OCT) of right eye during diagnostics.

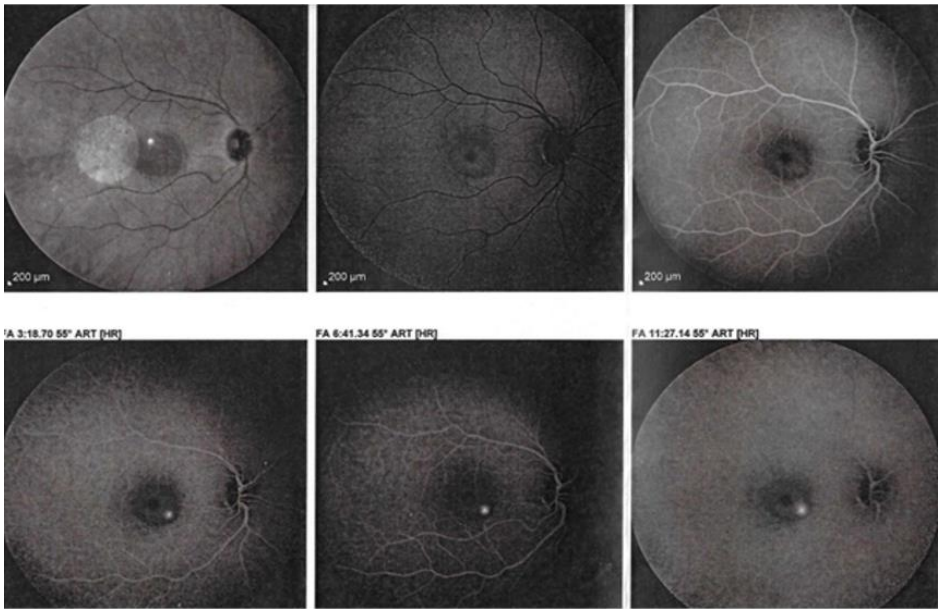

Fig. 2. Fluorescein angiography (FA) of right inferonasal part of macula with focal point of hyperfluorescence increasing over time with contrast leakage at site of active central serous chorioretinopathy (CSC) – "inkblot".

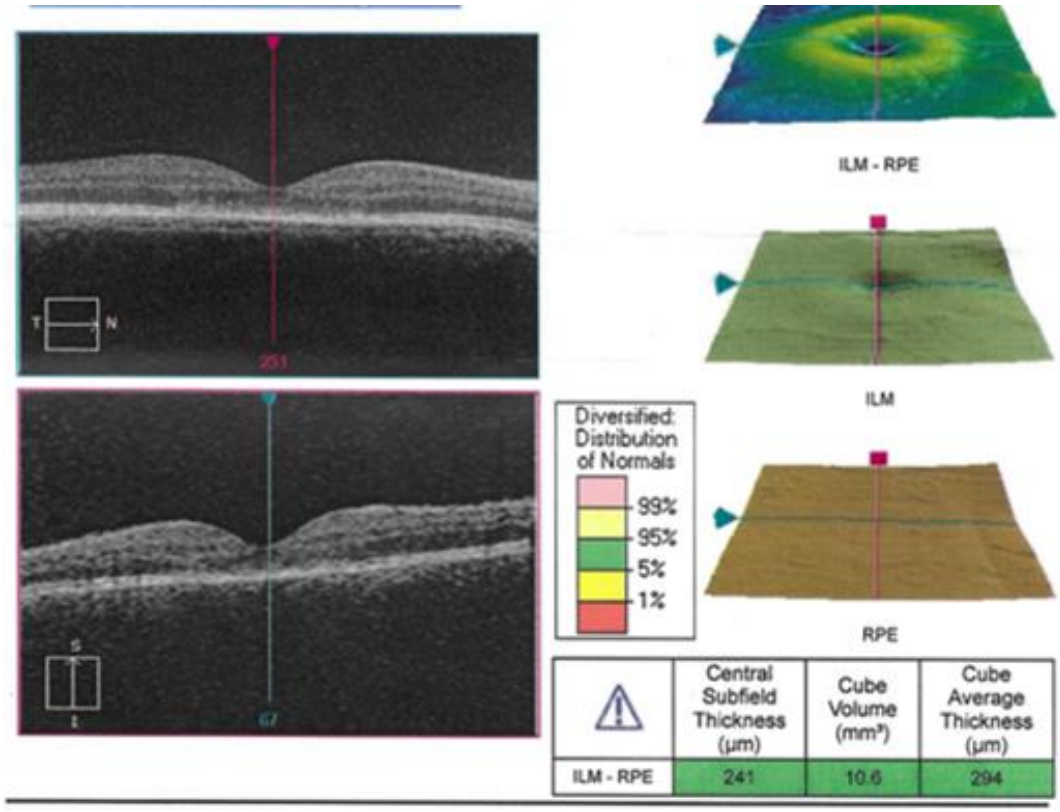

Fig. 3. Optical coherence tomography (OCT) of patient's right eye after conducting micropulse laser therapy.

DISCUSSION

CSC is characterized by its recurrent nature and chronicity, making it challenging to acknowledge the optimal treatment method. Although, pharmacological treatment appears relatively safe, there is no definitive evidence of its effectiveness [6]. In contrast, conventional photodynamic therapy, which is renowned for its established efficacy, is a subject of controversy due to the absence of a standardized dosing regimen, uncertainties regarding the sustainability of therapeutic outcomes and the potential risk of adverse effects. These concerns are associated with high temperatures affecting biological tissues and overall limited precision of this method [7]. Micropulse laser therapy seems to provide similar anatomical and functional effects, without the destructive impact on the RPE observed in the use of traditional lasers [8]. A laser with a wavelength of 577 nm, in the yellow color spectrum, is minimally absorbed by *xanthophyll* (yellow pigment), allowing laser energy to accumulate in both the inner and outer plexiform layers around the fovea [7]. Moreover, the yellow light spectrum is not absorbed by macular carotenoid pigments, making this approach exceptionally secure, notably when targeting areas around the macula. The laser functions by partitioning the total exposure into a series of short pulses separated by microsecond intervals, enabling a controlled decrease in retinal tissue temperature. It is speculated that the *modus operandi* of the given method, in addition to the thermal coagulation of the RPE, may involve activating its biological response. The objective of micropulse laser therapy is to operate in a way that leaves no traces on the retina, causing no adverse changes detectable by modern retinal imaging methods such as biomicroscopy, fundus autofluorescence, OCT or FA. In contradistinction to conventional laser therapy, which may result in permanent visual field loss (known as a "scotoma") when specifically targeting the fovea, micropulse laser therapy aims to minimize the impact on the RPE and areas in proximity [5]. This approach mitigates the risk of extensive scarring referred to as "atrophic creep" [9]. By minimizing damage to the RPE and adjacent structures, micropulse laser therapy preserves retinal function and reduces the hazard of visual impairment. In cases of CSC involving the macular region, conventional laser therapy is contraindicated as it leads to extensive cicatrization in the RPE. The projected operation mechanism of micropulse laser therapy prevents the formation of a central scotoma, RPE scarring and neovascularization of the choroidal areas, which are associated with a potential adverse effect of conventional laser therapy [7,10].

CONCLUSIONS

Owing to the unclear quiddity of chronic CSC and the various treatment strategies available, there is no universally recommended therapeutic approach. Micropulse laser therapy emerges as a highly effective, safe and durable treatment method, regardless of the pathology's location within the retina. Despite the lack of a clear consensus on treatment modality, the significance of micropulse laser therapy in treating CSC appears to be rapidly growing.

Author's contribution

Study design – M. Michalik, D. Hennik
Manuscript preparation – M. Michalik, K. Marcinkowski
Literature research – K. Marcinkowski, D. Hennik
Final approval of the version to be published – S. Sirek

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