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Case Report

Successful Ablation of the Large Conjunctival Cyst (21.68 × 10.5 mm) using Plasma-Assisted Non-Invasive Surgery (PANIS) with 1-Year Follow-Up: A Clinical Case Report

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Abstract

Large conjunctival cysts are common benign lesions that can cause various visual and cosmetic problems. A 78-year-old female was diagnosed with a large conjunctival cyst in her left eye. Plasma Assisted Noninvasive Surgery (PANIS) involves applying plasma spots to the top of the cyst using the PLEXR PLUS device to sublimate and drain the cyst behind the slit-lamp, after topical anesthesia. Visual parameters, including refractive error, uncorrected visual acuity (UCVA), best-corrected visual acuity (BCVA), intraocular pressure (IOP), and ocular surface disease index (OSDI), were measured before the procedure, six months, and one year after the procedure. Complete removal of the cyst was achieved, and no recurrence, side effects, or complications were observed in slit-lamp photos after six months and one year of follow-up. Both UCVA and BCVA improved by 2 lines after one session of the PANIS method, and IOP did not show any significant change. The OSDI score decreased from 42 to 0, indicating relief from dry eye disease signs and symptoms. The PANIS method seems to be a safe, minimally invasive, office-based, and cost-effective technique for large conjunctival cyst ablation.

Keywords: Large conjunctival cyst; Plasma-assisted noninvasive surgery; PANIS; atmospheric low-temperature plasma

Introduction

Conjunctival cysts are vesicles full of fluid, varying in size and location on the ocular surface [1]. Large conjunctival cysts may need removal treatment to relieve patients from foreign body sensation, dry eye symptoms, blinking issues, and cosmetic dissatisfaction [2]. Besides the primary conjunctival cysts that are congenital, secondary cysts can be a consequence of other systemic diseases such as Fabry disease, or any ocular inflammatory conditions such as chronic keratoconjunctivitis and pyogenic granuloma, or trauma, or any eye surgeries. [3-5]. Mainly, cosmetic problems will lead patients to excision of cysts. Every surgical technique could be effective, but they cause risks and complications such as orbital inflammation and corneal damage in doxycycline injection, thermal burns of surrounding tissues in thermal cautery, or recurrence in methods like YAG laser. [6-8]. In 2020, an office-based approach with no recurrence or complications was introduced by Nejat et al., named Plasma Assisted Noninvasive Surgery (PANIS), which utilized the benefit of low-temperature plasma for sublimating conjunctival cysts [9]. In this recent study, our team aims to report the effect and safety of the PANIS method on the ablation of a large conjunctival cyst measuring 21.68 mm in length and 10.5 mm in width.

Case Presentation

A 78-year-old woman was diagnosed with a large conjunctival cyst characterized by a solitary, non-tender, soft, cystic mass measuring 21.68 × 10.5 mm on the inferior fornix in her left eye when she

visited the Vision Health Research Center in 2021. This study was identified with the ethics committee of Semnan University of Medical Sciences. After the patient signed informed consent and was informed of all possible side effects and complications, the plasma-assisted noninvasive surgery (PANIS) began. This technique was initiated after three consecutive instillations of tetracaine 0.5% (Sina Darou, Tehran, Iran) in the targeted eye with a 5-minute interval. The patient was seated behind the slit lamp, and one surgeon (F.N.) performed all the procedure steps. Atmospheric low-temperature plasma was generated when the white handpiece of the PLEXR PLUS (GMV, srl, Rome, Italy) ionized the air between the tip of the device and the targeted tissue (Table 1). The sublimation mechanism caused the complete removal of the cyst. Intentionally, to prevent future recurrence and conjunctival tissue fusion, scar formation was induced with more plasma spots on the base of the cyst (Supplemental video 1). For post-operative medications, chlobiotic 0.5% (Raha Pharma Co, Isfahan, Iran) was prescribed every six hours for one week, and betamethasone 0.1% (Sina Darou, Tehran, Iran) was prescribed every four hours during the first week. The dosage of betamethasone was tapered off over a month. Visual parameters, including uncorrected visual acuity (UCVA), best-corrected visual acuity (BCVA), refractive errors, and intraocular pressure (IOP) by Topcon CT-80 non-contact tonometer (NCT), were measured before, six months, and one year after the PANIS procedure. All slit-lamp examinations were conducted during every ophthalmic visit with a photo slit-lamp (SL9900 ELITE 5X-D, CSO, Firenze, Italy), and the ocular surface disease index (OSDI) questionnaire was administered before, six months, and one year after the PANIS procedure. The OSDI score decreased from 42 to 0 in the 1-year period of follow-up. The UCVA and BCVA significantly improved by 2 lines. As expected, IOP did not change remarkably. The surgical procedure was done with no intraoperative or postoperative complications, including pain during and after the surgery. Photo slit-lamp examinations showed complete large conjunctival cyst removal with no recurrence in the 1-year follow-up (Figure 1).

The device operates using air as the working gas	
White handpiece	Peak to peak voltage of 500 V
	Power of 0.7 W
	Frequency of 75 kHz.
Green handpiece	Peak to peak voltage of 600 V
	Power of 1 W
	Frequency of 75 kHz
Red handpiece	Peak to peak voltage of 700 V
	Power of 2 W
	Frequency of 75 kHz
It is powered by a docking station with a voltage of 24 V	
Handpieces	The maximum power output of the devices are 2 W.
It employs a sterile disposable needle made of stainless steel as the applicator electrode.	The maximum working voltage is 1.3 kVPP.

Table 1: PLEXR PLUS Characteristics.

Figure 1: Photo slit-lamp images before, 6 months, and 1 year after the treatment with the PANIS method.

Follow-up times	UCVA	Refractive errors			BCVA	IOP	OSDI
		Sphere	Cylinder	Axis			
Before	6/10	-1.5	-1	150	7/10	12	42
After 6 months	8/10	-1	-0.5	160	9/10	12	0
After 1 year	8/10	-1	-0.5	160	9/10	12	0

Table 2: Patients measured parameters.

Discussion

Large conjunctival cysts are translucent lesions on the bulbar conjunctiva, which usually cause cosmetic and annoying symptoms that may indicate the need for an interventional removal technique [10]. Conjunctival cysts are disturbing in the implantation of any kind of contact lenses, and they also exacerbate symptoms related to blinking problems and dry eye disease, causing Dellen formation [11]. Removal techniques are categorized into conventional and novel groups. Transcutaneous approach with Nylon suture, argon laser photoablation, trichloroacetic acid injection, thermal cautery, and cryotherapy are performed as conventional methods [7,12,13]. Novel techniques include the use of methylthioninium dye for better visualization and the PANIS method, which utilizes atmospheric low-temperature plasma [9,14]. The PANIS method is defined as using plasma for treatment of ocular surface diseases such as conjunctivochalasis, conjunctival cysts, pinguecula, pterygium, dry eye disease, conjunctival concretion, and nevus [9,15,16]. All ocular applications were performed after safety checks in rabbit's eyes and histopathological evaluations, conducted 1 month and 6 months after plasma exposure on the conjunctiva [17,18]. In this study, our aim is to evaluate the safety and efficacy of PANIS treatment in the removal of a large conjunctival cyst in one female patient with a 1-year follow-up. Our patient has been evaluated with anterior optical coherence tomography (OCT) imaging to differentiate between a conjunctival cyst and a lymphatic malformation. Despite the beneficial advantages of this novel technique indicated in this study, more patients should be treated with the PANIS method to provide more reliable and authentic support for the claim.

Conclusion

The PANIS method is a widely used approach for treating ocular surface conditions, including the ablation of large conjunctival cysts. After 1 year of no recurrence and no complications in the treated patient, it appears that the PANIS method is a cost-effective, safe, and effective modality with a low rate of complications or recurrence.

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