A TOOTH FOR AN EYE
Case Report
By: *V Sanene*, K Muma

1Department of Ophthalmology, School of Medicine and Clinical Sciences, Levy Mwanawasa Medical University, Lusaka, Zambia
2University teaching Hospitals-Eye Hospital, Lusaka, Zambia

*E-mail Address: Viola Sanene: violasan2002@yahoo.com*

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ABSTRACT
A female patient aged 30 years was brought to the University Teaching Hospitals - Eye Hospital (UTH-EH) complaining of poor vision in both eyes after suffering from Steven Johnson syndrome (SJS). On examination, visual acuity was hand movement (HM) in both eyes. The right eye (RE) had adhesions (symblepharon) of both upper and lower eyelids, haziness and cornea opacification, while left eye (LE) had a total permanent tarsorrhaphy with Osteo-odontokeratoprosthesis (OOKP) at the centre.

INTRODUCTION
Corneal opacification is the second most common cause of blindness in the world affecting an estimated 10 million people [1]. Corneal blindness is far more prevalent as a result of ocular surface disease leading to corneal neo-vascularization and scarring. The blindness due to corneal scarring can be managed in various ways depending on the density of the scar [2]. The Osteo-odontokeratoprosthesis (OOKP) is indicated for corneal lesions resulting from Steven Johnson Syndrome, trachoma, pemphigoid, trauma limited to the cornea and chemical burns [3].

Benedetto Strampelli described the original technique of OOKP nearly fifty years ago using the patient’s own tooth root and alveolar bone as a vital support to an optical cylinder. The OOKP also known as tooth in eye surgery is an auto graft used for the treatment of severe corneal opacities not suitable for corneal transplant [4,5]. A Kerato-prosthesis is used to replace damaged cornea [4,5].

Falcinelli et al., 1986, modified this technique in a stepwise fashion [6-9]. OOKP is a 2-stage operation. Stage 1 of the surgery involves 5 separate procedures. First, the eye is opened up and the entire inner surface of the eyelids, corneal surface and all scar tissue is removed. Then the inner mucosal lining of the cheek is transplanted onto a new surface of the eye [10]. A canine or premolar tooth and part of the adjacent bone and ligaments are harvested. A bolt shaped structure is fashioned from the tooth-bone complex which is fitted with a plastic optical cylinder [11]. Stage 2 (about 4 months later) involves two separate procedures. The cheek mucosal lining over the eye is opened and the inner contents of the eye are removed. The tooth-bone-cylinder complex is harvested from the cheek and inserted into the eye; the mucosal cheek lining is placed over the implant. At the end of the procedure, light can now enter through the plastic cylinder and the patient is able to see through this cylinder with good vision [12-14].

The cornea is replaced by a polymethyl methacrylate (PMMA) optical cylinder glued to a biological support (haptic) made from human living tissue. Currently available KPro (kerato-prosthesis) devices range from totally synthetic such as the Boston KPro, to the totally biological tissue engineered artificial cornea [15]. The OOKP combines both a synthetic optic with a biological haptic [16]. The OOKP is a true heterotopic auto graft made of living long lasting human tissue.

CASE SCENARIO
A female patient aged 30 years presented to the UTH-EH complaining of poor vision in both eyes. The patient gave a report of having reacted to anti-tuberculosis drugs while in Zambia. After being diagnosed with SJS in 2016, she sought medical advice in the United States of America (USA) where OOKP was conducted successfully on the left eye and vision improved and was able to carry out normal activities. In May 2019, she noticed that her vision was gradually decreasing; she later presented to UTHs - Eye Hospital with poor vision 6 months later. On examination, there was an obvious symblepharon in the right eye and OOKP in the left eye (fig.1). The visual acuity in both eyes was hand movement (HM). On slit-lamp examination, the right eye had symblepharon of upper and lower eyelids and opacification of the cornea. The left eye had a total permanent tarsorrhaphy with Osteo-Odontokeratoprosthesis (OOKP).

Fundoscopy of the LE showed optic disc cupping of about 0.9 cup disc ratio (CDR) whereas fundoscopy was not possible to perform in the RE due to the scarred cornea. The intraocular pressures were 18 mmHg RE and was not measured in left eye. The patient was started on acetazolamide (Diamox) 500 mg stat then 250 mg three times a day for three days.

DISCUSSION
Osteo-odontokeatoprosthesis is a vision restoring surgical technique where the patient’s opaque cornea is replaced with an artificial device. In this case, the patient had end stage corneal blindness and hence, OOKP was done on the left eye as a way of restoring her vision [11]. The optical device is made up of a PMMA (Polymethylmethacrylate) cylinder which acts as an artificial cornea. It is particularly resilient to a hostile environment such as the dry keratinized eye. Patients are ad-

![Figure 1. The left eye after osteo-odontokeratoprosthesis.](image)
vised to quit smoking and practice measures that will improve their oral hygiene so as to increase the chance of survival of the buccal mucous membrane graft. In this case the patient was neither smoking nor consuming alcohol. Therefore, the buccal mucous membrane could survive longer [12-14]. The success rate of the OOKP surgery vary from different studies, Lui C, et al (1998) reported excellent long-term retention of 85% in 18 years [3]. According to Herold et al., (1999), 80% of OOKP patients achieved improvement of vision [16]. Lui C, et al., (2005), stated that OOKP described by Falcinelli gives the best long-term results for visual acuity of 75% with 6/12 or better and retention of 85% for up to 18 years [15].

Follow up visits is life-long in order to detect and treat complications which include oral, oculoplastic, glaucoma, vitreo-retinal complications and extrusion of the devise [17]. Follow ups are done at weekly interval for 1 month, then monthly for six months, then every 2 months for six months, then every four months for the prosthesis and intraocular pressure measurement. Once it is stable, follow up can be at longer intervals [10, 11]. In this case the patient did not adhere to follow up schedule and the doctors who performed the procedure did not forward the report to the doctors of the patient’s residence for effective follow up. So, when the vision started deteriorating, the patient could not be attended to promptly to establish what was causing that. There was also lack of communication between the primary OOKP team and the patient which created a huge gap for follow up. Therefore, the vision was not good as expected or it could be that the patient could have fallen in the 15% of OOKP patients reported not to have good vision by Lui et al., 2005.

Giancarlo et al., (2005), described the long term anatomical and functional outcome in 181 cases and the results indicated that modified OOKP surgery can provide favourable anatomical and functional results, which are stable in the long term and retaining an intact OOKP was 85% [9]. Just as in this case, the patient retained good anatomical and functional of OOKP. Tan DT et al., 2008 treated 29 cases to restore sight with OOKP surgery and found excellent results without any instability problems or extrusion [6]. The OOKP in this case report was very stable and there were no signs of extrusion. Hughes et al., 2008, reported vitreo-retinal complications of the OOKP in a retrospective review of 35 patients after a mean 57 months follow up which revealed 9 vitreo-retinal complications in 8 patients (23%) [18]. In this case, there were no vitreo-retinal complications. Kumar et al., 2009, did a study to report diagnostic modalities and treatment options for glaucoma in 15 eyes that underwent OOKP surgery and they concluded that visual field testing and optic disc assessment with optic disc photographs seem to be effective methods to monitor glaucoma and treatment strategies include oral medication (acetazolamide 500mg twice a day) to lower intraocular pressure and cyclo-photocoagulation [19]. Due to inadequate follow up, the patient was not fully evaluated for glaucoma and as a result she ended up with a CDR of 0.9 in the LE.

The OOKP is considered the only devise capable of offering long term visual rehabilitation in patients with end-stage ocular surface disease and severe tear deficiency (with or without eyelid defect based on the studies of cases that were done before [5].

Thus, it is necessary for both surgeons to understand the finer details of the procedure and its possible complications which can be avoided with adequate precautions during surgery and its timely follow up of the patients.

CONCLUSION
Osteo-Odonto-Keratoprosthesis is the ocular surgical procedure of choice for restoring sight in patients with end stage corneal scarring. Frequent follow up and good follow up plan for Osteo-Odonto-Keratoprosthesis is critical in order to diagnose and treat complications as early as possible so that restored vision is not lost.


