



Case Report

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Complications Associated with the Surgical Techniques of Upper Eyelid Loading: A Clinicopathologic Study of 7 Explanted Gold Weight Lid Loads

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Abstract

Loading of the upper eyelid with gold weights is a well-established procedure for the correction of paralytic lagophthalmos. Only a few studies show the impact of the implant on the surrounding tissues.

The aim of this case series is to present clinicopathological correlations in patients requiring implant removal due to post-surgical complications.

There were 7 patients (2 men, 5 women aged 24 -79 years) from a sample of 64 with unresolved facial nerve palsy and exposure keratopathy treated with upper gold-weight lid-loading from 2009-2014. Causes of implant removal were: swelling and reddening of the eyelid followed by weight extrusion in 5 cases, 1 excessive ptosis, and 1 unsatisfactory cosmesis.

The mean implant weight was 1.5 ± 0.3 g. Complications occurred within 5-92 months. All weights were surrounded by fibrous capsules with lymphocytic infiltrates CD3, CD4, CD8, and CD20 positive.

We conclude that complications related to operation technique mimicked an allergic reaction to gold.

Keywords

Gold weights; Lid-loading; Allergy to gold; Exposure keratopathy; Lagophthalmos; Facial nerve palsy

Keymessages

Complications related to the operation technique may mimic symptomatic allergy to gold in the upper eyelid loading procedure. Meticulous fixing of the weight to the upper border of the anterior tarsus may outdistance it from the blood vessels of the lid margin and thereby minimize its potential impact on the surrounding tissues.

Introduction

Since its introduction in 1958 [1], upper gold-weight lid-loading has been an effective method for the correction of lagophthalmos in

facial nerve palsy [2-4]. Among the relatively rare complications related to the procedure (including: weight extrusion, migration, bulging, induced astigmatism, under- or overcorrection and unsatisfactory cosmesis) only a few cases of non-infectious inflammatory response to gold have been reported [5-9]. Some complications are attributed to type IV hypersensitivity reactions [5,8], but due to the small number of investigated cases, scarce histopathological examination, and limitations of screening technologies, there is still no direct confirmation of this hypothesis.

Case Report

This was a prospective, consecutive case series assessing clinical outcomes after upper gold-weight lid-loading as treatment for ocular complications of unresolved facial nerve palsy in years 2009-2014.

The weight with surrounding tissues was removed in 7 out of 64 cases. Each specimen was stained according to the following protocols: Mayer's Hematoxylin and Eosin, Masson's trichrome and using CD3, CD20, CD4, CD8 and Mac387 monoclonal antibodies (Table 1, Figure 1A-C). All patients had a negative history of metal allergies.

Patient 1

Presented with left fifth and seventh cranial nerve palsies (5th, 7th CNP) and weight extrusion (Table 2, Figure 1D,1E). Otherwise, she remained healthy.

After implant removal, secondary gold weight implantation was performed with our standard 2-week postoperative course of topical antibiotic and steroid ointment (oxytetracycline with hydrocortisone, 4 qd). No further complications occurred.

Patient 2

Presented with right 5th, 7th CNP and gold weight extrusion after secondary lid-loading (Table 2). The patient's other medical history was unremarkable.

After implant removal, the patient received a new 1.6 g gold weight, fixed to the anterior upper tarsal border with absorbable sutures (Vicryl 6.0). No complications occurred.

Patient 3

Was slightly hypertensive and presented with left 5th, 7th CNP and weight extrusion in the site of a previous tarsorrhaphy performed for neurotrophic corneal ulceration (Table 2). The weight was fixed with absorbable sutures to the anterior tarsus, about 2 mm above the eyelash line. The eyelid was noticeably reddened on postoperative Day-1 (Figure 1F). After implant removal the eyelid was pale. Mullerectomy and levatoraponeurosis recession were performed to provide corneal protection. No other complications occurred.

Patient 4

Presented with left 7th CNP (Table 2). She was healthy but tired of using topical moisturizers. Gold weight implantation was successful (Figure 1G, 1H). After initial enthusiasm due to a complete relief of symptoms, she started complaining of occasional drooping of the

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Table 1: Histopathology.

Patient	Masson trichrome	CD3+	CD20+	CD4+	CD8+	Mac 387	CD3:CD20	CD4:CD8
1	Fibrosis, fibrin, hemorrhages	50	70	30	50	Numerous, in clusters	1:1,5 granulomatous	1:1,5
2	Fibrosis, hemorrhages	60	60	40	20	Numerous, in clusters	1:1 non granulomatous	2:1
3	Fibrosis, hemorrhages	50	30	40	70	Numerous, in clusters	1,5:1 non granulomatous	1:1,5
4	Fibrosis, fibrin	70	20	30	10	Sparse, dispersed	4:1 non granulomatous	3:1
5	Fibrosis, hemorrhages	40	30	40	40	Numerous, in clusters	1:1 non granulomatous	1:1
6	Fibrosis, fibrin	50	50	50	70	Sparse, dispersed	1:1 non granulomatous	1:1,5
7	Fibrosis, hemorrhages	50	40	70	70	Numerous, in clusters	1:1 non granulomatous	1:1

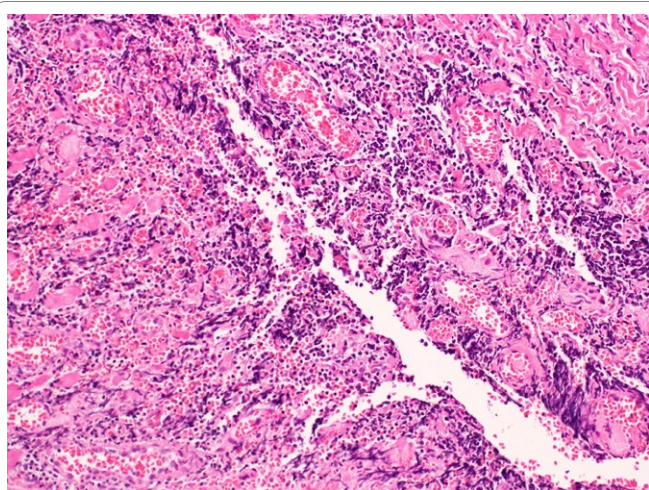


Figure 1A: Micrograph showing abundant lymphocytic infiltrate with petechiae around the apparent gap (after weight explantation). In the right upper corner is an extensive network of small blood vessels with homogeneous bundles of fibrous connective tissue in between (hematoxylin-eosin, x100).

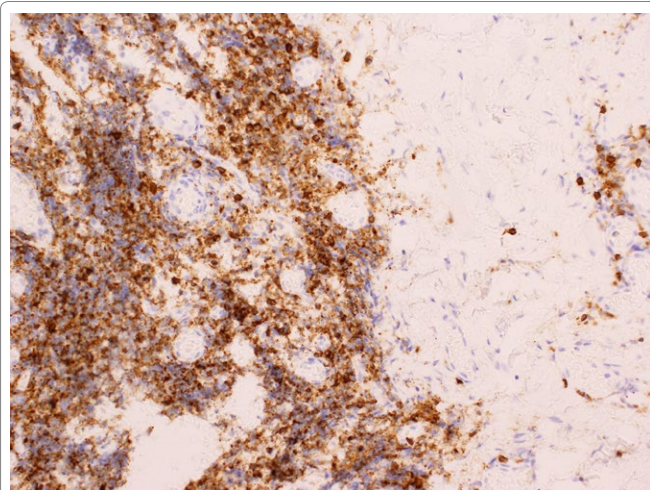


Figure 1C: CD8 + cells with the CD4 (lymphocytes Th)/ CD8 (lymphocytes Tc) ratio 1:1 (DAKO, Immunoperoxidase for Dako Autostainer, x200).

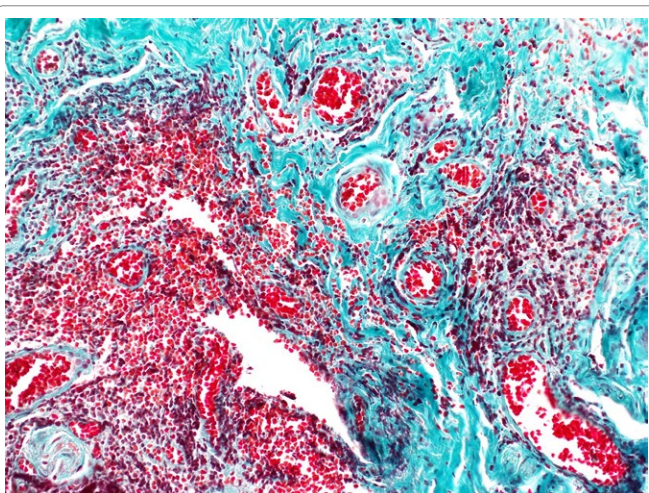


Figure 1B: Right upper zone of the same microphotograph with clearly visible bundles of connective tissue (stained green), blood cells and scattered lymphocytes (Masson trichrome, x200).

loaded eyelid in a downgaze position during postoperative Month 3. We removed the weight at the patient’s request. Eyelid closure is possible with some effort and the patient is asymptomatic.

Patient 5

Was mildly hypertensive and presented with right 5th, 7th CNP and a corneal ulcer (Table 2). Urgent tarsorrhaphy was performed and then we placed a gold weight into the pretarsal space, like in Patient 3. The clinical signs were similar (Figure 1I). The patient underwent secondary lid loading with the same weight fixed to the upper border of the tarsal plate with absorbable sutures. The eyelid was pale and no other complications occurred.

Patient 6

Presented with corneal neurotrophic ulcer and uveitis (Table 2) Except for mild hypertension, her past medical history was unremarkable. After conservative local and systemic antiviral treatment (Acyclovir) the symptoms of left 5th, 7th CNP persisted so we placed the weight on the upper tarsal border. The results were initially encouraging but after 3 months progressive ptosis occurred, which resulted in implant removal. The ptosis persists and the patient has refused any additional surgical intervention.

Patient 7

Was in general good condition and presented with left 5th, 7th CNP and weight extrusion (Table 2). After implant removal, eyelid closure was possible with some effort. The patient uses topical moisturizers. No additional surgical intervention is necessary.

Table 2: Clinical data.

Patient	Age	Gender	Eye	Etiology	Weight [gram]	Weight Manufacturer	Cause of removal	Complications free period [months]	Corneal sensation
1	24	F	L	ANS*	1.4	Upper Eyelid Implant, Heinz Kurz GmbH Medizintechnik, Germany	extrusion	5(referral)	No
2	35	M	R	ANS*	1.4	domestic	extrusion	92(referral)	No
3	42	M	L	ANS*	1.2	Contour™ Eyelid Implant, MedDev Corporation, USA	extrusion	31(our surgery)	No
4	37	F	L	Trauma	1.4	Contour™ Eyelid Implant, MedDev Corporation, USA	cosmesis	12(our surgery)	Normal
5	60	F	R	ANS*	1.0	Contour™ Eyelid Implant, MedDev Corporation, USA	extrusion	29(our surgery)	No
6	75	F	L	HZO**	1.8	Contour™ Eyelid Implant, MedDev Corporation, USA	ptosis	14(our surgery)	No
7	79	F	L	ANS*	2.0	domestic	extrusion	8(referral)	No

*ANS=Acoustic Neuroma Surgery
 **HZO=Herpes Zoster Ophthalmicus



Figure 1D: Patient 1 with partial extrusion of the gold weight (1.4 gram) in the left upper eyelid in primary gaze.



Figure 1F: Patient 3 at 3 month follow-up after loading of the left upper eyelid with the gold weight (1.2 gram) with closed eyes.



Figure 1E: Patient 1 with partial extrusion of the gold weight (1.4 gram) in the left upper eyelid with closed eyes.



Figure 1G: Patient 4 at 3 month follow-up after loading of the left upper eyelid with the gold weight (1.4 gram) in primary gaze.

Discussion

Following previous reports [3-6,10] our study confirms that gold implants induce a non-granulomatous chronic inflammatory reaction (Figure 1A, Table 1) of lymphocytes B (CD20+) and T (CD 3+) (Figure 1C, Table 1) and local fibrosis, visualised by Masson trichrome (Figure 1B, Table 1). Macrophages (Mac 387) are crucial cells in an immune response, indicating that there was an active inflammatory process in Patients: 1,2,3,5 and 7, who had implant extrusions (Table 1).

In all patients with extrusions the implant was placed approximately 2 mm above the eyelash line and the major blood

vessels, which are vital participants in inflammatory reactions and angiogenesis. Since we started suturing the weight to the bare anterior upper tarsal border with absorbable polyglactin sutures, we have had no extrusions, reddening, or vessels visible on the surface of the eyelid skin (Figure 1H). Both neovascularization visible in Patients 1,2,3,5,7 and significantly fewer vessels and hemorrhages in Patients 4 and 6 presenting no signs of extrusion, may confirm that implantation site plays a crucial role in tissue response to biomaterials [11]. Eosinophilic infiltrate, typical for



Figure 1H: Patient 4 at 3 month follow-up after loading of the left upper eyelid with the gold weight (1.4 gram) with closed eyes.



Figure 1I: Patient 5 at 3 month follow-up after loading of the right upper eyelid with the gold weight (1.0 gram) with eyes closed.

allergic reactions as reported by Bair [6], was not noted in any sample. Given that the same weight implanted again in Patients 1 and 5 caused no adverse reactions after changing the operation technique and that histopathological findings revealed no difference between the different types of examined weights (Table 1), it seems that the implant itself did not influence the outcomes. A typical foreign-body giant cell reaction was observed only in Patient 1 close to the non-absorbable sutures (Table 1), similar to the results from other studies [6,10]. In contrast, however, absorbable polyglactin sutures used by Townsend [4], Doyle et al. and our ward, both seem to be sufficient to keep the implant in place until the fibrotic capsule formation stabilizes and seem not to induce any additional long-term reactions [5]. The significantly higher concentration of T helper cells (CD4+) in Patient 4 with isolated facial nerve palsy indicates that a lack of tissue innervation may inhibit T-helper mediated cell-to-cell interactions in the immune response.

Following our experience and Anderson's study [11], we conclude that complications after upper gold-weight lid-loading related to operation technique may mimic an allergic reaction to gold. A symptomatic allergy to gold in the lid-loading procedure seems to be a rare complication, but it should be taken into account when taking a patient's medical history.

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