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Utilization of Calcium Hydroxylapatite for Non-cosmetic Facial Volume Restoration

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Abstract

Objectives: Facial volume deficiency resulting from trauma, disease, and/or prior oncologic treatments can result in aesthetic and function sequela. We present our experience with injectable calcium hydroxylapatite for non-cosmetic volume restoration.

Study Design: Retrospective case series

Methods: A retrospective chart review of patients at a tertiary care center undergoing non-cosmetic facial volume restoration with injectable calcium hydroxylapatite between August 2015 and 2016 was performed. Data collected included etiology of volume deficiency, aesthetic and functional sequela, and prior reconstructive treatments. Treatment plan was reviewed for injection volume, treatment number, and adjunctive procedures/injections.

Results: Seven patients underwent facial volume restoration with injectable calcium hydroxylapatite for non-cosmetic indications. Etiology of facial volume deficiency included prior treatment for carcinoma (n=3), ossifying fibroma (n=1), scleroderma (n=1), and trauma (n=2). Volume deficiency manifested as esthetic asymmetry (n=7) ectropion (n=3), epiphora (n=3), and oral incompetence (n=1). Each treatment included injection of 1.5 mL of calcium hydroxylapatite to affected areas; 5 patients required only one treatment, and 2 patients required a series of 2 treatments. Patients reported results of “good” (n=2) to “excellent” (n=4) following treatment.

Conclusions: The treatment of facial volume deficiency following trauma, disease, and/or oncologic treatment is a complex problem for the reconstructive surgeon. Injectable calcium hydroxylapatite can be successfully used for non-cosmetic volume restoration in this patient population with patient reported satisfaction in both aesthetic and functional results.

Introduction

Since the early 2000's multiple injectable filler products have entered the market for facial volume restoration. With their introduction, there has been an exponential increase in the number of non-surgical procedures performed for facial rejuvenation. Since 1997 there has been a 6,449% increase in the number of injectable procedures performed with a total of 6.7 million injectable filler procedures performed during 2015 in the US alone.¹ Although the majority of these procedures are for cosmetic indications, injectable fillers can also play a role in reconstruction.

Calcium hydroxylapatite (CaHA) is an injectable filler was approved for injection in the face in 2006. CaHA is made of 30% microspheres of synthetic bone (25-45 µm) suspended in a 70% carboxymethylcellulose carrier. Within several weeks of injection, the carrier gel is absorbed and neocollagenesis is induced with the CaHA microspheres acting as scaffolding. It is nonantigenic, nonirritating, nontoxic, has a low risk of adverse events, and extended longevity (12-18 months) compared to HA.² We present our experience utilizing it for non-cosmetic volume restoration.

Results

#	Age Sex	Etiology	Location and Symptoms	Prior Reconstruction or Intervention	CaHA Volume	Depth of Injection	# of Treatments	Adjunctive Procedures	Follow-Up (months)	Results
1	56F	Scleroderma	Perioral	Restylane w/ early reabsorption	1.5 mL	Dermal/SubQ junction	1	Restylane into red lip; Botox mentalis m.	18	Excellent
2	79F	SCC Mohs	R cheek w/ epiphora	Midface lift and z-plasties	1.5 mL	Supra-periosteal	1	BBL laser of scar	17	Excellent
3	46F	Ossifying fibroma resection	L malar region with L ectropion and epiphora	None	1.5 mL	Supra-periosteal	2	None	6	Good with resolution of epiphora and decreased ectropion
4	77F	SCC Mohs Resection	R midface w/ oral incompetence	None	1.5 mL	Supra-periosteal & Dermal/SubQ to drop lip	2	Restylane into red lip	18	Excellent w/ improved oral competence
5	63F	Trauma	Right malar region	Wedge resection upper and lower lip with dermal fat graft to cheek	1 mL	Supra-periosteal	1	None	12	Good
6	58F	Trauma	R malar region with ectropion	None	1.5 mL	Supra-periosteal	1	BBL laser	8	Excellent
7	59F	SCC Mohs Resection	L malar with ectropion	None	1.5 mL	Supra-periosteal	1	Botox	15	Excellent, improved eye symptoms



Figure 1: Patient #3 with history of ossifying fibroma resection. (A) Pre-treatment frontal view left malar deficiency with ectropion. (B) Post-treatment frontal view after 1st injection with improvement of ectropion and resolution epiphora (note relative MRD 2s). (C) Oblique view pre-treatment. (D) Oblique view post-treatment with improvement in lower lid position.



Figure 2: Patient #7 with history of SCC s/p Mohs. (A) Pre-treatment left malar deficiency with ectropion on frontal view. (B) Post-treatment frontal view with improvement in ectropion and resolution of her ocular symptoms.

Methods

- IRB approved study
- Retrospective chart review of patients undergoing non-cosmetic facial volume restoration with injectable calcium hydroxylapatite (CaHA)
- Evaluated patient factors including: volume deficiency, aesthetic and functional sequela, prior reconstructive treatments
- Evaluated treatment factors including: CaHA injection volume, treatment number, and adjunctive procedures/injections

Technical Pearls

- Mixing 1.3 mL of CaHA with 0.2mL of 2% lidocaine improves patient comfort as well as ease and smoothness during injection
- Depth of injection varies based upon treatment location and scar/deficiency requirements
 - Supra-periosteal is preferred in malar and mandibular regions
 - Dermal/subcutaneous junction is favored in the perioral region
- Low volume (1.5 mL) injection recommended initially with possible re-injection at 6 weeks. Further injection is titrated to achieve the desired correction.
- Avoid high volume injections as tissue may have compromised viability due to prior disease, trauma, or treatments

Discussion

The safety and efficacy of CaHA for volume restoration in the aging face has been well established. Rates of adverse events reported are ~5% (consistent with other injectable fillers). Adverse events are typically local erythema, edema, or cellulitis.³ It must be considered when using CaHA for augmentation following prior cancer treatment, trauma, or other disease process that the risk of an adverse event may be increased. The tissue requiring augmentation has been affected by both the underlying disease process resulting in volume deficiency and prior surgical treatments. As such, we recommend a graduated approach using low volume injection initially (1.5 mL per treatment). If patients require additional volume augmentation, we typically perform this 6 weeks following the initial treatment.

In our experience, CaHA can be a powerful tool for treatment of volume deficiency related to tumor resection, trauma, and disease related volume loss. Although this is a small series of patients, it is important that this and similar case series enter the literature to establish the use of CaHA for non-cosmetic indications. Not only does this knowledge provide an additional treatment option for physicians; it also provides data to support insurance and CMS coverage for these procedures. If patients can receive significant benefit from these procedures without the associated risk and morbidity of open surgical procedures, these procedures may be offered as an additional or alternative treatment option.

Conclusions

- Calcium hydroxylapatite provides an additional option for volume restoration in patients with non-cosmetic volume deficits
- It can be an especially powerful tool for patients who have previously undergone prior surgical reconstruction and would like a minimally invasive option for volume improvement or are poor surgical candidates
- Good evidence supporting safety of CaHA injection with few adverse events associated with its use in large clinical trials
- Depth of injection varies depending on location and volume deficient requiring correction.

References

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