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# Craniofacial Surgery: Genioglossus Advancement Surgery Using Autologous Platelet Concentrate Enriched with Growth Factors (APC<sup>+</sup>)

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## INTRODUCTION

Obstructive sleep apnea syndrome affects approximately 40 million Americans. Standard therapies include CPAP use. However, CPAP is poorly tolerated. When surgical therapy is indicated for retrolingual collapse, genioglossus advancement with hyoid suspension myotomy-advancement (GA-HSM) is an excellent procedure for treating this disorder.

Since this procedure involves intraoral osteotomies, bone healing is critical to rapid recovery to allow patients to return to work with minimal discomfort, and ultimate healing. Our standard phase one surgical therapy includes GA-HSM with tongue base temperature controlled, radio frequency tissue reduction. Our technique for GA-HSM has been published.<sup>1</sup>

Autologous platelet concentrate enriched with growth factors (APC<sup>+</sup>) is derived from the patient's own blood. APC<sup>+</sup> has been shown to accelerate wound healing and enhance bone graft survival.<sup>2</sup> PRP has excellent hemostatic properties, provides an excellent biologic dressing, and reduces postoperative pain and swelling in cases that utilize osteotomies.

The following case report describes a GA-HSM for obstructive sleep apnea syndrome, using APC<sup>+</sup> to increase bioactivity of the bone and soft tissue healing.

## OBJECTIVE

A 53 year old female was diagnosed with severe obstructive sleep apnea and had been treated with CPAP. She was intolerant of this therapy and elected to undergo phase one surgery for OSA. Cephalometrograms and a panorex film was obtained for pre-surgical planning.

## MATERIALS AND METHODS

Approximately 50cc of intravenous blood was drawn pre-operatively and processed using an automated dual spin process (SmartPREP<sup>®</sup>, Harvest Technologies, Inc., Plymouth, MA). The 12 minute process produced 10cc of autologous platelet concentrate enriched with growth factors (APC<sup>+</sup>) and approximately 20cc of platelet poor plasma (PPP).

The patient underwent a genioglossus advancement-hyoid suspension myotomy. APC<sup>+</sup> was used as an adjunct to augment bone and soft tissue healing. Figure 1 shows the intraoral incision and measurement for superior osteotomy border. The intraoperative view after completion of visor osteotomy can be seen in Figure 2. Figure 3 shows the advancement of bone-genioglossus muscle segment prior to securing the composite flap with bone plates.



Figure 1



Figure 2



Figure 3

Figure 4 shows the intraoperative view after plating of advanced pedicled flap just prior to securing the visor osteotomy segment. The visor segment is secured with two additional lateral plates as shown (Figure 5). The Bone graft matrix is placed in the osteotomy site (Figure 6). A layer of APC<sup>+</sup> is applied over the graft prior to soft tissue closure (Figure 7).



Figure 4



Figure 5



Figure 6



Figure 7

The preoperative and postoperative radiographs (Figure 8) of the lateral cephalometrograms show increased posterior airway space. Figure 9 shows the postoperative panorex view. Preoperative and postoperative views of the patient are shown on Figure 10. Note, the patient desired chin advancement with the functional osteotomy.

The presurgical RDI value was 56 and lowest saturation (LSAT) was 78%. The patient had a postoperative polysomnogram 6 months after the surgery. The polysomnogram demonstrated an RDI less than 10, and a LSAT of 89%. The patient also reported improved sleep hygiene.



Figure 8

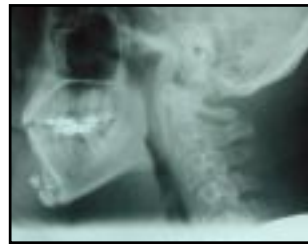


Figure 8a

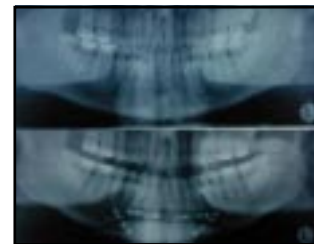


Figure 9



Figure 10a



Figure 10b



Figure 10c



Figure 10d

## DISCUSSION

Genioglossus advancement and hyoid suspension myotomy are procedures which are best utilized in patients with retrolingual collapse that cannot tolerate CPAP. It is a reliable, stable osteotomy which heals faster when incorporated with APC<sup>+</sup>. APC<sup>+</sup> also promotes soft tissue healing and appears to lessen the recovery time. No pathologic fractures have been seen to date (N=45), and all postoperative radiographs reveal excellent bone healing. Our practice routinely uses APC<sup>+</sup> to accelerate healing in head and neck applications ranging from intranasal sinus surgery to facial cosmetic surgery.

## REFERENCES

1. Kerner MM, Hale RG, Silva K. A Novel Three-Piece Anterior Mandibular Visor Osteotomy for Genioglossus Advancement in Surgery for Obstructive Sleep Apnea. *Operative Tech in Otolaryngol Head Neck Surg* (in publication)
2. Marx RE, Carlson ER, Eichstaedt RM, et al: Platelet rich plasma: Growth factor enhancement for bone grafts. *Oral Surg* 85:638, 1998.