INQUEST

VOLUME:
01

ISSUE:
01

RECEIVED DATE:
July 7, 2020

ACCEPTED DATE:
July 20, 2020

PUBLISHED DATE:
July 27, 2020

JOURNAL SHORT NAME:
Ann Plast Aesthet Surg

Editorial

Annals of Plastic and Aesthetic Surgery

Functional Reanimation of the Eye Sphincter in Longstanding Facial Paralysis; Neurotized Platysma Graft versus Platysma Transfer with Nerve Coaptation

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Keywords *: Platysma free graft; Neurotized; Functional reanimation; Facial paralysis; Technique*

Editorial

Nassif et al [1], recently published an interesting report in the Plastic and Reconstructive Surgery (PRS) journal, shared with us their experience and proposed a new technique for functional reanimation of the eye sphincter (ES) using a neurotized plastysma graft (PG) in the setting of long-standing facial paralysis (LFP). we agree with the authors on existence of limited outcome data following functional reanimation of the ES in LFP. While we congratulate Nassif et al [1], for their remarkable analysis of a relatively large case-series, we believe their outcome should be gauged against the outcome of studies performing platysma transfer with nerve coaptation i.e. milestone publication by Tezis group [2], as each of the approaches have their own pros and cons.

Nasif series included a retrospective analysis of 38 patients who underwent eyelid reanimation in a two-stage manner, first with cross facial nerve grafting (CFNG), followed by a PG with direct neurotization. Thirty-four patients were seen in follow-up, and return of spontaneous blink reflex (SBR) was seen in one patient (3%), a "good result" in 18 patients (53%), and "satisfactory result" in 13 patients (38%) [1]. While maintaining the ability to voluntarily close the ES is important (facial reanimation), the return of SBR is of utmost virtual importance, as the loss of SBR can lead to corneal irritation, ulceration, and ultimately blindness.

It should be noted that the SBR is involuntary and purposed to moisturize and clean the eye, whereas eyelid closure is a forced and voluntary closure of the eye. A successful functional reanimation of the eyelid requires restoration of the SBR. Terzis et al [2], first introduced the use of platysma for dynamic reconstruction of the orbicularis oculi (OO) in 1984. The OO is a thin muscle with a very high density of fast twitch muscle fibers (87% Type II), which acts as a sphincter to close in both vertical and horizonal dimensions during eyelid closure [3]. Sharing similar embryologic origins with the OO, high density of fast twitch muscle fibers (80%), making PG an ideal replacement for the OO in recreation of the ES. However, success of this restorative procedure is dependent on coordinating this action with the contralateral facial nerve (CFNG), and maintaining sufficient innervation to the healthy transferred muscle fibers to allow for adequately strong contractions to cause SBR. This was first accomplished by Terzis with free platysma transfer and nerve coaptation, however due to technical difficulties, the procedure has not been widely used.

Nassif et al [1], first presented the idea of a PG with direct neurotization at the International Facial Nerve Symposium in Rome in 2009. In 2017, Biglioti et al [4], published their findings with a similar, two staged technique. Transferring the muscle as a graft rather than a free flap, eliminates the need for a vascular anastomosis. The procedure was further simplified by replacing nerve coaptation with direct neurotization. However, Biglioti [4] was unable to provide consistent results in their cohort, with only one patient (7%) achieving complete voluntary closure, 7 (50%) with near complete closure, and 6 (43%) with insufficient closure. In contrast, a recent study published by Guelinick [5], in which the platysma was transferred as a free muscle flap with vascular anastomosis and neurorrhaphy to a CFNG (two stage procedure), showed a success with SBR achieved in 62% of cases. The two primary differences between these studies is the use of the muscle as a graft vs anastomosis of vessels, and neurorrhaphy vs direct neurotization.

As presented by the Nassif et al [1], muscle bellies up to 6 grams show near complete regeneration, and 6 grams of platysma is sufficient for replacement of the OO. Additionally, coaptation of nerves has been shown to be more effective compared to direct neurotization. The primary question is whether direct neurotization provides sufficient innervation to OO fibers to produce an SBR. Also, does the combination of grafting and direct neurotization ultimately work? It seems that, technical difficulties aside, free muscle transfer with microvascular anastomosis and neurorrhaphy produces more favorable results. Further studies are certainly needed, however, to determine if this is due to loss of muscle fibers secondary to a non-vascularized muscle grafting, or if this is a result of the inherent suboptimal regeneration achieved with direct neurotization compared with nerve coaptation between the donor nerve and the native OO nerve or perhaps both.

It is important to mention Nassif group did not clarify or control as to whether the direct neurotization in their study created a return of function in some of the native OO muscle fibers or the observed function was purely from the PG. Simply, Nassif study set up did not take measures to elaborate on this point and the authors did not go into the details in speculating the reasons behind their suboptimal success rate, study limitations, and detailed evaluation of their complications. Nassif outcome analysis was mostly concentrated on voluntary aperture (ES) closure than involuntary SBR

which is actually more important for physiologic corneal protection [1]. Lack of a consistent objective measures while assessing the pre-operative severity of the facial palsy (although all patients had LFP) makes the assessment for success in Nassif study very difficult if not impossible [1]. We also certainly don't particularly agree with the way the Nassif group divided the PG muscle fibers, chose to pass the CFNG over two access routes and specially over the nose bridge and at the level of the eyebrows and separately over the superior lip.

At the end, we value the simplicity of the procedure proposed by Nassif [1] and Biglioti [4], performing a direct neurotized PG compared with platysma transfer (free flap) with nerve coaptation proposed by Guelinick [5] and Terzis [2], for functional reanimation of the ES with an LFP. While direct neurotized PG may offer the ability to maintain the voluntarily closure of the ES, the return of the SBR is much better achieved with a platysma transfer (free flap) and nerve coaptation which in our opinion should be considered as the gold standard for functional reanimation of the ES a in the setting of LFP.

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