

Polyglycolic Acid Sheets and Fibrin Glue Versus Nasolabial Flap for Reconstruction of Oral Mucosal Defects

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ABSTRACT

Background: Early-stage oral cancers are usually treated with surgical resection and in most of cases the resulting defects are too large to be primarily reconstructed. There are many modalities of reconstruction as nasolabial flap, buccal bad of fat, polyglycolic acid sheets. **Objective:** This work aimed to evaluate the reconstruction of oral mucosal defects using either polyglycolic acid (PGA) sheet or nasolabial flap.

Material and Methods: 51 patients of them 26 were reconstructed using (PGA) sheet, and 25 using nasolabial flap retrospectively. The tumors' location, perioperative situation, postoperative aesthetic and functional results were assessed. **Results:** There was no significant difference between the 2 groups regarding the early start of oral feeding or hospitalization time. While, the PGA group had significant shorter operative time. In cases with exposed bone surface, the PGA sheet was more feasible for reconstruction. There was no significant difference between the 2 groups in speech intelligibility in lingual cases. In buccal reconstruction the PGA sheets were more suitable for larger defects.

Conclusion: The optimal choice of nasolabial flap or PGA sheet depends on tumor location, mucosal defect size, the general condition of the patient and tolerability for surgery.

Keywords: Oral mucosal defect, Polyglycolic acid sheet, Nasolabial flap.

INTRODUCTION

Early-stage oral cancers are usually managed with surgical excision and in most of cases the resulting mucosal defects are too large to be primarily reconstructed. Extensive mucosal defects are usually managed with free vascularized grafts. While, in intermediate ones, there are many modalities for reconstruction such as nasolabial flaps or submental flaps and recently polyglycolic acid (PGA) sheets and fibrin glue were used⁽¹⁾.

The nasolabial flaps are perfect for reconstructing the mouth. It is straightforward and appropriate for the closure of oral deformities in the tongue, cheek, and mouth floor^(2, 3). The inferiorly based flap is used to reconstruct the lip, oral commissure, and anterior region of the mouth floor. It can be superiorly or inferiorly based^(3, 4). The flap's thickness is determined by the thickness of the donor tissues and the requirement for the defect. A nasolabial flap is a straightforward operation with little risk of complications and donor defect⁽²⁻⁴⁾.

A polyglycolic acid nonwoven membrane makes up PGA sheets (a homopolymer with a molecular weight of 100,000 Dalton). Through a unique procedure, the cloth acquires its elastic and soft qualities. Fibrin glue is utilized to adhere the PGA sheet (Neoveil, Gunze Co., Ltd., Tokyo, Japan). Recently, oral mucosal lesions have been repaired using PGA sheets⁽⁴⁾.

To our knowledge, there are no papers that compared PGA sheets with nasolabial flaps for the repair of oral mucosal lesions in a sufficient number of instances. Therefore, we undertook this study to evaluate the effectiveness of nasolabial flaps vs

polyglycolic acid (Neoveil) sheets and fibrin glue for the restoration of oral mucosal lesions.

PATIENTS AND METHODS

A retrospective study included patients who had surgery for oral cancer resulting in mucosal defects and were reconstructed by PGA sheets or nasolabial flap at Maxillofacial Surgery Unit, General Surgery Department, Faculty of Medicine, Sohag University, Egypt. The study was conducted between April 2014 and June 2020.

Ethical consent: The Academic and Ethical Committee of Sohag University granted its clearance for the study. Each patient signed a written informed consent form to agree to participate in the study. The Declaration of Helsinki, the World Medical Association's code of ethics for studies involving humans, guided the conduct of this study.

Inclusion criteria: All patients with oral mucosal defects beyond primary repair and not too large defects, which is usually reconstructed with free vascularized flaps.

Exclusion criteria: Cases presented with recurrent lesions associated with marked fibrosis and severe limited mouth opening.

Polyglycolic acid sheet and fibrin glue technique

According to Takeuchi *et al.*⁽¹⁾, following effective hemostasis, the mucosal defect was treated with a small quantity of fibrin glue spray (fibrinogen). The defect was then covered with a PGA sheet that had been cut into pieces the same size as the remaining region, and the sheet and surrounding area were sprayed with a solution of fibrin glue and thrombin using a specialized

spraying kit (Figures 1, 2, 3 & 4). Following surgery, postoperative feeding was started using a Ryle tube to reduce the risk of the sheet coming undone. After five

days following surgery, oral eating was resumed as usual.



Figure (1): A, Neoveil sheet patch. B, Fibrinogen and thrombin. C, spraying kit utilized for mixing thrombin and fibrinogen and spraying over the PGA patch



Figure (2): A, Tongue mass. B, residual mucosal defect after excision of the mass. C, application of PGA to cover the residual defect.



Figure (3): A, 1 week postoperative. B, 4 weeks postoperatively. C, 5 weeks postoperative with complete healing process with no contracture of fibrosis.



Figure (4): A, Cheek ulcer, B, application of PGA sheet after resection of the tumor, C, 3 months postoperative.

Nasolabial flap technique:

For the majority of our patients, we employed the inferiorly based nasolabial flap to restore oral mucosal abnormalities. The incision line was 3 to 4 mm medial to the nasolabial fold in the inferior third and followed the nasolabial fold in the superior two thirds^(2,3,4,6).

This results in less distortion once the flap is transferred, which enhances rotation arc 3. A base flap with a width of 1.5 to 2.5 cm was requested. Prior to and inferior to the medial canthus, the medial and lateral arms of the incision come together superiorly. The flap's inferior limit was level with the mouth's angle⁽⁶⁾.

The size of the flaw determined the width. A breadth to length ratio of 1:3 was possible when the facial artery was protected. A ratio of 1:2 was used if the facial artery was not maintained.

The flap was turned inward and ligated with 4/0 Vicryl sutures after it had been elevated to the proper height. While Utilizing 3/0 Vicryl, the flap's mucosal side was implanted. The flap was inserted via a buccal tunnel for restoration of the buccal mucosa, lower alveolus, tongue, or floor of the mouth when no incision on the lips was done. The flap was parted and the tunnel was sealed after three weeks (Figure 5).



Figure (5): A: T3 Inferior alveolar margin squamous cell carcinoma, in 82 years old, medically compromised male, B: Single-stage inferiorly based axial nasolabial flap, skin incision made, C: preparation for single-stage transfer, D: 4 weeks postoperative, the flap is completely survived.

If the defect was in the central 1/3 of the oral cavity (central palate, anterior floor of mouth, central alveolar margin, and anterior tongue), the reconstruction with nasolabial flap could be either a two-stage procedure or a single stage for lateral oral cavity defects (lateral third of the palate, alveolar margin, floor of mouth, and retromolar trigon)^(5,6).

Clinical data as type of the tumor, site, size of the mucosal oral defect, duration of the operative reconstruction technique, hospital stay duration, number of days postoperatively before the normal oral

feeding. The size of mucosal defects (cm²) was taken from operative notes and the histopathological reports. In buccal resection cases, the postoperative mouth opening was evaluated after 3 months postoperatively while in lingual and floor of mouth cases, the speech was evaluated 3 months after surgery.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 22 for Windows was used to code, process, and analyze the obtained data (IBM SPSS Inc., Chicago, IL, USA). Quantitative data were presented as mean \pm SD

(Standard deviation). ANOVA was used to compare continuous data, while the Chi-square test was used to analyze categorical data. $P \leq 0.05$ is considered statistically significant.

RESULTS

This study included 51 patients (29 male, 22 female). Reconstruction was done using PGA sheet and fibrin glue in 26 patients and with nasolabial flap in 25 patients. The median age at time of surgery in PGA group was 62.5 years (range, 29-81) while in nasolabial flap group the median age at time of surgery was 59 years (range 27- 66). As regards tumor location, the commonest location of PGA sheet and fibrin glue group was tongue (10 cases) followed by floor of the mouth (7 cases). The commonest location in nasolabial flap group was floor of the mouth (11 cases) followed by palate (5 cases) as shown in table (1).

Table (1): Site of the tumors

	PGA group (26 cases)	Nasolabial flap Group (25 cases)
Tongue	10	4
Floor of the mouth	7	11
Buccal mucosa	6	2
Lower alveolus	2	3
Upper alveolus	1	0
Hard palate	0	4
Soft palate	0	1

As regards tumors type in PGA group, it was squamous cell carcinoma in 25 cases and leukoplakia in one case, while in nasolabial flap group, it was squamous cell carcinoma in 24 cases and melanoma in one case. Table (2) showed that in buccal mucosa reconstruction, the residual mucosal defect size was larger in patients reconstructed with PGA (P value = 0.02) but in palate group the size of lesion reconstructed with nasolabial flap was larger than those reconstructed with PGA sheet ($P=0.03$).

Table (2): mean of the size of residual mucosal defect in cm 2 mean \pm SD

	PGA group	Nasolabial flap group	P
Tongue	7.70 \pm 1.84	8.25 \pm 1.91	0.23
Floor of the mouth	9.30 \pm 2.31	8.68 \pm 2.10	0.85
Lower alveolus	6.55 \pm 1.21	7.5 \pm 1.83	0.48
Upper alveolus	7.8 \pm 1.90	No cases	
Buccal mucosa	9.50 \pm 2.30	6.25 \pm 1.42	0.02
Hard palate	4.50 \pm 1.02	7.55 \pm 1.83	0.04
Soft palate	No cases	5.50 \pm 1.31	

SD =standard deviation.

As regards the operation time, the duration of surgery was significantly lesser in PGA group ($P= 0.001$). There was no significant statistical difference between the 2

groups regarding the duration of hospital stay also no significant difference between the 2 groups in the duration until the start of normal oral feeding (Table 3).

Table (3): Difference regarding duration of hospital stay, postoperative days till the start of oral feeding, operative duration

Variable	PGA group Mean \pm SD	Nasolabial flap group Mean \pm SD	P value
Duration of hospital stay (days)	5.5 \pm 6.2	6.5 \pm 9.5	0.24
Operative time (hours)	0.73 \pm 0.54	1.25 \pm 0.86	0.001
Postoperative days before the start of oral feeding(days)	4 \pm 5.5	4.5 \pm 6.2	0.35

Postoperative complications:

As regard nasolabial flaps, all flaps survived completely. 2 cases developed complications, Postoperative wound dehiscence developed in one case, while minimal infection at the donor site was found in another case, which had improved conservatively.

In cases of buccal reconstruction using PGA sheet, one cases developed fibrosis and contracture with limited mouth due to early detachment of the PGA sheet.

As regard the lingual function and the speech intelligibility, we found no significant difference between the 2 groups after 3 months of surgery (we excluded the cases, which already developed speech intelligibility before oral surgeries)

Reconstruction with PGA sheets was very useful in cases with exposed bony surface (5 cases) as the adhesion to bone not necessitate suturing and epithelium gradually regenerated from the surrounding mucosa. This make the feasibility of PGA sheet and fibrin glue is better than nasolabial flap in reconstruction of mucosal defect with exposed bone surface.

DISCUSSION

After excision of oral tumors, the resulting defects sometime is large to be reconstructed primarily, many modalities for reconstruction used in such cases like nasolabial flap or submental flap or pectoralis major flap and even free vascularized graft in large mucosal defects. Several authors described the feasibility and usefulness of PGA sheet and fibrin glue these reports match with our study as we found the application of PGA is feasible, not time consuming, simple with no functional or morphological deformities until the epithelialization completed (1, 5, 7, 8, 9, 10).

The feeding started immediately after surgery with nasogastric tube and normal oral feeding started from the 4th to 5th day in most of cases. Some authors (7, 9) prefer to start the oral feeding from day 1 without nasal tube with no cases recorded to early detachment. But we prefer to delay the oral feeding to decrease the postoperative pain and to reduce the possibility of early

detachment of PGA sheet. It was reported that PGA sheet gradually detach from the mucosal defect as the re-epithelialization progress, in our cases the sheet remained for 3 to 4 weeks and detached completely between 5th and 6th week with no postoperative contracture, which match other studies (1,5,7,8,9).

The nasolabial flap is a straightforward, reliable, and risk-free flap with a low rate of complications. This series encountered little difficulties, which is consistent with several investigations (2, 3, 4, 6). Although it only occurs in a tiny fraction of their patients, some writers have described additional problems such as mild or significant flap necrosis (9). Most of the time, especially in situations when bilateral flaps have been raised, donor site morbidity is acceptable.

To our knowledge this study is the 1st to compare between the PGA sheet and nasolabial flap for reconstruction of oral mucosal defect. We found that both techniques are effective, feasible and simple with few complication (just postoperative fibrosis and contracture in one case reconstructed by PGA sheet, and minimal wound dehiscence in case reconstructed by nasolabial flap). The duration of surgical technique was statistically shorter in PGA sheet group, which was reported by many authors that the main advantage of such method that is not time consuming making it the ideal method for bad general condition patients (7, 8, 9, 10).

The other studies reported that one of the main advantages of PGA sheet that there is no donor site morbidity, and shorter hospital stay time (9, 11). In our study we found that the PGA sheet group had no statistically significant shorter hospitalization time than nasolabial flap group as both techniques needed no long stay in hospital?

In buccal mucosa reconstruction the PGA sheet and fibrin glue were more suitable than nasolabial flap and could be helpful in larger defects with no postoperative fibrosis or contracture. **Satoshi et al.** (12) reported that PGA sheet is very useful when there is exposed bone surface, in our study we preferred the use of PGA sheet than nasolabial flap for reconstruction of oral defects with bone surface as adhesion to bone surface was done using fibrin glue spray without sutures.

There was no difference between the two groups in lingual function and speech in long-term follow up (after 3 months). No limitation of mouth opening in long-term follow up after buccal mucosa reconstruction but from our point of view we prefer the use of PGA sheet as it is candidate for larger and deeper defects.

CONCLUSION

PGA sheet with fibrin glue and nasolabial flap are very useful techniques for reconstruction of oral

mucosal defects. PGA sheet is considered to be more beneficial in defects with bony surface. The PGA group had shorter operation time with less donor site morbidity. The choice of PGA sheet or nasolabial flap depend on the defect size, locations of the tumors and the general condition of the patients and tolerability for surgery.

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