



## Original Research Article

# Comparison between two surgical techniques for vestibuloplasty – A retrospective study

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### ABSTRACT

**Aim and Objective:** 1) Comparing the vestibular depth achieved in the mandibular anterior region with the two techniques. i.e Modified Kazanjian and Lipswitch technique 2) Patient satisfaction.

**Materials and Methods:** In the present study a comparison of two techniques of vestibuloplasty, i.e. Modified Kazanjian and Lipswitch techniques was done to evaluate the efficiency in maintaining the vestibular depth in a follow up period of 6 months. 40 patients medically fit patients who required vestibuloplasty procedure were selected; 20 patients underwent Modified Kazanjian technique and 20 patients underwent Lipswitch technique. Vestibular Depth, patient compliance and complications if any were recorded and reviewed on the 1<sup>st</sup> day, 1 week, 1 month and 6 months postoperatively.

**Results:** The immediate post-operative depth in modified Kazanjian group ranged from 10.3 to 15.3 mm, it was 9.8 to 14.9 mm after 1 week, 9.5 to 14.5 mm after one month and 4.8 to 13.9 mm after 6 months postoperatively. The immediate post-operative depth in Lipswitch group ranged from 11.2 to 15.1 mm. it was 11.6 to 14.9 mm after 1 week, 10.6 to 14.8 mm after 1 month and 10.2 to 14.2 mm after 6 months postoperatively. The percentage of increase in vestibular depth 6 months postoperatively was 166.70% in Modified Kazanjian technique and in that of Lipswitch technique it was 283.88% which showed a highly significant P value of 0.003.

**Conclusion:** Reviewing the results with regard to the maintenance of vestibular depth, patient compliance and complications, we recommend Lipswitch technique over the Modified Kazanjian technique for vestibuloplasty.

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## 1. Introduction

One of the most commonly faced and one of the most common challenging problems in fabrication of complete denture for a patient is when patient who requires a mandibular denture having an atrophied ridge. The bony foundation may even be larger, but the presence of high muscle and membranous attachments which limits the usable areas for support. The patient may complain that the denture “floats, wobbles and hurts”. This is often a state of serious mental, physical and social distress.<sup>1</sup>

Following loss of teeth there follows a continuous process of alveolar ridge resorption. As the denture bearing area becomes smaller, denture stability and retention decrease.<sup>2</sup> Long term use of ill-fitting dentures can compound the problem by accelerating the resorption of the alveolar ridges. As the alveolar processes resorbs, adjacent muscles are found to attach at or near the crest of residual ridges. The residual gingival becomes diminished and the labio-buccal vestibule and lingual sulcus becomes shallow.<sup>2,3</sup>

To compensate for this reduction in size and effectiveness of the denture bearing area, the patient must depend increasingly on the use of the lips, cheeks and tongue against

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the polished surfaces of the denture to stabilize them. As alveolar ridge shrinkage progresses speech, mastication and patient comfort are compromised. Many patients resort to the use of denture adhesive pastes and powders at some expense to their oral hygiene and some ultimately find themselves unable to wear artificial dentures.<sup>4</sup>

Until recent years, little attempt was made to correct these defects surgically. The dentist depended on mechanical means to overcome these difficulties. The aim of surgery in these circumstances is to aid the Prosthodontist because generally we are dealing with unfavorable environment rather than a pathologic condition.<sup>4</sup>

Vestibuloplasty is a surgical procedure whereby the oral vestibule is deepened by changing the soft tissue attachment. The main purpose of any vestibuloplasty technique is to create a larger bony base that is capable of supporting and retaining a denture. Repositioning muscles to expose more of the ridge of the jaw will achieve this.<sup>5</sup>

There are basically two techniques of vestibuloplasty by secondary epithelization, they are the Kazanjian and Clark Vestibuloplasty technique each one has its own Advantage and Disadvantages before hence several modification has given by different authors that is Obwegeser, Godwin, Lipswitch, and Modified Kazanjian.<sup>2</sup>

Hence in our study an attempt has been made to compare the efficiency between these two secondary epithelization vestibuloplasty techniques. i.e. “The Lipswitch technique” and the “Modified Kazanjian Technique” in mandibular anterior ridge extension vestibuloplasty procedures.

## 2. Aims and Objectives of the Study

1. Comparing the vestibular depth achieved in the mandibular anterior region with the two techniques.
2. Patient satisfaction.

## 3. Materials and Methods

This retrospective study was conducted in the Department of Oral & Maxillofacial surgery. 40 patients who were referred to Dept for vestibuloplasty procedure over in the past over a period of 2 years were selected aged between 39 years to 63 years. The patients were medically fit. There were 22 males and 18 females who were selected in the study. The patients were divided according to the procedure used i.e Group – A for Modified Kazanjian Technique and Group – B for Lipswitch Technique.

### 3.1. Inclusion criteria

1. Patients with reduced vestibular depth in anterior mandibular region.
2. Medically fit Patients.
3. Patients who came to the department for followup for the period of 6 months.

4. Clinically healthy mucosa is essential..
5. Alveolar bone free from any pathologic conditions, remaining roots and foreign bodies.
6. Radiographic evidence showing 15 to 20 mm of basal bone in the anterior region of mandible.<sup>6</sup>

### 3.2. Exclusion criteria

1. Smoking
2. Medically compromised condition which prohibit vestibuloplasty i.e. diabetes, bleeding disorders, recent infarctions, cancer and asthma.
3. Any previous surgeries in the anterior mandibular vestibule.
4. ASA Grade III and Grade IV.

Out of 40 patients who were selected for the study, 7 were denture wearers and 33 patients never had dentures before.

The surgery was performed under local anesthesia as an outpatient procedure. The patients’ mouth was irrigated with 0.2% Chlorhexidine gluconate. Extraoral preparation was done with Povidine-Iodine.

Bilateral Mental Nerve blocks were given using 2% Lignocaine with Adrenaline 1:80,000. The Lower Lip was retracted outward and everted during the Procedure. Local anesthetic was infiltrated submucosally to help submucosal dissection and to achieve hemostasis.

### 3.3. Surgical procedure: Group A - Modified Kazanjian Technique

A curvilinear mucosal incision was made anterior to the mental foramina approximately 10 to 12 mm anterior to the attached mucosa on the alveolar ridge. Using atraumatic forceps and with sharp and blunt dissection with a pair of dissectors, a bipediced mucosal flap was elevated. Subperiosteal dissection of high muscle and connective tissue attachments was done to the desired depth of the vestibule. The dissected tissues were eventually freed from the labial side with careful sharp dissection and excised.

The bipediced flap was advanced and was secured to the extended vestibular depth with a polyurethylene tube fixed through the lip with percutaneous sutures around cotton rolls using straight needle. The labial and alveolar sides of the flap was sutured to the lip and periosteum, respectively, using horizontal mattress 3-0 silk sutures starting in the midline and continued to either side. The resultant raw surfaces were covered with a dressing moistened with an antibiotic ointment and was left to heal by secondary epithelization.

### 3.4. Surgical procedure: Group B – Lipswitch Technique

A transverse mucosal incision extending bilaterally just short of the mental foramina was made on the mucosal

surface of extended lip approximately at the distance one and a half time the desired additional vestibular depth. The vertical relieving incisions which extended till the crest of the alveolar ridge were made proximal to the mental foramina bilaterally.

A labial mucosal flap was developed and extended to the crest of the alveolar ridge. In cases in which the bone has been smoothed before vestibuloplasty, the flap is extended only to the demarcation between attached and unattached gingiva. The mental nerve was identified bilaterally and minor attachments to mucosa were freed gently, perforation of the mucosal or tearing of the flap during submucosal dissection was avoided.

With the mucosal flap retracted to the lingual side, an incision through the periosteum was made around the crest of the ridge, and vertical relieving incisions were made proximally in an inferior direction.

The periosteum was elevated in an inferior direction to the desired level for the new vestibule. At this stage, the Mucosal flap was pushed down over the alveolar ridge and the margins were sutured to the periosteum at the new vestibular depth; thus, originates the designation of the procedure as the “Lipswitch”.

The periosteal flap was sutured over the raw surface created over the lip after transpositioning. This periosteal flap takes the attachment of the mentalis muscle and submucosal tissues away from the mandibular bone and created a deepened labial vestibule.

All patients who underwent either of the techniques were prescribed the following drugs:

- Cap Amoxicillin 500 mg TID Orally for 5 days
- Tab Metronidazole 400 mg TID Orally for 5 days
- Tab Ibuprofen + Paracetamol TID orally for 5 days
- Chlorhexidine Gluconate 0.2% mouthwash

#### 4. Results

The age of group A patient ranged between 42–65 years, which included 15 males, and 5 females. The group B patients were aged between 39–63 years, which included 7 males and 13 females.

The average pre-operative depth in group A patient ranged from 2.3 – 4.8 mm (Mean  $\pm$  SD 3.74 $\pm$ 0.812) and that of group B patients ranged between 2.3–4.7 mm (Mean  $\pm$  SD3.46 $\pm$ 0.686).

The average immediate post-operative vestibular depth in group A ranged between 10.3 – 15.3mm(Mean  $\pm$  SD13.19 $\pm$ 1.46), 1st week post-operatively was 9.8 –14.9 mm (Mean  $\pm$  SD12.71 $\pm$ 1.15), 1st month post-operatively was 9.5 – 14.5mm (Mean  $\pm$  SD12.46 $\pm$ 1.54) and that of 6 months post-operatively was 4.8 – 13.9 mm (Mean  $\pm$  SD8.75 $\pm$ 2.19).

The average immediate post-operative vestibular depth in group B ranged between 11.2–15.1mm (Mean  $\pm$  SD13.71 $\pm$ 1.18), 1st week post-operatively was 11.6 – 14.9

mm (Mean  $\pm$  SD13.44 $\pm$  1.24) 1st month post-operative was 10.6 – 14.8mm (Mean  $\pm$  SD 13.32 $\pm$ 1.24) and that of 6 months post-operative was 10.2 – 14.2 mm (Mean  $\pm$  SD12.87 $\pm$ 1.21).

The percentage of increase in vestibular depth 6 months post-operatively in group A was 166.7% and that group B was 283.8% (P value 0.03 – highly significant).

#### 4.1. Statistical analysis

##### 4.1.1. Study design

A comparative study consisting 20 subjects in Group A (Modified Kazanjian technique.) and 20 subjects in Group B (Lipswitch technique.) is undertaken to compare vestibular depth in mm between the two groups. Mean with Standard deviation, chi-square test and Student’s UNPAIRED t-test were used for statistical analysis. SPSS 11.0 and Systat 8.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate tables etc.

#### 5. Discussion

Tooth loss is a form of oral handicap that causes physical, emotional and functional trauma to the individual person. The lack of dentate stimuli leads to progressive loss of the residual alveolar bone and its underlying basal bone. As the alveolar resorption increases, good retention and function of the complete dentures becomes more difficult to attain.<sup>2,3</sup>

In edentulous patients, as the alveolar resorption takes place, the attachment of mucosa and muscles near the denture bearing area exerts a greater influence on retention and stability of denture, by decreasing the vestibular depth as well as the amount and quality of fixed tissue over the denture bearing area.<sup>7</sup>

More than 60 years ago surgical techniques were developed to enlarge the surface of the mandible and maxilla. The aim of these procedures was to improve the retention and function of the dentures by means of relative elevation of the alveolar process. This meant a deepening of the vestibulum and / or the floor of the mouth.<sup>8</sup>

In most patients, problems with lower denture are more than with upper denture since the alveolar ridge is upto four times greater than in maxilla.<sup>2</sup>

The success of any operative technique must be assessed ultimately in terms of functional and aesthetic criteria and of patient satisfaction. The aim of vestibuloplasty procedures are to improve denture retention and stability.<sup>9,10</sup>

Hillerup S et al.<sup>11</sup> commended that the beneficial effect of the mandibular vestibular sulcus deepening is threefold –

1. The displacing action of the mentalis muscle is neutralized
2. The stability of the denture during function is increased, i.e., the extended denture flange prevents displacement of the denture during load.

**Table 1:** Comparison of average vestibular depth in mm

Study period	Vestibular Depth Mean ± SD (Range)		P value
	Group A	Group B	
Pre-Operative	3.47+/-0.8124	3.46 +/- .6862	0.966684
Immediately Post-op	13.19 +/- 1.4689	13.71 +/- 1.18539	0.225933
1st week Post-op	12.715 +/-1.1552	13.44 +/- 1.2424	0.106455
1 month of Post-op	12.465 +/- 1.5424	13.32 +/-1.2475	0.061849
6 month of post-op	8.755 +/-2.1979	12.87 +/-1.2139	0.003**
	166.7014987	283.8895222	
Significance	F = 130.0757774 P <0.001	F =292.200465291 P <0.001	
Estimate of Effect Size	0.992370825	0.996589364	

\*\*Highly significant

**Table 2:** Comparison of patients’ satisfaction between the study groups

Total number of patient	Satisfied	Not satisfied
Group A =20	8	12
Group B =20	19	1

3. The load on the front teeth is taken up by a broader base, especially in cases with a more horizontal frontal inclination of the mandible.

Jennings D.E et al.<sup>12</sup> has defined the ideal denture-supporting ridge as possessing –

1. Adequate bone support for dentures
2. Bone covered by adequate soft tissue
3. No undercuts or overhanging protuberances
4. No sharp ridges
5. Adequate buccal and lingual sulci
6. No scar bands to prevent normal seating of dentures
7. No muscle fibers or frenula to interfere with the periphery of the prosthesis
8. Satisfactory ridge relationships between the maxilla and mandible
9. No soft tissue folds, redundancies or hypertrophies on the ridge or sulci
10. Ridge free of neoplastic disease

The progressive atrophy of the alveolar bone following extraction of teeth is a physiologic occurrence. Tallgren Asuggested that this reduction in the residual ridge is a multifactorial disease and its rate depends not on one single factor but on the occurrence of two or more factors, which may be called cofactors. These factors could be divided into four categories:

1. Anatomic – includes the size and shape of the ridge, the type of bone and the type of mucoperiosteum
2. Metabolic - Includes age, sex, hormonal balance, osteoporosis etc
3. Functional - includes the frequency, direction and amount of force applied to the ridge

4. Prosthetic – includes the denture base, the form and type of teeth, the interocclusal distance etc.<sup>6</sup>

AmphlettJ, Colwell W. C et al<sup>6</sup> mentioned the indications and contra indications for the vestibular extension procedure which include:

Indications-

1. High muscle attachments
2. Shallow lingual and / or facial vestibule
3. Resorbed ridges
4. Adequate bone available - the minimal vertical height of bone is considered to be 1.5 cm to relocate the vestibule.

Contraindications –

1. The emotionally disturbed patient
2. Lack of motivation
3. Financial limitations
4. Inadequate vertical height of bone
5. Tissue inflammation

Various surgical techniques have been described in literature that are used to treat this problem which include:<sup>12</sup>

1. Autogenous overlay grafts
2. Osteotomy procedures
3. Alloplastic grafts
4. Implant procedures
5. Vestibular extension procedures

Ridge extension is one of the intriguing procedures in preprosthetic surgery. It has been devised as a surgical modality to compensate for insufficient vestibular depth when the bone height is satisfactory for such extension.

There are three basic techniques of ridge extension:

1. Submucosal vestibuloplasty
2. Secondary epithelization vestibuloplasty
3. Soft tissue grafting vestibuloplasty

Kazanjian in 1935 described a secondary epithelization vestibuloplasty technique for deepening the mandibular labial vestibule in which a labial mucosal flap pedicled off from the alveolar process was used to cover the newly exposed bone while the lip surface was permitted to re epithelize.<sup>13</sup> The major disadvantages of the technique described By Kazanjian and most of its modifications is the scar contracture which results in loss of vestibular depth.<sup>13–15</sup>

To overcome the drawback of Kazanjian technique, Lipsitch vestibuloplasty a modification of kazanjian technique has been advocated. In this technique mucosal flap will cover the bare bone and periosteal flap will cover the labial side, so that epithelization of periosteum occurs in 2-3 weeks without scarring.<sup>15,16</sup>

Our study compared the Modified Kazanjian's and Lipsitch technique of vestibuloplasty. 40 patients were divided into two equal groups randomly for the purpose of study. The average pre- operative vestibular depth of Modified Kazanjian technique was 3.46 mm and that for Lipsitch technique was 3.47 mm. A mean net gain of 5.2 mm was achieved 6 months post-operatively in Modified kazanjian group and 9.4 mm that for Lipsitch group.

In our study, clinical evaluation showed satisfactory early primary healing in all the cases in the Lipsitch group. But delayed healing was observed in Modified Kazanjian group in comparison with Lipsitch group.

Other possible complications of vestibuloplasty which have been reported are:<sup>3,15,16</sup>

1. Pain and oedema
2. Transient paraesthesia
3. Hypersensitivity of the surgical site
4. Breakdown of the sutured margin of the mucosa
5. Damage to the mucosal flap
6. Sagging chin
7. Infection

In our study, clinical evaluation showed satisfactory early primary healing in all the cases in the Lipsitch group. But delayed healing was observed in Modified Kazanjian group in comparison with Lipsitch group.

Two patients showed altered sensation of the lower lip on the left side, which lasted approximately for two months. This was probably due to the damage to the fibers of the mental nerve innervating this area and the inadvertent excessive traction executed on the peripheral branches.

Two patients in the Modified Kazanjian group showed a complication that the raw surface of the inner mucosa of the lip got fused with the raw surface (the crest of the ridge). The fused area was incised under local anesthesia and the vestibular depth was regained.

As described in the study conducted by Liposky R.B,<sup>14</sup> a fibrous band will form at the junction of the flap and the existing tissues the fibrous band is thick and contracts during the early maturation process. As it contracts there can be loss of vestibular depth. In our study one of our patients in Modified Kazanjian group showed excess relapse reducing the depth of 14.8mm immediate postoperatively to 4.8 mm after 6 months of surgery. Two patients showed a small soft tissue growth in the inner mucosa of lower lip region.<sup>14</sup>

Patients in the Lipsitch group didn't have any major complications except for the pain and swelling in the first few postoperative days.

Postoperative follow up was done for six months. Patients were referred to Department of Prosthodontics for early construction of dentures to maintain the sulcus depth.

## 6. Conclusion

Based on our results with regards to the vestibular depth, patient compliance and complications, we recommend the Lipsitch technique of vestibuloplasty over the Modified Kazanjian technique because of the following advantages:

1. It is a well-tolerated surgical procedure, can be done under local anesthesia with satisfactory results.
2. This eliminates the need for a free graft or splint.
3. Adequate amount of sulcus depth can be achieved with minimal relapse.
4. Complications were minimal compared to Modified kazanjian technique.
5. The areas respond well to irrigation and require only one to two weeks longer to heal.
6. Acceptance of the procedure by the patient is good and most patients are pleased with their increased ability to tolerate and use their dentures.
7. Hence, a long term longitudinal study is warranted to authenticate the short-term conclusions that are derived in the present study.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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