

# Evaluation of the Patterns of Maxillary Anterior Alveolar Ridge Defects – A Cross Sectional Study

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## ABSTRACT

**Introduction:** Alveolar bone loss can be the result of trauma, periodontal disease, surgical treatment or congenital mal-development. Esthetic outcome of fixed prosthesis depends on three dimensional emergence profile of the pontic design which in turn depends on the residual alveolar ridge volume of the anterior maxilla. The aim of the present study was to evaluate the patterns of maxillary anterior alveolar ridge defects in Kashmiri population.

**Material and methods:** This cross-sectional study was conducted at the Department of Prosthodontics, Crown & Bridges, Government Dental College & Hospital, Srinagar, J&K on 60 partially edentulous patients. Based on the Siebert's classification, the amount of destruction of the alveolar ridge was analyzed to determine the prevalence. The statistical analysis was done using Chi-Square test.

**Results:** The results indicated that the most prevalent alveolar ridge destruction was Class III defect 37 (61.6%), followed by Class I defect 17 (28.3%) and Class II defect was the least with 6 (10%).

**Conclusion:** The Siebert's classification is a quick assessment method to evaluate the amount of alveolar ridge destruction so that proper treatment plan can be designed for the successful prosthetic restoration.

**Keywords:** Alveolar Ridge Defect, Siebert's Classification, Ridge Augmentation, Tissue Grafts.

## INTRODUCTION

A localized residual alveolar ridge defect is characterized by deficiency of bone volume and soft tissue collapse during healing creating unesthetic contours.<sup>1</sup> Besides, it may also lead to food impaction and difficulty in speech due to percolation of saliva.<sup>2</sup>

Prosthetic rehabilitation in such situations is challenging for the clinician because of the esthetic demands of patients and unfavorable pre-existing anatomy.

Furthermore, it is also essential for the selection of pontic for the patient and indication for the patient to undergo surgical intervention to reshape the ridge.<sup>3</sup> Various soft and hard tissue procedures were proposed to correct alveolar deformities.<sup>4</sup> Hard tissue augmentation procedures include, autologous block grafts, bone grafts and substitutes.<sup>4,5,6</sup> and guided bone regeneration.<sup>7</sup> The soft tissue ridge augmentation procedures include, onlay free mucosal,<sup>8</sup> inter positional connective tissue grafts<sup>9</sup>, pouch graft<sup>10</sup>, roll pedicle grafts<sup>11</sup> and modified roll pedicle grafts.<sup>12,13,14</sup>

Several published reports classified ridge defects to help plan the treatment regimen for clinical correction. Seibert classified ridge deformities into three broad categories:

**Class I defects** – Facio-lingual loss of tissue width with normal ridge height.

**Class II defects** - Loss of ridge height with normal ridge width.

**Class III defects** - A combination of loss in both dimensions.

**Class I Defects:** Soft tissue procedures have been advocated for improving the width of a Class I defect; however, because Class I defects are infrequent and are not esthetically challenging, surgical augmentation of ridge width is uncommon. Paying careful attention to provisional pontic contour will help the operator identify patients who would benefit from surgery. The rolls technique uses soft tissue from the lingual side of the edentulous site. The epithelium is removed, and the tissue is thinned and rolled back upon itself, thereby thickening the facial aspect of the residual ridge. Pouches<sup>15</sup> may also be prepared in the facial aspect of the residual ridge, into which subepithelial<sup>16,17</sup> or submucosal<sup>18</sup> grafts harvested from the palate or tuberosity may be inserted.

**Class II and III Defects:** Unfortunately, few soft tissue surgical techniques can increase the height of a residual ridge with any predictability. The inter-positional graft<sup>8</sup> is a variation of the pouch technique, in which a wedge-shaped connective tissue graft is inserted into a pouch preparation on the facial aspect of the residual ridge. The epithelial portion of the wedge may be positioned coronally to the surrounding epithelium if an increase of ridge height is desired. The onlay graft is designed to gain ridge height<sup>8,19</sup> but also contributes

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to ridge width, which makes it useful for treating Class III ridge defects. It is a thick "free gingival graft" harvested from partial or full-thickness palatal donor sites. Since the amount of height augmentation can only be as thick as the graft, the procedure may have to be repeated several times to re-establish normal residual ridge height.

The ideal ridge width and height allow placement of natural appearance pontic and thus help in the maintenance of plaque-free environment.<sup>3,20</sup>

In the literature, there are descriptions of several techniques for assessment of alveolar bone loss. Compass, ruler, millimeter probe, grid pattern and software have been used in numerous studies worldwide.<sup>21-26</sup>

Many case reports have been presented on various treatment possibilities of alveolar ridge defect in patients. Therefore, the purpose of this study is to evaluate the patterns of maxillary anterior alveolar ridge defects based on Siebert's classification among fixed partial denture patients in Kashmiri population to achieve a good treatment outcome for the most prevalent ridge defect.

## MATERIAL AND METHODS

This cross-sectional study was conducted at the Department of Prosthodontics, Crown & Bridges, Government Dental College & Hospital, Srinagar, J&K on 60 partially edentulous patients involving both the male & female patients.

### Inclusion criteria

- Single partially edentulous site
- Multiple partial edentulous site
- Anterior or posterior ridge defect

### Exclusion criteria

- Congenitally absent teeth
- Completely edentulous patients

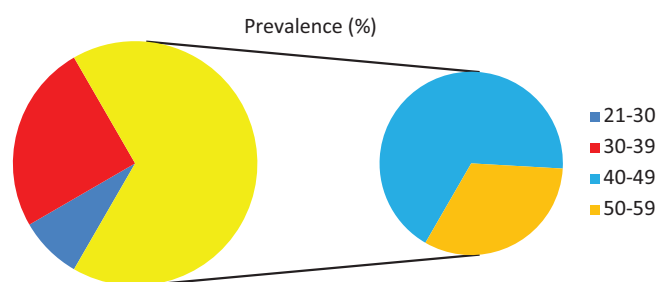
The alveolar ridge of the patient was observed clinically based on the Siebert's classification and the amount of destruction of the alveolar ridge was analyzed to determine the classification.

## RESULTS

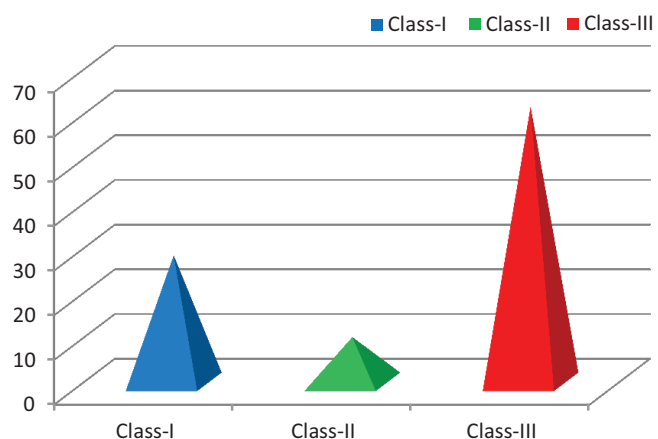
The data were collected, and statistical analysis was performed using SPSS version 20.0. The descriptive statistic was computed. The Chi-square test was used to compare the data.

This study composed of 60 partially edentulous patients with alveolar ridge defects. Based on the patient's age, 5 (8.3%) were in the range of 21–30 years old, 15 (25%) were in the range of 30–39 years old, 27 (45%) were in the range of 40 to 49 years old and 13 (21.6%) were in the range of 50–59 years old (Fig.1).

According to Siebert's Classification, the most prevalent alveolar ridge destruction was Class III defect which is both bucco-lingual and apico-coronal loss of tissue of alveolar ridge, 37 (61.6%), followed by Class I defect which is bucco-lingual loss of tissue of alveolar ridge with 17 (28.3%) number of patients and Class II defect was the least with 6 (10%) which is apico-coronal loss of tissue of alveolar ridge (Fig.2).



**Figure-1:** The graph showing prevalence of alveolar ridge defects based on age



**Figure-2:** Prevalence of the type of alveolar ridge defect based on Siebert's Classification

## DISCUSSION

The treatment planning and prognosis of the patient with alveolar ridge defect is directly affected by the severity of the existing conditions. The main problem that occurs with the incidence of anterior tooth loss with alveolar ridge defect is very difficult to treat properly due to many factors such as lack of emergence profile, lack of root eminence, lack of marginal gingiva, and presence of black triangles in interdental papillae area which is an esthetic disturbance.<sup>27</sup>

The results of our study based on the Siebert's classification revealed that the prevalence of class-III defects is high (61.6%) followed by class-I defects (28.3%) and lowest for class-II defects (10%). Also, our study showed high prevalence of alveolar ridge defects in the age group of 40-49 years (45%) and lowest in the age group of 21-30 years (8.3%). The results of our study are consistent with the study done by Abrams *et al.*<sup>28</sup> who reported that the prevalence of Class III defects were the highest with 55.8% followed by Class I defects with 32.8% and Class II defects with 2.9%.

The management of alveolar ridge defect can be categorized into hard tissue augmentation and soft tissue augmentation.<sup>3</sup> There are myriad of treatment options available to treat alveolar ridge defect such as the roll technique for Class I defect and inter-proximal graft technique for Class II and Class III defect, free gingival graft, bone grafting using both inlay and onlay grafting technique either autogenous grafts, allografts, or xenografts, ridge augmentation using bone graft followed by implant placement, removal partial denture, fixed partial denture with pink ceramic, and Andrew's bridge.<sup>29</sup> To achieve an esthetically successful pontic, all

criteria including replication of the form, contours, incisal edge, gingival and incisal embrasures, and color of adjacent teeth should be met.<sup>30</sup>

## CONCLUSION

Within the limitations of this study, the individualized treatment plan should be formulated based on the clinical assessment supplemented with other diagnostic techniques to ensure the long-term prognosis for the technique selected. However, based on the earlier studies, the suggestive treatment procedure for Class-I with surgical augmentation of ridge width is uncommon. Carefully contoured provisional pontic can help to identify patients who would benefit from surgery. For Class-II, the recommended treatment is alveolar osteotomy with interpositional grafting, and Andrew's bridge in Class-III. The onlay graft which can, however, be designed to gain not only ridge height but also the ridge width, makes it useful for treating Class-III ridge defects.

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