a classification system for complete edentulism based on diagnostic findings. These guidelines determine appropriate treatments for patients. Four categories are defined, ranging from Class I to Class IV, with Class I representing an uncomplicated clinical situation and a Class IV patient representing the most complex and higher-risk situation. Each class is differentiated by specific diagnostic criteria.

complete edentulism defines as follows: the physical state of the jaw(s) following removal of all erupted teeth and the condition of the supporting structures available for reconstructive or replacement therapies.

A review of the prosthodontic literature was used to identify the many variables associated with complete edentulism. A classification system was developed based on the most objective variables.
**Diagnostic Criteria**

The diagnostic criteria are organized by their objective nature and not in their rank of significance. Because of variations in adaptive responses, certain criteria are more significant than others. However, objective criteria will allow for the most accurate application of the classification system and measurement of its efficacy.

1- Bone height—mandibular

2- Maxillomandibular relationship

3- Residual ridge morphology-maxilla

4- Muscle attachments

**1- Bone height—mandibular only**

The identification and measurement of residual bone height is the most easily quantified objective criterion for the mandibular edentulous ridge. In addition, it represents a measurement of the chronic debilitation associated with complete edentulism in the mandible. Despite the lack of a known etiology, it has been established that the loss of denture supporting structures does occur, the importance of various cofactors is unknown. The continued decrease in bone volume affects:

1) denture-bearing area;

2) tissues remaining for reconstruction;

3) facial muscle support/attachment;

4) total facial height; and

5) ridge morphology.
The results of a radiographic survey of residual bone height measurement are affected by the variation in the radiographic techniques and magnification of panoramic machines of different manufacturers.

To minimize variability in radiographic techniques, the measurement should be made on the radiograph at that portion of the mandible of the least vertical height. The values assigned to each of the four types listed below are averages that historically have been used in relation to preprosthetic surgical procedures. A measurement is made and the patient is classified as follows:

Type I (most favorable): residual bone height of 21 mm or greater measured at the least vertical height of the mandible.

Type II: residual bone height of 16 to 20 mm measured at the least vertical height of the mandible.

Type III: residual alveolar bone height of 11 to 15 mm measured at the least vertical height of the mandible.

Type IV: residual vertical bone height of 10 mm or less measured at the least vertical height of the mandible.

Figure 1. Radiograph with residual bone height of 21 mm or greater measured at the least vertical height of the mandible (Type I).

Figure 3. Radiograph with residual bone height of 11 to 15 mm measured at the least vertical height of the mandible (Type III).
2- Residual Ridge Morphology: Maxilla Only

Residual ridge morphology is the most objective criterion for the maxilla, because measurement of the maxillary residual bone height by radiography is not reliable." The classification system, describing the effects of residual ridge morphology and the influence of musculature on a maxillary denture."

Type A (most favorable)

- Anterior labial and posterior buccal vestibular depth that resists vertical and horizontal movement of the denture base.
- Palatal morphology resists vertical and horizontal movement of the denture base.
- Sufficient tuberosity definition to resist vertical and horizontal movement of the denture base.
- Hamular notch is well defined to establish the posterior extension of the denture base.
- Absence of tori or exostoses.

Type B

- Loss of posterior buccal vestibule.
- Palatal vault morphology resists vertical and horizontal movement of the denture base.
- Tuberosity and hamular notch are poorly defined, compromising delineation of the posterior extension of the denture base.
- Maxillary palatal tori and/or lateral exostoses are rounded and do not affect the posterior extension of the denture base.

Type C

- Loss of anterior labial vestibule.
• Palatal vault morphology offers minimal resistance to vertical and horizontal movement of the denture base.
• Maxillary palatal tori and/or lateral exostoses with bony undercuts that do not affect the posterior extension of the denture base.
• Hyperplastic, mobile anterior ridge offers minimum support and stability of the denture base.
• Reduction of the post malar space by the coronoid process during mandibular opening and/or excursive movements.

Type D

• Loss of anterior labial and posterior buccal vestibules.
• Palatal vault morphology does not resist vertical or horizontal movement of the denture base.
• Maxillary palatal tori and/or lateral exostoses"(rounded or undercut) that interfere with the posterior border of the denture.
• Hyperplastic, redundant anterior ridge.
• Prominent anterior nasal spine.

Figure 5. Type A maxillary residual ridge.

Figure 6. Type B maxillary residual ridge.

Figure 7. Type C maxillary residual ridge.

Figure 8. Type D maxillary residual ridge.
**Muscle Attachments: Mandible only**

The effects of muscle attachment and location are most important to the function of a mandibular denture characteristics are difficult to quantify. The classification system follows a logical progression to describe the effects of muscular influence on a mandibular denture. The clinician examines the patient and selects the category that is most descriptive of the mandibular muscle attachments.

Type A (most favorable)
- Attached mucosal base without undue muscular impingement during normal function in all regions.

Type B
- Attached mucosal base in all regions except labial from canine to canine.
- Mentalis muscle attachment near crest of alveolar vestibule ridge.

Type C
- Attached mucosal base in all regions except anterior buccal and lingual vestibules - canine to canine.
- Genioglossus and mentalis muscle attachments near crest of alveolar ridge.

Type D
- Attached mucosal base only in the posterior lingual region.
- Mucosal base in all other regions is detached.

Type E No attached mucosa in any region

---

**Figure 9.** Type A mandibular muscle attachments. All vestibules are adequate.

**Figure 11.** Type C mandibular muscle attachments. Loss of anterior labial and lingual vestibules.
**Maxillomandibular Relationship**

The classification of the maxillomandibular relationship characterizes the position of the artificial teeth in relation to the residual ridge and/or to opposing dentition. Examine the patient and assign a class as follows:

- **Class I (most favorable):**
  - Maxillomandibular relation allows tooth position that has normal articulation with the teeth supported by the residual ridge.

- **Class II:**
  - Maxillomandibular relation requires tooth position outside the normal ridge relation to attain esthetics, phonetics, and articulation (e.g., anterior or posterior tooth position is not supported by the residual ridge; anterior vertical and/or horizontal overlap exceeds the principles of fully balanced articulation).

*A method of arranging artificial teeth for class two jaw relation*

The lower cast appears to be too far back in its relationship to the upper cast. The problem is both mechanical and aesthetic considerations.

1. Articulate casts and
2. Position anterior 12 teeth to achieve proper esthetics and phonetics.
3. Occlusal plane best suited for the patient is selected,
4. Sometimes the experimental arrangement may provide for better centralization of masticatory forces if placed considerably distal to the normal location.

5. If the blocks are placed too far buccal to the teeth can be placed in their proper position and tooth colored wax can be added to the buccal to achieve a proper aesthetic result. The waxed areas are duplicated with acrylic resin to give a wide block of teeth that is both
functional and aesthetic. The wax could also be added to the palatal surface but this would reduce tongue space.

Magnitude of Overjet  More for Class II patients

Class III:
maxillomandibular relation requires tooth position outside the normal ridge relation to attain esthetics, phonetics, and articulation (ie crossbite-anterior or posterior tooth position is not supported by the residual ridge).

Integration of Diagnostic Findings
The previous four subclassifications are important determinants in the overall diagnostic classification of complete edentulism. In addition, variables that can be expected to contribute to increased treatment difficulty are distributed across all classifications according to their significance.
Classification System for Complete Edentulism (continue)

**Class I**

This classification level characterizes the stage of edentulism that is most appear to be successfully treated with complete dentures using conventional prosthodontics techniques. All four of the diagnostic criteria are favorable.

- Residual bone height of 21 mm or greater measured at the least vertical height of the mandible on a panoramic radiograph.
- Residual ridge morphology resists horizontal and vertical movement of the denture base; Type A maxilla.
- Location of muscle attachments that are conducive to denture base stability and retention; Typ A or B mandible.
- Class I maxillomandibular relationship

**Class II** (Fig 15 A-H)

This classification level distinguishes itself by the continued physical degradation of the denture supporting anatomy, and, in addition, is characterized by the early onset of systemic disease interactions, patient management, and/or lifestyle considerations.

- Residual bone height of 16 to 20 mm measured at the least vertical height of the mandible on a panoramic radiograph.
- Residual ridge morphology that resists horizontal and vertical movement of the denture base; Type A or B maxilla.
- Location of muscle attachments with limited influence on denture base stability and retention; Type A or B mandible.
- Class I maxillomandibular relationship.
- Minor modifiers, psychosocial considerations, mild systemic disease with oral manifestation.
Figure 14. Class I patient. (A) Panoramic radiograph. (B) Facial view at the approximate occlusal vertical dimension. (C) Occlusal view; maxillary arch. (D) Occlusal view; mandibular arch. (E) Facial view; tongue in resting position. (F) Facial view; tongue elevated. (G) Lateral view of mandible; patient right. (H) Lateral view of mandible; patient left.
Figure 15. Class II patient. (A) Panoramic radiograph. (B) Facial view at the approximate occlusal vertical dimension. (C) Occlusal view; maxillary arch. (D) Occlusal view: mandibular arch. (E) Facial view: tongue in resting position. (F) Facial view: tongue elevated. (G) Lateral view of mandible; patient right. (H) Lateral view of mandible; patient left.
Class III

This classification level is characterized by the need for surgical revision of supporting structures to allow for adequate prosthodontic function. Additional factors now play a significant role in treatment outcomes.

- Residual alveolar bone height of 11 to 15 mm measured at the least vertical height of the mandible on a panoramic radiograph.
- Residual ridge morphology has minimum influence to resist horizontal or vertical movement of the denture base; Type C maxilla.
- Location of muscle attachments with moderate influence on denture base stability and retention; Type C mandible.
- Class I, II, or III maxillomandibular relationship.
- Conditions requiring preprosthetic surgery:
  1) minor soft tissue procedures;
  2) minor hard tissue procedures including alveolotomy.
  3) simple implant placement, no augmentation
  4) multiple extractions leading to complete edentulism for immediate denture placement.

- Limited interarch space (18-20 mm).
- Moderate psychosocial consideration and or moderate oral manifestations of systemic diseases or conditions such as xerostomia
- TMD symptoms present.
- Large tongue (occludes interdental space) with or without hyperactivity.
- Hyperactive gag reflex.
Class IV

This classification level depicts the most debilitated edentulous condition. Surgical reconstruction is almost always indicated but cannot always be accomplished because of the patient's health, preferences, dental history, and financial considerations. When surgical revision is not an option, prosthodontics techniques of a specialized nature must be used to achieve an adequate treatment outcome.

- Residual vertical bone height of 10 mm or less measured at the least vertical height of the mandible on a panoramic radiograph.
- Residual ridge offers no resistance to horizontal or vertical movement; Type D maxilla.
- Muscle attachment location that can be expected to have significant influence on denture base stability and retention; Type D or E mandible.
- Class I, II, or III maxillomandibular relationships.
- Major conditions requiring preprosthetic surgery:

1) complex implant placement, augmentation

2) surgical correction of dentofacial deformities;

3) hard tissue augmentation required;

4) major soft tissue revision required, ie, vestibular extensions with or without soft tissue grafting.

- History of paresthesia or dysesthesia.
- Insufficient interarch space with surgical correction required.
- Acquired or congenital maxillofacial defects.
- Severe oral manifestation of systemic disease or conditions such as sequelae from oncological treatment.
- Maxillo-mandibular ataxia (incoordination).
➢ Hyperactivity of tongue that can be associated with a retracted tongue position and/or its associated morphology.
➢ Hyperactive gag reflex managed with medication.
➢ Refractory patient (a patient who presents with chronic complaints following appropriate therapy).

These patients may continue to have difficult achieving their treatment expectations despite the thoroughness or frequency of the treatments provided.

➢ Psychosocial conditions warranting professional intervention

**Reasons for a Classification System**

Classifying edentulous patients according to present criteria can be an aid in numerous aspects of treatment:

• establishing a basis for diagnostic and treatment procedures
• justifying treatment procedures and fees to patients
• screening patients treated in dental faculties for assignment to undergraduate or graduate students
• providing data for review of treatment outcome
• simplifying communication in discussions of treatment with patients and colleagues.

*The classes are differentiated from each other according to the following features:*

• The skill level required to treat that class of patient: Does the patient require novice or expert treatment?
• The necessity for modification of basic clinical or laboratory procedures: Will more complicated procedures or more time be required for treatment?

• Overall management and complexity of treatment: Will expert intervention and referral be required?

**Guidelines for Use of the Complete Edentulism Classification System**

In those instances when a patient’s diagnostic criteria are mixed between two or more classes, any single criterion of a more complex class places the patient into the more complex class. The analysis of diagnostic factors is facilitated with the use of a worksheet.

Use of this system is indicated for pre-treatment evaluation and classification of patients. Re-evaluation of classification status should be considered following preprosthetic surgery. Retrospective analysis on a post treatment basis may alter a patient’s classification.

The classification system for complete edentulism is based on the most objective criteria available to facilitate uniform utilization of the system. With such standardization, communication will be improved among dental professionals.

This classification system will help to identify those patients most likely to require treatment by a specialist or by a practitioner with additional training and experience in advanced techniques.

This system should also be valuable to research protocols a different treatment procedures are evaluated.
<table>
<thead>
<tr>
<th>Bone Height-Mandibular</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
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<tbody>
<tr>
<td>21 mm or greater</td>
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<td>16-20 mm</td>
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<td>Type A - vertical &amp; horizontal</td>
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<td>Type B - buccal vest, poor</td>
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<td>Type C - ante vest, min support</td>
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<td>Type D - ante/post vest, tori,</td>
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<td>Muscle Attachments-Mandibular</td>
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<td>Type A - adequate attached</td>
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<td>Type B - no attach mucoea</td>
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<td>Type C - no ante &amp; ante vest</td>
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<td>Type D - only in post</td>
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<td>Type E - no attach mucoea, cheek</td>
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<td>Class III</td>
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<td>Minor soft tissue procedures</td>
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<td>Correction of dentofacial deformities</td>
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<td>Large</td>
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<td>Refractory Patient</td>
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Examples about questions on the subject;

whats more important in the maxilla, the shape of the palate or the thickness of the bone?

the shap.

whats more important in the mandible, the shape of the ridge or the thickness of the bone?

the thickness

what class jaw realationship does class I edentulous pt have?

class I

maxillary residual ridge morphology resists horizontal and vertical movment of denture base: name the type?

type A

location of muscle attachments that are conducive to denture base stability and retention

type A, B- mandible

what is going on the class II patient physiologically and with their oral health?

early onset of systemic disease interactions, localized soft tissue factors and patient management/lifestyle considerations

what is the residual bone height of a class II pt?

16-20 mm

what class jaw relationship does the class II pt have?

class I
what types have residual ridge morphology that resists movement of denture

A, B- maxilla

what types have location of muscle attachments with limited influence on denture base stability and retention

Type A,B—Mandible

name the kind of disease condition exists in the class II patient (psychologically, systemically, orally)

● Minor modifiers, psychosocial considerations, mild systemic disease with oral manifestations and localized soft tissue conditions

what is class III characterized by clinically

characterized by the need for surgical revision of denture supporting structures to allow for adequate prosthodontic function.

residual bone height of class III pt

11-15 mm

what jaw relationship does the class III pt have

I, II, or III

in what type of pt does Residual ridge morphology have minimum influence to resist horizontal or vertical movement of the denture base—type C max

in what sort of pt do Location of muscle attachments yield moderate influence on denture base stability and retention—

type C mandible
what are some things that would require preprosthetic surgery

Minor soft tissue procedures

- Minor hard tissue procedures

- Implant placement (simple)—no augmentation required

- Multiple extractions leading to complete edentulism for immediate denture placement

- Limited interarch space—18-20 mm

- Moderate psychosocial considerations and/or moderate oral manifestations of systemic diseases or localized soft tissue conditions

- TMD symptoms present

- Large tongue with or without hyperactivity

- Hyperactive gag reflex

Do class IV pts need surgery

almost always

in what patient type does the residual ridge offer no resistance to horizontal or vertical movment

- type D, maxilla, class IV

In what class IV pt does Location of muscle attachments have significant influence on denture base stability and retention—

- type D and E mandible

what are some major conditions that require preprosthetic surgery

- Implant placement (complex)—augmentation required

- Surgical correction of dentofacial deformities
- Hard tissue augmentation
- Major soft tissue revision, i.e., vestibular extensions with or without soft tissue grafting
- History of paresthesia or dysesthesia
- Insufficient interarch space with surgical correction required
- Acquired or congenital maxillofacial defects

what is a refractory pt?

a patient who has chronic complaints following appropriate therapy). These patients continue to have difficulty in achieving their treatment expectations despite the thoroughness or frequency of the treatment provided.

would we err on the side of more or less complex when classifying edentulous pt

In those instances when a patient's diagnostic criteria are mixed between two classes, any single criteria of a more complex class will move the patient into that respective class.

Good luck…………………………………Dr.Intisar J. Ismail