



## Review Article

# Unveiling the gummy smile: Modern perspectives on etiology, diagnosis, and orthodontic management - Contemporary review

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## Abstract

To satisfy patient's growing need for Aesthetic Enhancement, orthodontists nowadays must focus functional as well as aesthetic smile enhancement. A recent trend in orthodontics is the pursuit of enhanced facial aesthetics and a youthful appearance, which has motivated experts to lay forth guidelines and standards in an effort to identify the factors that influence face aesthetics. Obviously, a young and pleasant smile is the most important aspect of this need.

Inappropriate or even unattractive smiles might result from excessive gingival show. As a result, addressing the "gummy smile" becomes a key treatment goal in response to patient demand.

The excessive vertical maxillary growth, excessive labial contraction, shorter upper lip, excessive gingival growth, and anterior tooth extrusion are some of the multifactorial symptoms of the aetiology. Other treatment options include orthognathic, plastic, and periodontal surgery, as well as orthodontics. Therapies are frequently interdisciplinary.

The purpose of this article is to clarify the diagnosis, aetiology, and therapeutic alternatives for the treatment of gummy grin.

**Keywords:** Esthetic, Gummy smile, Altered passive eruption, Lip repositioning Excessive gingival display, Vertical maxillary excess.

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## 1. Introduction

The way a patient smiles can convey a variety of emotions, including happiness, success, sensuality, tenderness, politeness, and compassion. An attraction and socialisation technique, smiling is more than just a means of communication.

For certain people, especially those who exhibit certain variations of the "gummy smile," it can be a genuine challenge or even a disability. Smile harmony is influenced by gingival tissue in addition to tooth location, colour, and form.

For women, a healthy and continuous gingival margin display of around 3 mm during a natural grin is preferred; for men, just the anterior teeth show is anticipated, without the continuous band of gingiva. Age-related changes in muscle

tone lead to reduced visibility of the upper teeth and a propensity for higher lower tooth show.<sup>1</sup>

It is crucial to identify the aetiology of the gummy smile once the irregularity in the smile level has been identified. It is typically multifactorial and involves excessive vertical growth of the maxilla, reduced length of the upper lip, excessive contraction of the upper lip, and disproportionate crown length and width of anterior teeth, often linked to excessive gingival display, hyperplasia, and passive eruption.<sup>2</sup> The issue may also be connected to upper tooth protrusion, which is linked to deep bite.<sup>3</sup>

The goal of the current study is to pinpoint the origins of gummy smiles after a thorough investigation of the grin in order to decide on the most effective course of action.

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## 2. Smile Classification

The sociable smile and the pleasure grin are the two fundamental varieties of smiles.

A voluntary, unforced, unchanging facial expression known as the social smile or the normal welcoming smile.

Laughter or intense pleasure can cause an enjoyment grin, which is automatic. The upper and lower lip depressor and elevator muscles, respectively, contract to their maximum capacity to cause it.

Each person's the direction of the lips' elevation and depression as well as the main muscle groups involved determine the style of a grin.

The motion of the upper lip's elevators, which raise the lip like a window shade to reveal the teeth and gingival scaffold, creates the cuspid or commissure grin.

The complex or full-denture grin is distinguished by the simultaneous activity of the upper lip elevators and lower lip depressors, which raise the upper lip like a window shade and lower it like a window.

The zygomaticus major muscles draw the outer commissures outward and upward in the Mona Lisa grin, which is characterised by a progressive elevation of the top lip. Compared to individuals with Mona Lisa grins, those with complicated smiles often show more teeth and gingiva. (Figure 1).<sup>4,5</sup>

Allen states that a grin is considered gummy if more than two or three millimetres of gum are evident when smiling continuously; forced smiling verifies this.<sup>6,7</sup>

### 2.1. Classification system for gummy smile

According to etio-pathogenetical variables, instances of gummy smile were categorised as follows: (Table 1)<sup>2</sup>

### 2.2. The mercado-rosso classification system for GS divides GS into three categories: (Figure 2 and Table 2)

#### 2.2.1 Potential causes of gummy smile<sup>7</sup>

1. Cutaneo-mucosal origin: Increased visibility of the teeth at rest due to thin upper lip length, which is termed thin if it is less than 20 mm <sup>25</sup>.  
In accordance with Peck and Peck, those who grin gummy have more powerful upper lip muscles.<sup>8</sup>
2. Dento-periodontal aetiology can take one of three different forms: The gum that is visible when smiling appears even more prominent in comparison to the incisors' shortness due to abnormal maxillary incisor size, gingival hypertrophy, and hyperplasia.  
The last condition is impaired passive eruption, which is defined as abnormal hypertrophic development of the gum, especially at the interdental papillae, covering part or even the entire crown.<sup>6</sup>
3. A condensed medical crown

4. Vertical maxillary excess
5. Modified passive eruption
6. Dentoalveolar extrusion
7. Gingival hyperplasia

### 2.3 Methodology

A contemporary review of the literature was conducted to identify contemporary trends in gummy smile. A comprehensive search of electronic databases, including PubMed, IEEE Xplore, and Google Scholar, was performed in november 2024. The following search terms were used: "Gummy smile and short tooth syndrome," "Gummy smile: A contemporary and multidisciplinary overview," and "Gummy smiles: etiologies, diagnoses, and formulating a clinically effective treatment protocol."

Inclusion criteria were studies published in peer-reviewed journals between 1983 and 2025, focusing on orthodontic treatment approaches in gummy smile.

Exclusion criteria included studies that did not involve etiologies, diagnosis and treatment approaches in gummy smile or were not available in English.

Initially, 150 articles were identified, and after screening titles and abstracts, 31 studies were included for full-text review.

Data extraction focused on key themes such as the types of treatment approaches used, clinical outcomes, and challenges faced. The studies were synthesized qualitatively. Identifying common trends in diagnosis and treatment planning of gummy smile. It also described the challenges with each treatment approach.

### 2.4. Diagnosis

Despite the importance of clinical analysis in gummy smiles, radiography allows for the following: confirmation of the skeletal aetiology; determination of the palatine plane's orientation and occlusion plane.<sup>9</sup>

### 2.5. Diagnosis of gummy smile<sup>7</sup>

Diagnostic assessment of the gummy smile

1. Patient medical history
2. Facial analysis
3. Lip analysis: static versus dynamic
4. Rest position analysis
5. Dental analysis: crown length and incisal margin
6. Periodontal examination

### 2.6. Treatment of gummy smile

Depending on the precise diagnosis, there are many treatment options for excessive gum exposure when smiling. Following are the treatment options available. (Figure 3)

## 2.7. Periodontal surgery

Periodontal surgery focuses on the treatment of the supporting structures of the teeth, including the gums, bone, and ligaments.

Two common procedures are:

### 2.7.1. Gum contouring or gingivectomy (**Figure 4**)

Gum contouring is a surgical procedure aimed at removing excess gum tissue to improve the appearance of the gums and enhance the smile. This can be performed for both cosmetic and health reasons.

1. **Cosmetic Reason:**
2. **Health Reason:** Gingivectomy may also be necessary to treat periodontal disease to allow for better cleaning and healing of the gums. It can also help eliminate pockets that form around the teeth due to infection.

In this procedure, a small portion of the gum is removed, and the remaining tissue is reshaped to create a more aesthetically pleasing contour. Healing typically takes a few weeks, during which care must be taken to avoid infection or irritation.<sup>10,11,12,13</sup>

### 2.7.2. Surgical crown lengthening

Surgical crown lengthening is a procedure performed to expose more of a tooth's structure, either for functional or aesthetic reasons

This procedure can be done on a single tooth or multiple teeth, depending on the case.

Both of these procedures aim to improve the overall health and appearance of the gums, whether for cosmetic enhancement or to aid in the treatment of dental disease or restorative procedures.<sup>13</sup>

## 2.8. Orthognathic and plastic surgery

Orthognathic and plastic surgery are two distinct fields but often overlap when it comes to procedures that address both functional and aesthetic concerns. Here's a breakdown of the three procedures you've mentioned:

### 2.8.1. Lip repositioning

This surgery involves repositioning the upper lip to lower its resting position and reduce the visibility of the gums. It is typically performed in patients who have a normal or well-positioned upper jaw but still show a disproportionate amount of gums when they smile.

#### 2.8.1.1 Procedure

1. A small incision is made inside the mouth along the gum line, where a portion of the tissue is removed to reposition the lip.
2. The lip is then sutured in a new position to help lower the smile line.<sup>14</sup>

### 2.8.2. Botox injections

Botox (Botulinum toxin) injections are a non-surgical procedure used in plastic surgery and aesthetic medicine to temporarily reduce wrinkles and fine lines, as well as to treat certain medical conditions. Botox works by blocking nerve signals to the muscles, causing temporary muscle paralysis.

#### 2.8.2.1. Indication

1. Wrinkles and fine lines, particularly around the eyes, forehead, and mouth.
2. Treatment for conditions like bruxism (teeth grinding), migraines, excessive sweating (hyperhidrosis), and jaw clenching.
3. Cosmetic procedures like brow lifts or lip enhancement.

#### 2.8.2.2. Procedure

1. A small needle is used to inject Botox into the targeted muscle areas, typically in the forehead, crow's feet, or around the mouth.
2. Results usually start appearing within a few days and last for about 3–6 months.

Injection with BTX-A at preselected sites is a novel, cosmetically effective, minimally invasive alternative for the temporary improvement of gummy smiles caused by hyperfunctional upper lip elevator muscles.<sup>15</sup>

### 2.8.3. Le fort I impaction

Le Fort I impaction is an orthognathic surgical procedure used to correct issues related to the position of the upper jaw (maxilla). This procedure is typically performed to treat conditions such as a severe overbite, open bite, or midface deficiency.

#### 2.8.3.1. Indications

1. Significant malocclusion (misalignment of the teeth), particularly involving the upper jaw.
2. Disproportionate facial features due to a recessed or advanced upper jaw.
3. Difficulty with chewing, breathing, or speaking due to jaw misalignment.

#### 2.8.3.2. Procedure

1. The Le Fort I procedure involves making cuts in the bone of the upper jaw (maxilla) to allow it to be repositioned, often upward or downward, to improve bite and facial aesthetics.
2. Once the desired position is achieved, the bones are fixed in place using plates and screws.

#### 2.8.3.3. Recovery

1. This procedure is more invasive than Botox or lip repositioning and requires a longer recovery period. It typically involves a few weeks of swelling and dietary restrictions (e.g. soft or liquid foods).

2. Full recovery may take several months, with follow-up visits to ensure proper healing and alignment.<sup>13</sup>

### 2.9. Orthodontic treatment in gummy smile

Correcting a gummy smile can be complex for orthodontists, especially if it's of alveolar origin, which typically responds to orthodontic treatment only when the issue is moderate and limited to the incisor area. In cases of vertical normal gummy smiles, intrusion of the maxillary incisors is effective. Early intervention can prevent supra-occlusion.

### 2.10. Orthodontic treatment in gummy smile of alveolar origin

Gummy smile of alveolar origin is generally associated with supra-occlusion limited to the incisor group. In vertically normal gummy smile, intrusion of the maxillary incisors is the treatment of choice.

Moreover, except in particularly severe cases, gummy smile is rarely the prime target of orthodontic treatment. Rather, it is usually associated to correction of malocclusion, determining the treatment plan.

Treatment can be undertaken at a very early age to prevent onset of supra-occlusion. Once gummy smile has emerged, there are orthodontic mechanisms to improve the relation between upper lip and teeth, reducing gum exposure. Conventional techniques can be used: e.g, Ricketts' basal arch to achieve superior incisor intrusion.

This intrusion, however, is difficult to obtain and is often accompanied by molar extrusion, which may not be desired, especially in hyperdivergent subjects with gummy smile. **(Figure 7)**

Below are the descriptions for the specific types of orthodontic treatment:

### 2.11. Orthodontic intrusion of the maxillary anterior segment

Orthodontic intrusion involves the controlled movement of teeth into the bone, which reduces the height of the teeth in relation to the upper jaw.

Intrusion of this segment is typically used to:

1. Correct excessive gingival display (gummy smile)
2. Improve tooth alignment:

Treatment method: Traditional techniques like Ricketts' basal arch can help with superior incisor intrusion, though it can be challenging and may cause unwanted molar extrusion. Mini-screw bone anchors now allow for better control, particularly in adults, reducing side effects while correcting anterior vertical excess.<sup>16,17</sup>

### 2.11.1. Intrusion of anterior segment using different intrusion arches

#### *Intrusion arches in orthodontics for treating gummy smiles*

Intrusion arches are an essential tool in orthodontics used to correct various dental alignment issues, including gummy smiles.

Intrusion arches are used to intrude (move inward vertically) the upper anterior teeth, helping to reduce the gum exposure and improve the aesthetic balance of the smile.

1. How intrusion arches work to treat a gummy smile
  - a. For a gummy smile, intrusion arches help intrude the upper anterior teeth (incisors and canines), reducing their vertical height, and thus, diminishing the amount of gum visible when smiling.
2. Mechanism of Action
  - a. Intrusion arches apply gentle, continuous forces to the anterior teeth, encouraging them to intrude into the jaw.
  - b. The controlled force used by the arch allows for predictable tooth movement, minimizing the risk of complications like root resorption or damage to the supporting bone.
3. Addressing Vertical Maxillary Excess
  - a. In some cases of gummy smiles, the upper jaw may grow excessively in the vertical direction, causing excessive gum exposure. Intrusion arches help reduce the vertical height of the upper teeth and reposition them to create a more harmonious smile.<sup>17</sup>
4. Advantages of Using Intrusion Arches for a Gummy Smile
  - a. Non-Surgical
  - b. Gentle, Controlled Movement
  - c. Minimal Side Effects: Because the forces are applied in a controlled manner, the risk of complications such as root resorption is minimized.
  - d. Improvement in Aesthetics:
5. Challenges and Considerations
  - a. Duration of Treatment: Intruding the anterior teeth takes time, and the process happens gradually. Treatment can take several months, depending on the severity of the gummy smile and the amount of intrusion required.
  - b. Root Resorption: Although the forces applied are gentle, there is still a small risk of root resorption. Regular monitoring by the orthodontist helps minimize this risk.
  - c. Compliance: As with all orthodontic treatments, patient cooperation is key. Regular visits and consistent use of the appliance are necessary to achieve the best results.<sup>17,18,19</sup>

6. Duration of Treatment with intrusion arches
  - a. The treatment duration can vary based on the severity of the gummy smile and the degree of intrusion required. Generally, it may take several months (typically 6 months to a year) for the teeth to move into the desired position, though this can vary by individual case.
7. Ideal Candidates for correction with intrusion arches
  - a. Patients with excessive vertical eruption of the upper front teeth.
  - b. Individuals with a gummy smile caused by the prominence of the upper teeth in relation to the gums.
  - c. Patients seeking a non-surgical solution to improve the appearance of their smile.<sup>18,19</sup>

#### Types of intrusion arches used for gummy smiles

1. Ricketts Utility Intrusion Arch (**Figure 5**): Developed by Dr. Robert Ricketts, this is a commonly used appliance in orthodontics. The arch is made of stainless steel and shaped to fit the patient's dental anatomy.
  - a. The Ricketts Utility Arch applies gentle, continuous pressure to the upper anterior teeth, helping to intrude them and reduce gum display.
  - b. This arch is often used when the anterior teeth are over-erupted or protrusive, causing an excessive gum display.

#### Advantages of using the ricketts utility intrusion arch for a gummy smile

- c. Non-Invasive: The Ricketts Utility Intrusion Arch is a non-surgical, orthodontic solution to reduce a gummy smile, making it an attractive option for many patients.
  - d. Controlled and Gradual Correction: The appliance provides a controlled and gradual movement of the anterior teeth, ensuring that the correction is both effective and aesthetically pleasing.
  - e. No Need for Lip Repositioning Surgery: In some cases of gummy smile, lip repositioning surgery is considered, but the intrusion arch provides an alternative that addresses the underlying dental cause without invasive surgery.
2. Connecticut intrusion arch
    - a. The Connecticut Intrusion Arch was designed by Dr. Ravindra Nanda to gradually intrude the teeth into a more natural alignment with the gums, reducing vertical gum exposure.
    - b. Shape memory, springback, and light, continuous force distribution are features of the nickel titanium alloy used in the fabrication of the CIA (Connecticut intrusion arch). (**Figure 6**)

- a. Precision: The design is highly customizable, allowing the orthodontist to tailor the appliance to the patient's specific needs, ensuring that the forces applied to the teeth are in the correct direction and intensity.
- b. Non-Invasive: It provides a non-surgical solution to treating a gummy smile by intruding the teeth, rather than cutting away gum tissue or repositioning the jaw surgically.
- c. Gradual Movement: The arch works by applying gentle, continuous pressure, ensuring gradual and controlled movement of the teeth, which minimizes the risk of discomfort or harm to the teeth or surrounding structures.
- d. Aesthetic Improvement: As the upper incisors are intruded into the desired position, the visible gum line is reduced, improving the overall aesthetics of the smile without needing invasive procedures like gum recontouring or lip surgery.

#### Treatment mechanism

- a. The arch works by applying gentle and continuous pressure to intrude the front teeth. This force is transmitted through a customized wire and bracket system that is fixed to the patient's upper teeth, typically as part of an ongoing orthodontic treatment plan.
- b. The arch helps the upper incisors move toward the desired position by gradually pushing them toward the gum line, which in turn reduces the amount of gum tissue that shows when the patient smiles.

#### Effect on smile.

- a. By intruding the incisors, the Connecticut Intrusion Arch reduces the vertical height of the upper teeth, which can be too long or too prominent in patients with a gummy smile.<sup>18,19</sup>
  - c. The result is a more harmonious smile line, where the teeth are in better proportion with the lips and gums.
3. Bayonet intrusion arch
    - a. This is a variation of the intrusion arch used for localized intrusion of specific teeth. The Bayonet Intrusion Arch is customized to fit over the anterior teeth and applies targeted pressure to the teeth needing intrusion.
  4. C-Arch
    - a. A C-shaped arch designed to intrude the anterior teeth. The C-arch is used primarily for gummy smiles caused by over-erupted teeth. This appliance applies light, continuous pressure, allowing for gradual tooth movement while minimizing the risk of complications like root resorption.

#### Benefits of the connecticut intrusion arch design

### 12.11.2. Intrusion of anterior segment using temporary anchorage devices (**Figure 7**)

More recently, the development of mini-screw bone anchors has extended the possibilities of orthodontic treatment: anterior vertical excess found in adults can now be corrected by intrusion, limiting unwanted side effects in the posterior sectors by appropriate mini-screw positioning.<sup>13</sup>

This technique is increasingly used to correct gummy smile in adults, as mini-screws combine several advantages:

1. Easy of fitting and ablation;
2. Immediate implementation;
3. Patient comfort;
4. Relatively low cost.

It is an interesting alternative to the risks and demands of orthognathic surgery, the previous attitude of choice.<sup>20</sup>

### 12.11.3. Orthodontic intrusion of the whole maxillary arch

When the entire maxillary arch undergoes intrusion, the goal is often to reduce the vertical height of the upper jaw. This is a more comprehensive approach compared to treating just the anterior segment. Reasons for arch-wide intrusion include:

1. Correction of a vertical skeletal discrepancy: For cases of excessive vertical facial growth, such as an open bite or deep bite.
2. Cosmetic improvements: To improve the overall balance of the face, particularly if the upper jaw appears too long.
3. Treatment method: This typically involves using TADs, braces, or aligners. The forces are applied evenly across the arch to move all teeth in the same direction, often as part of a broader orthodontic plan.

### 2.12. Retraction of proclined incisors for a better/more relaxed lip fall

Proclined incisors are teeth that are tipped outward or forward. Retraction of these incisors is often done to:

1. Achieve a more natural lip profile: Proclined incisors can cause the lips to appear more prominent. By retracting the teeth, the lips can fall more naturally, leading to a more relaxed and aesthetically pleasing appearance.
2. Improve function and occlusion: Proclined incisors can affect the bite and function of the teeth. Bringing them back into better alignment can improve both aesthetics and the functional relationship between the teeth.
3. Treatment method: Retraction is typically performed using braces, sometimes in combination with TADs or elastics to apply the necessary forces.

### 2.13. Orthodontic intrusion of the canted segment to correct asymmetric high gingival smiles

A canted smile refers to a smile line that is tilted or uneven, often caused by an asymmetry in the upper arch or individual teeth. This can lead to a smile that is not harmonious, especially when the upper teeth show uneven amounts of gingival (gum) display. Intrusion of the canted segment is used to:

1. Correct an uneven smile: By intruding the canted (tilted) teeth, the goal is to level the smile and make it symmetrical, improving the overall aesthetic.
2. Reduce gum exposure: If certain areas of the gums show more than others, intrusion can help reduce the visibility of the gums and make the smile more balanced.
3. Treatment method: This is often achieved through braces or clear aligners, with careful planning to ensure the right amount of intrusion is applied to the correct teeth or segments of the arch.<sup>13,19</sup>



**Figure 1: a:** Cuspid grin; **b:** Complicated smile; **c:** Mona Lisa smile



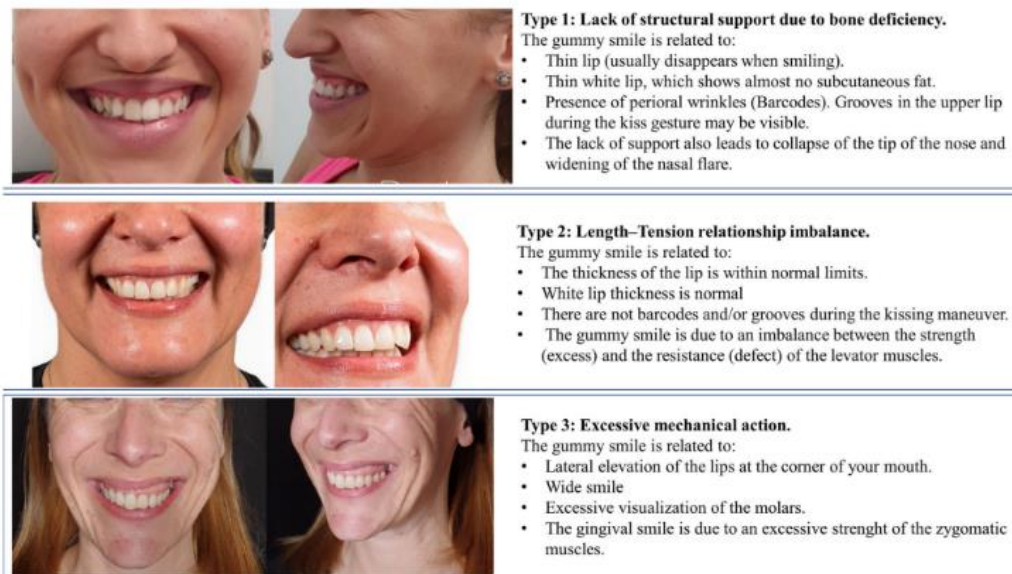


Figure 2: Mercado Rosso classification system<sup>5</sup>

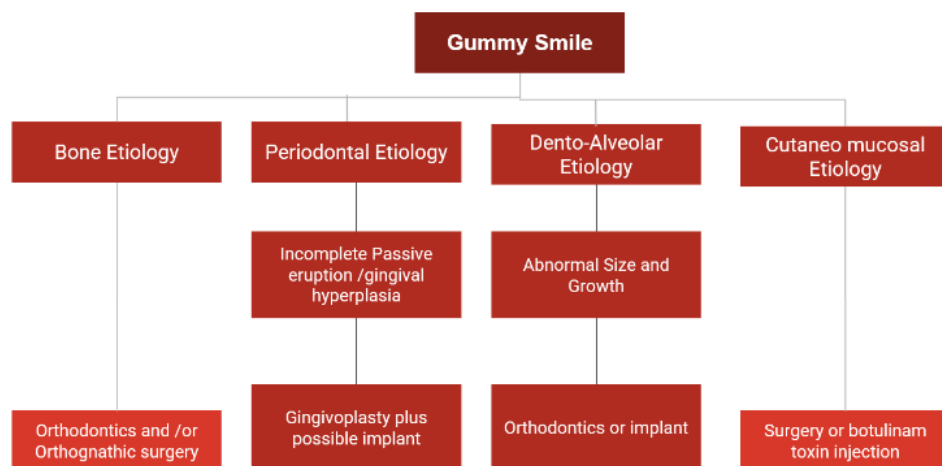


Figure 3: Treatment flow chart



Figure 4: Gingivectomy

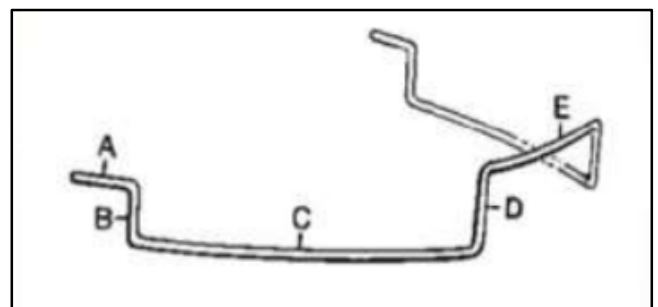


Figure 5: Ricketts utility intrusion arch; **A:** Molar fragment; **B:** Posterior vertical fragment; **C:** Vestibular fragment; **D:** Anterior vertical fragment; **E:** Incisal fragment

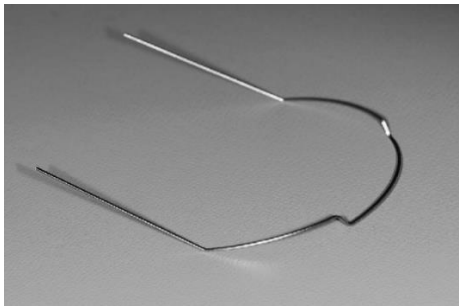


Figure 6: Connecticut intrusion arch<sup>19</sup>



**Figure 7:** Intrusion using Mini implant; **a:** Diagram of incisor intrusion using mini-screws;<sup>11</sup> and **b:** Treatment of supra-occlusion by mini-screw anchorages.<sup>15</sup>

**Table 1:** According to etio-pathogenetical variables, instances of gummy smile were categorised as follows

Dento-alveolar gummy smile, if there was an excessive vertical descent;
Dento-gingival gummy smile, if there was an altered passive eruption of teeth;
Muscular gummy smile, if there was hyperactivity of the upper lip muscle and of the great zygomatic;
Mixed gummy smile, if more than one of these conditions appeared. <sup>2</sup>

**Table 2:** The mercado-rosso classification system for GS divides GS into three categories

Type 1	Which is characterised by a lack of support and/or projection of the upper maxilla.
Type 2	Which results from an imbalance between the strength (excess) and resistance (defect) of the levator muscles.
Type 3	Which is characterised by an excessive strength of the zygomatic muscles, which results in a wide smile and an excessive visualisation of the molar teeth. <sup>5</sup>

3. Discussion

Excessive gingival display can be classified into various categories based on its underlying causes.<sup>2,23</sup> The following factors should be taken into consideration while treating gummy smiles due to their various aetiologies: Type of face, alveolar bone thickness; gingival biotype; smile line; lip thickness, size, and profile; vertical height and symmetry of the face; tooth size and form.<sup>22</sup>

Case studies have demonstrated that the skeletal, dento-alveolar, and aesthetic outcomes vary depending on the

method of treatment. Therefore, establishing therapeutic goals is crucial.<sup>12,13</sup>

The existence of a gummy smile is essentially a subjective clinical assessment rather than a measurable cephalometric measurement. Subjectively, there may be a regular pattern of increased gingival show in smiles. Patients with "gummy smiles" will objectively exhibit a range of underlying causes, from soft tissue to hard tissue origins. In order to use the right techniques and meet the patient's expectations and results, the physician must be able to distinguish between the two. With a focus on orthodontic treatment options, the current communication offers an overview of the many aetiologies, diagnostic issues, and treatment approaches that can be employed to treat moderate to severe gummy smiles.<sup>12,13</sup>

One type, dentoalveolar excessive gingival display, results from an overgrowth of the maxillary anterior dentoalveolar height. However, correcting this issue using standard orthodontic devices can be challenging. Therefore, in severe cases of a gummy smile, surgical impaction of the maxillary anterior dentoalveolar region is commonly employed. The potential of traditional orthodontics can be extended when gummy smiles are primarily caused by strong vertical alveolar growth at the incisors. Isolated orthodontic treatment can produce good results, particularly with the development of bone anchorages. However, when the cause is basal, maxillofacial surgery is necessary. The entire maxilla was impacted to rectify the gummy smile linked to the maxilla's overall abnormal vertical development.<sup>24</sup>

Surgical correction, however, involves potential risks such as infection, alveolar bone necrosis, and loss of tooth vitality. Additionally, anterior segment impaction using the Le Fort I procedure often results in an increased nasal alar width, which can negatively affect the patient's nasal profile. Therefore, careful consideration is required when deciding between surgical and nonsurgical treatment options.

Conversely, orthodontic anchorage implants, including miniplates<sup>25,26,27,28</sup> and miniscrews,<sup>29,30</sup> have been developed in recent years. Creekmore and Eklund, along with Ohnishi et al.<sup>31</sup> suggested positioning a single miniscrew between the roots of the maxillary incisors. This approach offers direct anchorage for incisor intrusion, helping to reduce excessive gingival display.

True intrusion of upper incisors can be achieved using miniscrew anchorage. During the application of intrusive force, the axial inclination of the upper incisors showed minimal change, which was considered to be clinically acceptable. Root resorption was not seen as a consequence of incisor intrusion. Gummy smile and deep-bite correction can be achieved successfully by miniscrew-assisted maxillary anterior intrusion. Maxillary central and lateral incisor intrusion was greater in subjects with two miniscrews. The apical root resorption of the maxillary central incisors was



greater in subjects with one miniscrew, while the maxillary lateral incisor resorption was greater in subjects treated with two miniscrews. No significant differences were found between the one- and two-miniscrew groups regarding changes in incisor inclination, labial bone thickness, and buccal alveolar crest height.<sup>21</sup>

The gummy smile in this patient may result from several factors, including vertical maxillary excess and iatrogenic anterior dental extrusion. However, it's also important to acknowledge the role of bidental protrusion in contributing to the condition. In some instances, when the patient smiles, the lip may retract or recede more than usual due to dental proclination. Furthermore, during a wider smile, the lip may become thinner than normal, leading to an increased gingival display. In such cases, it may be helpful to retract the teeth so that the lip better aligns with the underlying hard tissues, achieving a more natural smile.<sup>32</sup>

It is essential to highlight that the decision between these treatment options should be made after a thorough evaluation by both an oral and maxillofacial surgeon and an orthodontist. They will assess the patient's unique condition, the severity of the gummy smile, and any other dental or skeletal issues and risk factors. Treatment plans must be tailored to each patient to ensure the best possible outcomes and satisfaction.

### 3.1. Orthodontic or surgical approach?

Whether an orthodontic or surgical approach is better for correcting a gummy smile depends on the underlying cause and the severity of the condition.

1. Orthodontic approach: This is typically preferred when the gummy smile is due to issues like excessive vertical maxillary growth or improper teeth alignment. Through braces or clear aligners, orthodontics can help realign the teeth and jaw, potentially reducing the amount of gum exposure when smiling. This approach is less invasive and can be effective if the cause is primarily dental or mild skeletal issues.
2. Surgical approach: If the gummy smile is caused by skeletal issues, such as an overdeveloped upper jaw (maxilla) or a misaligned bite, surgery may be necessary. Surgical options, like lefort osteotomy (for jaw repositioning), can address the structural cause and provide a more permanent solution, especially in more severe cases.

In many cases, a combination of both orthodontics and surgery may be used, depending on the individual's needs. It's best to consult with an orthodontist and a surgeon to determine the most appropriate treatment based on the specific diagnosis.

## 4. Conclusion

The presence of a gummy smile is primarily a subjective clinical observation. Smiles may consistently exhibit excessive gingival display, but objectively, the underlying causes of a "gummy smile" can vary, ranging from soft tissue to hard tissue factors. It is crucial for the clinician to identify these distinctions in order to apply the appropriate strategies to meet the patient's expectations and desired outcomes.

A gummy smile is generally defined as a continuous band of gingival exposure exceeding 3 mm during a spontaneous smile. Its underlying causes can arise independently or in combination and include skeletal issues (dental and bone-related), gingival conditions (such as passive eruption and gingival hyperplasia), and muscular factors (such as short upper lip length or hyperactive musculature).

Treatment options are typically multidisciplinary and tailored to the specific etiology.

### 4.1. The literature outlines the following approaches:

1. Periodontal surgery for cases of excessive gingival display or delayed passive eruption.
2. Muscle surgery for addressing a short upper lip.
3. Botox injections or muscle surgery to treat hyperactivity of the upper lip elevator muscles.
4. Orthognathic surgery for excessive vertical maxillary growth.
5. Orthodontic techniques combined with intrusion arched and intrusive mini-implants for managing overbite due to upper anterior tooth extrusion.

This communication offers an overview of the various causes, diagnostic considerations, and treatment options, with a particular focus on orthodontic approaches, for addressing moderate to severe gummy smiles.

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None.

## 6. Conflict of Interest

None.

## 7. References

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