Non-invasive correction of gummy smile- a case report

Dr. Sadashiv Daokar¹, Dr. Suchita Tarvade², Dr. Sonali Shelke³

1. Professor & PG guide, Dept of Conservative Dentistry, CSMSS Dental College, Maharashtra, India
2. Professor & PG guide, Dept of Orthodontics, CSMSS Dental College, Maharashtra, India
3. Consulting Orthodontist, Maharashtra, India.

Abstract: Gummy smile has lead many patients to undertake various dental treatment. The treatment of gummy smile varies from periodontal surgeries, orthodontic correction to extensive orthognathic surgeries. These treatment include a very skilful invasive approach and in terms are very costly. This article deals with an non-invasive, affordable and acceptable approach to deal with the problem.

I. Introduction :
Excessive display of gingiva during smiling has always thought to be unsightly, driving the patients to undertake dental treatment. The feature is termed as gummy smile / gingival smile line. Gummy smile is considered as a normal variation of human anatomy, but many people with gummy smiles are very self-conscious when smiling. Gummy smile according to Tjan& Miller is defined as more than 2mm of maxillary gingiva exposed above the central incisors at maximum smile.

Etiological factors for gummy smile-
1. Vertical maxillary excess (VME)
2. Delayed passive dental eruption
3. Greater muscular activity to raise the lip
4. Short upper lip

Rubin et al have attributed the gummy smile to the hyperactivity of
1. Levatorlabiisuperioris.
2. Levatorlabiisuperiorisalaquenasii
3. Zygomaticus minor

II. Case report :-
A male patient named Rohit Muluk of age 23 years, reported to the department with a chief complaint of gummy smile.

III. Records taken :-
Lateral cephalogram was obtained and traced to rule out vertical maxillary excess. Model analysis was done to check the eruption of various teeth. Clinical examination & photographs were taken during rest and smiling to check the amount of gingival display during smile.
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Models- Frontal view
Models- Lateral view

Photograph at rest
Photograph on smile

IV. Recording the measurements-
The following reference points (RP) and linear measurements were used:
RP1- the lowest margin of the upper lip perpendicular and superior to the midportion of the maxillary central incisors gingival margin.
RP2- the maxillary central incisors gingival margin at its midpoint.
RP3- the midpoint of the incisal edge of the maxillary central incisor.
The measurements recorded were.
A= RP1 to RP2
B= (RP1 to RP3)-( RP1 to RP2)

After proper diagnosis of the case, the treatment with botox injection was decided.

Review of literature of botox-
Botulinum toxin was discovered in 1887. It is produced by anaerobic bacteria C. Botulinum. There are about 8 serotypes. BTX- A is most potent and commonly used.
Botox is purified BTX-A isolated from the fermentation of C. Botulinum. It is stable, sterile, vacuum dried powder that is diluted with saline solution without preservatives.
The first clinical application of botox was performed by Scott et al in 1980.
The first use of botulinum toxin for cosmetic purpose (correction of asymmetry) was done by Clark and Berris in 1989.
In 1992, Carruther and Markey used botox for smoothening of facial lines and wrinkles.
The drug was approved by FDA (Food & Drug Administration) in 1989.
In 1990, National Institute of Health Consensus Conference considered it as safe for other non-labelled uses.
Since then it is used as a neuromuscular blocker in neurology, orthopaedics, gastroenterology, ophthalmology.

Mode of action of Botox:-
Blocks neuromuscular transmission by binding to acceptor sites on motor or sympathetic nerve terminals, thus inhibiting release of acetylcholine.
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This inhibition occurs as the neurotoxin cleaves SNAP-25, a protein integral to the successful docking and release of acetylcholine from vesicles in nerve ending. When injected intra musculary at therapeutic doses, BTX-A produces partial denervation of the muscles, resulting in localized decrease in muscle activity.

**Administration of Botox:-**

50 units of Botulinum toxin was dilute with 1.25 ml of normal saline.

Injection site of sensitivity test  
24 hrs after sensitivity test

Sensitivity test was done. After 24 hours there was no redness, itching, pain, numbness on the test side. The patient was considered safe for the administration of botox.

Under sterile conditions 1 unit of botox was injected per side. The botox was injected at 2 sides per side in both overlapping points of the right and left levatorlabii superiusalaquenasii (LLSAN) and levatorlabii superiors (LLS) and LLS and zygomaticus minor (ZM) muscle sites.

Site- 2 per side  
Dose- 1 unit per side

The injection sites were determined by muscle contraction and palpation to ensure exact site for the injection delivery.

EMG activity was not recorded, neither any local anaesthesia was administered.

Gingival display on smile were recorded by the above stated measurements.

The records were done 1 day prior to botox administration, on the day of botox administration, 7th day of botox administration and 14th day of botox administration. Thus 4 recordings were done.

**V. Results:-**

Preinjection gingival display was 6 mm.

At 14th day mean gingival display was declined by 4 mm. Gingival display at maximum smile was 2 mm. Definitive change upon smiling was noticed between 1-7 days.

Patient did not report any pain, bruising, dizziness, headache postinjection.

No redening, inflammation, swelling, tenderness was seen at the site of injection.

When asked regarding the treatment outcome, the patient was very positive and commented on recommending this treatment procedure to others.
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VI. Discussion :-
Excessive gingival display on smiling has a negative quotient of patients self esteem. Muscles of facial expression responsible for upper lip elevation and lateral retraction upon smiling are LLSAN, LLS, ZM, risorius and to a lesser degree the depressor septinasi muscle. All these muscles interact with the orbicularis oris muscle in production of smile. Botox, due to its muscle weakening action, is thought to do wonders with patients suffering from gummy smile.

VII. Conclusion :-
Botulinum toxin, once known as a substance to be feared, is now perceived as a “Wonder drug”. Botulinum toxin due to its muscle weakening action can be drug of choice in treatment of hyperactive muscles. BTX-A proves to be efficient for gingival smile secondary to hyperfunctional upper lip elevators. Long term local and systemic effect of these drug has yet to be extensively studied, and hence this wonder drug has to be cautiously used.

References: