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Adjunctive cosmetics therapy for orthodontic patients (Review Study)

A Project Submitted to
The College of Dentistry, University of Baghdad, Department of Orthodontics in Partial Fulfillment for the Bachelor of Dental Surgery

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SUPERVISOR CERTIFICATION

I certify that this project entitled "**Adjunctive cosmetics therapy For orthodontic patients"** was prepared by the undergraduate student Wed Sameer Eisa under my supervision at the College of Dentistry / University of Baghdad as a partial fulfilment of the graduation requirements for Bachelor degree in dentistry.

Supervisor's Name : Dr. Noor Falah Kadhim Al-Khawaja

Date :

Dedication

To the reason of my success, I'm immensely grateful to Allah

To my family especially my mom, RIdhab , Safa and my baby Tota

To my friends Noorhan, Nadia , Nagham, Tiba and Mena

To my supportive supervisor Dr. Noor Falah Kadhim Al-Khawaja

And to every person who stood beside me and made me

stronger to reach this place

Wed..

Acknowledgment

Thank to allah, the most giving and the most forgiving for everything given to me and for blessing me.

I would like to thank professor Dr. Raghad Alhashimi, Dean of College of Dentistry for his great facilitation all the way through the study .

Finally , I would like to thank and express my deep gratitude to my supervisor for all the time she was by my side and every moment she gave me. I am very grateful for having a supervisor like her.

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Abbreviation	Meaning
DSD	Digital smile design
BoNT	Botulinum neurotoxins
BT	Botulinum toxins
BTA	Botulinum toxins type A
BTB	Botulinum toxins type B
ACh	Acetylcholine
Fig	Figure
U	Unit

Introduction:

The ultimate goal of any cosmetic dentist is restoring a healthy and maintainable aesthetic functional interface from a damaged dentition. To achieve this goal, a multi-speciality management plan is required to achieve the periodontal, orthodontic, maxillofacial and cosmetic requirements for a healthy, stable dentition that has a favorable long-term prognosis. The procedure of the adjunctive orthodontic therapy aspire for the dentition to have a proper occlusal scheme with properly aligned and positioned teeth prior to prosthetic therapy **(Silverstein *et al*., 2001)**.

The most important motivation for patients to seek orthodontic treatment is an improvement in their dental and facial appearance. Standards of facial esthetics and patient expectations are equally difficult to elucidate. It is important for the orthodontist to determine a patient‘s desired outcome so that an acceptable treatment result can be delivered **(Burden, 1995**).

Lips and the perioral area are of outstanding importance in youthful appearance, attractiveness, and beauty. The soft tissue varies according to the gender and age, the men depended on musculine aspects of beauty for enhanced features, on other hand the female tend to have finer and delicate features, age change include decrease of vascular supply, decrease in collagen content that will lead to sagging, volume loss, at the end, it will lead to alternation of facial features due to aging **(Donath *et al*, 2007)**.

Correction of skeletal or dental deformities alone may not achieve appreciable results unless a focus is made on the correction of soft tissue deformities during the treatment planning. Because the patient seeking correction of dental or dentofacial deformities also present with concomitant soft tissue deformities like decreased lip length, increased or decreased lip thickness, inadequate vermillion show etc. Soft tissue deformities that exist with the skeletal or dental deformities may be self-corrected by Orthognathic

surgery/Orthodontics or combination of both. But in many situations adjuvant procedures to the perioral structures may need to be performed to get the optimal overall results. This can be accomplished by dermal fillers or Botulinum Toxin injections **(kahn and shaw, 2010)**.

Aim of study :

Reviewing a different method can be used to compensate for variation of tooth size and tooth shape and to enhance soft tissue insufficiency following orthodontic tissue / orthographic surgery to improve patient esthetic and satisfaction .

Chapter 1 : Review of literature

1.1 Orthodontic-restorative interference

This method used to compensate the discrepancy between tooth size and shape via orthodontic and restorative dentist, both specialities are involved in assessment and treatment plan, and to optimize the esthetic and function **(Lewis *et al*., 2010)**.

In some cases like patient with worn or abraded tooth, fractured teeth , multiple edentulous space, peg - shaped lateral incisor or ortho restorative need may require tooth positioning that is slightly different from non-restored, non-abraded, completely dentulous aldoscent **(Semin and Kokich, 1997)**.

In such a case with spacing of anterior teeth following orthodontic treatment must have to manage the patient properly, multiple factor must give attention to them, such as tooth position and tooth proportion and gingival architecture, to optimize the esthetic and function results after orthodontic treatment. The patient seek orthodontic for function and esthetic to improve and make their smile better. Its aim to establish and optimal occlusal relationship between the upper and lower arch while maintaining the the esthetic, so the orthodontics must depend on restorative procedure to make an excellent result **(Senty, 1976)**.

The orthodontist must decide whether to close the space completely or preserve the open space for the prosthetic restoration to be placed at the end of treatment, and the decision is depended on type of occlusion, the width and shape of the existing incisor and canine and the amount of space available **(Chaushu *et al*., 2001)**.

1.1.1 Tooth shape and position :

The first thing that catches our attention when we look at the face when smile is the central incisor, the central incisors must be match each other with symmetry in shape, size and position, unworn incisor had trapezoidal form with

average 78 percent length to ration, when tooth is wear the ratio increase to 87 percent and will vary with individuals. Lateral incisor usually smaller than central incisor, the length of lateral incisor can be slight different with one another but show a slight mesial tip, the mean width of lateral incisor is approximately 78 percent than the mean width of central incisor, the length of canine has a great mesial tip than the lateral incisor also the canine play an important role in occlusion and it contact the width of the arch, the actual width of canine is on average 7 to 8 mm, when visualized from the front only the mesial aspect is visible and it make the canine slightly narrower than the lateral incisor, the incisor must be made with Trapezoidal shaped with a greater length than width and Gradual increase in the mesial tip from the central incisors to the canines, smaller lateral incisors and canines with an approximately 78 percent decrease width from a facial perspective **(Magne *et al*., 2003)**.

1.1.2 Smile line

Its line should be parallel to the curvature of the lower lip and its joining the incisal edge of central incisor and canine, when the patient become older, the general curvature gradually become wearing, then the smile line become flatter, when the curvature is reversed when compared with lip line, it become unattractive, the aim is for position smile line curvature adapted to the lip line **(Sarver, 2001; Tjan and Miller, 1984)**.

1.1.3 Midline

It's a line site between the two upper and lower central incisor and must be align with the middle if the face " coincide with face line " If these not happened, this case will called (deviated midline), there are many case such as missing of permanent teeth and severe crowding, the orthodontic and people establish that the subject in photos to be less pleasant and when a deviated midline got larger result in more unpleasant appearance and attractiveness score has been decreased, the ley people recorded less pleasant and less favorable

attractiveness score when there was 2mm imbalance between dental and facial midline was 56% **(Johnston *et al.*, 1999)**.

1.1.3.1- Management of median diastema

First, we must use Bolton analysis to evaluate whether there will be adequate coordination of upper and lower tooth size after build up, we must give attention to close the diastema while maintaining the adequate tooth proportion and vertical midline **(Bennett and McLaughlin, 1997)**.

1.1.3.2 Management of spacing in the lateral incisor region (Missing or peg shaped lateral incisor):

A peg shaped mean a defect or anomaly in coronal portion, the width had been reduced with proximal surface converging markedly towards the incisal region. In past, the beg lateral is extracted when decided to treatment the crowding dentition by orthodontic treatment, but now we used a restorative material that is conservative and remove minimum amount of tooth structure such as porcelain veneer or crown **(Counihan, 2000)**.

In the case of presence of one or more narrow lateral incisors, if only a small amount of space needs to be build-up, the peg shaped lateral incisor must be placed nearer to the central incisor, distal surfaces are more convex and the mesial surface must be flat, if the size of the lateral incisor is closer to the optimal dimension of the space, the orthodontist should consider interproximal reduction of the mandibular incisors to balance the anterior tooth size discrepancy, if there too much tooth size discrepancy resin bonded build-ups should be considered **(Kokich and Spear, 1997)**.

1.3 Application of porcelain veneer following orthodontic treatment

Nowadays, the whole community become use porcelain veneer, in order to compensate the esthetic problem that cannot accomplish by orthodontic treatment, if diastema reopen after we closed by orthodontic, we can used

porcelain veneer to remedy the problem, we can use it when we have small lateral incisor and cause dissimilarity in tooth size between the upper and lower arch, its used to coordinate tooth size and stabilize the occlusion, it's usually applied to malocclusion like a diastema, it can easily reopen because it impossible to apply over correction, other example is lateral open bite, to remedy this problem we must use retainer for a long period of time more than the usual, we can also used fixed splint to stabilize the occlusion, porcelain veneer usually applied to rotated teeth, class II and classIII molar relationships, open or deep bite **(Miyajima *et al.*, 1993)**.

Fig.1: The brackets were bonded as considered the teeth movements (Moon *et al.*, 2010).

Fig.2: Frontal view of definitive porcelain laminate veneers (Moon *et al.*, 2010).

1.4 A Communication Guide for Orthodontic-Restorative Collaborations

Whenever orthodontic-restorative treatments are performed, it is essential to comprehensively assess the case, establish treatment objectives, and

plan the sequence, communication and progress follow-up are critical when seeking ideal outcome. One additional challenge in the orthodontic-restorative collaborative case management is the ability to evaluate case readiness for the completion of the orthodontic phase. In the final steps of the orthodontic treatment, the orthodontist will refer the patient for a restorative esthetic evaluation and verification before removing the orthodontic appliances. At this point, the restoring dentist will often be asked to determine if the position of the teeth is appropriate for completion **(Whiteman, 2020)**.

1.6 Purpose of digital smile design tool in orthodontic-restorative communication

A fundamental objective of an aesthetic treatment is the patient's satisfaction and that the outcome of the treatment should meet the patient's expectation of enhancing his/her facial aesthetics and smile. Ideally, the restorative dentist should have an opportunity to conduct his or her own assessment before placement of orthodontic appliances. The beauty of applying facially driven smile design fundamentals with basic digital smile design tools (DSD) is that they can be used in case planning before or even during orthodontic appliance therapy, and therefore minimize much of the aforementioned concerns. This tool can help dentists and patients visualize possible outcome, communicate goals, and evaluate progress and ultimate readiness related to the esthetic outcome in orthodontic-restorative cases Purpose of digital smile design tool in orthodontic-restorative communication **(Zeba *et al.*, 2020)**.

1.7 Restorative complications of orthodontic treatment

The orthodontic have adverse results include failure to achieve their “perfect smile”, relapse, resorption, recession or caries. Patients need to be made aware about this adverse result **(Alani and Kelleher, 2016)**.

These complications may be due to biofilm-related (plaque-induced diseases) or by the exacerbation of various physiologic phenomena and/or issues related to attempting long-term retention of the teeth in their new more desirable, but not necessarily stable, positions **(Farrell and Brazier, 2015**)

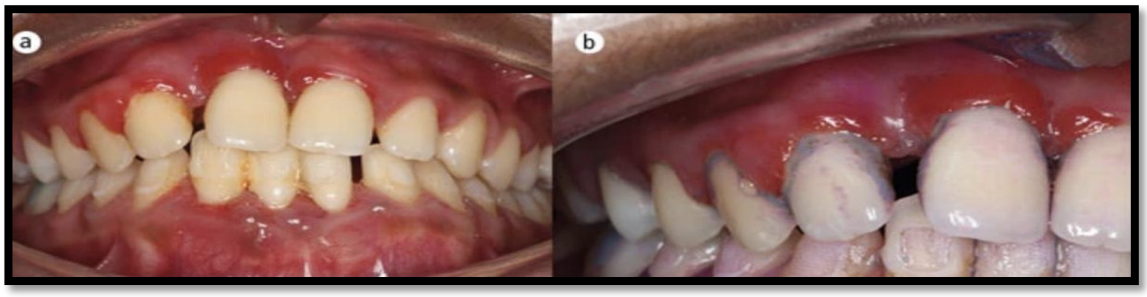

Fig.3: (a) This patient attended secondary care complaining that her teeth had moved and were loose on completion of orthodontics one year previously; (b) The patient was disclosed to reveal masses of plaque accumulation and residual cement from previous brackets (Alani and Kelleher, 2016).

1.7.1 Potential problems:

1.7.1.1 Enamel demineralization

Orthodontic brackets and associated attachments increase plaque retention **(Cardoso *et al.*, 2015)**, orthodontic brackets and banding are plaque retentive in the same manner as difficult-to-clean, plaque accumulation has been reported as being up to three times higher with fixed orthodontic appliances than without them, there has been a documented decrease in salivary pH and an increased level of Streptococcus mutans and Lactobacillus acidophilus noted in orthodontic patients the enamel demineralization in early caries – often given the more euphemistically named 'white spot lesions', these findings confirmed earlier cross sectional study findings that showed that 50% of patients had demineralization after orthodontic debond which was twice as great as the control group **(Klukowska *et al.*, 2011)**.

Fig.4: This patient presented to a general dental practitioner after debond, due to the plaque retention associated with the orthodontic brackets and poor oral hygiene caries was diagnosed on the majority of upper anterior teeth. Unfortunately this was so severe that the upper left lateral incisor spontaneously decoronated and the upper right lateral incisor developed pulpal necrosis (Alani and kelleher, 2016).

In a more recent study by Akin and colleagues, the prevalence of demineralization was 20% before orthodontic treatment, but, rather worryingly, this increased to over 50% on completion of orthodontic treatment. Bracket type, age and dental hygiene care were significantly associated with demineralization during orthodontic treatment **(Akin *et al.*, 2015)**. Boersma and colleagues showed that demineralization had a positive correlation with caries prevalence and with bleeding on probing **(Boersma *et al*, 2005)**.

1.7.2 Periodontal implications

The provision of fixed appliance therapy in healthy and well cared for mouths can result in gingival inflammation **(Boyd *et al.*, 1989)**, this inflammation does not necessarily lead to frank periodontal attachment loss, but it can give the impression of false pocketing especially in the vicinity of orthodontics bands and brackets **(Atack *et al.*, 1996)**, placement of fixed braces can cause the subgingival biofilm to develop into a more perio-pathogenic flora that makes the progression from gingivitis to periodontitis more likely **(Paolantonio *et al.*,1999; van Gastel *et al.*, 2008; Ristic *et al.*, 2007; Naranjo *et al.* ,2006)**.

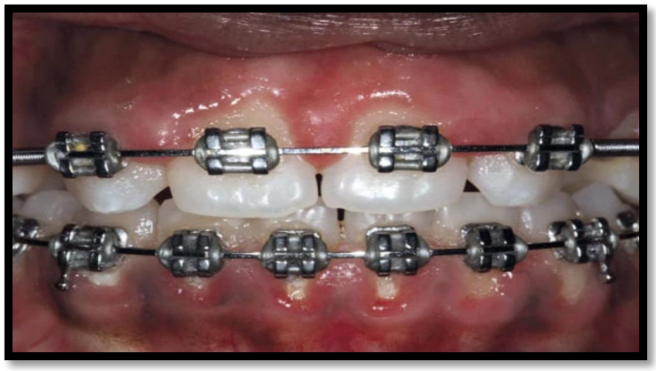

Fig.5: This patient underwent a comprehensive course of orthodontics. Her attempts at maintaining a low level of plaque she developed gingival inflammation resulting in overgrowth in the vicinity of the brackets (Alani and Kelleher, 2016).

When optimal hygiene levels are maintained in non-susceptible patients, gingival inflammation or frank attachment loss can be prevented **(van Gastel *et al.*, 2008; Naranjo *et al.*, 2006; Ristic *et al.*, 2007)**. when inflammation is ongoing with modification of the associated risk factors, periodontal tissue loss is still likely to occur, thereby leading to periodontal pocketing and possible attachment loss **(Artun and Urbye, 1988; Wennström *et al.*, 1993)**.

Fig.6: (a) This patient presented complaining of spaces between their teeth and progressive movement of his upper anterior. A diagnosis of generalized moderate to severe periodontitis was made and the patient was encouraged to have periodontal treatment as opposed to orthodontic treatment, which they had requested; (b) Six years later the patient was re-referred for chronic mobility of teeth and periodontal abscesses. Despite attempts by the referring practitioner, closure of the space between the 13 and 12 had not been achieved. There was a marked increase in probing depths and delayed bleeding (Alani and Kelleher, 2016).

Teeth with orthodontic bands seem to be at a greater risk of periodontal problems than those with bonded brackets **(Gkantidis *et al.*, 2010)**, after placing a band, pockets depths can increase by approximately 0.5 mm and this

may be attributed to either frank attachment loss, or false pocketing due to gingival inflammation **(Al Shayeb *et al.*, 2014)**.

1.7.3 Alveolar bone damage

The majority of patients who undergo orthodontic treatment will experience loss of up to 1 mm of alveolar bone height **(Harris and Baker, 1990)**, if some patients lose 1 mm loss of alveolar bone height but also develop more virulent changes in their periodontal flora and/or get some apical root resorption then the multiple effects of orthodontics will be compounded **(Nelson and Artun, 1997)**.

1.7.4 Complications associated with gingival changes

Localized gingival recession is a recognized complication of orthodontic treatment **(Kamak *et al.*, 2015)**. Risk factors associated with increased chance of recession during orthodontics include the presence of a thin biotype, previous recession and proclination of teeth when associated with plaque induced gingival inflammation **(Johal, 2013)**. Movement of teeth outwith the 'alveolar envelope' may result in increased incidence of recession **(Wennström *et al.*, 1987)**.

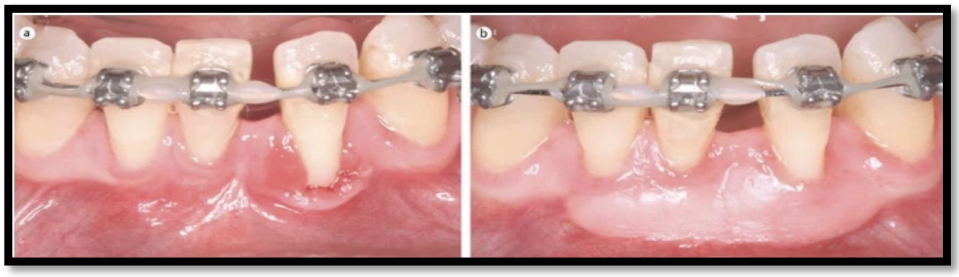

Fig.7: (a) This patient developed labial recession on the lower left lateral incisor during orthodontic treatment; (b) This was treated with a connective tissue graft which was maintained during the completion of orthodontics (Alani and Kelleher, 2016).

Adolescent patients undergoing orthodontic treatment are over four-times more likely to develop labial recession than their non-orthodontic counterparts **(Renkema *et al.*, 2013)**.

Treatment of recession defects is varies among clinicians in different countries with different dental cultures. In the majority of cases customising hygiene measures to accommodate for the recession defect may suffice. Hypersensitivity can usually be managed with desensitising toothpaste containing 5% potassium nitrate and no n-lauryl sulphate held for a number of weeks in a clear, carefully contoured, thermoplastic retainer which does not damage the vulnerable thin periodontal tissues. It is only when patients are scrupulous with their hygiene, compliant with instructions and still really keen on correcting the gingival margin discrepancy that treatment with periodontal plastic surgery procedures should be considered. In a systematic review by Chambrone root coverage procedures resulted in significant reduction in recession depth and clinical attachment gain **(Tatakis *et al.*, 2015)**.

1.7.5 Pulp health, endodontics and orthodontic movement

The orthodontic tooth movement can cause some degenerative inflammatory reaction of the dental pulp of teeth with mature root apices and the consequences are related to the magnitude, direction and duration of these forces **(Hamersky *et al.*, 1980)**.

Fig.8:This canine presented with tenderness to percussion and progressive discolouration towards the end of orthodontic treatment, root canal treatment required removal of the direct retainer and a temporary retainer (Alani and Kelleher, 2016).

1.7.6 Root resorption

Some apical root resorption is almost unavoidable in the provision of orthodontics **(Ellis and Benson, 2002)**, this might seem to be insignificant due to the benefits to the patient of improvements in the positions of the crowns of the teeth. Nonetheless, some caution is advised, particularly when considering the possible repercussions of treatment with pre-existing short teeth or where orthodontics is being done again, the factors influencing root resorption include those associated with biological ageing of the pulp as well as the magnitude and duration of the forces being applied to the teeth. It appears that where teeth are intruded, or the apex is moved labially, or palatally, that the incidence of apical root resorption increases. A longer treatment period seems to be associated with increased amounts of resorption **(Snelgrove, 1995; Baumrind *et al*., 1996)**.

Maxillary anterior teeth seem to be at a greater risk than other teeth with the maxillary lateral incisor being at the greatest risk **(Linge and Linge, 1991)**. Root apices that are pipette shaped or curved have also been shown to be susceptible, basic orthodontic principles suggest that light and intermittent forces are less likely to result in resorption **(Sameshima and Sinclair, 2001)**.

1.8 Gingival architecture:

The gingiva has a pink stippled appearance and had a symmetrical sinus architecture in healthy gingiva, the orthodontist should reposition in their optimal position, the gingiva hight of contour of central incisor and canine stands at distofacial angle, on other hand the gingiva hight of contour of the lateral incisor is centered mesiodistally **(Levine and McGuire, 1997)**.

1.8.1 Gummy Smile:

Excessive gingival display, or a “gummy smile”, is defined as 2 mm or more of gingival exposure upon smiling. Such excessive gingival exposure can be aesthetically unappealing to patients. One factor that contributes to a gummy smile is hyperfunctional lip elevator muscles **(Suber *et al*., 2014)**.

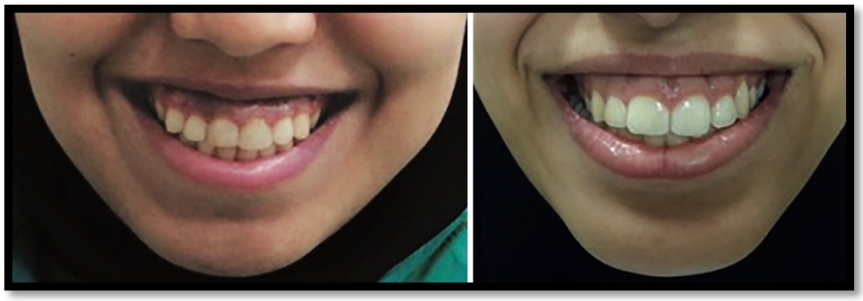

Fig.9: (A) and (B) Clinical preoperative frontal smile view photographs showing excessive gingival display (Smile, 2014).

1.8.1.1 Etiology of gummy smile :

The main etiological factors related to gummy smile involve gingival (altered passive eruption), skeletal (vertical maxillary excess) and muscle (upper lip hyperfunction) characteristic **(Tjan and Miller, 1984)**, altered passive eruption occurs when the periodontal complex does not migrate apically in the direction of the cementoenamel junction, covering part of the clinical crown, resulting in short teeth **(Jananni *et al.*, 2014)**. This covering may have aesthetic complications, especially in patients with a high smile line. The prevalence of gummy smile is 10% among the population aged between 20 and 30 years, and is more common among women than men **(Tjan and Miller, 1984)**.

1.8.1.2 Treatments for Gummy Smiles:

A-Gum Lift (also known as Gingivectomy or Crown Lengthening):

Essentially a gingivectomy means the removal of gum tissue. Hence the name, “gingiva” which means gum and “ectomy” which means to remove. When the amount of gum tissue is more severe, it may accomplished by a procedure called crown lengthening. Crown lengthening is similar to a gingivectomy, but involves the sculpting of the area around the tooth to achieve proper results, which means adjusting the gum and the bone around the teeth to the proper level. Healing for a gum lift is generally around 1-3 days of mild swelling and tenderness, The full results are generally observed in about 1 week after the procedure for a gummy smile reduction by a gingivectomy. For more

complex gummy smile reduction with crown lengthening the final results may be observed in 4-6 weeks **(Bynum, 2016)**.

Fig.10: This patient had and asymmetric gumline that was too conspicuous, her teeth appeared short, misaligned, and timid (Smile, 2014).

Fig.11: After a gum lift and the placement of porcelain veneers, the gums appeared healthier and more balanced within the aesthetic zone of the new smile, appearing more youthful and confident (Smile, 2014).

B- lip repositioning surgery :

It's done by removing a section of connective tissue from the underside of your upper lip. This will prevent the elevator muscles located in the area of your lip and nose from lifting your upper lip too high above your teeth. The surgery is performed under local anesthesia so you won't feel pain. Once your mouth is numb, the periodontist will make two incisions on the underside of your upper lip and remove a section of connective tissue from the area. After the connective tissue is removed, the periodontist will stitch up the incisions. The procedure lasts from 45 minutes to 1 hour. After the procedure, your periodontist may

prescribe antibiotics and pain medication for you. Recovery typically takes about a week **(Mahn, 2017**).

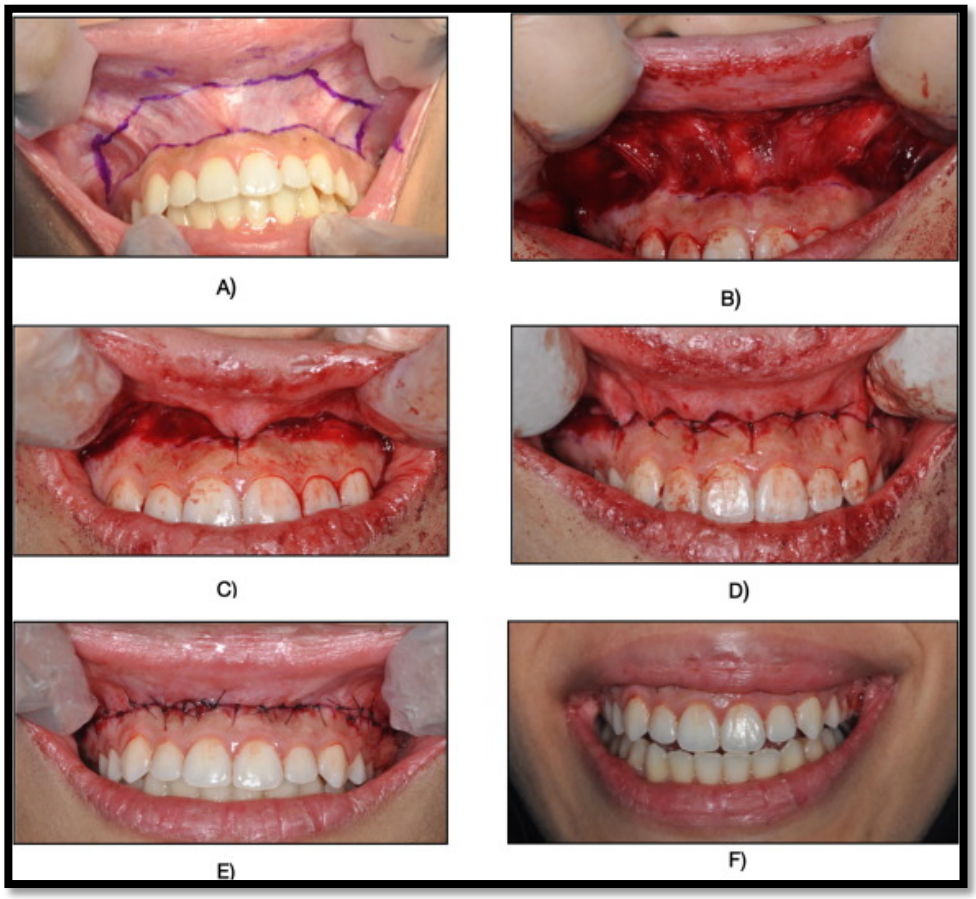

Fig.12:Surgical steps. (A) Incision area outlined according to the rule "Twice Gingival Display" (B) Incision area after superficial incision is finished (C) Midline anchoring suture (D) Remaining anchoring sutures opposite to papillae (E) Both anchoring and stabilizing sutures (F) Immediate post – operative picture (Foudah, 2019).

C-Orthognathic surgery:

When the cause of the gummy smile is an excessively long upper jaw, it is possible to perform an operation known as orthognathic surgery. This procedure is performed under general anesthesia, in which the specialist surgeon places the bones of the face in a suitable position, moving the jawbone upwards to shorten the gum **(https://www.kin.es/en/gummy-smile/)**.

Fig.13: Treating gummy smile by orthognathic surgery (https://medizzy.com/feed/24562855).

1.8.1.2.1 Treating Gummy Smile with botulinum toxin:

Of these various treatment approaches of gummy smile, BoNT injection is a relatively simple, noninvasive, less adverse-effective, and reversible treatment approach, drawing a lot of attention. BoNT is a natural protein produced by the anaerobic bacterium Clostridium botulinum, which inhibits the release of acetylcholine, a neurotransmitter responsible for the activation of muscle contraction and gland secretion. It blocks the muscle contraction of the application site, weakening the muscle tone **(Rao et al., 2011)**. BT is a protein and neurotoxin Botulinum is one of the most lethal toxin known and has found applications bioterrorism as well **(Arnon *et al*, 2001)**.

Botulinum is the first toxin to be accepted for therapeutic uses. Since the first therapeutic use by Scott for strabismus **(scott, 1980)**. Till today, the spectrum of therapeutic applications has widened. Botox can be differentiated into seven types from A to G and the seven serotype, A, B, C, E, F and G differ in their potency, duration of action, and cellular target sites commercially available variant is purified exotoxin and only BT type A (BTA) And BT type B (BTB) are marked by various brand names **(Dolly, 2003)**.

Fig.14:Extraoral photographs of the smile of a patient before and after the application of the botulinum toxin (Dutra *et al.,* 2020).

1.8.1.2.1.1 Botulism:

Botulism is life threatening disease first described by Kerner **(Kerner, 1817)**. It is caused by Botulinum toxin (BT) also known as botulinum neurotoxin produced under anaerobic conditions synthesized by the anaerobic Gram-positive Clostridium Botulinum bacterium, and inhibit the release of acetylcholine (ACh) at the neuromuscular junction, impeding the muscle contraction **(Polo, 2005)**.

1.8.1.2.1.2 Applications:

BT find varied applications in head and neck region **(Persaud *et al,* 2013)**.

1. Adjunct to orthodontic treatment and prevent relapse: In some cases, relapse following an orthodontic correction may occur in patients with strong muscles activity such as that of mentalis muscle. BT can be used during treatment to reduce the intensity of muscle contractions and muscles can be slowly and gradually trained posttreatment to a more physiologic movement **(Polo, 2008; Nayyar *et al*, 2014)**.

2. Temporalis and masseter muscle hypertrophy: The hypertrophy of temporalis and masseter muscles is generally associated with clenching or other parafunctional use of the jaws. The results of BT use in cases with masseter and temporalis muscle hypertrophy are very encouraging and appear to be safe and effective in treating chronic facial pain associated with masticatory hyperactivity **(Niamtu, 2003; Ihde and Konstantinovic, 2007)**.

Injection sites identified by palpation during clenching receive and the BT injected percutaneously in the thickest part of the muscle **(Jaspers *et al*, 2011) (Fig.7)**.

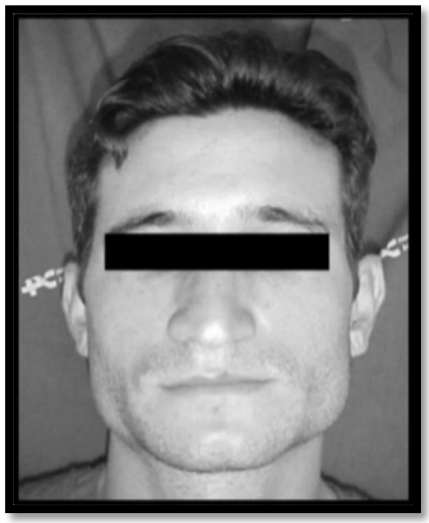

Fig.15: The patient with bilateral masseter muscle hypertrophy injected with BT (Maxwell and Weggoner, 1951).

3. Dentofacial esthetics and gummy smile:

Recently, BT and fillers have been used to provide immediate volume to black triangles formed due to loss or inadequate interpapillary tissue **(Amin *et al*, 2014)**. Dermal fillers along with BT act as volumizers injected into the interdental papilla to offer a minimaly invasive treatment option as compared to the conventional therapies which include aggressive gingivectomy or orthognathic treatment approaches **(Polo,2008; Hwang *et al*, 2009)**. The use of BT is particularly effective in managing cases of excessive gingival display due to excessive contraction of upper lip muscles; primarily levator labii superioris alaque nosi **(Miskinyar, 1983; Polo, 2008)**.

4. Drooping of corners of mouth:

Hyperactivity of depressor anguli oris can lead to drooping of the corner of the mouth. Injection of BT has shown to have positive results in such cases.

The site of injection is on trajectory of nasolabial fold to the jaw line. Bilateral injections in doses of about 2-5U is the norm **(Choi *et al*, 2014)**(Fig.16).

Fig.16: the patient with drooping of corner of the mouth before and after treated with BT (Choi *et al.*, 2014).

1.8.1.2.2 Dermal fillers

Dermal fillers are substances which can be injected beneath the skin, that helps restore the lost volume. They are gel like in consistency. Patients seeking orthodontic therapy often also present with adjuvant soft tissue deformities. The soft tissue deformity caused by an underlying skeletal or dental deformity will be self-corrected by orthognathic and/or orthodontic treatment. The inherent soft tissue deformities like decreased lip length, increased or decreased lip thickness, inadequate vermillion show, can be addressed by injecting dermal fillers. Botulinum Toxin A and cosmetic surgical soft tissue procedures **(Chate, 2013)**.

1.8.1.2.2.1 Types of dermal fillers that used in orthodontic :

1. Biodegradable fillers

These fillers are temporary fillers which degrade with time. There have been several attempts to treat them with various chemicals to enhance their life. Biodegradable fillers are the right choice for starting off in a patient who has never been exposed to fillers, they provide an opportunity to study the host reaction to fillers **(Derek, 2014)**.

2. Non-biodegradable fillers

These fillers include polyacrylamide fillers, silicone and other synthetic materials. An ideal filler should be non-allergenic, should not degrade in the tissue releasing carcinogens and other potential harmful chemicals, should have low immunogenicity, be easily retrievable in case it has to be retrieved and should have the approval of an authorizing agency to validate it for human use **(Leslie, 2014)**.

1.9 Thread Lifting :

In some cases of orthodontic treatment such as patients with double chin after class 3 orthodontic treatment. We need to correct the fold of skin between the face and neck by thread lifting, which is a cosmetic procedure that lift and realigns sagging tissue, while adding definition to facial contours by using threads that are manufactured from same materials used in surgery to close wounds. When placed under the skin, they can be used to tighten the tissue and add volume to the area of application. Even though there are many thread lift techniques used in clinical practice, there has not been a comprehensive literature review about thread lift technique. Therefore, thread lift techniques for facial rejuvenation, focusing on the type of thread, patient selectior id how to choose the appropriate technique for the selected patient were reviewed (**Boland *et al*, 2005)**.

Chapter two : discussion

Society becomes more esthetically conscious, orthodontists are more challenged to produce not only outstanding occlusions but also outstanding esthetics. Every minute, detail is becoming more important in separating the good from the great orthodontist. Because the soft tissue manipulation is very important to smile attractiveness, thus enhance patient's own satisfaction with their smile. Correction of the hard tissues can alter the way the adjacent soft tissues look and feel but it may not be sufficient alone to give the perfect desired change. So, many times it has to be accompanied by procedures done on the soft tissues to enhance the final outcome such as dermal fillers, botulinum toxin and thread lift. The basic knowledge of the soft tissue surrounding the perioral structures is essential for a successful outcome **(Donofrio, 2000)**.

The facial aesthetic harmony is formed by union of three components: teeth, gingiva and lips, and with the aid of adjunctive therapy like fillers the esthetic will become achieved easily and rapidly compared with more sophisticated procedures such as gingivectomy. Because the patient seeking correction of dental or dentofacial deformities also present with concomitant soft tissue deformities like decreased lip length, increased or decreased lip thickness, inadequate vermillion show etc. In such cases when the problems not excessive contraction in lip muscles the most appropriate technique is biodegradable dermal filler (hyaluronic acid) with cross hatching technique to compensate deficiency in lip length and thickness because the filler can give a volume and contour with immediately beneficial effect for 3-4months **(Lesile, 2014)**.

The use of BT is particularly effective in managing cases of excessive gingival display due to excessive contraction of upper lip muscles; primarily levator labii superioris alaque nosi and drooping the corner of the mouth due to hyperactivity of depresser anguli oris muscle and not give a volume. In addition to many condition can have great benefit from these therapies like temporomandibular joint disorders, bruxism, mandibular spasm, oromandibular dystonia, pathologic clenching, dental implant and surgery and masseteric hypertrophy can be treated with BT easily compared with more sophisticated procedure such as surgical procedures. Benifical effect apparent of BT in 7-10days for 3-6months **(Polo, 2008)**.

Thread lift more effective and sophisticated technique can be used in cases of patients with double chin after class 3 retrognathic surgery, lax neck skin and slightly unclear mandibular margin. We need to correct the fold of skin between the face and neck by thread lifting, which is a cosmetic procedure that lift and realigns sagging tissue, while adding definition to facial contours by using threads that are manufactured from the same materials used in surgery to close wounds. When placed under the skin, they can be used to tighten the tissue and add volume to the area of application. Beneficial effect appearnt of thread lift in 10-14days for 1-3years **(Bartholomew, 1981)**.

Chapter three: conclusions and suggestions

Conclusions

1. The ultimate goal in adjunctive cosmetic therapy is a comprehensive plan to provide the most viable options to the patient and have a treatment plan individualized for the patients. Any experienced dentist vouches that many times just orthodontic treatment not enough to achieve the best results but should be willing to incorporate adjuvant procedure to achieve the best results.

2. The present treatise has outlined the major advances in the development and utilization of filler in the dental clinic. Although fillers have great benefit for many cases and play an ever-expanding role within this dental clinic. Many people still apprehensive about the fillers because of complications, wrong injection technique and economic results.

3. BT from deadly poison to a remarkably resourceful therapeutic agent. Relatively safe, non-invasive and recovery period is low. Several disorders in orthodontics also being treated with the help of BT. many people are still apprehensive about BT because they feel that when a BT goes wrong, it can give expressionless face. But these risks can be easily avoided if the procedure is done by an experienced dentist.

4. Thread lift is a safe procedure performed on cohorts of patients requiring a facial lifting after orthodontic treatment. But have a measurable risk of adverse events and patient discomfort. Positive results depend on the process of patient selection, as well as selection of the most appropriate technique for the patient.

Suggestions

To obtain the best results and enhance the satisfaction of the patients, the orthodontists should be use an adjunctive cosmetic therapy in cases that really required this type of treatment in their clinic, hopefully, a progress in the materials, techniques and researches on this field to get benefits for both patients and specialist with least adverse effects.

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