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Integration of Aesthetic Medicine into Modern Dental Practice

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Abstract

Introduction:
Modern aesthetic dentistry increasingly integrates techniques from aesthetic medicine to improve the appearance and function of the oral cavity. Growing patient expectations concerning not only health but also the aesthetics of teeth and perioral tissues have led to the development of interdisciplinary treatment methods.

Materials and Methods:
This article reviews current techniques used in aesthetic medicine, such as botulinum toxin, tissue fillers, and mesotherapy, and their adaptation in dental practice. The use of platelet-rich plasma (PRP) for aesthetic treatment of the face and perioral structures is also discussed.

Results and Discussion:
Aesthetic dentistry now includes procedures that enhance both teeth and facial soft tissue aesthetics. Botulinum toxin is used to treat gummy smile, bruxism, and muscular asymmetry. Dermal fillers help in contouring facial structures and enhancing lip volume. Mesotherapy and PRP support tissue regeneration and skin quality, also aiding healing after dental procedures.

Conclusions:
Integrating selected aesthetic medicine techniques into dentistry significantly expands therapeutic possibilities, improving both facial function and appearance. This requires appropriate training and adherence to safety standards. Introducing aesthetic procedures into dental offices meets rising patient demands and holistic health and beauty trends.

Keywords:
aesthetic dentistry, aesthetic medicine, botulinum toxin, fillers, mesotherapy, platelet-rich plasma

Introduction

Aesthetic medicine has become a widespread discipline used by a significant portion of society. It is a multidisciplinary field that combines elements of sciences such as cosmetology, dietetics, surgery and dermatology [1]. Recently, dentistry has also become involved in aesthetic medicine [2]. Its primary goal is to slow down aging processes, especially those visible in the face; however, some procedures can now be used in the oral cavity as well. Preparations such as fibrin, platelet-rich plasma (PRP), botulinum toxin, or hyaluronic acid are just a few of the compounds used in this field [1, 3].

Botulinum toxin, commonly used for reducing mimic wrinkles, has found applications in the treatment of bruxism by temporarily and dose-dependently weakening muscle activity, thereby reducing chronic pain caused by masseter overactivity [2, 4]. The use of botulinum toxin is also effective in treating gummy smiles [4].

Platelet-rich plasma is used in various dental procedures, such as tooth extractions, periapical surgeries, pulp regeneration, and bone defect treatments, as well as during implant placement. Its effectiveness stems from the presence of growth factors responsible for tissue healing and regeneration [2, 3, 5]. Hyaluronic acid (HA), a key component of soft tissues like gingiva and periodontal ligaments, and hard tissues like alveolar bone and cementum, plays a regulatory role in inflammatory responses and tissue healing [6, 7]. Additionally, HA is used to improve facial contours, increase lip volume, smooth out wrinkles as a supplementary procedure after orthodontic or surgical treatment, and eliminate gingival black triangles [7, 8].

Platelet-Rich Plasma (PRP)

PRP, obtained by centrifuging a patient's blood, has become a valuable addition to wound healing, playing an important role in tissue repair mechanisms [9]. In addition to platelets, PRP contains inflammatory cells and numerous proteins, such as platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), and adhesive molecules (fibrin, fibronectin, vitronectin) [7]. These growth factors are responsible for cell recruitment, proliferation, and angiogenesis, contributing to the regeneration and healing of both soft and hard tissues [7, 10].

Beyond effective control of angiogenesis and proliferation, another important platelet feature is their bacteriostatic effect. This has been observed against bacteria such as

Staphylococcus aureus and Escherichia coli, Porphyromonas gingivalis and Actinobacillus actinomycetemcomitans [10].

Recent efforts aim to use PRP in many dental procedures. Studies have shown that using PRP after tooth extraction enhances tissue healing, reduces complications such as dry socket, and alleviates postoperative pain compared to patients not treated with PRP [9]. Other studies have demonstrated the beneficial effects of PRP in treating gingival recession and bone grafting with a reduced rate of resorption [9, 10]. In patients with thin gingival phenotypes, the use of PRP alone or in combination with microneedling may increase gingival thickness. Increased gingival thickness may reduce the likelihood of recession recurrence [11].

In regenerative endodontics, PRP is used in treating immature permanent teeth with periapical lesions. These teeth showed further root development and apical closure [10]. Research by T.M. Beltagy et al. demonstrated that when PRP was applied to inflamed exposed pulp, normal soft tissue organization was restored without signs of pulp inflammation and with reduced hyperemia. PRP provided better histological results than commonly used formocresol. After three months, the pulp tissue architecture was normal, with no inflammation, only minor hyperemia, and intact odontoblasts [11].

Positive results were also reported by Poeschl et al. when PRP was used with graft materials in sinus augmentation procedures [9].

Another autologous platelet concentrate is platelet-rich fibrin (PRF) - an autologous fibrin matrix composed of cytokines, leukocytes, stem cells, platelets and a tetramolecular structure that supports vascularization and serves as a transport scaffold for cells essential in soft and hard tissue regeneration [12]. PRF is clinically similar to PRP but has advantages such as easier handling, lower costs, and no need for anticoagulants or bovine thrombin, minimizing biochemical changes and associated risks [13]. PRF is used in regenerative procedures, including implant osseointegration and periodontitis treatment [12, 13]. It also exhibits bactericidal activity against Porphyromonas gingivalis [13]. PRF thickens thin gingival phenotypes, reduces dental plaque, gingivitis, attachment loss, and dry socket risk [13, 14]. Combining PRF with free gingival grafts showed better root coverage in gingival recession treatment compared to grafts alone [13]. PRF also accelerates bone remodeling and tooth movement, which is especially relevant in orthodontics [13].

In conclusion, the ability of PRP and PRF to stimulate tissue regeneration, reduce inflammation and promote healing makes them valuable adjuncts in dentistry. They hold significant potential for further research and clinical application [12, 13, 14].

Hyaluronic Acid (HA)

Hyaluronic acid is a glycosaminoglycan found in the extracellular matrix of connective tissues, synovial fluid, embryonic mesenchyme, vitreous body, skin and many organs [6]. It is a key element of periodontal soft tissues, gingiva, ligaments, and hard tissues such as alveolar bone and cementum. Its biocompatibility and regenerative properties have drawn attention in dentistry [15]. Additionally, it is hydrophilic and strongly binds to water molecules, which allows it to retain moisture [6, 15].

Its biocompatibility, regenerative and antimicrobial properties, high viscosity and elasticity, as well as biodegradability and non-immunogenicity make HA an attractive material for various dental procedures [15, 16]. In dentistry, HA is used as an injectable material to increase volume and improve appearance [16].

By enhancing tissue regeneration, reducing inflammation, and increasing angiogenesis, topically applied HA can accelerate recovery after extractions, sinus lifts, and implant surgeries. It increases bone density and induces osteogenesis in the maxillofacial region [6, 15, 16]. When used as a coating, it improves migration, adhesion, proliferation and differentiation of precursor cells on titanium implants, enhancing implant-bone integration [17].

According to studies, HA use in periodontitis treatment may reduce pocket depth, improve attachment levels and reduce bleeding on probing [15, 18]. In orthodontics, injecting HA into the periodontal ligament increases expression of osteoblasts and osteoclasts, accelerating tooth movement [15].

In pediatric dentistry, HA can be applied locally in gel or mouth rinse form to treat oral ulcers, reduce inflammation and promote healing. It accelerates epithelial repair and reduces oxidative stress [15, 18].

After endodontic procedures, HA can reduce postoperative discomfort and accelerate recovery, mainly due to its anti-inflammatory properties. It has also been used intracanal to promote periapical tissue healing and regeneration. HA is used as a root canal irrigant, and studies show that HA-based irrigants effectively remove smear layers and debris without adversely affecting dental tissues [15].

As a dermal filler, HA bridges aesthetic medicine and dentistry. Due to its ability to enhance facial contours, restore volume and improve skin appearance, HA is widely used to address aesthetic and functional issues such as gummy smiles [15, 19]. Injecting fillers into the upper lip or gumline can reduce gum exposure, creating a more balanced and harmonious smile

[19]. HA adds volume and fills the targeted area after injection, helping to smooth wrinkles and lines [15, 19, 20]. Fillers can increase lip and perioral volume, giving patients fuller, more youthful lips [19]. Injecting HA into the upper lip and cheekbones can enhance facial harmony in class III malocclusion, while injecting it into the chin improves facial balance in class II cases. This enhances not only orthodontic outcomes but also overall facial appearance, leading to greater confidence and patient satisfaction [20].

Botulinum Toxin

Botulinum toxin is produced by Clostridium botulinum during anaerobic fermentation and includes seven serotypes (A to G). Type A (BTX-A) is most commonly used [21]. It works by temporarily inhibiting acetylcholine release at the neuromuscular junction, with reversible effects lasting several months [21].

In dentistry, BTX is used for treating gummy smiles, asymmetric smiles, bruxism, masseter hypertrophy, trismus, temporomandibular disorders (TMD), hypersalivation, tension headaches, trigeminal neuralgia, and post-implant pain [21, 22, 23].

A gummy smile may result from vertical maxillary excess, hyperactive lip elevators, short clinical crowns or delayed passive eruption. BTX offers a minimally invasive alternative with satisfactory results. By reducing upper lip elevator muscle contractions, it lessens gum exposure [21].

Bruxism refers to teeth grinding that can lead to wear, loss of occlusal height and periodontal or muscle damage. BTX injections into the masseter muscles reduce symptom severity and pain from muscle overactivity [23, 24]. In TMD, where patients often experience limited mouth opening, BTX relaxes chewing muscles and improves range of motion [24].

BTX also treats salivary gland hypersecretion in Parkinson's disease and Frey syndrome [24]. Intraglandular BTX injections reduce salivation in patients with neurological disorders. The toxin blocks ACh release at both neuromuscular and autonomic secretomotor synapses [25, 26]. The effects last 3–4 months [25]. Initially used for sialorrhea, BTX has also been injected to reduce benign glandular hypertrophy, with more superficial injections than into the masseter [26].

The FDA has approved BTX for cervical dystonia, hemifacial spasm and chronic migraines [27]. It effectively relieves chronic facial pain, including trigeminal neuralgia and myofascial pain syndrome [23, 25, 19]. BTX has shown efficacy in treating trigeminal neuralgia with minimal side effects [23]. Injecting cholinergic autonomic parasympathetic synapses can also reduce excessive tearing [25]. "Crocodile tears" syndrome, a symptom of facial nerve palsy,

results from disordered interaction between secretomotor fibers of the lacrimal and salivary glands [23].

BTX is also used by implantologists to reduce masticatory muscle contractions and occlusal overload, improving implant osseointegration. This increases treatment success, especially in patients with parafunctional habits such as bruxism [21, 22].

Conclusion

This article presents selected aesthetic medicine techniques used in modern dentistry, emphasizing that contemporary dental practice extends beyond treating teeth and includes improving the appearance of the lower face. The integration of dentistry with aesthetic procedures such as botulinum toxin, hyaluronic acid, lifting threads, mesotherapy and PRP significantly expands therapeutic options.

These methods can be successfully employed by dentists to enhance perioral appearance, correct asymmetry, reduce mimic wrinkles, and improve smile aesthetics.

The article also highlights the need for an interdisciplinary approach and the growing patient demand for comprehensive facial aesthetics, which is driving increased interest in aesthetic procedures among dental professionals.

Authors' Contributions Statement:
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Investigation:[JR][MS][MSi][GS][BW][KŚ][JP][JG][SS][KZ][KZa][MZ][OP]
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