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Minimal invasive dentistry: A review

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***Abstract*---**The ideal definition of "Minimal Invasive (MI) Dentistry" is the use of a biological method rather than a typical (surgical) operational dentistry strategy to treat dental caries. When operational dentistry is necessary, it is now done in the most conservative way possible, with the least amount of tooth structure being harmed. This novel method of caries cares shifts the focus from detecting carious lesions as cavities (and a recurring cycle of restorations) to diagnosing the oral ecological imbalance and affecting biological changes in the biofilm. After stopping the disease process, MI aims to restore lost tooth structure and function, while optimizing the tooth's healing capacity. “Caries treatment has evolved from G.V. Black's extension for prevention to minimally intrusive owing to advancements in dental adhesives and restorative materials, increased knowledge of the caries process and remineralization, and changes in the incidence of caries.

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A decrease in cariogenic bacteria, new classifications of caries based on the location and size of lesion remineralization, and procedures and materials for minimally invasive cavity preparation are some of the topics covered in this book."

***Keywords*---**Minimal invasive, healing capacity, lesion remineralization.

Introduction

There are several studies across the globe looking for the most advanced equipment and techniques so that both the patient and the dentist benefit. Medical and dental research initiatives are always looking for ways to make operations more accessible and less intrusive so that everyone has access to the same level of care. The term "minimally intrusive dentistry" encompasses all facets of the field. As a primary goal, it is to prevent tissue damage and disease progression, as well as treat and replace damaged tissue. 1 The primary drawback of implementing this in practice is persuading patients since they are only ready to undertake the operation after it has advanced and they are experiencing pain or other symptoms, and they are often not ready when it first begins. Endodontics, periodontics, orthodontics, and other fields are increasingly included in the growing list of minimally invasive dental procedures.

Core Minimum Intervention Principles

With the development of "more moderate caries expulsion approaches" and its continuing construction as a coordinated way of thinking about patient administration, "least intercession dentistry (MID)" is the cutting-edge clinical way of dealing with illness. There are many different ways to implement the CAMBRA (Caries Management by Risk Assessment) technique, but they all have one thing in common: they all include some degree of intervention.[2]

Recognizing and surveying potential caries risk factors ahead of time, through the way of life examination, spit testing, and using plaque indicative tests; (2) Reduction - to wipe out or limit caries risk factors, by modifying liquid equilibrium and decreasing the admission of dietary food varieties that are cariogenic; and (3) Expanding the pH of a patient's mouth to reduce the acidity of their saliva, which is a risk factor for dental caries; In cases of severe dentine caries, when the risk of iatrogenic pulpal damage is significant, bioactive materials are used to help restore the tooth and speed up dentine recovery.[3]

In contrast to the standards of MID, which emphasize early detection, interference with the disease with minimal penance on unaffected tooth structure, alteration of cariogenic verdure artificially or precisely, remineralization of early injuries, and advancement fix rather than replacement of inadequate reclamations, Dr. G.V. Dark, the father of modern dentistry, came up with the concept of "augmentation for anticipation." Insignificantly intrusive dentistry, according to the World Congress of MID, refers to dental operations that consider oral tissue's

health, capability, and sense of well-being by preventing illness or catching it promoting it with little tissue harm.[4]

1. The following are the most important elements for designing a minimally invasive cavity for an adhesive permanent restoration:
2. So that the preparation can be seen and caries can be reached, as little dental structure should be removed as possible.
3. Predictable marginal seals are achieved by removing demineralized dentine from the cavity's entire perimeter.
4. No need for a flat floor cavity.
5. Internal cavity angles should be rounded; occlusal keys or dovetails are not necessary. It is possible to minimize the tension on the binding to dentine by placing some internal cavity resistance or tiny proximal retention holes.[5]

"According to a recent policy statement published by the World Dental Federation, four key requirements must be maintained to achieve the concept of minimal intervention dentistry".[6]

1. "Control the disease through reduction of cariogenic flora.
2. Remineralise early lesions. Perform minimal intervention surgical procedures, as required.
3. Repair, rather than replace defective restorations."

To combat dental caries, it is recommended that we adhere to these principles in current times as they have been done in previous centuries. As a practice builder, minimum intervention may be used in three ways: Identity, Prevent, and Control.[7]

Risk Assessment

Patients may be categorized based on their risk of developing caries. [8]:

"Low Risk

1. No caries in last years
2. Coalesced or sealed pit and fissure
3. Good oral hygiene
4. Appropriate fluoride use
5. Regular dental visits

Moderate Risk

1. One carious lesion in last years
2. Deep pits and fissures
3. Fair oral hygiene
4. White spots/ interproximal radiolucencies
5. Inadequate fluoride exposure
6. Irregular dental visits
7. Orthodontic treatment [9]

High Risk

1. ≥2 carious lesions in the last 3 years
2. Past smooth surface caries
3. Deep pits and fissures
4. No/little fluoride exposure
5. Elevated S. mutans count

6. Poor oral hygiene
7. Frequent sugar intake
8. Inadequate saliva flow
9. Irregular dental visits
10. Inappropriate bottle feeding or nursing (infants)

Prevention Options for Risk Categories:

High-Risk Category
1. Educational reinforcement
2. Brush with fluoride dentifrice
3. Restorations
4. Home fluoride (mouth rinse/1.1% NaF gel)
5. Professional topical fluoride at each visit

3-6 Months Recall
1. Dietary counseling
2. Monitoring s.mutans count
3. Antimicrobial agents
4. Fluoride supplements

Moderate Risk Category
1. Educational reinforcement
2. Brush with fluoride dentifrice
3. Restorations
4. Professional topical fluorides

6- 12 Months Recall
1. Dietary counseling
2. Fluoride supplements
3. Remineralization

Low-Risk Category
1. Educational reinforcement
2. Maintenance of good oral hygiene
3. Fluoride dentifrice
4. Recall after every 6- 12 months

Remineralizing Agents”
1. Casein Phosphopeptide- According to University of Melbourne researchers, milk contains a substance known as CPP, which has been shown to have anti-caries properties. The remineralization impact from 0.5-0.1% of CPP-ACP solution is the same as 500 parts per million of fluoride. To prevent enamel demineralization and aid remineralization, the localized CPP-ACP buffers free Ca and P, greatly elevates the plaque"s calcium phosphate content, and therefore preserves a condition of supersaturation that inhibits enamel decalcification.9 CPP-ACP
2. Combination of CPP-ACP and fluoride: Fluoride and CPP-ACP have been found to work synergistically to remineralize teeth.

3. Novamin: Phosphosilicate, in chemical terms, is calcium phosphoric acid. As soon as it comes into touch with water, saliva, or any other bodily fluid, the bioactive glass responds uniquely. Calcium, phosphate, sodium, and silicon ions are liberated during this reaction, culminating in the production of new hydroxycarbonate apatite crystals. In addition to toothpaste, varnish, and a root desensitizer, these goods have desensitization as their primary application and are available in a variety of forms.[10]
4. TiF4 technology: In comparison to Sn, the titanium ion hydrolyzes H2O more quickly, releasing proton (H+) and lowering the pH of the solution. 11 This is due to the acidic nature of the TiF4 solution. As a result of the titanium ion's affinity for oxygen, titanium phosphate complexes are very likely to form (i.e., titanium ion reacting with the oxygen atom of the phosphates of the tooth structure). Dentin demineralization will be less likely to occur because the combination produced is so strong that it cannot be replaced by protons (H+) even at low pH (pH,1).
5. Resin infiltrant technology: "To achieve minimal intervention dental, this minimally invasive therapy (microinvasive) may provide therapeutic benefits and considerably reduce both long-term restorative demands and costs, thereby advancing the concept of minimum intervention dentistry".[12]
6. Tricalcium phosphate: Two transparent forms of tricalcium phosphate are alpha and beta, which have the formula Ca3(PO4)2. Warming up the human polish produces the typically insoluble alpha TCP at high temperatures in the mouth cavity. A surfactant, such as sodium lauryl sulfate (SLS), may be used to coat TCP or TCP complex particles. However, as particles encounter spit, it has been noted that the natural coating may fade away, decreasing the unfavorable connections with fluoride.
7. Nano hydroxyapatite: Recent advances in dentistry and medicine have led to an increased interest in the biocompatible and biologically active substance, nano-hydroxyapatite (n-HAp). Porcelain enamel's apatite crystal structure and shape are very comparable to those of nano-sized particles. The combination of zinc carbonate (ZnCO3) and nanohydroxyapatite (NaOH) is also beneficial.
8. Enamelon: Some of the sodium fluoride included in enamel has not yet dissolved. Sodium fluoride and phosphate salts are separated by a plastic separator in the tube of toothpaste. EnamelonTM has a particular problem since calcium and phosphate are not balanced, allowing the two particles to merge before they come into touch with salivation or lacquer.

"Minimal intervention techniques
Chemomechanical Cavity Preparation"-
Carious dentin may be eliminated with chemomechanical methods in pediatric dentistry, particularly for individuals who are apprehensive or have other health issues. Carious dentine is first chemically softened, and then gently excavated away using this innovative treatment procedure. 13 Additionally, this approach may be used to treat patients whose use of local analgesics is prohibited, as 82 to 92 percent of patients using this method do not need it.
"Exposed buccal lesions, cervical or root caries, particularly deep carious lesions (possible pulp exposure may be minimized), and the treatment of a recalcitrant pediatric patient or an older, scared youngster are all cases when chemomechanical caries removal is indicated."

Patients who need just a few minutes of treatment time or who have a shallow pit or fissure caries that may be removed with little pain by using rotational preparation are ineligible for this procedure.

“Preparations Available For Chemomechanical Cavity Preparation”-

Caridex- N-monochloroglycine and aminobutyric acid were the primary ingredients in the original CaridexTM formulation, which has since been phased out. 13 It was convenient to have all of the chemicals in separate bottles so that they could be transported in a single container. “The two solutions were mixed just before use to obtain a reagent with a pH of around 11 that would stay stable for an hour. Fluid reservoir heaters and pumps were utilized to heat a tube linked to a handpiece and applicator tip so that Caridex could be administered (20 gauge hypodermic needle, the tip of which had been modified into spoon shape).” Caridex's limited therapeutic utility was attributed in part to the fact that it had a bad taste, took a long time to prepare (10-15 minutes), needed a large volume of solution (200-500ml), and was no longer commercially available.

“Carisolv- is available in two forms”

1. Single mix system- There is a new gel out there with a few changes. Amino acids and sodium hypochlorite were used in the original CarisolvTM red gel before treatment. In the new gel, there is no coloring agent. One-third less amino acids and almost twice as much sodium hypochlorite are found in this version, compared to the original CarisolvTM gel.

The system consists of 5 white syringes carrying a clear liquid and 5 transparent syringes containing an uncolored gel.

a) Leucine, glutamine, and lysine are the three amino acids that make up the uncolored gel. It also includes sodium chloride, Na-CMC 1300-2200 mPas, and filtered water, pH 11.
b) Hold the syringes so that the holes face up and not down. Screw the syringes together after removing the corks.
c) To homogenize the liquids, alternately push the syringe ends to mix them. Fill one of the syringes to the brim with the liquid.
d) A Luerlock cannula is used to inject the liquid mixture into the cavity, and an appropriate content should be used for this purpose.
e) A CarisolvTM tool is used to extract gel drops from the container, and the gel is then administered to the carious dentine using a dropper. Ensure that the gel has been absorbed into the lesion completely.

Sodium hypochlorite solution, 95%, is the active ingredient in the clear liquid.

2. A dual-syringe multi-mix system that contains 1.7 ml of clear liquid and 1.7 ml of clear gel. Remove the end cap from the syringe and hold it upright. Using a plunger and some care, remove the fluids from the canister and dispose of them properly. Replace the end cap immediately. A homogenous solution may be made by thoroughly mixing the fluids. You should replace the end cap immediately. There is a 30-minute window of time in which the gel's effects will begin to fade. Multiple events combine to alter collagen's fiber structure, causing the softening impact on cancerous tissue. Due to the various charges on the three amino acids, the proteins in carious dentine may be attracted to one another through electrostatic attraction in different places. Hydrophilic (positive or negative) and

hydrophobic (non-charged) peptide chains are found in all proteins, including collagen. By electrostatically pulling in one chloro-amino corrosive from Carisolv®, it is possible to provide receptive power over the whole length of the collagen fiber while limiting annoying side effects from hypochlorite.
The breakdown of damaged collagen in the demineralized section of a carious lesion is the outcome of these processes. Dental pulp and healthy tissue are untouched by this gel. CARISOLV can more readily penetrate deteriorated collagen because of its open structure, and this dentin may be scraped off with ease.

As a result of the need for specialized tools and intensive training and registration of the specialists involved, this approach has several drawbacks. 13 Caries elimination by chemo-mechanical means has been made more widely available and more widely used in public health via a novel formula developed in Brazil in 2003, thanks to a research study conducted by Professor Papacarie To give it a brand name, Papacarie® was given the new formula. 13 Antiprotease 1-antitrypsin in plasma stops proteolytic papain from working in healthy tissues, therefore papain only works in necrotic tissue. Because the 1-antitrypsin was missing from the infected tissue, papain was able to break down the otherwise inactive collagen molecules. Chloramine-T is 0.5 percent in the Papacárie ® gel's formulation. Protein from papaya was included in the formulation as well as a thickener and toluidine blue dye.

Papain Gel Application Procedure

The following procedures must be followed when using papain gel for the eradication of caries tissue: A rubber cup, pumice, and a rubber dam may be used to do dental prophylaxis. Papacárie is given after 30 seconds for acute caries and 40 to 60 seconds for persistent carious lesions. Dentin that has softened due to illness may be removed using a manual instrument after this period. It is reapplied until the cavity has a smooth, glossy finish if all carious tissue remains. Time to clean, dry, and complete the repairs.

Between applications, there is no need to flush the cavity. Papacarie is still the subject of few investigations in the scientific literature. In terms of biocompatibility, tooth decay eradication, antibacterial action, reduced anesthetic use, and patient acceptability, the existing data seem promising. Carisolv has also been shown to provide comparable outcomes as Papacárie. SS White's Ardent was the first commercially available air abrasion device, designed by Robert Black in 1945 as an alternate pseudo-mechanical approach for the removal of dental tissue.

Aluminum oxide particles (Alumina) were used in a stream of air to blast the tooth surface with high-velocity particles. This year has seen the introduction of new air-abrasive cutting devices that can cut tooth tissue with alumina powder ranging from 27-50 m in particle size. 15 Even though it is a non-traumatic way of cutting, the absolute lack of tactile feeling, as well as the capacity of alumina particles to remove sound tooth structure rather than the carious substrate, should all be taken into account when making a choice. An advantage of the use of water is that it keeps abrasives inside the working area, but the non-selective

character of this method may result in a harmful surface assault of sound tooth structure. Researchers have indicated that this approach should only be used towards the end of a cavity preparation to remove carious dentine.
For effective tooth reduction at all air pressures, a precise ratio between powder flow and air volume must be maintained as it leaves the nozzle. There is also an appropriate powder volume for each air pressure and nozzle diameter combination. Typically, this powder amount flows at a rate of 0.8 to 1.4 grams per minute. It is sufficient to mention that maximal performance can be reached at all air pressures if the abrasive flow rate is maintained and adjusted to remain within this range.

According to Dr. G.V. Black, when it comes to patient sensitivity, air pressures as low as 35 PSI are required to preserve patient comfort, and operational pressures are kept between 35 and 75 PSI at all times. This modality's basic premise is that low air pressure is better for your health. Low-pressure dentin reduction can only occur if the powder is fed into the stream properly such that powder volume is maintained within a narrow range. Using an abrasive that is "dysfunctional" will only reduce pulpal temperature, which in turn triggers a pain response from patients if the air stream is excessively rich or lean with powder.
“Five air-abrasive units currently are being marketed
1. The three KCP series (KCP 1000 Whisperjet, KCP 2000, and KCP 2000 Plus) American Dental Technologies),
2. The MicroPrep(Sunrise Technologies) and
3. The Kreativ (Kreative Inc.).”

Contraindications- The procedure should be avoided by anyone with severe allergies to dust or pollen, asthma or chronic obstructive pulmonary disease, as well as those who have recently undergone oral surgery, have open wounds, extensive periodontal disease, or who have recently had orthodontic appliances implanted or oral abrasions removed. Several of these conditions raise the possibility of an oral soft tissue air embolism.

The Ultrasonic Instrumentation- The use of high-frequency ultrasonic vibrations to eliminate proximal carious lesions in both anterior and posterior teeth has been suggested since the 1950s, to minimize the amount of preparation required. Using a diamond-coated tip that oscillates at a frequency of roughly 6.5 kHz, this method does not physically remove the dentine, but rather abrasively removes it.
Sono-abrasion, a variation of the original ultrasonic approach, has recently been created. To selectively prepare the enamel and dentine, sono-abrasion is a procedure that provides outstanding effectiveness, quality, and safety. 16 By using air scalers with modified abrasion tips, this technique may produce an elliptical motion of 0.08-0.15 mm transverse distance and 0.055-0.135 mm longitudinal motion. At a pressure of 305 bar, these diamond-coated tips are utilized to fill holes with water. Half-torpedos, small and big hemispheres, and hemispherical tips are all now available. Preparation of predefined cavity outlines and removal of softened, carious dentine are both facilitated by the use of various tip shapes.

“Advantages- Other benefits of using ultrasonic technology include a reduction in or elimination of unwanted noise, vibration, heat, and pressure. The ultrasonic

technique may help prevent iatrogenic damage to surrounding teeth caused by the use of dental burs.

Disadvantages- For example, minimal abrasion and high hub movement of the tips, together with the associated weakening of the enamel rods next to prepared areas, are characteristics of this method."

Systems Available- Chemical Vapour Deposition (CVD, So José dos Campos, Brazil) diamond tips are currently used in a new ultrasonic system that has improved resistance and endurance. This is because the diamond deposition is chemically bonded to the shank, allowing the dentist to see the working area more clearly. As a further benefit, the new technique enables a more thorough cavity preparation, as well as tissue conditioning.

Ozone- The remineralized dental tissues are known to be more resistant to decay than sound tooth structure, hence it has been hypothesized that Ozone might be used to reverse caries in recent years. Incipient pit and fissure caries, as well as incipient root caries, may be remineralized by ozone treatment. Furthermore, it is effective in treating open wounds.[17]

Cariogenic microorganisms have no place in an ozone-rich environment, which makes ozone a powerful tool for remineralization. This 'clean' lesion should remineralize because ozone rapidly penetrates degraded tissue, eradicating any bacterial, fungal, or viral contamination. This treatment will then be carried out using a remineralizing solution applied to the skin, along with a patient's suggested maintenance package. Aside from removing protein protection and killing bacteria, ozone damages biomolecules necessary for the niche to survive and expand over time because of its powerful oxidizing powers. One of the strongest naturally occurring acids generated by bacteria and associated with caries development is oxidized by ozone-producing acetate acid and carbon dioxide. Due to the increased alkalinity of the carious lesion's environment, the acidity of an acetate acid is lower than that of pyruvate, which results in mineral absorption. After ozone treatment, the lesion will be colonized by typical oral commensals that do not create acid.

Because it eliminates the requirement for local anesthetic, drilling, and filling, this new method is only useful for treating caries on the surface of the enamel and in the roots. The Heal Ozone dental ozone equipment was the first of its kind. Dental therapy using ozone has become faster, more predictable, and has now spread to all aspects of dental care thanks to innovative ozone delivery technologies. Because excessive quantities at ground level have been linked to respiratory discomfort, ozone must be carefully regulated.

Dental Ozone Devices - There are a variety of dental ozone devices on the market (for example, the Heal Ozone and DentOzone unit.) At each of these dental ozone machines, the ozone gas is delivered in a predetermined concentration. To begin the process of remineralization, the mineral wash is applied to the treated region after 30 to 60 seconds of ozone exposure. Once the ozone treatment is complete, the patient is given an "at-home care package" to take with them.

In the beginning, the decayed portions would be soft and unable to sustain any repair. This is a crucial consideration. Because of this, it is recommended that restoration be scheduled for 2-3 months following ozone therapy, which is when the remineralization process is expected to be well established and the lesion is stable and reversed, allowing for a transitional repair. Dental caries may be effectively treated with ozone therapy, which eliminates any possible stresses. No local anesthetic may be administered, no-drill can be used, and no restorative material can be packed. The amount of time it takes to administer the therapy is likewise quite low.

The Ozident® dental ozone device's typical ozone duration is 30 seconds, and there is very little preliminary work required. The initial step is to remove all of the loose material until a leathery foundation is achieved. Hand instruments may be used to do this. It is necessary to use ozone first, followed by a wash that restores minerals to the lesion, before using a glass ionomer (Fuji VII). Holmes has reported on a new ART approach that uses a modified method.

Lasers:
The end of the 1990s saw a period of ambiguity over the use of lasers in dentistry, but three wavelengths are now accessible for clinical application in the treatment of hard tooth tissue. These included
"1. Erbium:yttrium-aluminum-garnet Er:YAG (λ =2.94μm)
2. Erbium-chromium:yttrium-scandium - gadolinium-garnet Er,Cr: YSGG, (λ = 78μm)
3. Er:YSGG (λ =2.79μm).

Clinical Applications"

Preparation of cavities, elimination of dental caries, removal of restorative materials, etching of the dentin, prevention of dental caries, and bleaching may all be accomplished using lasers. Adhesive dentistry and the spread of minimal intervention principles may lead to a paradigm shift in cavity design and preparation.

Caries prevention

To make teeth more resistant to acid attack and caries, laser-irradiated dental hard tissues are irradiated to alter the calcium to phosphate ratio as well as the carbonate/phosphorous ratio. There is evidence to suggest that laser-treated surfaces are more resistant to acids than those that have not been irradiated. While this has been shown to increase acid tolerance, it is not known how exactly it works. The pH threshold for enamel dissolving has been dropped from 5.5 to 4.8, and the hard tooth structure has become four times more resistant to acid breakdown. 18

It seems that the combination of lasers and fluorides has great promise for the prevention of dental cavities. Furthermore, it has been reported by Flaitz and colleagues that acidulated fluoride gel (1.23 percent gel for 4 minutes) applied before to or after argon laser exposure resulted in a considerable decrease in lesion depth, as opposed to previous approaches. Following Nd: YAG laser therapy

with APF solution, Zezell DM and colleagues [18] found that the enamel's acid resistance was significantly increased.[19]

Caries Removal

When compared to healthy tooth hard tissues, carious material has larger water content. Consequently, caries ablation is more effective than that of healthy tissue. The Er: YAG laser effectively ablated carious dentin in an in vitro study by Bader C and Krejci with little thermal damage to the surrounding undamaged dentin.[20]

Cavity Preparation

The Er: YAG laser is a useful cavity preparation tool because of its ability to cut as fast as turbines, activate secondary dentin, and have an antimicrobial impact. As a result of the Er: YAG laser's radiation, changes to the dentin structure may be made, which would allow adhesive systems to adhere better to the surface and improve repair sealant adherence. Roughening the dentin as a result of the acid etching provides adequate micro retention for adhesive materials, according to Vissuri et al and Groth et al.[21,22]

Minimally invasive periodontal therapy

While MIS has been around since 1995, Harrel and Rees introduced it in dentistry literature back then. Reflection and manipulation of the tissue minimize tissue stress, resulting in better clot stability and decreased surgical morbidity. Because treatments are becoming more and more technique-sensitive as they grow less invasive and the equipment and armamentarium get more advanced, surgeons and operators must keep up to date with the latest advancements in their respective fields. 23

It has always been the ultimate objective of periodontal treatment to regenerate lost periodontal tissues. Interbody flaws may be regenerated using a variety of techniques. An obstacle film joins the mix, a veneer grid subordinate, and a demineralized freeze-dried bone allograft make up a few model variations (EMD). More than 92% of treated regions were able to maintain the initial injury conclusion throughout the recuperation period using a microsurgical method combined with various healing materials. More than 92% of the treated regions were successful during the repair period. 24

Periodontal microsurgical techniques employing working magnifying tools and microsurgical gear to assist amplification and visual keenness with less cautious pressure, creating the least incisions, and negligible fold reflection for better post-careful recuperation have been presented and investigated.[25]
General considerations of MIST:

- The less invasive form of the incision avoids the need for lengthy reflections.
- Multiple, distinct flaps are used instead of a single flap that covers all of them.
- Incisions were kept to a minimum.

- Avoiding the use of vertical incisions
- The only way to see the reflection of the flap is via careful dissection.
- Wherever graft material or membrane is employed, it is thoroughly coated to aid regeneration and preserve the interproximal papilla.
- Using operating microscopes, loupes, and other magnification devices, procedures are carried out.
- Miniaturized devices and ultrasonic scalers are used to clean the root surface thoroughly while minimizing flap elevation.
- Vertical mattress stitches are used to secure the flaps.

Minimally invasive surgical techniques (MIST) use either the MPPT or SPPF to reach the deformed interdental papilla, depending on the size of the interdental gap. The MPPT is used in large interdental spaces, while the SPPF is used in small interdental spaces.[27]

"Minimally invasive periodontal therapy techniques-

1. Laser-assisted periodontal therapy
2. Minimally invasive surgical technique (MIST)
   2.1. Modified Papilla Preservation Flap (Cortellini et al., 1995)[28]
   2.2. Simplified Papilla Preservation Flap (Cortellini et al., 1999)[29]
3. Modified-minimally invasive surgical technique (M-MIST)
   Cortellini and Tonetti (2009")[30]

Minimally invasive orthodontics

"Some studies have shown that a newly developed branch of five-to-five clear aligner treatment (CAT) (Invisalign Go, Align Technology, San Jose, Calif.) may assist multidisciplinary therapies, particularly in terms of less invasive procedures." 31

An upper central incisor is used as a major reference point for the rest of the face and lips in Spear and Kokich's FGTP.32,33

Facial geometry-based treatment planning (FGTP) starts with a patient's face to determine the optimal site for dental implants as well as other supporting structures such as gingiva and papillae. A complete denture has the same effect.

Discussion

Because of a lack of finances, ART was created as a way to restore caries in underdeveloped nations where it may be difficult to provide final therapy. 34 Fluoride-releasing restorative materials like GIC or resin-modified GIC are used to remove and fill in contaminated tooth structures, without the need for anesthetic, in this procedure (RMGI). 35 GIC's release of fluoride leads to a more acid-resistant type of fluorapatite, which makes the tooth less vulnerable to caries in the future. 36,37

MIST's clinical performance and patient impression have been evaluated in several investigations. There were statistically significant decreases in probing depths and increases in clinical attachment levels in 16 patients who had numerous deep pockets treated with MIS and enamel matrix protein (Harris et al. 2005). 38 Other investigations, on the other hand, had clinical results that were much better than those of the previous research. 39,40

“Liu et al. (2016) found that there was no difference in clinical association level expansion and assessment of pocket significance decrease, expansion in slump levels, and radiographic bone fill between the MIS and biomaterials group and just the MIS group, demonstrating the importance of considering both costs and benefits when deciding on a medical procedure.”[41]

“**Advantages of MIST:**

- Reduced post-operative healing phase
- Reduced post-operative complications like edema, pain, and root sensitivity.
- Enhanced esthetic results due to minimal reflection and manipulation of the flaps, minimal manipulation of the papillary tissue, and limited or no scarring.
- Post-operative gingival recession is minimal or non-existent.
- Improved papillary soft tissue height and contour.
- Increased patient's acceptance.”

With the FGTP, treatment objectives may be formulated in an inter-disciplinary manner, and the vision of the whole team can be aligned to achieve the desired outcomes. It may also be used as a means of communication with the patient. An in-depth examination of the case may help determine the best course of treatment, particularly if aligners are to be used in the interim period before the final restoration. The SAFE evaluation translates all of these ideas into ortho-restorative scenarios using CAT. Using this complete evaluation, general practitioners and orthodontists may thoroughly examine and prepare any instances they may be faced with. Straightening teeth using CAT is a well-known procedure. As an alternative to fixed braces, it is capable of correcting a wide range of dental problems. Adults' dental arches can be aligned and leveled using a CAT, according to a comprehensive study of the subject.[42]

Conclusion

The ultimate objective of any therapy is to cure the illness by regenerating the tissues that have been lost, with the least amount of side effects as feasible. For example, minimally invasive surgery has been shown to decrease surgical trauma, enhance wound stability, and provide an effective initial wound closure with minimum patient pain and adverse effects. MIS is a beneficial therapy technique in several clinical trials. For now, further research is needed to show that minimally invasive surgery may achieve the same or even better outcomes than conventional treatment alternatives while causing the least amount of postoperative discomfort and harm.

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