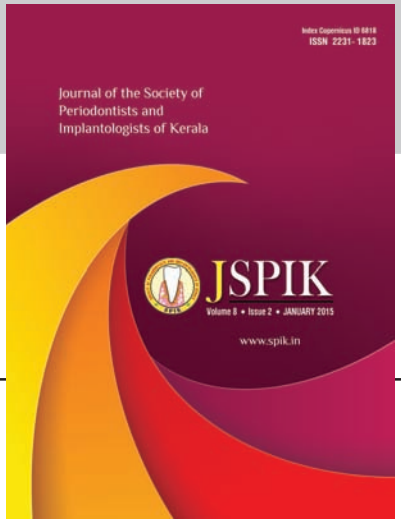
Index Copernicus ID 6818
ISSN 2231- 1823

Journal of the Society of Periodontists and Implantologists of Kerala

JSPIK

Volume 8 • Issue 2 • JANUARY 2015

www.spik.in



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President's message

Recently I came across an article in a leading national newspaper by Padma Bhushan Dr B M Hegde who is the former Vice chancellor of Manipal University and a widely respected medical teacher. The article is about the declining standards of health care in the country in particular and globally in general. The article shares the concerns and anguish expressed by a role model physician and teacher of the older generation on the state of affairs of modern day medical practice in India.

Urbanization and westernization has come as a complimentary to globalization and liberalization. In the new world order healing has become an industry and a lucrative business at least in our country. With Medical schools mushrooming even in the remote parts of the country, every aspiring parent want their children to join one of them. After having spent a lion share of their life's earning on medical education it is not extraordinary if they want to reap the benefits as early as possible once they graduate. Patients are commodities and their malady an opportunity to cash in. The graver the disease or condition the better for the hospital. More tests, new investigations, costly drugs, more days of hospitalization or ICU stay and multiple procedures are on the cards.

'Medical profession has become technologically proficient but emotionally deficient', says Dr Hegde. Words of a visionary who is passionate about the good old days of meaningful doctor patient relationship strongly based on mutual respect, trust and empathy.

How many of us tries to understand the real social and financial background of the patient in front of you? His desires and expectations. How often we consider the patients affordability before we prescribe an expensive drug or a fancy investigation. I have heard that there are super specialists who insists on MRI scans before even examining the patient. Heart lung machines, ventilators or pharmaceuticals cannot offer tender loving care. They have no heart. But we ought to have, rather a very big one, as so called healers. Big enough to understand the poor sick ones aspirations, thoughts and worries, his agony and pain. We have to carefully choose the words we use to communicate as they are comforting than any five star hospital amenities. We have to don gestures that are soothing and never forget to offer that healing touch when it is most needed.

Food for thought I believe for you and me.

Perio is thrilling

Dr Baiju R M
President - SPIK

From the editors desk

Our future ?

Recently in one of our get together a friend asked me a pertinent question. What is the future of periodontics ? If you need to answer this question you will need to introspect into the scenario in dentistry today, where it is quoted that in Kerala the dentist: patient ratio is far ahead of the national average. With an increasing competition among general dentists, even periodontal speciality practice may be taken over by general dentists who will want to provide all treatment options to the few patients they have, like what is happened to the field of orthodontics. Are we ready to deal with such a scenario?

I was happy when i looked at the program schedule for our midterm conference. It is containing the same topic for discussion- The future of periodontics. As the leaders of our profession in Kerala we will need to take the initiative in moulding the scenario to our advantage. It could be a win situation for Periodontists if this speciality practice is promoted to be included in everyones practice. For that a initiative has to be taken to promote the practice of periodontics in the general setting by innovative strategies or by promoting newer technologies like piezosurgery or lasers which are less invasive and minimally traumatic. But our population is reluctant to go behind the new technology and even in the PG curriculum more stress in given on theoretical aspect of disease rather than the clinical ways to correct or prevent the disease process.

We need to change our thinking process and may this midterm conference be an eye opener in many ways than one with a consensus developing on how we need to develop ours into a leading clinical speciality.

As always the editors job is to call for articles and i request each and every member to contribute quality articles to our journal. May this new year be a wonderful one for each one of you

Yours as always in SPIK

Dr Mahesh Narayanan
editorspik@gmail.com

Secretary's Message

Dear Members,

Warm greetings to all the spik members

At the outset let me wish all the SPIK members A Happy and prosperous 2015

This SPIK year started of with Periodontal health awareness programme which was conducted in Kannur with varieties of programmes to create awareness among the public. The awareness programme was well appreciated and could deliver the message.

Let me congratulate the Editor for bringing about the Second issue. As we are aware the journal has always maintained the quality of articles which also includes color photographs with definite increase in the number of articles per issue.

This year has been special because of the tremendous increase in the membership of associate members. Following this Spik would provide a definite scientific learning platform for all the post graduate students.

The coming months to follow we would further like to increase the membership strength as well as implement new ideas and innovations to improve the scientific activity of SPIK.

Looking forward for a fabulous Mid Term conference at Kottayam on Jan 31st & Feb 1st.

Jai Spik

Dr. Anil Melath
Secretary, SPIK

Proteomics soon to revolutionize diagnosis – A short review

Annie V. Issac [1]

ABSTRACT

Proteins are vital parts of living organisms, as they are integral components of the physiological metabolic pathways of cells. The knowledge of various proteins involved in periodontal disease pathogenesis can be used in the diagnosis, prevention and treatment of periodontal diseases. Proteomics is the study of all proteins including their relative abundance, distribution, posttranslational modifications, and functions. Its application to periodontal science can be used to monitor health status, disease onset, treatment response, and outcome.

Introduction

Periodontium is abiding with multi complex cells and matrix that forms the foothold for the attachment, proprioception, and physical protection for the teeth.[1]Periodontitis is the reciprocal action between infectious agents cells and matrix. Various protein molecules determine the onset, progression and severity of periodontal disease.[2] Visual and tactile perception is the corner stone for periodontal diagnosis in day to day practice. Early detection and identification of patients with high risk for periodontitis are the need of the hour in periodontal diagnosis. To accomplish that, it is important to understand the molecular basis of tissue of periodontium. The swift advancement in molecular biology has brought Protemics, Biomarkers, and Genomics to the spearhead for periodontal diagnosis.[1]

The proteins are vital part human cells. Organic molecule in the body is made of protein or the result of a protein's activity. M. Wilkins, an Australian geneticist in the mid-1990s created the word proteome which was merged from the word "protein" and "genome".[3] The term "proteomics" was first coined in 1997.Proteome is the protein complement of the genome and it is defined as the study of all proteins including their relative abundance, distribution, posttranslational modifications, functions and interactions with other macromolecules, in a given cell or organism within a given environment and at a specific stage in the cell cycle.[3] Recent advances in biotechnology like protein separation, quantification, sequence analysis, and structural and interaction proteomics offers great promise for bringing periodontal physiology and pathology into the modern era.[4]

Proteomics in periodontics

An understanding of the human proteome is a prerequisite to gain insight into the physiological and pathological processes relevant to oral health, and is crucial for the identification of meaningful biomarkers for oral diseases.

Periodontal proteomic markers range from salivary protein markers like Immunoglobulin G to bone remodeling protein.[5]Variable amounts of blood, serum, serum products, GCF, electrolytes, epithelial

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and immune cells, microorganisms, bacterial degradation products, lipopolyscaaharides, bronchial products and other foreign substances are present in whole saliva. This makes saliva, the best periodontal diagnostic tool[4]. In addition, blood, GCF, serum, serum products, electrolytes, microorganisms, epithelial and immune cells, bacterial degradation products, lipopolysaccharides, and periodontal fibroblasts can be used for proteome analysis. There are specific/nonspecific. Specific markers are immunoglobulins which characterize the presence of chronic or aggressive periodontitis. Among nonspecific markers are enzymes, proteins, mucins, histatin, lactoferrin, lysosomal peroxidise etc.[6]

Proteomic biomakers

- **Proteomics in Periodontal Ligament Fibroblasts**

Proteome from PDL is a significant diagnostic aid for understanding PDL physiology and regulation and for identifying disease-related protein markers. Total of 117 proteins have been identified from PDL fibroblasts which can serve as a reference map for future clinical studies as well as basic research.[7]

- **Proteomics and periodontal pathogens**

A whole-cell proteomic analysis study to investigate the changes from an extracellular to intracellular lifestyle for P.gingivalis and found that a total of 385 proteins were over expressed in internalised P. gingivalis relative to extra cellular P. gingivalis. [8]

Hendrickson et al found that there is shift in the production of cytotoxic fatty acids by intracellular P.Gingivalis, which suggests that the interior of host cells provides a more energy rich environment compared to the extracellular milieu.[9]

Yoshimura M et al conducted proteome analysis of P. gingivalis which was placed in subcutaneous chamber of mice showed that PG1385 protein is involved in the virulence of these bacteria. The results of these studies suggest that adaptation to an epithelial cell environment induces a major shift in the expressed proteome of the organism. [10]

- **Host Factors and Tissue Breakdown Products**

Matrix Metalloproteinases (MMP 2, MMP 3, MMP 9), Immunoglobulin (Ig), Esterases, Lysozyme, Lactoferrin levels in saliva are valuable for predicting the progression of periodontitis. Numerous other salivary proteases have also been used as diagnostics biomarkers. Various cytokines like C- reactive protein, pentraxin-3, TNF, various other interleukins which are involved in its pathogenesis have come handy in diagnosing periodontal diseases.[5]

- **Proteomics in stem cell**

Hye Won Park et al elicidated that MSC proteins function as a starting point for the generation of a comprehensive reference map of their proteome. Analyses of this protein may facilitate fundamental insights into the protein expression, regulation, and cellular biology of MSC.[1]

Cells studied by proteomic analysis[3] (see the table)

Type of proteomics [12]

- **Structural Proteomics** (Indepth analysis of protein structure)

Structural proteomics includes the identification of all the proteins on a genome-wide scale, determining their structurefunction relationships, and describing three-dimensional structures of the proteins.

- **Interaction Proteomics** (information on the proteins responsible for cellular regulation).)

The functions of biological systems are dependent on interactions between their components. These interactions are ultimately determined by genetic elements and selection processes. The sequencing of complete genomes provides information on the proteins responsible for cellular regulation, but it does not indicate the function of proteins or how they are assembled into the molecular machines and functional networks that regulate cell behaviour.

- **Functional Proteomics** (analysis of function of each protein)

It monitor and analyse the spatial and temporal properties of the molecular networks and fluxes involved in the living cells" [13]

It concentrates on the following two issues [14]

CELLS STUDIED BY PROTEOMIC ANALYSIS	PROTEINS IDENTIFIED	RELEVANCE/SIGNIFICANCE
PDL fibroblast[8]	Cytoskeleton proteins-actin,tubulin, vimentin; cellular motility protein; membrane trafficking protein; chaparonone; stress and folding protein; metabolic enzymes.	Related to PDL fibroblast function and homeostasis
PDL cell undergoing mineralization[15]	Cytoskeleton proteins; cytoskeleton associated proteins; nuclear protein; cell membrane bound protein	Maintain Periodontal tissue homeostasis
Oral squamous cell carcinoma (OSCC) specimen[16]	Ubiquitin-cross reactive protein (UCRP) of IFN stimulated gene (ISG) family	May help in the development of novel biomarkers for OSCC pathogenesis
Streptococcus mutans[17]	Surface proteins; Intrinsic membrane proteins	They are similar to proteins present in other gram positive bacteria.
P. gingivalis[13]	PG1089; PG1385; PG2102	PG1385 is involved in Pg virulence
F. nucleatum[18]	Various cytoplasmic proteins eg. Pyruvate kinase; enolase; flavodoxin; adenylate kinase etc.	Cellular biosynthesis; maintenance of homeostasis; may be important in the organism persistence during the transition from health to disease
Saliva in periodontitis subjects[19]	S100 proteins; haptoglobulins; prolactin induced protein; parotid secretary proteins	Associated with host defence; New potential biomarker for monitoring disease activity in periodontitis
Minor labial salivary gland from primary sjogren's syndrome(pSS) patients and non SS patients[7]	Heat shock proteins; carbonic anhydrase; enolase; vimentin; alpha defensin and carmodulin	Alpha defensin and carmodulin are exclusively found in pSS patients; may be used as a biomarker of prognostic and diagnostic value

(i) Elucidation of biological functions of unknown proteins,

(ii) Cellular activity at molecular level.

Steps in proteomics

Proteomics involves separating the very large number of proteins in cells or tissue prior to analysis by mass spectrometry, followed by recognition and characterization with bioinformatics approaches.[15]

The first step in proteomics is the sample preparation in this step proteins are extracted from the cell followed by 2D electrophoresis to separate different proteins. Then the proteins are cut into peptides and do proteome quantification and analysis.[15]

Proteome quantification[15]

It is an analytical chemistry technique for determining the amount of protein in a sample. Rather than giving the list of protein identified in certain sample, quantitative proteomics yield information about difference between samples. It is mostly done by 2D gel electrophorisis.

There are two type of quantification

- Relative quantification
- Absolute quantification

Methods of proteome analysis[1]

- **ELISA**
- **Immunoassays with mass spectrometry (MSIA).**

Determine the set of proteins that have undergone posttranslational modification, antibodies can be developed which are specific to the modifications and can only recognize certain proteins.

- **Protein Topography and Migration Analysis Platform (PROTOMAP)**

Combines Sodium Dodecyl Sulphate Poly Acrylamide Gel Electrophoresis (SDSPAGE) with shotgun proteomics to enable detection of changes in gel migration such as those caused by proteolysis or posttranslational modification.[16]

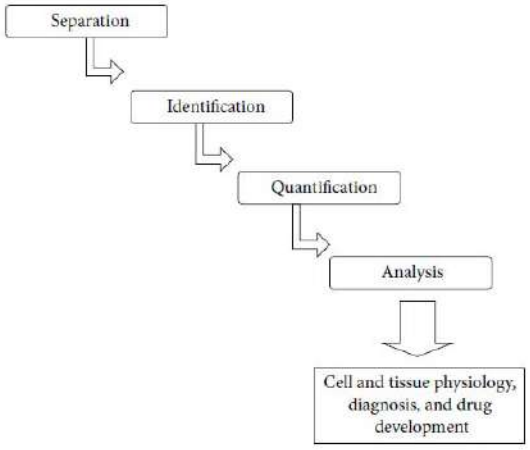

FIGURE 1: The major steps of separation to analysis of the fractionated proteins.

♦ **Matrix-assisted laser desorption/ionization (MALDI)**

Employed for rapid determination of proteins in particular mixtures.[17]

♦ **Two-dimensional polyacrylamide gel electrophoresis**

For analysis of complex protein mixtures derived from biological samples[18].

♦ **Non gel based proteome separation techniques**

Overcome the limitations of two-dimensional electrophoresis while preserving the ability to resolve complex protein and peptide mixtures before mass spectrometry analysis were developed.

♦ **Capillary electrophoresis**

Alternative to both two dimensional electrophoresis for protein separation and to chromatography for peptide separation

♦ **Mass spectrometer-based proteomic analysis**

It is used more frequently in studies of interest to dental scientists including, for example, the analysis of Streptococcus mutans and the analysis of osteoblastic differentiation. It improved ability to detect and characterize the amount of protein in biological samples.[19]

Future trend in proteomics

The use of proteomics and gene expression will advance the diagnosis and treatment of various oral pathological conditions. Three dimentional structure of a protein that is implicated in a particular disease, will provide information to design the drug that interferes with the function of protein. A good example is the identification of new drugs to target and inactivate the HIV-1 protease. The HIV-1 protease is an enzyme that cleaves a very large HIV protein into smaller, functional proteins. The virus cannot survive without this enzyme; therefore, it could be one of the most effective protein targets for killing HIV.[3]

OraSure, OraSure Technologies,N Bethlehem, Pennsylvania, which collects HIV-1 antibodies from gingival tissues using oral mucosal transudate, are entirely based on proteome analysis.[1]

New diagnostic technologies such as nucleic acid and protein microarrays are under development for risk assessment and comprehensive screening of biomarkers. Proteomics can provide comprehensive and systematic information about proteins in a wide array of tissues and organs. The recent advances are leading to the development of more powerful diagnostic tools for practitioners to optimize their treatment predictability.

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INFORMATION FOR AUTHORS

- JSPIK accepts articles from dentists, dental specialists (Any speciality) and students. the articles submitted must have relevance to the speciality of Periodontics. Authors are encouraged to submit research papers, interdisciplinary case reports, interesting case discussions, letters to editor review articles or short communications.
- Manuscripts: Articles should be type written on one side of A4 size (21x28cm) White paper in double spacing with a sufficient margin. One Original and two high quality photostat copies should be submitted. The author's name, and phone number with email for communication is to be written only on the original copy and not on the two photostat copies. In addition to the printed version, a CD containing the article file also should be submitted compulsorily. Use a clear and concise reporting style. SPIK reserves the right to edit, manuscript, to accommodate space and style requirements. Authors are advised to retain a copy for the reference. A soft copy of the article also has to be send to the editor's email- editorspik@gmail.com
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- Tables: Tables should be self explanatory, numbered in roman numbers, according to the order in the text and type on separate sheets of paper.
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JSPIK

Periodontal microsurgery – better vision to perfection

Arya K.S.[1]
Arun Sadasivan[2]
Elizabeth Koshi[3]
Nita Syam[4]

ABSTRACT

In the field of periodontology, an increased demand for mucogingival aesthetics has required the optimization of periodontal procedures. Microsurgery is a minimally invasive surgical technique that shares the attributes with medical microsurgery which will positively influence its professional acceptance. It is performed either by surgical loupes or by an operating microscope. This article reviews the benefits and applications of magnification and microsurgery in the speciality of periodontics.

Key words: Magnification, Microsurgical instruments, Surgical loupes, Operating microscope.

Introduction

Periodontal microsurgery is the natural transition from conventional surgical principles to a surgical ethic in which microscope is used for improved cosmetics, rapid healing and enhanced patient acceptance. Microsurgery is defined as the refinement of basic surgical techniques which is made possible by improved visual acuity gained with the use of surgical microscope.[1]It is based on three distinct principles. First is the enhancement of motor skills, therby improving surgical ability. Second is decreased tissue trauma and third is to achieve passive wound closure. The main aim behind this is to eliminate the dead spaces at the wound edge so that painful and inflammatory phase of wound healing can be avoided.Although loupe optical system improves normal vision, they donot increase visual acuity to the degree required for microsurgery and can result in eye strain,fatigue and pathologic vision changes after prolonged use.[2] However, surgical microscope offers much higher magnification and superior optics when compared to loupe systems.In addition to increasing clinical accuracy,the microscope also plays an important role in diagnostic and non-surgical periodontal procedures.

History

Magnification for microsurgical procedures had been introduced in medicine during the late nineteenth century. Carl Nylen in 1921 conducted the first surgical operation to correct otosclerotic deafness using binocular microcope.[3] Barraquer in 1950[4] began using the microscope for ophthalmological surgery. Jules Jacobson in 1960 coined the term microvascular surgery.[5] By the 1960s microsurgery was standard in many specialities suchas neurology and ophthalmology. Microscope had been introduced to dentistry in 1978 by Apotheker and Jako.[6] Microsurgery was first introduced in to the speciality of Endodontics by Carr.[7] Later in 1993, Dennis A Shanelec adopted the use of magnification in the field of Periodontology.[1]

Concept of microsurgery

The concept of microsurgery offers three distinct advantages referred to as microsurgical triad (Fig.1); that includes illumination, magnification and increased precision in the delivery of surgical skills[8]. Fiber optic technology has been advanced in focusing light on to specific areas for specific purposes. Fiber optic illumination helps in the removal of deposits from deeper pockets[9], which is a standard feature of surgical operating microscopes. Magnification can be attained through the use of the dental loupes and are available in the form of eyeglasses or attached to a headset. They are of 3 types-simple, compound, or prism.

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Compound and prism loupes;commonly used in dentistry which will produce superior magnification.[10] They receives the ergonomic benefits as well as increased visual acuity. The synergy of effective illumination and increased visual acuity allows for increased precision which will result in accurate incisions and less trauma.

Microsurgical instruments

The use of microsurgical instruments reduces tissue trauma and as a result better post-operative healing can be achieved. Microsurgical instruments should be approximately 15cm in length and should be placed in pen grasp position which will improves the surgical ability. The rotating movement of the hand from two o'clock to seven o'clock for right-handed persons is the most precise movement the human body can able to perform.The weight of each instrument should not exceed 15–20 g to prevent muscular fatigue.They should be circular in cross-section for performing smooth rotation movements.Working tips are much smaller when compared to standard sized ones. (Fig.2).For manipulation of tissues, most microsurgical instruments are manufactured under magnification to high tolerences.Titanium instruments are used for strength and lightness and are made with round handles to allow for high precision movements. The needle holder should be equipped with a precise working lock that should not exceed a locking force of 50 g, because high locking forces can produce tremor. The suture of choice is a monofilament suture material such as polypropylene or polydioxanone.The gauge of sutures 9-0 to 12-0 and needles with a diameter of less than 0.15mm are used in microsurgery.[11]

Magnification methods

Magnification systems are available in forms of magnification loupes (Fig. 3) and an operating microscope.[12] (Fig. 4)

Loupes

Loupes are the commonest form of optical magnification used in dentistry.Loupes are two mononuclear microscopes with side by side lenses that are angled to focus on an object and the image formed has stereoscopic properties by virtue of their convergence.A convergent lens optical system termed as Keplerian optical system.The main disadvantage is eye strain,fatigue and even vision changes with prolonged use of poorly fitted loupes.[13] Two types of loupes are used in dentistry-Prism and Compound type. For most periodontal surgical procedures,loupes of 4X to 5X is commonly used which will provide increased visual acuity.

Compound loupes

Compound loupes use converging multiple lenses with intervening air spaces.They are achromatic and these lenses consists of two glass pieces bonded together with clear resin.The specific density of each lens counteracts the chromatic aberration of its paired lens to produce a color correct image.They are commonly mounted in or on eye glasses.

Prism loupes

Prism loupes are low power telescopes containing Schmidt or Rooftop prisms to lengthen the light path through a series of switch back mirrors between the lenses. This will folds the light sothat barrel of loupes can be shortened. Prism loupes produces better magnification,wider depths of field,longer working distances and larger fields of view. The barrels of prism loupes are short enough to be mounted on eye glasses, but at magnifications of 3.0 diameters or greater the increased weight often results in headband-mounted loupes being more comfortable than those mounted on glasses.

Operating microscope

Operating microscopes combine the magnification of loupes with a magnification changer and a binocular viewing system,which will protect against eye strain. They incorporate coated optics with achromatic lenses to provide the best optical resolution and most efficient illumination and works on Galilean principles. To be used in various areas of mouth,the microscope must have extensive horizontal and vertical maneuverability. Advantages of operating microscope include its versatility and excellent coaxial fiber-optic shadow free illumination. Ergonomic and body posture advantages also occur when using the microscope.Good body posture and controlled breathing are inherent to proper microscope use. An additional advantage is the availability of numerous accessories for digital still and video image case documentation. For periodontal surgical procedures, operating microscope has got a magnification from 10X to 20X appears to be ideal.

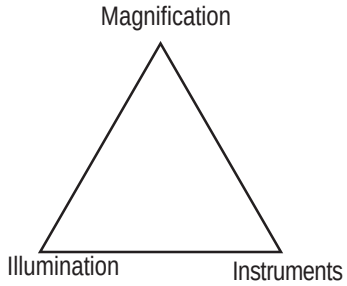

Fig.1 Microsurgical Triad

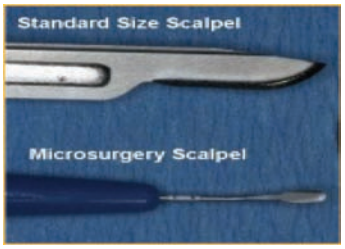

Fig.2 Microsurgical instruments


Fig.3 Magnification loupes


Fig.4 Operating microscope

Advantages of microsurgery

- Surgical decision making is enhanced.
- Passive wound closure with exact primary apposition of wound edge.[14]
- Reduces tissue trauma due to microsurgical instrumentation and suturing.
- Permits precise rotation
- Ergonomics and good body posture.[15]
- Neuromuscular fatigue and occupational skeletal pathology are reduced.
- Improvement of motor skills, enhancing surgical ability.

Microsurgery in periodontics

The primary goals of periodontal surgery include better access to the root surface for performing both regenerative and resective treatments. The introduction of surgical microscopes led to less invasive surgical incisions and flap reflections; thereby providing a bloodless field for the surgeon to work.Controlling homeostasis before closing the wound helps in preventing post-operative hematomas. Microsurgical techniques create flaps with uniform thickness and margins with a scalloped butt joint, which facilitates better adaptation of tissue to the tooth surface. This encourages primary wound healing and enhanced periodontal reconstruction.

Microsurgical principles have applications in resective and regenerative procedures,extractions and ridge preservation procedures,sinus augmentations and repairs,biopsies and large soft tissue transfers. Periodontal microsurgery proven effective in treatment of recession with less trauma and discomfort.[16] Autologous grafts, homologous grafts and heterologous grafts can be used in root coverage procedures. In Millers Class 1 and 11 recession defects, complete root coverage can be possible[17;] but in case of Class III & Class IV defects, only partial root coverage is achieved. Root coverage grafting, is more predictable using autologous grafts because they re-vascularize quickly.The most reliable root coverage techniques include full-thickness gingival graft and sub-epithelial connective tissue graft.Full thickness grafts donot offer as good as color match as subepithelial connective tissue grafts and produce a less natural appearing result,but can be used to restore narrow recession defects. Wide defects can be restored by sub-epithelial connective tissue grafts. Periodontal plastic microsurgery may be applied to those relative to edentulous ridge often involves the addition of bone or soft tissue.[18] Apart from root coverage techniques, papilla reconstructions and ridge augmentation around natural teeth and implants can also be carried out. Ridge augmentation includes guided bone regeneration, block and particulate grafts,soft tissue grafts and a combination of these. To establish adequate vertical height, sufficient soft tissue thickness must be created to provide an emergence profile for pontics or a dental implant prosthesis.Papilla reconstruction may be viewed conceptually as a microsurgical variation of ridge augmentation periodontal plastic microsurgery between two adjacent teeth.[19, 20]

Microultrasonics are used for the removal of supragingival and subgingival calculus.These instruments are probe-like measuring 0.2 to 0.6 mm in diameter and moves with an ultrasonic speed of 25,000 to more than 40,000 cycles per second.They had active working sides on all surfaces of the instrument and provides ultrasonically activated lavage in the working field.[21] The periodontal endoscope helps in better visualization of root surface at magnifications of 24x to 48x and is achieved through a 0.99 mm fiber optic bundle. This fiber is delivered to the gingival margin coupled into an instrument called an Explorer. The captured image will be then relayed on to the screen. The explorers

are of shielded or nonshielded ones. The Shielded explorers are commonly used for periodontal debridement and provides a mechanism for subgingival visualization, while pushing the soft tissue away from the camera lens which is at a lowerlevel from the tip of the shield. This space from the tip of the shield to the camera lens allows for adequate instrumention or endoscopic debridement.

Periodontal microsurgery doesnot compete with conventional periodontal surgery.It is evolution of surgical techniques to permit reduced trauma.Its methodology improves existing surgical practice and introduces the possibility for better patient care to periodontics.[22]

TOMS -Three Dimensional On-Screen Microsurgery System

TOMS is a three dimentional system used for better visualization of the surgical area through the monitor, sothat direct viewing through microscope can be avoided and thereby reduces eye strain.The system consists of two single chip video cameras mounted on to the custom fit eyepiece adapters, a dual camera-controller, a record image processor, a VCR for optional recording, digital monitor, synchronizing signal emitter and 120 MHz shutter glasses.The greatest advantage is that they helps in providing a clear and accurate sense of depth perception.[23]

Drawbacks

1. Technique sensitive
2. High cost
3. Restricted areas of vision
4. Time consuming
5. Loss of visual reference points.

Conclusion

Microsurgery introduces the potential for a less invasive surgical approach in periodontics.The use of microvascular techniques expanded the range of options for reconstructing large anatomical defects in patients. Since the surgical procedure is less traumatic, the duration of healing period as well as patient pain gets reduced. Microsurgery is technique sensitive and more demanding than periodontal macrosurgery,but it results in more rapid healing which can be beneficial to the patient.

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Periimplant complications : A review

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ABSTRACT

This review attempts to group the periimplant complications, mainly due to pathologic changes in the periimplant area, technical failures of implants and esthetic complications; and make aware the therapist to properly diagnose and treat the various complications.

Key words: Periimplant disease, Periimplantitis, diagnosis, treatment.

Introduction :

The periimplant complications can be broadly classified as due to pathologic changes in the periimplant area, technical faliures of implants and esthetic complications. Pathologic changes of the periimplant tissues can be placed in the general category of periimplant disease[1]. Inflammatory changes, which are confined to the soft tissue surrounding an implant, are diagnosed as periimplant mucositis[1]. Progressive periimplant bone loss in conjunction with a soft tissue inflammatory lesion is termed periimplantitis[1]. Periimplantitis begins at the coronal portion of the implant, while the more apical portion of the implant maintains an osseointegrated status[2]. TPS International team for oral implantology (ITI) -implants demonstrated a mean radiographic change in periimplant bone levels of less than 1.1 mm in the first year of function[3]. The percentages of implant sites with bone level changes of more than 0.5 mm between 1 and 2 years was 7% and bone level changes of more than 1 mm were 4%[3]. Hydroxyapatite (HA)- coated implants showed a significant number of implants experiencing moderate (1-3) mm bone loss whereas a smaller number of implants demonstrated severe bone loss[4]. Thus the overall frequency of periimplantitis appears to be in the range of 5% to 10%.

Soft tissue complications such as periimplant mucositis and hyperplasia were noted in 21% to 28% of jaws during the first period of clinical experience with osseointegration[5]. But decreased to a low degree in recent years mainly attributed to improved oral hygiene methods and changes in prosthetic designs.

Etiology

The two major etiologic factors associated with resorption of crestal periimplant bone tissue are bacterial infection and biomechanical factors associated with an overloaded implant site[6].

Bacterial infection: If Plaque accumulates on implant surface, the subepithelial connective tissue becomes infiltrated by large number of inflammatory cells and the epithelium appears ulcerated and loosely adherent. When the plaque front continues to migrate apically, the clinical and radiographic signs of tissue destruction are seen around both implants and teeth however the size of the soft tissue inflammatory lesion and the bone loss is larger around implants. One reason for the increased inflammation around an implant might be the low vascularity soft tissue band and the difference in collagen-fibroblast ratio of gingival tissue, which affects the defense mechanisms around an implant as compared with those seen in tissues around teeth with a periodontal ligament[2,7]. In addition, different implant surface characteristics influence the amount of periimplant tissue breakdown and inflammation, specifically, Hydroxyapatite- coated implants seem to have increased bone loss when compared with titanium implants[4].

Biomechanical factors: Experimental and clinical evidence supports the concept that excessive biomechanical forces may lead to high stress or

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microfractures in the coronal bone to implant contact and thus lead to loss of osseointegration around the neck of the implant[8]. Overloading of implants is clinically difficult to define and measure, overloading is likely to happen when implant is placed in poor quality bone, unfavourable load transmission over implant surface, heavy occlusal function associated with parafunction and poor fit of prosthetic super structure over implants[6].

Technical implant failures

Balshi listed three categories of causes that may explain implant fractures : design and material, non passive fit of the prosthetic framework and physiologic or biomechanical overload[9]. The occurrence of implant fractures can be kept to a minimum through the use of quality controlled implant designs and the consideration of physical principles and biomechanical characteristics of various materials and prosthetic design. Patients with bruxism seem to be at higher risk for such events and therefore need to be screened and informed accordingly[9].

Abutment loosening and fracture: Screw loosening has been reported to occur quite frequently in screw retained fixed partial dentures. Screw retained single crowns may also be prone to technical complications. Reports have shown anywhere from 6% to 49% screw loosening at the first annual check-up[10].

Esthetic complications : Implant placement in the aesthetic zone requires precise three-dimensional tissue reconstruction and ideal implant placement. If the amount of bone does not allow for ideal implant placement and the implant is positioned too apical, buccal, or interproximal a prosthetic profile will be developed with unesthetic dimensions. If the crown form, dimension, shape and gingival harmony around the implants are not ideal, the patients consider the implants-restorations as complications because the result does not represent a natural profile. Appropriate treatment planning and execution keeps esthetic complications to a minimum, although it should be noted that anterior implant work is very technique sensitive and time consuming[6].

Diagnosis

To diagnose a compromised implant site, soft tissue measurements using manual or automated probes have been suggested. Although some reports say that probing is contraindicated, careful monitoring of probing depth and clinical attachment level over time seems useful in detecting changes of periimplant tissue[11]. Radiographic procedures to assess periimplant bone level have been shown to be useful. Standardized radiography, both with and without computerized analysis, have been documented in a number of studies[12]. Aside from pocket formation and radiographic bone destruction assessment, suppuration, calculus build-up, swelling, color changes, and bleeding upon gentle probing have been documented as signs of periimplant disease[13]. Microbial monitoring is useful in evaluating the periimplant health condition and the microbial composition of a periimplantitis site. This information then can potentially be used to determine the etiology of break- down and select a specific antibiotic regimen[14]. Mobility has been extensively described to detect early and late failures after loading of the implants with superstructure[15].

Removal of failed implants:

In cases in which osseointegration has been reduced severely and bone loss has extended into the apical half of the implant or in which the implant demonstrates mobility, implant removal should be considered[16].

Initial phase of Periimplantitis treatment

Occlusal Therapy :

When excessive forces are considered the main etiologic factor for periimplant bone loss, treatment involves an analysis of the fit of the prosthesis, the number and position of implants and occlusal evaluation. Prostheses design changes, improvement of implant number and position, and occlusal equilibration can contribute to arrest the progression of periimplant tissue breakdown[6].

Antiinfective Therapy:

The nonsurgical treatment of periimplant bacterial infection involves the local removal of plaque deposits with plastic instruments and polishing of all accessible surfaces with pumice[17], subgingival irrigation of all periimplant pockets with 0.12% chlorhexidine,

systemic antimicrobial therapy for 10 consecutive days and improved patient compliance with oral hygiene until a healthy periimplant site is established[18]. Mechanical instrumentation may damage the implant surface if performed with metal instruments harder than titanium[19]. The method of choice involves the use of a high pressure air powder abrasive (mixture of sodium bicarbonate and sterile water), this method removes microbial deposits completely from titanium surfaces, does not change the surface topography significantly and does not adversely affect cell adhesion[20]. Irradiation with a soft laser for elimination of bacteria associated with periimplantitis has also shown promising results in the destruction of bacterial cells[21].

Surgical techniques for treatment of periimplantitis :

Periimplant Resective Therapy

The indications for periimplant resective therapy are moderate to severe horizondal bone loss, one and two- walled bone defects, implant position in unaesthetic area. Apically positioned flap techniques and osseous resective therapy are used to correct horizontal bone loss and moderate vertical (less than or equal to 3mm) bone defects and reduce overall pocket depth[6].

Surface polishing- Implantoplasty : The long term goal of the surgical treatment of periimplant breakdown is to arrest the progression of perimplant disease and achieve a maintainable site, for this purpose, all implant surfaces that are smooth and clean coronal to the bone level are preferred. Therefore surfaces with threads or roughened topography such as hydroxyapatite are indicated for alterations with high speed diamond burs and polishers to produce a smooth continuous surface[22]. Periimplant bone defects with predominately horizontal or one walled topographies treated with surgical resective techniques result in healthy shallow pockets postsurgery[23].

Periimplant Regenerative Therapy :

To accomplish regeneration of lost bone tissue and reosseointegration, Guided bone regeneration (GBR) and bone graft techniques have been suggested[6]. In several experimental and clinical studies, the GBR principle using a nonresorbable expanded polytetrafluroethylene membrane has been used for healing of bone defects seen at the time of implant placement[11] and around failing implants[21]. Demineralised freeze dried bone and hydroxyapatite have been used as a supporting graft material for the membrane therapy, but with inconclusive results[24]. The allograft bone undergoes patterns of incorporation similar to those of autografts, but the incorporation tends to be slower and less complete[25]. Until more supportive results for allografts or synthetic graft materials are demonstrated, the use of intraoral autogenous bone grafts are preferred[26].

Conclusion

Post surgical intervention in the management of periimplantitis it is advised to schedule maintenance visits at least every 3 months. This allows for monitoring of plaque levels, soft tissue inflammation and changes in the level of the bone. Thus allowing the therapist to intervene early and prevent a possible failure of implant.

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Current concepts and understandings in the etiology of aggressive periodontitis

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ABSTRACT

The definitions of periodontal diseases have changed regularly over time, according to our understanding of the etiopathogenesis. Aggressive periodontitis comprises a group of rare, often severe, rapidly progressing forms of periodontitis characterized by an early age of clinical manifestation and a distinctive tendency for cases to aggregate in families. This article reviews the most recent concepts in the etiopathogenesis including the microbiological, neutrophil functions, and immunology of aggressive periodontitis and the treatment modalities of aggressive periodontitis.

Introduction

The definitions of periodontal diseases kept changing regularly over time, with better understanding of its etiopathogenesis. At the 1999 international classification workshop, the different forms of periodontitis were reclassified into three major forms; chronic, aggressive, and necrotizing forms of periodontitis and into periodontal manifestations of systemic diseases.

Aggressive periodontitis, as the name implies is a type of periodontitis where there is rapid destruction of periodontal ligament and alveolar bone which occurs in otherwise systemically healthy individuals generally of a younger age group but patients may be older. It tends to have a familial aggregation. Aggressive periodontitis is an autosomal dominant triad with reduced penetrance. Parents, offspring and siblings of patients affected with aggressive periodontitis have a 50% risk of this disease.

The amount of destruction seen at an early age implies that etiologic agents have been able to cause clinically detectable levels of disease over a relatively short time and suggests a high ratio of damage to age. Though localized and generalized chronic periodontitis are considered to be slightly different manifestations of the same disease, major clinical differences between localized and generalized aggressive periodontitis suggests that they are different diseases.

Etiology and pathogenesis

The etiology of aggressive periodontitis may be broadly divided into two categories: bacterial plaque with highly pathogenic bacteria, and impaired host defence mechanism.[1] As all biofilm-caused periodontal diseases, localized aggressive periodontitis is not a mono - infection.

The consensus report at the 1996 World Workshop In Periodontics stated that *Aggregatibacter actinomycetemcomitans* is most often found in aggressive periodontitis whereas *P. gingivalis* and *T. forsythia* are found more frequently in chronic periodontitis.[2] The presence of periodontal pathogens (*P. gingivalis, A. actinomycetemcomitans, T. forsythia,* and *Campylobacter rectus*) cannot distinguish between subjects with chronic and aggressive periodontitis.[3]Some individuals with the disease do not harbor the microorganism.[4]

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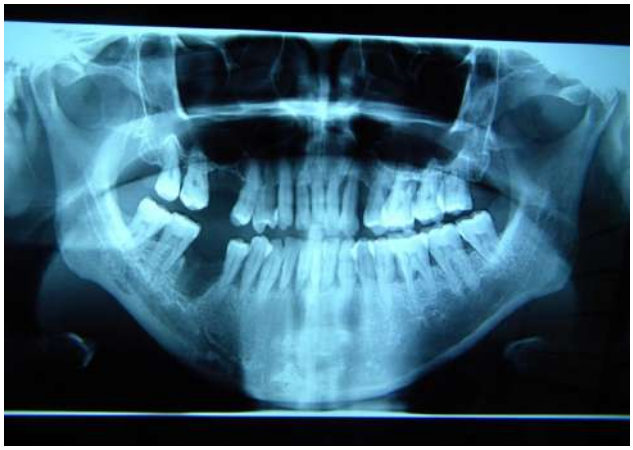

Fig. 1 Panoramic radiograph showing extensive bone loss in upper anterior region - Aggressive Periodontitis

Faveri*et al.*[5] reported the presence of approximately 70 taxas in the subgingival microbiota from sites with probing depths >7 mmin patients diagnosed as having generalized aggressive periodontitis, using culture-independent molecular techniques. The two most prevalent genera detected were *Selenomonas* and *Streptococcus*. Riep et al.[6] reported higher prevalence of *T. lecithinolyticum*in the generalized aggressive periodontitis patients when compared to chronic periodontitis.

Electron microscopic examination of teeth extracted because of localized aggressive periodontitis revealed relatively simple, thin, non-calcified microbial deposits.[7]Immunocytochemical analysis of the microbial deposits on the localized aggressive periodontitis teeth showed that many of the microorganisms were *A. actinomycetemcomitans*.[8]

Matarazzo et al.[9] investigated the diversity, levels and proportions of Archaea in the subgingival biofilm of generalized aggressive periodontitis (GAgP) and periodontally healthy (PH) subjects. *Methanobrevibacteroralis* was found in all 20 samples studied, *Methanobacteriumcurvum/congolense* in three GAgP and six PH samples, and *Methanosarcinamazeii* in four samples from each group.

The earliest pioneering work on neutrophil functions and periodontal diseases in general and aggressive periodontitis in particular,[10][11][12][13] indicated an impairment of neutrophil functions responsible for host protection. The new perspective emphasized the role of the destructive aspect of inflammation in general, and neutrophil-mediated tissue damage and bone resorption in particular, in the pathogenesis of aggressive periodontal diseases.

The earliest studies on a possible impairment of neutrophil function were centered on impaired chemotaxis in response to signals from bacterially derived N-Formyl-Methionyl-Leucyl-Phenylalaninie (f-Met-Leu-Phe) peptides.[14] Most of these early studies, which were performed on peripheral neutrophils revealed a pattern of reduced chemotaxis (directed migration) to f-Met-Leu-Phe at concentrations of 10^{-9} to 10^{-7} M in a significant proportion of aggressive periodontitis patients (72–86%), but unaltered or increased random migration.[19][20][21] Defects inneutrophil chemotaxis were also observed in a skin window test on patients with localized aggressive periodontitis,[15] and in studies that examined both crevicular neutrophils and peripheral neutrophils in the same patient.[16][17]

One early study demonstrated that 86% of localized aggressive periodontitis patients showed impaired neutrophil chemotaxis due to an intrinsic abnormality, while 48% of generalized aggressive periodontitis patients showed an abnormality related to the composition of their serum.[11]

Neutrophil priming in aggressive periodontitis may be due to an inherent defect or acquired from substances in the serum and D or exposure to oral microbiota. The serum of localized aggressive periodontitis patients contains a neutrophil-priming substance that is capable of triggering the release of superoxide from neutrophils.[14] Superoxide generation by neutrophils is also enhanced by exposure to f-Met-Leu-Phe and pre-incubation with *P. gingivalis*[18] or *A. actinomycetemcomitans*.[19] Neutrophil priming by inflammatory cytokines like interleukin-8 in serum has also been implicated in aggressive periodontitis.[20]

Aggressive periodontitis is mediated by a Th-2 response because aggressive lesions have B-cell/plasma-cell nature.[21] The complex regulatory network that are probably operating in aggressive periodontitis can be the conversion of $CD4^+$, $CD25^+$, forkhead box $P3^+$ ($Foxp3^+$) regulatory T – cells to an interleukin-17 –producing cells when co-cultured with dendritic cells selectively activated via dectin-1.[19]

Studies have reported no association between

toll-like receptor – 4 or toll-like receptor – 2 mutation and aggressive periodontitis.[22] Results from various studies suggest that toll-like receptor-2 and toll-like receptor-4 are involved in the pathogenesis of both chronic periodontitis and aggressive periodontitis and that specific polymorphisms of these innate receptors may be associated with disease susceptibility.

Discussion

Preliminary studies have suggested that individuals with generalized aggressive periodontitis have higher subgingival levels of *Selenomonas*sp. and *T. lecithinolyticum* compared to patients with chronic periodontitis.[1]

Aggregatibacter actinomycetemcomitans is capable of causing marked alterations in its host as a result of its powerful toxins and its ability to adhere to host cells and to enter into them and travel through them. One of the most fascinating aspects of the interac-tion of *A. actinomycetemcomitans* with its human host is the evolution of strains (Eg. JP2 clones) that recognize minor genetic differences in the human population. Henderson et al.[23] in a review article on *Aggregatibacter actinomycetemcomitans* shared an interesting idea of using the predatory bacterium *Bdellovibriobacteriovorus*, which was recently shown to be able to kill *A. actinomycetemcomitans* while this bacterium was in its biofilm mode of growth.

The biochemical changes in aggressive periodontitis include:

- Increased expression of proteins lactoferrin, caldesmon, heat shock protein 70, and in the neutrophils,[24]
- High level of serum antibody IgG-2 specific for specific for *Actinobacillus actinomycetemcomitans* and *Porphyromonas gingivalis,*[25]
- Increased serum albumin, immunoglobulin (Ig) gamma2 chain C region, Ig alpha2 chain C region, vitamin D-binding protein, salivary alpha-amylase and zinc-alpha2 glycoprotein in whole unstimulated saliva,[26]
- Increased Levels of platelet-activating factor and prostaglandin E, [27]
- Increased lactate dehydrogenase enzyme, (can be used to distinguish localized and generalized aggressive periodontitis)[28]
- Increased calprotectin in gingival crevicular fluid, (correlate with periodontal disease severity and treatment outcome and can be used as a diagnostic marker for monitoring periodontal treatment),[29],[30]
- Elevated levels of plasma C-reactive protein and interleukin-6,[31] and
- Decreased lactotransferrin, elongation factor 2, 14-3-3 sigma, short palate, lung and nasal epithelium carcinoma-associated protein 2 precursor and carbonic anhydrase 6.[26]

Genetic factors play a role in aggressive periodontitis and, contribute to aggressive periodontitis, with or without interaction with environmental factors.The evidence for genetic influences in aggressive periodontitis exists, but its effect on disease expression is not understood.[32]

The gene polymorphisms associated with higher risk forsusceptibility and severity of aggressive periodontitis are

- IL-6 polymorphism 1363 and 1480[35]
- Interleukin-10 haplotype ATA,[34]
- The del/del genotype of NF –kappa B polymorphism[35]
- D polymorphic allele of TPA (Tissue plasminogen activator) gene polymorphism,[36]
- TIMP2 (tissue inhibitor of metalloproteinase-2) -418G to C gene polymorphism,[37]
- A/G polymorphism in the lactoferrin gene,[38]
- polymorphism of 2518 MCP-1(Monocyte Chemoattractant Protein 1)[39]
- FokI polymorphism of vitamin D receptor gene,and SNP (Single Nucleotide Polymorphism) rs 3795391 (A > G) of S100A8gene.[40]
- SNP (Single Nucleotide Polymorphism) rs 3795391 (A > G) of S100A8 gene.[41]

Several localized aggressive periodontitis loci on chromosomes 1, 4, 6 and 9 have been identified by linkage analysis. To date, it has been commonly reported that the underlying cause of localized aggressive periodontitis is related to leukocyte dysfunction in certain races, and there is a relatively good correlation between neutrophil abnormality and the presence of serum antibodies reacting with *A. actinomycetemcomitans.*[32]

Conclusion

Aggressive periodontitis is characterized by widespread destruction of periodontal tissues in young patients. Age of onset and family history are important additional criteria for diagnosis and classification. Aggressive periodontitis appear to be plasma cell-dominated lesions mediated by Th2 cells. Generalized aggressive periodontitis may represent advanced chronic periodontitis in a young individual with extreme susceptibility, which could explain the common histopathology and immunopathology. Generalized aggressive periodontitis and localized aggressive periodontitis are two different entities or diseases.

Microorganisms that cause periodontal infections are commensal opportunistic pathogens.*Aggregatibacter actinomycetemcomitans* is considered a possible etiological agent for aggressive periodontitis, especially in case of localized aggressive periodontitis. *Aggregatibacter actinomycetemcomitans* seems to be associated with the onset of localized aggressive periodontitis and *Porphyromonas gingivalis, Tannerella forsythia, Treponema denticola, Campylobacter gracilis, Eubacteriumnodatum* and *Prevotella intermedia* play an important role in disease progression. Herpesviruses may be related to the etiology of aggressive periodontitis and chronic periodontitis by triggering periodontal destruction or by increasing the risk for bacterial infection. Individuals with generalized aggressive periodontitis have higher subgingival levels of *Selenomonas*sp. and *T. lecithinolyticum* compared to patients with chronic periodontitis. *Selenomonas*sp (*Selenomonas. sputigena* and *Selenomonasdianae*) and *Mitsuokella*sp. HOT 131 may be associated with the pathogenesis of generalized aggressive periodontitis.Higher levels and proportions of Archaea/total prokaryotes (e.g; *Methanobrevibacteroralis, Methanobacteriumcurvum/congolense* and *Methanosarcinamazeii.)* are also observed in generalized aggressive periodontitis and indicate a possible role as an environmental modifier in generalized aggressive periodontitis.

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A comparative evaluation of soft tissue wall of gingival pocket with pocket wall of chronic and aggressive periodontitis: A light microscopic study

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ABSTRACT

A cross sectional study was undertaken to comparatively analyze the epithelial lining changes in the soft tissue wall of gingival sulcus in conditionswith and without attachment loss with following objectives: 1)To analyze the gingival pocket under light microscope. 2) To analyze the sulcular lining changes in the soft tissue walls in cases of chronic and aggressive periodontal pockets. 3)To compare the epithelial and soft tissue wall changes in cases of gingival pocket and chronic and aggressive periodontal pockets. Methodology: Three gingival biopsy samples from 1) gingival pocket, 2) chronic periodontal pocketand 3) aggressive periodontal pocket were consider for study. Histopathologic specimens were observed under the light microscope to analyze the epithelial changes in the soft tissue wall of each condition.Observation: Under normal light microscope, histopathologic section showed no major difference between the soft tissue wall of gingival pocket, chronic periodontitis and aggressive periodontitis, though inflammatory changes in each of the tissues were evident.

Key words: Gingival pocket. Periodontal pocket, Histopathology, Inflammatory cells

Introduction

Gingiva invest and protect the underlying periodontal structures and also act as an indicative for the initiation of periodontal disease. Microscopic changes in gingival sulcus are considered as the first changes in periodontal disease. Thus clinical symptoms of inflammation may appear subtle in the early stages of gingivitis but the underlying histopathological changes are quiet marked[1]. The microscopic changes that happen into the soft tissue wall of the gingival sulcus in various situations like chronic and aggressive periodontitis is indeed a curious concern fora periodontist. Thus this study focus on the microscopic changes that occur in soft tissue wall of gingival sulcus in condition like relatively non infected gingival pocket,chronic periodontal pocket and aggressive periodontal pocket.

Need of the study

1. To know the histopathological changes of soft tissue wall of gingival pocket, chronic and aggressive periodontal pocket under light microscope.

2. To know the limitations of routine light microscope for assessing the histopathologic changes of soft tissue wall of pocket.

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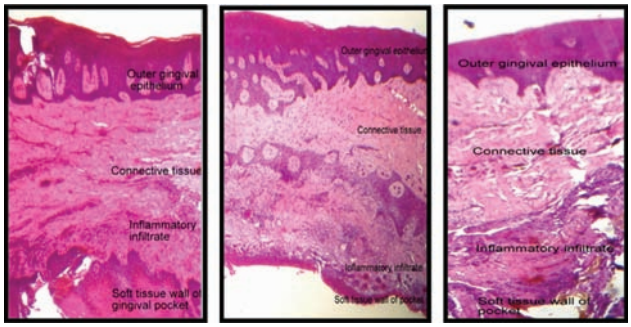

Fig. I(a) I(b) I(c)

FigI.(a):Histopathologic section ofsoft tissue wall of pseudopocket,(b): Histopathologic section of chronic periodontitis,(c): Soft tissue wall of Aggressive periodontitis

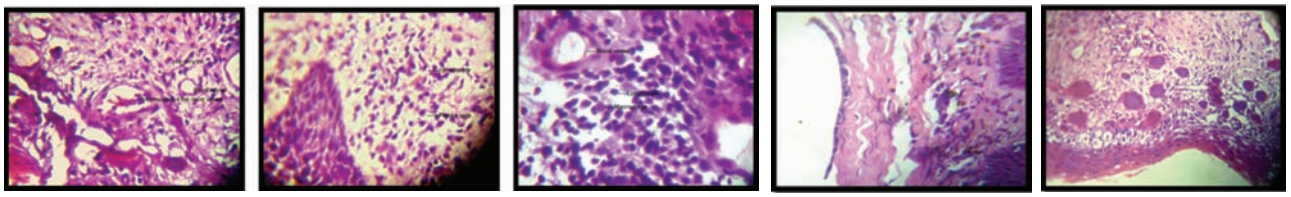

Fig. II(a) II (b) II(c) II(d)II(e)

FigII (a): Lymphocytes emerging from the blood vessel, (b) Inflammatory infiltrate containinglymphocytes and plasma cells, (c): Histologic section showing blood vessels, lymphocytes and macrophages,(d): Suggesting the presence of dental cuticle like structures, (e): Calcified masses seen just beneath the sulcular epithelium in the connective tissue.

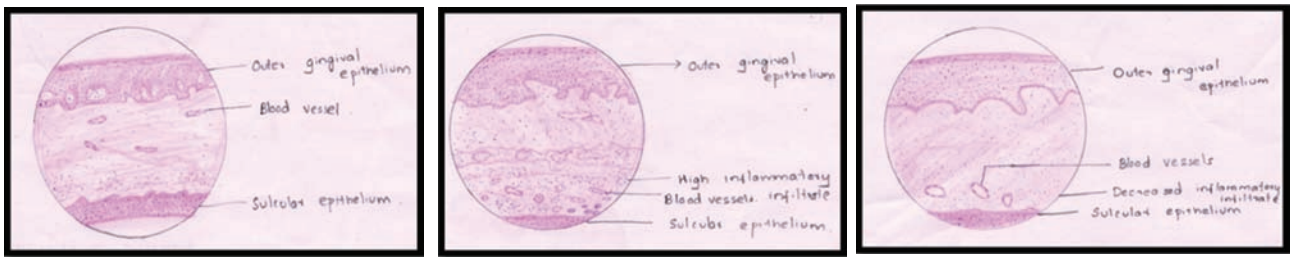

Fig. III (a) III (b) III (c)

Fig III: Diagrammatic representation of the histologic sectionIII (a)Gingival pocket, (b)Chronic periodontitis,(c) Aggressive Periodontitis

Rationale for the study

1. To find out histopathological changes in soft tissue wall of gingival sulcus of commonly occurring three conditions.

2. To figure out its microscopic level of inflammatory changes beyond its clinical condition.

Objectives of the study

1. To analyze the gingival pocket under light microscope.

2. To analyze the sulcular lining changes in the soft tissue walls in cases of chronic and aggressive periodontal pockets.

3. To compare the epithelial and soft tissue wall changes in cases of gingival pocket and chronic and aggressive periodontal pockets.

Study participants

Patients undergoing periodontal surgical treatment in the Department of Clinical Periodontology and Oral Implantology, Royal Dental College, Chalissery

Sample size

Biopsy specimen of gingiva excised from gingival pocket and pocket walls of one chronic and one aggressive periodontitis as a part of its surgical management.

Three samples were taken from 1) Gingival pocket 2) Chronic periodontal pocket and 3) Aggressive periodontal pocket.

Criteria of sample collection

Gingival Pocket

- >18 years of age;

- No sites with PD and CAL measurements >3 mm

- No Mobility

- <20% of sites exhibiting gingival bleeding and/ or bleeding on probing.

Chronic periodontitis[2]

- >35 years of age;

- Minimum of six teeth with at least one site each with PD and CAL >5 mm;

-At least 30% of the sites with PD and CAL >4 mm and

-Presence of BOP.

Aggressive periodontitis[3]

-<35 years of age;

- Minimum of six permanent incisors and/or first molars with at least one site each with probing depth (PD), clinical attachment level (CAL) >5 mm and bleeding on probing (BOP);

- Minimum of three teeth other than first molars and incisors with at least one site each with PD and CAL >5 mm;

-Familial aggregation (at least one other member of the family presenting or with history of periodontal disease).

Soft tissue wall was obtained from the required site and then sent to laboratory for tissue processing and staining of the specimen.Later the specimen was viewed under light microscope.

Methodology

Armamentarium:

Periodontal probe,mouth mirror, local anesthesia, Pocket marker,15 blade, Gracey curette, Cumin Scaler, Glass Container and 10 % Formalin.

Procedure:

Patient consent was obtained for each cases before starting the case. Patient was explained the tissue removed will be assessed for the study.

Site of sample collection

Gingival pocket - 26 region

Chronic periodontal pocket - 15,16 region

Aggressive periodontitis -15,16 region

After anesthetizing the required area, pocket marking was done using pocket marker.The incision for undisplaced flap surgery was performed for pocket removal. The obtained tissue was washed in saline and stored in a glass container with 10% Formalin solution. Later the sample was sent to Department of Oral Pathology for histopathological examination. The histologic sections was observed under light microscope in 10 X,40X and 100 X. Photographs were obtained

Observations

Histopathologic feature

Gingival pocket site (Fig I a)

Based on examination of histologic section of soft tissue wall of gingival tissues from biopsy,in gingival pocket there was inflammatory cells which was distributed widespread. Among the inflammatory cells, neutrophils and lymphocytes were more in number and were more seen in connective tissue just beneath the sulcularepithelium.Collagen fibers were seen in the connective tissue ina haphazard pattern.Blood vessels were also dispersed in the connective tissue.

Chronic periodontitis region (Fig I b)

In the histologic section of clinically diagnosed chronic periodontitis case, there was dense infiltration of inflammatory cells especially in the connective tissue just beneath the sulcular epithelium.The lymphocytes and plasma cells were the prominent inflammatory cells.(Fig IIa) Macrophages were also present.There were numerous blood vessels seen more near the sulcular epithelium.(Fig IIb) At certain sites, lymphocytes were seen emerging from the blood vessel.(Fig IIc)There was also dense collagen fiber which was distributed haphazardly in the connective tissue. Also calcified masses were present in the connective tissue just beneath the sulcular epithelium.(Fig IIe) At certain regions of sulcular epithelium, there is loss of continuity of the epithelium.

Aggressive periodontitis (Fig Ic)

In the histologic section of aggressive

periodontitis, there wascomparatively less inflammatory cells in the connective tissue.There were inflammatory cells, mainly the lymphocytes and plasma cells, in thesubepithelial connective tissue region. The sulcularepithelium was extremely fragile suggesting of the ulcerative nature of the epithelium.There was dense collagen fibers present in the connective tissue.

Diagrammatic representation of the histopathologic section have been represented in Fig III.

Discussion

Gingivitis and periodontitis are infectiousdiseases that afflict a high percentage of thepopulation, even at younger ages. The early concept that gingivitis and periodontitis are separate diseases, one being an extension of the other, is still considered valid today.[4] Periodontal disease has been classified by Page & Schroeder (1976)[5] and Schluger et al. (1990)[6], as a sequence of events in which specific cytologic and morphologic changes occuring the gingiva in stages. These have been classified progressively as the initial lesion, the early lesion, and the established lesion. Only in the advanced lesion is there mention of the extension of the inflammatory infiltrate into the alveolar bone and periodontal ligament.

It is important to understand that each of the periodontal components has its very specialized structure and that these structural characteristics directly define function[7]. Few studies have been conducted to compare the histopathological changes of chronic and aggressive periodontitis.[8,9,10,11,12,13,14,15] Though minimum inflammatory cells are documented in normal gingiva,in our study there were a significant number of inflammatory cells in normal gingiva. Age, sex,host response are few determinants for this difference.[6] Most of the inflammatory cells were lymphocytes and plasma cells. In chronic periodontitis case,there were comparable amount of inflammatory cells as in normal gingiva. There was no finding such as thickening of sulcular epithelium, ulceration of epithelium and rete peg in sulcular epithelium. This may be because of the stage of chronic periodontitis. Inflammatory cells include lymphocytes,plasma cells and macrophages. In aggressive periodontitis case, there was significant amount of inflammatory cells in subepithelial region. Also the sulcular epithelium was more fragile and ulcerated. Inflammatory cells include the plasma cells and lymphocytes.

A peculiar finding that was found is a thin layer of film with haematoxylin stain overlying the epithelium(Fig II d). There was some collagen fibers in between this layer and epithelium, suggesting the possibility of dental cuticle. Dental cuticle consists of a layer of homogenous organic material of variable thickness (approximately 2.5μm) overlying the enamel surface.It is non-mineralized and not always present.It may be present over the cemento enamel junction, deposited over a layer of afibrillarcementum,which overlie the enamel. The cuticle may be present between the junctional epithelium and the tooth. Ultrastructuralhistochemical studies have shown that the dental cuticle is proteinaceous and it may be an accumulation of tissue fluid components.[16]

Another finding that was found was localized calcified masses that are seen just beneath the sulcular epithelium from the biopsy of chronic periodontitis case (Fig II e). Cementicles are round lamellated cemental bodies that lie free in the periodontal space or are attached to the root surface. Cementicles develop around a central nidus, which may be a spicule of bone or cementum or calcified epithelial rests or phleboliths (vein stones).[17] Mostly they are found in an aging person along the root. They may be found at the site of trauma.[18]Cementicles are rarely seen in gingiva. They can be incorporated in the event of trauma or can be incorporated through scaling. Differential diagnosis of these calcification are seen in ossifying fibroma,[19]cemento fibrous dysplasia,[20] cememtoma[21] etc.

Limitation of this study includes difficulty in differentiating a definite clear cut difference between a gingivitis, chronic periodontitis and aggressive periodontitis. Immunohistochemistry may be a next advanced level for this dilemma. By detecting the presence or increased number of specific cell receptors,the stage and type of periodontal disease may be differentiated.[22] By knowing the nature of periodontal disease, a more definite diagnosis, prognosis and treatment plan can be achieved.

Conclusion

From the histologic sections that we have viewed it is clear that how well the outer gingival epithelium

and how weak the sulcular epithelium are structurally arranged. In periodontitis there are some important changes in the soft tissue wall like rete peg formation, thickening of the epithelium and ulceration of the epithelium. So by knowing the early alteration of the epithelial changes, the importance of treatment planning is becoming much clearer.Under normal light microscope, it is difficult to differentiate between soft tissue wall of gingival pocket,chronic periodontitis and aggressive periodontitis. So may be with advanced histochemical analysis the differentiation of periodontal disease will become much more appreciable.

Acknowledgment

Our special gratitude to Dr.MahijaJanardhanan, Department of Oral Pathology, Amrita Institute of Dental Science, Edapally for giving valuable knowledge throughout this study.

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JSPIK

Regenerative procedures in periodontics - a compilation of systematic reviews

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ABSTRACT

The field of Periodontics is rapidly changing with advances in the ability to diagnose, prevent disease and slow its progression, and regenerate lost periodontium. One important element of evidence-based periodontology is the systematic review. Systematic reviews are a research design termed "research synthesis" as they use research methodology to pool data from multiple studies that address a particular hypothesisand are considered as gold standard in evidence. Applying the evidence-based process to the periodontal literature will improve periodontal treatment. Surgical pocket therapy combined with regenerative procedures and barrier membranes used in the treatment of intrabony defects, maxillary facial and mandibular Class II furcation defects, and dehiscence defects resulted in significant clinical improvement. Lately newer materials with potential for enhanced regeneration are being marketed. This review is an attempt to compile the systematic reviews of various regenerative procedures,materials and their outcomes.

Keywords: Evidence- based periodontology, Systematic Review, Surgical pocket therapy, Periodontal Regeneration

Introduction

Periodontology has a rich background of research, efficient use of this wealth of research data needs to be integrated in periodontal practice. Evidence-based periodontology aims to facilitate such an approach, accelerating the introduction of best research into patient care.

The evidence-based approach strives to strengthen clinical experience through the systematic evaluation of information, which allows the clinician to benefit from the amassed data. In an evidence-based approach, all evidence is not given the same weight. The stronger the evidence, the stronger the recommendation it will support.[1]

Applying Evidence Based Medicine principles to dentistry, the American Dental Association developed the following definition for the term Evidence Based Dentistry: " An approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient' s oral andmedical condition and history, with the dentist' s clinical expertise and the patient' s treatment needs and preferences."

What is a systematic review?

A systematic review can be defined as a review of a clearly formulated question that attempts to minimize bias using systematic and explicit methods to identify, select, critically appraise and summarize relevant research [2].

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Although the term meta-analysis is often used interchangeably with systematic review, strictly speaking a meta-analysis is an optional component of a systematic review undertaken by members of The Cochrane Collaboration adhering to a review. The term systematic reviewrefers to the whole process of finding, selecting, appraising, synthesising and reporting evidence, and meta-analysis refers to the specific statistical technique of combining the data from individual studies. Systematic Reviews and Meta analyses are considered the gold standard and the highest level of evidence because of their strict protocols to reduce bias.

Cochrane reviews are systematic specific methodology. The Cochrane Collaboration is an international organisation that aims to help people make well-informed decisions about healthcare by preparing, maintaining and promoting the accessibility of systematic reviews of the effects of healthcare interventions.

Indications for surgical pocket therapy:

- to gain access to achieve more effective removal of calculus and the associatedsubgingival microbiota
- to manage persistent diseased sites with deep probing depths
- the management of periodontal abscesses
- surgical procedures to facilitate and enhance restorative, prosthetic, and cosmeticdentistry.

The contraindications for surgical pocket therapy

- inadequate plaque control by the patient or non-compliance with supportive periodontal therapy or shallow probing depths.
- medical conditions
- anatomic limitations
- a concern for cosmetic consequences
- advanced lesions that may limit prognosis
- consideration of psycho-social factors.[3]

Indications for regenerative therapy:

Periodontal regenerative procedures are indicated where the endpoint achieved would improve the local anatomy and/or function and prognosis of the tooth/teeth or jaw region.

Evidence exists demonstrating that regenerative procedures used in the treatment of intrabony defects, maxillary facial and mandibular Class II furcation defects, and dehiscence defects result in significant clinical improvement. Less favorable results have been reported for Class III furcations and horizontal defects.

Contraindications for regenerative therapy:

There are no specific factors that are contraindications to regenerative therapies except for general contraindications for surgical periodontal therapy; i.e., acute and/or debilitating systemic conditions that place the patient at risk. A number of factors may modify outcomes of regenerative therapy.

Two factors have been identified that adversely affect outcomes:

1) Inadequate plaque control/poor compliance with supportive periodontal therapy and

2) Smokers/smoking.

Therapeutic endpoints of success:

The goal of periodontal regenerative therapy is complete regeneration of the periodontal attachment apparatus. Clinical criteria provide surrogate evidence of periodontal regeneration,since human histologic specimens are difficult to obtain. These clinical criteria include bonefill of osseous defects (or crestal bone growth) and gain of clinical probing attachment level.

Regenerative therapy can improve clinical probing attachment and bone levels, decrease probing depth and tooth mobility, improved esthetics, and reduction in furcation involvement. The extent of regeneration necessary to influence long-term tooth prognosis has not been established[4]. Intra-operative factors such as surgical flap design, defect, and root management, regenerative material placement, flap position and postoperative management may influence outcomes of therapy. Age does not appear to have an adverse influence on outcomes of regenerative therapy. No evidence exists indicating that systemic conditions; e.g.,diabetes, may influence outcomes of regenerative therapy. No evidence exists regarding theuse of barrier membranes in patients requiring prophylactic antibiotic coverage.

Compilation of systematic reviews on surgical pocket therapy & regenerative procedures

➢ **A systematic review of guided tissue regeneration for periodontal furcation defects.What is the effect of guided tissue regeneration compared with surgical debridement in the treatment of furcation defects?**

GTR was consistently more effective than OFD in reducing open horizontal furcation depths, horizontal and vertical attachment levels and pocket depths for mandibular or maxillary class II furcation defects[5].

➢ **A systematic review of guided tissue regeneration for periodontal infrabony defects**

GTR was consistently more effective than OFD in reducing open horizontal furcation depths, horizontal and vertical attachment levels and pocket depths for mandibular or maxillary class II furcation defects. However, these improvements were modest, variable and there was only a limited number of studies available to appraise the effects, thus limiting general conclusions about the clinical benefit of GTR. Future studies should aim to identify factors associated with achieving consistent and more pronounced benefits over open flap debridement[6]

➢ **Guided Tissue Regeneration for the Treatment of Periodontal Intrabony and Furcation defects. A systematic Review**

GTR was more effective than OFD in improving attachment levels. However, there was marked variability between studies and general conclusions about the clinical benefit of GTR are limited by this heterogeneity. Future studies should aim to identify factors associated with achieving consistent benefitsover open flap debridement. Open flap surgery should remain the control comparison in these studies[7].

➢ **The efficacy of bone replacements grafts in the treatment of periodontal osseous defects. A systematic review**

This systematic review indicate that bone replacement grafts provide demonstrable clinical improvements in periodontal osseous defects compared to surgical debridement alone[8]

➢ **Growth and Amelogenin like factors in periodontal wound healing. A systematic review**

There is enough evidence supporting the use of EMD (Emdogain) for periodontal osseous defects to improve CAL and reduce PD, although long-term benefits have not been established. EMD had demonstrated notable consistency among the studies investigated in terms of superiority to controls (in general compared to open flap debridement)[9]

➢ **Enamel Matrix Derivative for Periodontal Tissue Regeneration in Treatment of Intrabony Defects: A Cochrane Systematic Review**

EMD is able to significantly improve PAL levels and PPD reduction when compared to flap surgery; however, there is no evidence that more teeth could be saved. There was no evidence of important differences between EMD and GTR[10]

➢ **Guided tissue regeneration for periodontal intrabony defects –a Cochrane Systematic Review**

More research is needed to identify the most important patient, site and technique factors associated with successful outcomes. This should then be followed by independent trials showing a more consistent benefit of GTR over OFD, before acceptance into wider practice. Until consistent benefits from GTR can be shown, open flap debridement should remain the control comparison [11].

➢ **Non-bioabsorbable vs. bioabsorbable membrane: assessment of their clinical efficacy in guided tissue regeneration technique. A systematic review**

The use of any barrier type or EMD configuration was found to yield more Clinical Attachment Level (CAL) gain than any open flap configuration. Other than collagen without grafts versus non-bioabsorbables without grafts, no other comparison between membranes and EMD found any significant differences ($P > 0.05$). GTR was confirmed to be superior to open flap debridement[12].

➢ **The adjunctive use of platelet-rich plasma in the therapy of periodontal intraosseous defects: a systematic review**

Diverse outcomes (positive and negative) have been reported for the efficacy of PRP combined with various therapeutic bioactive agents/procedures, reflecting the limited and heterogeneous data available

and possibly suggesting that the specific selection of agents/procedures combined with PRP could be important. Additional research on the efficacy of each specific combination of PRP is necessary[13]

Ø **Is Platelet Concentrate Advantageous for the Surgical Treatment of Periodontal Diseases? A Systematic Review and Meta-Analysis**

PRP may exert a positive adjunctive effect when used in combination with graft materials, but not with GTR, for the treatment of intrabony defects. No significant benefit of platelet concentrates was found for the treatment of gingival recession[14].

Ø **Periodontal Regeneration With Enamel Matrix Derivative in Reconstructive Periodontal Therapy:A Systematic Review**

In the treatment of intrabony defects, the use of EMD is superior to control treatments but is as effective as resorbable membranes. The additional use of EMD with a coronally advanced flap for recession coverage will give superior results compared with a control but is as effective as a connective tissue graft. The use of EMD in furcations will give more reduction in horizontal furcation defect depth compared with resorbable membranes[15].

Conclusion

The practice of periodontology continues to increase in complexity. Developments in therapies and techniques, changing socio-demographic patterns, increasingly knowledgeable health care consumers and the information ' explosion', all are placing greater demands on clinical decision making. As health care practitioners it is important to offer the best possible care for the patients.[1]

Defence of clinical decisions increasingly requires reliable data or evidence to support the instance taken. Evidence-based approach (EBA) offers a bridge from science to clinical practice.[16]

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Periodontal plastic surgeries for gaining attached gingiva:current trends and concepts (a 5-year literature review)

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ABSTRACT

Gingival recession remains an important challenge in dental esthetics, and for a dentist it is both concerning esthetics as well as maintenance of a healthy periodontium around the concerned tooth. Though different surgical techniques are followed in meeting these requirements, there has been always a quest for a more predictable one. Though autogenous sub epithelial connective tissue graft (SCTG) is generally agreed to be the most predictable one, it bears the risk of having surgical associated difficulties for patients and demand heavy surgical skill of the operator. Several alternative techniques to substitute these conventional surgeries are being introduced in recent years with equal predictability. This is a 5 year literature review aimed at finding the recent advances in this field of plastic surgery practiced worldwide in gaining the width of attached gingival, and also it attempts at identifying the best material and technique in this field of periodontal plastic surgery.

Introduction

Mucogingival therapy is the procedure for correction of defects in morphology, position, and/or amount of soft tissue and underlying bone support at teeth and implants.[1] In 1993 Miller proposed the term periodontal plastic surgery, considering that mucogingival surgery had moved beyond the traditional treatment of problems associated with the amount of gingiva and recession type defects to also include correction of ridge form and soft tissue esthetics.[2]

Periodontal plastic surgery would accordingly be defined as "surgical procedures performed to prevent or correct anatomic, developmental, traumatic or disease-induced defects of the gingiva, alveolar mucosa or bone"[3]

Among treatment procedures that may fall within this definition are various soft and hard tissue procedures aimed at:

- Gingival augmentation
- Root coverage
- Correction of mucosal defects at implants
- Crown lengthening
- Gingival preservation at ectopic tooth eruption
- Removal of aberrant frenulum
- Prevention of ridge collapse associated with tooth extraction
- Augmentation of the edentulous ridge.[2]

Mucogingival therapy is a broader term which includes nonsurgical procedures like papilla reconstruction by means of orthodontic or restorative therapy. Periodontal plastic surgery includes only surgical procedures of mucogingival therapy.[4] The

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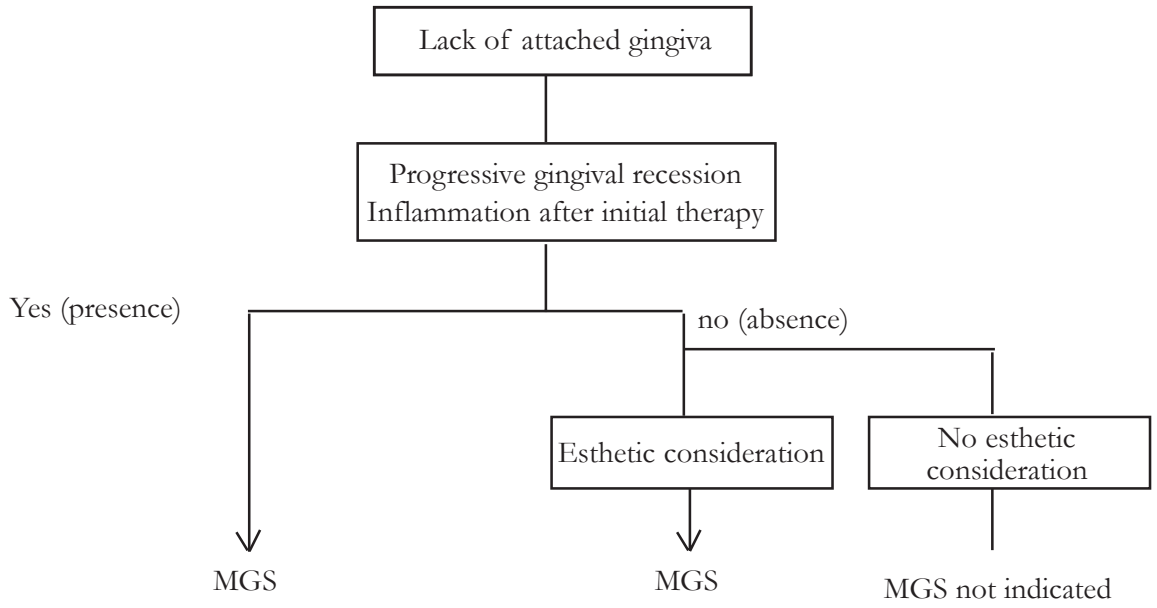

Fig.1 Indications for mucogingival surgeries[5]

ultimate aim of mucogingival surgery is creation or widening of attached gingiva.

Objectives of periodontal plastic surgeries

• Main objective of mucogingival surgery is shifted to improve the periodontal environment by increasing the attached gingiva and providing root coverage.[5]

• Mucogingival surgery is appropriate where there is little attached gingival and persistent inflammation (after initial therapy) or in areas with advanced gingival recession.

The three objectives of periodontal plastic surgery are as follows: [4]

1. Problems associated with attached gingiva
2. Problems associated with shallow vestibule
3. Problems associated with aberrant frenum

Importance of attached gingiva and periodontal health

"Adequate" zone of gingiva was considered critical for the maintenance of marginal tissue health and for the prevention of continuous loss of connective tissue attachment.[6,7]

Prevailing concept was that narrow zone of gingiva was insufficient:

(1) To protect the periodontium from injury caused by frictional forces encountered during mastication

(2) To dissipate the pull on the gingival margin created by the muscles of the adjacent alveolar mucosa.[8]

(3) Reduce subgingival plaque formation because of improper pocket closure resulting from the movability of the marginal tissue.[9]

(4) To avoid favor attachment loss and soft tissue recession because of less tissue resistance to apical spread of plaque-associated gingival lesions.[10]

"Adequate" or "sufficient" dimension of the gingiva varied, less than 1 mm of gingiva may be sufficient[11], others claimed that the apicocoronal height of keratinized tissue ought to exceed 3 mm[12]. A third category of authors had a more biologic approach to the question and stated that an adequate amount of gingiva is any dimension of gingiva which

(1) is compatible with gingival health or

(2) prevents retraction of the gingival margin during movements of the alveolar mucosa[13]

Techniques to gain attached gingiva

• Gingival augmentation apical to the area of recession

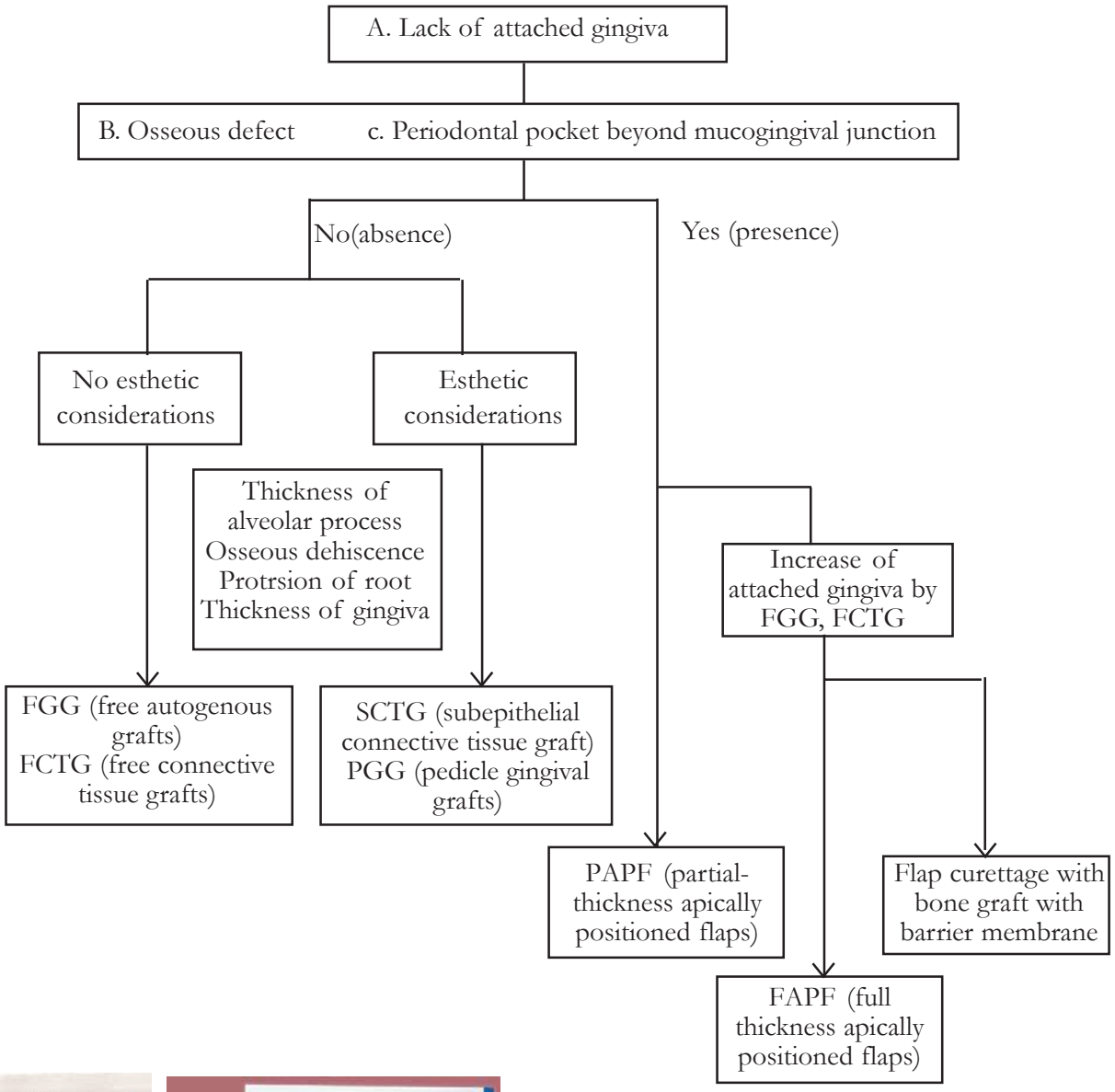

Fig. 3 Acellular dermal matrix graft

Fig.4 Mucograft

1. Free gingival autograft
2. Free connective tissue autograft
3. Apically positioned flap

• Gingival augmentation coronal to the recession (root coverage)

1. Free gingival autograft
2. Free connective tissue autograft
3. Pedicle autografts

a. Laterally (horizontally) positioned

b. Coronally positioned includes Semilunar pedicle (Tarnow)

4. Subepithelial connective tissue graft (Langer)
5. Guided tissue regeneration
6. Pouch and tunnel technique

Other techniques

• The vestibular extension technique, originally described by Edlan and Mejchar, produces statistically significant widening of attached nonkeratinized tissue.

Fig.5: Emdogain

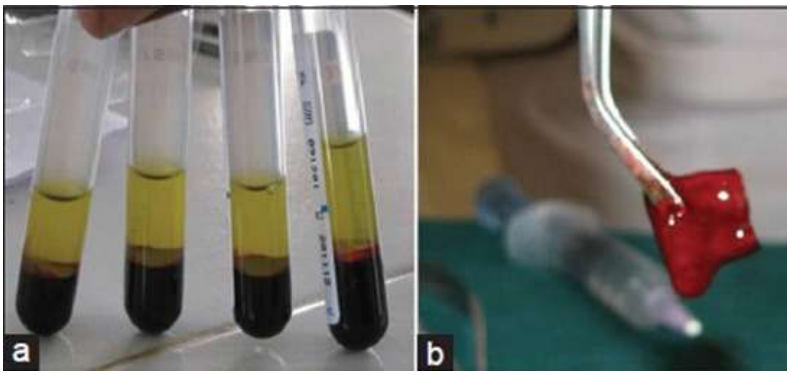

Fig 6: (a) Platelet-rich plasma (b) Platelet concentrate graft (PRP + COLLACOTE)

- Fenestration operation was designed to widen the zone of attached gingiva with a minimum loss of bone height. It has also been called periosteal separation.

Recent advances

- Acellular dermal matrix graft
- New collagen matrix (mucograft)
- Barrier membranes
- Enamel matrix derivative
- Living tissue – engineered human fibroblast derived dermal substitute
- Platelet concentrate graft

Discussion:

A review of articles published in the last 5 years reveals that the main aim of increasing attached gingiva to promote gingival health has been performed using graft materials other than autogenous graft. Prior to performing a mucogingival surgery, the practitioner should always select the most predictable method to achieve successful root coverage.

The main goal of mucogingival surgery is to treat gingival recessions that adversely affect patient esthetics. In recent years several studies have compared different surgical techniques. In addition to treating recessions, other goals are to stop hypersensitivity and prevent root caries.

One of the primary reasons for root coverage has been attributed to establishing an adequate width of keratinized tissue.

There were many advancement in the field of periodontal plastic surgeries using materials other than connective tissue graft. Current trends in periodontal plastic surgery techniques to gain attached gingiva are acellular dermal matrix graft, new collagen matrix (mucograft), barrier membranes, enamel matrix derivative, living tissue – engineered human fibroblast derived dermal substitute and platelet concentrate graft.

Among them the use of mucograft or new collagen matrix prevails to be the most agreeable technique to date.

A 5 year literature review revealed use of many potential alternative to grafting like-barrier membrane, enamel matrix derivative, acellular dermal matrix, new collagen matrix (mucograft), living tissue – engineered human fibroblast-derived dermal substitute, platelet concentrate graft.

Studies by Ahmet Efeoqlu[14] using acellular dermal matrix derivative indicated that it is a non-vital and non-cellular scaffold and its survival depends mainly on revascularization and repopulation of host recipient tissues from blood vessels and tissue cells. It can only increase the zone of keratinized gingiva indirectly.

Study by Marmar Modarressi[15] showed sites treated with acellular dermal matrix revealed 1.11 nm decrease in keratinized tissue width.

The reason for this may be autogenous connective tissue originates from keratinized gingiva whereas acellular dermal matrix may originate elsewhere in the body. Healed acellular dermal matrix sites were similar to scar tissue.

Daniele Cardaropoli[16] (2009) reasoned the increased keratinized was because of (1) tissue

maturation following healing and mucogingival junction tends to be located at its genetically determined position,[17,18] (2) quality of tissue healing beneath the flap, since the inductive properties in the periodontal ligament caused by the regenerative procedures can cause surface keratinization.

Study by Farideh Haghighate[19] using ADMA favored the use of ADMA, the reason was attributed to uniform thickness of ADMA which causes better graft adaptation.

Contradictory results demonstrating the limitations and complications of ADMA, such as an insignificant amount of keratinized gingiva obtained and significant graft shrinkage, have been reported. Myron Nevins et al.[20], after considering the disadvantages of ADMA, used an extracellular matrix membrane (Dynamatrix). This study indicated effective and predictable increase in keratinized gingiva.

In a study by Balint Molnar et al.[21], they showed that histologic and clinical outcomes of using collagen matrix had this matrix completely incorporated in the adjacent host connective tissue without any sign of inflammation.

Collagen matrix with coronally advanced flap technique was studied by Vignolette et al.[22] wherein they concluded that collagen matrix with coronally advanced flap was more effective in promoting new cementum and limiting epithelial proliferation than with coronally advanced flap alone.

The use of xenogenic collagen devices were limited as barrier membrane for guided bone regeneration[23] and guided tissue regeneration procedures[24]. Recently, they are specifically designed for soft tissue regeneration[25] and for keratinized tissue augmentation.[20]

Roberto Rotundoet al.[26] used new collagen matrix (mucograft) as a graft substitute to conventional connective tissue graft for treatment of multiple gingival recessions. They observed an increased amount of keratinized tissue and optimal tissue integration of grafted material. Harvesting a graft from the palate leads to increase in patient morbidity and surgical chair time. This also requires adequate surgical skills to overcome difficulties like a flat palatal profile, thin palatal masticatory mucosa and the need for a great amount of connective tissue.

Kecele H. G. used platelet gel along with connective tissue graft in their study.[27] They found that Platelet Rich Protein (PRP) did not provide an additional benefit to connective tissue graft in terms of width of keratinized tissue at 6 and 12 months follow-up. On the contrary Jankovicet al.[28] observed increase in width of keratinized tissue at 6 months. This they say was because of tissue manifestation of the proliferation of gingival or periodontal fibroblasts as a result of influence of growth factors from PRP. They used Weibrichet al.[29] technique of obtaining platelet (2001). There was no dose-dependent effect of PRP and growth factors on periodontal regeneration outcomes in a study by Christgau et al. in 2006.[30]

Jagmohan Singh et al.[31] used a different approach to periodontal regeneration by using polypeptide growth factors – PRP and PRF (Platelet Rich Fibrin). The main advantage of PRF over PRP is that PRF needs no addition of anticoagulants or bovine thrombin. It needs only one centrifugation. PRF has a long term effect because of the intrinsic incorporation of cytokines within the fibrin-mesh which allows for the progressive release over time (7 – 11 days).

Though subepithelial connective tissue graft technique and its modifications for treating gingival recessions have high success rates and predictability, it requires the creation of a second surgical site. This may cause discomfort, increase the risk of postoperative complications and limit the number of teeth that can be treated in a single procedure. The use of soft tissue substitutes like acellular dermal matrix or collagen matrix appears useful for the treatment of these conditions with equal predictability.

Conclusion

Several comparative studies have been done on identifying the best possible grafting techniques to gain attached gingiva, in the field of periodontal plastic surgeries. All these studies invariably stated the limitations of each of them while being tried at variable conditions. No single treatment has been proved to be ideal in comparison with the other. No old technique once introduced has been discarded owing to its limitations, but is being used even today in appropriate conditions. Thus the present review of

literature aiming at identifying the best technique for root coverage in the field of periodontal plastic surgery remains incomplete. Though, the newer techniques and materials in this field of surgery indicate promising results, the limitations in its definite predictability still remain a fear factor for Periodontists in taking up such cases for treatment. However the article emphasize the importance of further researches in this field and the need of more materials, techniques and its modifications to widen the arena of periodontal plastic surgery, thus suiting every need of the patient, irrespective of its challenges.

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Xerostomia and its management - A review

[1]HI Al Zainab Fatima

ABSTRACT

Xerostomia, commonly called dry mouth, is a common symptom most often caused by a decrease in the amount of saliva or a change in the quality of saliva. Xerostomia is not a diagnosis as such, but a symptom with multiple causes. This is usually noticed when salivary flow drops to half or lesser of the normal flow. This article deals with introduction, role of saliva, causes, clinical signs and symptoms, clinical assessment, management of xerostomia.

Key Words: Xerostomia, Dry Mouth, saliva

Introduction:

Xerostomia refers to a subjective sensation of a dry mouth with various causes that, if ignored, can lead to serious oral consequences. It may be related to a variety of conditions including systemic disease, radiation therapy involving the salivary glands, and drug therapy. Individuals with a dry mouth may have complaints that are due to changes in quality as well as quantity of saliva and also may not be related to the degree of salivary dysfunction. Without the protective functions of saliva that include antimicrobial activity, control of pH, and removal of food debris from the oral cavity, the risk for developing *Candida* infection and dental caries increases [1,2]. Diagnosis of xerostomia requires careful evaluation of signs and symptoms, with clinical extra-oral and intra-oral examinations, assessment of salivary gland function by measurement of unstimulated and stimulated flow rate, and, in some cases, biopsy of minor salivary glands.

Role of saliva:

Saliva is nature's primary defense system in the oral cavity. It is an essential body fluid that contributes to the protection and preservation of the oral cavity and plays a major role in maintaining oral health and comfort [3]. It is produced by the three pairs of major salivary glands and hundreds of minor salivary glands. Autonomic parasympathetic and sympathetic nerves regulate salivary gland activity. Parasympathetic stimulation produces more watery secretions, while sympathetic stimulation produces a sparser, more viscous flow [4].

Saliva functions in the following capacities:

- Hydrating and moisturizing oral tissues.
- Lubricating the oral cavity for swallowing and speech.
- Taste sensing by acting as a solvent.
- Digesting by the actions of amylase and lipase.
- Clearing of material from the oral cavity.
- Buffering acids and alkali in plaque and food.
- Serving as a reservoir for calcium, phosphorus and fluoride ions needed for remineralization.
- Providing autimicrobial activity through lysozyme, lactoperoxidase and other enzymes [5].

Causes of xerostomia:

Xerostomia is a common complaint found often among older adults, affecting approximately 20% of the elderly [3]. The dry mouth is common during periods of anxiety, mouth breathing and with advancing age. Very rarely, children are born with missing salivary glands so-called salivary gland aplasia or agenesis. The condition can be temporary or transient and the causes

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can be local and systemic. There are a variety of salivary and nonsalivary causes of xerostomia.

Table : 1. Common causes of xerostomia[6]

Iatrogenic:
Drug therapy
Radiation therapy
Chemotherapy
Chronic graft-versus-host disease

Diseases of the salivary glands:
Sjogren's syndrome
Sarcoidosis
HIV disease
Hepatitis C virus infection
Primary biliary cirrhosis
Cystic fibrosis
Diabetic mellitus

Rare Causes:
Amyloidosis
Hemochromatosis
Wegener's disease
Salivary gland agenesis (with or without ectodermal dysplasia)
Triple A syndrome

Others:
Mouth breathing
Smoking
Decreased mastication
Duct calculi
Sialoadenitis
Head and neck injury
Aging

Drug Therapy:

More than 400 drugs can cause hypo secretion of the salivary glands. The salivary dysfunction is magnified with multiple medication usage in the elderly and medically compromised patients. This group includes anticholinergic, sympathomimetic, antidepressants, bronchodilators, antihistamines and diuretic drugs. As these drugs do not damage the anatomy of the glands, the hypo secretion of the salivary glands can be reversed by discontinuation of the drugs.

Table : 2. Drugs associated with dry mouth [6]

Drugs which directly damage the salivary glands:
Cytotoxic drugs

Drugs with anticholinergic activity:
Anticholinergic agents: Atropine and Hyoscine
Anti-reflux agents: Omeprazole

Psychoactive agents:
Amitriptyline, Dothiepin

Selective serotonin re-uptake inhibitors:
Fluoxetine

Others: Phenothiazines,
Benzodiazepines,
Opioids, Antihistamines

Drugs acting on sympathetic system:
Drugs with sympathomimetic activity:
Ephedrine
Anti-hypertensive:
Alpha 1 antagonists: Terazosin,
Prazosin
Alpha 2 agonists: Clonidine
Beta blockers: Atenolol,
Propranolol

Drugs which deplete fluid:
Diuretics.

Radiation Therapy:

Therapeutic radiography of head and neck tumors cause xerostomia. The most radiosensitive salivary gland is parotid gland followed by submandibular, sublingual and minor salivary gland. The degree of xerostomia depends on the degree of exposure of the salivary tissue to the radiation [7].

Chemotherapy:

Drugs administered for treatment of tumors can make saliva thicker, causing dryness of mouth. These drugs sometimes cause irreversible changes. Few drugs

partly restore salivary function.

Chronic graft-versus-host disease:

Xerostomia is a common complaint in chronic graft-versus-host disease as the immunological response destroys the salivary gland.

Sjogren's Syndrome:

Sjogren's syndrome is an autoimmune inflammatory disease with multisystem manifestations. There is a progressive loss of lacrimal and salivary function, resulting in **xerostomia** and **xeropthalmia** (**sicca syndrome**) [8]. **Primary Sjogren's syndrome** is confined to dry eyes and a dry mouth. **Secondary Sjogren's syndrome** is associated with connective tissue disorders. The most common connective tissue disorder associated with Sjogren's is rheumatoid arthritis [9].

Sarcoidosis:

It is a multisystem granulomatous disease of unknown origin characterized by the formation of uniform, discrete, compact, non caseating granulomas. The lesions are common in the skin, lungs, lymph nodes, salivary glands and bones.

Diabetic mellitus:

Diffuse, non tender, bilateral enlargement of parotid glands called **diabetic sialadenosis**, may be seen in patients with diabetes. Diabetic patients are also predisposed to develop oral candidiasis, median rhomboid glossitis, denture stomatitis and angular chelitis associated with denture use and poor glycemic control. It is believed that in diabetic patient, xerostomia is one possible cause for this predisposition[10].

HIV Disease:

About 5% of HIV patients exhibit HIV associated Salivary gland disease (SGD). Usually bilateral parotid enlargement associated with cervical lymphadenopathy is noted in these patients. Antiretrovial drugs also cause dry mouth.

A number of additional disease entities may contribute to the presence of xerostomia, either through pathophysiology of the disease process or due to the medications used in treating the disease and its symptoms. Patients with the following disorders should be considered at risk for xerostomia:

Table : 3. Risk factors for Xerostomia [6]

1. AIDS
2. Systemic Lupus Erythematosus
3. Thyroid Dysfunction
4. Parkinson's Disease
5. Cerebral Palsy
6. Depression
7. Anxiety
8. Post-Traumatic Strees Disorder
9. Dehydration
10. Eaten-Lambert Syndrome
11. Trauma to Salivary Glands
12. Anorexia and Bulimia

Clinical signs and symptoms:

Commonly observed signs of severe hyposalivation include depapillation or erythema of the dorsum of the tongue, fissuring of the dorsum of the tongue, the lips, the corners of the mouth, dry tongue, atropic mucosa, no pooling of saliva in the floor of the mouth, residual food debris and cervical and root caries.

Mild signs of hyposalivation include frothing of saliva, mild depapillation of the saliva and dry lips [8].

The lack of effective salivary function will cause any or all of the following symptoms:

- Tissue sticking to teeth
- Viscous saliva
- Sticky saliva
- Difficulty in speaking
- Difficulty swallowing
- Halitosis
- Altered sense of smell
- Altered taste
- Complaint of dryness
- Complaint of burning mouth, lips or tongue
- Impaired retention of full upper denture
- Impaired lubrication of lower denture
- Mucosal irritation from foods and dental home care products
- Denture wearers often complain of severe discomfort with their dental appliance. [11,20]

Clinical assessment:

Xerostomia is complex. Specifies of the complaint history of dry mouth are obtained: duration, frequency, and severity. The presence of dryness at other sites (eyes, nose, throat, skin, and vagina) is documented. A complete medical and prescription drug history is taken.

Major salivary glands are palpated for the presence of tenderness, firmness, or enlargement. The amount and quality of saliva coming from the ducts inside the mouth are assessed. The soft and hard tissues of oral cavity are examined. The absence of saliva or presence of dry or reddish oral mucosa is noted. Active dental decay is evaluated.

The visible soft tissue changes include: [12]

- Dryness of the vermillion border of the lip
- Loss of filiform papillae of the tongue Cracking and fissuring of the tongue
- Increased plaque formation on the tongue.
- Absence of saliva in response to gland palpation.
- Oral candidiasis
- Ulcreation of the oral mucosa

The hard tissue changes include: [12]

- Increased caries rate (especially in the cervical third)
- Increased non-carious loss of tooth structure by dental erosion
- Cervical dentinal hypersensitivity
- Increased plaque accumulation on teeth and appliances.

These soft and hard oral tissue changes are serious complications of xerostomia and must be considered in the comprehensive treatment plan. An individual may have clinically identified oral dryness with or without xerostomia and with or without hyposalivation.

Salivary assessment is an important component of a dental evaluation. Hyposalivation may be diagnosed with the aid of salivary collection tests (called **sialometry**). Salivary flow rate should be measured by standardized techniques. As salivary secretion fluctuates between minimal and maximal rates during the day, it is important to assess the salivary secretion consistently at an established time of the day. Salivary secretion is assessed in unstimulated or stimulated conditions. The stimuli that enhance salivation are related to eating: tasting, smelling or seeing food, and chewing. Therefore it is crucial to consistently assess salivary function at fixed periods after such stimuli. Most units assess whole unstimulated sialometry.

Imaging techniques provide additional important information in some cases, although they may not be useful in assessing salivary gland function. In **sialography**, a radio-opaque material is injected into the salivary glands. It is useful in identifying salivary gland stones and salivary gland masses.

Scintigraphy of the major glands using sodium pertechnetate can be helpful in assessing salivary gland function. **Biopsy** of minor labial salivary glands is used in the diagnosis of Sjgren's syndrome, HIV-salivary gland disease, sarcoidosis, amyloidosis, and graft-vs-host disease. Biopsy of major glands should be reserved for investigation of salivary gland enlargement when malignancy is suspected [13]

Management of xerostomia:

The dental management of patients suffering from dry mouth should begin with through patient education and the identification of the underlying cause. Treatment should include local and systemic stimulation of salivary glands, palliative treatment for symptomatic relief, as well as preventing and treating oral complications [14]. Medications are available to stimulate the salivation.

Systemic sialogogues:

Pilocarpine and cevimeline are two systemic US Food and Drug Administration-approved sialogogues for treatment of dry mouth. Their effect depends of the presence of functional glandular tissue. Oral pilocarpine is a parasympathomimetic medication with muscarinic action [15]. Cevimeline is a salivary gland stimulant with a stronger affinity for M3 muscarinic receptors. Pilocarpine is typically administered at a dose of 5 mg three times a day for at least 3 months and cevimeline is prescribed at a dose of 30 mg three times a day for at least 3 months [16]. Side effects include: excessive sweating, cutaneous vasodilation, emesis, nausea, diarrhea, persistent hiccup, bronchoconstriction, hypotension, bradycardia, increased urinary frequency, and vision problems. Both pilocarpine and cevimeline are relatively contraindicated in patients with uncontrolled asthma

or chronic pulmonary disease and in β adrenergic blocker users, and should be used with caution in patients with active gastic ulcers or uncontrolled hypertension. Pilocapine is also contraindicated in individuals with narrow-angle glaucoma and iritis, and should be used with caution in individuals with chronic pulmonary disease, asthma, or cardiovascular diseases.[17]

Intraoral topical agents:

Oral sprays, specifically oxygenated glycerol tri-ester, serve as an alternative treatment for dry mouth and have been proven to be more effective than other commercially available saliva substitutes. Saliva substitutes aim to increase viscosity and mimic natural saliva without altering the salivary flow.

Mucin-containing lozenges provided benefit for the treatment of xerostomia when compared to a placebo. Patients applying the anticholinesterase physostigmine on the oral mucosa to stimulate salivary production from the minor glands reported great benefit, and this could be a valid alternative to systemic treatment.

A non-specific mechanical and gustatory stimulant increases salivation; therefore, the use of sugar free gums, hard candies, and mints are highly recommended for the relief of symptoms in patients with residual salivary capacity [18]. To control and prevent dental caries a rigorous oral hygiene regimen and non-cariogenic diet should be adhered. Brushing twice a day with a soft bristle toothbrush and a low abrasive, highly fluorinated toothpaste is recommended, accompanied by a sodium fluoride rinse. Topical applications of fluoride gels or fluoride varnishes at home is advised. Patients affected with xerostomia should also increase their fluid intake due to the fact that most people do not drink enough water, contributing to the condition.

Acupuncture has been reported to increase parasympathetic activity, causing a release in neuropeptide, stimulating salivary flow and secretions. Three points are treated in each ear, and one in the radial aspect of each index finger [19- 21].

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Hemorrhagic disorders and periodontal therapy - a review

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ABSTRACT

Occasionally a periodontist comes across a patient with a hemorrhagic disorder and often finds it difficult to adequately manage the patient. This review attempts to list the common hemorrhagic disorders and suggest appropriate measures to be taken by the periodontist to safely manage the patient.

Key Words: Coagulation Disorders, Thrombocytopenic purpuras, management.

Introduction

The identification of patients with bleeding disorders starts with health history, clinical examination and clinical laboratory tests. Health history questioning should cover history of bleeding after previous surgery or trauma, past and present drug history, history of bleeding problems among relatives and illnesses associated with potential bleeding problems.[1]

Clinical examinations should detect the existence of jaundice, ecchymosis, spider telangiectasia, hemarthrosis, petechiae, hemorrhagic vesicles, spontaneous gingival bleeding, gingival hyperplasia. Laboratory tests should include bleeding time, tourniquet test, complete blood cell count, prothrombin time, partial thromboplastin time and coagulation time.[1]

Coagulation Disorders

The main inherited coagulation disorders include Hemophilias A and B and Von Willebrand's disease.

Hemophilia A results in a deficiency of coagulation factor 8, and the clinical severity of the disorder depends on the level of factor 8 remaining.[2] Severe Hemophiliacs with less than 1% of normal factor 8 may have severe bleeding on the slightest provocation, whereas moderate hemophiliacs (1% - 5% factor 8) have less frequent spontaneous hemorrhage but still bleed with minimal trauma.[1] Mild hemophiliacs (6%-30% factor 8) rarely bleed spontaneously but may still have hemorrhage after severe trauma or during surgical procedures.[1,2]

The clinician should consult the patient's physician before dental treatment to determine the risk for bleeding and treatment modifications required. To prevent surgical hemorrhage, factor 8 levels of at least 30% are needed [1,2] Parentral 1-deamino-8-D-arginine vasopressin (DDAVP) can be used to raise factor 8 levels 2 to 3 fold in patients with mild or moderate hemophilia. Most moderate and severe hemophiliacs require infusion of factor 8 concentrate before surgical procedures. Before 1985 the risk of viral disease transmission from these infusions was high, in recent years virally safe, highly purified monoclonal antibody or recombinant DNA factor 8 products have come into widespread use. [2]

Hemophilia B, or Christmas Disease, results in a deficiency of factor 9, the severity of the disorder depends on the relative amount of existing factor 9. Surgical therapy requires a factor 9 level of 30% to 50% and is usually achieved by administration of purified prothrombin complex concentrates or factor 9 concentrates.[2]

Von Willebrand's Disease results from a deficiency of von willebrand factor, which mediates adhesion of platelets to the injured vessel wall and is required for primary hemostasis. Von Willebrand factor also carries the coagulant portion of factor 8 in the plasma. The disorder has three major sub types with a wide range of clinical severity. More severe

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forms require preoperatively factor 8 concentrate or cryoprecipitate infusion. Milder forms respond favorably to administration of DDAVP before periodontal surgery or tooth extraction. [2,3]

Probing, scaling can usually be done without medical modification. More invasive treatment such as block local anesthesia, root planing or surgery dictate prior physician consultation. During treatment, local measures to ensure clot formation and stability are of major importance. Complete wound closure and application of pressure will reduce hemorrhage. Antihemostatic agents such as oxidized cellulose or purified bovine collagen may be placed over surgical sites or extraction sockets. The antifibrinolytic agent epsilon-aminocaproic acid (EACA), given orally or intravenously, is a potent inhibitor of initial clot dissolution. [4] Tranexamic acid is a more potent antifibrinolytic agent than EACA and has been shown to prevent excessive oral hemorrhage after periodontal surgery and tooth extraction.[5] It is available in a mouthrinse form that may be used either alone or in combination with systemic tranexamic acid for several days after surgery.[6]

Liver diseases may affect all phases of blood clotting because most coagulation factors are synthesized and removed by the liver. Long term alcohol abusers or chronic hepatitis patients often demonstrate inadequate coagulation Coagulation may also be impaired by Vitamin K deficiency, often caused by malabsorption syndrome or by prolonged antibiotic administration, which alters the intestinal microflora that produces Vitamin K.

Dental treatment for patients with liver disease should include physician consultation, laboratory evaluations prothrombin time, bleeding time, platelet count, partial thromboplastin time. Conservative, non surgical periodontal therapy and if surgery is required (may require hospitalisation) INR or prothrombin time should generally be less than [2]. For simple surgical procedures, INR less than 2.5 is generally safe. [7]

Patients with prosthetic heart valves or histories of myocardial infarction, stroke or thromboembolism are frequently placed on anticoagulant therapy using coumarin derivatives such as dicumarol and warfarin. [7] These drugs are vitamin K antagonists that decrease production of vitamin K- dependent coagulation factors 2,7,9 and 10.

The effectiveness of anticoagulation therapy is monitored via the prothrombin time. The recommended level of anticoagulation for most patients is an INR of 2 to 3, with prosthetic heart valve patients generally in the 2.5 to 3.5 range. [7] Frequently, the anticoagulant is discontinued 2 to 3 days before periodontal treatment (the clearance half life of warfarin is 36 to 42 hours) if INR is within the acceptable range on the treatment day, the procedure is done and the anticoagulant is resumed.

Thrombocytopenic purpuras

Thrombocytopenia is defined as a platelet count of less than one lakh per cubic mm.

Periodontal therapy for patients with thrombocytopenia should be directed toward reducing inflammation by removing local irritants to avoid the need for more aggressive therapy. 1,2 Scaling and root planing is generally safe unless platelet count is less than 60,000 per cubic mm. No surgical procedures should be performed unless the platelet count is greater than 80,000 per cubic mm. Platelet transfusion may be required before surgery, surgical technique should be atraumatic as possible and local hemostatic measures should be applied.[1.2]

Conclusion

Adequate laboratory investigations and proper history taking goes a long way in early detection of patients with hemorrhagic disorders and timely consultation with patient's physician and use of drugs help the periodontist to plan his therapy to achieve good results.

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Statins in periodontal regenerative therapy- A Review

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ABSTRACT

Periodontitis is a bacterially induced chronic inflammatory disease associated with the degradation of periodontal tissues. It is highly prevalent in late middle age. This can be one of the major causes of adult tooth loss.

Statins are 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitor. They are widely used to lower cholesterol and they provide an effective approach for the treatment of hyperlipidemia and arteriosclerosis. Many cardiovascular studies have suggested that statins also have an potential anti-inflammatory effects and antioxidant properties. Statins modulate bone formation by increasing the expression of bone morphogenetic protein- 2(BMP-2), inflammation and angiogenesis, thus providing a new direction in the periodontal therapy. This article reviews the beneficial effect of Statins on periodontal disease.

Keywords: Periodontitis, Statins, (HMG-CoA) reductase inhibitor, BMP-2

Introduction

Periodontitis is a chronic inflammatory degradation of the tissue and bone supporting the teeth, composed of gingiva, cementum, periodontal ligament, and alveolar bone. Periodontitis is considered as a result from an imbalance between destruction and repair of periodontal tissues, triggered by oral bacteria. A number of bacterial products stimulate local host responses that enhances the production of prostaglandins and inflammatory cytokines (such as IL-1α, IL-β, IL-6 and IL-8), the recruitment of inflammatory cells, elaboration of lytic enzymes, and subsequently damage of periodontal tissue. Oral pathogens and inflammatory mediators (such as IL-1 and TNF-α, from periodontal lesions, intermittently reach the blood stream inducing systemic imflammatory reactants, such as acute-phase proteins, and immune effectors including systemic antibiotics to periodontal bacteria.[1] Periodontitis an inflammatory disease occurring adjacent the bone can lead to bone resorption creating bony defects and ultimately leading to tooth loss.[2] Moreover periodontitis can be accompanied with severe systemic complications. Epidemiological studies have indicated that inflammatory and immunological reactions induced by periodontal infections contribute to pathogenesis of atheroma formation, leading to cardiovascular disease (CVD). Currently the tissue regenerative therapy is applied to treatment of periodontal disease, in addition to therapies focusing on eradication of the cause of the disease. For these therapies to be successful, control of inflammatory conditions is essential. Furthermore, since many patients from various systemic diseases and taking a number of drugs in combination, it is extremely important to find effective therapies adequate for respective patient. Statins has an anti-inflammatory effect and there is a similar progress of the disease state between CVD and periodontitis.[1]

Statins are specific inhibitors of 3-hydroxy-3-methylglutaryl- coenzyme reductase that are used to inhibit the production of cholesterol in cardiovascular diseases. Statins have pleiotropic therapeutic effects including vasodilatory, antithrombotic, antioxidant,

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anti-inflammatory, and immunosuppressive actions.[3] Cholesterol, steroid hormones and other isoprenoids are produced from fatty acid through a biosynthesis pathway known as mevalonate pathway. Statins lower cholesterol synthesis by inhibition of this pathway by inhibiting HMG-COA reductase.[4]

Statins in appropriate doses have shown therapeutic applications for the treatment of osteoporosis.[5]

Systemic administration and local application of statins helps in the bone formation by increased expression of BMP-2 by blocking the mevalonate pathway.[2,4] Thus statins could play a significant role as a therapeutic agent in the treatment of periodontal disease.

Molecular structure of statins

Statins contains a hexahydronaphthalene ring with two major side chains, viz. dimethylbutyrate ester and a second one, which contains a hydroxyacid (Fig 1). The hydroxyacid of the second chain forms a six membered analogue of the intermediate compound in the HMG-CoA reductase reaction, which is the rate-limiting step in the mevalonate pathway. As a result of its similarity to the compound HMG-CoA, Statin is a reversible competitive inhibitor of the enzyme HMG-CoA reductase. The reaction catalysed by HMG-CoA reductase and inhibited by simvastatin is the conversion of HMG-CoA to a compound called mevalonate via an intermediate. Simvastatin, like the other statins, is thus an inhibitor of the mevalonate pathway and consequently cholesterol synthesis.[6]

Classification of statins

Some of the statins are obtained after fungal fermentation: lovastatin, pravastatin, simvastatin, and others by synthesis: fluvastatin, atorvastatin, and cerivastatin.

Atorvastatin, cerivastatin, fluvastatin and pravastatin are administered as active compounds (acid form). Lovastatin and simvastatin are administered as inactive forms (lactone), which have to be enzymatically hydrolized to generate active forms.[7]

Effect on bone metabolism

Bone is a metabolically active organ in which the organizational pattern of the mineral and organic components determines the successful mechanical function of the skeleton. Bone turnover is controlled by defined agents and mechanisms that regulate bone formation and bone resorption, which are the two major processes of bone remodeling. Disturbances in these mechanisms can lead to either bone loss, resulting in osteoporosis, or an overgrowth of bone, leading to osteosclerosis.

The bone morphogenetic proteins (BMPs) have bone-forming activity and account for the major proportion of the osteoinductive potential of bone extracts. The BMP-2 promoter has been characterized, and based on the properties of BMP-2, this promoter was utilized as a target to identify new compounds that stimulate its transcription and subsequent osteoblast differentiation.

Mechanism of action

The reduction in mevalonate pathway intermediates with a subsequent inhibition of prenylation by statins is responsible for a large proportion of the pleiotropic effects of these drugs. Mevalonate, farnesyl pyrophosphate and geranyl geranyl pyrophosphate all inhibited statin-stimulated bone formation. Furthermore geranylgeranyl pyrophosphate inhibited statin stimulated bone formation, inhibition of prenylation due to geranylgeranylation must play a major role in the stimulation of bone formation by this drug.[8]

Mundy et al demonstrated that Lovastatin and simvastatin increased bone formation when injected subcutaneously over the calvaria of mice and increased cancellous bone volume when orally administered to rats.[5]

Garrett et al found that statins are capable of increasing bone formation and bone mass in rodents suggesting a potential new action for the statins, which may be beneficial in patients with established osteoporosis where marked bone loss has occurred. Recent clinical data suggests that they may reduce the risk of fracture in patients taking these drugs.[6]

Xu X C et al concluded that simvastatin has the potential of promoting bone formation and reducing alveolar bone loss in maxillary following ovariectomy (OVX) and ligature placement in rats.[9]

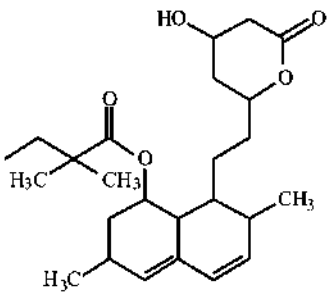

Fig 1 Molecular structure of statins

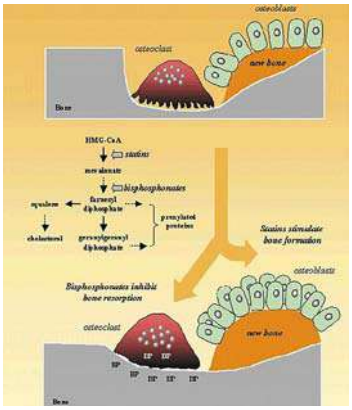

Fig 2 Statins action on bone [9]

Antinflammatory properties of Statins

Inflammatory processes are considered to participate in the development of cardiovascular disease (CVD). In addition to local inflammatory reactions in the arterial wall, chronic inflammatory processes in other tissues have been suggested to impose a systemic burden on the arteries, thus contributing to CVD. This systemic inflammation involves an increase in serum C-reactive protein, recently identified as a risk marker of atherosclerosis. Chronic periodontitis, a continuous inflammatory process resulting in irreversible periodontal tissue destruction. This medium-grade inflammation may place a considerable burden on the cardiovascular system and contribute to CVD, and has been shown to be associated with systemic inflammation.[10]

Periodontitis can be an risk factor for CVD due to elevated inflammatory mediators such as IL-1 and TNF-α in periodontal lesions and increased serum levels. Administration of statins to cardiovascular patients may have added benefits on atherosclerotic suppression through inhibition of inflammation in oral tissue. Statins like simvastatin reduces expression of IL-α induced inflammatory cytokines, IL-6 and IL-8 in human gingival fibroblasts (HGFs) and human epithelial cell line (KB cells), which has been used as study model for epithelial cells.[1]

Applications of periodontal therapy

Ideal goal of the periodontal therapy is to regenerate the loss periodontal tissues through periodontal regeneration. Periodontal ligament cells are believed to play an important role in maintenance, repair and regeneration of tissues that forms the tissue attachment apparatus.

M.J. Somerman et al conducted a comparative study on in vitro of human periodontal cells and gingival fibroblasts and demonstrated that periodontal ligament cells had higher alkaline phosphatase levels when compared with those of gingival fibroblasts and they have osteoblast like properties.[11]

Yazawa et al[4] conducted an in vitro study using periodontal ligament cells obtained from human teeth. It was observed that simvastatin enhanced cell proliferation and metabolism dose dependently after 24 hours. It also promoted cell proliferation significantly. The maximum effect was seen at simvastatin concentrations of 10^8 and 10^7 M. After 7 days, alkaline phosphatase activity was promoted dose dependently and the maximum effect was seen at a concentration of 10^8 M. They concluded that at low concentrations, simvastatin exhibits positive effect on proliferartion and osteoblast differentiation of human PDL cells.

Statins also enhance new bone formation in vitro and in rodents due to the association of increased expression of the bone morphogenetic protein (BMP-2) gene in bone cells.[5] Lovastatin and simvastatin may stimulate the osteoblastic differentiation of periodontal ligament cells via the ERK1/2 pathway. This suggests that the statins may be useful for regenerating periodontal hard tissue.[12]

Clinical data consistently support the view that adverse events are uncommon even when intensive therapy is used to reach aggressive low-density lipoprotein cholesterol goals and thus Statins have long term safety profile.[13] Thus this can be used as an acceptable drug in periodontal diseases.

Studies on Systemic administration of Statins

Cunha cruz Z et al conducted a retrospective study over a seven year period and found that the statin use resulted in a decreased tooth loss rate in chronic periodontitis patients.[14]

Sangwan et al reported that the patients with hyperlipidemia are more prone to periodontal disease and also statins have a positive impact on periodontal health.[15]

Estanislau IM et al conducted a systematic review on the pleiotropic effects of statins on the treatment of chronic periodontitis and found that lowered the alveolar bone loss and reduction of clinical signs of inflammation.[16]

Studies on Locally delivered statins

Pradeep AR et al investigated the effectiveness of simvastatin, 1.2% in an indigenously prepared biodegradable controlled-release gel as an adjunct to scaling and root planing (SRP) in the treatment of chronic periodontitis and concluded that there was a greater decrease in gingival index score and probing depth and more clinical attachment gain with significant intrabony defect fill at sites treated with SRP plus locally delivered Simvastatin (SMV) in patients with chronic periodontitis.[2]

Pradeep AR et al investigated the effectiveness of 1.2% Atorvastatin (ATV) as an adjunct to scaling and root planing (SRP) in the treatment of intrabony defects (IBDs) and results showed that Mean Probing Depth reduction and mean Clinical attachment level gain were greater and significantly greater radiographic bone fill was found in the ATV group and concluded that ATV as an adjunct to SRP can provide a new direction in the management of IBDs.[17]

Price U et al evaluated the effects of local administration of a simvastatin-alendronate-â-cyclodextrin (SIM-ALN-CD) conjugate for preventing experimental periodontitis bone loss and concluded that locally applied SIM-ALN-CD has the potential to prevent episodes of periodontitis bone loss.[18]

Studies on statins in implants

Akukawa Y examined effect of simvastatin on the promotion of osteogenesis around titanium implants and concluded that the administration of simvastatin increases the value of both(Bone Contact Ratio) BCR and (Bone Depth) BD and the drug may have the potential to improve the nature of osseointegration.[19]

Moriyama Y evaluated whether the topical application of statin enhances the osteogenesis around a titanium implant and revealed the positive effect of topically applied fluvastatin on the bone around the implant.[20]

Fang W investigated the effects of simvastatin--nanohydroxyapatite (HA) coatings on implant surfaces in an animal model of osteoporosis The results indicated that the simvastatin-HA coatings increased bone-implant contact and new bone formation around implant surfaces. They concluded that implants loaded with simvastatin by an electrochemical process improved implant osseointegration in osteoporotic rats.[21]

Conclusion

Periodontitis can be a risk factor for cardiovascular disease due to elevated inflammatory mediators in periodontal lesions and increased serum levels. The administration of statins to cardiovascular patients has additional benefits through inhibition of inflammation in oral tissues. They have pleiotropic therapeutic effects. Statins in systemic and local application enhance osteoblastic differentiation and bone formation by upregulating bone morphogenic proteins and by blocking the intermediate metabolites of the mevalonate pathway. Thus statins can be used in promoting periodontal regeneration. Although the adverse effects are not common long term studies for the safety of statins should be evaluated. This drug may lead to development of novel therapeutic approaches, if confirmed by consecutive prospective studies.

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Desquamative Gingivitis – Review of literature

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ABSTRACT

Desquamative gingivitis is a clinical term to describe red, painful, glazed and friable gingivae which may be a manifestation of some mucocutaneous conditions such as lichen planus or the vesiculobullous disorders. It is important to be aware of this rare clinical entity so as to distinguish desquamative gingivitis from plaque induced gingivitis which is an extremely common condition, easily recognized and treated daily by the dental practitioner. This article gives an overview of desquamative gingivitis, its presentation, the possible causes, diagnosis and treatment. Early recognition of these lesions may prevent delayed diagnosis and inappropriate treatment of potentially serious dermatological diseases.

Key words: Gingivitis, lichen planus, pemphigus, pemphigoid, immunofluorescence.

Introduction

The term desquamative gingivitis (DG) is used in this paper as a clinical description of the gingiva which may manifest as a result of various underlying conditions to be discussed below. It is characterized by fiery red, glazed, atrophic or eroded looking gingiva. There is loss of stippling and the gingiva may desquamate easily with minimal trauma. As opposed to plaque induced gingivitis, DG is more common in middle-aged to elderly females, is painful, affects the buccal/labial gingiva predominantly, frequently spares the marginal gingiva but can involve the whole thickness of the attached gingiva and its clinical appearance is not significantly altered by traditional oral hygiene measures or conventional periodontal therapy alone.[1]

Desquamative gingivitis (DG) is a clinical condition with unclear etiology. This is not a specific diagnosis but a descriptive term for nonspecific gingival manifestation which is associated with different diseases. A variety of mucocutaneous disorders represent gingival manifestations in the form of desquamative lesions or ulceration of the gingiva.[2]

DG is spread over mainly women at middle and advanced age. Significant subjective sensations are: warmth, tenseness, tingling, itchiness, burning and pain. Erythema and oedema of the marginal and attached gingiva are clinically observed predominantly in the frontal areas. [2, 3, 4] Typical sign is desquamation of the epithelium with painful erosive lesions and formation of hemorrhagic bullae.[4]

Several mucocutaneous lesions, e.g., lichen planus, pemphigoid, pemphigus vulgaris (PV), erythema multiforme (EM), lupus erythematosus (LE), drug-induced lesions, and allergy due to application of dental material or food additive are included. The most common features of all these lesions and conditions are "desquamative gingivitis" (DG) and immunomediated pathogenesis.[3,4] Smooth erythema, desquamation, and erosion of the gingiva are common signs of DG, irrespective of the etiopathogenesis.[4,5] DG has no association with loss of attachment and alveolar bone destruction.[4,5]

Classification

The classification of DG was based on the etiological, histological, and immunological findings.[4]The classification has been divided into the following categories: dermatological diseases, endocrine disorders, aging, atypical response to

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bacterial plaque, idiopathic agents, and chronic infections.[1]Dermatological diseases enlist cicatricial pemphigoid, lichen planus, pemphigus vulgaris (PV), psoriasis (PS), bullous pemphigoid, epidermolysis bullosa, and contact stomatitis.[1,4,5] Endocrine disorders include estrogen deficiencies following oophorectomy and in postmenopausal stages, testosterone imbalance, hypothyroidism.[1,4,5]Chronic infections include tuberculosis, chronic candidiasis, and histoplasmosis.[1,4,5] However, the most commonly recognized causes of DG are mucous membrane pemphigoid (MMP), oral lichen planus (OLP), and PV with the first two responsible for the highest of cases. [1,4,5]

Etiology

DG can be caused by numerous conditions. They can be dermatoses such as lichen planus, MMP, pemphigus, dermatitis herpetiformis (DH), linear immunoglobulin A disease (IAD), and epidermolysis bullosa.DG have been most commonly caused by lichen planus and pemphigoid.

Unlike lichen planus and pemphigoid, pemphigus is rarely seen as a cause of DG.Local hypersensitivity responses to various substances such as mouthwashes, dental materials, drugs, cosmetics, chewing gum, cinnamon, sodium lauryl (a usual ingredient of toothpaste) may also play a role as causative agents in some patients.Other likely causes of DG that present erythematic and ulcerative lesions include plasma cell gingivitis (PCG), systemic LE, discoid LE, chronic ulcerative stomatitis (CUS), and granulomatous disorders for example, orofacial granulomatosis, Crohn's disease, and sarcoidosis.[1,4,5]

Clinical features

Almost all of the disorders associated with DG (except forFBG) can affect various sites in the oral cavity and have involvement of extraoral regions.[4,6] Skin, scalp, nails, and mucosae with squamous differentiated epithelium, such as laryngeal, esophageal, nasal, genital, and conjunctival, represent possible locations.[4] There is a variation of gingival features from erythema to erosive and/or visibly ulcerated areas. Intact vesicles/bullae may occur but often rupture quickly in the oral cavity.

Diagnosis

Diagnosis cannot be made on a clinical basis,when DG is the only clinical feature. For a definite diagnosis, histopathologic and immunologic studies are required. However, typical and distinctive oral and/or skin lesions, sometimes with a characteristic location, can be observed and represent a valuable aid in guiding the differential diagnosis.

Treatment

Treatment of DG requires elimination or control of local irritants. Rough restorations, illfitting dentures, traumatic oral hygiene procedures, and dysfunctional oral habits should be corrected. Prosthetic treatment for patients having DG should be limited to a fixed prosthesis, since wearing a tissue-borne prosthesis may be uncomfortable.[7]In some cases, DG can be successfully managed with topical corticosteroids combined with effective plaque control.

The symptoms of the gingiva were improved by meticulous oral hygiene habits in some DG patients with oral LP.[8] Plaque accumulation may be a stimulus factor to make DG worse, but the plaque itself does not cause DG. Therefore, it should be noted that the underlying causes of DG cannot be eliminated by plaque control alone.

Anti-inflammatory agents mainly topical corticosteroids are widely used in the treatment of OLP. Other therapeutic agents that have been investigated are acitretin, retinoids, imunosuppressants such as cyclosporin, azathioprine, mycophenolate, mofetil, tacrolimus and pimecrolimus, thalidomide, interferon alpha, levamisole and phototherapy.[9]

Out of the large number of options available, corticosteroids are most widely used for the treatment. Corticosteroids suppress the cell mediated immunity but the response to the drug may differ from patient to patient. Topical corticosteroids have not been reported to have any systemic side effects and can be used safely. [10]

Conclusion

Desquamative gingivitis is a complex term that needs a clear definition. Although adefinitive diagnosis is required to provide proper treatment, it is almost impossible todifferentiate between the diseases and disorders reported to cause DG based solely on

theclinical presentation. Both histopathological examination and DIF testing are often essentialto establish a definitive diagnosis. If biopsy testing is inconclusive, other etiologic factorssuch as hypersensitivity reactions to oral hygiene products should be suspected.Further research is needed to help dental students understand the differential diagnosis of this term.

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