



Tri-Immune Phasic Periodontal Therapy: A Regenerative, Non-Invasive Strategy for Periodontal Treatment

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ABSTRACT:

Introduction: Periodontal diseases result from a complex interaction between pathogenic bacteria and the host immune system, leading to inflammation and destruction of supporting tooth structures. Conventional treatments often involve surgical interventions, which can be invasive and may not promote optimal tissue regeneration.

Objective: This review highlights the concept and clinical application of Tri-Immune Phasic Periodontal Therapy (TIP), a novel, non-surgical approach designed to stimulate natural healing and regeneration through immune modulation.

Methods: TIP therapy follows a structured protocol comprising three key phases: immune readiness, defense, and regeneration. Key components of the therapy include bacterial DNA testing to identify pathogens, a single-session bone treatment (BOST) using a stretch flap technique to access deep pockets without incisions, occlusal force correction, and reinforcement of oral hygiene through aerobic cleaning techniques. Nutritional support and lifestyle modification are also integral to the therapy.

Results: TIP therapy promotes healing by minimizing trauma and enhancing the body's natural repair mechanisms. The BOST method improves access to affected areas without tissue incision, supporting a stronger attachment and reduced recurrence. Immune modulation and host-supportive measures help shift the body from a defensive to a regenerative state, resulting in improved clinical outcomes.

Conclusion: TIP offers a promising alternative to traditional periodontal therapies by combining minimally invasive techniques with biological healing principles. Further clinical research is needed to establish its long-term effectiveness, but early evidence suggests TIP may enhance patient comfort, recovery, and periodontal stability.

1. Introduction

Periodontal disease is at rise in our country more in village areas as compared to cities.^{1,2} Characteristic features of periodontitis are inflamed gingiva, pocket formation, CAL, loss of alveolar bone.^{3,4} Host immune

response and microbe's presence contribute to periodontal diseases. Various surgical & non-surgical periodontal therapies and treatments are used nowadays for the treatment of periodontal diseases but ultimately healing is slow, recurrence & invasive in nature.^{5,6} Therefore to overcome these hardships a newer non-



invasive technique was introduced by US periodontal therapist i.e. TIP- in which anaerobic bacteria causing infection are destroyed up to the crest of the alveolar bone. Conventional periodontal therapy consists of scaling, root planing, gingival curettage, gingivectomy and flap procedures of various types, including osseous surgery. Most of these procedures favourably affect the anatomical defects produced by periodontitis.^{7,8} Reported changes produced by conventional periodontal therapy in humans included pocket depth reduction mediated by recession of the gingival margin and gain of clinical attachment.⁹ Furthermore, resective bone procedures eliminate the uneven bone margin, which is often caused by periodontitis, and help prevent the reoccurrence of periodontal pockets caused by coronal rebound of the gingival margin. Conversely, when angular defects are allowed to remain, they often remodel by a process of bone fill and crestal resorption.¹⁰

NEED FOR THE REVIEW: It is a minimally invasive, reasonably priced surgery that helps to build a new attachment and aims to regenerate the alveolar bone in addition to removing the local etiologic factors such as calculus and plaque from the deepest portion of the diseased periodontal pocket. It generates an environment that aids the body in transitioning from a defensive phase against bacteria and other microorganisms to a regenerative phase for self-healing and the development of new attachments.

HYPOTHESIS FOR TIP- Elimination of the causative factors for the breakdown of the periodontal tissue leads to healing of the alveolar bone as other sites of the human body.

DIFFERENT PHASES OF TIP PROCEDURE-

The three immune phases are: Vigilant readiness, Défense phase Repair and regeneration.³

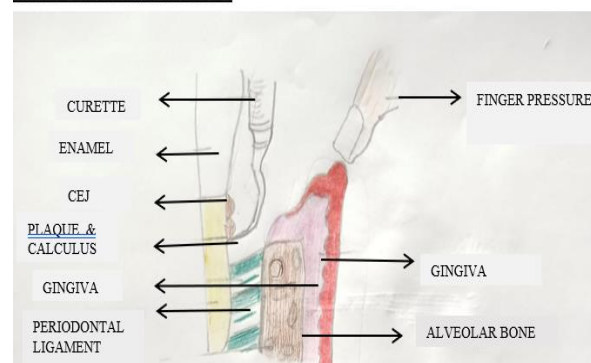
TIP periodontal therapy methods:

DNA testing - Determining the kind and quantity of bacteria present in the pockets is the first step towards treating periodontal disease. Bacterial DNA testing is a reliable method of identifying the developing bacteria responsible for periodontal disease. Preliminary identification like this will prevent overuse of antibiotics. But organisms like *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* etc., cannot be controlled by only treatment.¹¹

Treatment in a single session - An aerobic process called "bone one session treatment" (BOST) guards against periodontal disease in the deepest pockets while maintaining alveolar bone. Over the course of a single day, a typical full mouth BOST treatment takes four to five hours. This treatment minimizes harm to the periodontal apparatus, bone, and gingiva during therapy. The Stretch Flap method is used. Without creating an incision, the stretch flap technique makes it possible to reach the deepest parts of the bone surface and roots.

First Step: The 4R-4L universal curette is introduced into the sulcus during this phase, with the blunt non-working end facing the tissue and the working end facing the tooth surface. After removing the superficial plaque and calculus, the tissue is gently compressed to initiate the stretching process. (Figure 1)

FIGURE 1: TISSUE STRETCHING WHEN THE TOOL MOVES TOWARD THE DEEPER SURFACES DEEPER SURFACES

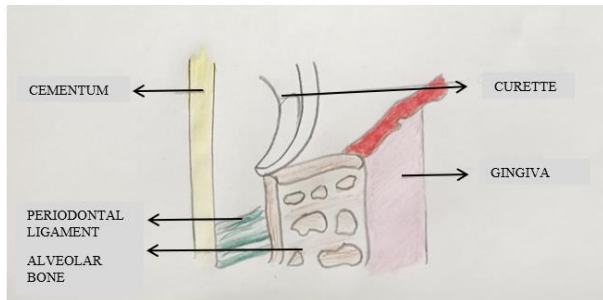


Second Step: Starting at the corner, the trajectory shifted to a circumferential motion in order to mobilise the tissue, prevent pulling the papilla free, and eventually produce an incisional flap.²

Third Step: The bone surface may be instrumented to remove the attached granulation tissue then reveal and plasticize the bone porosities that physically aid in the extraction of toxins and microorganisms from the pockets through the fresh bleeding phase by moving the tip of the curette forward first. By doing this process, the periodontium is guaranteed to be in a state that allows for efficient healing. Stretching out the tissue will not leave any scar tissue behind. Tissue that is scarred prevents attachment to the tooth's surface. (Figure 2)



FIGURE 2: BONY CRATER'S CLEANING AND RESHAPING



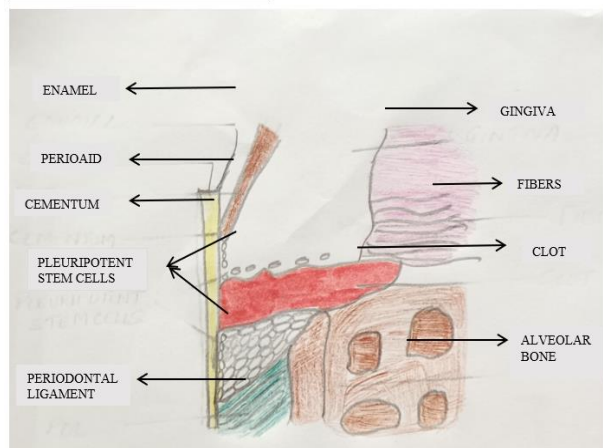
This implies that following standard periodontal therapy, there will still be a weak link between the tissue and the bone, which will enable bacteria to re-infect the tissue.

The "stretch flap" technique can be used to create a strong connection where good tissue can grow. After treatment, the attachment between the periodontium and the tooth would probably be as strong as a safe attachment.¹²

Healing after BOST:

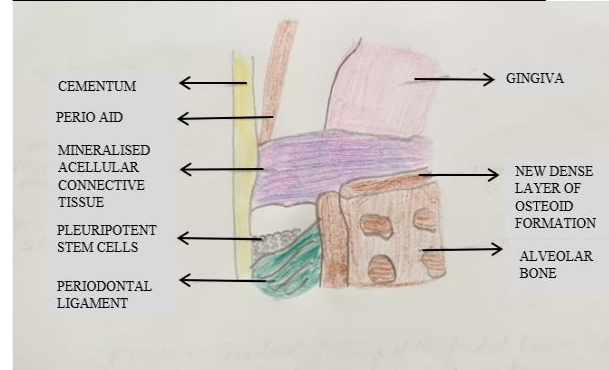
Following treatment for the first bone session, the clot that is firmly affixed to the clean bone serves as a plinth. For eight days, at a rate of 0.05 mm each day, the stem cells will move along and up the root surfaces, thickening the clot layer. (Figure 3)

FIGURE 3: A SCAFFOLD IS CREATED BY THE CLOT THAT ADHERES SECURELY TO THE SPOTLESS BONE SURFACE



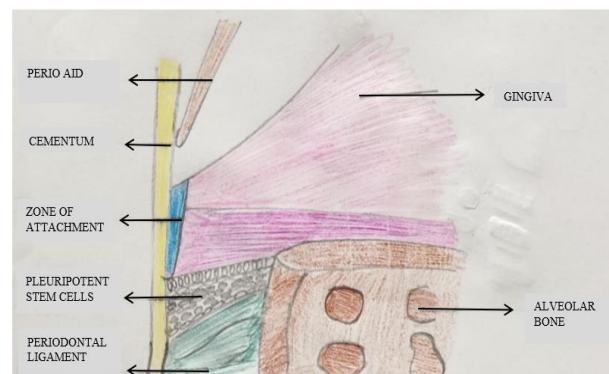
Over the course of four to six weeks, the spaces gradually fill in with very thick, partially mineralized connective tissue as the repair time advances. Eventually, the tissue becomes acellular. (Figure 4)

FIGURE 4: THE POCKET GRADUALLY FILLS UP FROM THE BOTTOM WITH EXTREMELY THICK, PARTIALLY CORRODED CONNECTIVE TISSUE.



The bone heals naturally beneath the new mineralized attachment of the acellular connective tissue if it is in place in about a month. Over the cured inner (cancellous) bone, a new, thick layer of cortical bone grows in roughly eight more months.¹ (Figure 5)

FIGURE 5: MINERALIZED ADHESION OF ACELLULAR CONNECTIVE TISSUE



3. Regulating the occlusal pressures -

The purpose of doing this is to stop more tissue injury and tooth movement. Regular occlusal forces become stressful with weekend periodontium, which leads to bite changes. Enameloplasty, coronoplasty, and occlusal splints are used in therapy to evenly distribute the forces over all of the teeth.

4. Dental hygiene routine -

Patients' ability to improve with BOST frequently rests on their ability to adhere to a painless daily cleanliness regimen. This procedure directly inhibits the growth of bacteria by allowing oxygen to reach below the gum line. It is only in the absence of oxygen that bacteria can survive. Oral hygiene can be improved by using dental hygiene practices such as brushing and flossing. Oral hygiene kit for aerobics is created especially to eliminate



the illness that results in anaerobic bacteria in deep pockets and root concavities, as well as to clean the gingival region.¹³

5. Life style, nutrition and exercise -

Maintain a balanced diet by eating at regular intervals, abstaining from added sugar, avoiding unhealthy snacking and avoiding whole grain breads, nuts, and seeds, among other foods. Boosting consumption of vitamins and minerals. Zinc and vitamin C are possibly the most important of all. Quitting smoking as smoke weakens specific immune cells and impairs digestion. Regular exercise is important because it increases circulation, which brings oxygen and the building blocks of tissues into the body as well as the vitamins and minerals needed for correct synthesis.

THE BENEFITS OF TIP THERAPY INCLUDE:

- Less discomfort due to the lack of incisions or sutures.
- Minimal gingival damage.
- Preservation of tooth sensitivity and aesthetics as the gingival margins tend to remain close to their initial height.
- No bone necrosis.
- Accelerated recovery from inflammation.
- Patients can resume their oral hygiene the following day following BOST therapy.
- Stretching the tissues open once more makes it simple to perform any small retreatment that may be required in the future.
- Compliance with less hassles and patience is beneficial.²

DISCUSSION-

Until the mid-1970s, the favorable changes produced by conventional periodontal therapy were often interpreted to represent a true periodontal regeneration. Oftentimes, various substances were placed around teeth and within bony defects prior to flap closure in order to enhance the bone augmentation. Indeed, longitudinal human clinical studies from several different research centers demonstrated that conventional periodontal therapy followed by good periodontal supportive therapy was effective in stabilizing periodontal status and maintaining periodontal health.¹⁴

In a review, Kalaivani et al. stated that there are now more approaches to treating periodontal disease thanks to tri-immune phasic therapy. The benefits of this therapeutic approach outweigh those of conventional periodontal methods. Helped the conditions for the body to stop being defensive are all built up by periodontal therapy. Stage that fights off germs and other microbes before entering a regeneration stage that repairs a novel attachment. In a review, Kalaivani et al. emphasise how TIP therapy can successfully lower the anaerobic bacterial load while reducing harm to the alveolar bone and soft tissues. They contend that TIP therapy is better than conventional surgical or nonsurgical periodontal therapies because it incorporates biological healing concepts. They also stress that long-term success requires systemic and lifestyle adjustments, such as better nutrition and oral cleanliness. The use of complementary therapy and host modulation.¹⁴ TIP therapy's immune-centric strategy is supported by a different study published in *Frontiers in Immunology*, which points out that by lowering damaging inflammation and facilitating tissue regeneration, targeting the complement cascade (e.g., C3 inhibitors) may improve results. This is consistent with TIP's focus on using the body's immune systems to promote regeneration. It has also been noted that using host modulatory agents, like specialised pro-resolving mediators (SPMs), holds promise for accomplishing regeneration without negative side effects. Critics point out that there aren't many extensive randomised controlled trials (RCTs) confirming TIP's effectiveness in comparison to well-established periodontal therapy, despite supporters' claims to the contrary.¹⁴ According to some research, BOST reduces invasiveness, but when combined with systemic therapy, its long-term regeneration results are on par with traditional methods. The lengthy chair time needed for BOST (4–5 hours per session) is one of the logistical difficulties in implementing TIP therapy, according to Kalaivani et al.¹⁴ clinical viability and patient acceptance may be restricted as a result. Discussion of the Focus on Host Modulation-Opponents of immune-focused treatments contend that the major objective of periodontal therapy should continue to be bacterial biofilm reduction.¹⁵ Although TIP places a strong emphasis on immune regulation, critics point out that bacterial dysbiosis is the primary cause of periodontal disease and that it needs to



be fully addressed using mechanical and chemical methods. Even while Cp40 and other complement inhibitors appear promising, further research is needed to fully understand their systemic effects.¹⁸ A delicate balance is required between the immune system's twin functions of tissue regeneration and infection management, as any interference could increase the likelihood of secondary infections.¹⁶

CONCLUSION-

New approaches to treating periodontal disease have become more prevalent as a result of TIP therapy. By creating all the ideal conditions surrounding the healing area, the process shifts the body from the defensive to the regenerative phases, smoothing the tissues for new attachment and regeneration. There are now just a few limited studies available on these procedures, and more research will be needed in the future to fully comprehend them. Based on the current facts, it seems that this strategy is fortunate.

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