

**Review article**

**Failures in periodontal therapy**

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**Abstract**

Studies have shown that modern periodontal therapies are effective in maintaining a healthy natural dentition as well as controlling periodontal disease. Numerous treatment strategies and various techniques have been designed & described to treat periodontal disease. Most of these procedures had drawbacks which were identified, leading to the modifications of the original techniques which lead to better treatment options, but still very less emphasis has been laid on failures. Without a regular program of clinical reevaluation, plaque control, oral hygiene instructions, and reassessment of biomechanical factors the benefits of treatment are often lost and inflammatory disease in the form of recurrent periodontitis may result. So, this review describes the most common failures noticed in periodontal therapies and also discusses the possible solutions to reduce the incidence of failures in periodontal therapy.

**Key words:** Periodontal therapy, risk factors, failures.

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**Introduction**

Gingival & periodontal diseases, in their various forms have afflicted humans since the dawn of history. Even after continuous research, gingival & periodontal diseases are the most common dental diseases to affect humans though it dates back to 2500 B.C. Since then, numerous treatment strategies and various techniques have been designed & described to treat periodontal diseases. All these therapies ranging from scaling & root planing (SRP) to various flap surgeries have their own advantages & limitations. These procedures had failures which were identified leading to the modifications of the various techniques which lead to better treatment options, but very less emphasis has been laid on failures.<sup>1</sup> So, this review describes most common failures noticed in various periodontal therapies and also discusses the possible solutions to reduce the incidence of failures in periodontal therapies.

To discuss treatment failures, the concept of successful periodontal therapy must be defined first. In the past, treatment was only considered successful when there was radical elimination of pockets; today the concept of successful treatment has been defined more modestly with clinical parameters like absence of bleeding on probing, reduction in probing pocket depth, gain in clinical attachment level (CAL) and/or reduction in tooth mobility. After completion of comprehensive periodontal therapy, persistence of residual periodontal pockets, presence of bleeding and/or pus on probing, increase in loss of attachment or persistence of tooth mobility would be criterias to categorize a periodontal case as failure.<sup>1</sup> The causes for failure are manifold. In addition to the fact that periodontal therapy always takes place in regions exposed to plaque formation, failures may be ascribed to the following

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factors: 1) incorrect patient selection, 2) incomplete diagnostic procedures, improper diagnosis & incorrect prognosis, 3) difficult or inappropriate treatment and 4) unsupervised healing & absence of maintenance therapy.<sup>2</sup> These main causes and their possible solutions are listed in Table 1.<sup>2</sup>

**1. Incorrect patient selection:** A properly educated and motivated patient is a prerequisite for comprehensive periodontal therapy. A good comprehensively chalked out treatment plan of a patient with poor oral hygiene maintenance will fail even under the hands of an excellent periodontist. Every patient with periodontal disease does not necessarily and automatically become an ideal candidate for comprehensive periodontal therapy. Smokers who are not ready to quit smoking or follow a certain smoking cessation protocol are always worst candidates for comprehensive periodontal therapy.<sup>3</sup>

**2. Incomplete diagnostic procedures, improper diagnosis, and incorrect prognosis:** The seriousness of the disease must be established exactly through the diagnostic procedures, not only for entire dentition, but also for each tooth individually and for each side of a tooth. Only the most careful probing of each tooth side, analysis of radiographs, and determination of tooth mobility will reveal the severity of the disease, which requires a correspondingly extensive treatment.<sup>4</sup>

**3. Difficult (or inappropriate) treatment:** Plaque is the main reason for initiation of all forms of periodontal disease. So, the ultimate end point of any periodontal therapy is to elimination of plaque and also areas/niches which favour accumulation of plaque. However, several difficulties stand in the way of subgingival scaling like uneven course of periodontal pocket, micro-morphology of the root surface and macro morphology of the root surface. So,

in many instances elimination of plaque, especially subgingival plaque is incomplete which is the main reason for failure of periodontal therapy.<sup>4</sup>

**4. Unsupervised healing and absence of maintenance therapy:** Many failures arising soon after completion of treatment can be traced to the absence of supervision of the healing process.<sup>5</sup> Maintenance therapy or supportive periodontal therapy is decisive for long term success and prevents recurrence of the disease. Without regular recall examinations of the patients which are tailored according to the needs of the individual case, recurrence of periodontal disease will occur over a period of time.<sup>5</sup> The frequency of recall is based on variety of factors such as primary diagnosis, presence of systemic conditions (e.g. diabetes), presence of risk factors (e.g. smoking), success of primary treatment following a period of supervised healing and the extent to which, the patients can be motivated to cooperate.<sup>6</sup> Depending on the needs of the individual case, recall visits can be between 2 months to one year.<sup>5-7</sup>

#### **Failures associated with non surgical periodontal therapy**

Primary objective of SRP is to restore gingival health by completely removing elements that provoke inflammation (i.e. plaque, calculus, & necrotic cementum and endotoxin embedded on the root surface). Failures associated with SRP include: 1) Persistence of inflammation because of residual embedded calculus which in turn can be due to a wide variety of reasons, such as, inadequate accessibility & visibility seen in deep pockets & in complex anatomical areas of the tooth like the furcation areas, grooves & concavities present on the root surface. 2) Condition of the instruments: dull instruments frequently cause burnishing of the calculus instead of removing it in totality. So, regular sharpening of instruments is advised as it will improve both patient comfort/acceptance and operator

performance. 3) Faulty techniques of instrumentation: decreased angulation ( $<45^\circ$  to the long axis of the root surface) can lead to burnishing of the calculus & prevent it from being removed in total. Increased angulation ( $>90^\circ$  to the long axis of the root surface) can lead to laceration and trauma to the gingival tissues. Abscess formation can also be noticed in situations wherein residual calculus is embedded in the tissues. Mechanical therapy which follows the principles of periodontal instrumentation will result in reduction in failures in periodontal therapy.<sup>2</sup>

#### **Failures associated with local drug delivery (LDD) of antimicrobial agents**

Local drug delivery is defined as the placement of the drug directly to the periodontal pocket. In spite of the obvious advantages, failures with LDD is associated due to i) difficulty in placing the LDD in inaccessible, deep pockets and in furcations, ii) development of resistance among bacteria, iii) time consuming and expensive if many sites are involved with periodontal disease.<sup>1</sup>

#### **Failures noticed with treatment of furcation involved teeth**<sup>8</sup>

Multirouted teeth offer unique & challenging problems for the periodontist. The furcation area, because of the interrelationships between the size & shape of the teeth, the roots & their alveolar housing, & the varied nature & pattern of periodontal destruction, creates situations in which routine periodontal procedures are somewhat limited & special procedures are generally required.<sup>8</sup> Failures associated with furcation involved teeth are usually due to inability to maintain the furcal area free of plaque either by the patient or by the lack of access to the clinician.<sup>8</sup>

#### **Failures associated with supragingival & subgingival irrigation**<sup>9</sup>

Oral irrigation is defined as targeted delivery of water or irrigant to a specific

location (periodontal pocket) within the mouth. These clean the non-adherent bacteria and debris from the oral cavity. Failures associated with these procedures are due to i) Persistence of inflammation as the irrigant solution cannot be penetrated into deeper pockets. ii) The drug present in the irrigant gets thrown out of the gingival sulcus/periodontal pocket by the constantly oozing crevicular fluid (which is known as “wash-out effect”). iii) So, apart from the fact that, irrigation cannot be employed as a solo therapy, it is weakly effective even as adjunctive therapy.<sup>9</sup>

#### **Failures associated with frenectomy**

Frenectomy procedures may fail due to i) Reattachment of the frenum as a result of improper incision design, & failure to sever the underlying periosteal attachment, therefore care should be taken to design the incision and to completely remove the muscle fibre attachment and ii) If sutures are not placed properly gaping of the wound may occur leading to hindrance in healing. In the changing era of perio surgeries one innovative remedy has ended the inconvenience of suturing and has allowed the clinician to meet growing expectations and demands of today's dental patient, and the remedy is fibrin glue.<sup>10</sup>

#### **Failures associated with crown lengthening**

Failures associated with this procedure are primarily due to i) Inflammation of the gingiva due to violation of the biological width (defined as the combined physiologic dimension of the junctional epithelium & the supracrestal connective tissue attachment which is approximately 2 mm). So, the minimum distance between the bone crest & the gingival margin should be 3 mm or more to prevent impingement of the restoration on to the biologic width. ii) In cases of surgical crown lengthening, excessive removal of the bone can lead to down gradation of the prognosis of the tooth. Hence, optimum

bone removal should be planned to maintain the biologic width as well as bone support of the tooth.<sup>11</sup>

#### **Failures associated with depigmentation**

Failures associated with this procedure are mainly due to lack of patient co-operation in smokers. An increase in melanin pigmentation is associated with increase in smoking. If the procedure of depigmentation is carried out with electrocautery, care should be exercised to prevent necrosis of bone. So, contact of the cautery instruments with underlying bone should be avoided. If chemicals are used to produce depigmentation, there may be damage to the bone and underlying tissue because the depth of action of these chemicals is not controlled.<sup>12</sup>

#### **Failures associated with periodontal flap surgery**

Failures of periodontal flap surgery can be due to i) Improper incision: the rationale of any periodontal flap surgery is to gain access to underlying root and bone surfaces. If incisions are not made upto the bone/root surface a mucosal flap is elevated which, hinders in gaining proper access to the underlying root surfaces. It can also cause increased amount of bone resorption. Therefore while giving incision the blade should hit the bone in order to elevate a full thickness flap. ii) Reflection of the flap: elevation of the periodontal flap should be such that only around 1 mm of marginal bone is exposed. Over reflection will result in bone resorption, whereas under reflection will result in limited access to the underlying root/bone surface. iii) Debridement of the root surfaces and the bone: complete debridement with removal of plaque and calculus from the root surface is essential for success of any periodontal flap surgery. iv) Suturing of the separated flaps should be done to closely adapt the flap to the tooth margins. Failure to properly place the

sutures will lead to gaping of the wound and hence recurrence of the disease.<sup>12</sup>

#### **Failures associated with papilla preservation flap**<sup>4</sup>

Papilla preservation flap surgical procedure was devised by Takie et al.,<sup>13</sup> in 1985, to prevent the partial or complete exfoliation of bone graft material by providing primary coverage of the entire interproximal defect.<sup>13</sup> It is commonly used in regenerative techniques. Failures associated with this procedure are i) presence of too narrow interdental space. This procedure should be performed only if the interdental space is adequate to permit the reflection of the papilla. If there is too narrow interdental space then it should not be attempted as it will lead to failure of this procedure. ii) Incisions should be placed without compromising the blood supply, otherwise it will lead to necrosis of the papilla, iii) While suturing, flap should be adapted properly, if not, there will be gaping of the flap & failure of regeneration.<sup>10</sup>

#### **Failures associated with soft tissue augmentation surgery**<sup>2,14</sup>

It is most widely used and predictable technique for increasing the width of the attached gingiva. Common failures associated with soft tissue autografts are i) Mismatch between graft size and defect: if the denuded root defect is small enough, the collateral circulation will be adequate to support bridging. On the other hand, when prominent roots, with relatively wide areas of root exposure are grafted, two – point collateral circulation is insufficient for the graft support. As a result, the center of the graft thins and becomes necrotic; the graft splits and ultimately fails. ii) Improper graft adaptation to the underlying periosteum. After suturing, slight pressure is applied to the soft tissue graft with gauze moistened in saline for 5 minutes to permit fibrin clot formation and prevent bleeding. Bleeding will result in hematoma under the

graft with subsequent necrosis.<sup>14</sup> iii) To permit adequate transfusion of the graft, it has been recommended that all fat and glandular tissue be removed prior to suturing to prevent possible necrosis and/or inadequate take. Even though the need for this has been questioned, it is still generally accepted procedure. iv) Graft movement as a result of inadequate or insufficient suturing will surely result in failure because no plasmatic diffusion will occur. v) The final failure is often seen only after the graft has healed. The clinical appearance is acceptable, but the graft is totally movable when probed. This is a failure of technique and results from not removing all loose connective tissue and muscle fibres from the periosteal bed prior to the placement and not making sure that the bed is firmly attached to the underlying bone.<sup>14</sup>

#### **Failures associated with palatal flaps**<sup>4</sup>

The palate, unlike other areas, is composed mainly of dense collagenous connective tissue. This fact precludes the palatal tissue from being positioned apically, laterally or coronally. Therefore, surgical techniques are required that allow the tissue to be thinned & apically positioned at the same time. Common failures associated: i) The flap may be too short. Generally the result of deep primary incision, or use of a beveled gingivectomy incision. This results in delayed healing & increased patient discomfort. ii) Poor marginal flap adaptation caused by incomplete thinning of the tissue. The margins of the flap stand away from the tooth when the flap is replaced. This can be corrected either by additional thinning of inner flap surface close to the base of the original incision or by more osteoplasty. Careful examination will reveal the problem. iii) Incision beyond the vertical height of the alveolus, bringing the scalpel blade close to the

palatal artery. Cutting the palatal artery can be dangerous near its exit point from the greater palatine foramen. iv) Extension beveling or thinning of tissue on a low, broad palate invites damage to the palatal artery. v) Tissue placement too high onto the teeth results in poor flap adaptation & recurrent pocket formation. This can be corrected by proper trimming at the time of flap placement prior to suturing which is usually accomplished with scissors or scalpel blade. It often results in a thick, heavy margin.<sup>4</sup>

#### **Failures associated with root coverage procedures**<sup>1,15</sup>

Gingival reconstruction is today not only possible but a routine part of periodontal practice. The ability to cover unsightly exposed roots, sensitive roots, and crown margins, to reconstruct lost ridges & to enhance prosthetic reconstruction has made root coverage procedures popular both among patients and clinicians. According to Langer and Langer<sup>15</sup> in 1992 common failures associated with root coverage procedures are i) Recipient bed is too small to provide adequate blood supply, ii) Perforation of the mucosal flap, iii) Inadequate (small) size of the graft, iv) Inadequate coronal positioning of the flap, v) Poor root preparation and/or root conditioning.<sup>15</sup>

#### **Conclusion**

Therapeutic failure appears to be more frequent in periodontology than in other fields of dentistry.<sup>16</sup> Such failure may be caused by errors in patient selection, incomplete diagnostic procedures, diagnostic or prognostic errors, treatment difficulties and obstacles, non-controlled healing, or the absence of maintenance therapy. Most failures can be avoided by instituting a regular recall system.<sup>16</sup>

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