

# Sequential treatment planning

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**P**atients needing major restorative treatment that involves extensive fixed prosthodontic care often require many preparatory procedures involving various dental specialties. Coordination of a total treatment plan is essential to the completion of a comprehensive treatment regimen. Every project in modern society requires organized management, and total dental care is no exception. To afford the dental patient with every advantage of modern dental treatment, a closely supervised combination of efforts becomes increasingly essential. In this age of specialization, a dentist can no longer stand alone and accomplish all phases of clinical practice with mastery of the art. The era of superdentist is rapidly declining. Educational levels have advanced the many treatment areas of dentistry into the sophisticated dental specialties.

For the patient who requires extensive therapy, ideal treatment is likely to result from the coordinated efforts of specialists available to participate in treatment. Astute treatment by the dental specialist, however, may be useless unless it is performed in harmony with a total treatment program. All too often we have observed a specialist's results deteriorate. A classic example is that of an endodontically treated terminal molar abutment that remains unrestored for several years after endodontic therapy. Recurrent caries reduce the tooth to hopeless root tips. On more occasions than we would like, a key abutment involved in an uncoordinated treatment effort falls prey to the exodontist's forceps because it has become unrestorable. Another example of the lack of sequential treatment planning concerns the area around a recently placed restoration that requires extensive periodontal therapy.<sup>1</sup> When postrestorative

periodontal therapy is used where pre-restorative considerations were indicated, the final result usually manifests as a compromised condition.

The practice of dentistry cannot exist in an academic vacuum. Cases that require extensive therapy will require a team effort in accomplishing the final result.<sup>2</sup> "If the operator does not wish to cope with each individual problem, it may be necessary to consult with the proper specialist and to direct the patient into the proper channels for treatment as part of the treatment plan."<sup>3</sup> Prichard<sup>4</sup> says that the examiner is not obligated to perform therapy but is obligated to make a diagnosis and to inform the patient of an existing disease condition. With whom does the responsibility of coordinating treatment lie? Maybe the question would be better phrased, "Who will the patient hold responsible for the total treatment?"

If the end product of therapy results in the fabrication of an extensive fixed restoration or a combination of fixed and removable restorations, the party most likely to be considered responsible for the total treatment is the restorative dentist or prosthodontist. It is therefore imperative that, as restorative dentists, we organize the treatment program in an orderly and logical manner. The sequence of therapy has become the master architect, the captain of the team. The restorative dentist must have a working knowledge of the treatment modalities used by specialists available for support therapy. It is imperative that all the knowledge that has been acquired through study and experience be combined.<sup>5</sup> A comfortable rapport and an open line of communication with these specialists must also be established.

Coordination of the sequence of therapy involving several dental spe-

cialities is impossible to accomplish unless the prognosis can be established. Establishing the prognosis warrants either a working consultation system to answer specific questions, a thorough knowledge of the ability of the specialists to accomplish the required treatment, or both. For extensive rehabilitations as well as with smaller restorations, the preservation of the total masticatory system as a functional unit is the most important consideration. The individual components should not overshadow the importance of the entire functional system. Goldman and Cohen point out that "the loss of a single tooth or even several teeth does not destroy the dentition if the teeth can be restored properly. If the tooth can be dispensed with and still maintain enough remaining members to assure adequate support for a fixed prosthesis, then obviously the tooth can be sacrificed."<sup>6</sup>

Arranging a comprehensive treatment program may directly affect the prognosis. If the sequence of treatment follows a logical course, the prognosis often becomes more favorable. The converse is also true. Poor coordination of treatment sequence may lead to a less favorable prognosis or even total failure of the final treatment.

In addition to a logical sequence of therapy, additional considerations have been listed in the literature as factors to consider in establishing a prognosis. These include: the length of time the dentition has been seriously involved; the degree to which significant change can be accomplished; estimating the crown-to-root ratio that will classify a tooth as hopeless; the effect of root form on its retention; the relationship of tooth mobility with respect to its etiology; age of the patient and general degree of disease progress; the existence of suppuration; the condition of a

removable prosthesis and its relation to the existing disease condition; and general systemic factors that affect the oral cavity.<sup>6</sup>

As the responsibility for the final restoration lies ultimately with the restorative dentist, naturally, it is the restorative dentist's responsibility to develop the treatment plan, gather the necessary information, and coordinate the sequence of therapy.

The sequence of therapy can only evolve in the form of a comprehensive treatment plan if all necessary information is available. This information can only come from a thorough examination. Of necessity, this examination must include at least a complete medical and dental history, a complete series of intraoral radiographs, a set of diagnostic casts, and a thorough clinical examination.<sup>7</sup> The diagnostic casts should be mounted properly on a suitable articulator. Included in the clinical examination should be an overall first impression of the patient's status.<sup>8-11</sup> Scopp refers to an inscription on the National Archives in Washington, DC, "The past is prologue . . . It is particularly pertinent to pointing up the necessity for obtaining a case history."<sup>12</sup>

Special effort should be made to accurately record not only individual restorative considerations, such as carious lesions and missing teeth, but other specific information as well. Included in the clinical examination of a new patient's work-up should be a comprehensive periodontal charting. Accurate measures of pocket depth should be recorded, with notations on specific problem areas. Glickman says, "The only accurate method of detecting and evaluating periodontal pockets is careful exploration with a pocket probe or explorer."<sup>13</sup> Calibrated silver points used in conjunction with radiographs are often beneficial.<sup>14</sup> Deposits of calculus and plaque should be noted, as well as areas presenting mucogingival defects. The level of epithelial attachment is of greater diagnostic value, however, than the general measurement of pocket depths.<sup>15</sup>

Attention should be directed to the molar and premolar area, noting the extent of any bone loss and the degree of furcation involvement. Closely related to periodontal charting is the recording of tooth mobilities and the relationship of these mobilities to the present occlusal system. A determina-

tion should be made to classify these mobilities as resulting from primary or secondary trauma. Tilted, shifted, and rotated teeth and their relationship to the occlusal system should also be noted.

A thorough occlusal and temporomandibular joint analysis should also be made.<sup>16-19</sup> Examining jaw relations and recording occlusal interferences are useful in developing a comprehensive treatment plan.<sup>21</sup> The patient's chewing patterns and the age and condition of a previously placed prosthesis should also be noted.<sup>6</sup> We may often glean a great deal by what previous treatment has accomplished or failed to accomplish.

Radiographic examination must be coordinated with the clinical examination. Testing the vitality of questionable teeth also adds information.

When the work-up is completed, the restorative dentist should have available all the necessary information from which to formulate the tentative treatment plan. As Prichard says, "Treatment planning follows diagnosis, but treatment can never be planned by a rigid set of rules."<sup>4</sup>

For a treatment plan to function effectively, it should be a fully written plan, expanding in details wherever necessary. In the process of developing comprehensive treatment plans that control the sequence of therapy, a format has evolved. This format has been based on three active treatment phases and a final maintenance phase that coordinates follow-up and recall treatment. A brief outline of some more frequently used treatment modalities in the various phases of treatment follows. Before formulation of the treatment plan, any emergency condition should be eliminated.

## Phase 1

The first phase of treatment should include:

1. Initial emergency and patient comfort.
2. Control of active pathologic lesions, such as, apical lesions; periodontal abscess; acute dental caries; and primary occlusal trauma.
3. General caries control.
4. Initial periodontal therapy and plaque control program.
5. Initiation of required endodontic treatment. The completion of endodontic treatment in which a periodontic-endodontic syndrome

exists should be postponed until removal of hopeless teeth.

6. Placement of a provisional restoration if required for esthetics.

7. Establishment of a new vertical dimension of occlusion, if required.

8. Orthodontic treatment, including: initiation of limited tooth movement; initiation of complete orthodontic treatment; and periodontal reevaluation during orthodontic treatment.

9. Occlusal adjustment.

10. Orthodontic stabilization after tooth movement is completed.

11. Initial tooth preparation and placement of provisional restorations, including, root resections, as required.

12. Additional oral surgical procedures, such as: residual ridge corrections or modifications, and tuberosity reductions.

## Phase 2

The second phase of treatment should include:

1. Reevaluation of the occlusal system as established through provisional restorations, occlusal adjustments, or both.

2. Definitive periodontal surgery, including: osseous recontouring; reduction of soft tissue ridges; and correction of mucogingival defects.

3. Completion of endodontic treatment.

4. Fabrication of cast gold post and cores (often completed in Phase 1, when provisional restorations are required).

5. Healing period after periodontal surgery.

6. Repreparation of abutments in the area of periodontal surgery and modification of provisional restorations.

7. Reevaluation of periodontal response to the provisional restorations, with special attention to areas of plaque accumulation.

8. Final evaluation of esthetic aspects of provisional restorations.

9. Radiographic reevaluation if sufficient changes warrant.

## Phase 3, the final restoration

A detailed written description of the final restoration should include all aspects of design. Sufficient information should be listed to adequately transcribe details to the laboratory work order. An example of items listed might include:

1. Fixed partial denture—specifying the teeth from which the fixed partial denture extends and which teeth are replaced.
2. Material used to fabricate the fixed partial denture.
3. Pontic design and ridge relationship.
4. Design of facings (for example, porcelain, buccal veneers, or full occlusal porcelain, long pin facing, and so on).
5. Stress-broken splints, specifying the type of stress-breaking precision attachments to be used.
6. Contour designs to be incorporated in fixed restorations to accept a removable partial denture.
7. The complete description of any removable partial denture to include: major connector design; position of undercut areas and appropriate clasps; location of rest seats; and type of base and teeth to be used.
8. A description of the occlusal system to be used in the final restoration.

## Phase 4, maintenance and disease control

If the patient has extensive periodontal therapy, then a coordinated recall system must be established between the periodontal and restorative office. For the extensive periodontally-prosthetically treated patient, more frequent recalls are needed; generally, four visits per year, alternating visits between offices.

Recall appointments should include a close evaluation of the patient's oral physiotherapy, observation of the occlusal system, and general periodontal response to the final restoration.

When the practitioner initially presents the treatment plan, patients must be informed that after the first three phases of therapy are completed, the treatment is not complete. All too often patients think when the final restoration is placed or the removable appliance is provided that dental treatment has come to an end. Patients should be constantly reminded that even when the restoration is completed, the treatment is not.

Constant observations are essential to the successful maintenance of any completed treatment.

Although each aspect of the treatment plan is important, one of the most important is the coordination of efforts by participating specialists. If an endodontist, periodontist, orthodontist,

and oral surgeon participate in a comprehensive treatment program, it is imperative that each specialist be fully aware of all aspects of the treatment plan. Direct verbal communication will convey the facts concerning an immediate situation, but a written memo should follow. Included in each letter of referral to a support specialist should be a copy of the tentative treatment plan. In addition to the written treatment plan, a copy of the treatment plan diagram should be included.

The treatment planning diagram is a convenient way of conveying, at a glance, the design of the projected restoration.

Examples of tentative treatment plans are illustrated in Figures 1 and 2. To illustrate the flexibility of the tentative treatment planning system, Figure 1 illustrates a situation in which the provisional restorations are programmed for Phase 2 of treatment, rather than Phase 1.

During the initial explanation of treatment, the patient is given a copy of the tentative treatment plan. Each phase of treatment is reviewed generally and notes are added to the patient's copy to explain specific phases or project a time frame that might be anticipated. The fact that this is a tentative plan is pointed out, and changes may become necessary during the active treatment phase.

The treatment plan diagram is designed so that the outline of the final restoration is instantly clear. Included in the diagram are the position of connections, precision attachments, major and minor connectors for removable partial dentures, and the like.

A uniform and neatly presented diagram can be produced in minutes with the use of small rubber stamps to identify various aspects of the final restorations. Use of the unfamiliar abbreviations should be avoided on the rubber stamps. This will minimize unnecessary confusion by a support specialist in interpreting the diagram.

Every effort must be made to be clear and concise in both the tentative treatment plan and treatment plan diagram. Clarity in communication will aid a coordinated effort between practitioners and facilitate effective patient care.

## Summary

Sequence of treatment is essential to comprehensive care of patients. An outline of a four-phase tentative treat-

ment plan as well as an effective method for producing a treatment plan diagram have been described.

Close coordination of efforts between restorative dentist and other specialists involved in therapy is essential to the successful completion of a comprehensive treatment program.

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## Figure 1. Sample tentative treatment plan.

### Phase I:

1. Initial periodontal therapy and instruction on plaque control (periodontist).
2. Provisional restorations:  
Maxillary arch—complete arch splint from tooth #4 through #13 (ten units) and previous orthodontic treatment and extraction of premolars.  
  
Mandibular arch—complete arch splint from tooth #20 through #30, replacing teeth #21, 24, 25, 26, and 29; strategic extraction of teeth #24, 25, and 26 before placement of provisional splint; and initiation of necessary endodontic treatment.

### Phase II:

1. Reevaluation of occlusal system as established in provisional restorations.
2. Definitive periodontal therapy, including:  
  
Elimination of surgical pockets in both arches.  
  
Mucogingival corrections, especially on facial aspect of teeth #4 and #6, and lingual aspect of tooth #30 using free gingival grafts.  
  
Esthetic management of gingival tissues on facial aspect of maxillary anterior teeth.
3. Healing period and periodontal reevaluation.
4. Completion of necessary endodontic treatment.

### Phase III, the final restoration:

1. In maxillary arch, complete arch splint from tooth #4 through #13, assembled in three sections with precision Ney M/S attachments on distal aspects of #6 and #11. Restoration will be porcelain fused to gold with buccal veneers on posterior teeth.
2. In mandibular arch, complete arch splint, assembled in two sections with a precision interlock, Stern Type VII .096, between teeth #27 and #28. Section from tooth #20 through #27 will be porcelain-fused-to-gold fixed partial denture to replace teeth #21, 14, 25, and 26. Pontics will be modified ridge lap design.

Restorations in both arches will be cast with an alloy with a high content of gold.

The section from tooth #28 through #30 will be porcelain-fused-to-gold fixed partial denture to replace tooth #29. Pontic design for this tooth could be modified ridge lap design.

### Phase IV, maintenance and control of disease:

1. A comprehensive maintenance and recall program will be developed to meet specific needs of treatment. Periodontal and prosthodontic supervision will be coordinated to effectively reinforce methods for control of disease emphasized during therapeutic phases of treatment.

## Figure 2. Sample tentative treatment plan.

### Phase I:

1. Emergency endodontic treatment for tooth #1 (endodontist).
2. Orthodontic consultation to consider correction of Class II jaw relationship (orthodontist).
3. Initial periodontal therapy and instruction on control of plaque (periodontist).
4. Provisional amalgam restorations for tooth #12 and #13.

### Phase II:

1. Completion of orthodontic treatment.
2. Provisional restorations.
3. In maxillary arch, teeth #1, 2, 3, and 4 will be stabilized with processed acrylic resin splint. Teeth #12 and #13 will be splinted. A provisional removable partial denture will replace teeth #14, 15, and 16.
4. In mandibular arch, teeth #18, 19, and 20 and teeth #29, 30, and 31 will be reevaluated for stabilization and provisional restorations will be placed. Periodontal reevaluation will be completed and referral to periodontist will occur if needed.

### Phase III, the final restoration:

1. In maxillary arch, porcelain-fused-to-gold crown will be provided for teeth #9 and #1. Porcelain-fused-to-gold partial denture will extend from tooth #2 through #4, replacing tooth #3. Pontic design for tooth #3 is modified ridge lap. Porcelain-fused-to-gold splint will be provided for teeth #12 and #13 with a Stern .096 GL precision attachment on distal aspect of tooth #13 and milled in attachments on teeth #2 and #3. Precision-attachment removable partial denture will replace teeth #14, 15, and 16; it will have broad strap chrome major connector across palate. Buccal porcelain veneers will be used on all maxillary restorations.
2. In mandibular arch, porcelain-fused-to-gold fixed partial dentures will be provided:  
  
Left side—it will extend from tooth #18 through #20 and replace tooth #19. Sanitary pontic design will be used for this tooth.  
  
Right side—porcelain-fused-to-gold fixed partial denture will extend from tooth #29 through #31 and will replace tooth #30. Sanitary pontic design will be used for this tooth.  
  
Full occlusal porcelain will be used on both mandibular fixed partial dentures.  
  
Casting in both arches will be made with an alloy with a high content of gold.

### Phase IV, maintenance and control of disease:

A comprehensive maintenance and recall program will be developed to meet specific needs of treatment. Periodontal and prosthodontic supervision will be coordinated to effectively reinforce methods for control of disease emphasized during therapeutic phases of treatment.