



## Aesthetic zone for the single tooth implant - Part 4

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**A**ttaining an acceptable aesthetic result in the aesthetic zone with an implant-supported crown is dependent upon the existing biological parameters and the reconstruction approach followed.

In essence the biological parameters determine the degree of difficulty with the reconstruction and can be classified into three categories:

1. Ideal situation;
2. Not ideal situation but manageable; and
3. Impossible situation.

These biological parameters are dependent upon both systemic and local parameters. The local factors in general are the dentition, bone and soft tissue; for a comprehensive list see Table 1. The greater the divergence of any of these parameters from the ideal, the greater the reconstruction problems. This is compounded further when 2 or all 3 of these general parameters are involved.

When these biological parameters are analyzed, it will provide information as to where the ideal implant position should be in a 3-D position. This information should facilitate the ideal prosthetic result by using a systematic approach incorporating the following three parameters:

1. The perfect *centre of the implant* is determined from the occlusal view. The aim is to have arch symmetry from the adjacent teeth and the corresponding contra lateral tooth. Naturally this positioning is not a problem if there is sufficient alveolar bone available in the labio-palatal dimension. However when there is progressively less bone, implant placement problems occur correspondingly (Figure 1). Once the theoretic centre is determined, the site is determined clinically by the use of a ruler or a pair of dividers. Once the site is marked, the round drill is used to establish it.

2. The perfect *angulation of the implant* is assessed from the lateral view of the adjacent teeth. With sufficient labial alveolar bone available this is not a problem,



Figure 1. The occlusal view of the maxillary arch demonstrates the progressive loss of labial bone from the 11 site is evident in moving from 1 to 6.

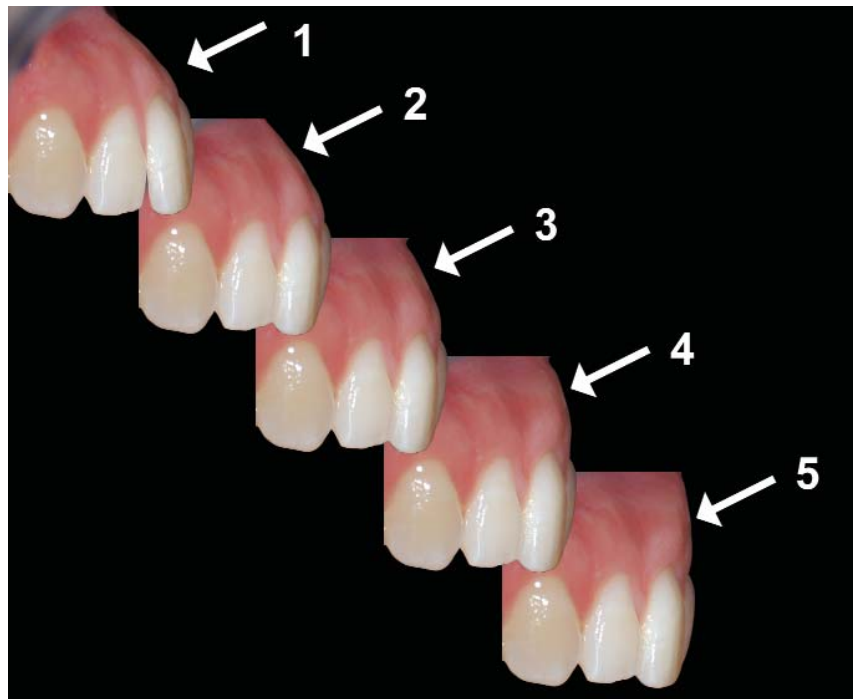


Figure 2. The lateral view of the anterior maxilla demonstrates the labial bone in the edentulous site. The steeper it is, as in 1 the more difficult it is to place the implant into an ideal position but it becomes easier with the other stages and the easiest is in 5.

however with less bone, problems can progressively occur (Figure 2). The site preparation is by the use of the narrow twist drill positioned into the prepared site with the ideal angulation. It is here where alignment problems can occur as the drill could easily slide away from the desired path. Establishing the correct angulation is usually the most difficult and critical aspect of positioning the fixture.

3. The perfect *depth of the implant platform* is determined from the frontal view of the adjacent teeth and the corresponding contra lateral tooth. When there is symmetry of the gingival and bone contour this should not present a problem, however with progressive asymmetry, problems can occur (Figure 3). The appropriate depth is 2 mm superior to the zenith point of that site. In the site preparation

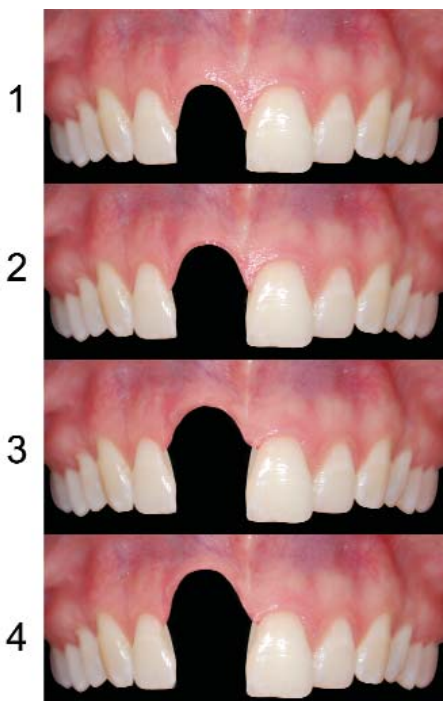


Figure 3. The frontal view of the anterior maxilla indicates the edentulous site's supporting bone and the gingival contour vertically. The closer it is to the ideal the simpler it is to place the implant into the ideal position. The diagrams progressively get worse from 1 to 4.

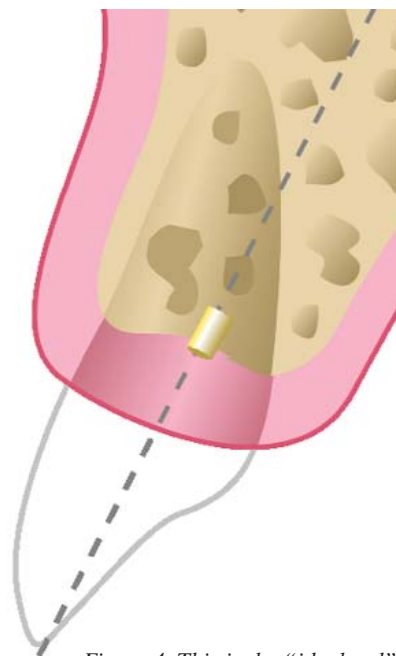


Figure 4. This is the "ideal rod" where the centre of the implant platform can be positioned and orientated in 3-D for an ideal position.

this is attained by the use of the final drill and in some implant systems with the use of the counter sink.

Now imagine the *centre of the implant platform* as the anchor of the implant in the horizontal plane. Now consider this point (implant platform) in the vertical plane to signify the *depth of the implant platform*. Next, consider a line through this point in 3-D orientation to signify the *angulation* of the implant. Naturally there is some latitude with the so called "ideal positioning of the implant". Hence a rod is formed that signifies the ideal implant platform positioning within this zone. It is essential to realise that these 3 aspects are related to each other, which means if you change one, the other 2 are affected. For example when moving the implant centre to maintain the perfect crown position; the implant angulation will have to be changed; and this will affect the depth of the implant platform to a varying degree to accommodate these changes (Figure 4).

The next concept to consider is the possibility of making a prosthetic compromise: either by sacrificing the option of using a screw-retained crown or use custom abutments. Opting for a cement-retained prosthesis or customizing abutments will provide additional latitude for ideal implant positioning. This means there are more positions possible to place the implant into an ideal position. Hence

the positioning rod can be made slightly thicker and slightly longer (Figure 5).

Now consider a halo around the rod (Figure 6). The halo represents a compromised implant positioning which in turn allows only an acceptable prosthetic result.

The final aspect to this theoretical model comprises an implant positioned according to the parameters as determined by the thin, smaller centering rod. This is the volume where ideal implant platform positioning is possible.

Next consider the thicker and longer centering rod but the original rod's volume has been removed from within. It is this remaining aspect of the rod which, if the implant is positioned, then calls for a technical prosthetic compromise.

Now consider just the halo; if the implant is positioned within the actual halo area then the implant position is a compromise and will effect the final prosthetic result.

In all of these scenarios, the implants in the horizontal plane require at least 2mm of bone coverage and if there is an adjacent implant at least 3mm, if possible. Naturally, as mentioned in our initial article, this is not always possible, so the other option is to augment the ridge and/or create more space mesio-distally. To overcome some of these problems deeper into the alveolar ridge, various types of implants can be used which are shorter, tapered and thinner. The shorter implants are used to compensate for the lack of

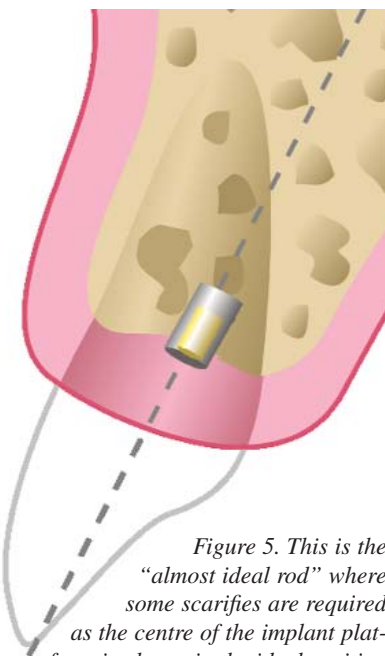


Figure 5. This is the "almost ideal rod" where some scarifies are required as the centre of the implant platform is almost in the ideal position and orientated in 3-D. Note the "ideal rod" is subtracted from the "almost ideal rod's" inner volume.

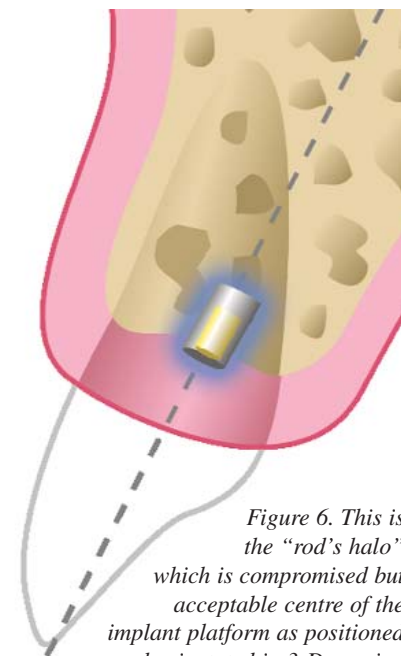


Figure 6. This is the "rod's halo" which is compromised but acceptable centre of the implant platform as positioned and orientated in 3-D causing significant prosthetic scarifies. Note both the rods are subtracted from the inner aspects of the halo.

labial bone or convergence of the adjacent roots. The tapered implant theoretically can help with the same problems in a very limited way. The thinner implants can be used for the same reasons and can be more beneficial in reducing the bone dehiscence and can be far more versatile in its positioning, but the sacrifice could be to the emergence profile. Obviously not all the problems can be overcome with this approach. But the reorientation and repositioning of the implant is the most common approach that can easily mislead the clinician. When there is a vertical problem, the most common approach is augmentation but this is not uniformly predictable, especially if the implant is placed above the crestal bone, above the adjacent teeth or the ridge is augmented above these points.

In conclusion, the aim is to position the implant into the ideal site, but for various reasons this cannot always occur. The aim is to select the ideal position and not vary this to accommodate the biological problems. If the positional and orientation parameters are adjusted then prosthetic problems can occur with a less than ideal result in aesthetics, function, mechanics and maintenance.

## 1) Biological Considerations

- a) Tooth factor
  - i) Adjacent teeth positions and angulation
  - ii) Contralateral tooth
  - iii) Class of Occlusion
  - iv) Jaw relationship
  - v) Opposing teeth positions
  - vi) Tooth's anatomy
- b) Bone factor
  - i) Ridge angulation
  - ii) Adjacent dentate alveolar ridge form
  - iii) Morphology residual edentulous ridge
  - iv) Resorption pattern of edentulous ridge
- c) Soft tissue Factor
  - i) Quantity of soft tissue
  - ii) Type of soft tissue
  - iii) Architecture
  - iv) Quality of soft tissue

## 2) Correction options in general

- a) Implant
  - i) Ideal placement and angulation
  - ii) Implant dimensions (length and width)
  - iii) Implant design
  - iv) Abutment design options

- b) Prosthetic
  - i) Prosthetic crown design
  - ii) Retention of crown options
  - iii) Tooth and occlusal correction
- c) Surgical
  - i) Ridge augmentation
  - ii) Adjunctive surgery
  - iii) Adjunctive management
- d) Orthodontics

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