Not long ago, I attended a scientific meeting here in Spain. One of the speakers was a prestigious and well-known researcher in the field. His lecture was going great until he said this: “Immediate implants are no longer an option in implant dentistry. Everyone who performs immediate implants should be aware that they’re doing something that’s not predictable in any case.”

Almost everyone, including me, disagreed. The speaker based his premise on animal experimentation, which doesn’t always exactly mimic natural responses in human behavior. Some colleagues disagreed more vehemently than others—the man next to me, for example, suggested that the speaker should head to a legendary place of eternal misery. (No, not Wal-Mart on Black Friday, but close.)

I, meanwhile, decided to write this article for Dentaltown. These tips can be easily applied in your daily practice (and all are based on scientific publications, so you can feel confident about what you read).

Before starting with the cool stuff, though, let’s discuss the biological and anatomical considerations of what happens after an extraction.
Bone healing

In implant dentistry, it’s important to know what events take place after an extraction—many times, because we want to prevent them. If we take a look at the literature, we should know that major changes in an extraction site take place during the 12 months after tooth extraction.1

• There’s around 50 percent reduction of the total width the first year, which means a variation of 5–7 millimeters.2
• Approximately two-thirds of this reduction occurs within the first three months after tooth extraction.
• It doesn’t matter if the extraction is in the mandible or maxilla—similar volumetric change is expected in both areas.
• Bone formation is the most common phenomenon during the first three months. After this period, bone remodeling takes place.
• One-millimeter height loss is expected.

Bone dynamics

On the other hand, from a histological point of view, some other events also take place after an extraction.3

• The first present element is a blood clot, which is replaced by granulation tissue during the first week (Figs. 2a–b).
• The granulation tissue is present mainly in the most coronal portion of the socket, while in the other two-thirds, the blood clot is replaced by a provisional matrix. This granulation tissue is filled with inflammatory cells, in response to the presence of infectious material in the oral cavity (Fig. 2c, p. 82).
• After 30 days, the socket is sealed with a keratinized mucosa (Fig. 2d, p. 82).
• Hard-tissue formation begins after two weeks of healing, during which half of that provisional matrix area—the most apical part of the socket—will be filled by woven bone.
• After two months of healing, a hard tissue bridge covers the marginal portion of the socket, and a periosteum is now attached to the lining mucosa (Fig. 2e, p. 82).
• The woven bone is gradually replaced by lamellar bone (Fig. 2f, p. 82).

Postextraction dimensional changes

Why is a collapse more likely to happen in the buccal wall? A structure called bundle bone is dependent on the blood supply from the periodontal ligament, and is resorbed when the extraction is performed.4

The average width of the bundle bone is around 0.2–0.4 mm,5 which in some cases

1 day 3 days 7 days 14 days 30 days 60 days 90 days 120 days 180 days

Figs. 2a–b: Day 1 to one week. The first element that is present is a blood clot, which is replaced by granulation tissue during the first week.
represents the entire buccal wall. When this bundle bone is entirely resorbed, there is a collapse of the buccal bone.

That’s when all the problems begin, and that’s why immediate implants in the aesthetic zone should be considered with caution.

**Case selection is the key to success**

To have an accurate case assessment, use the Esthetic Risk Assessment (ERA) tool (Fig. 3).

I’ve created an Excel system that lets me determine if the case in front of me is complex, straightforward or advanced (Fig. 4) by tallying the number of red, green and yellow boxes. It’s essential to see whether the red boxes outweigh the green, meaning the case isn’t suitable for an immediate case. For greater predictability, it’s more important to have a larger number of green boxes.

I also focus on three important points:

1. **The lip line.** This will determine if any mistakes you may commit will be visible.
2. **The soft tissue biotype.** Recession is more likely to happen in a thin biotype.

**Esthetic Risk Analysis for Implant Dentistry**

<table>
<thead>
<tr>
<th>ESTHETIC RISK FACTOR</th>
<th>LOW RISK</th>
<th>MODERATE RISK</th>
<th>HIGH RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Status</td>
<td>Healthy, cooperative patient with an intact immune system</td>
<td>Reduced immune system</td>
<td></td>
</tr>
<tr>
<td>Smoking habit</td>
<td>Non-Smoker</td>
<td>Light smoker (&lt; 10 cigs/day)</td>
<td>Heavy smoker (&gt; 10 cigs/day)</td>
</tr>
<tr>
<td>Patient’s Esthetic Expectations</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Lip Line</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Gingival Biotype</td>
<td>Low scalloped, thick</td>
<td>Medium scalloped, medium thick</td>
<td>High scalloped, thin</td>
</tr>
<tr>
<td>Shape of Tooth Crowns</td>
<td>Rectangular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection at Implant Site</td>
<td>None</td>
<td>Chronic</td>
<td>Acute</td>
</tr>
<tr>
<td>Bone Level at Adjacent Teeth</td>
<td>&lt; 5mm to contact point</td>
<td>5.5mm to 6.5mm to contact point</td>
<td>&gt; 7mm to contact point</td>
</tr>
<tr>
<td>Restorative Status of Neighboring Teeth</td>
<td>Virgin</td>
<td>Restored</td>
<td></td>
</tr>
<tr>
<td>Width of Edentulous Span</td>
<td>1 tooth (&gt; 7mm)</td>
<td>1 tooth (&lt; 7mm)</td>
<td>2 teeth or more</td>
</tr>
<tr>
<td>Soft-Tissue Anatomy</td>
<td>Intact soft tissue</td>
<td></td>
<td>Soft-tissue defects</td>
</tr>
<tr>
<td>Bone Anatomy of Alveolar Crest</td>
<td>Alveolar Crest without bone deficiency</td>
<td>Horizontal bone deficiency</td>
<td>Vertical bone deficiency</td>
</tr>
</tbody>
</table>

Fig. 2c: After two weeks, hard tissue formation starts. Half of the 2/3 of the most apical part of the socket has been filled by woven bone.

Fig. 2d: After four weeks, the socket is sealed with a keratinized mucosa.

Fig. 2e: After two months, a hard-tissue bridge covers the marginal portion of the socket, and a periosteum is now present that is attached to the lining mucosa.

Fig. 2f: After more than two months, the woven bone is gradually replaced by lamellar bone.

Fig. 3
3. **The patient expectation.** Make sure that the outcome the patient seeks is possible, from a biological and functional point of view. (Also be aware of the expectations of the patient’s girlfriend, mother or any other relatives. I once had an unscheduled quarrel with a patient’s relative, which wasn’t a pleasant experience.)

**Anatomical conditions are optimal in 81 percent of cases**

We always have to check the integrity of the sockets, because “the presence of interproximal bone is mandatory if you want to get some papilla around the restoration.”

The presence of the buccal bone will determine if you should perform a more conservative approach. The Elian classification (Fig. 5) is useful in this case: A Type I socket is favorable for an immediate implant placement, while Types II and III would need augmentation procedures. (See Figs. 6a–d on p. 84.)

It’s strongly recommended to use a CT scan to check the sagittal root position in relation to the anterior maxillary osseous housing.

**Surgical tips: The ideal implant size, position and geometry**

Choosing the “right” implant can be a controversial point, so I’ll try to be polite.

Primary stability has been suggested to be a key prognostic for osseointegration. Other studies suggested that implants without primary stability could be osseointegrated when they were left undisturbed during the healing process.

It is, in fact, important to achieve an optimal primary stability if we are going to perform an immediate restoration. A torque of 10 Ncm could be enough, as long as the provisional is bonded to the adjacent teeth. But I wouldn’t recommend loading an implant placed with that torque. You’ll feel more confident if a higher torque is used during the implant placement. Higher torque means higher survival rate and also fewer complications.

What’s the best implant geometry for an immediate implant? It seems that conical implant achieves a more optimal primary stability in a fresh extraction socket, but we should know that the spontaneous filling of the gap is significantly better in cylindrical implants than in conical ones.

**Implant diameter:** If we read some articles about immediate implants, we may notice that some authors used to choose implants with a diameter up to 5mm. However, this can bring negative consequences for the stability of the peri-implant soft and hard tissues. That’s why the implant diameter must be chosen in regard to the buccal-palatal width, and not the mesiodistal distance. The implant diameter in the anterior maxilla should be less than 4.5mm.

**Implant position:** A 3-D implant position is crucial to achieve an aesthetic outcome.

Figs. 7a–e (p. 84) illustrate some new concepts.

We need to avoid our implant drifting buccally. Start drilling...
Fig. 6a: Type I. The root is positioned against the labial cortical plate. A considerable amount of bone is present on the palatal aspect for implant engagement to attain primary stability.

Fig. 7a: Implant placed too buccally. This will be difficult to restore, and may increase biological complications.

Fig. 6b: Type II. The root is centered in the middle of the alveolar housing without engaging either the labial or palatal cortical plates at the apical third of the root. The amount of bone may not be adequate to ensure implant stability.

Fig. 7b: An ideal jumping distance of 1.5–2mm (ideal from a prosthetic point of view).

Fig. 6c: Type III. The root is positioned against the palatal cortical plate. The stability of the implant relies on its engagement in the available bone on the labial aspect.

Fig. 7c: The implant engaging the buccal wall will promote bone resorption, biological and restorative complications.

Fig. 6d: Type IV. At least two-thirds of the root is engaging both the labial and palatal cortical plates. (Class IV is considered by the authors to be a contraindication for immediate implant placement.)

Fig. 7d: An implant plated at the root tip will be drifted buccally because of the density of the palatal bone.

Figs. 6a–d: In a nutshell, a Type I socket is the most favorable and the most common—around 81 percent, in a sample size of 600 patients.6

Fig. 7e: Placing the implant engaging the palatal wall will provide an ideal prosthetic position and gap size (1.5–2 mm). Using a SCTG simultaneously with immediate implants placement

Using a subepithelial connective tissue graft, or SCTG, while placing immediate implants improves the stability of the peri-implant soft tissue.18, 19, 20, 21

When compared with immediate implants without connective tissue graft, an SCTG was shown to be beneficial in maintaining facial gingival level.22

Prosthetic tips: Provisional restoration and the ideal emergence profile

Provisionals are essential if we seek an aesthetic outcome. In the case of immediate implants, some authors have suggested that the provisional is important to maintain the dentogingival architecture.22

I’d like to add that the use of a CAD/CAM PMMA may be the best option, as it has been proven to have optimal mechanical and biological behavior.23 It’s an important part of my workflow when I perform a digital socket shield technique, too.

Concave emergence profiles seem to have a positive impact.24, 25 We should consider using a definitive abutment, placed the same day of the surgery, to avoid further disconnections.26

Figs. 8a–d (see periospot.com) illustrate how this concave profile can be applied.

Conclusions

Although this is a controversial topic, I believe these points can be useful from a clinical point of view:

The use of SCTG is mandatory in case of thin biotypes. Also, the use of a provisional is a “must-have” in every restoration with a demanding aesthetic outcome. And we can’t forget that everything else won’t make
sense if the implant isn’t placed in an ideal 3-D position.

The trimodal approach (immediate implant, flapless, immediate restoration) is a reliable and predictable procedure.27 In some cases, other techniques and features can be added to this approach:

- Subepithelial connective tissue graft, in case of a thin biotype
- Incorporate PMMA CAD/CAM provisional
- Socket shield technique (although it’s yet to be seen if this approach is predictable in the long term)

It can be an individualized approach by every clinician who incorporates scientific-based knowledge.

References

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