Accustomed to cementing restorative crowns on natural teeth, dentists have adopted a similar approach with cement-retained implant crowns and fixed partial dentures, the most frequently used restorations in implant dentistry. Such restorations are popular because they provide a solution to unsuitably inclined implants and unesthetic occlusal surfaces due to the screw access hole in screw-retained crowns. It has also been postulated that cement-retained suprastructures are more passive because of the cement layer between the framework and implant abutment.

The depth of the cementation margin influences the quantity of residual cement surrounding implants. In fact, the deeper the shoulder of the implant abutment is positioned, the greater the amount of residual subgingival cement that remains after cleaning. This is significant because excess cement on the implant or abutment may act as a foreign body and induce an inflammatory response that can lead to crestal bone resorption or implant loss. But excess cement may be difficult to remove if the margins are placed subgingivally.

Vindasiute et al from the Vilnius Research Group, Lithuania, conducted a prospective clinical study of 65 consecutively treated patients (30 males, 35 females) ranging in age from 20 to 75 years (mean age, 38 ± 1.8 years) to evaluate the correlation between undetected excess cement and factors influencing removal of excess cement in implant–supported restorations.

Factors Influencing Removal of Excess Cement in Implant–supported Restorations

1. location of the implant
2. diameter of the implant
3. undercut around the implant

Internal hexagon implants were used in this study. Prosthodontic therapy was initiated after 2 months of healing in the mandible and 4 months in the maxilla; no provisional restorations were used during the initial implant healing. One dental technician constructed all 65 single metal-ceramic crowns with occlusal openings.

Results revealed cement remnants present in almost all cases, even after meticulous cleaning of the abutment/crown complex follow-
When a cemented implant restoration is used, undercuts should be reduced to a minimum in order to allow greater access for the removal of excess cement.


Biologic Implant Complications and Implant Loss

Survival rates merely characterize whether implants or prostheses remain in place and are functioning. Implant prosthetic success rates go beyond survival rates to include consideration of any technical and biologic complications, including peri-implant diseases such as peri-implant mucositis and peri-implantitis.

Biological complications surrounding dental implants possess the same etiologic factors as do those associated with the development of periodontal disease. Therefore, long-term success rates of dental implants can be determined by utilizing the same principles that are used for the natural dentition.

Table 1. Ratios between the areas covered by cement and the total surface areas of the restoration and soft tissues

<table>
<thead>
<tr>
<th>Implant location</th>
<th>Cement/crown (Pixel ratio ± SE)</th>
<th>Cement/soft tissues (Pixel ratio ± SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anteriors</td>
<td>.030 ± .008</td>
<td>.034 ± .012</td>
</tr>
<tr>
<td>Premolars</td>
<td>.038 ± .004</td>
<td>.073 ± .011</td>
</tr>
<tr>
<td>Molars</td>
<td>.040 ± .004</td>
<td>.070 ± .009</td>
</tr>
<tr>
<td>Implant diameter (mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>.033 ± .004</td>
<td>.074 ± .013</td>
</tr>
<tr>
<td>4.0</td>
<td>.077 ± .004</td>
<td>.077 ± .009</td>
</tr>
<tr>
<td>5.0</td>
<td>.039 ± .008</td>
<td>.021 ± .007</td>
</tr>
<tr>
<td>Undercut (mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;1</td>
<td>.035 ± .004</td>
<td>.054 ± .009</td>
</tr>
<tr>
<td>1 to 2</td>
<td>.040 ± .004</td>
<td>.081 ± .010</td>
</tr>
<tr>
<td>≥3</td>
<td>.048 ± .012</td>
<td>.084 ± .022</td>
</tr>
</tbody>
</table>
of implant loss. Additionally, the studies found lower implant survival and success rates in periodontally compromised patients than in noncompromised patients.

Conclusion
The authors of this systematic review concluded that to obtain high long-term survival and success rates in dental implant restorations, a supportive periodontal therapy that includes anti-infective actions should be employed.


Transcervical Migration of a Broken Dental Needle

Local anesthetic needle breakage occurs rarely in dentistry due to the use of disposable needles and alloy technology. Augello et al (Clin Oral Investig 2011) reported that, of 64 needle breakage cases published in the previous 50 years, 70% occurred during inferior alveolar nerve blocks.

However, appropriate treatment planning for localization techniques and surgical approaches for needle retrieval must be put in place if needle breakage does occur, in order to diminish potential detrimental effects such as damage to vasculature and nerve structures. Altay et al from Case Western Reserve University School of Dental Medicine, Ohio, delineated an additional potential complication: migration or displacement of the needle into deep cervical spaces.

Okamoto et al (Anesth Prog 2000) reported that the needle for an inferior alveolar nerve block should be inserted between the tendons of the temporalis muscle and the medial pterygoid muscle into the pterygomandibular space. In most cases, however, the needle penetrates into more bulky structures such as the medial pterygoid muscle and tendon of the temporalis muscle. The resulting increase in tissue resistance may contribute to needle breakage. Needle breakage may also occur due to unanticipated patient movement, incorrect technique, over-manipulation of the needle, incorrect choice of needle gauge or a combination of these factors. The short 30-gauge needle appears to be the needle most likely to break.

Computed tomography (CT) scans, along with conventional panoramic radiographs, are generally used to localize the broken needle (Figure 1). Reference needles and C-arm fluoroscopic techniques may supplement the localization process.

Case report
A 34-year-old woman presented to the Department of Oral and Maxillofacial Surgery at Case Western Reserve University School of Dental Medicine for assessment of a broken local anesthesia needle, which had occurred on the left side during an inferior alveolar nerve block for a dental procedure. A CT scan showed that the needle fragment was located medial to the left mandibular ramus and about 10 mm above the distal aspect of the third molar (Figure 2). The patient exhibited trismus.

After the patient was admitted to the hospital and following nasotracheal intubation, a vertical incision was made along the ascending ramus where a full mucoperiosteal flap was reflected. Attempts at needle retrieval were unsuccessful. An 18-gauge spinal needle was inserted into the soft tissue to serve as a reference, and a C-arm image showed that the needle had migrated superiorly and posteriorly. After further dissection, the operation was aborted.

Four weeks later, the patient reported feeling the needle in the back of her neck, which was confirmed by a CT scan. The patient returned to the operating room, where a skin incision was made 2.5 cm posterior and 3 cm inferior to the mastoid process. The needle was identified and removed.

Conclusion
This case report of needle migration highlighted another potential complication of a broken local anesthetic needle. Management of these cases remains challenging.


Foreign Body Reaction to Biomaterials

The concept that dental implants are inert biomaterials is no longer considered valid. Previously, there had been a perception that titanium dental implants were inert—that chemically they had lit-
tle or no capacity to react with host tissue. From an immunological and healing perspective, this is highly improbable.

Performing a search using the PubMed specialized search engine, the Google generic search engine, and textbooks on biomaterials and immunology, Trindade et al from Malmö University, Sweden, attempted to expand upon the present knowledge of the healing mechanisms influencing implant-host interactions, as well as describing osseointegration of titanium dental implants and the peri-implant bone-loss phenomena from an immunological perspective.

Science suggests that anything foreign to the body will be recognized instantly by the immune system, and there will be a cascade of reactions in parallel to a modulated inflammation as part of tissue repair. The concept of foreign body equilibrium in relation to osseo-integration of titanium dental implants and the peri-implant bone-loss phenomena from an immunological perspective.

The adsorption of proteins by the implant surface occurs when the implant comes into contact with any living tissue, altering the “conformation of these molecules,” which will then function as antigens, provoking an immune and inflammatory response. Monocytes/macrophages appear to play a main role in the bone-loss pathway during the FBR process.

Rarely are loaded titanium implants completely surrounded by mineralized bone, enabling macrophages, typical of an FBR, to be present at the implant–bone interface and establishing osseointegration as a dynamic occurrence, rather than a static one. Rough implant surfaces possess a stronger bone reaction than do smooth surfaces, resulting in enhanced clinical function.

Osseointegration buildup events triggered by implant placement

- The titanium implant surface causes adsorption of body fluid proteins.
- Coagulation and complement systems’ activation by adsorbed and nonadsorbed proteins trigger an innate immune response.
- Macrophages differentiate from recruited monocytes and control the immune response; bone cells (osteocytes, osteoblasts and osteoclasts) originate from mesenchymal stem cells and, in the right balance, lead to bone formation (extracellular matrix formation, angiogenesis and hydroxylapatite precipitation).
- Newly formed bone shields the titanium implant from surrounding tissues.
- FBR equilibrium is achieved; an up- or down-regulation balance of specific immune responses occurs.
- The implant achieves clinical function.

Osseointegration breakdown triggered by disturbances

- Events such as overloading, cement remnants or systemic disturbances affecting the immune system cause the disruption of the immunological equilibrium.
- Inflammation and complement system mediators are reactivated.
- Macrophages are reactivated or recruited, some fusing into increasing numbers of foreign body giant cells, while at the same time osteoclastogenesis is induced.
- Breakdown of FBR equilibrium leads to bone resorption and rupture of the mucosal coronal seal.
- Possible secondary bacterial invasion occurs.
- The implant fails.

**Conclusion**

All materials in contact with living tissues trigger an FBR from the immune system; such response may threaten implant longevity. This reaction can have both positive and negative effects on osseointegration and the survival of an implant.