Review Article

Placing Implants in Infected Sites: Controversy or Reality

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Abstract:
Immediate implant placement in postextraction sites, without waiting for the site to heal, is a treatment modality that has received much attention. The presence of residual infection in a proposed implant site is often seen as a contraindication for implant placement. Hence the present paper is an effort to clinically implicate immediate placement of implants in infected sites and rule out the controversy of contraindicating implant placement in infected sites.

Key words: Immediate implant, Periapical abscess, YSGG laser

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Introduction:

An immediate implant involves the extraction of the offending tooth. The extracted tooth is observed for completeness in extraction. A suitable drill is selected with an implant with dimensions best suited to achieve primary implant stability and an optimal prosthetic position. After the suitable osteotomy site is drilled the final implant is placed in position with a provisional placed over it which may be functional or nonfunctional depending on the situation. But what is the need to extract the tooth or when do we call as the socket being infected that we need to remove the tooth. It may be due to faulty root canal treatment[1] or the presence of microorganisms in the apical part of the filled root canal. The presence of an abscess/or suppuration may necessitate extraction. The presence of periapical infection, progressive periodontal disease is some other indications. Then there is vertical root fracture that leaves us with no other option other than the extraction of the tooth.

This immediate implant placement offers a many advantages.[2] It saves the total treatment time on the part of the dentist and the patient. It prevents tissue loss and preserves the buccal plate of bone giving a good gingival architecture around the implants and a good emergence profile along with good esthetics. It saves the patient from another additional surgical procedure for second time as the tooth extraction, bone grafting and implant placement can be done in one single appointment. In addition because of

replacement of lost tooth an early stage it leads to better esthetics, early restoration of the function, a psychological benefit to the patient.

Immediate Implant in Infected Site: The Controversy

Here is a controversy that focuses on certain questions. What if the socket is infected? Can we still treat this small opening with confidence? Can we still immediately place implants even if the socket is infected?

The researchers who say a big no says infection increases inflammatory activity and leads to increased bone resorption and loss of primary implant stability and finally a big implant failure. It is stated that there is a potential for implant contamination during the initial healing period due to infection

Immediate implant placement into fresh extraction sockets with a pathologic lesion is considered a contraindication by many authors including Saadoun, Block[4] & Kent [5] and Sclar.[6] The authors considered immediate implant placement following tooth extraction is indicated only when the extraction socket is intact and free from any pathologic lesions.

Data from recent animal and human studies

Recent animal and human studies have proved that an implant plus an infected site would lead to no bone resorption, no loss of clinical attachment levels and a good osseointegeration and implants can be successfully placed in postextraction infected sites.

Table 1: Animal studies

Study	Animal model	Number of subjects	Number of implants	Type of infection	Treatment	Outcomes
Novaes et al[7] 1998	Dog	4	28	Induced periapical lesion versus healthy sockets	Debridement, rinse with tetracycline solution, antibiotic coverage	Zero failures and NSD in BIC in the experimental group
Marcaccini et al[8] 2003	Dog	5	40(20 non-infected sites	Ligature induced periodontitiss	Fluorescein angiography of Novaes etal ,2003	Slower healing initially and NSD after 12 weeks
Chang et al[8] 2009	Dog	4	24	Induced periradicula-r lesion versus healthy sockets	Osteotomy and curettage, placement with or without membranes ,and antibiotic coverage	Zero failures ,less BIC in experimental groups ,and less BIC in the non – membrane group.

BIC- Bone implant contact; NSD- No significant difference

Table 2: Human studies

Study	Number of patients	Number of implants	Follow up (months)	Type of infection	Treatment	Outcomes
Villa and ranger 2007[9]	33	100 maxillary	12	Endodontic, periodontic or root fracture	Socket debridement, bone curettage, antibiotic irrigation and GBR with placement.	97.4% survival
Del fabbro etal 2009[9]	30	61	10-21	Chronic periapical (histologic Granuloma)	Socket debridement and PRGF coating of implant	

GBR- Guided bone regeneration; PRGF- Plasma rich growth factor

Management of Infected Sites for Immediate Implant Placement

Hence with the progressing world of implantology now we have a solution for each problem. First is the curettage (Figure 1) or debridement of the infected socket so as to remove the granulation tissue that is formed as a response to bacteria.

Figure 1: Curettage of the infected socket

The natural healing process after tooth extraction, normally manages residual infection, but as an infection increases inflammatory activity, it may result in increased bone resorption and a higher risk of implant failure and stability loss .The presence of granulation tissue in the socket of the infected tooth must be considered as an inflammatory response to bacteria. This reactive tissue protects bone from direct bacterial aggression and if carefully removed, will reveal healthy bone. Therefore, infected tooth extraction and conventional granulation tissue removal, as well as an early onset of antibiotic treatment, may be effective in reducing the inflammatory response and the consequent bone resorption activity.

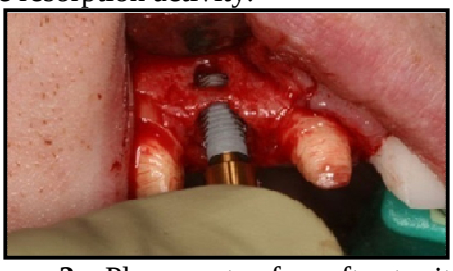

Figure 2: Placement of graft at site of exposure

If the infected tissue removal lead to a defect around the implant autogenous connective tissue graft (Figure 2) can be used over an occlusive membrane covering an implant placed in the extraction socket.[10,11] In addition it is reported that local administration of glucocorticoid dexamethasone reduces bone resorption processes by preventing macrophage and osteoclast activation. Therefore local delivery of an anti-inflammatory drug at the implant site may reduce the potential loss of implant stability during healing.

An important aspect of maintaining alveolar bone while placing implants in infected sites is the implant drilling protocol .Firm anchorage can be achieved by under preparation of the implant site without countersinking, but individual implant stability may also be improved by splinting.

The drilling should be performed just beyond the root apex, which minimizes heat generation and reduces the heat generation and reduces the risk of overheating the bone. This is in agreement with the study of Schwartz –Arad and Chaushu who reported that reducing surgical trauma at the time of implant placement especially in infected sites results in obtaining more vital bone in contact with the implant interface and thereby improving implant stability.[1]

It should also be notified that flapless implant placement reduces postoperative discomfort, pain and oedema since periosteum is left intact. It limits the buccal bone remodeling and preserves an intact vascular supply.

Another means to achieve successful implant placement in infected sites is the use of laser technology that is reported to kill bacterial at a level greater than 1000µm level. The Er,Cr:YSGG[12,13] laser is a US Food and Drug Administration–approved laser system.(Figure 3) A beam of infrared

energy at 2.78 mm is emitted that works in combination with water spray. This laser has

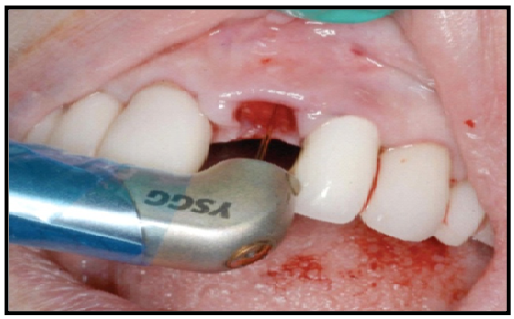

Figure 3: YSGG laser-inhibits bacterial growth in infected socket

assisted in accelerating healing, decreasing postoperative pain and increasing bone to implant contact. The effect on implant dentistry with laser energy is the usage of radiation and water to act as a means to destroy bacteria. The energy produced is an explosion of water energy. The use of laser technology has shown to have a significant effect upon areas of infected sites. Hydroacoustic[13] effects are often said to be very effective in preventing bacterial growth. YSGG laser therapy can be put into practice to stimulate the keratinized tissue around the implant site because the laser has found to stimulate tissue growth and thus prevent shrinkage.

The extraction should be as atraumatic as possible with the aid of a periotome so as to ensure minimum soft tissue loss and bone remodeling. Careful luxation and prudent use of burs to section ankylosed or curved roots must be done to prevent bone loss.

Spontaneous bone healing and osseointegeration takes place if the horizontal distance from the implant surface to socket wall is 2 mm or less .however spaces in excesss of 2 mm have been shown to not heal predictably with bone .guided bone regeneration, using a combination of barrier membrane and a bone grafting material, can enhance the percentage of bone implant contact. In addition socket can be irrigated with saline to flush off the bacterial remnants. Systemic antibiotic administration (rifocin, rifamycin) can be an effective postoperative measure. Postsurgical oedema can be minimized by cold pack applications postoperatively.

Additional Factors of Importance for Immediate Implant Placement in Infected Sites[14]

- The patient should be a non smoker (without any ill habits)
- The patient should be able to maintain good oral hygiene
- Longer implants must be used in case of poor bone quality
- Acid etched or grit blasted implants should be used for increased stability in infected sites
- All provisional prosthesis should be screw retained to avoid any residual cement interfering with tissue healing.
- Interim surgical endodontics can be performed before extraction to minimize infection at future implant placement site

Conclusion

It is hoped that this article will stimulate new thinking concerning the placement of dental implants into infected extraction sites. A larger prospective study should be performed to confirm the efficacy of this suggested treatment form. Patients wish to avoid the social embarrassment that accompanies staging performed via traditional methods. The use of this suggested technique would allow the patient and dentist to benefit from decreased treatment time.

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