Immediate and Early Placement of Dental Implants

Healing with Immediate Implants

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Protocols for Implant Placement

Type I: Implant placement immediately following tooth extraction and as part of the same surgical procedure

Type 2: Complete soft tissue coverage (typically 4-8wks)

Type 3: Substantial clinical and/or radiographic bone fill of the socket (typically 12-16 weeks)

Type 4: Healed site (typically more than 16 weeks)

Evaluation for Implant Timing

Overall patient treatment
Esthetic expectations of the patient
Soft tissue quality, quantity, and morphology
Bone quality, quantity, and morphology
Presence of pathology
Condition of adjacent teeth and supporting structures

Immediate Implant Loading: within 1 week of placement

Early Implant Loading: 1 week - 2 months

Conventional Loading: > 2 months

Advantages of Immediate Implants

- Reduced treatment time
- Reduced number of surgeries
- Psychological
Disadvantages of Immediate Implants

Cannot assure patient that implant will be placed that day

Potentially higher failure rates

Potential Lack of KT
**Immediate Loading: Contraindications**

- Insertion torque < 30 N/cm
- Poor bone quality
- Occlusion (ej deep overbite)
- Active infection
- Lack of KT
- Parafunctional habits
- < 10mm bone height
- < 3-4mm apical bone for immediate implants

Extraction socket repair

1. Hemorrhage

2. Clot formation

3. Inflammatory reaction -> recruitment of cells

4. **48-72 hrs** granulation tissue starts to replace clot

5. **4 days** epithelium proliferates, immature CT

6. **7 days** granulation tissue completely replaces clot, osteoid evident at the base of socket

7. **2-3 weeks** (3 to 4 wks after ext) - CT replaces granulation tissue, osteoid mineralizes coronally

8. **6 weeks** epithelialization complete, bone fills more than 2/3 of socket

Boyne 1966, Amler 1969, Darby 2009
Immediate Implants: Prevent Bone Resorption?
18 pts with a total of 21 teeth scheduled for extraction

All received immediate implants with flap elevation

Gap not filled / no membranes placed

4 months re-entry, gap measured

Horizontal bone resorption about 56%

70% of total horizontal bone resorption was attributed to buccal bone

Vertical resorption:
  buccal: 0.3
  lingual: 0.6
  mesial: 0.2
  distal: 0.5

Gaps filled with bone from inside of the defects, but substantial ridge resorption noted

Immediate Implants: Prevent Bone Resorption?

5 Beagles

Sectioned teeth and removed one root on each side

Control: socket left to heal

Test: SLA implant placed

Bony resorption was the same with or without immediate implant placement

Multi-center study (4 centers)

Very strict inclusion criteria (ideal cases for Type I placement)

Conical or Straight implants placed (randomized)

Measurements taken at placement and re-entry (16wks)

Submerged healing protocol

Measurements taken to nearest half millimeter with a caliper by calibrated examiner (not the surgeon)

No difference in bony resorption (36% buccal / 14% palatal)

Type I placement does not prevent bone resorption

Although B-L width changed, M-D dimensions did not (adjacent teeth were kept)

Crestal ridge width changes when placing implants at the time of tooth extraction with and without soft tissue augmentation after a healing period of 6 months: report of 24 consecutive cases. Grunder U. Int J Periodontics Restorative Dent 2011;31:9-17
The esthetic outcome of an implant-supported restoration is first of all dependent on the soft tissue volume. Since the labial bone plate resorbs in every direction after tooth extraction, even when an implant is placed immediately, most patients end up with compromised esthetics.
24 pts treated consecutively with immediate implants in anterior maxilla

12 without CT graft / 12 with CT graft

Healing abutment placed at time of Sx and removable prosthesis delivered

Crestal ridge width changes when placing implants at the time of tooth extraction with and without soft tissue augmentation after a healing period of 6 months: report of 24 consecutive cases. Grunder U. Int J Periodontics Restorative Dent 2011;31:9-17
Bucco-lingual volume measured before tx and 6months after Sx

No CT graft group: avg loss 1.1mm (range 0.23-2.0mm)

CT graft group: avg gain 0.34mm (range 0.0-1.5mm)

Crestal ridge width changes when placing implants at the time of tooth extraction with and without soft tissue augmentation after a healing period of 6 months: report of 24 consecutive cases. Grunder U. Int J Periodontics Restorative Dent 2011;31:9-17
Recommendations for case selection in esthetically demanding patients

No bone defect around tooth to be extracted

Soft tissue level that would still be in harmony with the gingival level of the adjacent teeth AFTER some shrinkage in the apical direction

Thick Biotype

Crestal ridge width changes when placing implants at the time of tooth extraction with and without soft tissue augmentation after a healing period of 6 months: report of 24 consecutive cases. Grunder U. Int J Periodontics Restorative Dent 2011;31:9-17
**Immediate Implants: Graft Gap?**

- Araujo 2005
- Covani 2004
- Paolantonio 2001

Gaps < 2mm fill spontaneously
No primary flap closure
No bone grafting
No membrane

Straight healing abutment placed

4.2mm buccal gap

Allowed 5 months healing time

Biopsied 10 months after placement
Immediate Implants: Fill Gap?

Aim: evaluate horizontal changes of ridge after flapless extraction and immediate implant placement with and without grafting, with and without a provisional

49 pts, 70% Central Incisors

Facial-palatal changes evaluated form FMB and apical to labial bone crest

Teeth without endo lesions, dehiscences, recession, PD...

Minimum torque 35 N/cm

Maryland
Casts were measured 6 months to 4 yrs after final delivery

Average 0.5mm less thickness at all points compared to contralateral natural teeth

Immediate Provisionalization does not prevent resorption

Immediate Provisionalization

35 pts / 35 implants

100% survival at 1-yr

Mesial and Distal papilla -0.55mm and -0.53 respectively after 1-yr

Mesial and Distal bone change -0.26 and -0.22 respectively at 1-yr
Immediate Provisionalization

Immediate Provisionalization

Midfacial change in position of gingiva -0.53

No pt noticed change at the gingival margin

All pts satisfied with the esthetic outcome

Healed Ridge vs Immediate Implant

Prospective multi-center study, 1-yr follow-up

Measured Rx bone levels, soft tissue levels

139 pts / 157 implants in maxilla

58 implants healed ridges / 55 immediate / 23 needed bone grafting prior to DI placement / 11 DI lack primary stability

All implants immediately provisionalized

3 immediate implants failed (5.2%)

1 failed in healed ridge (1.5%)

Zenith stable or moved incisally after definitive placement in 84% of immediate implants and in 87% of implants in healed ridges after 1 year

Responses of local bone and soft tissues at immediately loaded implants in extraction sockets or healed ridges were similar.

1-year results suggest that clinical management of esthetically critical soft tissue may be predictably achieved in both indications.
42 implants immediately placed, mean follow-up 19mo

Retrospective study

Not immediately provisionalized (delayed provisionalization)

Maxilla and mandible

100% survival rate

Highly SS change in crown height due to rec of 0.9mm for all sites, with no difference between implant systems

Thin biotype (probe seen through gingiva) more recession than thick (0.9 vs 0.7), NSSD

Implants with buccal shoulder position 3x more recession than lingual position (1.8 vs 0.6mm)

Finite Element Analysis

Increased length and diameter of implant decreased stress and strain on alveolar crest

Stress and strain increased on horizontal loading vs vertical loading

Diameter had a more significant effect than length to relieve crestal stress and strain concentration

Immediate Loading: Increased BIC

4 patients with 1 extra implant placed

Group A: immediate loading (non-functional)
Group B: implants submerged

4 weeks: 1 of each group trephined out
8 weeks: the other implants removed

Immediate Loading: Increased BIC

Immediate Loading group: 4wks BIC 65.6%; 8wks 76.2%

Submerged group: 4wks 54.7%; 8wks 62.3%

Outcome based on prosthesis failures, implant failures, and marginal bone levels measured on intraoral x-rays

11 trials including 300pts:
6 immediate vs conventional
3 early vs conventional
2 immediate vs early

NSSD between different loading protocols
10/23 immediately loaded implants failed

Single implants in anterior sites

9/10 failed implants had < 20 N/cm torque

No diet specifications given to patients

47 consecutive cases treated (10 I, 5 C, 30 PM)

Single implants placed after flapless extractions

Gap grafted with porcine bone and collagen membrane

Clinical exams and standard PAs taken at baseline, 1, 3, and 5 years

Smokers >10cigs/day and all diabetics excluded from study

Facial wall present after extraction

Implants submerged (no healing abutment/immediate load)

All implants restored 4-5 months later

Pre-med with atb and continued 4 days after sx
Survival rate at 5 years: 95.7% (1 removed at 7 and other 16mo)

Marginal Bone loss: SS
  1yr: -0.7
  3yrs: -0.95
  5yrs: -1.1

NSSD in width of KT (-0.2mm over 5yrs)

Facial Soft Tissue Level:
1 yr: +0.71
5 yr: +0.56 (decreased)

Patient satisfaction:
74% satisfied regarding overall implant tx
73% satisfied regarding peri-implant soft tissue
81% judged positively the finished crown appearance
NSSD at any point in time

Systematic Review 1991-2010

46 prospective studies, mean follow-up 2 years

Factors analyzed: reason for extraction, antibiotic use, position of implant (ant vs post, max vs man), type of loading

Only SS dif was for antibiotic use (POT atb lowered failures)

2-year survival rate 98.4%

Most soft tissue changes occurred in first 3 months, and stabilized towards end of first year

Marginal bone loss mostly took place within first year of implant placement, usually being less than 1mm

Immediate Loading in Periodontally Infected Sites

275 implants immediately loaded in extraction sockets, 197 in periodontally infected sites (I, C, PM)

Marginal bone levels measured at baseline, 12, 24 and 48 months (digital PAs)

At 4 yrs: infected group 98.9% survival (2 implants lost within 1st month), non-infected group 100% survival

NSSD between MBL at 4 yrs (both lost 0.79mm)

**Summary**

Type 1, 2, 3, and 4 DI placement have equal survival rates.

More literature necessary for Type 2 placement.

**SEVERAL CONTRAINDICATIONS FOR TYPE I PLACEMENT**

More long-term studies needed for success of Type I Placement.
6. Crestal ridge width changes when placing implants at the time of tooth extraction with and without soft tissue augmentation after a healing period of 6 months: report of 24 consecutive cases. Grunder U. Int J Periodontics Restorative Dent 2011;31:9-17
References


