Extractions In Patients With Prior Head And Neck Radiation

Group 9A-2
September 23rd, 2020

Rounds Team

- Group Leader: Dr. Derderian
- Specialty Leader: Dr. Camejo
- Project Team Leader: Lauren Preston
- Project Team Participants: Adam Fraeyman; Josh Rodriguez; Klea Rota

Patient: *[de-identified]*

- 74
- Male
- Hispanic
- CC: "To get my mouth fixed so I can eat normal"
- Pt diagnosed with esophageal cancer in 2012. Underwent H&N radiation & chemotherapy.

Medical History

- MHx:
  - Snoring, hypothyroidism, anemia, GERD, arthritis
  - Esophageal cancer in 2012. Radiation of the head & neck (PTV: 50.4Gy at 1.8Gy per fraction using IMRT with 6mV photons. 28 fractions delivered) & chemo
  - Hernia surgery 2017 – pt became septic & was hospitalized for 2 months
- Medications:
  - Prednisone, levothyroxine, multi-vitamin
- NKDA
- Med consults with PCP and Oncologist

1. Please provide the date, type, amount, and path of radiation that was used for the treatment of the patient's cancer.
2. Are there any recommendations or precautions that we should be aware of prior to starting dental treatments including complete denture fabrication, tooth extractions, alveoplasty or surgical implant placement?

Radiotherapy dates January 31, 2012 through March 8, 2012.
Distal esophageal mass PTV: 50.4Gy at 1.8 Gy per fraction using IMRT with 6mV photons. 28 fractions delivered.

Pt is cleared to proceed with dental work.

Physician's Answers:

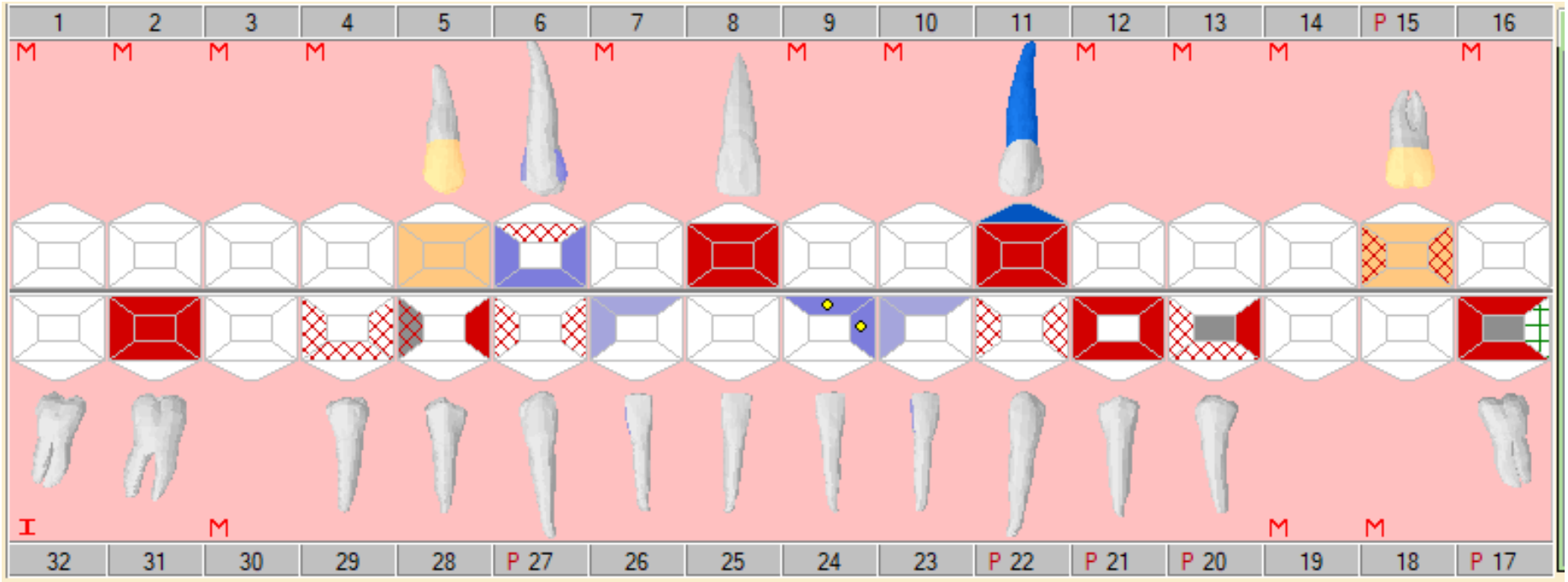
1. Considering the patients extensive medical history, does the patient require pre-medication prior to dental treatments?
2. Are there any other recommendations or precautions that we should be aware of prior to starting dental treatments including complete denture fabrication, tooth extractions, alveoplasty or surgical implant placement?

1) No pretreatment necessary.

2) Just keep in mind that he is on chronic prednisone per Rheumatologist.

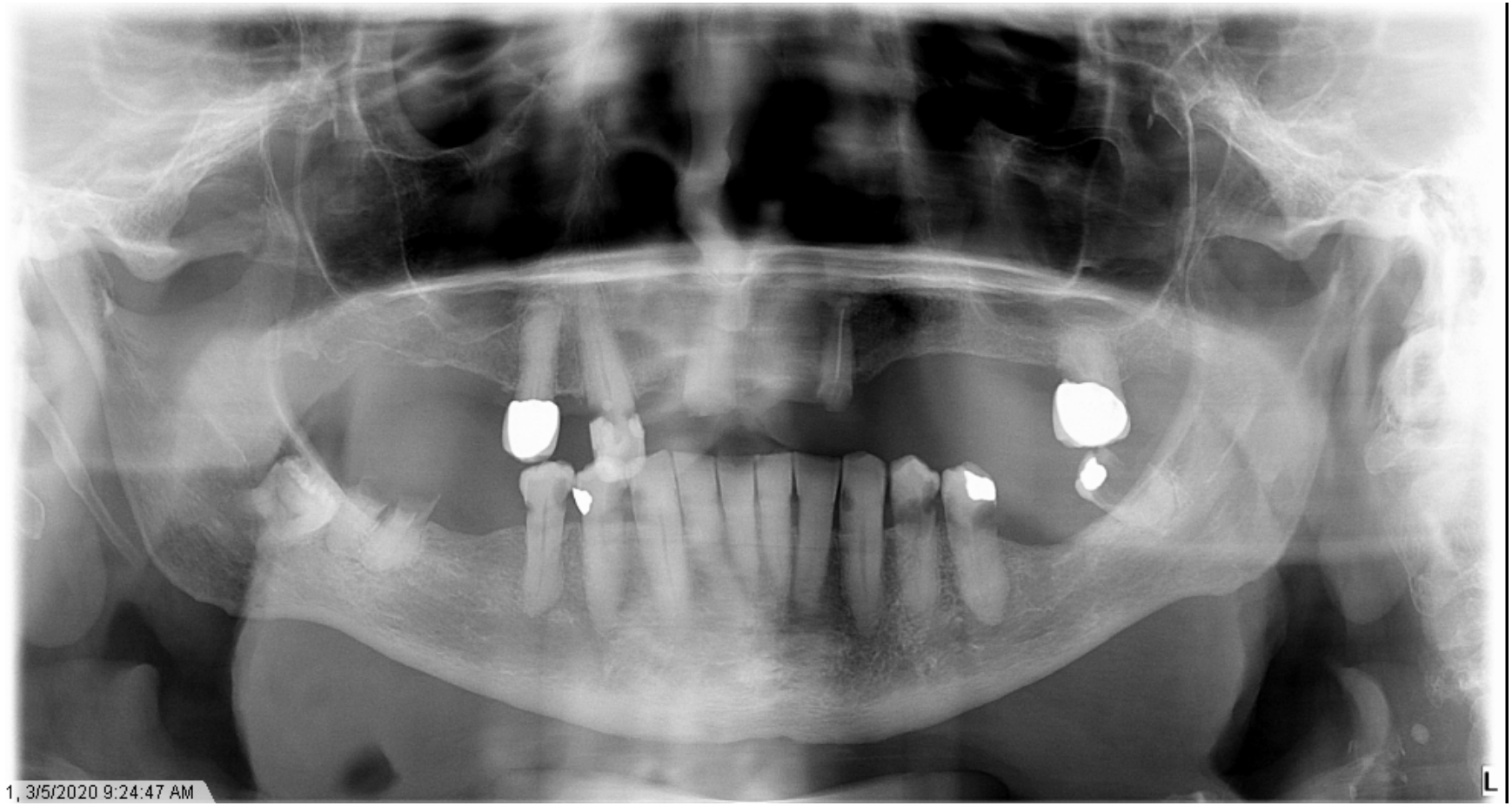
Dental History

- No regular dental treatment
- History of extractions and root canals
- Pt has trouble chewing and is a clencher
- Pt is unhappy with appearance of teeth

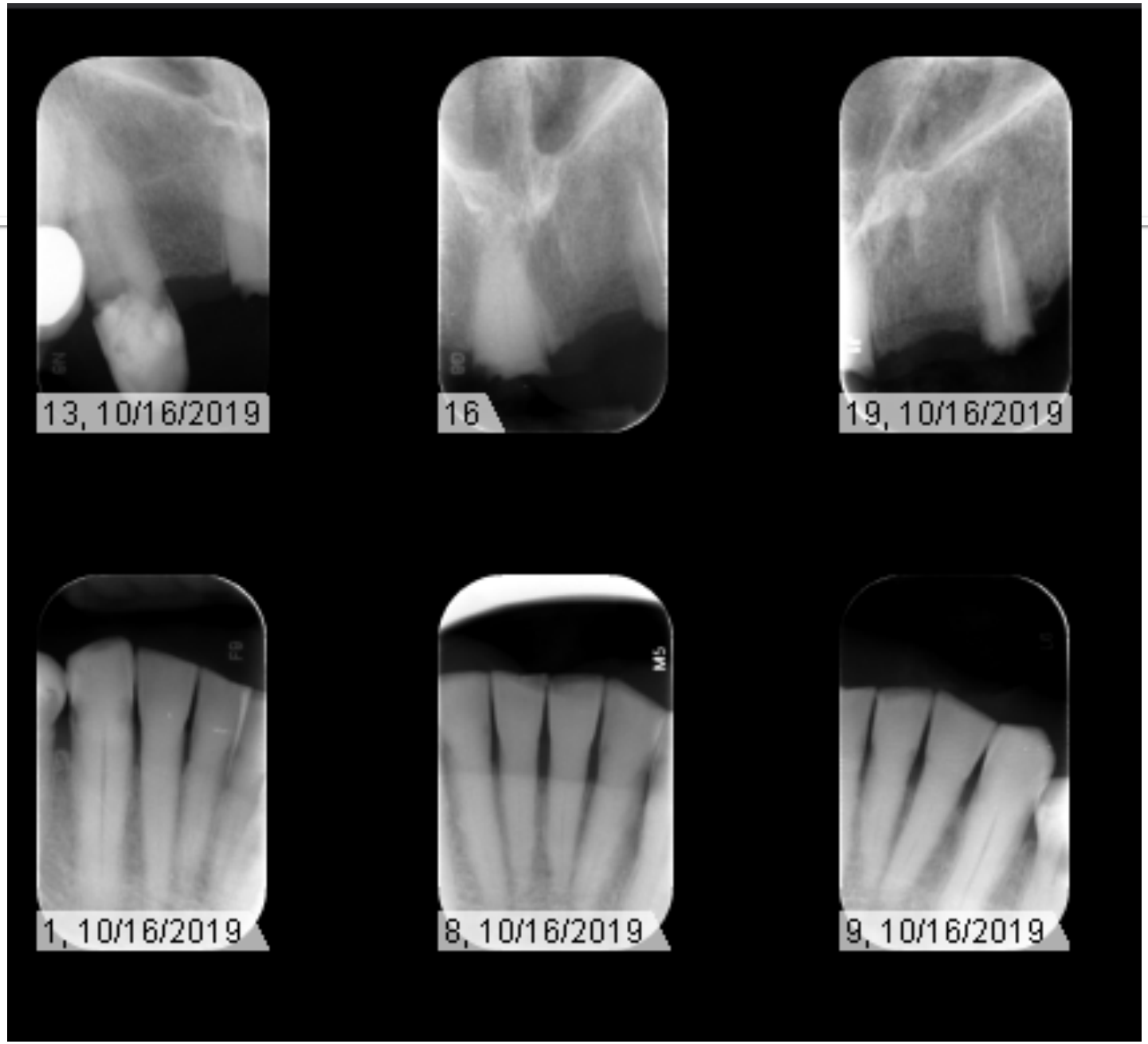


Radiographs

Panoramic - 3/5/2020



FMX – 10/16/2019



FMX – 10/16/2019

Radiographic Findings

- #5 PFM crown
- #6 DL & ML resin w/ MDFL decay
- #8 missing crown
- #11 missing crown & prior RCT
- #15 PFM crown w/ MD recurrent decay
- #17 MDBL gross decay w/ D fracture & O amalgam
- #20 DO amalgam with D gross decay & MB primary decay
- #21 MBDL gross decay
- #22 MD primary decay
- #23 M primary decay
- #24 D primary decay
- #26 D primary decay
- #27 MD primary decay
- #28 D amalgam w/ D recurrent decay & M gross decay
- #29 MBD primary decay
- #31 MODBL gross decay
- #32 impacted

Clinical Findings

- #5 PFM crown
- #6 DL & ML resin w/ MDFL decay
- #8 missing crown
- #11 missing crown
- #15 PFM crown w/ MD recurrent decay
- #17 MDBL gross decay w/ D fracture & O amalgam
- #20 DO amalgam with D gross decay & MB primary decay
- #21 MBDL gross decay
- #22 MD primary decay
- #23 M primary decay
- #24 D primary decay
- #26 D primary decay
- #27 MD primary decay
- #28 D amalgam w/ D recurrent decay & M gross decay
- #29 MBD primary decay
- #31 MODBL gross decay
- #32 impacted

- Missing # 1,2,3,4,7,9,10,12,13,14,16,18,19, & 30

Specific Findings

- Gross decay on many remaining teeth
- Teeth that need EXT
  - #5,6,8,11,15,17,20,21,28,29, & 31
  - Pt will retain #22-27 as well as impacted #32

Periodontal Charting

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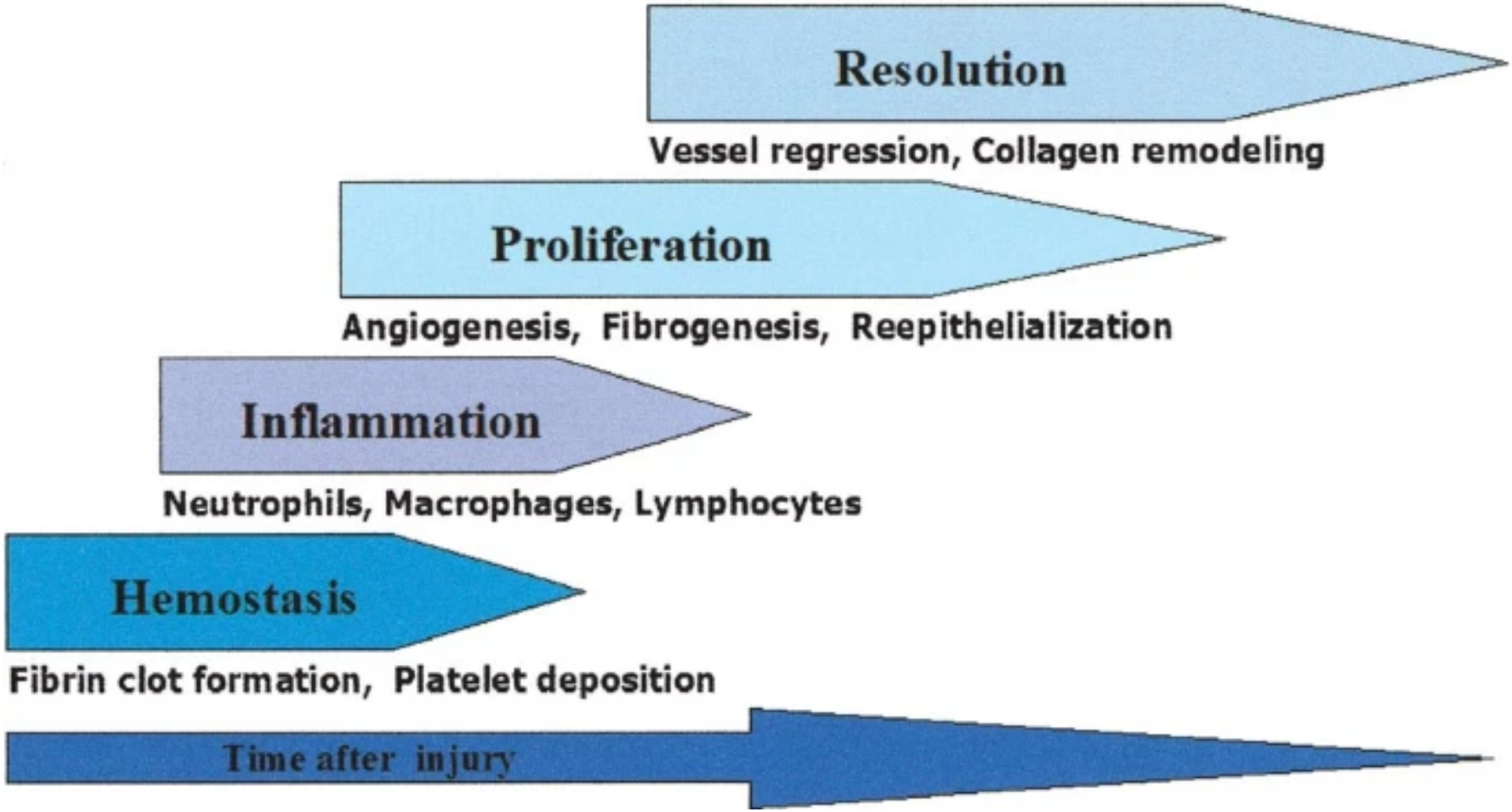
Diagnosis

- Pt has many teeth that are hopeless. Will need EXTs and will be a full over distal extension case.

Problem List

- Prior radiation therapy
- Other health issues
- Impacted #32
- Gross decay
- Missing teeth

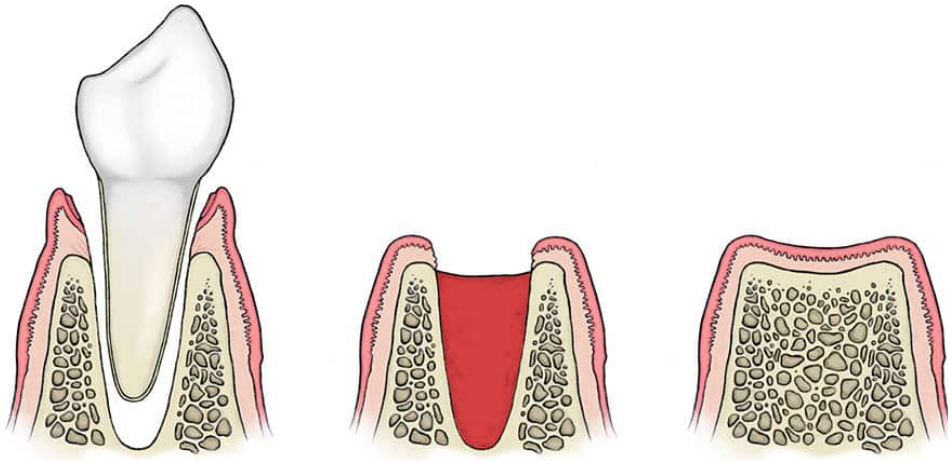
D1 Basic Science - How Does Healing Occur Following Extraction?



Guo, S., and L.a. Dipietro. "Factors Affecting Wound Healing." *Journal of Dental Research*, vol. 89, no. 3, 2010, pp. 219–229., doi:10.1177/0022034509359125.

Evidence of Healing Stages

Hemostasis **Inflammation** **Proliferation** **Resolution**

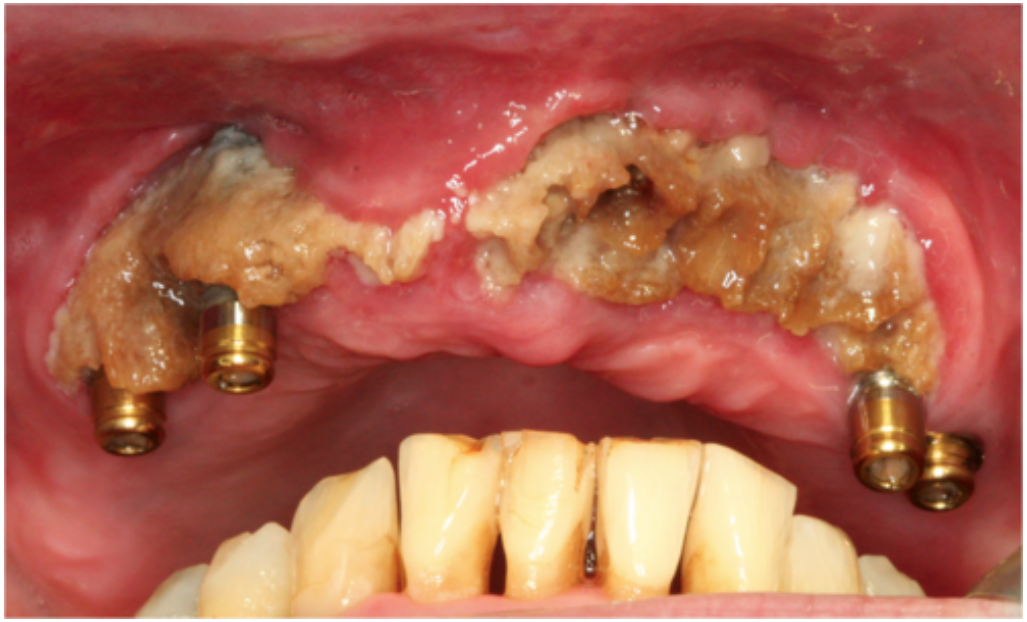


"Tooth Extraction Healing Pictures." *Animated-Teeth.com*, 17 Oct. 2019, www.animated-teeth.com/tooth_extractions/a-tooth-extraction-healing-times.htm.

Sutera, Charles. www.aestheticsmilereconstruction.com/2020/06/02/how-long-does-it-take-the-hole-to-close-after-a-tooth-extraction/.

D2 Pathology Question: What is osteoradionecrosis and how does it occur?

- *Osteoradionecrosis- bone death due to radiation*
- *Can present years after radiation therapy has ended*
- *Develops from damage to bone*



Kolokythas, A., Rasmussen, J., Reardon, J., & Feng, C. (2019). Management of osteoradionecrosis of the jaws with pentoxifylline–tocopherol: A systematic review of the literature and meta-analysis. *International Journal of Oral and Maxillofacial Surgery*, *48*(2), 173-180. doi:10.1016/j.ijom.2018.08.007
Kumar, Saurabh et al. "Osteoradionecrosis of Jaw: An Institutional Experience." *Contemporary clinical dentistry* vol. 9,2 (2018): 242-248. doi:10.4103/ccd.ccd_843_17

D3 PICO

- **Clinical Question:** How can the risk of ORN be reduced in patients who require post-radiation extractions?

PICO Format

P: Patients with previous H&N radiation

I: Extractions with prophylactic treatments (HBO, ABX, etc.)

C: Extractions alone

O: Reduce risk of osteoradionecrosis

PICO Formatted Question

- In patients with previous H&N radiation, will extractions with conjunctive treatments, as compared to extractions alone, reduce the risk of ORN?

Clinical Bottom Line

- There is weak evidence to support the use of HBO therapy and/or ABX in prevention of ORN associated with dental extractions in previously irradiated patients.
  - HBO therapy may be considered in high risk patients. ABX and CHX mouthwashes may be considered for extensive surgical procedures.
- Extractions should be performed with limited mucoperiosteal disruption in order to reduce risk of ORN.

Search Background

- **Date(s) of Search:** 9/13/20, 9/14/20
- **Database(s) Used:** PubMed
- **Search Strategy/Keywords:**
  - Radiation
  - Dental caries
  - Tooth extraction
  - Osteoradionecrosis
  - Hyperbaric Oxygen Therapy
  - Antibiotics
  - Outcomes

Search Background

- **MESH terms used:**
  - Radiation
  - Tooth extraction
  - Osteoradionecrosis
  - Hyperbaric Oxygen Therapy

Article 1 Citation, Introduction

- Citation:

  Nabil S, Samman N. Incidence and prevention of osteoradionecrosis after dental extraction in irradiated patients: a systematic review. *Int J Oral Maxillofac Surg*. 2011;40(3):229-243. doi: 10.1016/j.ijom.2010.10.005

- Study Design: Systematic Review

- Study Need / Purpose:

  To identify and review the best available evidence to answer the clinical question 'What are the incidence and the factors influencing the development of osteoradionecrosis after tooth extraction in irradiated patients?

Article 1 Synopsis

- Searched MEDLINE, PubMed, Ovid, EMBASE and The Cochrane Library databases
- Selection Criteria:
  - 1950- April 2010
  - H&N radiation, including maxilla and/or mandible
  - Post-irradiation extraction
  - No ORN present before tooth extraction
- 144 articles found. 19 selected.

Article 1 Synopsis

Intervention	Incidence of ORN
Extraction (all types)	7%
Extraction + prophylactic HBO	4%
Extraction + prophylactic ABX	6%

Location	Incidence of ORN
Maxilla	1%
Mandible	3%
Outside of radiation field	0%

- Patients with radiation dose < 60 Gy did not develop ORN, 12% developed ORN with >60 Gy radiation dose
- 2-5 years after radiotherapy had the highest incidence of ORN
- **Conclusion:** Based on weak evidence, prophylactic HBO is effective in reducing the risk of ORN after post-radiation extractions in patients with the most risk
- **Limitations**: Limited sample size; most studies were retrospective which introduced bias

Article 1 Selection

- Addressed PICO question
- Compared various options for performing extractions in post-irradiated patients
- High level of evidence

Article 2 Citation, Introduction

- Citation:

  Shaw RJ, et al. HOPON: A Randomized Controlled Trial of Hyperbaric Oxygen to Prevent Osteoradionecrosis of the Irradiated Mandible After Dentoalveolar Surgery. *Int J Radiat Oncol Biol Phys*. 2019;104(3):530-539. doi:10.1016/j.ijrobp.2019.02.044

- Study Design: Randomized Controlled Phase 3 Trial

- Study Need / Purpose:

  To establish the benefit of HBO in the prevention of ORN after high-risk surgical procedures to the irradiated mandible

Article 2 Synopsis

- Eligibility criteria:
  - Prior radiotherapy >50 Gy
  - Required dental extractions or implant placement in the mandible
- Randomly assigned to receive, or not receive HBO
  - All received pre & post-op CHX rinse and ABX
  - HBO group received 100% O2 at 2.4 ATA for 80-90 mins, 20x pre-tx & 10x post-tx
- Primary outcome measure: blinded diagnosis of ORN 6 mo after tx
  - 144 patients were randomized & 100 patients were analyzed for the primary endpoint

Article 2 Synopsis

- Incidence of ORN at 6 mo: 6.4% for HBO group and 5.7% for the control group
  - None of the patients with ORN at 6 mo healed by 12 mo, and no new cases of ORN developed between 6-12 mo
- HBO group had fewer acute symptoms but no significant differences in late pain or QoL
- **Conclusion**: Low incidence of ORN makes it unnecessary to recommend HBO for dental extractions or implant placement in irradiated mandible
- **Limitations**: Drop-out rate was higher in the HBO group; Limited sample size

Article 2 Selection

- Directly addressed PICO question
- High level of evidence
- Recent publication which demonstrates the current trend in treatments

Article 3 Citation, Introduction

- Citation:

  Al-Bazie SA, Bahatheq M, Al-Ghazi M, Al-Rajhi N, Ramalingam S. Antibiotic protocol for the prevention of osteoradionecrosis following dental extractions in irradiated head and neck cancer patients: A 10 years prospective study. *J Can Res Ther.* 2016; 12:565-70

- Study Design: Prospective Cohort Study

- Study Need / Purpose:

  To establish the long-term efficacy of a perioperative antibiotic protocol combined with antibacterial mouthwashes in preventing ORN.

Article 3 Synopsis

- Inclusion criteria:
  - Jan 2002 – Dec 2009
  - > 60 Gy radiation dose to H&N
  - Non-restorable tooth in radiation field
  - 6 months post-radiotherapy
  - No previous ORN, ulcers or bone exposure at EXT site
  - Available for follow up
- Prescriptions starting 10 days pre-EXT and continued 7 days post-EXT
  - Amoxicillin 500 mg orally every 8th hour
  - 10 mL CHX Gluconate 0.2% solution for 1 min every 12th hour

Article 3 Synopsis

- 89 patients, mean age 42 y.o., extractions performed 12-30 months post-radiation
- 232 teeth extracted (78 maxilla, 154 mandible)
- No reports of ORN with a mean follow-up period of 63 months
- **Conclusion**: Perioperative ABX with antibacterial mouthwash are effective in preventing ORN following dental EXT in irradiated patients
- **Limitations**: No control group for comparison

Article 3 Selection

- Addressed PICO question
- High level of evidence

Levels of Evidence

- ☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
- ☒ **1b** – Individual RCT
- ☒ **2a** – Systematic Review of Cohort Studies
- ☒ **2b** – Individual Cohort Study
- ☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research
- ☐ **4a** – Systematic Review of Case Control Studies
- ☐ **4b** – Individual Case Control Study
- ☐ **5** – Case Series, Case Reports
- ☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review
- ☐ **7** – Animal Research
- ☐ **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT)

☐	**A** – Consistent, good quality patient oriented evidence
☒	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Conclusions

D3: How does the evidence apply to this patient?

- Patient is at relatively LOW risk for developing ORN post-extractions. If all teeth are extracted on the same day and/or require surgical extraction, prophylactic ABX in conjunction with CHX mouthwash may be indicated.

D4:How will you advise the patient?

- Continue with planned EXTs and full maxillary denture/ distal extension mandibular RPD

Discussion Questions

- If osteoradionecrosis occurs at one extraction site, what are the chances of it happening in the other sites as well?
- Does previous head and neck radiation exposure alone increase clinical risks with extractions, or is there a certain measurable amount of exposure that is correlated with significant risk?
- What alternative treatments are common when extraction is indicated after radiation therapy?
- Prior to chemoradiation therapy, how often are patients not checked for a sound dentition or advised by their physicians to undergo dental treatment first?
- How long after radiation treatment must you consider the risk of osteoradionecrosis when planning for an extraction?
- Does the risk of osteoradionecrosis increase when multiple extractions are needed as opposed to just one?

Discussion Questions

- How common are conjunctive treatments used with extractions to reduce the risk of osteoradionecrosis?
- Does the risk of osteoradionecrosis increase if multiple extractions are done in the same day, as opposed to spacing out the timeline of extractions?
- Are there genetic predispositions that cause the development of osteoradionecrosis?
- Why has HBO been selected as a treatment in previous literature? Are there specific biochemical properties that make it an attractive candidate to prevent osteoradionecrosis?
- Is there a difference in risk of ORN between the maxilla and mandible?
- In cases where ORN does become a complication, how do we address it and what steps do we take to stop it from continuing or worsening?
- What medical conditions or medications are contraindications to receiving hyperbaric oxygen therapy?