

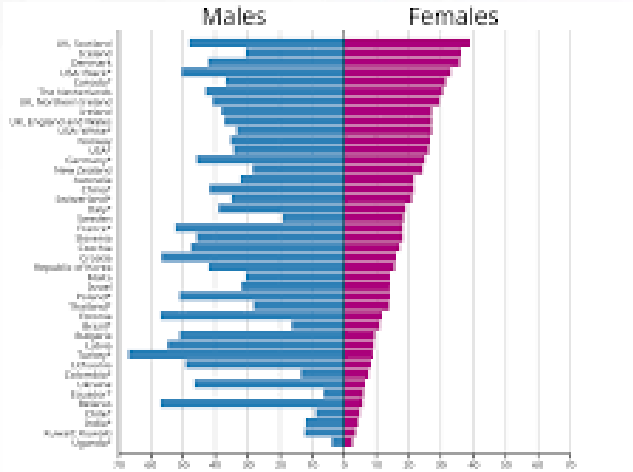


# Onkoloji Hastalarında Diş Sağlığı Yönetimi

**DOÇ. DR. EFSUN SOMAY**  
Ağız, Diş, Çene Cerrahisi AD



# Onkoloji hastalarına dental anlamda genel bakış



**TOPLAM**



**18.1 milyon**

**KADIN**

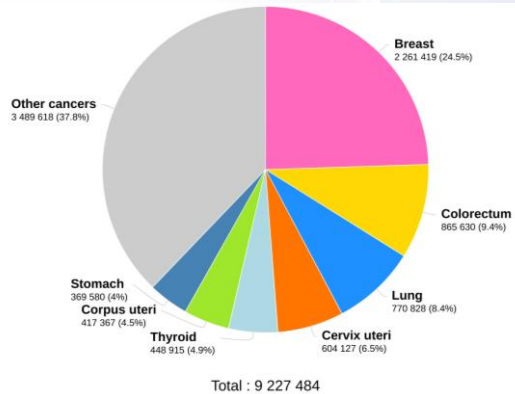


**8.8 milyon**

**ERKEK**

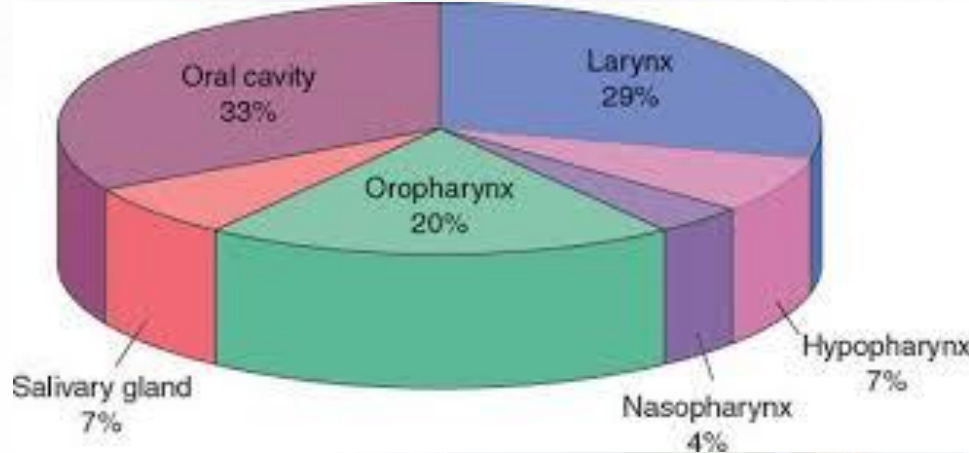


**9.3 milyon**





# Baş ve boyun kanserleri



- ✓ Her yıl dünya çapında 700.000'den fazla kişiye baş ve boyun kanseri teşhisi konulmaktadır.
- ✓ IMRT (yoğunluk ayarlı radyoterapi)
- ✓ RT
- ✓ Yalnızca cerrahl
- ✓ Cerrahi+RT
- ✓ E-KRT (eş zamanlı kemoradyoterapi)



- Radyoterapi ve medikal onkoloji alanındaki gelişmelerle sağ kalım oranı artmaktadır.
- Dental gereksinimlerin karşılanması önemi artar

Supportive Care in Cancer (2023) 31:90  
<https://doi.org/10.1007/s00520-022-07551-z>

COMMENT



**Letter to the Editor: To extract or not extract teeth prior to head and neck radiotherapy?**

Busra Yilmaz<sup>1</sup> · Efsun Somay<sup>2</sup> · Erkan Topkan<sup>3</sup>

Received: 25 October 2022 / Accepted: 19 December 2022 / Published online: 28 December 2022  
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Article

**Predicting Teeth Extraction after Concurrent Chemoradiotherapy in Locally Advanced Nasopharyngeal Cancer Patients Using the Novel GLUCAR Index**

Efsun Somay<sup>1</sup>, Erkan Topkan<sup>2,\*</sup>, Busra Yilmaz<sup>3</sup>, Ali Ayberk Besen<sup>4</sup>, Hüseyin Mertsoylu<sup>5</sup> and Ugur Selek<sup>6</sup>

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<sup>4</sup> Clinics of Medical Oncology, Adana Seyhan Medical Park Hospital, Adana 01120, Turkey; besenay@gmail.com  
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<sup>6</sup> Department of Radiation Oncology, School of Medicine, Koc University, Istanbul 34450, Turkey; ugurselek@yahoo.com  
\* Correspondence: docdretopkan@gmail.com



## Hasta Profili

**Çene yüz bölgesine  
radyoterapi alan**



**Oral kavite  
Nasofarinks  
Hipofarinks  
Larinks  
Orofarinks  
Tükrük bezi kanserleri ve  
Diğerleri**

**Çene yüz bölgesine radyoterapi alan ve eş  
zamanlı kemoterapi alan**



**Oral kavite  
Nasofarinks  
Hipofarinks  
Larinks  
Orofarinks  
Tükrük bezi kanserleri (sıklıkla sadece cerrahi ve  
RT ile tedavi edilir E-KRT nadir eşlik eder)  
ve Diğerleri**

**Çene yüz bölgesine radyoterapi  
almamış kemoterapi alan**



**Hematolojik kanserler  
Baş ve boyun kanserleri dışında  
Metastatik Kanserler**

# Radyoterapi toksisitesi

## AKUT TOKSİSİTELER



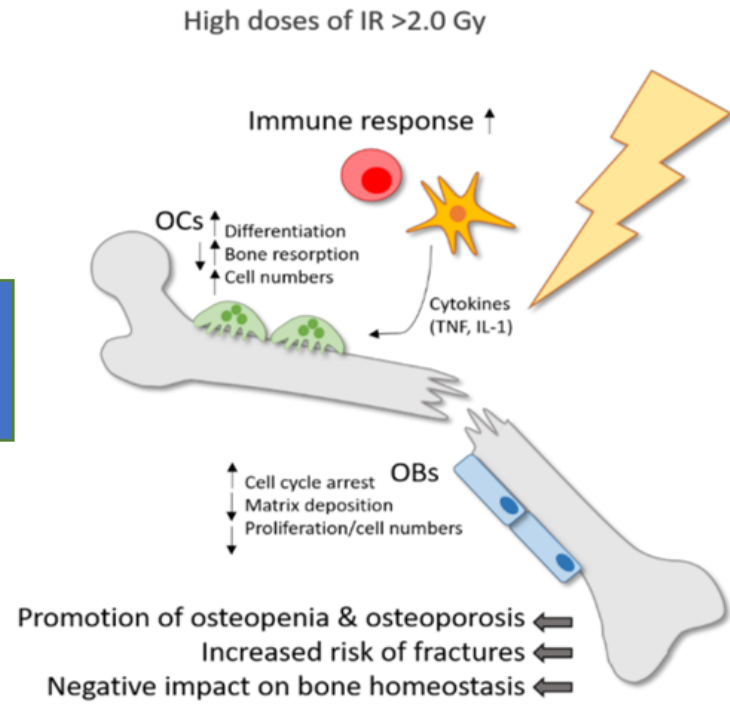
- Mukozit
- Tat Bozukluğu
- Disfaji
- Odinofaji
- Kilo Kaybı
- Kserostomi

## GEÇ TOKSİSİTELER

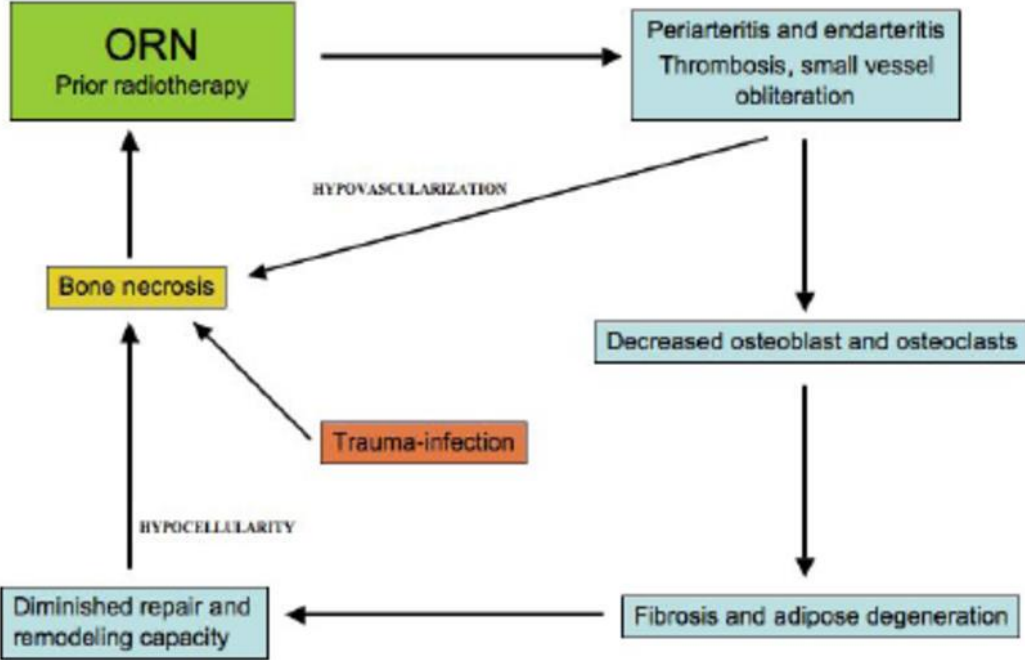


- **Osteoradyonekroz**
- Faringoözofageal Stenoz
- Diş Çürüğü
- Yumuşak Doku Nekrozu
- Fibrozis
- Miyozit
- Bozulmuş Yara İyileşmesi
- Lenfödem

# Osteoradyonekroz

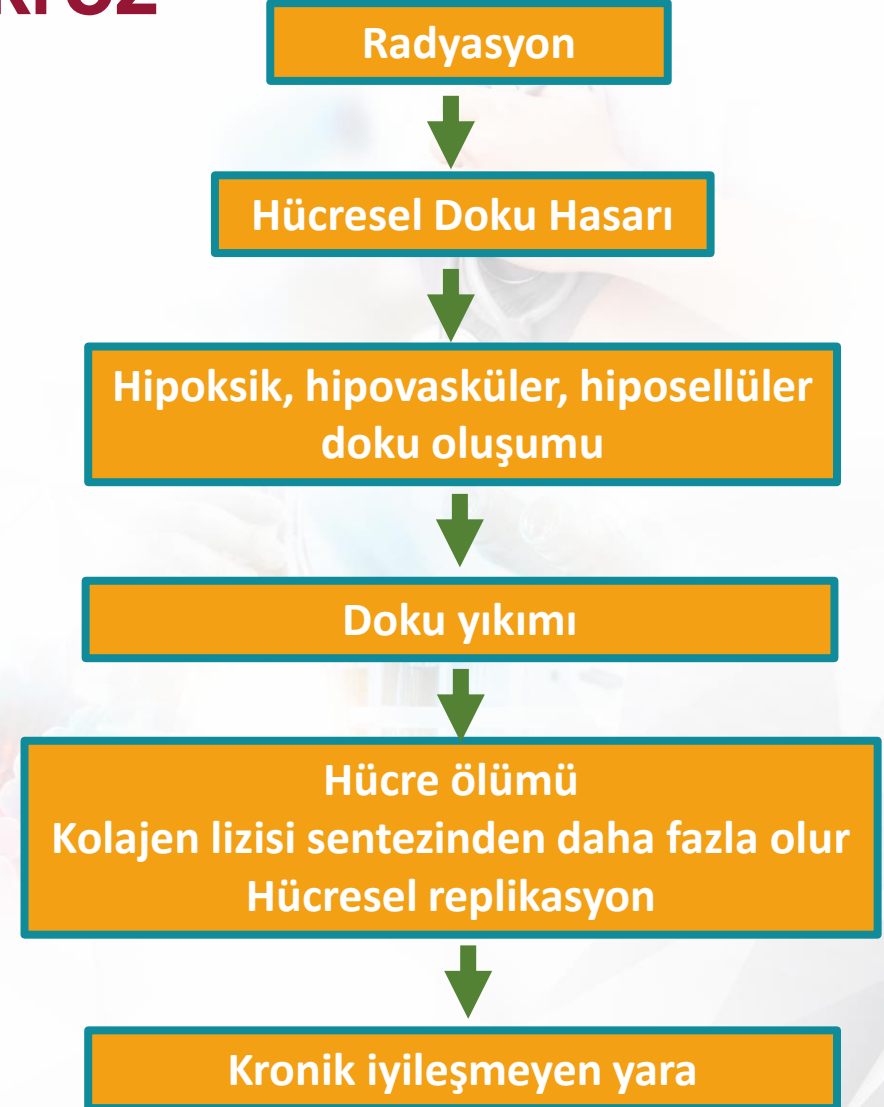


# Osteoradyonekroz



**Travma** → Tetikleyici faktör ?

**Mikroorganizmalar** → Bulaştırıcı faktör





## OSTEORADYONEKROZ

Radyasyon D (> 50-60 Gy)

Işınlanmış kemik hacmi

RT yöntemi

Tümör evresi ve invazyonu

Diş çekimi

Eş zamanlı kemoterapi

Kötü oral hijyen

Sigara bağımlılığı

Yetersiz beslenme

Enfeksiyon

Alkol kullanımı

Genetik yatkınlık



## Radyoterapi, toksisite, hayat kalitesi

### Assessment of the Impact of Osteoradionecrosis on Quality-of-Life Measures in Patients with Head and Neck Cancer

Efsun Somay<sup>1</sup> • Busra Yilmaz<sup>2</sup> • Erkan Topkan<sup>3</sup> • Ahmet Kucuk<sup>4</sup> • Berrin Pehlivan<sup>5</sup> • Ugur Selek<sup>6,7</sup>

<sup>1</sup>Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Baskent University, Ankara, Turkey;

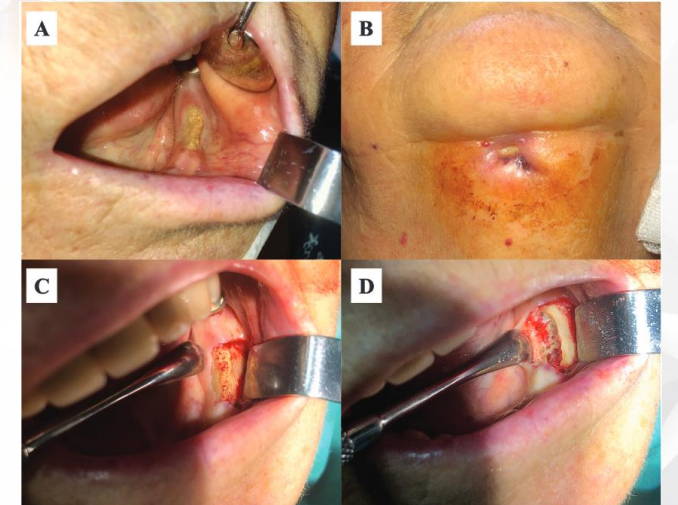
<sup>2</sup>Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Baskent University, Ankara, Turkey;

<sup>3</sup>Department of Radiation Oncology, Faculty of Medicine, Baskent University, Adana, Turkey; <sup>4</sup>Department of Radiation Oncology, Mersin City Hospital, Mersin, Turkey; <sup>5</sup>Department of Radiation Oncology, Bahcesehir University, Istanbul, Turkey; <sup>6</sup>Department of Radiation Oncology, School of Medicine, Koc University, Istanbul, Turkey; <sup>7</sup>Department of Radiation Oncology, MD Anderson Cancer Center, The University of Texas, Houston, TX, USA

### Challenges in the Radiological Diagnosis of Osteoradionecrosis of the Jaw in Head and Neck Cancer Patients

Busra Yilmaz<sup>1</sup> • Efsun Somay<sup>2</sup> • Ahmet Kucuk<sup>3</sup> • Berrin Pehlivan<sup>4</sup> • Ugur Selek<sup>5,6</sup> • Erkan Topkan<sup>7</sup>

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- Radyoterapi ile tedavi edilen kanser hastalarının %0,4 -%56'sında osteoradyonekrozun meydana geldiği rapor edilmiştir ve yakın zamanda risk faktörlerinin tanımlanması ve
- IMRT'nin (%4-%8) kullanılmasıyla insidansı azalmıştır.

## CONCISE REVIEW

International Dental Journal 2018; 68: 22–30

doi: 10.1111/ijdj.12318

## Osteoradionecrosis of the jaws: definition, epidemiology, staging and clinical and radiological findings. A concise review

Aristeidis Chronopoulos<sup>1</sup>, Theodora Zarra<sup>2</sup>, Michael Ehrenfeld<sup>1</sup> and Sven Otto<sup>1</sup>

<sup>1</sup>Department of Oral and Maxillofacial Surgery, Ludwig-Maximilians-University of Munich, Munich, Germany; <sup>2</sup>Department of Endodontology, Dental School, Aristotle University of Thessaloniki, Thessaloniki, Greece.

Critical Reviews in Oncology/Hematology 107 (2016) 39–43

Contents lists available at ScienceDirect



Critical Reviews in Oncology/Hematology

journal homepage: [www.elsevier.com/locate/critrevonc](http://www.elsevier.com/locate/critrevonc)



## Osteoradionecrosis and intensity modulated radiation therapy: An overview



Francesca De Felice<sup>a,\*</sup>, Daniela Musio<sup>a</sup>, Vincenzo Tombolini<sup>a,b</sup>

<sup>a</sup> Department of Radiotherapy, Policlinico Umberto I "Sapienza" University of Rome, Viale Regina Elena 326, 00161 Rome, Italy  
<sup>b</sup> Spencer-Lorillard Foundation, Viale Regina Elena 262, Rome, Italy

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3. Basic clinical radiobiology and fractionation	40
4. Recommendation for mandible contouring and dose constrain	40
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# Osteoradyonekroz tedavisinde ilaç protokolü

Durum		Klavulonat	pentoksifilin	tocopherol	Prednisone + ciprofloksasine
<b>Cerrahi girişim öncesi</b>	<ul style="list-style-type: none"><li>3 gün önce profilaktik antibiyotik uygulamasına başlanması</li></ul>	Klavulonat BID 1000mg (2X1)	Pentox 400mg (2X1) gerekirse	1000UI(500X2) gerekirse	-----
<b>Cerrahi girişim sırasında</b>	<ul style="list-style-type: none"><li>Atravmatik çekim</li><li>Radyoterapi alanındaki şüpheli tüm dişlerin çekimi</li><li>İnvaziv cerrahi girişim kaçılmalı</li><li>Primer sturasyon ekspose kemik kalmayacak</li><li>Tercihen vasokonstriktörsüz lokal anestezi (özellikle anterior dişlerde daha yüzeysel anestezi yeterli olabileceği için)</li><li>Sivri kemik kenarları düzeltilecek</li></ul>	Klavulonat BID 1000mg (2X1)	Pentox 400mg (2X1) gerekirse	1000UI(500X2) gerekirse	-----
<b>Cerrahi girişim sonrası</b>	<ul style="list-style-type: none"><li>Metronidazole eklenmiş ağız gargarası (SF ile kombine) (günde 2 kez diğışler alınana kadar)</li></ul>	Klavulonat BID 1000mg (2X1)	Pentox 400mg (2X1)	1000UI(500X2) gerekirse	-----
<b>ORN gelişmişse</b>	<ul style="list-style-type: none"><li>İzin varsa nekrotik doku debritleme (invaziv olmayacak şekilde) metranidazolü ağız gargarası</li></ul>	Klavulonat BID 1000mg (2X1)	Pentox 400mg (2X1)	1000UI(500X2) gerekirse	VEYA 5 gün klavulonat BID 1000mg 2 gün 20mg prednisone + 1000mg ciprofloxacine



## Use of pentoxifylline and tocopherol in the management of osteoradionecrosis

Vinod Patel<sup>a</sup>, Yusuf Gadiwalla<sup>a</sup>, Isabel Sassoon<sup>b</sup>, Chris Sproat<sup>a</sup>, Jerry Kwok<sup>a</sup>, Mark McGurk<sup>c,\*</sup>

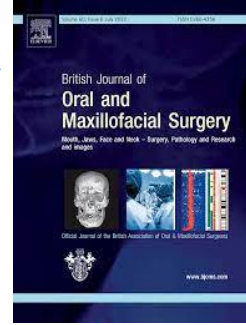
<sup>a</sup> Oral Surgery Dept, Floor 23, Guys Dental Hospital, London Bridge, London, SE1 9RT

<sup>b</sup> Department of Informatics, King's College London, Strand, London, WC2R 2LS

<sup>c</sup> Department of Oral and Maxillofacial Surgery, Atrium 3, 3rd Floor, Bermondsey Wing, Guy's Hospital, London, SE1 9RT

Accepted 27 November 2015

Available online 19 January 2016



% 72

% 50

Management	Grade I	Grade II	Grade III	Total
Pentoxifylline and vitamin E only:				
No. treated	18	4	3	25
No. resolved	11	1	2	14
Pentoxifylline, vitamin E, and antibiotics:				
No. treated	11	3	8	22
No. resolved	3	1	2	6
Pentoxifylline, vitamin E, and debridement:				
No. treated	2	7	1	10
No. resolved	0	5	1	6
Pentoxifylline, vitamin E, and resection:				
No. treated	0	0	3	3
No. resolved	0	0	2	2
Pentoxifylline, vitamin E, and hyperbaric oxygen:				
No. treated	0	0	2	2
No. resolved	0	0	0	0
Total:				
No. treated	31	14	17	62
No. resolved	14	7	7	28

- Pentoksifilin ve tokoferol (E vitamini) radyasyona bağlı fibrozise dayanan ORN için yeni önerilen patogeneze dayanmaktadır
- Fibrotik reaksiyonun, pentoksifilin ve tokoferol formundaki antioksidanlar ve antifibrotik tedavi ile iyileştirilebileceği düşünülmektedir.

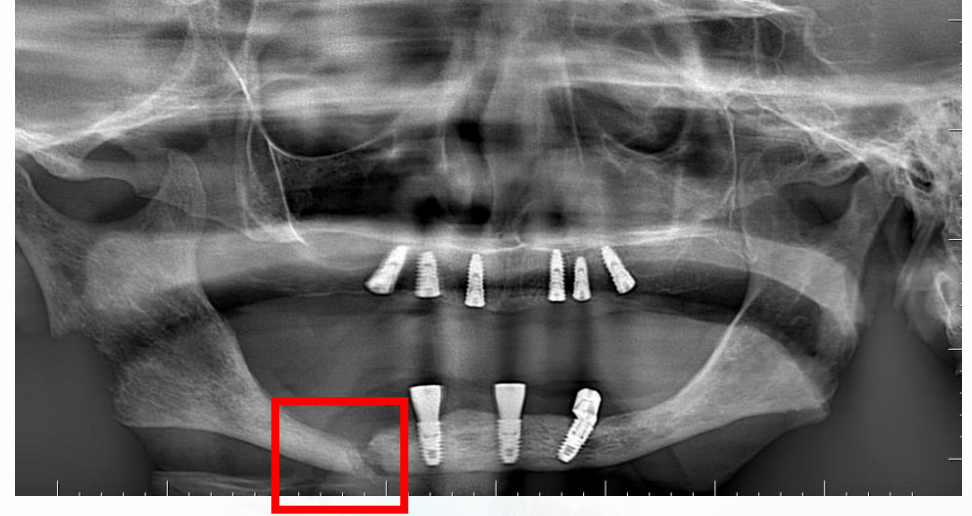
Pentoksifilin dozu günde iki kez 400 mg  
tokoferol 1000 IU günde bir kez

PROFİLAKTİK  
ANTİBİYOTİK



## Kemoterapinin etkisi

- MRONJ başlangıcının BMA tedavisinin bağlamı ile ilişkili olduğu rapor edilmiştir,
- Uzun süreli yüksek doz BMA tedavisinin ana sistemik risk faktörlerinden biri olduğu anlamına gelir



DİL Ca RT +IV BP (RT den 10 yıl sonra)

Oral and maxillofacial surgeons:  
The experts in face, mouth and  
jaw surgery\*



American Association of Oral and Maxillofacial Surgeons

### Position Paper

Medication-Related Osteonecrosis of the Jaw – 2022 Update

SIPMO

SICMF

SOCIETÀ ITALIANA CHIRURGIA MAXILLO-FACCIALE



Italian Position Paper (SIPMO-SICMF) on Medication-Related Osteonecrosis of the Jaw (MRONJ)



# İlaça bağlı osteonekroz (MRONJ)

Oral BP  
%1,6

MRONJ

IV BP %  
14,8

Review

## Management of Tooth Extraction in Patients Taking Antiresorptive Drugs: An Evidence Mapping Review and Meta-Analysis

Chang Liu <sup>†</sup>, Yu-Tao Xiong <sup>†</sup>, Tao Zhu, Wei Liu, Wei Tang <sup>\*</sup> and Wei Zeng <sup>\*</sup>

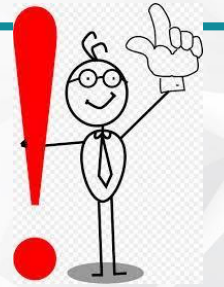
State Key Laboratory of Oral Diseases, National Clinical Research Centre for Oral Diseases, Department of Oral and Maxillofacial Surgery, West China Hospital of Stomatology, Sichuan University, Chengdu 610041, China  
<sup>\*</sup> Correspondence: mydrtw@vip.sina.com (W.T.); zengwei\_2022@foxmail.com (W.Z.);  
Tel.: +86-028-85501456 (W.T. & W.Z.)  
<sup>†</sup> These authors contributed equally to this work.

**Abstract:** Background: Medication-related osteonecrosis of the jaw (MRONJ) is a well-known severe adverse reaction of antiresorptive, antiangiogenic or targeted therapies, and usually occurs after tooth extraction. This review is aimed at determining the efficacy of any intervention of tooth extraction to reduce the risk of MRONJ in patients taking antiresorptive drugs, and present the distribution of evidence in these clinical questions. Methods: Primary studies and reviews were searched from nine databases (Medline, EMBase, Cochrane Library, Scopus, WOSCC, Inspec, KCI-KJD, SciELO and GIM) and two registers (ICTRP and ClinicalTrials.gov) to 30 November 2022. The risk of bias was assessed with the ROBIS tool in reviews, and the RoB 2 tool and ROBINS-I tool in primary studies. Data were extracted and then a meta-analysis was undertaken between primary studies where appropriate.

- İlaç tatili tartışmalı (progression ve malignancy <sup>↑</sup>)
- Primer kapatma ve uygun sağlıklı flep dizaynı
- Cerrahi işlem öncesi AB profilaksisi

4 yıldan fazla IV BP kullanımı MRONJ riski <sup>↑</sup>

amoxicillin, penicillin, sultamicillin



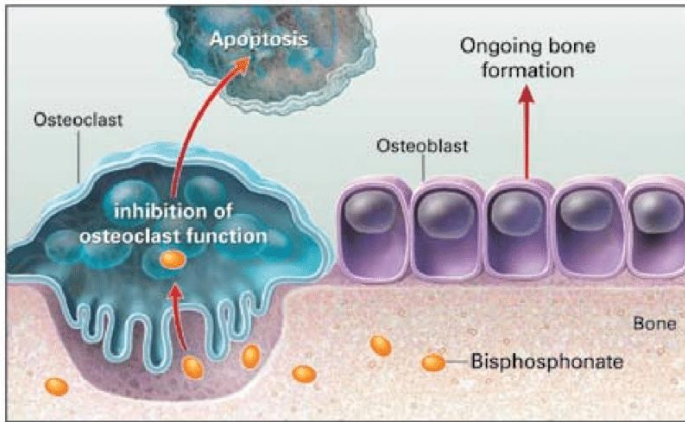


## İlaça bağlı osteonekroz mekanizması

### İLACA BAĞLI ÇENE OSTEONEKROZUNUN KLİNİK VE RADYOLOJİK OLARAK DEĞERLENDİRİLMESİ

Efsun SOMAY<sup>1</sup>, Büşra YILMAZ<sup>2</sup>

Öz: İlaça bağlı çene osteonekrozu, hastaların yaşam kalitesini düşüren ve ciddi morbidite yaratan bir klinik tablo olarak karşımıza çıkmaktadır. İlk kez 2003 yılında 'İlaça Bağlı Çene Osteonekrozu' tanımı intravenöz (IV) bisfosfonat (BP) uygulanan hastalarda maksillofasiyal bölgede iyileşmeyen, açığa çıkmış nekrotik kemik dokularının mevcut olduğu vakaların tespit edilmesiyle literatürde yer almıştır. İlerleyen yıllarda Amerikan Oral ve Maksillofasiyal Cerrahi Derneği (AAOMS), daha önce baş-boyun bölgesine radyoterapi uygulanmamış, BP kullanmış ya da kullanmakta olan hastaların maksillofasiyal bölgesinde 8 haftadan uzun süre mukozadan açığa çıkan nekrotik kemik görüntüsünü



Important

Tam etki 3 ay sonra başlar



Bakteriyel kontaminasyon

Avasküler nekroz

Kimyasal nekroz

Remodeling yavaşlar  
Osteoklastik aktiviteyi baskılanır

Damarsal destekte bozukluk

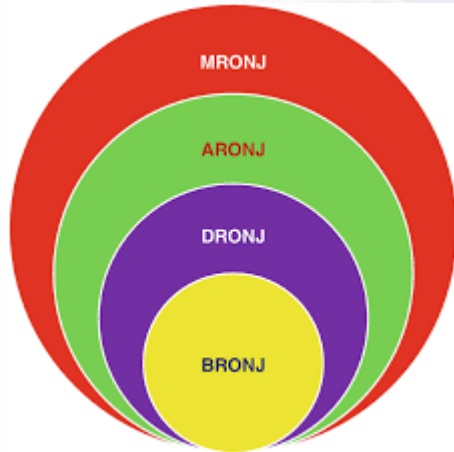
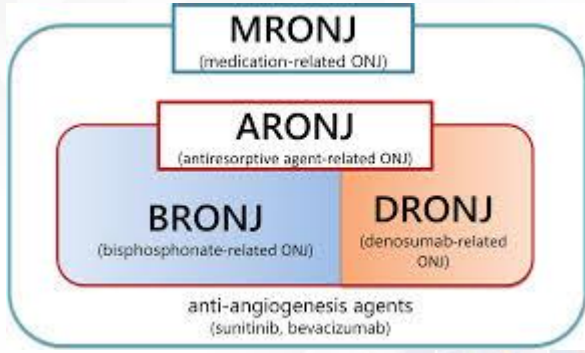
Enfeksiyon

Kemik rezorpsiyonunda artış

Kronik osteomyelite benzer tablo



# İlaça bağlı osteonekroz

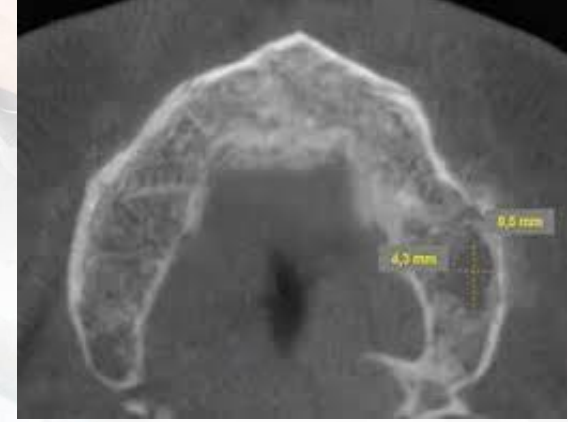


Kemik turn-over'nın baskılanması

Anjiogenesis'in inhibisyonu

Yumuşak doku hücreleri üzerinde toksik etkiler

Enfeksiyon



# Bifosfonatlar

- IV BP için ilaç tatili etkili değil
- Oral BP için en az 3 ay sonra kemiğe bağlanma azalıyor MRONJ ↓



## REVIEW

JBMR PLUS  
Open Access ASBMR

### Bisphosphonate Drug Holidays: Evidence From Clinical Trials and Real-World Studies

Mawson Wang,<sup>1,2†</sup> Yu-Fang Wu,<sup>1†</sup> and Christian M. Girgis<sup>1,2,3</sup>

<sup>1</sup>Department of Diabetes and Endocrinology, Westmead Hospital, Westmead, NSW, Australia

<sup>2</sup>Faculty of Medicine and Health, University of Sydney, Sydney, NSW, Australia

<sup>3</sup>Department of Endocrinology, Royal North Shore Hospital, St Leonards, NSW, Australia





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Original Article

Medication-related osteonecrosis of the jaw. Implant presence-triggered osteonecrosis: Case series and literature review

M.F. Escobedo<sup>a</sup>, J.L. Cobo<sup>b</sup>, S. Junquera<sup>c</sup>, J. Milla<sup>d</sup>, S. Olay<sup>a</sup>, L.M. Junquera<sup>e,\*</sup>

<sup>a</sup> Faculty of Odontology, Oviedo University, Principado de Asturias, Spain

<sup>b</sup> Department of Maxillofacial Surgery, Central University Hospital of Asturias, Oviedo, Spain

<sup>c</sup> Department of Radiology, University Hospital of Santiago of Compostela, Santiago de Compostela, Spain

<sup>d</sup> Oviedo, Principado de Asturias, Spain

<sup>e</sup> Department Maxillofacial Surgery, Oviedo University, Principado de Asturias, Spain

**Alendronat**

**Ibandronat**

**Zolendronik asit**

**111 çalışma**

**İlaç tedavisinden önce implantların yerleştirildiği hastalarda implantların yükleme süresi uzun tutulmalıdır**

**Kimyasal osteonekrozda implant kaybı sıklıkla cerrahiye bağlı değil yüklemeye bağlı ortaya çıkar**







## CLINICAL STUDY

### Medication-Related Osteonecrosis of the Jaw Around Dental Implants: Implant Surgery-Triggered or Implant Presence-Triggered Osteonecrosis?

Ilaria Giovannacci, DDS, MSc,\* Marco Meleti, DDS, PhD,\* Maddalena Manfredi, DDS, PhD,\*  
Carmen Mortellaro, MD, DDS,<sup>†</sup> Alberta Greco Lucchina, DDS,<sup>†</sup>  
Mauro Bonanini, MD,\* and Paolo Vescovi, DDS, MSc\*

**Grup 1**

implant cerrahisi ile  
tetiklenen MRONJ

implant  
yerleşiminden 2-15  
ay sonra

**Grup 2**

implant varlığı ile  
tetiklenen MRONJ

implant  
yerleşiminden 1-15  
yıl sonra

The  
JOURNAL OF  
CRANIOFACIAL  
SURGERY

**Hem implant cerrahisi hem  
de implantın kendi varlığı  
MRONJ için risk faktörü**

Oral BP risk

Posterior bölgedeki implantlar  
BP süresi 3 yıldan fazlaysa  
Ek kortikosteroid tedavisi







## Dental Implants in Patients Receiving Chemotherapy: A Meta-Analysis

Bruno Ramos Chrcanovic, DDS, MSc,\* Tomas Albrektsson, MD, PhD,† and Ann Wennerberg, DDS, PhD‡



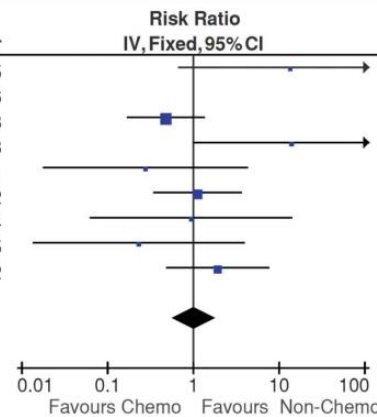
**Cisplatin**



**Kemik remodelingini bozuyor**

**%60 kemik oluşumunu**

Study or Subgroup	Chemo		Non-Chemo		Weight	Risk Ratio IV, Fixed, 95% CI	Year
	Events	Total	Events	Total			
Franzén et al.	1	3	0	17	4.0%	13.50 [0.66, 274.34]	1995
Aldegheri et al.	0	6	0	13		Not estimable	1996
Ihara et al.	4	32	11	42	32.7%	0.48 [0.17, 1.36]	1998
Andersson et al.	1	6	1	84	5.1%	14.00 [0.99, 197.20]	1998
Kovács	1	196	1	54	4.7%	0.28 [0.02, 4.33]	2001
van Steenberghe et al.	3	127	24	1136	25.5%	1.12 [0.34, 3.66]	2002
Kourtis et al.	0	11	74	1681	4.8%	0.94 [0.06, 14.32]	2004
Teoh et al.	0	25	6	77	4.4%	0.23 [0.01, 3.96]	2005
Linsen et al.	5	59	3	68	18.6%	1.92 [0.48, 7.70]	2012
<b>Total (95% CI)</b>		<b>465</b>		<b>3172</b>	<b>100.0%</b>	<b>1.02 [0.56, 1.85]</b>	
Total events	15		120				
Heterogeneity: Chi <sup>2</sup> = 11.35, df = 7 (P = 0.12); I <sup>2</sup> = 38%							
Test for overall effect: Z = 0.06 (P = 0.95)							



**Kemoterapi uygulananlar  
%25,5-%32,7 oranında ↑  
Kemoterapi uygulanmayanlar**



Guidelines

## Dental Implant Failure Risk in Post Oncological Patients, a Retrospective Study and Sapienza Head and Neck Unit Decisional Protocol- 7 Years of Follow-Up

Edoardo Brauner<sup>1</sup>, Valentino Valentini<sup>1</sup>, Umberto Romeo<sup>1</sup>, Marco Cantore<sup>2,\*</sup>, Federico Laudoni<sup>3</sup>, Oriana Rajabtork Zadeh<sup>1</sup>, Valeria Formisano<sup>4</sup>, Andrea Cassoni<sup>1</sup>, Marco Della Monaca<sup>1</sup>, Andrea Battisti<sup>1</sup>, Silvia Mezi<sup>5</sup>, Alessio Cirillo<sup>5</sup>, Francesca De Felice<sup>5</sup>, Andrea Botticelli<sup>5</sup>, Vincenzo Tombolini<sup>5</sup>, Marco De Vincentiis<sup>1</sup>, Andrea Colizza<sup>6</sup>, Gianluca Tenore<sup>1</sup>, Antonella Polimeni<sup>1</sup> and Stefano Di Carlo<sup>1</sup>

- Department of Oral and Maxillofacial Sciences, Sapienza University of Rome, Via Caserta 6, 00161 Rome, Italy; edoardo.brauner@uniroma1.it (E.B.); valentino.valentini@uniroma1.it (V.V.); umberto.romeo@uniroma1.it (U.R.); oriana.rajab@gmail.com (O.R.Z.); andrea.cassoni@uniroma1.it (A.C.); marco.dellamonaca@uniroma1.it (M.D.M.); andrea.battisti@uniroma1.it (A.B.); marco.devincentiis@uniroma1.it (M.D.V.); gianluca.tenore@uniroma1.it (G.T.); antonella.polimeni@uniroma1.it (A.P.); stefano.dicarlo@uniroma1.it (S.D.C.)
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- Independent Researcher, via Garibaldi 141, 00012 Guidonia, Italy; federico.laudoni@hotmail.it
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- Department of Sense Organs, Policlinico Umberto 1 Sapienza University of Rome, viale Regina Elena 326,



Citation: Brauner, E.; Valentini, V.; Romeo, U.; Cantore, M.; Laudoni, F.; Rajabtork Zadeh, O.; Formisano, V.;

TOTAL NUMBER of ANA-LYZED and REHABILITATED PATIENTS: 203	161 PATIENTS REHABILITATED WITHOUT IMPLANTS	30 patients under chemotherapy for bone metastases 10 patients under other medical therapies 29 patients with jaw plates 20 patients without bone reconstruction 72 patients under radiotherapy (dose ≥ 66 gy)
	42 PATIENTS REHABILITATED WITH IMPLANTS	no implant surgery absolute contraindications found

Total Number of Patients Rehabilitated with Implants	Total Number of Insterted Implants	Total Number of Lost Implants	% of Lost Implants
42	200	9	4.5%

RT kombinasyonu olanlar

Kemik metastazı olanlarda risk ↑

RT+KT risk ↑

BP ve Denosumab kullanılmış

### Implant Failure Risk Factors

Implant Failure Risk Factors	Risk Entity
FOR BONE METASTASES	High Risk (Red)
ADJUVANT CHEMOTHERAPY	Medium Risk (Yellow)
OSTEOMETABOLIC DRUG THERAPY	Medium Risk (Yellow)
NO CHEMOTHERAPY OR OTHER DRUG THERAPY	Low Risk (Green)

CHEMOTHERAPY or OTHER MEDICAL THERAPY

## MRONJ EVRELERİ

## TEDAVİ STRATEJİLERİ

### Evre 0

Hasta eğitimi  
Değiştirilebilir risk faktörlerinin azaltılması  
Ağrı kontrolü veya gerekirse oral antibiyotikler  
Üç ayda bir takip

### Evre 1

Hasta eğitimi  
Değiştirilebilir risk faktörlerinin azaltılması  
Ağrı kontrolü veya gerekirse oral antibiyotikler  
Üç ayda bir takip  
Antibakteriyel gargara  
Cerrahi debridman

### Evre 2

Hasta eğitimi  
Değiştirilebilir risk faktörlerinin azaltılması  
Ağrı kontrolü  
Sık takip  
Oral antibiyotiklerle semptomatik tedavi  
Yumuşak doku travmasını gidermek ve enfeksiyon kontrolünü sağlamak için  
cerrahi debridman

### Evre 3

Hasta eğitimi  
Değiştirilebilir risk faktörlerinin azaltılması  
Gerekirse ağrı kontrolü  
Sık takip  
Antibakteriyel gargara  
Oral antibiyotiklerle semptomatik tedavi  
Enfeksiyon ve ağrının daha uzun süreli hafifletilmesi için cerrahi  
debridman/rezeksiyon

**Cerrahi yara debridmanı**







# Radyoterapi ve dental doku etkileşimi

- Mine için 20 Gy ve dentin için 40 Gy'den sonra bozulma başlıyor
- RT uygulanmış dişlerde 40Gy üstünde dolgu materyali bağlanmada yetersizlik
- 70 Gy'den sonra her iki dokuda önemli ölçüde dejenerasyon ( $p < 0.05$ ).
- Dental restorasyon başarısı ↓ ←

Original Articles

The adverse effects of radiotherapy on the structure of dental hard tissues and longevity of dental restoration

Miguel Angel Muñoz , Carolina Garín-Correa, Wilfredo González-Arriagada , Ximena Quintela Davila, Patricio Häberle , Ana Bedran-Russo  & ...show all

Pages 910-918 | Received 05 Sep 2019, Accepted 17 Feb 2020, Published online: 26 Mar 2020

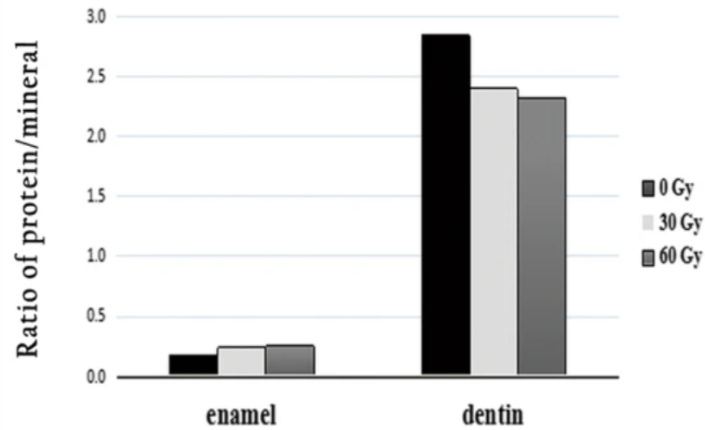


**DENTİN TÜBÜLLERİNİN  
TIKANMASI**





- 0'dan 30 Gy'ye kadar minimum diş hasarı
- 30 ile 60 Gy arasında diş dozu-hasar ilişkisi 2 veya 3 kat
- 60 Gy ve üzerinde bu ilişki 10 kat ↑
- 30 Gy RT'ye maruz kaldıktan sonra diş sert dokusunda dejeneratif değişiklikler belirgin ↑
- 60 Gy'ye ulaştığında diş sert dokusunda daha fazla tahribat ↑



kümülatif 60 Gy doza ulaşmak için 2 Gy/gün RT

Lu et al. *Radiation Oncology* (2019) 14:5  
<https://doi.org/10.1186/s13014-019-1208-1>

Radiation Oncology

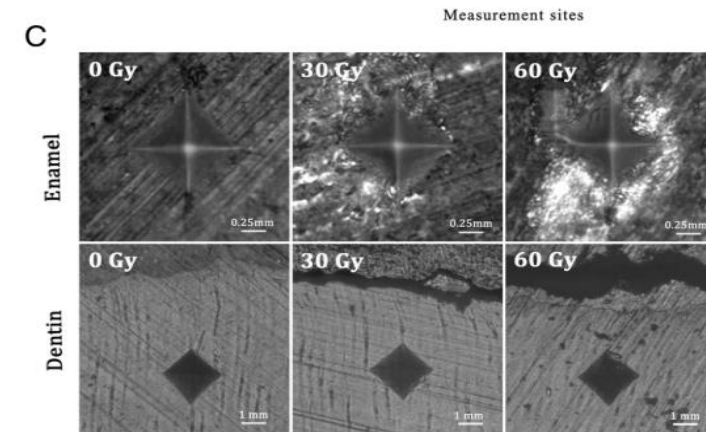
RESEARCH

Open Access

## Direct radiation-induced effects on dental hard tissue



Hui Lu<sup>1†</sup>, Qi Zhao<sup>2†</sup>, Jiang Guo<sup>1</sup>, Binghui Zeng<sup>1</sup>, Xinlin Yu<sup>3</sup>, Dongsheng Yu<sup>1\*</sup> and Wei Zhao<sup>1\*</sup>





# Kserostomi

EJC

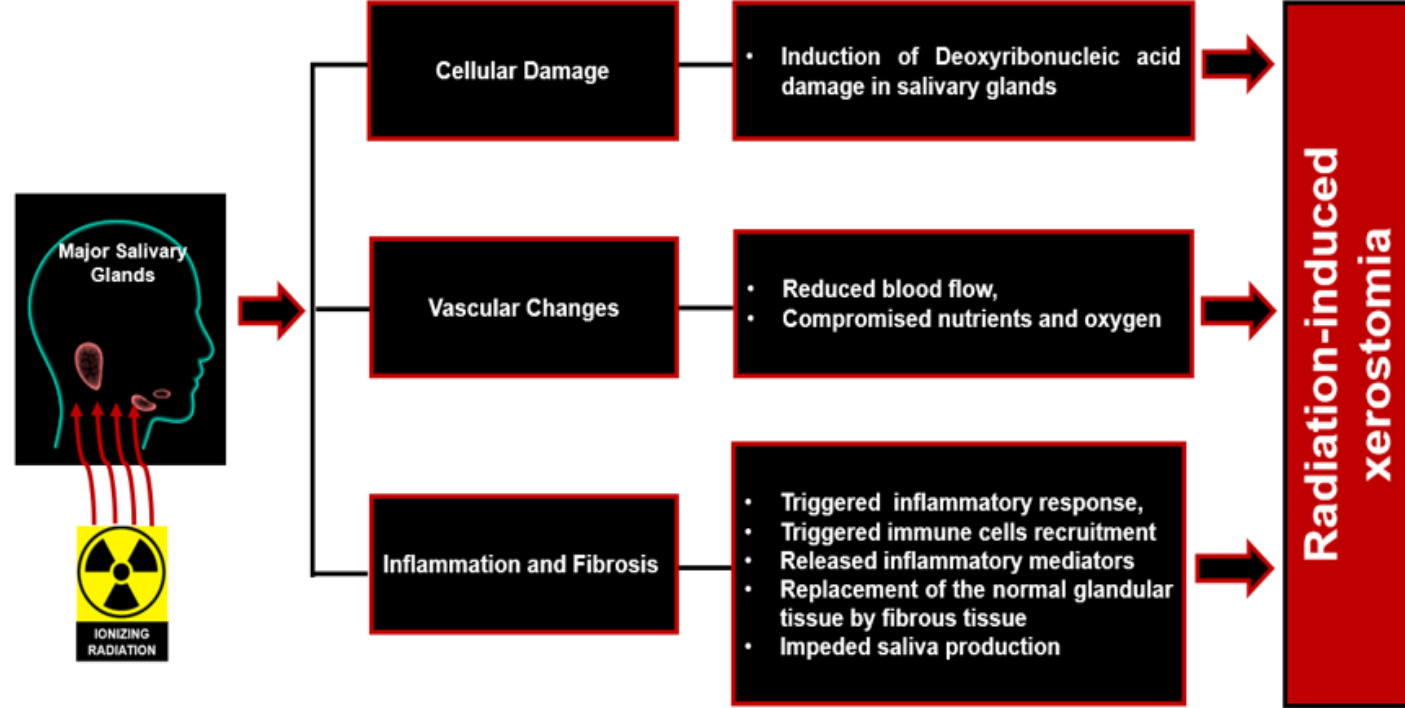
EUROPEAN JOURNAL OF CANCER

Parotid gland function during and following radiotherapy of malignancies in the head and neck

A consecutive study of salivary flow and patient discomfort

Lars Franzén • Ulrika Funegård • Thorild Ericson • Roger Henriksson

DOI: [https://doi.org/10.1016/S0959-8049\(05\)80076-0](https://doi.org/10.1016/S0959-8049(05)80076-0)



Tükürük akışı RT'den sonraki ilk haftada %50 ila %60 oranında azalır ve 7 hafta sonra ilave %20 azalır.

## Influence of Radiation-Induced Xerostomia on Tooth Loss in Head and Neck Cancer Patients

Efsun Somay✉

Email : efsuner@gmail.com

Erkan Topkan

Sibel Bascil

Ugur Selek



Reduction in saliva

Radiation-induced  
xerostomia

Increases the risk of  
tooth caries

Promotes tooth  
sensitivity and  
erosion

Decreases the ability  
of oral soft and hard  
tissues to heal and  
regenerate

Aggravates  
periodontal diseases

Tooth Loss

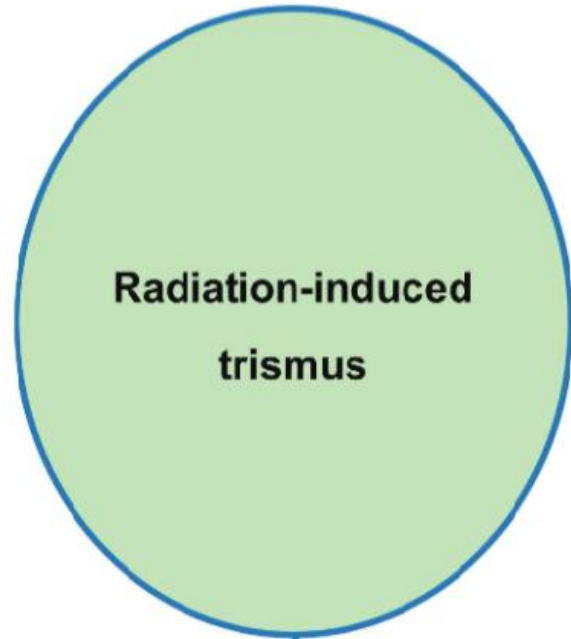
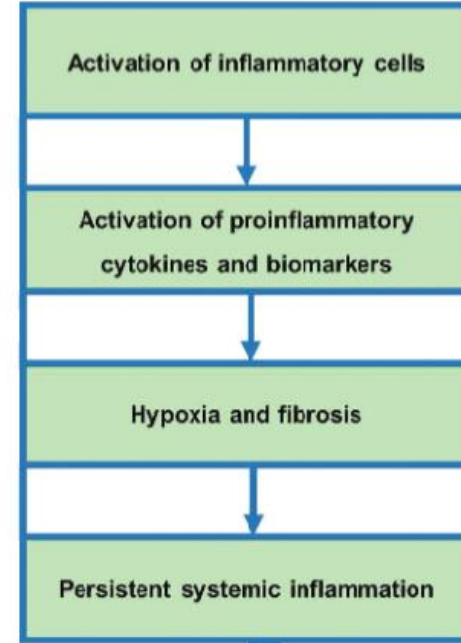
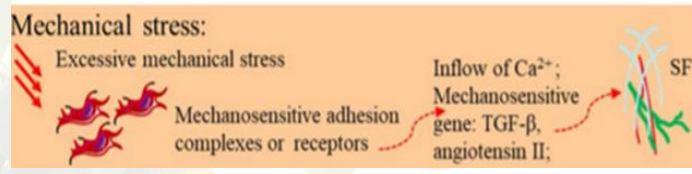
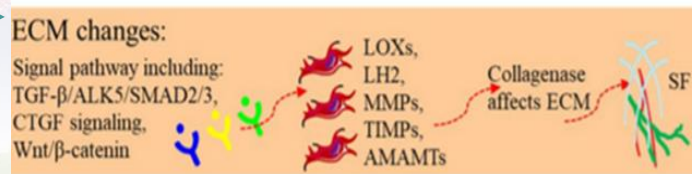
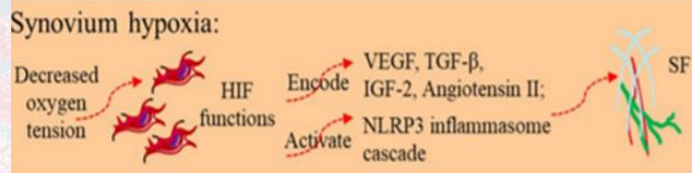
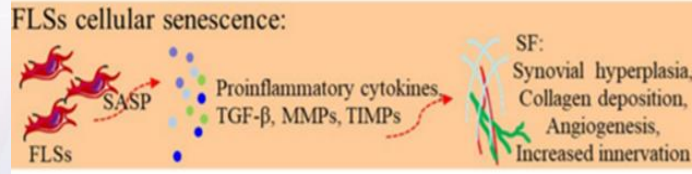




# Radyoterapiye bağlı trismus



## Ionizing Radiation





## Radyoterapiye bağlı trismus

Original Research Article

### Worth of pan-immune-inflammation value in trismus prediction after concurrent chemoradiotherapy for nasopharyngeal carcinomas

Efsun Somay, PhD<sup>1,2</sup>, Busra Yilmaz, MS<sup>3</sup>, Erkan Topkan, MD<sup>4</sup>, Beyza Sirin Ozdemir, MD<sup>5</sup>, Duriye Ozturk, MD<sup>6</sup>, Ali Ayberk Besen, MD<sup>7</sup>, Huseyin Mertsoylu, MD<sup>8</sup>, and Ugur Selek, MD<sup>9</sup>

DOI: 10.1111/odi.14429

ORIGINAL ARTICLE



### Initial neutrophil-to-lymphocyte ratio predicts radiation-induced trismus in parotid gland cancer

Efsun Somay<sup>1</sup> | Busra Yilmaz<sup>2</sup> | Erkan Topkan<sup>3</sup> | Ahmet Kucuk<sup>4</sup> | Berrin Pehlivan<sup>5</sup> | Ugur Selek<sup>6,7</sup>

<sup>1</sup>Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Baskent University, Ankara, Turkey

Abstract

Topkan et al. *BMC Cancer* (2023) 23:651  
https://doi.org/10.1186/s12885-023-11155-z

BMC Cancer

RESEARCH

Open Access



Valero's host index is useful in predicting radiation-induced trismus and osteoradionecrosis of the jaw risks in locally advanced nasopharyngeal carcinoma patients

Erkan Topkan<sup>1</sup>, Efsun Somay<sup>2</sup>, Busra Yilmaz<sup>3</sup>, Berrin Pehlivan<sup>4</sup> and Ugur Selek<sup>5</sup>



DOI: 10.1111/odi.14605

ORIGINAL ARTICLE

### Low hemoglobin levels predict increased radiation-induced trismus rates in nasopharyngeal cancer

Efsun Somay<sup>1</sup> | Busra Yilmaz<sup>2</sup> | Erkan Topkan<sup>3</sup> | Berrin Pehlivan<sup>4</sup> | Ugur Selek<sup>5,6</sup>

<sup>1</sup>Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Baskent University, Ankara, Turkey

<sup>2</sup>Department of Oral and Maxillofacial

Abstract

Purpose: To investigate the predictive significance of hemoglobin (Hb) values in the

Chapter 2

Print ISBN: 978-93-5547-865-8, eBook ISBN: 978-93-5547-866-5

### Radiation-induced Trismus and Related Measures of Patient Life Quality

Efsun Somay<sup>a</sup>, Busra Yilmaz<sup>b</sup>, Erkan Topkan<sup>c</sup>, Ahmet Kucuk<sup>d</sup>, Berrin Pehlivan<sup>e</sup> and Ugur Selek<sup>f,g</sup>

DOI: 10.9734/bpi/cimms/v2/3862A

Home > Chapter

### Intricate Relationship Between Radiation-Induced Trismus and Inflammation

Chapter | First Online: 17 November 2023

pp 1–16 | [Cite this chapter](#)

Efsun Somay | Erkan Topkan | Duriye Ozturk & Ugur Selek

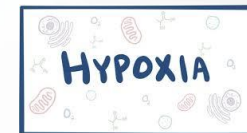
d: 20 April 2023



ORIGINAL ARTICLE

### Hemoglobin-to-platelet ratio in predicting the incidence of trismus after concurrent chemoradiotherapy

Efsun Somay<sup>1</sup> | Busra Yilmaz<sup>2</sup> | Erkan Topkan<sup>3</sup> | Ahmet Kucuk<sup>4</sup> | Veysel Haksoyler<sup>5</sup> | Berrin Pehlivan<sup>6</sup> | Ugur Selek<sup>7,8</sup> | Kenan Araz<sup>1</sup>





# Radyoterapiye bağlı trismus

Trismus  
↓  
MAA ≤ 35mm



Journal of Advances in Medicine and Medical Research

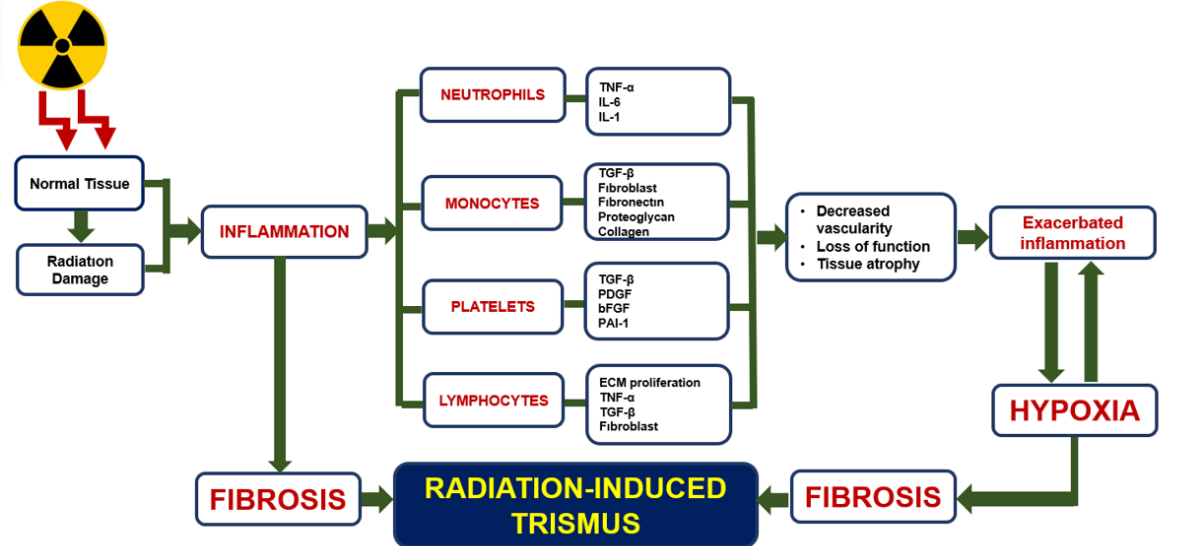
34(22): 255-266, 2022; Article no.JAMMR.92411

ISSN: 2456-8899

(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

## A Comprehensive Review of the Pros and Cons of Definitions of Radiation-Induced Trismus

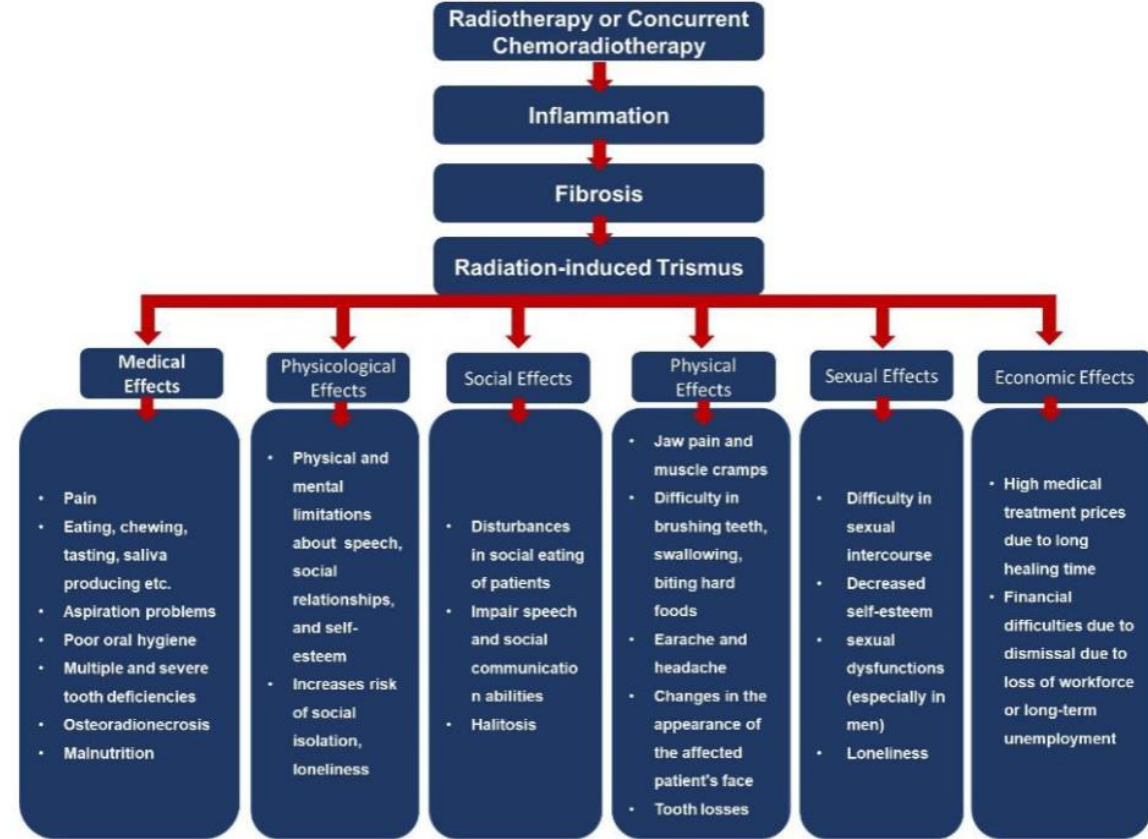
Efsun Somay <sup>a</sup>, Busra Yilmaz <sup>b</sup>, Ahmet Kucuk <sup>c</sup> and Erkan Topkan <sup>d\*</sup>







# Radyoterapiye bağlı trismus





Asian Journal of Research in Medical and Pharmaceutical Sciences

Volume 12, Issue 1, Page 1-12, 2023; Article no.AJRIMPS.95603  
ISSN: 2457-0745

## The Best Time to Dental Implant Placement in Patients with Head and Neck Cancers: An Ever-going Debate

Efsun Somay <sup>a\*</sup>, Busra Yilmaz <sup>b</sup> and Erkan Topkan <sup>c</sup>

<sup>a</sup> Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Baskent University, Ankara, Turkey.

<sup>b</sup> Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Baskent University, Ankara, Turkey.

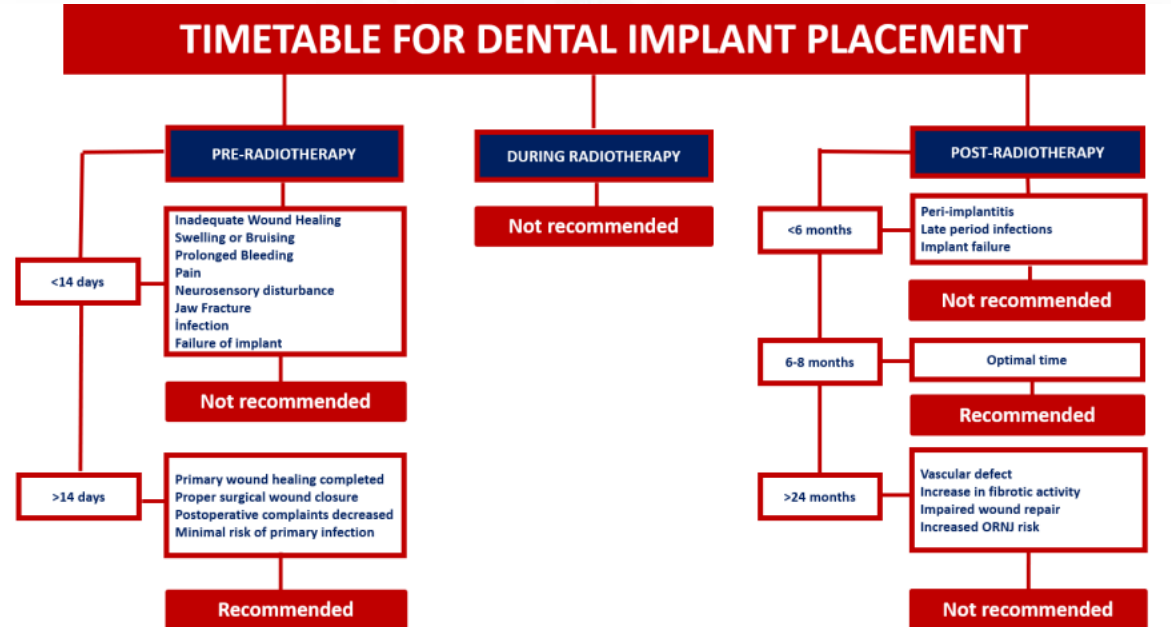
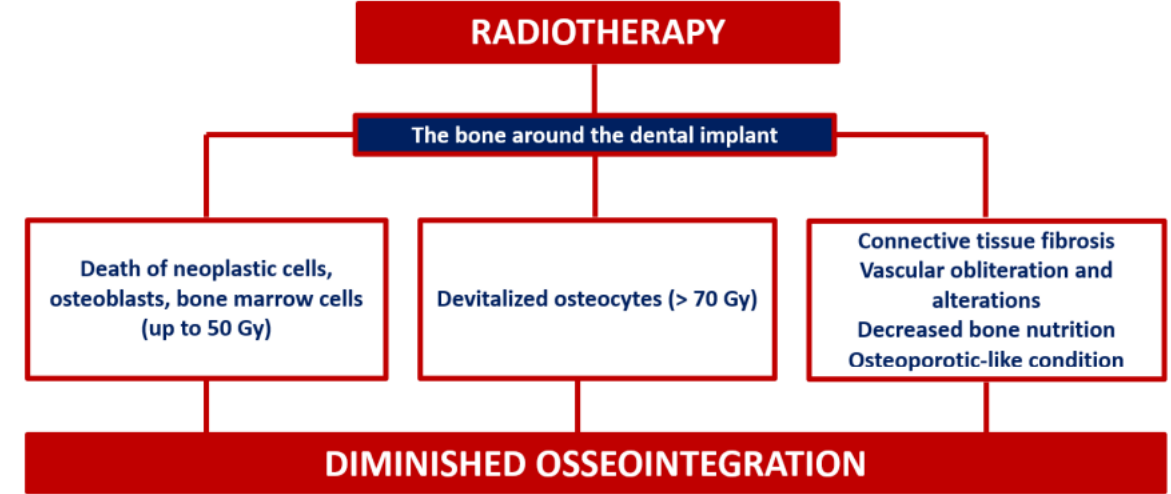
<sup>c</sup> Department of Radiation Oncology, Faculty of Medicine, Baskent University, Adana, Turkey.

En güvenli zaman RT sonrası 6-8 ay arası ve RT öncesi 14 gün <

! Yara iyileşmesinde gecikme ↓

! ORN riski ↓

! Osseointegrasyon başarısı ↑



## The Influence of Radiation Therapy on Dental Implantology

Lauren Anderson, DDS, MS,\* Stephen Meraw, DDS, MS,† Khalid Al-Hezaimi, BDS, MS,‡  
and Hom-Lay Wang, DDS, MSD, PhD§



Kemoterapi varsa dikkat

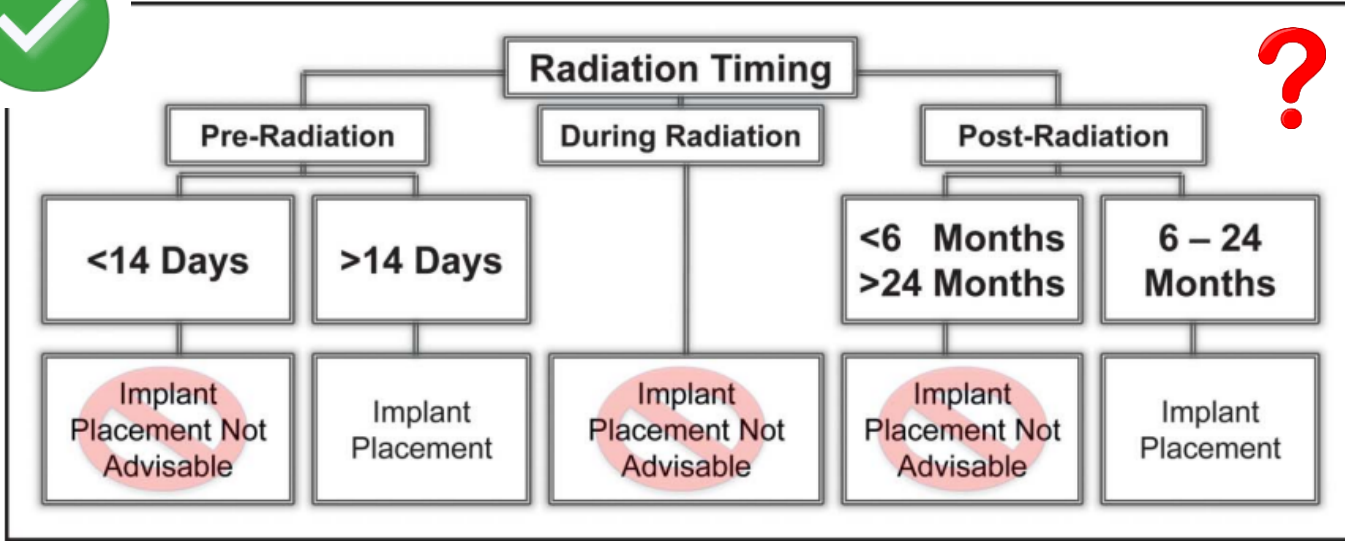


Fig. 1. Implant placement according to radiation timeline.

1- 6 ay arası cerrahi komplikasyonlar ↑

24 ay < vasküler yapı bozukluğu

fibrotik aktivitede

yara onarımında bozulma ↑

? 8 ay < sonra fibrotik aktivasyon başlıyor

GÜVENLİ



6-8 ay arası



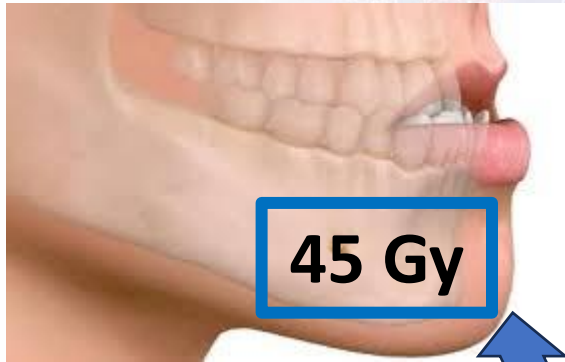


TÜMÖR İÇİN PLANLANAN  
HEDEF DOZ



İMPLANT YATAĞININ  
ALDIĞI GERÇEK DOZ

MANDİBULA VE MAKSİLLANIN  
ALDIĞI HACİMSEL DOZDUR =  $V_x$



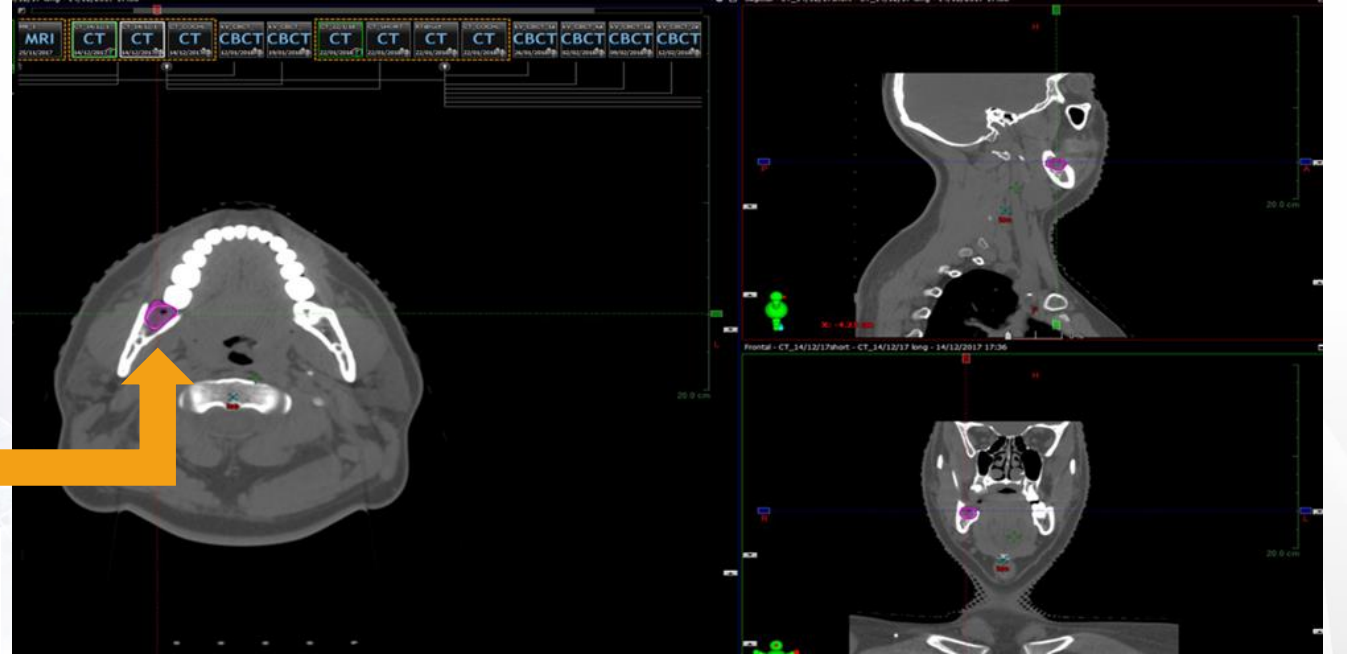
45 Gy

65 Gy



## Radyoterapi dozu

- Uygulanan RT dozu 67.6 Gy
- Çekim soketi bölgesinin aldığı doz 49.6 Gy



Received: 25 January 2024 | Revised: 21 February 2024 | Accepted: 12 March 2024

DOI: 10.1111/odi.14941

ORIGINAL ARTICLE

ORAL DISEASES | WILEY

### Osteoradionecrosis incidence in pre-radiation teeth extractions: A prospective study

C. Rupe<sup>1</sup> | G. Gioco<sup>1</sup> | M. Massaccesi<sup>2</sup> | L. Tagliaferri<sup>2</sup> | F. Pastore<sup>2</sup> |  
F. Micciché<sup>3</sup> | J. Galli<sup>4</sup> | D. Mele<sup>4</sup> | M. L. Specchia<sup>5</sup> | A. Cassano<sup>6</sup> | M. Cordaro<sup>1</sup> |  
C. Lajolo<sup>1</sup>

Çekim soketi dışındaki bölgenin aldığı doz 26,1 Gy

Osteoklastik aktivite ↓

Mikro kırık oluşumu

Nekrotik kemik  
oluşumunun başlaması



Bakteri kolonileri

Kemik rezorpsiyonu

**OSSEOİTEGRASYONUN  
BOZULMASI**



**FAIL İMPLANT**

**ONKOLOJİ HASTALARINDA  
DENTAL İMPLANT**





# Onkolojik Tedavi gören hastalar için kılavuzlar

## Key facts for dental safety to avoid osteoradionecrosis

Recommendation	Explanations and precautions
Assess oral and dental health prior to radiotherapy to reduce the risk of osteoradionecrosis	A comprehensive clinical and radiological examination is conducted to ascertain the current oral condition and necessary dental treatment
Dental cleaning, filling, and gingival interventions are deemed safe to be performed at any given time	Non-invasive dental procedures are generally regarded as having a relatively low risk of osteoradionecrosis
It is necessary to extract teeth that cannot be restored before undergoing radiotherapy, if possible. It is recommended to allow a minimum of 2 weeks for healing before starting the radiotherapy	It is imperative to ensure that the interval between tooth extraction and the initiation of radiotherapy is no shorter than 14 days to facilitate optimal wound healing
When tooth extraction is necessary during radiotherapy, it can be performed by taking the necessary precautions	It is important to consider that the likelihood of developing osteoradionecrosis escalates with the passage of time following radiotherapy
If tooth extraction is deemed necessary after radiotherapy, it is recommended to undertake the extraction procedure within the initial 5–6 months following the completion of radiotherapy	The formation of fibrous tissue 6–8 months after radiotherapy is a result of vascular obliteration and insufficient blood supply to the affected bone, which poses a significant risk for osteoradionecrosis
The administration of prophylactic antibiotics before tooth extraction is not obligatory to prevent osteoradionecrosis	The effectiveness of antibiotic administration, except for acute infections, lacks definitive evidence
The assessment of dental implants ought to be conducted using comparable criteria as those employed for tooth extractions after radiotherapy	While there is a dearth of conclusive evidence, it is advisable to consider scheduling dental implant procedures within the first 5–6 months following radiotherapy or 3–4 months before the initiation of radiotherapy
Having edentulism or fewer teeth does not completely eliminate the risk of osteoradionecrosis	Similar care should be provided to dentate patients
It is advised to schedule regular clinical and radiological dental assessments every 3–6 months following radiotherapy	Regular dental check-ups are advised to prevent complications resulting from the exacerbating impact of radiotherapy on dental caries and periodontal diseases
It is advisable to adopt a proactive approach when undergoing bone-active systemic treatment in conjunction with radiotherapy	The use of bone-acting agents increases the incidence of osteoradionecrosis and makes its accurate diagnosis difficult. Medication-related osteonecrosis should be taken into consideration as a potential differential diagnosis when jaw doses are below 40 Gy
It is essential that your dental procedures are meticulously planned by a team of qualified experts	It is recommended to involve a multidisciplinary team consisting of at least a dentist, an oral and maxillofacial surgeon, a periodontologist, a prosthodontist, an otolaryngologist, a radiologist, and a radiation oncologist in the decision-making process



## Important Considerations for Dental Safety to Prevent Osteoradionecrosis of the Jaws

Efsun SOMAY,<sup>1</sup> Uğur SELEK,<sup>2</sup> Erkan TOPKAN<sup>3</sup>

<sup>1</sup>Department of Oral and Maxillofacial Surgery, Başkent University Faculty of Dentistry, Ankara-Türkiye

<sup>2</sup>Department of Radiation Oncology, Koç University Faculty of Medicine, İstanbul-Türkiye

<sup>3</sup>Department of Radiation Oncology, Başkent University Faculty of Medicine, Adana-Türkiye

- RT uygulanmış olan hastada postop dönemde diş çekimi ve minimal invaziv cerrahi girişimi için en uygun süre 6-8 ay arası, 12 ayı aşmayacak şekilde olmalıdır.
- Süre uzadıkça ORN riski ↑

>12 ay fibrozis kalıcı hale gelmeye başlar

- Kemiğe etki eden ajanların kullanımı osteoradyonekroz insidansını artırır ve doğru teşhisini zorlaştırır.
- Çene dozlarının 40 Gy'nin altında olması durumunda ilaca bağlı osteonekroz potansiyel ayırıcı tanı olarak dikkate alınmalıdır.


Received: 2 June 2018 | Revised: 6 February 2019 | Accepted: 24 February 2019

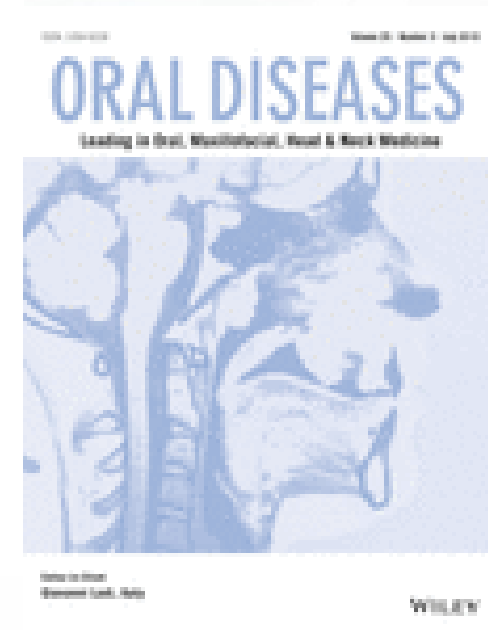
DOI: 10.1111/odi.13081

**ORIGINAL ARTICLE**

WILEY **ORAL DISEASES**

## Influence of bisphosphonates on clinical features of osteoradionecrosis of the maxilla and mandible

Thaís Gimenez Miniello<sup>1</sup> | Juliane Piráquine Araújo<sup>1,2</sup> | Maria Letícia Gobo Silva<sup>3</sup> |  
Luiz Paulo Kowalski<sup>4</sup> | André Caroli Rocha<sup>2</sup> | Graziella Chagas Jaguar<sup>2</sup> |  
Fábio Abreu Alves<sup>1,2</sup> 



# Diş çekimi ve dental implant uygulaması

- Dental implantın osseointegrasyon süreci için ideal süreye denk geldiğinden, en uygun zaman dilimi RT'den yaklaşık 5-6 ay sonra veya RT'den 3-4 ay öncedir
- Yumuşak doku iyileşmesini sağlamak ve olası komplikasyonları önlemek için diş çekimi gibi küçük cerrahi işlemler 14 günden az olmamalıdır.

Received: 24 January 2020 | Revised: 13 February 2020 | Accepted: 14 February 2020

DOI: 10.1111/odi.13312

INVITED MEDICAL REVIEW

ORAL DISEASES WILEY



What is the optimal timing for implant placement in oral cancer patients? A scoping literature review

Jamie M. Alberga | Nathalie Vosselman | Anke Korfage | Konstantina Delli | Max J. H. Witjes | Gerry M. Raghoobar | Arjan Vissink

Review Article

**Dental care during and after radiotherapy in head and neck cancer**

Department of Radiotherapy,  
J. N. Medical College, AMU, Aligarh,

Seema Devi, Nimisha Singh<sup>1</sup>







# International Expert-Based Consensus Definition, Staging Criteria, and Minimum Data Elements for Osteoradionecrosis of the Jaw: An Inter-Disciplinary Modified Delphi Study The International ORAL Consortium\*



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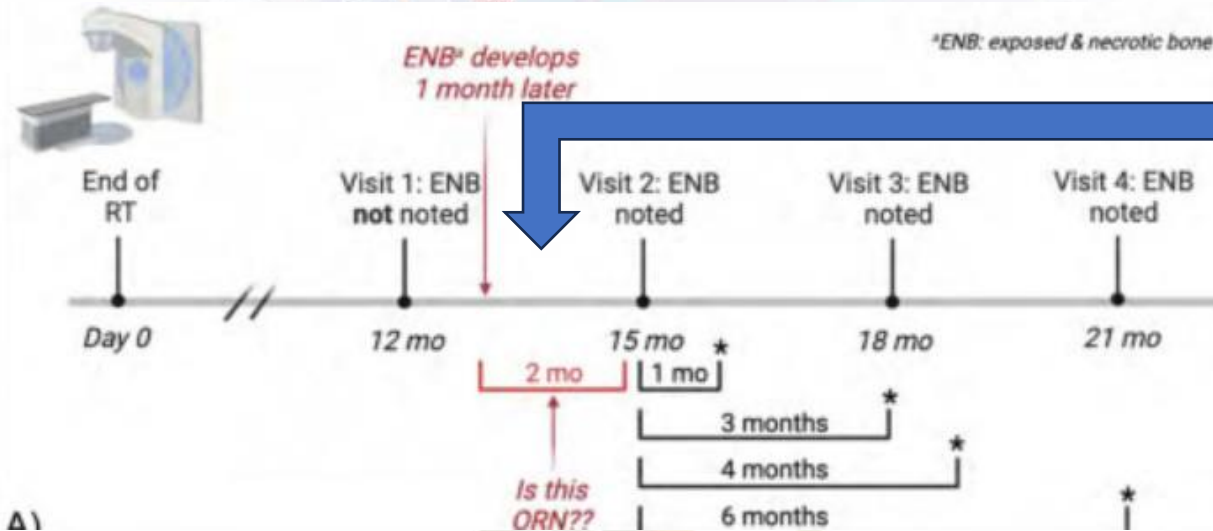
The International ORAL Consortium\*

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# Oral konsorsiyum kararlarına göre ORN tanımı

- Kemik Bozukluğu
- Radyasyon yaralanması ve/veya iyonlaştırıcı radyasyonun neden olduğu
- Kan akışı kaybı veya damarsal desteğin yetersizliği ve kemik ölümü/nekroz bulguları



ORNJ tanısı için gereken kemiğin minimum açıkta kalma süresi literatürde 1-6 ay arasında önemli ölçüde değişmektedir.

**ORN şüphesi?**



linik veya radyografik değerlendirme



- Açıkta kalan tüm kemik vakalarının mutlaka açıkta kalan nekrotik kemik olduğu düşünülmemelidir
- Kemik ölümü/nekrozunu destekleyen radyografik kanıtlar varsa, **sağlam mukozayla** (yani klinik kemik açıklığı olmayan) RT ile tedavi edilen bir hastada ORNJ tanısı konabilir.
- Mevcut sınıflandırma sistemi yeterli değil
- Süre ORN evrelemek için kesin bir kriter değil
- Özellikle mukozada (yani ülserasyon) veya kemikte (yani ilerleyici kemik açığa çıkması) değişiklikler tespit edildiğinde, RT sonrası gözetim sırasında hastanın tıbbi kaydına seri fotoğrafların dahil edilmesi şiddetle tavsiye edilir.
- Açıktaki kemik miktarı kumpas yada cetvellerle ölçülmelidir





# Italian position paper (SIPMO-SICMF) on medication-related osteonecrosis of the jaw (MRONJ), 2023

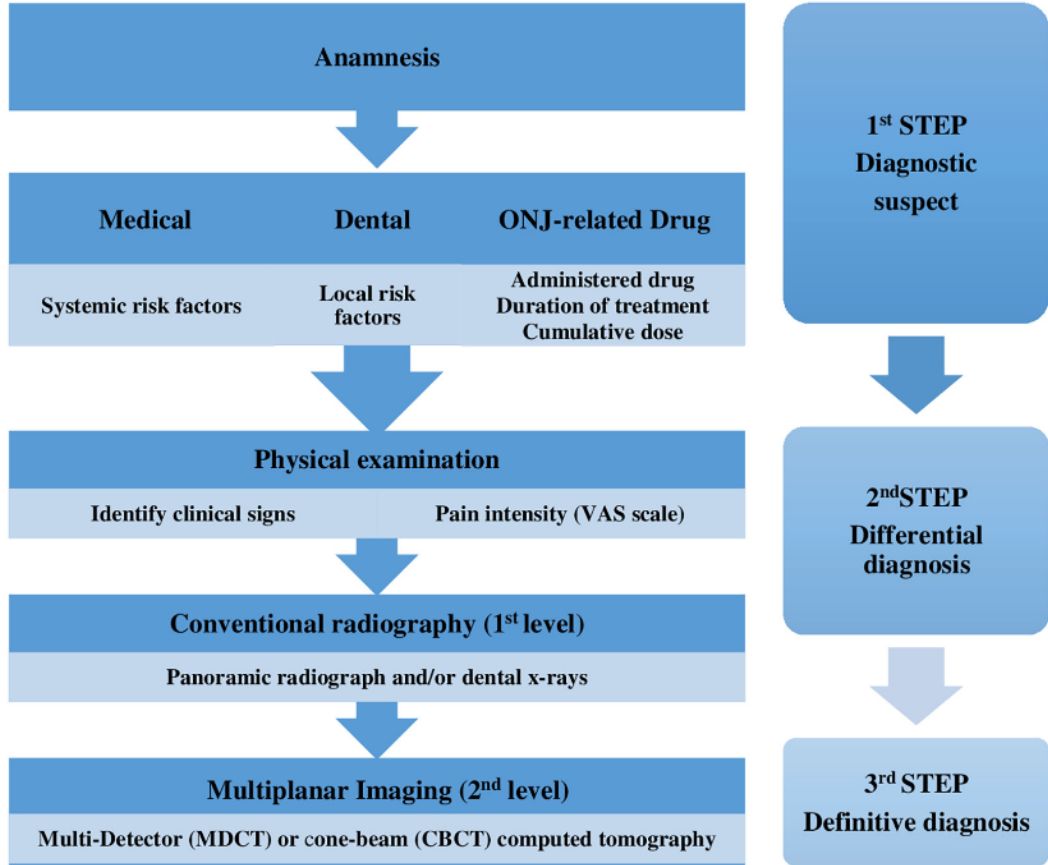
## Clinical signs and symptoms

Abscess	Mucosal inflammation
Bone exposure	Non-healing post-extraction socket
Cutaneous fistula	Numbness of the lips <sup>a</sup>
Fluid discharge from the nose	Purulent discharge
Halitosis	Soft-tissue swelling
Intraoral fistula	Spontaneous loss of bone fragments
Jaw pain of bone origin	Sudden dental/implant mobility
Mandible fracture (fragment mobility)	Toothache
Mandibular deformation	Trismus

<sup>a</sup>Caused by irritation of the inferior alveolar nerve and/or infraorbital nerve.



Sebepsiz ve radyolojik semptomsuz ağrı MRONJ başlangıcını düşündürmeli



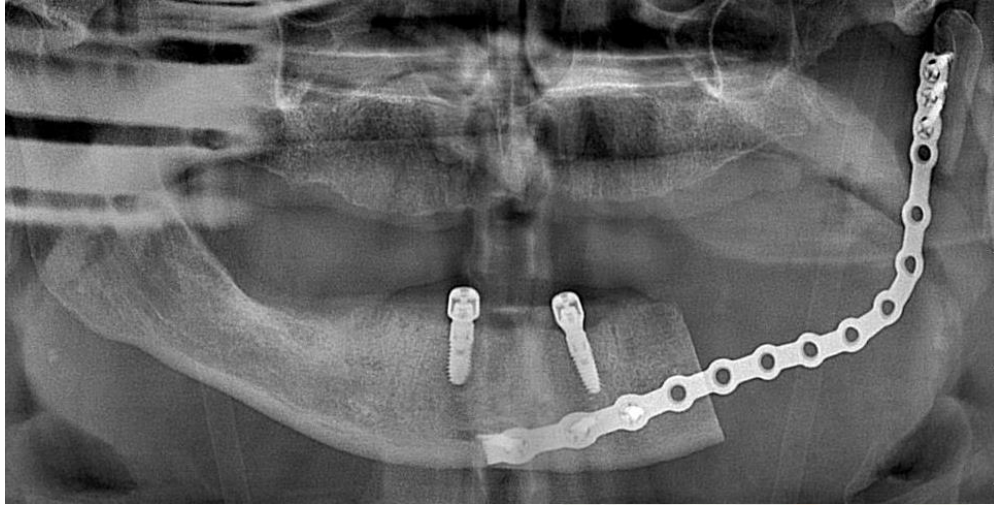
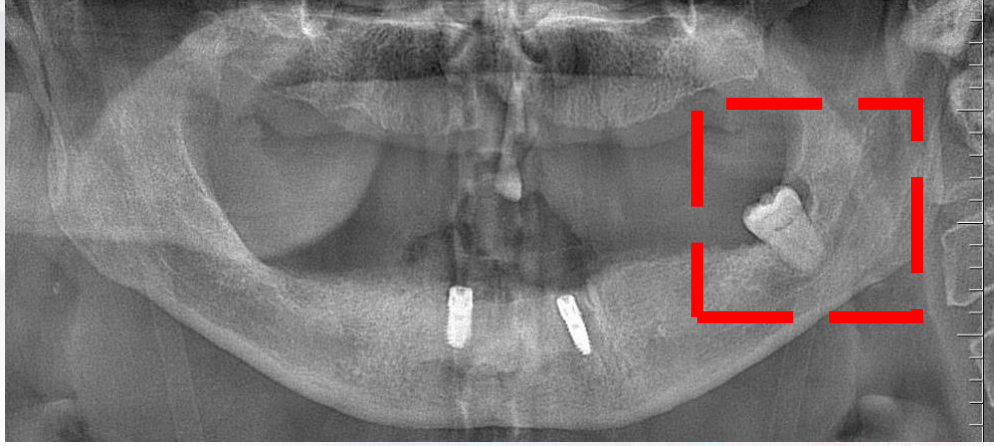
- Bone morfojenik ajanlar (BMA'lar):** bifosfonatlar (BP'ler) ve denosumab (DMB);
- Antianjiyojenik ajanlar (AA'lar):** anti-VEGF (örn. bevacizumab), TKI'ler (örn. sunitinib) ve mTOR'lar (örn. everolimus).

	Dental treatments	HD-BMAs R <sub>++</sub> and R <sub>++</sub> patients	LD-BMAs R <sub>x</sub> patients
Non-surgical procedures	Restorative dentistry	Indicated	Indicated
	Endodontic treatment	Indicated	Indicated
	Orthodontic treatment	Feasible	Feasible
	Periodontal therapy	Indicated	Indicated
	Prosthetic rehabilitation	Feasible	Feasible
Surgical procedures <sup>a</sup>	Dentoalveolar surgery	Indicated	Indicated
	Tooth extraction	Indicated	Indicated
	Pre-implant bone surgery	Contraindicated	Feasible
	Dental implant surgery	Contraindicated	Feasible <sup>b</sup>
	Periodontal surgery	Indicated	Indicated
	Endodontic surgery	Indicated	Indicated



Molecule type	Last dose before surgery	Resume treatment
Medication withdrawal in HD-BMAs $R_+$ and $R_{++}$ patients		
Bisphosphonates	1 week	Once wound healing has been achieved (4-6 weeks after surgery)
Denosumab (Xgeva®)	3 weeks	
Bevacizumab	5-8 weeks	
Sunitinib	1 week	
Everolimus	1 week	
Medication withdrawal in LD-BMAs $R_x$ patients		
Bisphosphonates	1 week	Once wound healing has been achieved (4-6 weeks after surgery)
Denosumab (Prolia®)	No need for suspension <sup>a</sup>	







- Multidisipliner ekip ve yapıcı işbirliği
- Tedavi öncesi planlama
- Rehberlerin takip edilmesi
- Hasta eğitimi
- Sık dental kontroller (risk kategorisine göre)
- Düzenli hasta takibi





"Şuna inanmak  
lazımdır ki,  
dünya üzerinde  
gördüğümüz her şey  
kadının eseridir."

**Mustafa Kemal  
Atatürk**



**TEŞEKKÜRLER.....**