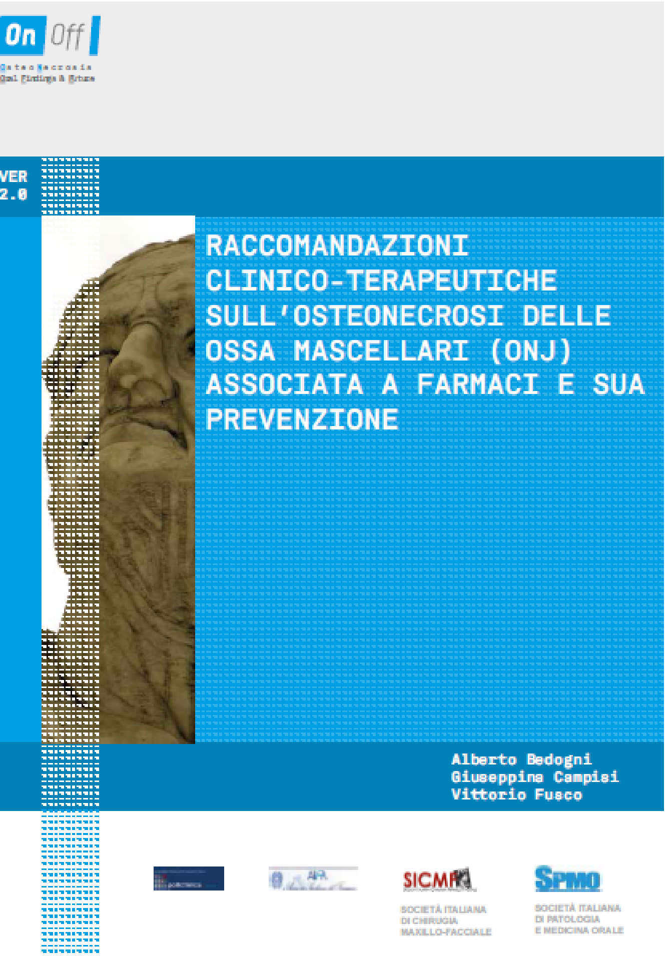


On Off

VER 2.0

RACCOMANDAZIONI CLINICO-TERAPEUTICHE SULL'OSTEONECROSI DELLE OSSA MASCELLARI (ONJ) ASSOCIATA A FARMACI E SUA PREVENZIONE

Alberto Bedogni
Giuseppina Campisi
Vittorio Fusco

SOCIETÀ ITALIANA DI CHIRURGIA MAXILLO-FACCIALE

SOCIETÀ ITALIANA DI PATOLOGIA E MEDICINA ORALE

4. DIAGNOSI di ONJ - radiologia

Versione 2.0/2015

Aggiornato a ottobre 2017

Indice

- ✓ Ruolo della diagnostica per immagini
    - ○ **OPT e Radiografie endorali**
    - ○ **TC volumetrica/TC a raggio conico (CBCT)**
    - ○ **RM**
    - ○ Scintigrafia ossea
    - ○ PET, TC/PET, SPECT e SPECT/TC
- ✓ Segni radiologici di ONJ
- ✓ Contributo radiologico alla diagnosi di ONJ

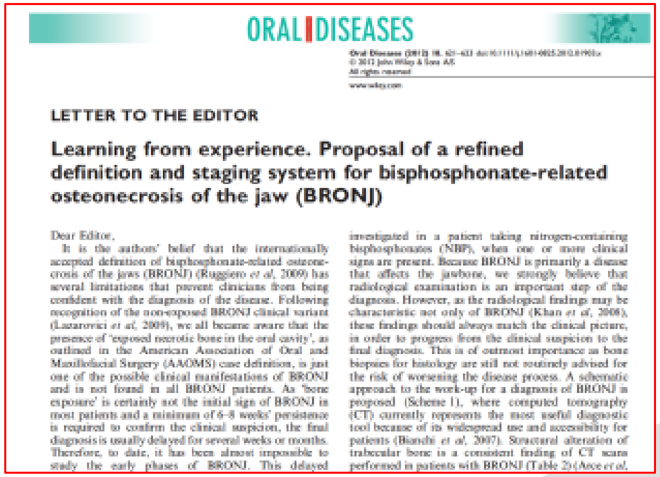
✓ Ruolo della diagnostica per immagini

- **Diagnosi differenziale**
- **Individuazione**
- **Estensione**
- **Stadiazione**
- **Complicanze**
- **Monitoraggio**

✓ Ruolo della diagnostica per immagini

"L'ONJ è una malattia dell'osso, che interessa solo parzialmente i tessuti molli".

Necessità di imaging mirato



ORAL DISEASES

LETTER TO THE EDITOR

Learning from experience. Proposal of a refined definition and staging system for bisphosphonate-related osteonecrosis of the jaw (BRONJ)

Dear Editor,

It is the authors' belief that the internationally accepted definition of bisphosphonate-related osteonecrosis of the jaws (BRONJ) (Ruggiero *et al*, 2009) has several limitations that prevent clinicians from being confident with the diagnosis of the disease. Following recognition of the non-exposed BRONJ clinical variant (Lazarovici *et al*, 2009), we all became aware that the presence of 'exposed necrotic bone in the oral cavity', as outlined in the American Association of Oral and Maxillofacial Surgery (AAOMS) case definition, is just one of the possible clinical manifestations of BRONJ and is not found in all BRONJ patients. As 'bone exposure' is certainly not the initial sign of BRONJ in most patients and a minimum of 6–8 weeks' persistence is required to confirm the clinical suspicion, the final diagnosis is usually delayed for several weeks or months. Therefore, to date, it has been almost impossible to study the early phases of BRONJ. This delayed

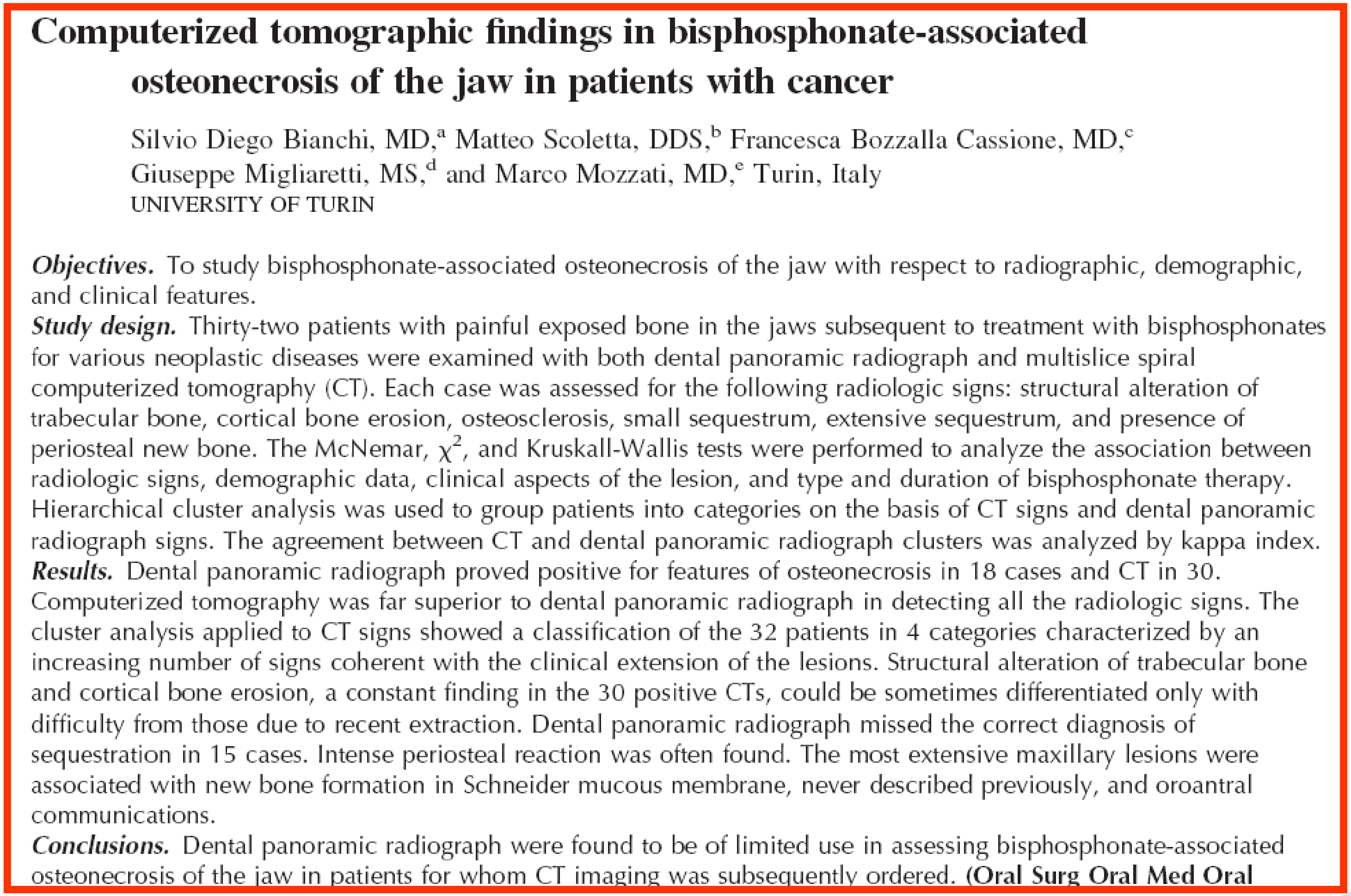
investigated in a patient taking nitrogen-containing bisphosphonates (NBP), when one or more clinical signs are present. Because BRONJ is primarily a disease that affects the jawbone, we strongly believe that radiological examination is an important step of the diagnosis. However, as the radiological findings may be characteristic not only of BRONJ (Khan *et al*, 2008), these findings should always match the clinical picture, in order to progress from the clinical suspicion to the final diagnosis. This is of outmost importance as bone biopsies for histology are still not routinely advised for the risk of worsening the disease process. A schematic approach to the work-up for a diagnosis of BRONJ is proposed (Scheme 1), where computed tomography (CT) currently represents the most useful diagnostic tool because of its widespread use and accessibility for patients (Bianchi *et al*, 2007). Structural alteration of trabecular bone is a consistent finding of CT scans performed in patients with BRONJ (Table 2) (Arce *et al*,

✓ Ruolo della diagnostica per immagini

Quale indagine più indicata per la diagnosi?

- ○ **OPT e Radiografie endorali**
- ○ **TC spirale / TC a raggio conico (CBCT)**
- ○ Risonanza Magnetica (RM)
- ○ SCINTIGRAFIA OSSEA
- ○ PET, TC/PET, SPECT e SPECT/TC

OPT vs TC



Computerized tomographic findings in bisphosphonate-associated osteonecrosis of the jaw in patients with cancer

Silvio Diego Bianchi, MD,[a] Matteo Scoletta, DDS,[b] Francesca Bozzalla Cassione, MD,[c]
Giuseppe Migliaretti, MS,[d] and Marco Mozzati, MD,[e] Turin, Italy
UNIVERSITY OF TURIN

Objectives. To study bisphosphonate-associated osteonecrosis of the jaw with respect to radiographic, demographic, and clinical features.

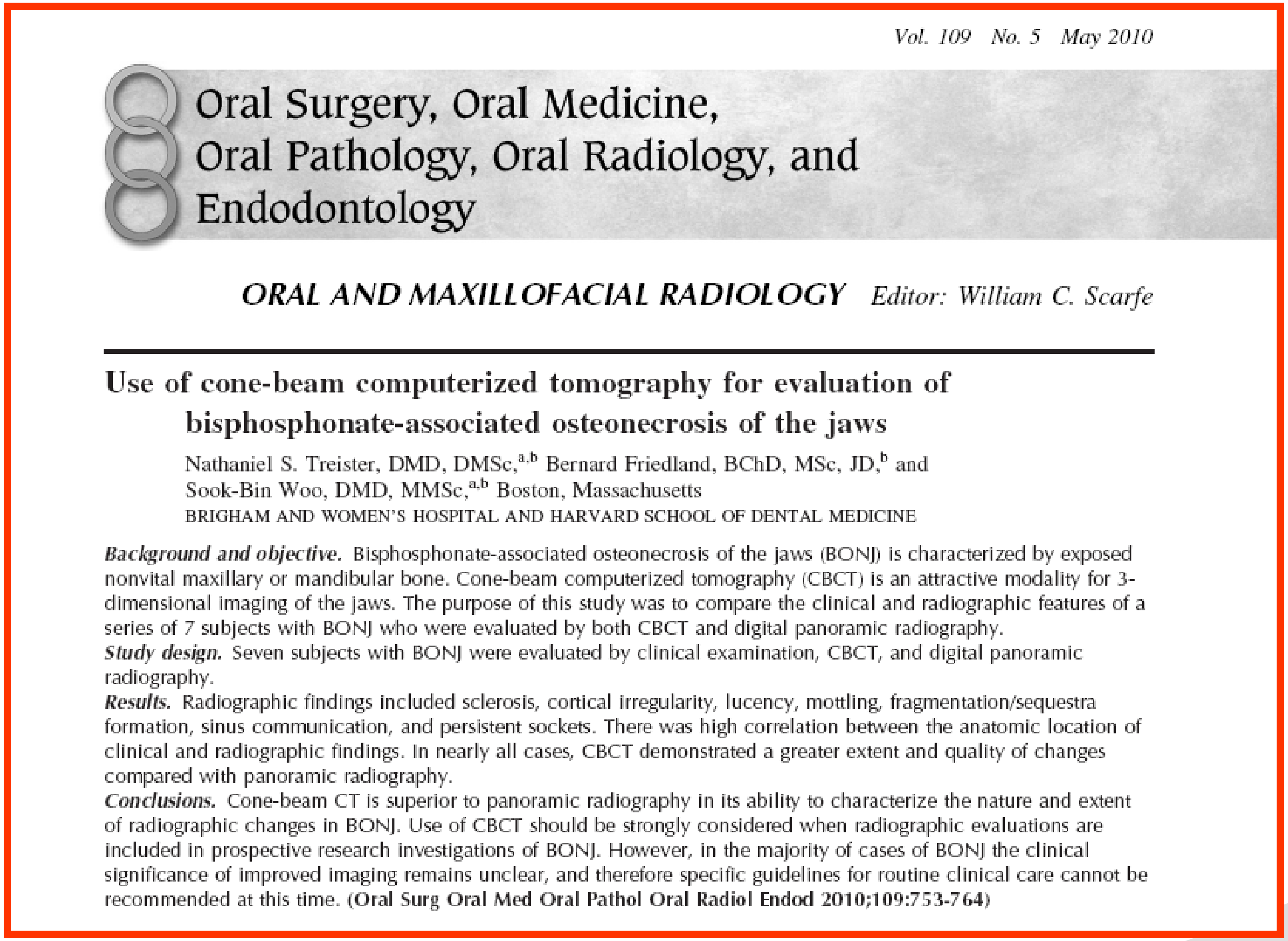
Study design. Thirty-two patients with painful exposed bone in the jaws subsequent to treatment with bisphosphonates for various neoplastic diseases were examined with both dental panoramic radiograph and multislice spiral computerized tomography (CT). Each case was assessed for the following radiologic signs: structural alteration of trabecular bone, cortical bone erosion, osteosclerosis, small sequestrum, extensive sequestrum, and presence of periosteal new bone. The McNemar, χ^2, and Kruskall-Wallis tests were performed to analyze the association between radiologic signs, demographic data, clinical aspects of the lesion, and type and duration of bisphosphonate therapy. Hierarchical cluster analysis was used to group patients into categories on the basis of CT signs and dental panoramic radiograph signs. The agreement between CT and dental panoramic radiograph clusters was analyzed by kappa index.

Results. Dental panoramic radiograph proved positive for features of osteonecrosis in 18 cases and CT in 30. Computerized tomography was far superior to dental panoramic radiograph in detecting all the radiologic signs. The cluster analysis applied to CT signs showed a classification of the 32 patients in 4 categories characterized by an increasing number of signs coherent with the clinical extension of the lesions. Structural alteration of trabecular bone and cortical bone erosion, a constant finding in the 30 positive CTs, could be sometimes differentiated only with difficulty from those due to recent extraction. Dental panoramic radiograph missed the correct diagnosis of sequestration in 15 cases. Intense periosteal reaction was often found. The most extensive maxillary lesions were associated with new bone formation in Schneider mucous membrane, never described previously, and oroantral communications.

Conclusions. Dental panoramic radiograph were found to be of limited use in assessing bisphosphonate-associated osteonecrosis of the jaw in patients for whom CT imaging was subsequently ordered. **(Oral Surg Oral Med Oral**

Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007 Aug;104(2):249-58

OPT vs CBTC



Vol. 109 No. 5 May 2010

Oral Surgery, Oral Medicine,
Oral Pathology, Oral Radiology, and
Endodontology

ORAL AND MAXILLOFACIAL RADIOLOGY *Editor: William C. Scarfe*

Use of cone-beam computerized tomography for evaluation of bisphosphonate-associated osteonecrosis of the jaws

Nathaniel S. Treister, DMD, DMSc,[a,b] Bernard Friedland, BChD, MSc, JD,[b] and
Sook-Bin Woo, DMD, MMSc,[a,b] Boston, Massachusetts
BRIGHAM AND WOMEN'S HOSPITAL AND HARVARD SCHOOL OF DENTAL MEDICINE

Background and objective. Bisphosphonate-associated osteonecrosis of the jaws (BONJ) is characterized by exposed nonvital maxillary or mandibular bone. Cone-beam computerized tomography (CBCT) is an attractive modality for 3-dimensional imaging of the jaws. The purpose of this study was to compare the clinical and radiographic features of a series of 7 subjects with BONJ who were evaluated by both CBCT and digital panoramic radiography.
Study design. Seven subjects with BONJ were evaluated by clinical examination, CBCT, and digital panoramic radiography.
Results. Radiographic findings included sclerosis, cortical irregularity, lucency, mottling, fragmentation/sequestra formation, sinus communication, and persistent sockets. There was high correlation between the anatomic location of clinical and radiographic findings. In nearly all cases, CBCT demonstrated a greater extent and quality of changes compared with panoramic radiography.
Conclusions. Cone-beam CT is superior to panoramic radiography in its ability to characterize the nature and extent of radiographic changes in BONJ. Use of CBCT should be strongly considered when radiographic evaluations are included in prospective research investigations of BONJ. However, in the majority of cases of BONJ the clinical significance of improved imaging remains unclear, and therefore specific guidelines for routine clinical care cannot be recommended at this time. **(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:753-764)**

“La Commissione ritiene che l’ ***OPT*** *e la* ***TC*** *siano da considerarsi le* ***tecniche di indagine di primo e secondo livello rispettivamente*** *più utili come complemento diagnostico”*

OPT → screening iniziale (informazioni generali)

TC spirale
TC a raggio conico → discrimina con buona approssimazione tra tessuto osseo sano e patologico

Anamnesi

Medica Farmacologica | **Odontoiatrica**

- Fattori rischio sistemici
- Fattori rischio locali
- Tipo
- Durata
- Via di somministrazione
- Dose cumulativa

Esame obiettivo

- Identificazione segni clinici
- Valutazione dolore (scala VAS)

I livello

Imaging 1° livello

Ortopantomografia (OPT) e radiografie endorali

II livello

Imaging 2° Livello

Tomografia computerizzata (CT/CBCT)

Sospetto diagnostico STEP 1

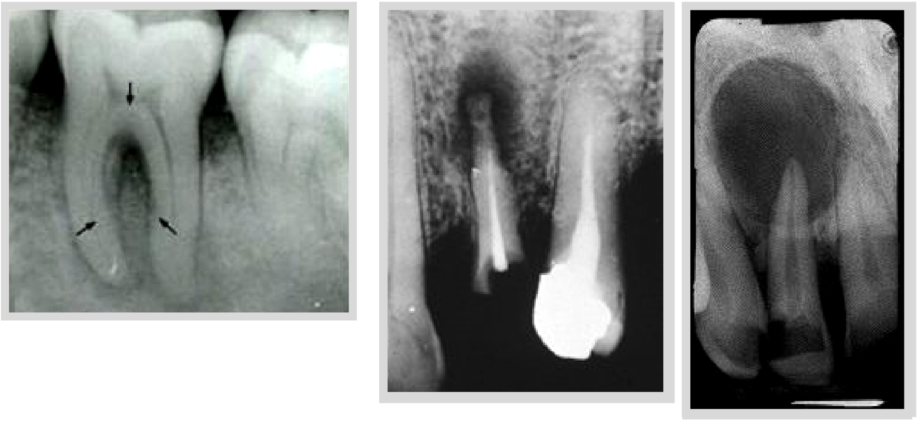
Diagnosi differenziale STEP 2

Diagnosi conclusiva STEP 3

- **Tecniche di diagnostica per immagini di I livello**

Diagnosi differenziale ONJ: ruolo della radiologia tradizionale

- ○ **Radiografie endorali**
- ○ **OPT**



- ➢ *Lesioni endodontiche*
- ➢ *Lesioni parodontali*
- ➢ *Lesioni cistiche odontogene*
- ➢ *Osteomieliti*
- ➢ *Secondarismi ossei*
- ➢ *Perimplantiti/mucositi perimplantari*

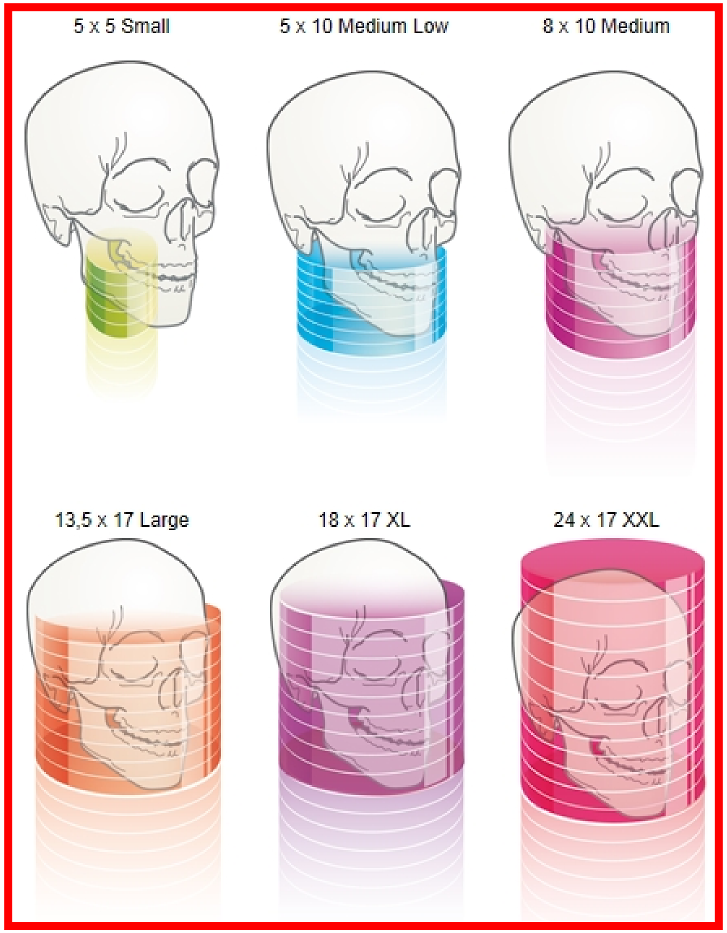
- **Tecniche di diagnostica per immagini di II livello**
  - ○ **TC volumetrica (spirale)**

Vantaggi	**Limiti**
➢ Facile accessibilità all’esame ➢ Costi contenuti (SSN) ➢ Abitudine alla interpretazione del dato	➢ Irraggiamento

  - ○ **TC a raggio conico (CBCT)**

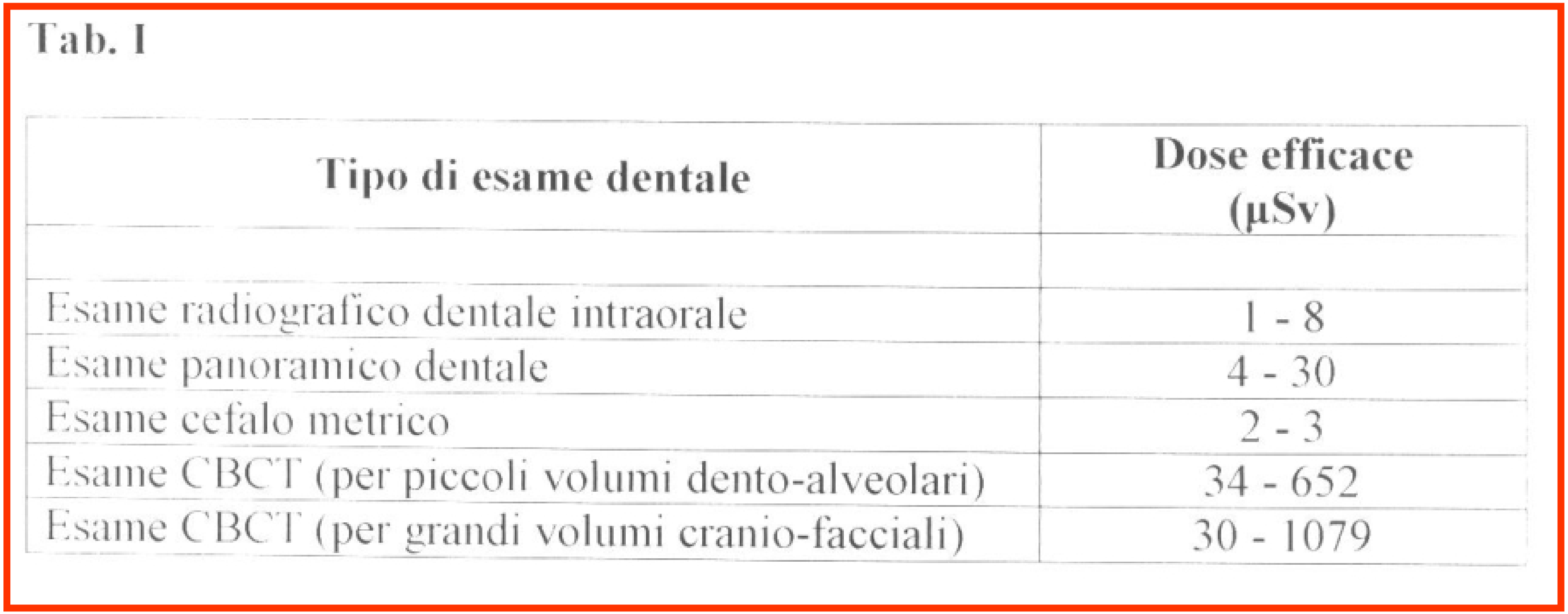
Vantaggi	**Limiti**
➢ Ridotto irraggiamento	➢ Campi limitati (FOV) in odontoiatria ➢ Ancora poco usata nel SSN

CBCT


5 x 5 Small
5 x 10 Medium Low
8 x 10 Medium
13,5 x 17 Large
18 x 17 XL
24 x 17 XXL

FOV

WAR



Tab. I

Tipo di esame dentale	Dose efficace (μSv)
Esame radiografico dentale intraorale	1 - 8
Esame panoramico dentale	4 - 30
Esame cefalo metrico	2 - 3
Esame CBCT (per piccoli volumi dento-alveolari)	34 - 652
Esame CBCT (per grandi volumi cranio-facciali)	30 - 1079

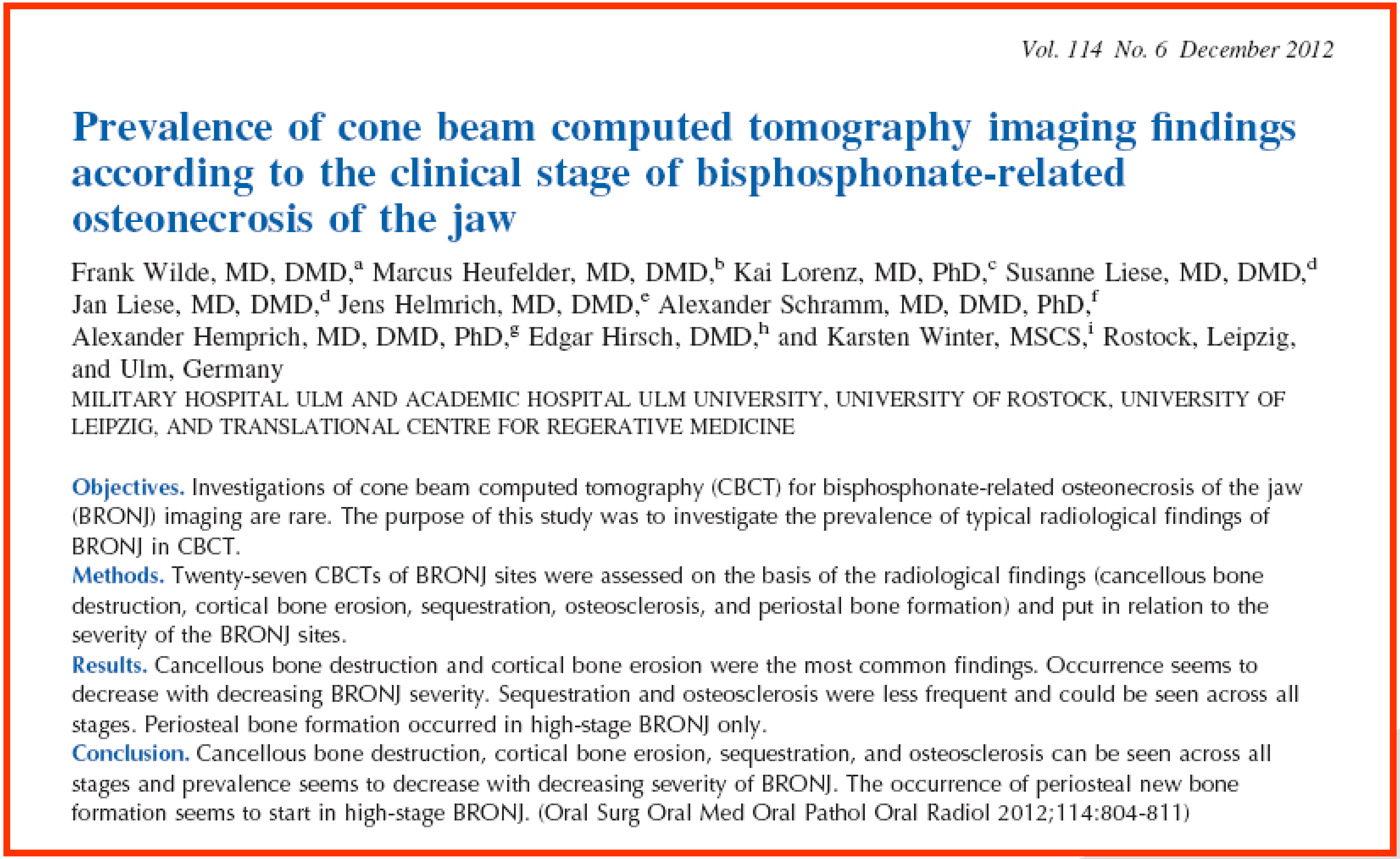
Raccomandazioni per l'impiego corretto delle apparecchiature TC volumetriche «Cone beam» (10A06042) (G.U. Serie Generale n. 124 del 29 maggio 2010)

- **Tecniche di diagnostica per immagini di II livello**
    - ○ **TC volumetrica (spirale)**
    - ○ **TC a raggio conico (CBCT)**

*“ **Prescrizione** : TC del massiccio e/o mandibola in finestra da osso, a strato sottili, in proiezione assiale e coronale (eventuale ricostruzione denta-scan)”*

Mezzo di contrasto da usarsi solo per escludere presenza di secondarismi ossei/tessuti molli, in caso di sospetto clinico

CBCT e ONJ



Vol. 114 No. 6 December 2012

Prevalence of cone beam computed tomography imaging findings according to the clinical stage of bisphosphonate-related osteonecrosis of the jaw

Frank Wilde, MD, DMD,[a] Marcus Heufelder, MD, DMD,[b] Kai Lorenz, MD, PhD,[c] Susanne Liese, MD, DMD,[d] Jan Liese, MD, DMD,[d] Jens Helmrich, MD, DMD,[e] Alexander Schramm, MD, DMD, PhD,[f] Alexander Hemprich, MD, DMD, PhD,[g] Edgar Hirsch, DMD,[h] and Karsten Winter, MSCS,[i] Rostock, Leipzig, and Ulm, Germany

MILITARY HOSPITAL ULM AND ACADEMIC HOSPITAL ULM UNIVERSITY, UNIVERSITY OF ROSTOCK, UNIVERSITY OF LEIPZIG, AND TRANSLATIONAL CENTRE FOR REGERATIVE MEDICINE

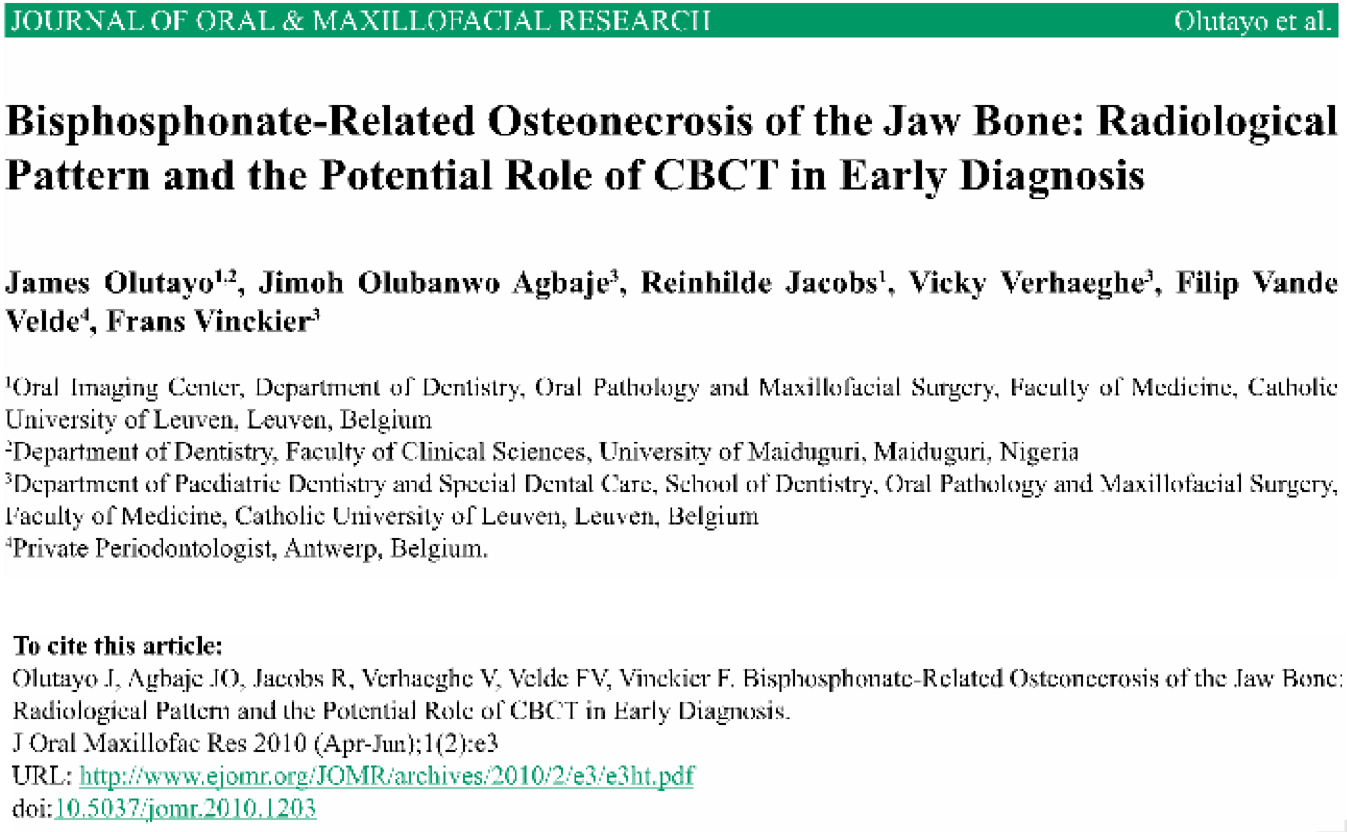
Objectives. Investigations of cone beam computed tomography (CBCT) for bisphosphonate-related osteonecrosis of the jaw (BRONJ) imaging are rare. The purpose of this study was to investigate the prevalence of typical radiological findings of BRONJ in CBCT.

Methods. Twenty-seven CBCTs of BRONJ sites were assessed on the basis of the radiological findings (cancellous bone destruction, cortical bone erosion, sequestration, osteosclerosis, and periostal bone formation) and put in relation to the severity of the BRONJ sites.

Results. Cancellous bone destruction and cortical bone erosion were the most common findings. Occurrence seems to decrease with decreasing BRONJ severity. Sequestration and osteosclerosis were less frequent and could be seen across all stages. Periosteal bone formation occurred in high-stage BRONJ only.

Conclusion. Cancellous bone destruction, cortical bone erosion, sequestration, and osteosclerosis can be seen across all stages and prevalence seems to decrease with decreasing severity of BRONJ. The occurrence of periosteal new bone formation seems to start in high-stage BRONJ. (Oral Surg Oral Med Oral Pathol Oral Radiol 2012;114:804-811)

CBCT e ONJ



JOURNAL OF ORAL & MAXILLOFACIAL RESEARCH Olutayo et al.

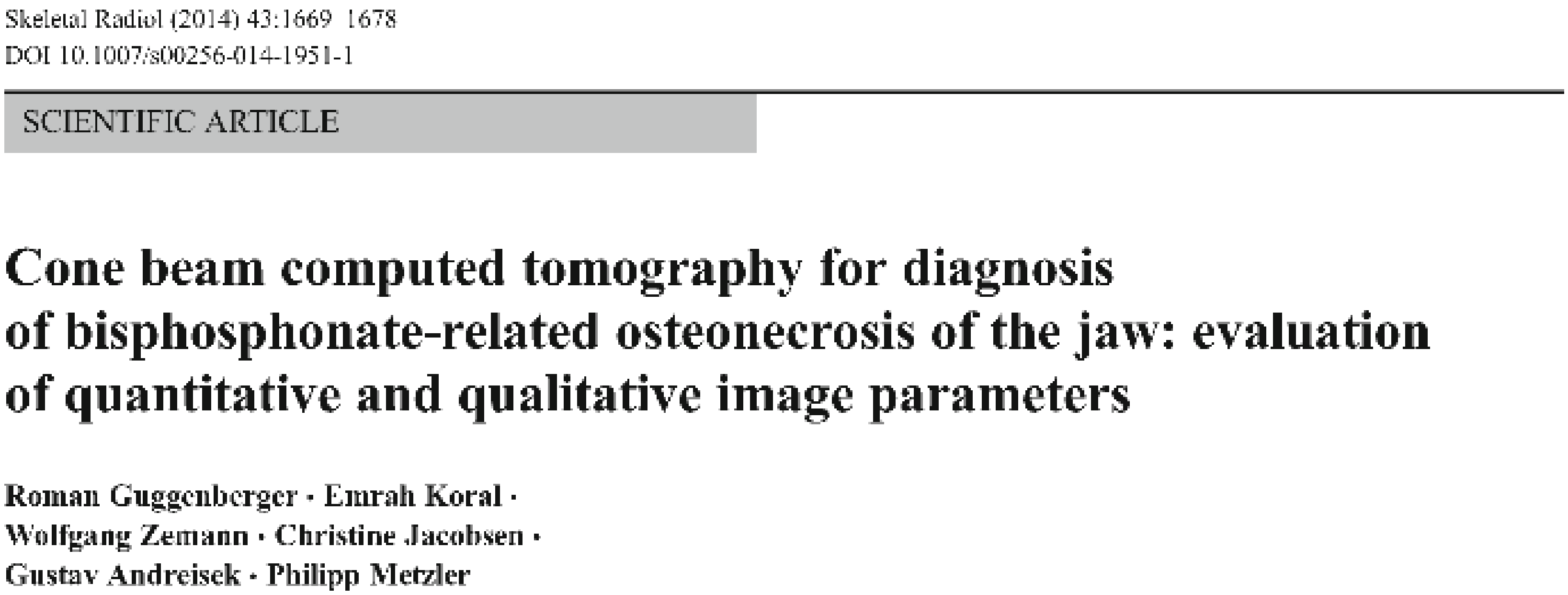
Bisphosphonate-Related Osteonecrosis of the Jaw Bone: Radiological Pattern and the Potential Role of CBCT in Early Diagnosis

James Olutayo[1,2], Jimoh Olubanwo Agbaje[3], Reinhilde Jacobs[1], Vicky Verhaeghe[3], Filip Vande Velde[4], Frans Vinckier[3]

[1]Oral Imaging Center, Department of Dentistry, Oral Pathology and Maxillofacial Surgery, Faculty of Medicine, Catholic University of Leuven, Leuven, Belgium
[2]Department of Dentistry, Faculty of Clinical Sciences, University of Maiduguri, Maiduguri, Nigeria
[3]Department of Paediatric Dentistry and Special Dental Care, School of Dentistry, Oral Pathology and Maxillofacial Surgery, Faculty of Medicine, Catholic University of Leuven, Leuven, Belgium
[4]Private Periodontologist, Antwerp, Belgium.

To cite this article:
Olutayo J, Agbaje JO, Jacobs R, Verhaeghe V, Velde FV, Vinckier F. Bisphosphonate-Related Osteonecrosis of the Jaw Bone: Radiological Pattern and the Potential Role of CBCT in Early Diagnosis.
J Oral Maxillofac Res 2010 (Apr-Jun);1(2):e3
URL: http://www.ejomr.org/JOMR/archives/2010/2/e3/e3ht.pdf
doi:10.5037/jomr.2010.1203

CBCT e ONJ



Skeletal Radiol (2014) 43:1669 1678
DOI 10.1007/s00256-014-1951-1

SCIENTIFIC ARTICLE

Cone beam computed tomography for diagnosis of bisphosphonate-related osteonecrosis of the jaw: evaluation of quantitative and qualitative image parameters

Roman Guggenberger · Emrah Koral ·
Wolfgang Zemann · Christine Jacobsen ·
Gustav Andreisek · Philipp Metzler

- **Tecniche supplementari di diagnostica per immagini di II livello**

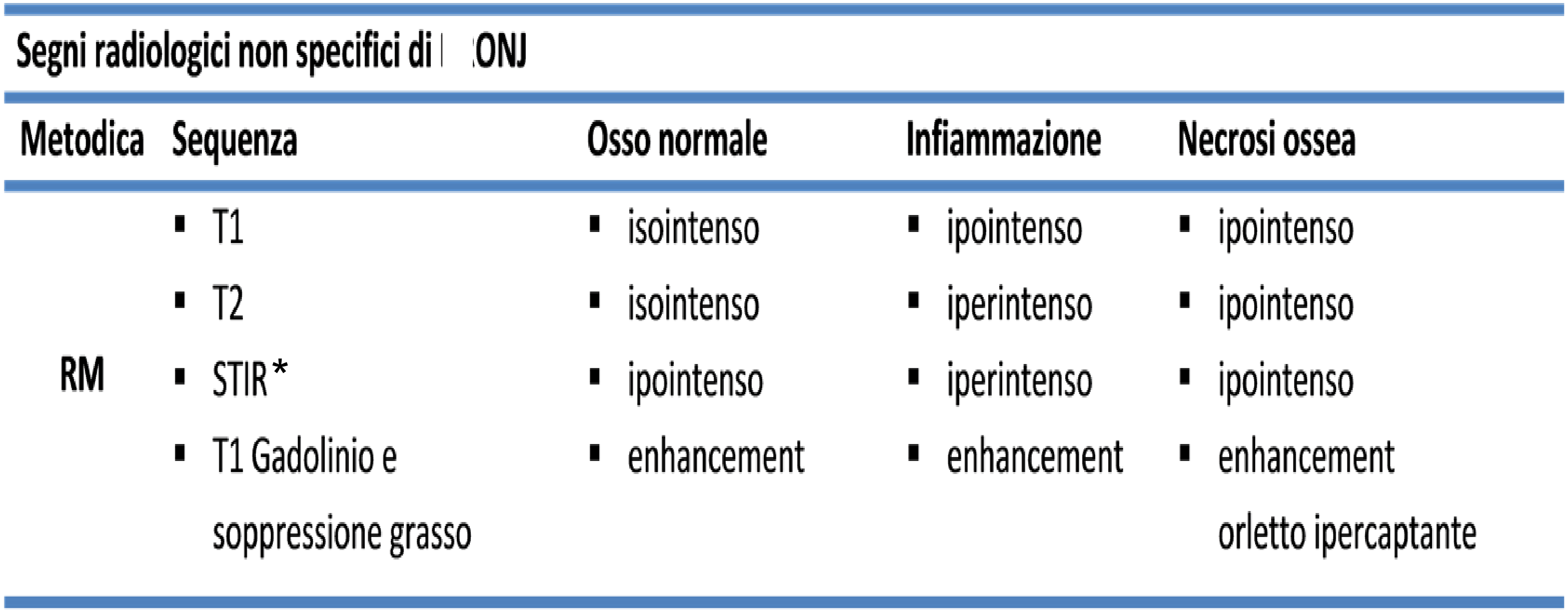
  (utili in casi di dubbia interpretazione o per definire con maggiore accuratezza l’estensione del processo osteonecrotico a scopo terapeutico)

  - **RM**

Vantaggi	Limiti
➢ Discrimina vitalità osso midollare (necrosi/infiammazione) ➢ Tessuti molli circostanti	➢ Claustrofobia ➢ Tempi di attesa (SSN) ➢ Artefatti

  - **SCINTIGRAFIA OSSEA**
  - **PET, TC/PET, SPECT e SPECT/TC**

○ **RM**



Segni radiologici non specifici di l ONJ

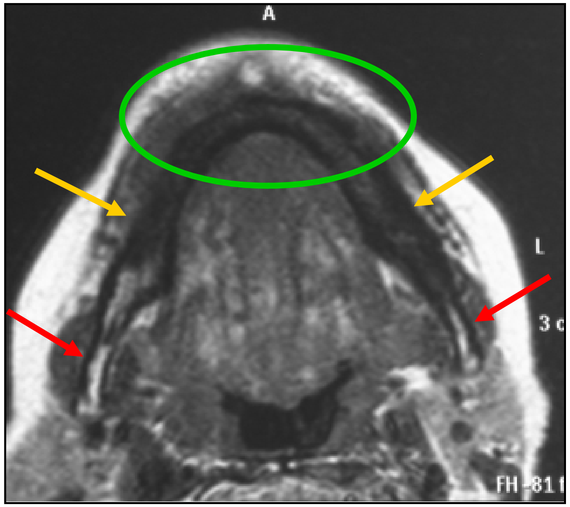
Metodica	Sequenza	Osso normale	Infiammazione	Necrosi ossea
RM	T1	isointenso	ipointenso	ipointenso
	T2	isointenso	iperintenso	ipointenso
	STIR*	ipointenso	iperintenso	ipointenso
	T1 Gadolinio e soppressione grasso	enhancement	enhancement	enhancement orletto ipercaptante

*Short Tau Inversion Recovery

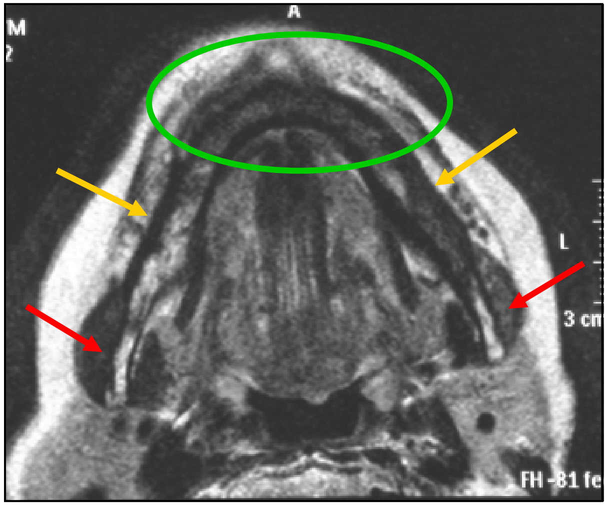
POSITION PAPER BRONJ (SICMF-SIPMO 2013)

○ RM – tessuto osseo

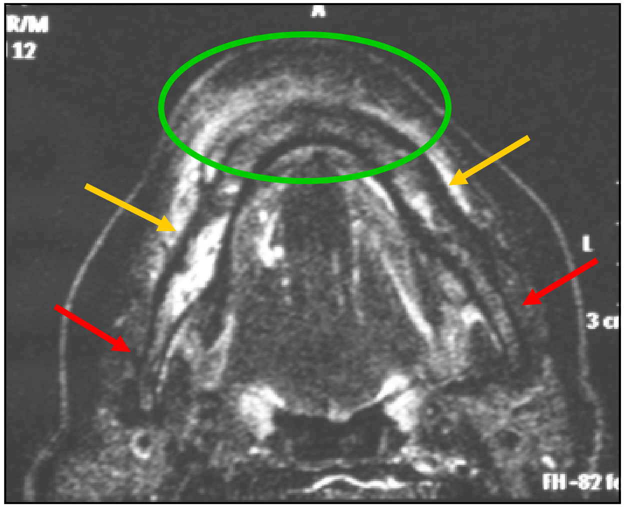
T_1



T_2


A
M
L
3 cm
FH -81 fe

STIR

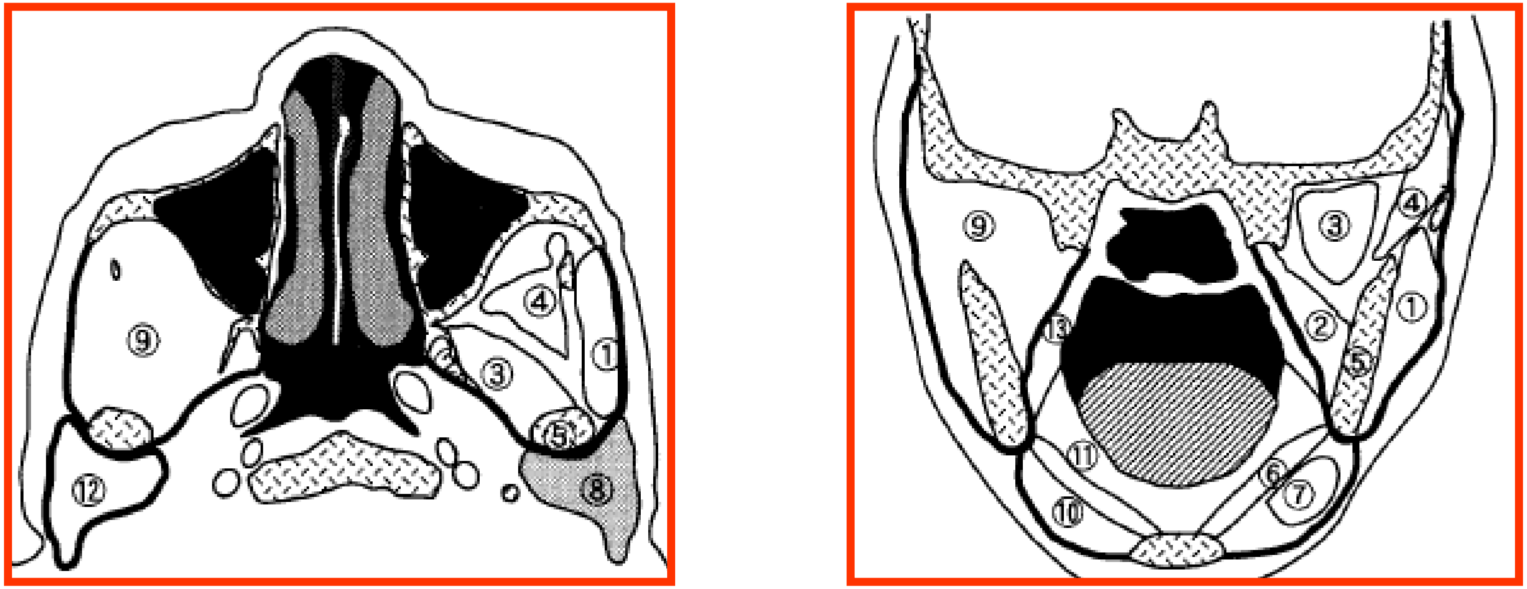

A
R/M
12
L
3 c
FH -82 f

MRI	**OSTEOMIELITE**	**OSTEONECROSI**
	IPOINTENSITA’ T_1 IPERINTENSITA’ T_2 e STIR	IPOINTENSITA’ T_1, T_2, STIR
	Elevato contenuto d’acqua	Basso contenuto d’acqua

- # RM – tessuti molli

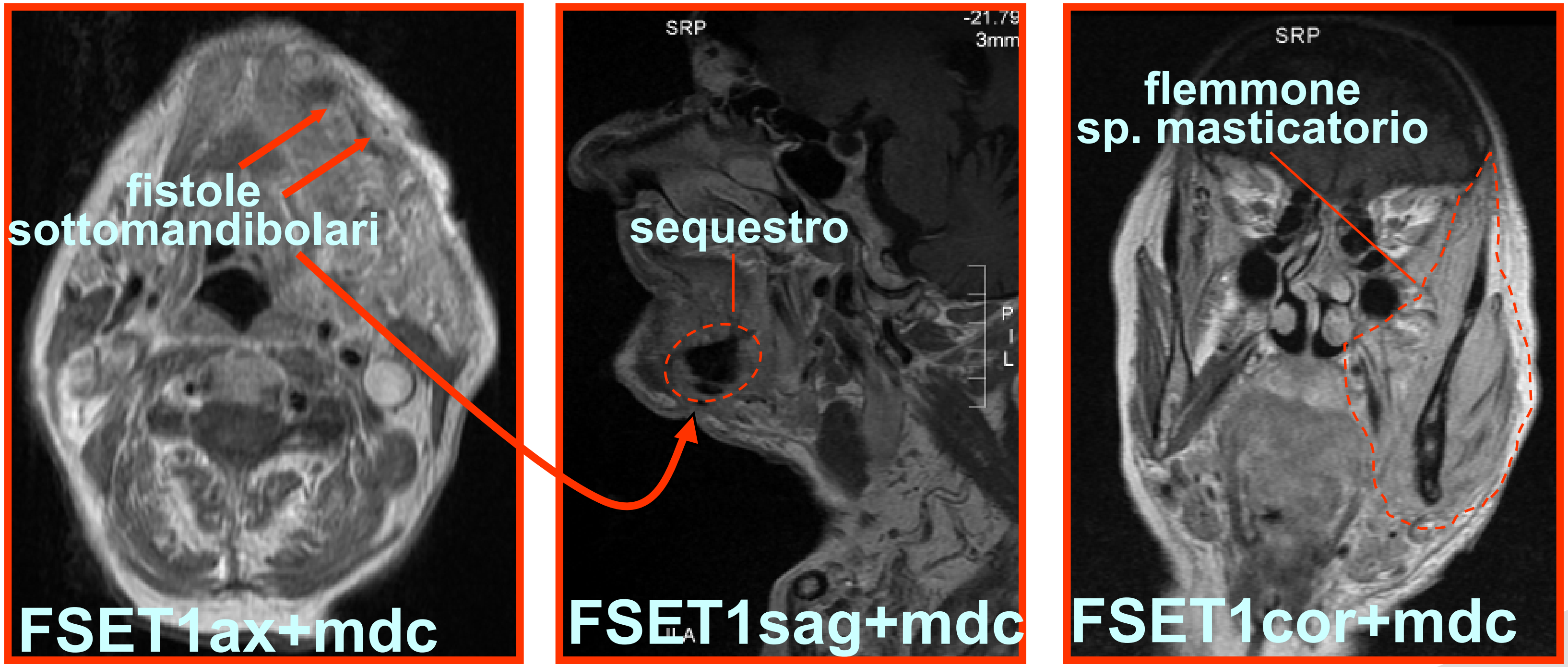
Definizione degli spazi cervico-facciali

Comunicazione tra dipartimenti anatomo-funzionali contigui, con ampia possibilità di diffusione dei processi patologici



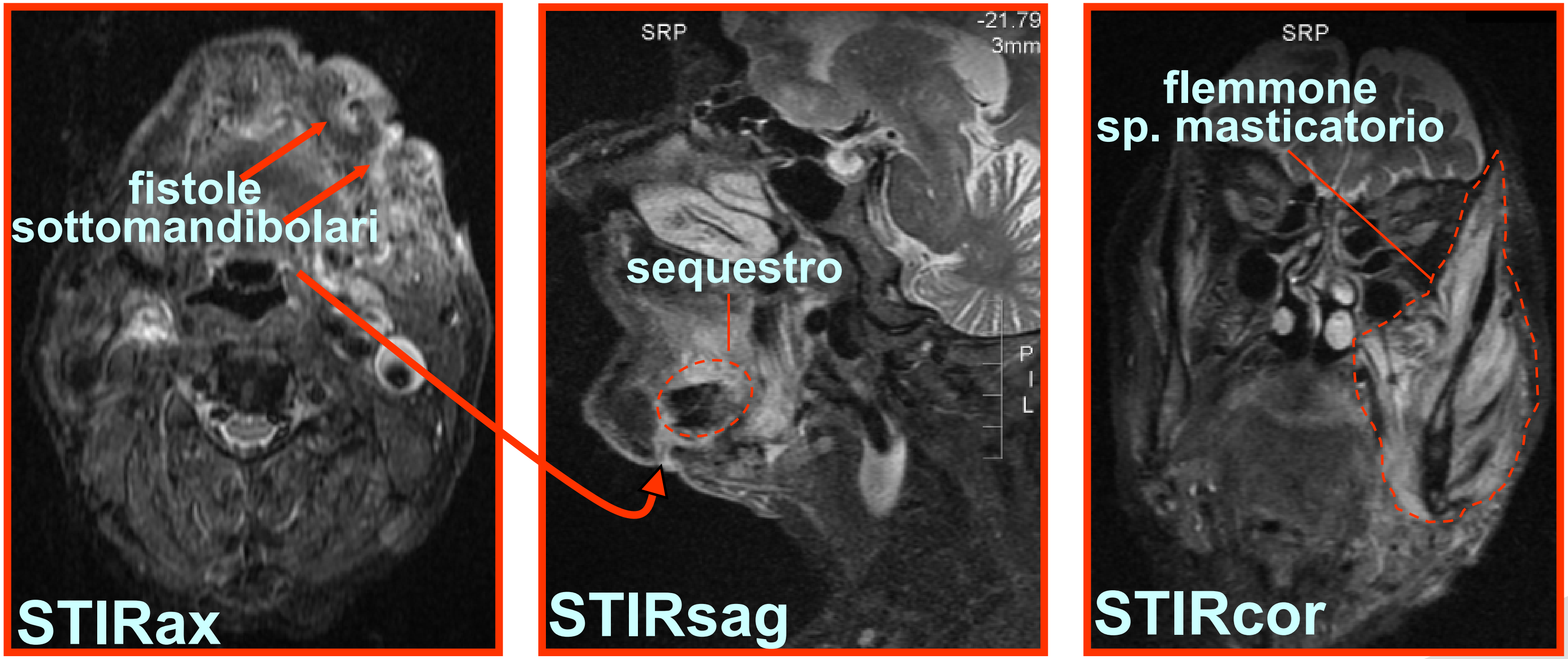
1 M. massetere, 2 m. pterigoideo interno, 3 m. pterigoideo esterno, 4 m. temporale, 5 mandibola, 6 muscolo milojoideo, 7 gh. sottomandibolare, 8 gh. parotide, 9 spazio masticatorio, 10 spazio sottomandibolare, 11 spazio sottolinguale, 12 spazio parotideo, 13 spazio parafaringeo

RM


fistole
sottomandibolari
FSET1ax+mdc
SRP
-21.79
3mm
sequestro
P
I
L
FSET1sag+mdc
SRP
flemmone
sp. masticatorio
FSET1cor+mdc

Osteonecrosi/osteomielite del corpo mandibolare con fistole cutanee sottomandibolari e flemmone dello spazio masticatorio

RM


fistole
sottomandibolari
STIRax
SRP
-21.79
3mm
sequestro
P
I
L
STIRsag
SRP
flemmone
sp. masticatorio
STIRcor

Osteonecrosi/osteomielite del corpo mandibolare con fistole cutanee sottomandibolari e flemmone dello spazio masticatorio

- ## Scintigrafia ossea total-body con TC^{99}

Esame funzionale utilizzato per la diagnosi ed il monitoraggio di localizzazioni scheletriche di neoplasie solide.

“La Commissione SICMF-SIPMO considera la scintigrafia ossea total-body un utile supporto diagnostico, quando già eseguito per altre ragioni, ma non ne consiglia l’esecuzione per finalità diagnostiche specifiche”

Bertoldo F et al. Nat Clin Pract Oncol 2007, 4(12): 711-721.
O'Ryan FS et al. J Oral Maxillofac Surg 2009, 67(7): 1363-1372.

○ PET, TC/PET, SPECT e SPECT/TC

Vantaggi	Limiti
• Definiscono aree di alterato metabolismo osseo	• Bassa risoluzione • Non permette la differenziazione tra flogosi e metastasi • Irraggiamento • Tempi di attesa (SSN)

F Dore, et al. J Nucl Med. 2009 Jan; 50(1):30-5.

F Wilde, Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009 ;107(3):412-9.

Arce K, Assael LA et al. J Oral Maxillofac Surg 2009 Suppl ; 67:75-84.

✓ Segni radiologici di ONJ

	Precoci	**Tardivi**
OPT	- Ispessimento cresta alveolare e lamina dura - Persistenza alveolo post-estrattivo **-** *Sequestro* - Slargamento spazio parodontale	- Frattura patologica - Ispessimento canale NAI - **Osteosclerosi diffusa** - Radiopacità seno mascellare - *Sequestro* - Reazione periostale
TC	- Erosione corticale - Ispessimento cresta alveolare e lamina dura - **Ispessimento trabecolare** - **Sclerosi midollare focale** - Persistenza alveolo post-estrattivo - *Sequestro* - Slargamento spazio parodontale	- Fistola oro-antrale, oro-nasale, muco-cutanea - Frattura patologica - Ispessimento canale NAI - Osteolisi estesa al seno mascellare - **Osteosclerosi diffusa** - *Sequestro* - Reazione periostale - Sinusite

✓ Segni radiologici di ONJ

Solo i segni TC che definiscono il grado di progressivo addensamento della matrice ossea (i.e. ispessimento trabecolare, sclerosi midollare focale ed osteosclerosi) sembrano caratterizzare le fasi iniziali di malattia, e quindi sarebbero quelli da ricercare per una diagnosi precoce.

Bisdas SN et al. Clin Radiol 2008, 63(1): 71-77.
Carneiro EP, et al. ANJR Am J Neuroradiol 2006, 27(5): 1096-97

L'addensamento osseo del segmento affetto è identificabile attraverso la comparazione con la densità ossea dei segmenti scheletrici limitrofi normali.

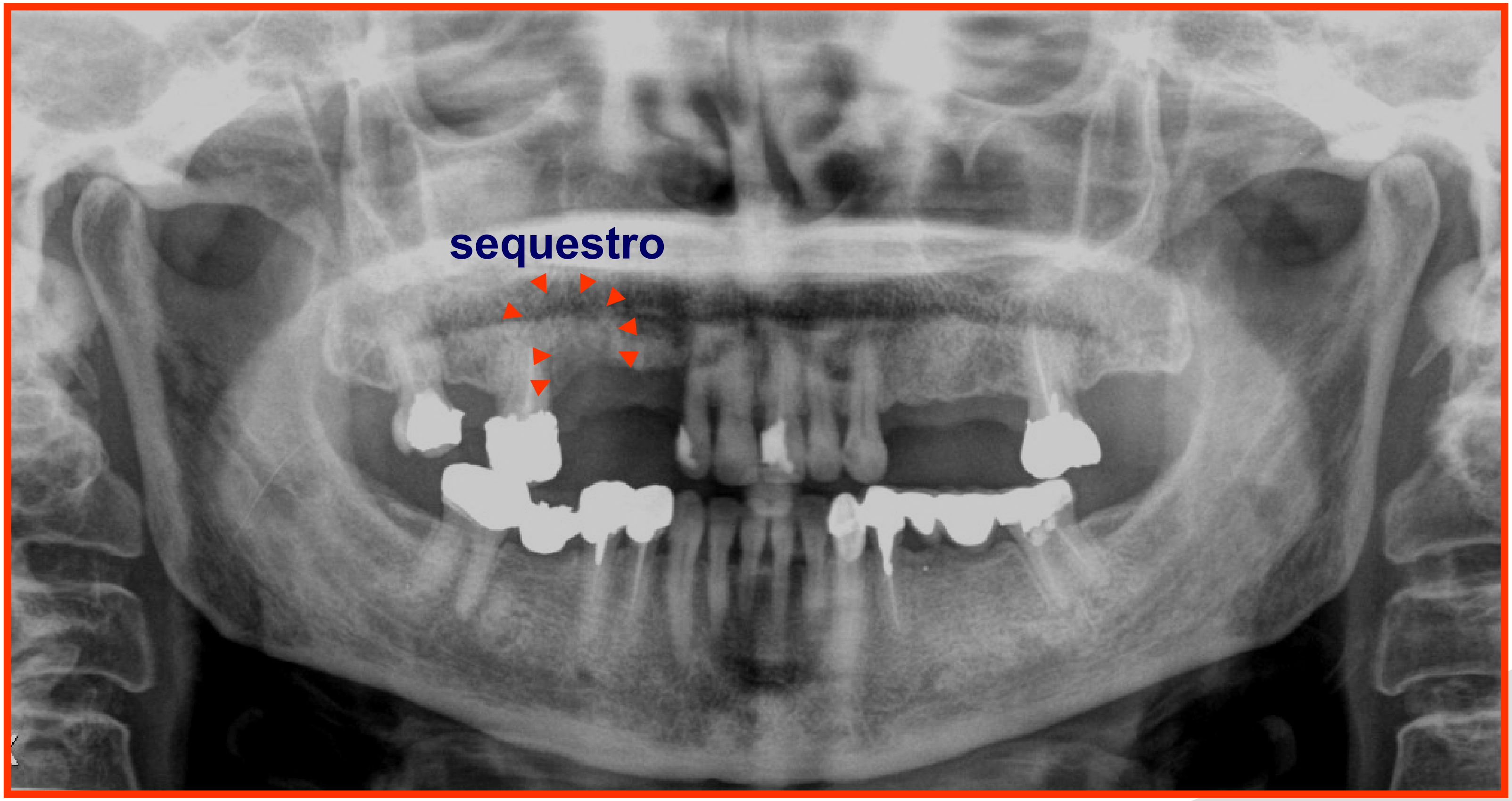
Hutchinson MF, et al. J Oral Maxillofac Surg 2010, 68(9): 2232-2240
Bedogni A, et al. Oral Oncol 2011, 47(5):420-4

- ✓ Segni radiologici di ONJ

Semeiotica radiologica

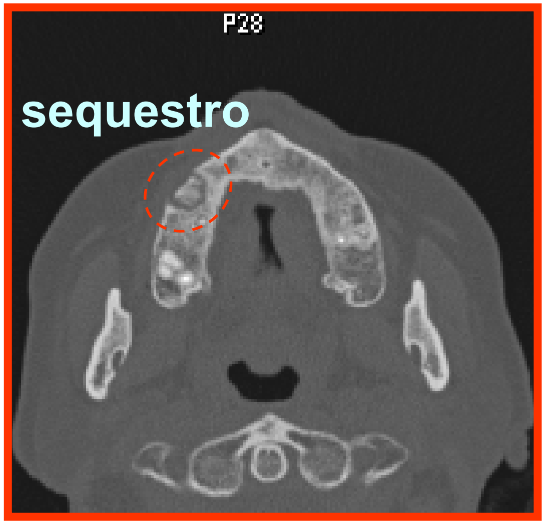
✓ Segni radiologici di ONJ

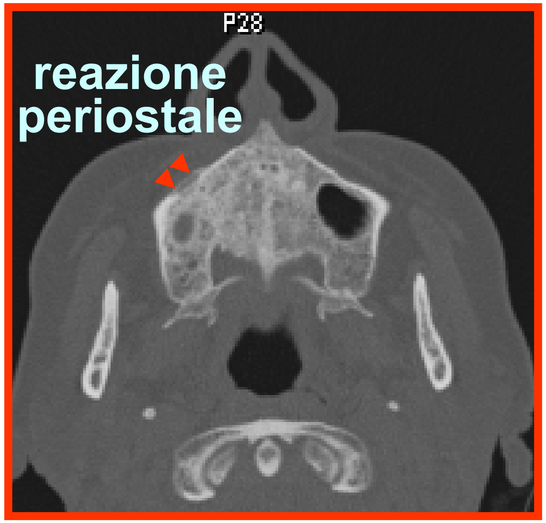
Caso #A

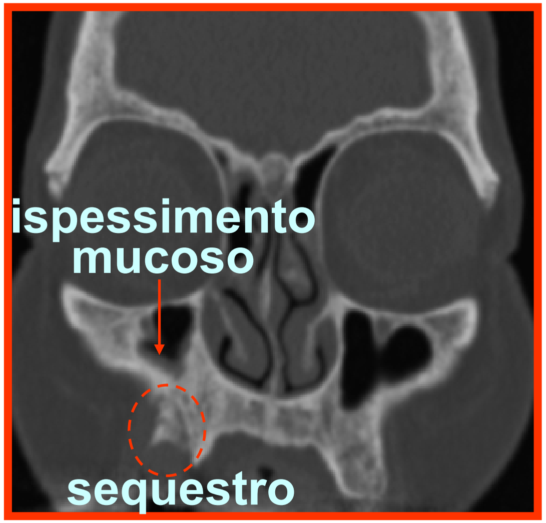


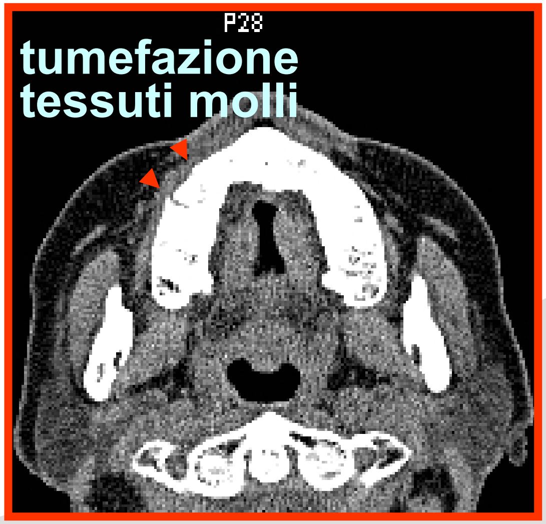
✓ Segni radiologici di ONJ

Caso #A


P28
sequestro

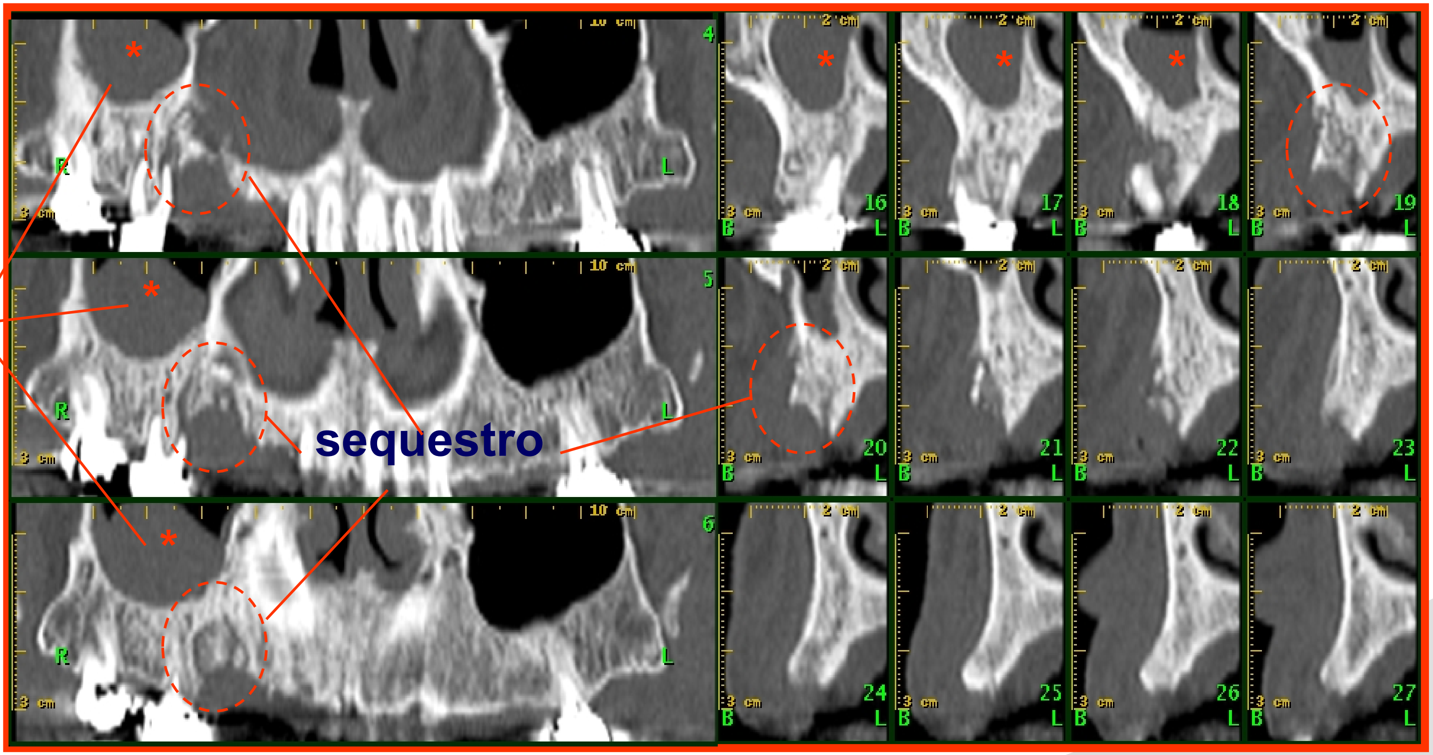

P28
reazione periostale


ispessimento mucoso
sequestro


P28
tumefazione tessuti molli

✓ Segni radiologici di ONJ

Caso #A



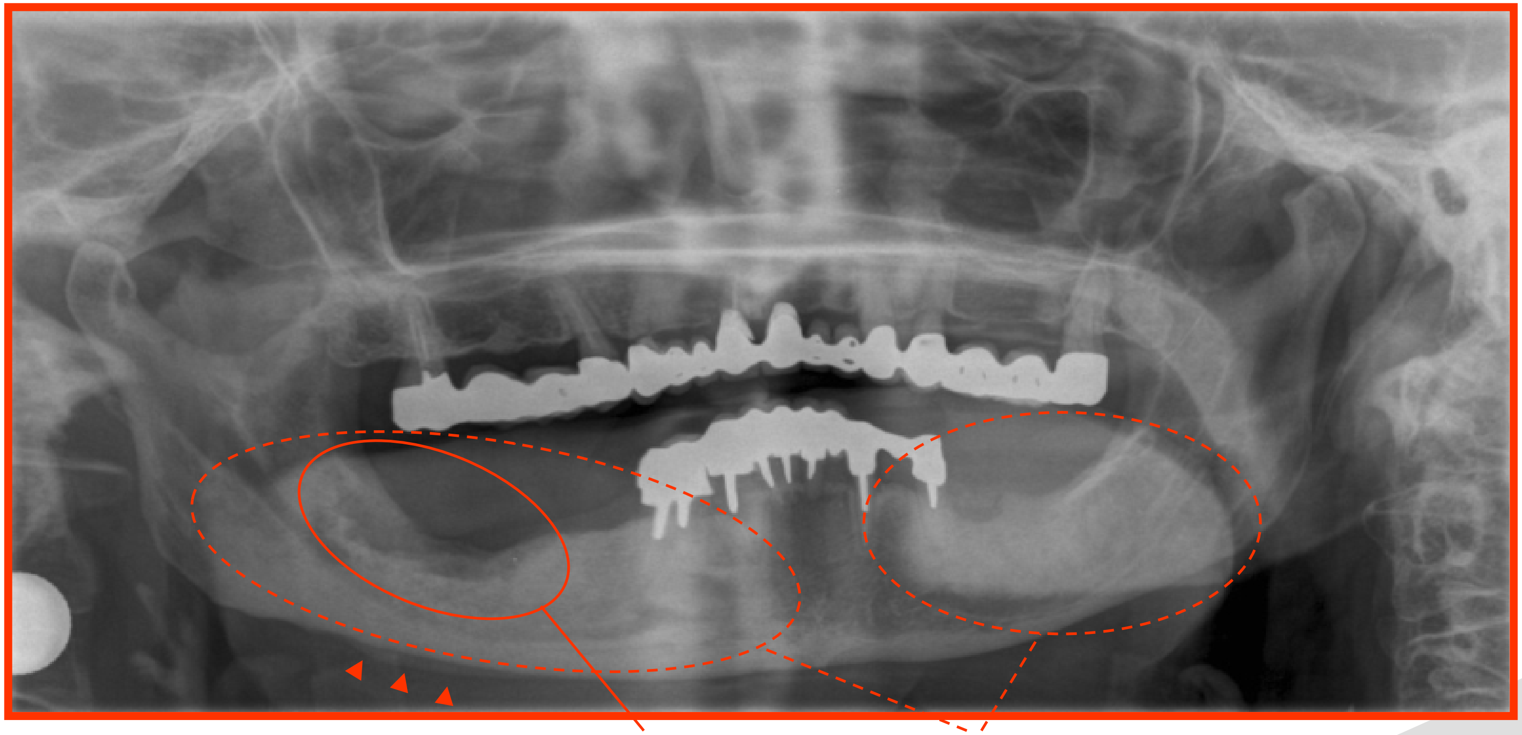
ispessimento mucoso

sequestro

*
10 cm
2 cm
3 cm
R
L
B
4
5
6
16
17
18
19
20
21
22
23
24
25
26
27

✓ Segni radiologici di ONJ

Caso #B



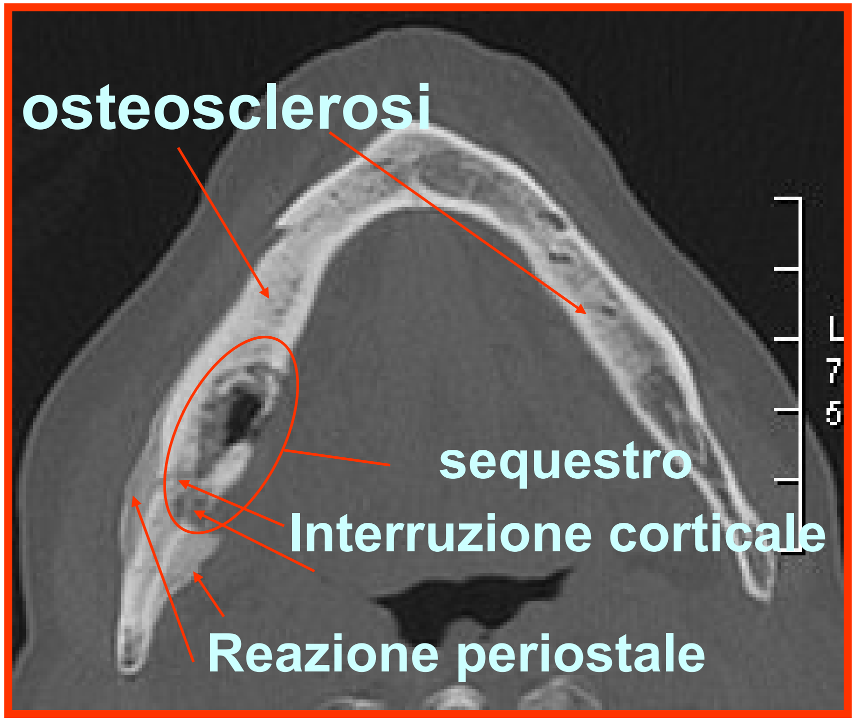
reazione periostale

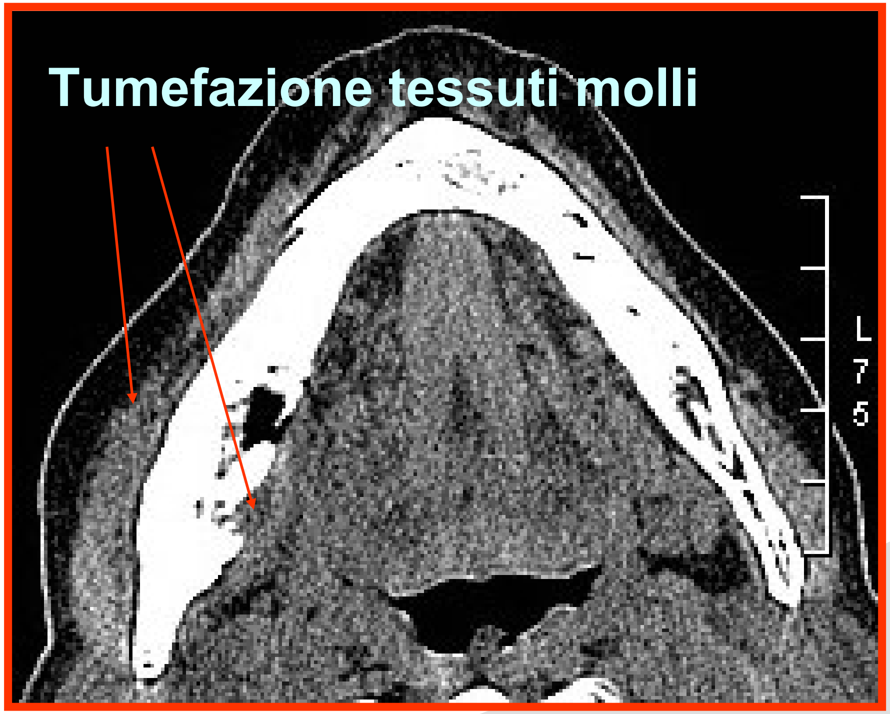
sequestro osseo

osteosclerosi

✓ Segni radiologici di ONJ

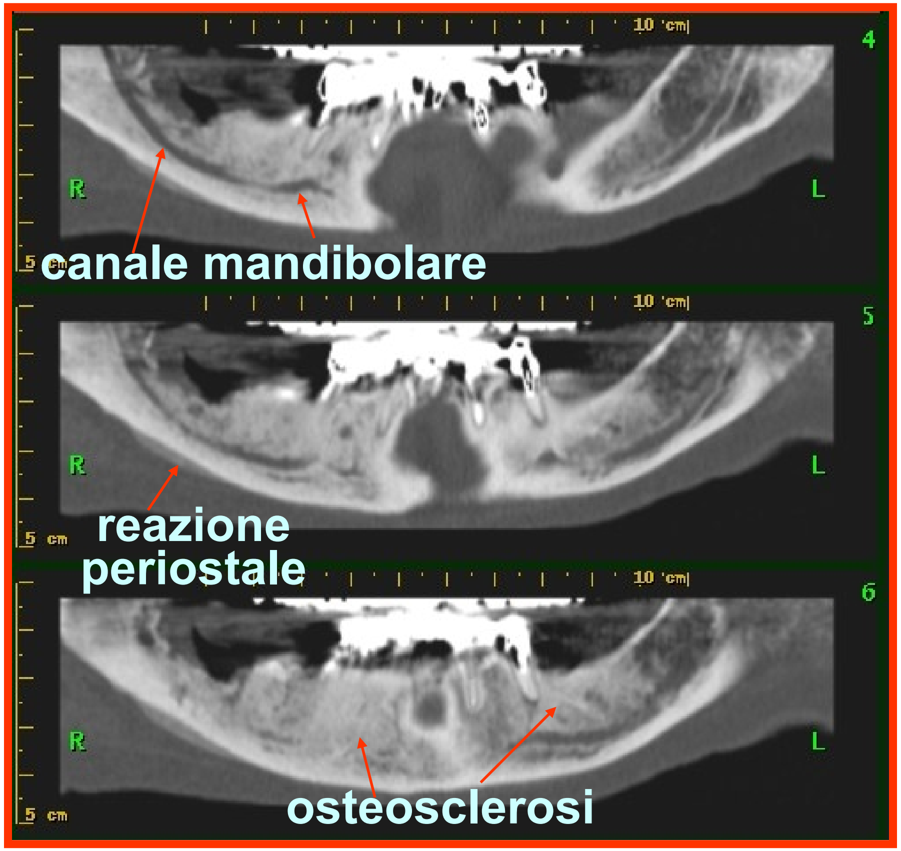
Caso #B

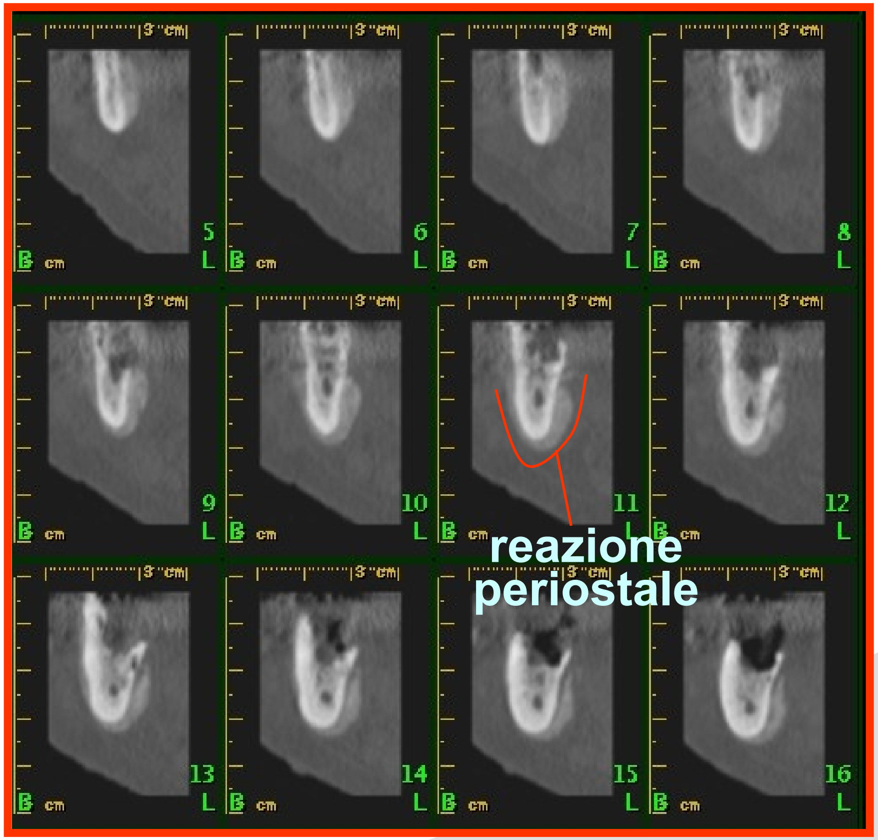

osteosclerosi
sequestro
Interruzione corticale
Reazione periostale
L
7
5


Tumefazione tessuti molli
L
7
5

✓ Segni radiologici di ONJ

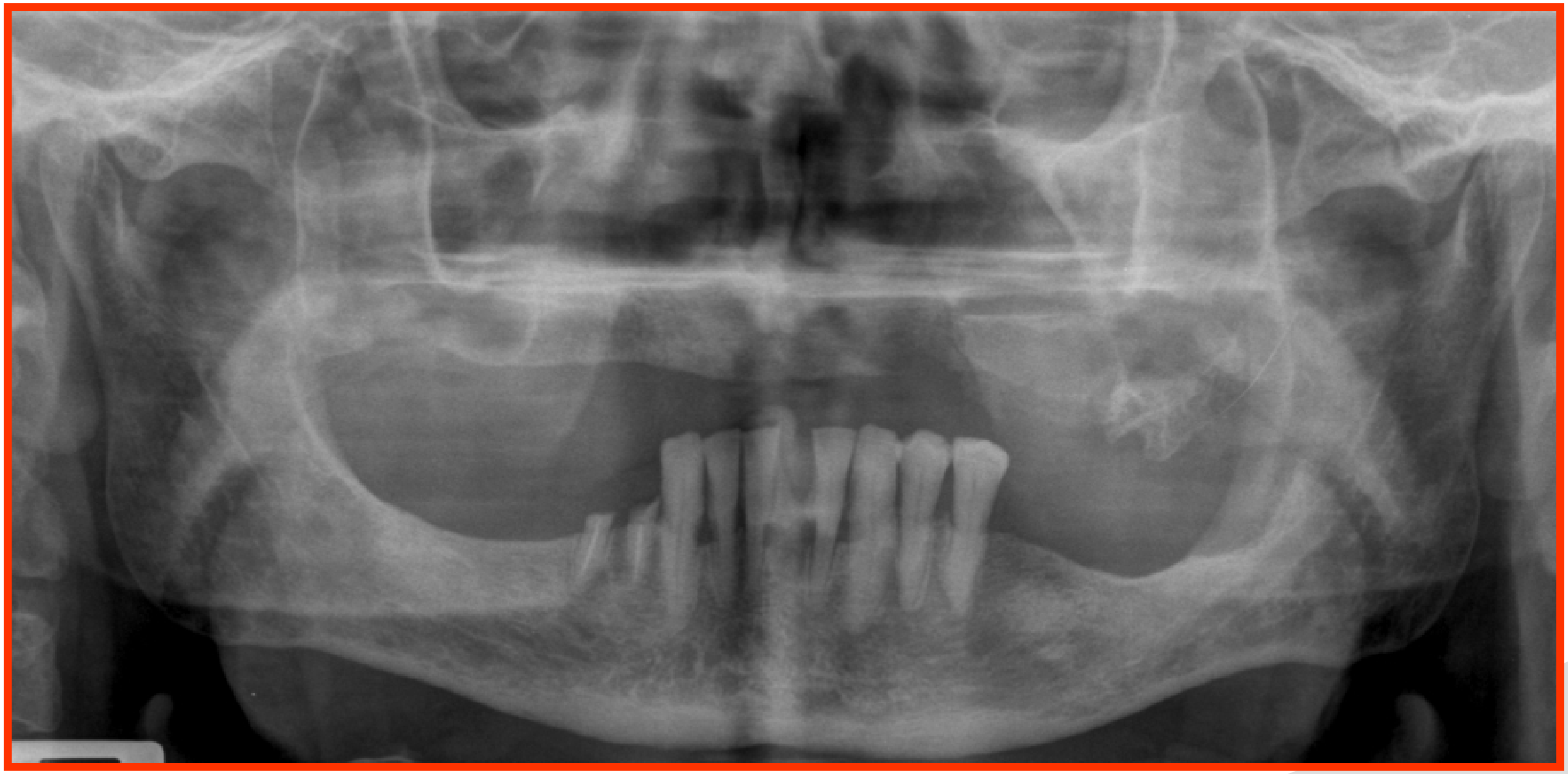
Caso #B


10 cm
4
R
L
5 cm
canale mandibolare
10 cm
5
R
L
5 cm
reazione periostale
10 cm
6
R
L
5 cm
osteosclerosi


3 cm
5
6
7
8
9
10
11
12
13
14
15
16
L
B cm
reazione periostale

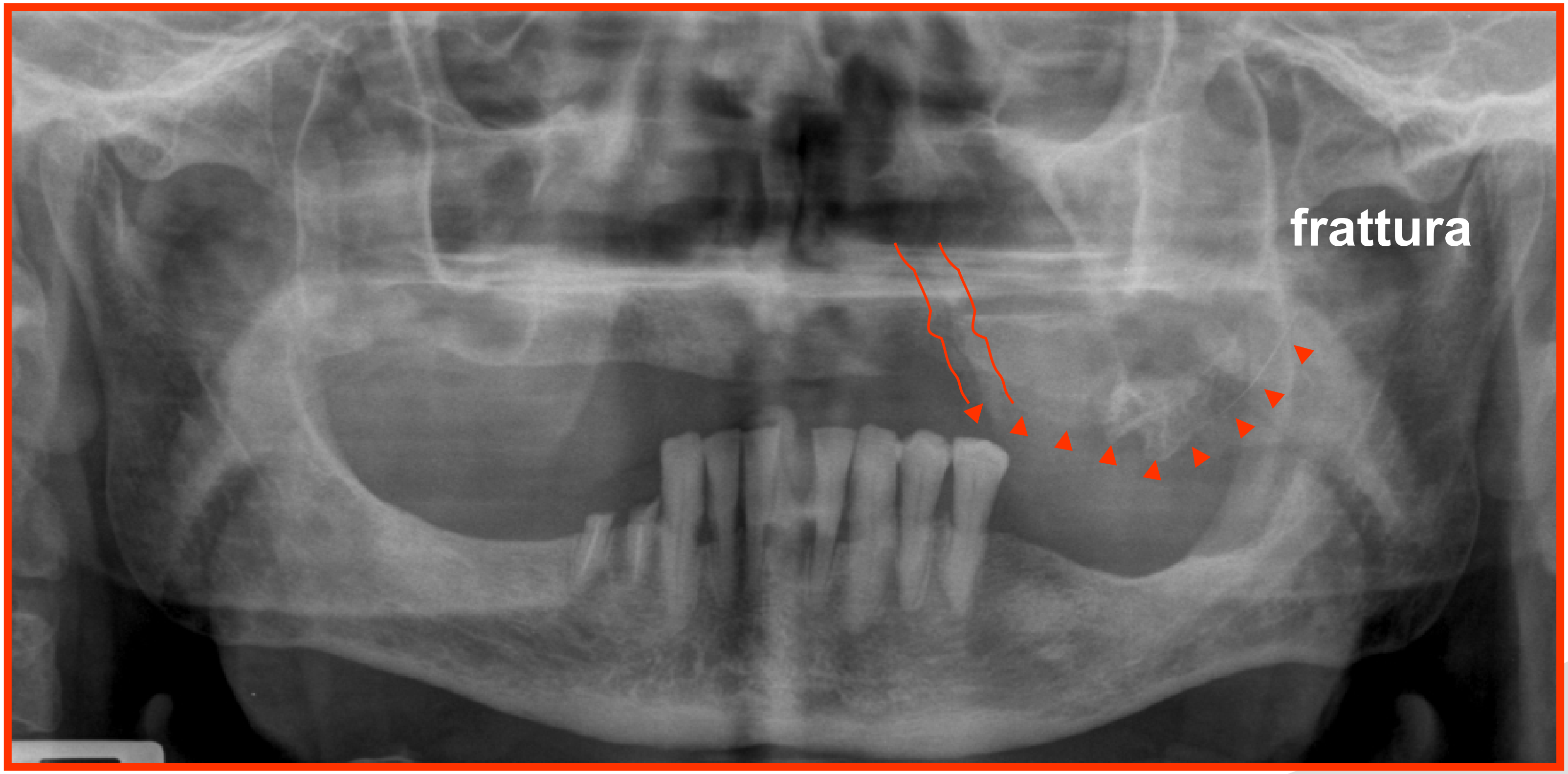
✓ Segni radiologici di ONJ

Caso #C



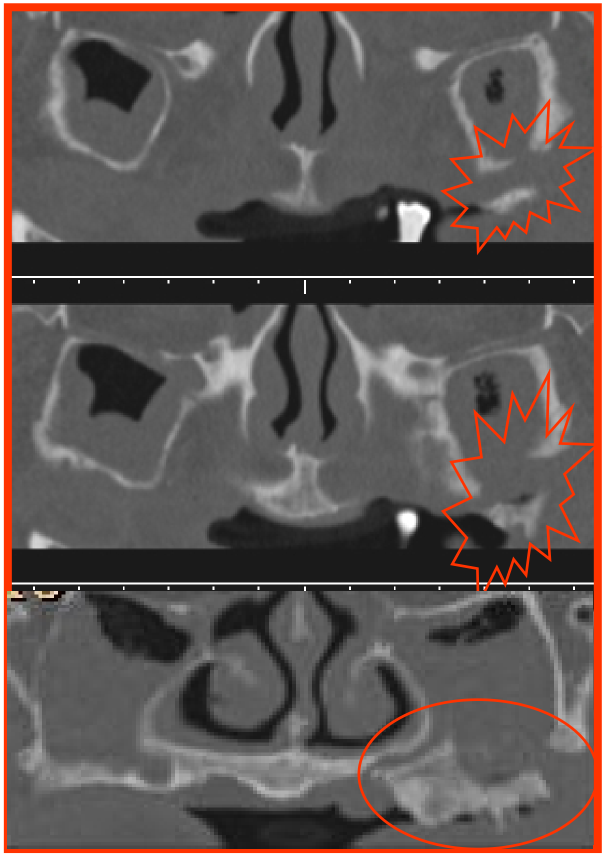
✓ Segni radiologici di ONJ

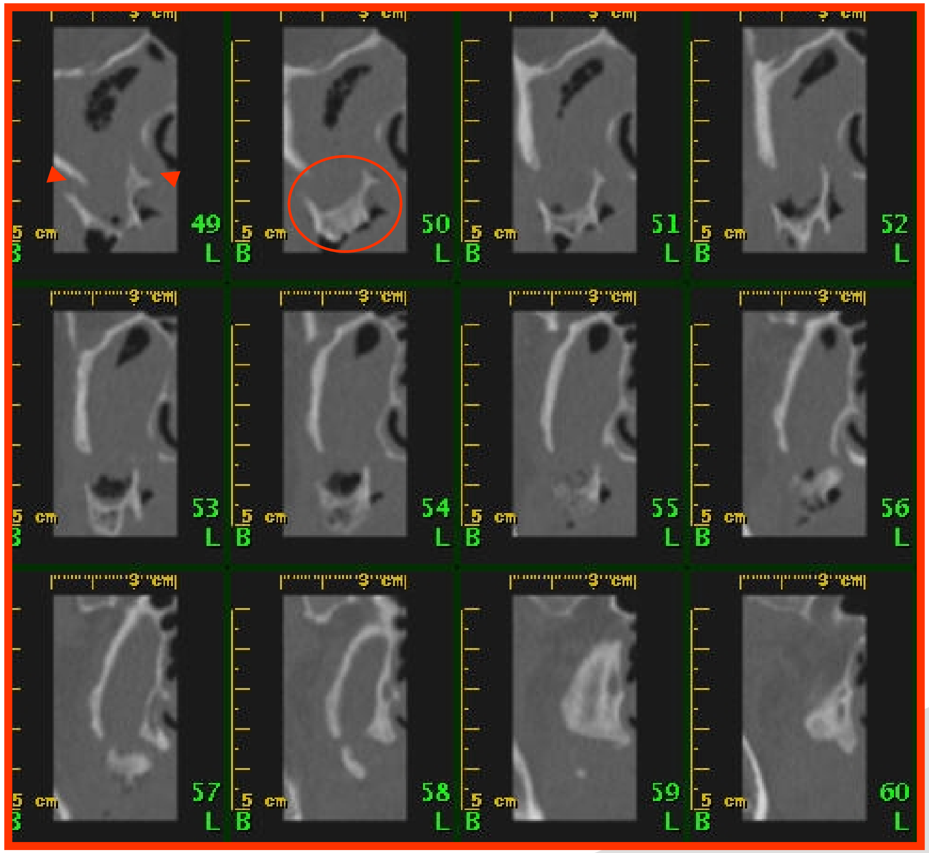
Caso #C



✓ Segni radiologici di ONJ

Caso #C

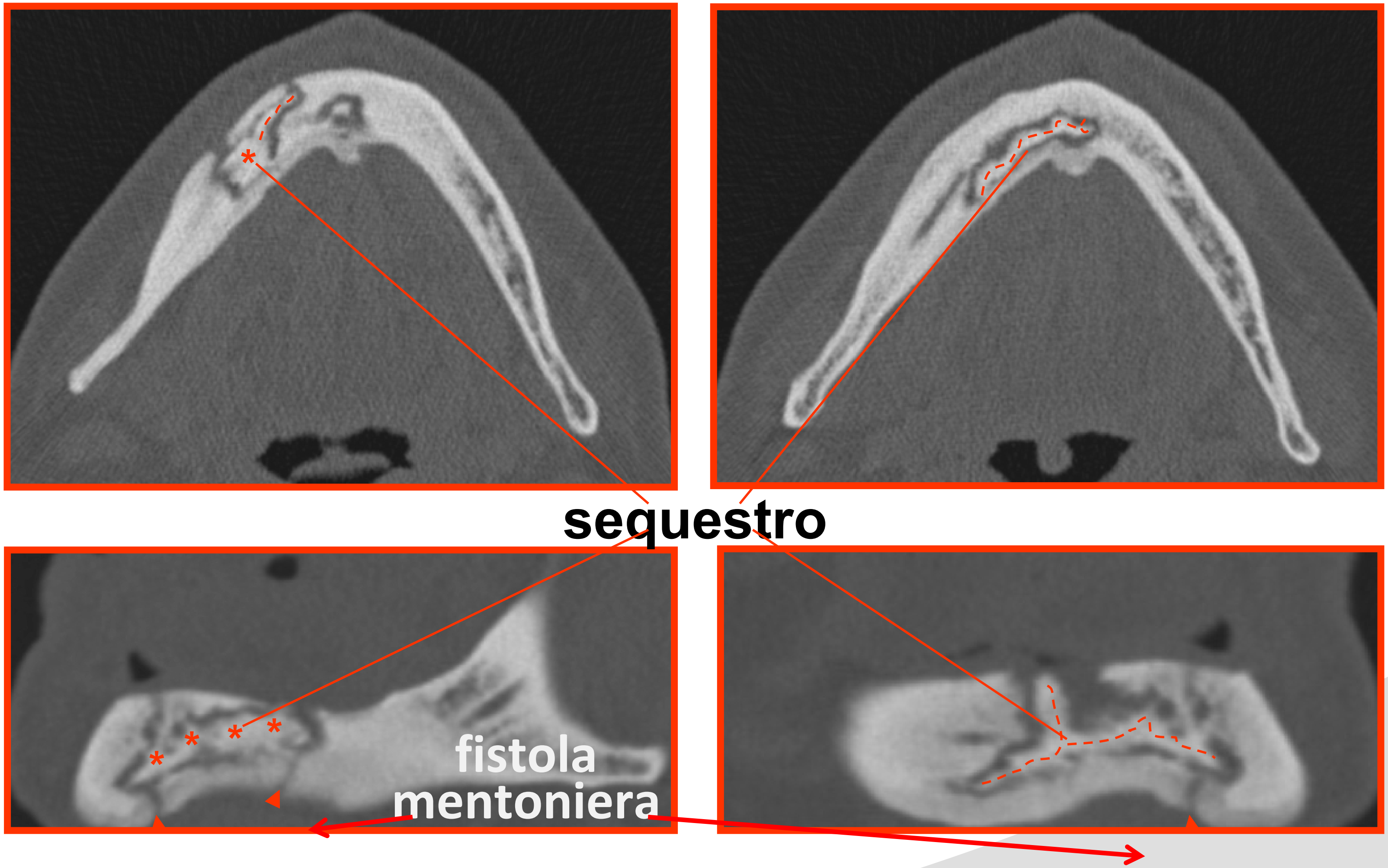



49
50
51
52
53
54
55
56
57
58
59
60
5 cm
L
B

frattura

✓ Segni radiologici di ONJ

Caso #D

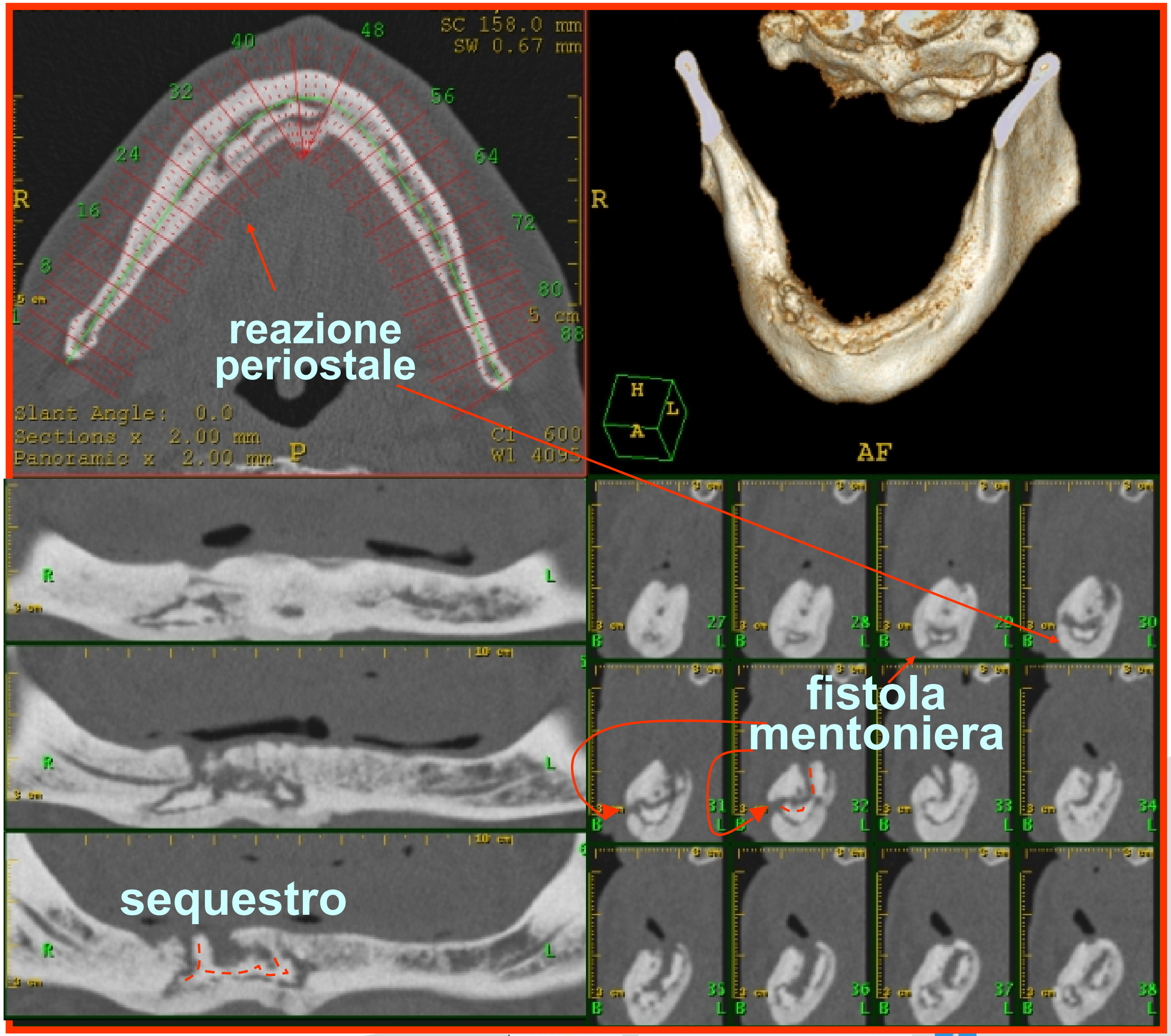


sequestro

fistola mentoniera

✓ Segni radiologici di ONJ

Caso #D


SC 158.0 mm
SW 0.67 mm
Slant Angle: 0.0
Sections x 2.00 mm
Panoramic x 2.00 mm
CI 600
WI 4095
R
P
AF
H
L
A
reazione periostale
fistola mentoniera
sequestro

DIAGNOSI DI ONJ →

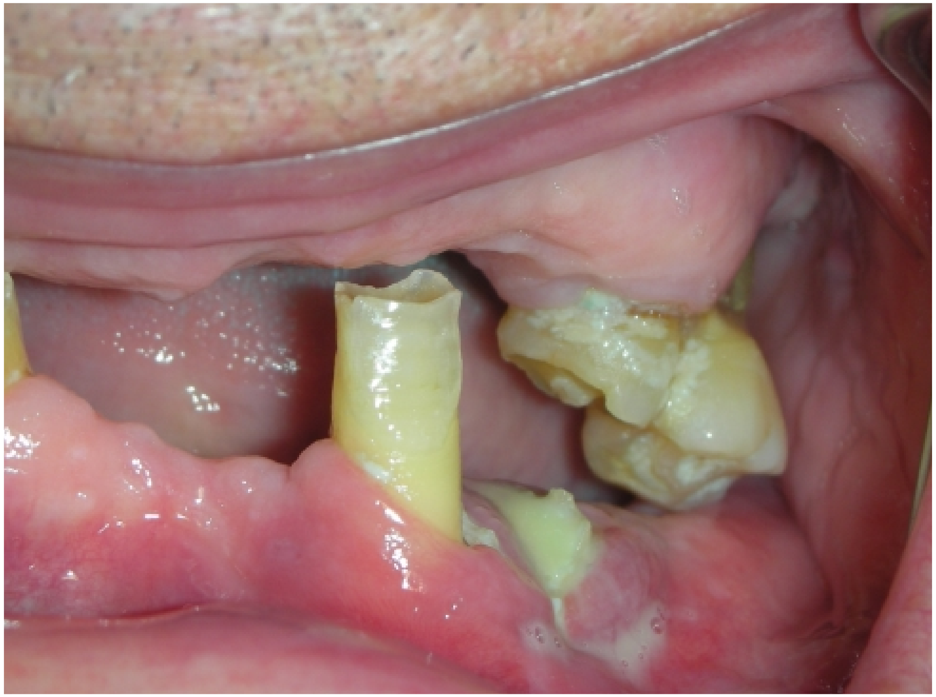
Contributo della radiologia nella *diagnosi definitiva* di ONJ

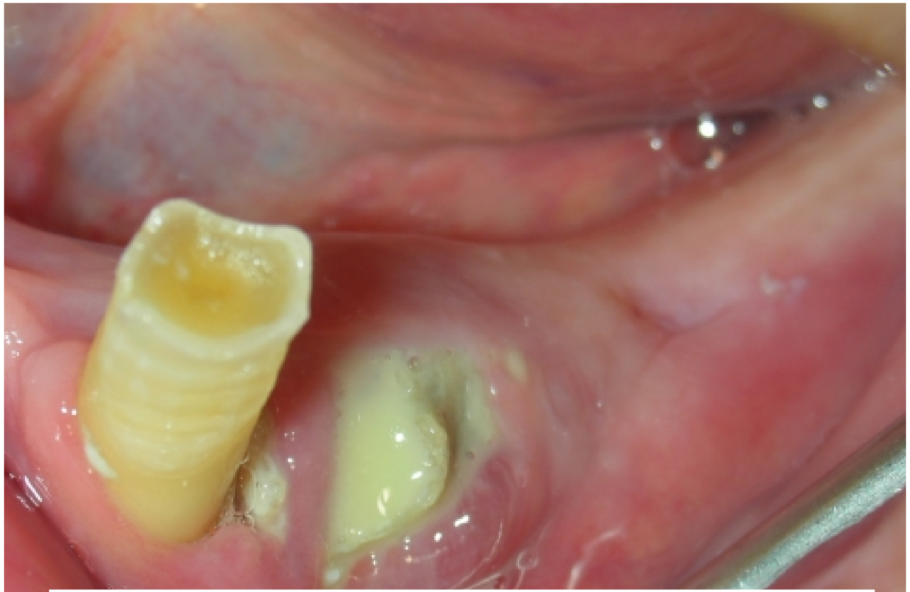
> *"Nessun segno radiologico è specifico per ONJ e deve essere sempre correlato ad uno o più criteri clinici, per poter avanzare il sospetto di malattia e giungere ad una diagnosi conclusiva".*

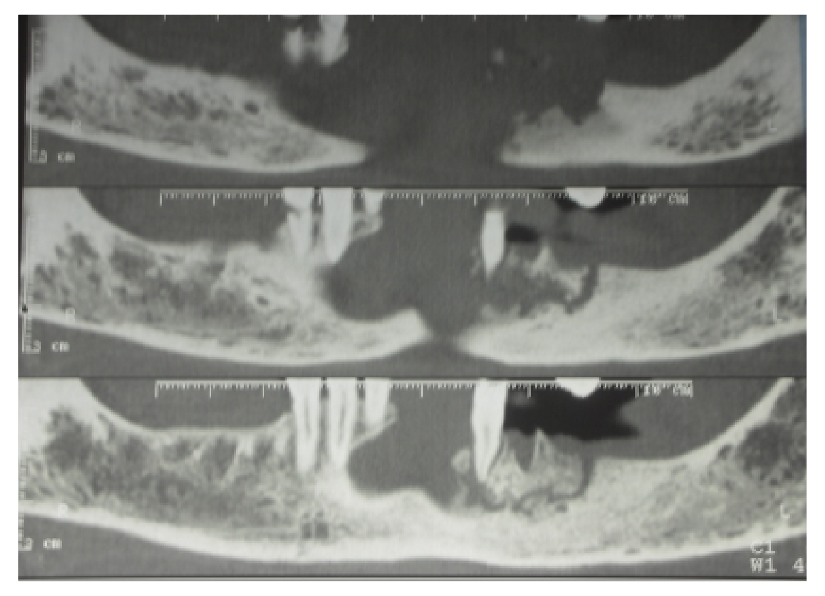
Il radiologo fornisce informazioni utili al clinico che deve porre la diagnosi conclusiva

Bedogni A, Campisi G et al. Raccomandazioni clinico-terapeutiche sull'osteonecrosi delle ossa mascellari associata a bisfosfonati e sua prevenzione. Ed. Cleup, 2013.

1

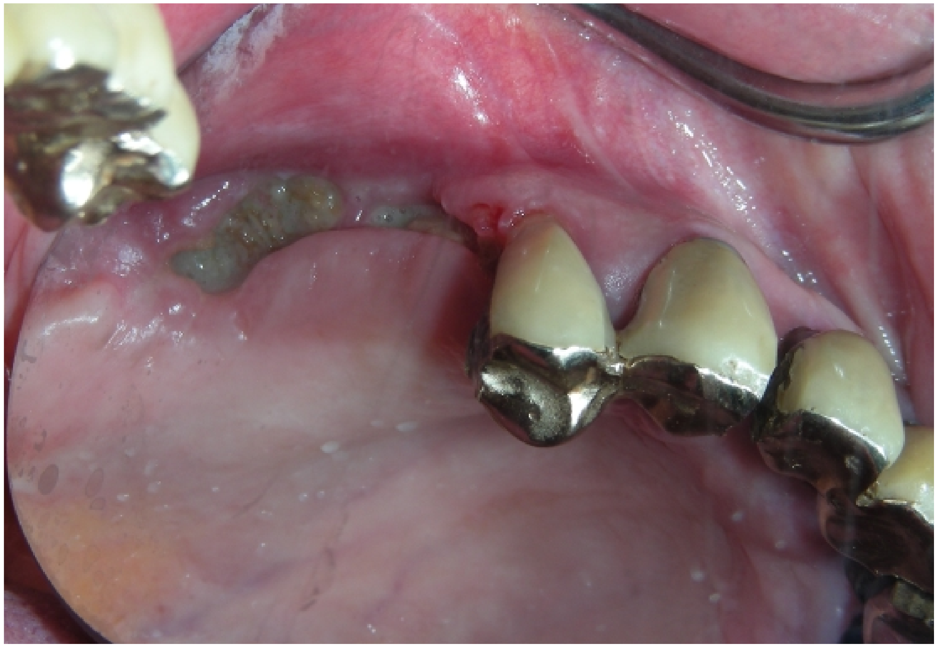


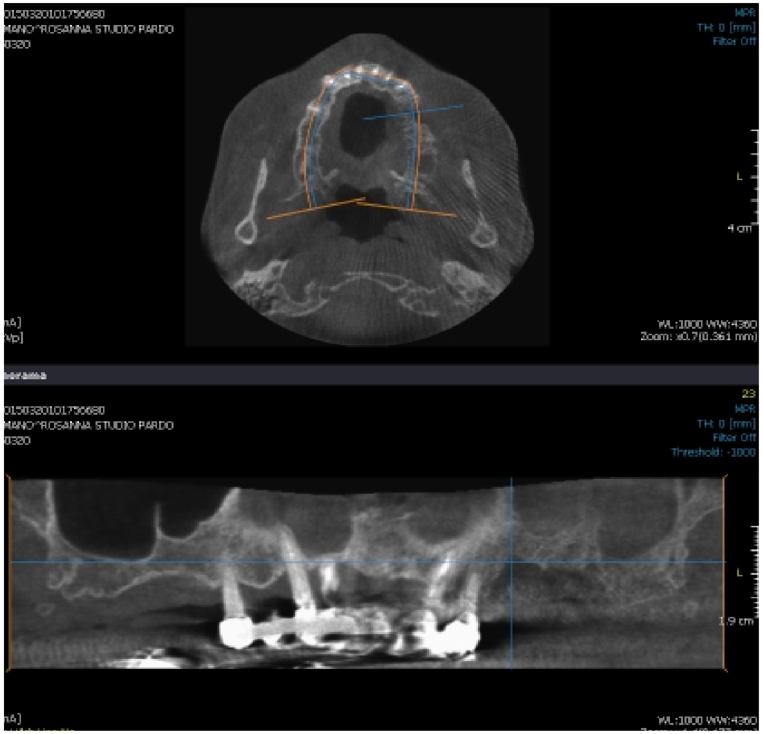


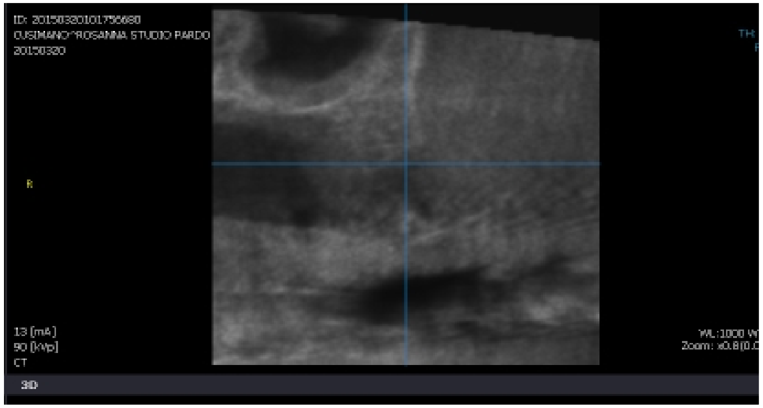


Ampia esposizione di osso necrotico in cresta edentula in zona 3.4/3.5 con deiscenza mucosa vestibolare

Le proiezioni coronali della TC evidenziano una ampia area di sequestrazione coinvolgente il processo alveolare da 3.3 a 3.5

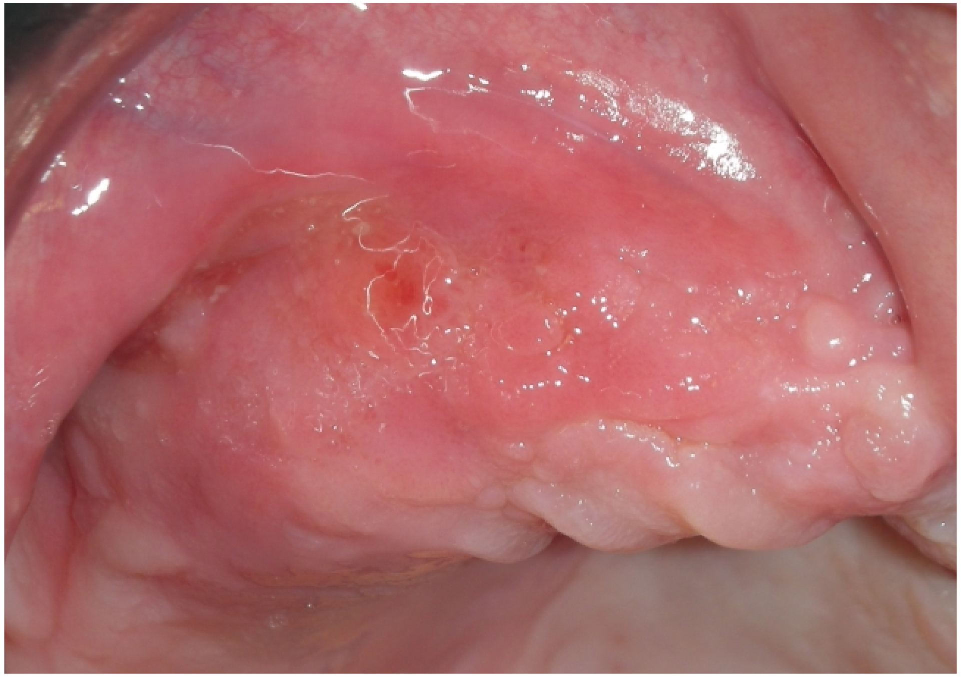


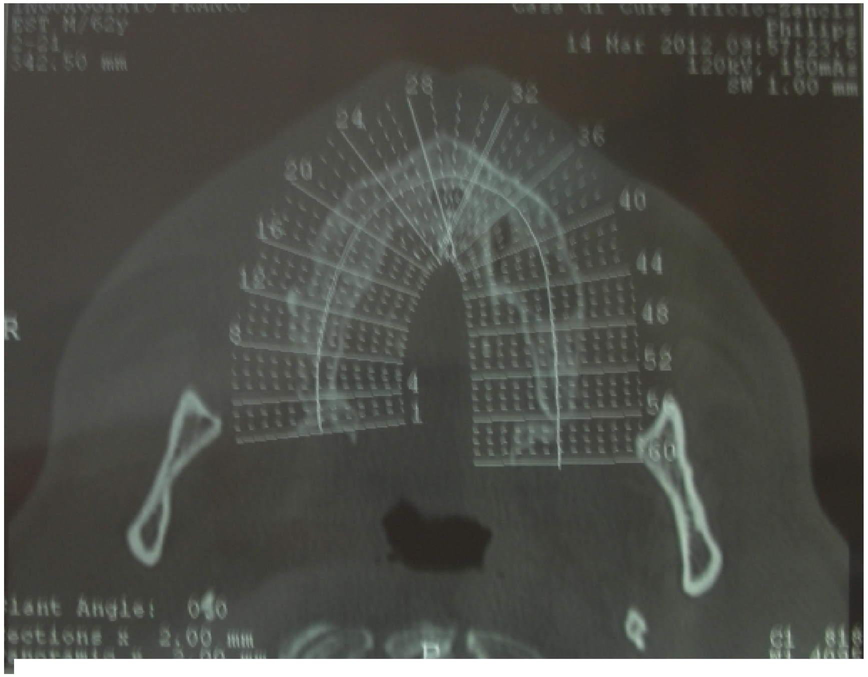

0150320101756680
MANO^ROSANNA STUDIO PARDO
0320
MPR
TH: 0 [mm]
Filter Off
L
4 cm
WL:1000 WW:4360
Zoom: x0.7(0.361 mm)
orama
23
MPR
TH: 0 [mm]
Filter Off
Threshold: -1000
1.9 cm
WL:1000 WW:4360

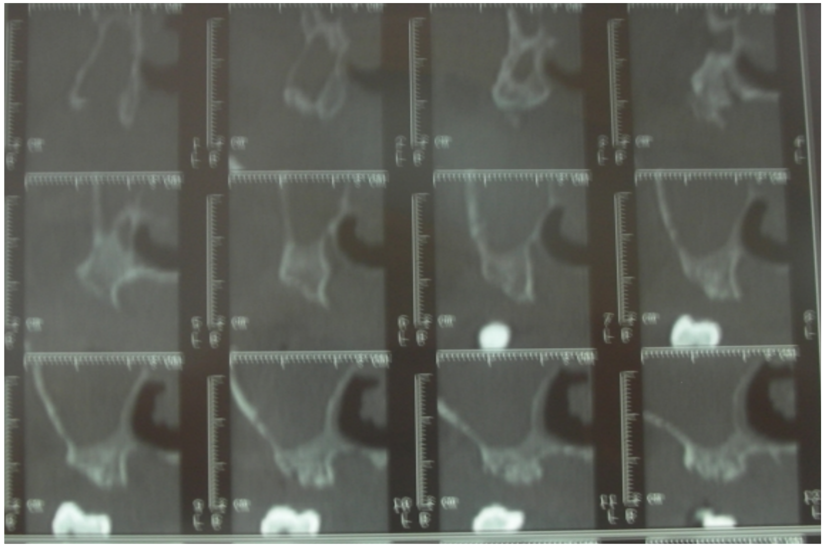

ID: 20150320101756680
CUSIMANO^ROSANNA STUDIO PARDO
20150320
TH
R
13 [mA]
90 [kVp]
CT
3D
WL:1000 W
Zoom: x0.8(0.0

Area esposizione di osso necrotico in corrispondenza del III sestante con deiscenza mucosa vestibolare

Le proiezioni coronali della TC evidenziano un ampia area di osteosclerosi/osteolisi coinvolgente il processo alveolare e basale da 2.4 a 2.7

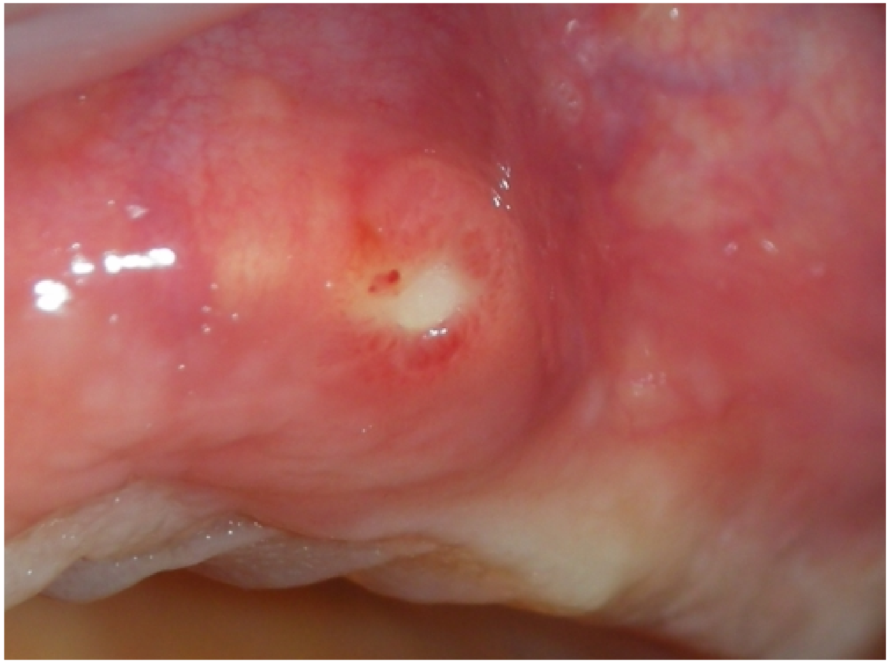


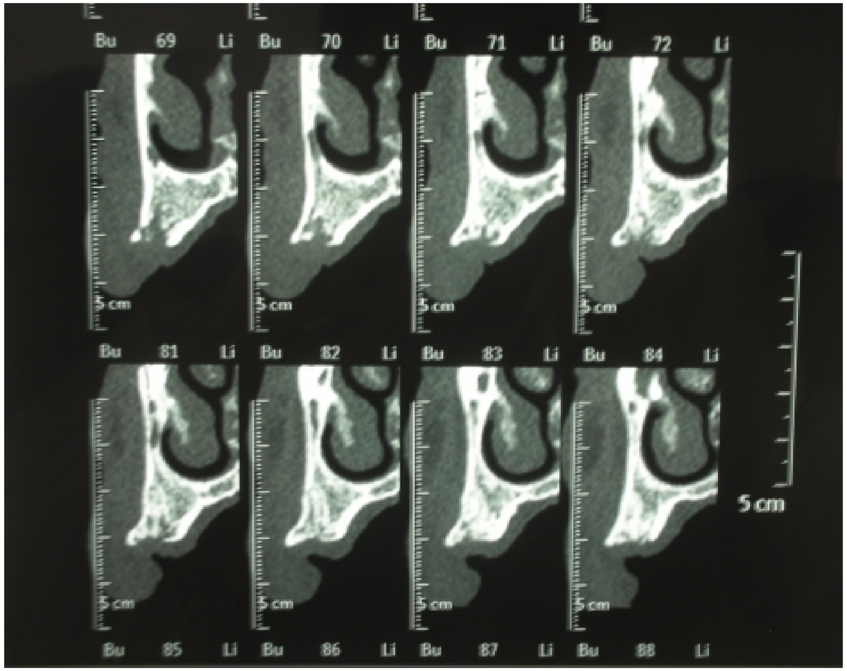

14 Mar 2012
120kV, 150mAs
SW 1.00 mm
342.50 mm
R
lant Angle: 0.0
ections : 2.00 mm



Presenza di fistola mucosa in sede 1.4 in assenza di esposizione di osso necrotico

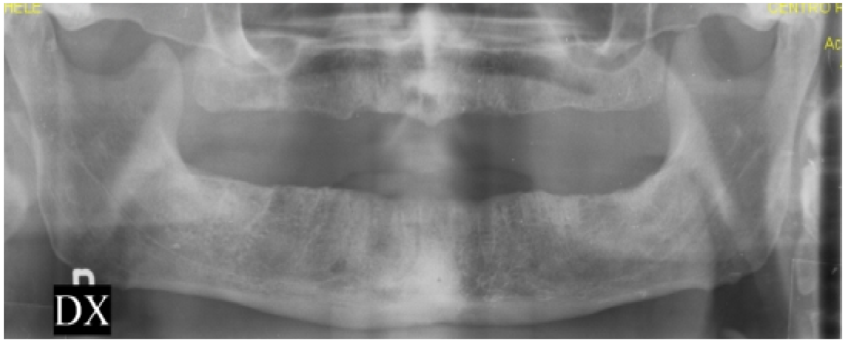
Le proiezioni coronali della TC evidenziano un ampia area di osteolisi coinvolgente la compagine ossea del I sestante

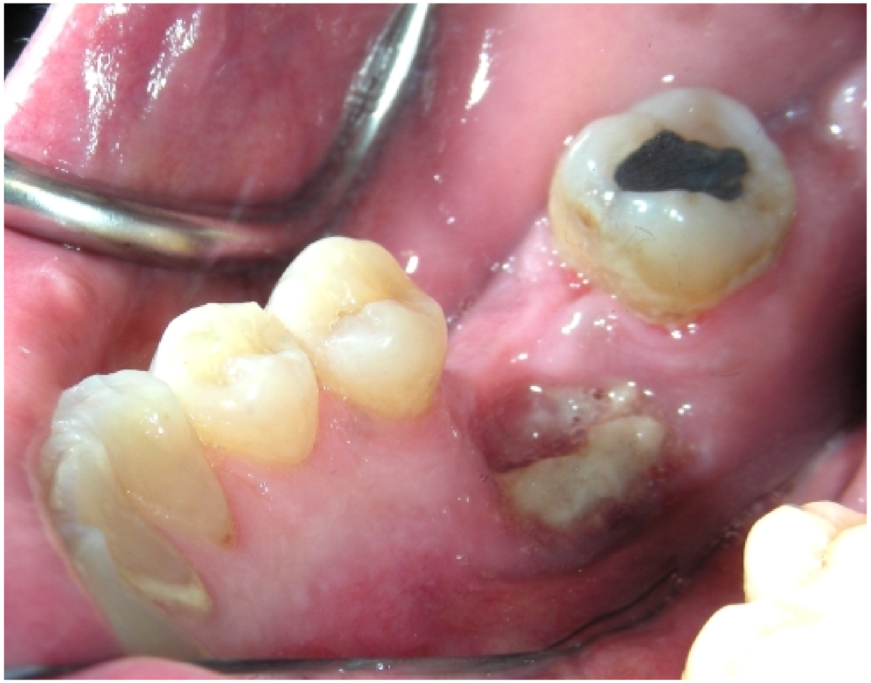


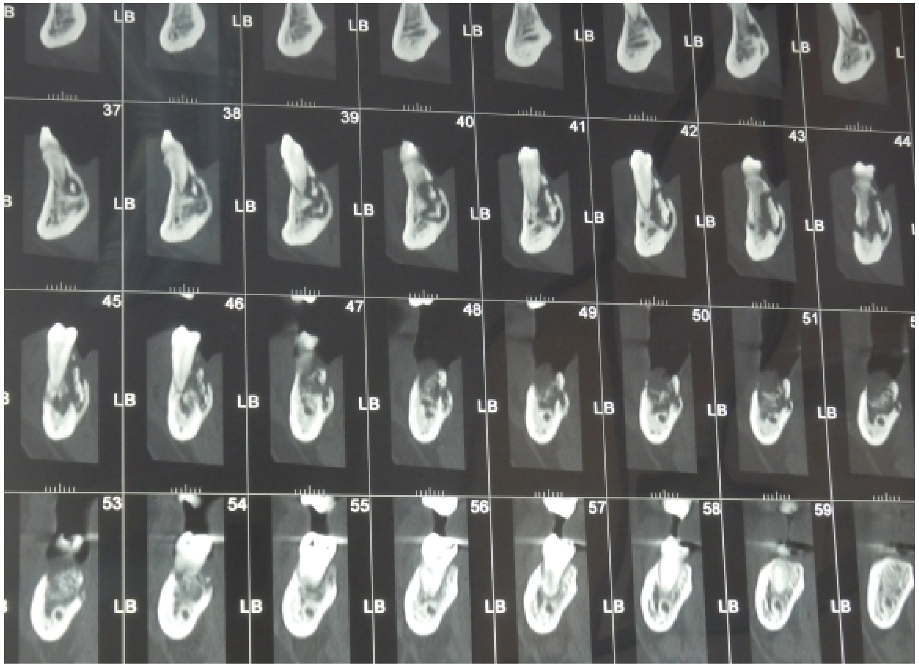

Bu
69
Li
Bu
70
Li
Bu
71
Li
Bu
72
Li
5 cm
Bu
81
Li
Bu
82
Li
Bu
83
Li
Bu
84
Li
5 cm
Bu
85
Li
Bu
86
Li
Bu
87
Li
Bu
88
Li

Presenza di fistolo mucosa in sede 2.3 in assenza di esposizione di osso necrotico

Le proiezioni coronali della TC evidenziano una ampia area di osteosclerosi midollare focale coinvolgente il processo alveolare ed erosione della corticale vestibolare in zona canina superiore di sinistra

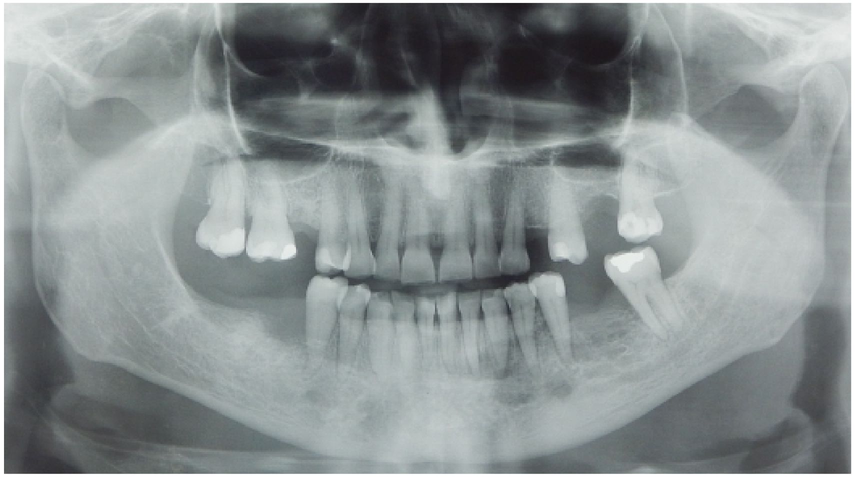


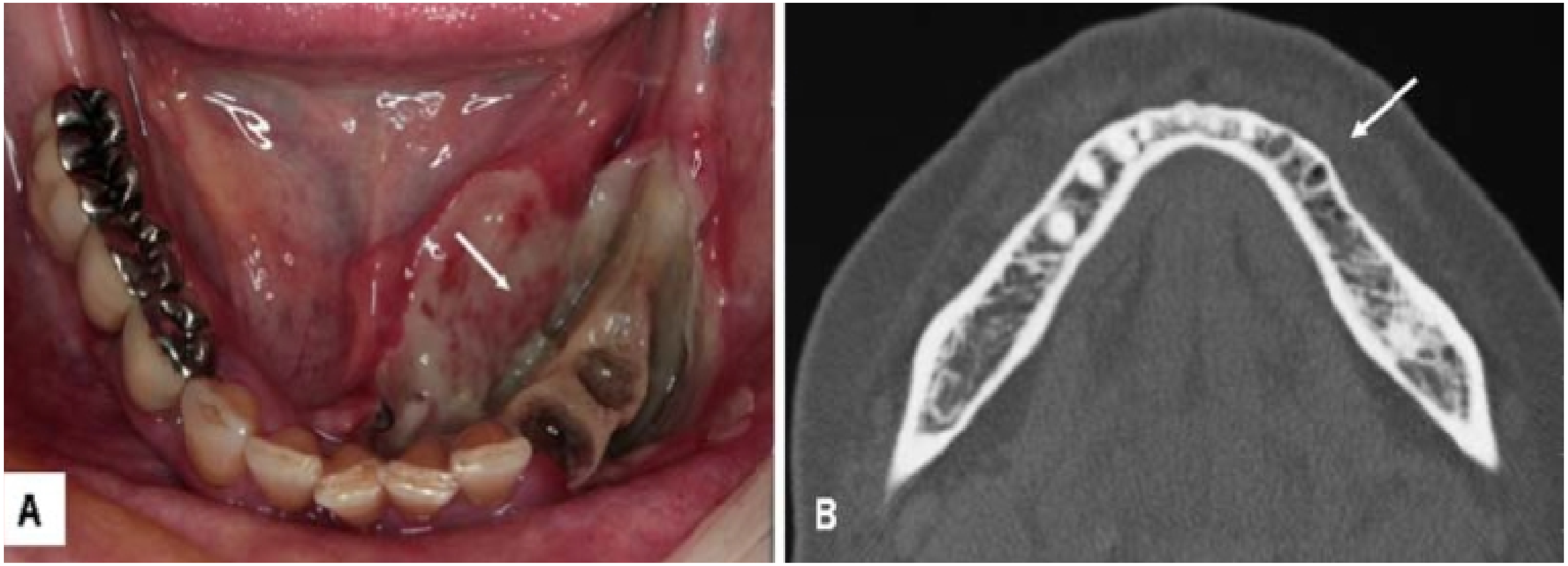




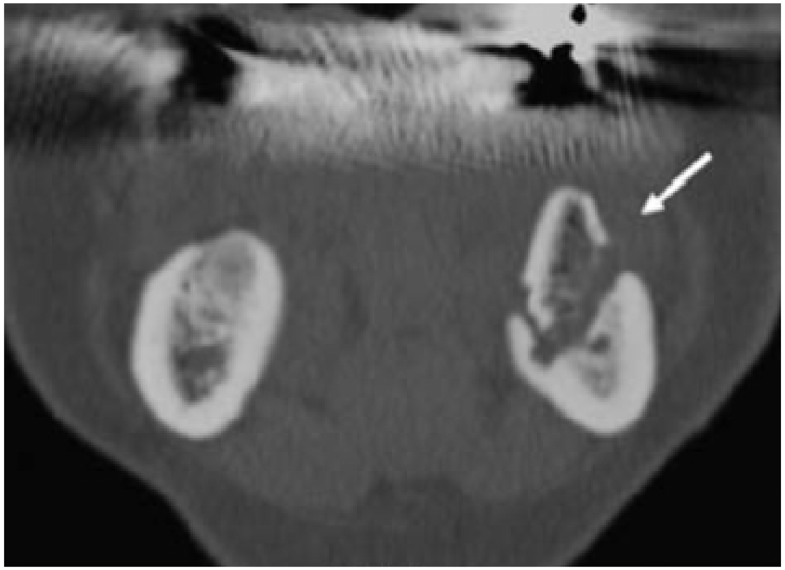
Presenza di esposizione di osso necrotico su versante linguale in zona 4.6

Le proiezioni coronali della TC evidenziano un area di osteolisi coinvolgente il processo alveolare con erosione della corticale vestibolare e interessamento del nervo alveolare inferiore.





**Iconografia gentilmente concessa da Bedogni A et al*



Ampia esposizione di osso necrotico in sede 3.3 -3.6 con deiscenza mucosa vestibolare e linguale; si osserva anche mucosite da farmaco

Le proiezioni assiali e, soprattutto, coronali della TC evidenziano una ampia area di sequestrazione coinvolgente il processo alveolare

Hanno curato la stesura del capitolo:

CORSO NAZIONALE

RACCOMANDAZIONI CLINICO-TERAPEUTICHE SULL'OSTEONECROSI DELLE OSSA MASCELLARI ASSOCIATA A FARMACI

- **Prof. Antonio Lo Casto,** DIBIMED, Università di Palermo
- **Dott. Alberto Bedogni,** UOC di Chirurgia Maxillo-Facciale, Dipartimento NeuroScienze-DNS, Università degli studi di Padova

Grazie per l’attenzione