osteoalveolar bone formation were all noted. Osteosclerosis of the
alveolar process was found in all radiographs. In the mandible, this
sclerosis was especially distinct and noted to be located only above
the inferior alveolar canal. Rarely were all radiographic
features visualized in a single case. Another important finding
was the presence of periodontal disease in all 29 of the cases that
involved the jaws. This could be attributed to the fact that BP
accumulates preferentially in sites of high bone turnover or
remodeling.

Conclusions. Recognition of the radiographic features plays
a crucial role in the early detection of osteonecrosis and treatment
planning of patients on oral BP. In early stages, oral radiographic
findings may be the only indicator of BONJ and can precede the
finding of exposed bone.

THE ROLE OF ZOLEDRONIC ACID IN THE APOPTOTIC
CELL DEATH OF METASTATIC CANCER. H. Almubarak,
A. Jones, M. Zhang, T.F. Meiller, M.A. Schepfer. U Maryland,
Baltimore.

Bisphosphonates are synthetic analogues of naturally occur-
rising pyrophosphate, capable of binding hydroxyapatite of bone
and inhibiting osteoclast-mediated bone resorption. This property
has led to their use in cancers well known to metastasize to bone,
most notably breast and prostate cancer. We show here that
zoledronic acid (ZA) directly induces apoptosis, in a survivin-
dependent manner, to a significantly greater degree in tumori-
genetic than in nontumorigenic primary tumors. Nontumorigenic
(MCF 10A, LNCaP, respectively) and tumorigenic (MCF 7, PC3,
respectively) human breast and prostate cell lines were exposed
to different concentrations of ZA (0-10 μmol/L), using 11/4M as
the baseline. A dose-response effect on apoptosis and cell pro-
liferation (microscopic observation with annexin V and MTS,
respectively) was observed with increasing ZA concentrations to
a greater extent in the tumorigenic versus nontumorigenic cells.
Gene expression analysis demonstrated the differential expres-
sion of multiple genes involved in apoptosis, including tumor
necrosis factor, BCL-2, caspase, IAP, TRAF, and death domain
family members.

Diabetes, hypothyroidism, smoking, and prior dental extractions
may play a role in BONJ development. Type of BP, diabetes,
hyperthyroidism, smoking, and prior dental extractions
might contribute to the development of BONJ.

RARE PRESENTATION OF METASTASIZING MIXED
TUMOR WITH INTRAORAL METASTASIS TO THE
MAXILLA. R. Gopalakrishnan, A. Pearson, D. Basi. U Min-
esota, Minneapolis.

Metastasizing mixed tumors are very rare salivary gland
neoplasms that are histologically benign but clinically malignant
as they metastasize to distant sites. The parotid gland is by far
the most common location of the primary tumor, and the most
common sites of metastasis reported in the literature include
bone, lung, and lymph nodes. We report an interesting case of
metastasizing mixed tumor in a 36-year-old man who presented
with a mass in the left maxillary buccal gingiva and alveolar
mucosa in the area of teeth #13 and #14 21 years after removal
of a pleomorphic adenoma from the left parotid gland. Imaging
studies showed that the lesion also involved the alveolar bone.
Histologic examination revealed a benign salivary gland neo-
plasm that was consistent with pleomorphic adenoma. Review of
the medical history revealed that the patient had 2 recurrences
of the primary tumor and 5 metastatic presentations before the
current lesion. The patient’s current and past clinical and histo-
logic presentations and work-ups are discussed, along with per-
tinent review of the literature. As far as we know, this is one of few
reports of metastasizing mixed tumor with an intraoral presenta-
tion of the metastasis.

DIAGNOSTIC IMAGING FEATURES OF INTRAOSSE-
OUS MUCOEPIDERMOID CARCINOMA. K.C. Chan,
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ronto, Princess Margaret Hospital, Toronto, Ont.

Intraosseous mucoepidermoid carcinomas of the jaws are
rare, comprising 2%-4% of all mucoepidermoid carcinomas. A
review of the English-language literature revealed a paucity of
publications detailing the radiographic features of intraosseous
presentation, and management of BONJ in cancer patients
received intravenous BPs at the University of Minnesota
Masonic Cancer Center and Park Nicollet Institute. Eighteen of
576 eligible patients (3.1%) developed BONJ, including 8
(4.2%) of 190 patients with breast cancer and 6 (7.2%) of 83
patients with multiple myeloma. Ten of the 18 BONJ patients
(59%) developed it after tooth extraction, and 7 (41%) developed
it spontaneously. The mean infusions and duration of BP treat-
ment were significantly higher in BONJ patients compared with
control subjects (P < .001). Multivariate Cox proportional haz-
ards regression analysis revealed that diabetes (hazard ratio [HR]
3.40, 95% confidence interval [CI] 1.11-10.11; P = .028), hy-
pothyroidism (HR 3.59, 95% CI 1.31-9.83; P = .013), smoking
(HR 3.44, 95% CI 1.28-9.26; P = .015), and higher number of
zoledronate infusions (HR 1.07, 95% CI = 1.03-1.11; P = .001)
significantly increased the risk of developing BONJ. Based on
the American Academy of Oral and Maxillofacial Surgeons
staging system, 1 patient was initially diagnosed with a stage I
lesion, 10 with stage II, and 4 with stage III lesions. Initial
management of BONJ was nonsurgical, with debridement per-
formed at subsequent visits if needed. BRONJ lesions healed
completely in 2 patients (11%), healed partially in 5 (28%),
remained stable in 5 (28%), and progressed in 6 (33%). Increased
cumulative doses and long-term intravenous BP treatment is the
most important risk factor for BRONJ development. Type of BP,
diabetes, hypothyroidism, smoking, and prior dental extractions
might play a role in BONJ development.