

Clinical Features and Radiographic Aspects of Squamous Cell Carcinoma in the Gnathic Bones

Características Clínicas e Aspectos Radiográficos do Carcinoma de Células Escamosas nos Ossos Gnáticos
Características Clínicas y Aspectos Radiográficos del Carcinoma de Células Escamosas en los Huesos Gnáticos

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Abstract

This integrative review aimed to discuss the clinical features and imaging aspects of squamous cell carcinoma in the gnathic bones on panoramic radiographs and cone-beam computed tomography. The electronic search was conducted in PubMed, Embase, and Scopus using the keywords cone-beam computed tomography, panoramic radiography, dentomaxillofacial complex, and oral squamous cell carcinoma. Studies between 2012 and 2022, report imaging aspects of the oral squamous cell carcinoma in panoramic radiography and cone-beam computed tomography were selected. The initial search found 375 articles, leaving 171 after excluding duplicates. Eighteen studies met the inclusion criteria, bringing together a total of twenty cases. Swelling and pain are common clinical features. In most cases, the squamous cell carcinoma was in the mandible; the borders were poorly defined with invasive aspects; the internal structure was radiolucent/hypodense and some cases, had radiopaque flecks. The lesion causes structures destroyed like the adjacent bone, the alveolar process, border of the mandibular canal, ramus of the mandible. The image aspects raised in this review: as large areas of osteolysis interspersed with an irregular pattern of radiopaque/hyperdense flakes, with imprecise limits and invasive borders, causing significant destruction of adjacent structures, squamous cell carcinoma can be a diagnostic hypothesis. In these cases, we recommend urgency in completing the diagnosis. The panoramic radiography can provide information that leads to the suspicion of a malignant lesion, but cone-beam computed tomography provides the real dimension and repercussion of the lesion.

Descriptors: Squamous Cell Carcinoma; Head and Neck Neoplasms; Diagnostic Imaging; Panoramic Radiography; Cone-Beam Computed Tomography.

Resumo

Esta revisão integrativa teve como objetivo discutir as características clínicas e aspectos de imagem do carcinoma de células escamosas nos ossos gnáticos em radiografias panorâmicas e tomografia computadorizada de feixe cônico. A busca eletrônica foi realizada no PubMed, Embase e Scopus usando as palavras-chave tomografia computadorizada de feixe cônico, radiografia panorâmica, complexo dentomaxilofacial e carcinoma de células escamosas oral. Foram selecionados estudos entre 2012 e 2022, relatando aspectos de imagem do carcinoma epidermóide oral em radiografia panorâmica e tomografia computadorizada de feixe cônico. A busca inicial encontrou 375 artigos, restando 171 após a exclusão de duplicatas. Dezoito estudos atenderam aos critérios de inclusão, reunindo um total de vinte casos. Inchaço e dor são características clínicas comuns. Na maioria dos casos, o carcinoma espinocelular localizava-se na mandíbula; as bordas eram mal definidas com aspectos invasivos; a estrutura interna era radiolúcida/hipodensa e, em alguns casos, apresentava manchas radiopacas. A lesão causa destruição de estruturas como osso adjacente, processo alveolar, borda do canal mandibular, ramo da mandíbula. Os aspectos de imagem levantados nesta revisão: como grandes áreas de osteólise intercaladas com padrão irregular de flocos radiopacos/hiperdensos, com limites imprecisos e bordas invasivas, causando destruição significativa de estruturas adjacentes, coloca o carcinoma de células escamosas como uma hipótese diagnóstica. Nestes casos, recomendamos urgência na conclusão do diagnóstico. A radiografia panorâmica pode fornecer informações que levam à suspeita de lesão maligna, mas a tomografia computadorizada de feixe cônico fornece a real dimensão e repercussão da lesão.

Descritores: Carcinoma de Células Escamosas; Neoplasias de Cabeça e Pescoço; Diagnóstico por Imagem; Radiografia Panorâmica;

Resumen

Esta revisión integradora tuvo como objetivo discutir las características clínicas y los aspectos de imagen del carcinoma de células escamosas en los huesos gnáticos en radiografías panorámicas y tomografía computarizada de haz cónico. La búsqueda electrónica se realizó en PubMed, Embase y Scopus utilizando las palabras clave tomografía computarizada de haz cónico, radiografía panorámica, complejo dentomaxilofacial y carcinoma oral de células escamosas. Se seleccionaron estudios entre 2012 y 2022, que reportan aspectos imagenológicos del carcinoma de células escamosas bucales en radiografía panorámica y tomografía computarizada de haz cónico. La búsqueda inicial encontró 375 artículos, dejando 171 después de excluir los duplicados. Dieciocho estudios cumplieron los criterios de inclusión, reuniendo un total de veinte casos. La hinchazón y el dolor son características clínicas comunes. En la mayoría de los casos, el carcinoma de células escamosas estaba en la mandíbula; los bordes estaban mal definidos con aspectos invasivos; la estructura interna era radiolúcida/hipodensa y en algunos casos presentaba motas radiopacas. La lesión provoca estructuras destruidas como el hueso adyacente, el proceso alveolar, borde del canal mandibular, rama de la mandíbula. Los aspectos de imagen planteados en esta revisión: como grandes áreas de osteólisis intercaladas con un patrón irregular de escamas radiopacas/hiperdensas, con límites imprecisos y bordes invasivos, que provocan una destrucción significativa de las estructuras adyacentes, el carcinoma de células escamosas puede ser una hipótesis diagnóstica. En estos casos, recomendamos urgencia en completar el diagnóstico. La radiografía panorámica puede aportar información que haga sospechar una lesión maligna, pero la tomografía computarizada de haz cónico aporta la verdadera dimensión y repercusión de la lesión.

Descriptorios: Carcinoma de Células Escamosas; Neoplasias de Cabeza y Cuello; Diagnóstico por Imagen; Radiografía Panorámica; Tomografía Computarizada de Haz Cónico.

INTRODUCTION

The early diagnosis of squamous cell carcinoma (SCC) in the gnathic bones can be

challenging for the dentist and physician and is directly related to healing and overall survival¹. Most of the cases occur in the oral mucosa, but

the gnathic bones can be affected. When the bone involvement of this neoplasia is revealed through imaging techniques, these lesions can be confused with diseases of inflammatory origin (apical periodontal cysts and peri-implantitis) and with odontogenic cysts and tumors^{2,3}. In cases of primary intraosseous tumors without evident oral manifestation with alteration observed by radiographic examination, the formulation of diagnostic hypotheses is challenging¹⁻³.

The panoramic radiographs (PR) and Cone-Beam computed tomography (CBCT) are complementary exams frequently used in the otorhinolaryngologist and dentist's routine besides relevant in the diagnosis of these lesions with bone involvement. The clinical findings associated with radiographic findings that may suggest malignancy may contribute to the early diagnosis of oral cancer and, consequently, for a better prognosis for the patient^{4,5}. Therefore, this paper aims to analyze and discuss the imaging aspects of SCC based on PR and CBCT images through a recent integrative literature review.

MATERIAL AND METHOD

This review followed the PECO strategy: the participants (P) correspond to individuals with SCC in the gnathic bones; the exposure (E) configures the acquisition of CBCT and PR; control (C) is not applicable in this case, and the outcome (O) are the imaging aspects of the SCC in the gnathic bones.

This integrative review of the literature list which imaging aspects of the SCC were observed in CBCT and PR in studies published between the years 2012 and 2022. The data were collected from a search strategy in the following electronic databases: PubMed, Embase, and Scopus. The search strategy was performed using Boolean operators (AND/OR), aiming to identify the relevant studies on the imaging aspects of SCC observed in CBCT and PR. The following search strategy was used: (Cone-Beam Computed Tomography OR CAT Scan, Cone Beam OR CAT Scan, Cone-Beam OR CAT Scans, Cone-Beam OR CT Scan, Cone Beam OR CT Scan, Cone-Beam OR CT Scans, Cone-Beam OR CT, Cone-Beam OR CT, Volume OR CT, Volumetric OR Computed Tomography, Cone-Beam OR Computed Tomography, Volume OR Computed Tomography, Volumetric OR Computer-Assisted Tomography, Cone-Beam OR Computerized Tomography, Cone-Beam OR Cone Beam CT OR Cone Beam Computed Tomography OR

Cone Beam Computer Assisted Tomography OR Cone Beam Computerized Tomography OR Cone-Beam CAT Scan OR Cone-Beam CAT Scans OR Cone-Beam CT OR Cone-Beam CT Scan OR Cone-Beam CT Scans OR Cone-Beam Computer-Assisted Tomography OR Cone-Beam Computerized Tomography OR Scan, Cone-Beam CAT OR Scan, Cone-Beam CT OR Scans, Cone-Beam CAT OR Scans, Cone-Beam CT OR Tomography, Cone Beam Computed OR Tomography, Cone-Beam Computed OR Tomography, Cone-Beam Computer-Assisted OR Tomography, Cone-Beam Computerized OR Tomography, Volume Computed OR Tomography, Volumetric Computed OR Volume CT OR Volume Computed Tomography OR Volumetric CT OR Volumetric Computed Tomography OR Radiography, Panoramic OR Orthopantomographies OR Orthopantomography OR Panoramic Radiographies OR Panoramic Radiography OR Pantomographies OR Pantomography OR Radiographies, Panoramic OR "Radiographic evaluation" OR "Radiographic imaging" OR "Dental imaging") AND ("Dentomaxillofacial Complex" OR Mandible OR Maxilla OR Jaw OR Jaws) AND (Carcinoma, Epidermoid OR Carcinoma, Planocellular OR Carcinoma, Squamous OR Carcinomas, Epidermoid OR Carcinomas, Planocellular OR Carcinomas, Squamous OR Carcinomas, Squamous Cell OR Epidermoid Carcinoma OR Epidermoid Carcinomas OR Planocellular Carcinoma OR Planocellular Carcinomas OR Squamous Carcinoma OR Squamous Carcinomas OR Squamous Cell Carcinoma OR Squamous Cell Carcinomas).

The End-Note Web reference management software (<http://www.myendnoteweb.com>) was used to collect, save records and remove duplicate references. The selection of studies involved a single reviewer who followed the inclusion and exclusion criteria previously established. The inclusion criteria were clinical studies, case reports, and series of clinical studies; English articles, conference articles, studies that report the SCCs in the gnathic bones imaging aspects in PR and CBCT; articles published from the year 2012. The exclusion criteria were letters to the editor, articles before 2012, books or book chapters, editorials, conference abstracts; SCC of head and neck in soft tissues without bone invasion; studies without information about the characteristics of the SCC in PR or CBCT; other

carcinomas, other than oral; aspects of SCC in helical tomography; imaging techniques other than CBCT and PR.

The information extracted from the included articles were: author, year of publication, country, sex and age of the patients, signals and symptoms, the region of the SCC, and imaging aspects. The identification and inclusion of studies were in stages: initially, the reviewer read the title and summary of each article; in the second stage, the full text of the studies selected initially was read. A second reviewer was consulted in case of doubt regarding the inclusion or exclusion of studies.

RESULTS

The search in the databases identified 375 articles. These articles were saved in the EndNote, remained 171 after the exclusion of duplication. After reading the title and abstract were selected 50 articles; were excluded 121 of these for not meeting the eligibility criteria. The others were excluded for the following reasons: six for focusing on the comparison between diagnostic techniques, ten articles for using only magnetic resonance imaging (MRI), another four for dealing with positron emission tomography (PET), four for being different tumors of the SCC and four for presenting incomplete information making it impossible to collect data about the SCC image aspects. The data from the review process are in a flowchart in figure 1.

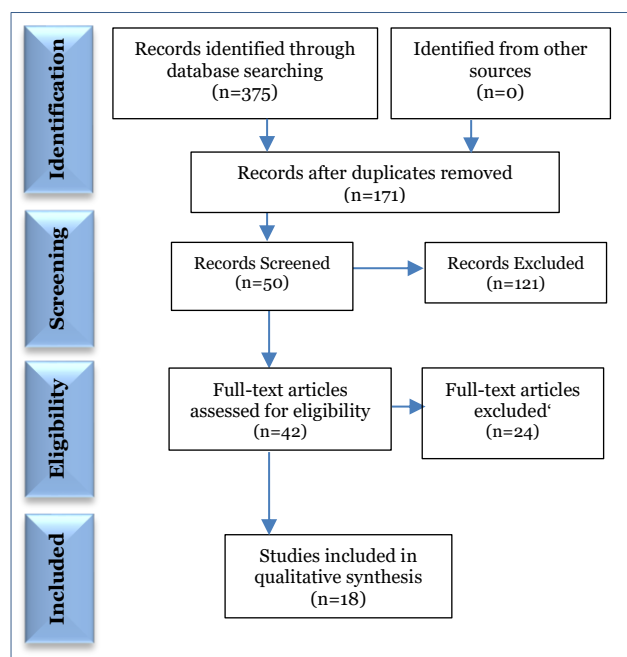


Figure 1: Flow-chart of the review process.

There were 18 articles included in the qualitative analysis, bringing together 20 case reports of SSC^{2,3,6-21}. The age of the patients ranged between eight and 76 years

(mean = 44.3 years; SD = 21.9). Regarding gender, there was no predominance (M: F ratio of 1:1). In most of the cases raised, the SCC was in the mandible, mostly in posterior region (15; 75%)^{2,3,6,8-10,14,15,17,19,21}.

Pain is the most common clinical feature, reported in 18 of 20 cases^{2,3,6-12,14-16,18-21}. Swelling is present in most cases (15;75%)^{3,6-9,11-14,16-20} and evolved rapidly in young patients between 8 and 15 years of age. Palpable lymph nodes^{6,9,11,12,18,20} and paresthesia^{3,8,16,21} also were reported.

Table 1 described the main characteristics observed in the imaging exams. The imaging aspects were described based only on PR in twelve cases^{3,6,7-9,11-14,16-20} in CBCT in six^{2,13,16,17,20,21} and both exams in two cases^{10,19}. Most cases that had a border of the lesion poorly defined and with invasive aspects in all extension^{2,3,6,8-11,15-17,19,21} (12; 60%). The internal structure of the lesions was mostly radiolucent, with radiopaque flecks^{3,6,8-11,14,18,19,21} (10; 50%).

These lesions also destroyed structures adjacent to the tumor such as bone, the alveolar process, border of the mandibular canal, ramus of the mandible, condyle, and coronoid process. Also, it causes resorption of tooth roots, and expansion of the maxillary sinus floor when affecting the maxilla. Details are in table 1.

Table 1. Clinical data and imaging aspects of SCC retrieved from the literature review

Nomura et al. ⁶ (2013) - Germany		
Age, Sex	76/ M	
Signals and symptoms	Pain, paresthesia of the mental nerve, and swelling of the right submandibular lymph node	
Origin of the carcinoma	Odontogenic cysts	
Imaging Aspects	Location	Rigth posterior mandible
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Destruction of the adjacent bone, including alveolar bone and the upper border of the mandibular canal. The teeth appear floating
	Studied Technique	PR
Nomura et al. ⁶ (2013) - Germany		
Age, Sex	50/M	
Signals and symptoms	Swelling on the left side of the neck	
Origin of the carcinoma	Odontogenic cysts	
Imaging Aspects	Location	Left posterior mandible
	Periphery	Well defined
	Internal Structure	Radiolucent
	Effects on adjacent structures	There was an impacted tooth and a follicular cyst. The upper border of the mandibular canal in the region of the lesion appears destroyed
	Studied Technique	PR

F: female; M: male; PR: panoramic radiography; CBCT: cone-beam computed tomography.

Table 1 (continuation). Clinical data and imaging aspects of SCC retrieved from the literature review

Bereket et al. ⁷ (2013) - Turkey		
Age, Sex	26/ M	
Signals and symptoms	Swelling with associated pain of the anterior maxilla	
Origin of the carcinoma	Odontogenic cysts	
Imaging Aspects	Location	Anterior maxilla
	Periphery	Well defined
	Internal Structure	Radiolucent
	Effects on adjacent structures	Bone expansion in the maxillary sinus floor, with slight resorption of the alveolar process in some teeth
	Studied Technique	PR
Adachi et al. ⁸ (2014) - Japan		
Age, Sex	59/F	
Signals and symptoms	Swelling with associated pain and paresthesia of the mental nerve	
Origin of the carcinoma	Odontogenic cysts	
Imaging Aspects	Location	Rigth posterior mandible
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Destruction of bone involving angle, inferior border of the mandible and the mandibular canal. The image suggests root resorption in tooth 37
	Studied Technique	PR
Lukandu e Micha ⁹ (2015) - Kenya		
Age, Sex	32/F	
Signals and symptoms	Swelling with associated pain and two palpable ipsilateral lymph nodes	
Origin of the carcinoma	History of diagnostic of Odontogenic cyst	
Imaging Aspects	Location	Rigth posterior mandible
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Extensive destruction of mandibular bone involving body, ramus, and coronoid process extending to the condylar process on the right side
	Studied Technique	PR
Beattie et al. ¹⁰ (2015) - Ireland		
Age, Sex	55/F	
Signals and symptoms	Severe pain in the right mandible	
Origin of the carcinoma	History of pericoronitis (lower right third molar), tooth extraction, severe pain, and delayed postoperative healing	
Imaging Aspects	Location	Rigth posterior mandible
	Periphery	Poorly defined/Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Characteristics before extraction (sagittal reconstruction): Increased space of the dental follicle, a hypodense area with irregular borders located in the distal surface. Characteristics after extraction: Destruction of the adjacent cortical bone in different degrees with apparent resorption of the superior border of the mandibular canal
	Studied Technique	CBCT PR

F: female; M: male; PR: panoramic radiography; CBCT: cone-beam computed tomography.

Table 1 (continuation). Clinical data and imaging aspects of SCC retrieved from the literature review

Geetha et al. ¹¹ (2015) - India		
Age, Sex	26/ M	
Signals and symptoms	Swelling with associated pain in the posterior right mandible and one palpable submandibular lymph node	
Origin of the carcinoma	Primary intraosseous carcinoma	
Imaging Aspects	Location	Antero-posterior right mandible, across the midline
	Periphery	Poorly defined/Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Destruction of bone anterior-posteriorly involving symphysis, mandibular ramus, condyle and coronoid process on the right side with rupture of the cortical bone, and the 46 giving the appearance of a floating tooth
	Studied Technique	PR
Sukegawa et al. ¹² (2015) - Japan		
Age, Sex	45/M	
Signals and symptoms	Swelling and mild pain in the upper maxilla and palpable the left submandibular and upper jugular lymph nodes	
Origin of the carcinoma	Residual cyst	
Imaging Aspects	Location	Left posterior maxilla and maxillary sinus
	Periphery	Well defined
	Internal Structure	Radiopaque
	Effects on adjacent structures	Elevation of the maxillary sinus floor with the destruction of the anterior sinus limits
	Studied Technique	PR
Bhandari et al. ² (2016) - India		
Age, Sex	71/F	
Signals and symptoms	Pain	
Origin of the carcinoma	Erythematous soft tissue around the dental implant (first molar site)	
Imaging Aspects	Location	Left Posterior Maxilla
	Periphery	Poorly defined/Invasive border
	Internal Structure	Hypodense
	Effects on adjacent structures	Destruction of the bone cortex adjacent to the implant and rupture of the cortex of the upper limit of the maxilla
	Studied Technique	CBCT
Magalhaes et al. ¹³ (2016) - Canada		
Age, Sex	8/M	
Signals and symptoms	Considerable swelling with two weeks of evolution	
Origin of the carcinoma	Odontogenic epithelium origin	
Imaging Aspects	Location	Left Maxilla and maxillary sinus
	Periphery	Well defined
	Internal Structure	Hyperdense
	Effects on adjacent structures	Destruction of the adjacent bone and alveolar process of the first molar, and elevation of the floor of the maxillary sinus
	Studied Technique	CBCT
Martínez-Martínez et al. ¹⁴ (2016) - Brazil		
Age, Sex	37F	
Signals and symptoms	Swelling with associated pain	
Origin of the carcinoma	Odontogenic keratocyst	
Imaging Aspects	Location	Left Mandible
	Periphery	Well defined in the most part
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Destruction of the cortical bone, lingual and buccal cortical bone showed focal areas of destruction, and the mandibular canal was displaced to the lower portion of the jaw
	Studied Technique	PR

F: female; M: male; PR: panoramic radiography; CBCT: cone-beam computed tomography.

Table 1 (continuation). Clinical data and imaging aspects of SCC retrieved from the literature review

Ai et al. ¹⁵ (2017) - Malaysia		
Age, Sex	60/ F	
Signals and symptoms	Pain and trismus	
Origin of the carcinoma	Left infratemporal fossa to the angle of mandible. History of toothache at a left mandibular molar, tooth extraction, hypoesthesia postextraction	
Imaging Aspects	Location	Poorly defined
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Radiolucent
	Effects on adjacent structures	Destruction of the adjacent bone and enlarged the left mandibular canal (7.7mm) compared to the contralateral side (2.8mm). The higher position of the zygomatic bone on the left side compared to the contralateral side
	Studied Technique	PR
Medawela et al. ¹⁶ (2017) - Sri Lanka		
Age, Sex	50/ F	
Signals and symptoms	Swelling with associated pain and paresthesia of the mental nerve	
Origin of the carcinoma	Odontogenic cyst	
Imaging Aspects	Location	Anterior mandible
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Hypodense
	Effects on adjacent structures	Destruction of buccal and lingual alveolar bone involving most of the mandible from the 35 to the 47 regions. There was very little buccolingual expansion, and the roots of the 34 and the 44 teeth were involved in the lesion without reabsorption evident
	Studied Technique	CBCT
Nokovitch et al. ¹⁷ (2018) - France		
Age, Sex	15/ F	
Signals and symptoms	Swelling with two months of evolution, pain and intermittent bleeding.	
Origin of the carcinoma	Odontogenic keratocyst	
Imaging Aspects	Location	Right Mandible
	Periphery	Poorly defined
	Internal Structure	Hypodense
	Effects on adjacent structures	Cortical lingual bone destruction and root resorption of teeth
	Studied Technique	CBCT
Bajpai et al. ¹⁸ (2019) - India		
Age, Sex	22/ M	
Signals and symptoms	Swelling with associated pain and left submandibular lymph nodes were enlarged, palpable, Mobile, and tender	
Origin of the carcinoma	Primary intraosseous carcinoma	
Imaging Aspects	Location	Left Mandible
	Periphery	Well defined in the most part
	Internal Structure	Radiolucent mostly, with radiopaque flecks in the periphery
	Effects on adjacent structures	Destruction of the ramus, condyle, and coronoid process on the left side involves the mandibular canal. Tooth 37 appears to be floating
	Studied Technique	PR
Abdelkarim et al. ³ (2019) - USA		
Age, Sex	60M	
Signals and symptoms	Swelling with associated pain and paresthesia in the right mandibular angle	
Origin of the carcinoma	Primary intraosseous carcinoma	
Imaging Aspects	Location	Right Mandible
	Periphery	First exam: Poorly defined Second exam: Poorly defined/ Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Destruction of the ramus, condyle, and coronoid process on the right side with rupture of the cortical bone
	Studied Technique	PR

Table 1 (continuation). Clinical data and imaging aspects of SCC retrieved from the literature review

Wu et al. ¹⁹ (2019) - China		
Age, Sex	52/ M	
Signals and symptoms	Swelling with associated severe pain	
Origin of the carcinoma	Orthokeratinized odontogenic cyst	
Imaging Aspects	Location	Left posterior Mandible
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Radiolucent mostly, with radiopaque flecks
	Effects on adjacent structures	Destruction of the left mandibular angle and ramus bone and of the mandibular canal
	Studied Technique	CBCT PR
Luo et al. ²⁰ (2020) - China		
Age, Sex	54/ F	
Signals and symptoms	Swelling with associated pain and pus. There was tooth mobility in the affected region and enlarged lymph nodes in the left neck	
Origin of the carcinoma	Orthokeratinized odontogenic cyst	
Imaging Aspects	Location	Left anterior maxilla
	Periphery	Well defined
	Internal Structure	Hypodense
	Effects on adjacent structures	Destruction of bone from the left maxillary central incisor to the secondary maxillary premolar, extending to the palatal region, with the destruction of the cortical bone.
	Studied Technique	CBCT
Lee et al. ²¹ (2021) - Korea		
Age, Sex	36M	
Signals and symptoms	Pain in the right mandibular region	
Origin of the carcinoma	Primary intraosseous carcinoma	
Imaging Aspects	Location	Right posterior mandible
	Periphery	Well defined
	Internal Structure	Radiolucent, with radiopaque flecks
	Effects on adjacent structures	Destruction of bone involving angle of the mandible with multilocular aspect and destruction of the superior border of the mandibular canal
	Studied Technique	PR
Lee et al. ²¹ (2021) - Korea		
Age, Sex	48M	
Signals and symptoms	Pain and paresthesia of the left lower lip	
Origin of the carcinoma	Odontogenic cyst	
Imaging Aspects	Location	Left posterior mandible
	Periphery	Poorly defined/ Invasive border
	Internal Structure	Hypodense
	Effects on adjacent structures	Destruction of bone adjacent tooth 38 impacted with different degrees of resorption bone. It is not to observe the limits of the inferior alveolar nerve channel in the affected region
	Studied Technique	CBCT

F: female; M: male; PR: panoramic radiography; CBCT: cone-beam computed tomography.

DISCUSSION

The osseous repercussion of squamous cell carcinoma, although infrequent, may go unnoticed by professionals who are unaware of the radiographic and imaging features of the disease in this type of manifestation. There was no significant predilection for sex in our analysis. The average age of patients was 44 years. Surprisingly, of the twenty cases analyzed, two

F: female; M: male; PR: panoramic radiography; CBCT: cone-beam computed tomography.

occurred in young patients^{13,17}. However, the development of malignant neoplasms in the maxillofacial region of pediatric patients is unusual²². In these cases, sudden swellings with the rapid evolution and without an apparent dental cause deserve careful evaluation.

In general, the SCC is more frequent in men from the sixth decade of life⁴. In adult patients, signs and symptoms such as swelling, pain, paresthesia, and the presence of palpable lymph nodes should immediately require tests aimed at detecting a possible SCC^{6,21}.

Among the studies shown in this review, it was common for SSC to develop from odontogenic cysts^{6-9,12,13,16,17,19,21}. This fact reinforces the importance of following up on cases of odontogenic cysts after treatment, even though malignant transformation can be considered rare or controversial. Other studies have highlighted that in cases where malignant transformation of cysts occurs, the clinical and radiographic signs observed were the same as those described in our study, such as pain, swelling and disruption of bone cortices^{23,24}.

The suspicion of SCC can be raised in cases where imaging aspects show an irregular pattern of osteolysis, presenting a mixture of radiolucent areas and radiopaque spots^{3,6,8-11,14,18,19,21}. The periphery of the lesion can contribute to the differential diagnosis, considering that odontogenic cysts and tumors such as ameloblastoma and keratocyst have precise limits and well-defined borders, and SCC presents ill-defined limits with invasive borders in most cases, even in those that developed from odontogenic cysts^{2,3,6,8-11,15-17,19,21}. However, when there is an association with the significant destruction of adjacent structures, especially bone cortical, as observed, the hypothesis of SCC should be investigated.

There was also a case initially treated as periimplantitis. The destruction of the bone cortex adjacent to the implant as seen in the CBCT of this case² should draw attention to the possibility of malignancy, especially if associated with clinical aspects of inflammation that persist for more than 14 days without an apparent cause.

The effects observed on the structures adjacent to the SCC were alterations as the expansion of bone cortical, elevation of the maxillary sinus, and enlargement of the mandibular canal^{6-13,18,19,21}. The alveolar cortices have osteolysis^{2,3,6-13,15-21}. In extensive lesions, the teeth appear to float in the tumor mass^{6,11,18}.

Dental resorption was reported in some cases^{7,18,16,17}.

However, this was not the most significant radiographic finding among the articles analyzed. The evaluation of discrete tooth resorption may be limited in a two-dimensional examination such as PR.

The PR was the method used to describe the imaging aspects in most of the articles analyzed, considering that was the only image examination performed^{3,6,7-9,11-14,16-20}. CBCT was performed with the intention of investigating in detail the extent of the lesion and repercussions on adjacent structures^{2,10,13,16,17}. The two imaging techniques enable the evaluation similar of the destruction of the cortical and medullary bone, and the mandibular canals, besides the aspect of floating teeth. However, evaluation of PR may underestimate the extent of bone destruction, expansion and perforation of cortical, and the presence of root resorption in the involved teeth.

In summary, when the images performed using the PR and CBCT shows the findings mentioned in this review: large areas of osteolysis interspersed with an irregular pattern of radiopaque/hyperdense flakes, with imprecise limits and invasive borders, causing significant destruction of adjacent structures, especially associated with the presence of swelling and pain, SCC in the gnathic bones can be a diagnostic possibility. In these cases, there is an urgent need to complete the diagnosis, which can be done using complementary exams such as biopsy and histopathological examination.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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