Pontifícia Universidade Católica do Rio Grande do Sul

Faculdade de Odontologia

Programa de Pós-Graduação em Odontologia

Mestrado em Odontologia

Área de Concentração em Estomatologia Clínica

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Contribuição da ultrassonografia como exame complementar no estabelecimento do diagnóstico de lesões nodulares submucosas e subcutâneas da região bucomaxilofacial

Porto Alegre

2014

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PONTIFÍCIA UNIVERSIDADE CATÓLICA DO RIO GRANDE DO SUL

FACULDADE DE ODONTOLOGIA

CONTRIBUIÇÃO DA ULTRASSONOGRAFIA COMO EXAME COMPLEMENTAR NO ESTABELECIMENTO DO DIAGNÓSTICO DE LESÕES NODULARES SUBMUCOSAS E SUBCUTÂNEAS DA REGIÃO BUCOMAXILOFACIAL

PORTO ALEGRE

2014

Dados Internacionais de Catalogação na Publicação (CIP)

M386c Martins, Felipe Leal

Contribuição da ultrassonografia como exame complementar no estabelecimento do diagnóstico de lesões nodulares submucosas e subcutâneas da região bucomaxilofacial / Felipe Leal Martins. – Porto Alegre, 2014.
106 f. : il.

Diss. (Mestrado) – Faculdade de Odontologia, PUCRS.
Orientador: Profª. Drª. Maria Antonia Zancanaro de Figueiredo.

1. Odontologia. 2. Patologia Bucal. 3. Ultrassonografia. 4. Diagnóstico por Imagem. 5. Lesões Nodulares. I. Figueiredo, Maria Antonia Zancanaro de. II. Título.

CDD 617.607
NLM WU 140

Ficha Catalográfica elaborada por
Vanessa Pinent
CRB 10/1297

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Linha de Pesquisa: Métodos de diagnóstico em Estomatologia

Dissertação apresentada como parte dos requisitos para obtenção do grau de Mestre pelo Programa de Pós-Graduação da Faculdade de Odontologia da Pontifícia Universidade Católica do Rio Grande do Sul – Área de Concentração em Estomatologia Clínica.

Aprovada em: 28 de Março de 2014.

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Porto Alegre

2014

EPÍGRAFE

“Devemos gerar coragem igual ao tamanho das dificuldades que enfrentamos”

Dalai Lama

Dedico este trabalho à minha querida família, por me incentivar, em todos os sentidos, a concluir mais uma importante etapa.

AGRADECIMENTOS

À minha mãe, Graça, agradeço por servir de inspiração na profissão, e principalmente, a sempre incentivar a aprimorar os conhecimentos.

À Magali, agradeço por me incentivar e confortar pacientemente, durante a realização deste estudo.

À minha irmã, Karen, por sempre acreditar que tudo vai dar certo.

Agradeço à minha querida orientadora, Profa. Dra. Maria Antonia Zancanaro de Figueiredo, por todo o seu conhecimento, inspiração e, principalmente, amizade. Por sempre transmitir tranquilidade, segurança e apoiar nos momentos difíceis.

Ao Dr. Roberto Oliveira por todo o seu conhecimento e acolhimento, além de ter se disponibilizado a realizar todos exames ultrassonográficos.

Às minhas colegas e amigas de ambulatório, Maria Noel Petruzzi e Ruchielli Borghetti, por sempre estarem disponíveis a ajudar na realização do estudo.

Às professoras Fernanda Salum, Karen Cherubini e Liliane Yurgel por todo conhecimento a mim transmitido durante a convivência no ambulatório de Estomatologia do Hospital São Lucas – PUCRS.

Aos colegas do Programa de Pós-Graduação em Estomatologia Clínica, pela amizade, incentivo e pelos momentos de descontração no ambulatório.

RESUMO

RESUMO

A ultrassonografia é uma ferramenta de diagnóstico inócua, não invasiva, de fácil acesso e baixo custo utilizada amplamente na área médica, indicada, em especial, no exame dos tecidos moles. Apesar disto, não costuma ser solicitada pelos cirurgiões dentistas, durante a investigação diagnóstica de lesões intraorais. O objetivo desta pesquisa foi verificar o grau de contribuição que o recurso fornece no estabelecimento do diagnóstico final de nódulos localizados na região bucomaxilofacial. Buscou-se estabelecer a indicação de uso e confiabilidade do método na área da Odontologia, considerando a possibilidade do mesmo favorecer ou não o diagnóstico conclusivo destas alterações. Foram selecionados 65 pacientes portadores de nódulos submucosos ou subcutâneos, que tiveram a indicação e foram submetidos à ultrassonografia regional, uma vez que não foi possível estabelecer o diagnóstico conclusivo das lesões exclusivamente através do exame clínico. A ultrassonografia foi realizada em um centro de diagnóstico por imagem utilizando o aparelho *Toshiba – Japan* modelo *Aplio* 80. Os laudos foram emitidos por um único examinador, com ampla experiência na interpretação de imagens da região bucomaxilofacial. Do total de pacientes, 43 foram submetidos à biópsia tendo o exame histopatológico para confirmação do diagnóstico final. Em 22 indivíduos não foi necessária a execução do procedimento cirúrgico, uma vez que o exame de imagem permitiu o estabelecimento do diagnóstico e manejo do paciente. Dois pesquisadores avaliaram os resultados obtidos na ultrassonografia e estabeleceram escores, que variaram entre zero (onde significou que o diagnóstico ultrassonográfico diferiu do final), 1 (contribuiu no manejo do paciente) e 2 (definiu o diagnóstico conclusivo). O escore zero, representou 12,3% dos exames realizados, entretanto os escores 1 e 2 computaram respectivamente 41,5% e 46,1%, totalizando um percentual de contribuição equivalente à 87,6%. O método favoreceu o diagnóstico das lesões vasculares em 93,3% e no manejo das neoplasias, tanto malignas quanto benignas, em 87,5%. Nos fenômenos de retenção de muco participou no estabelecimento do diagnóstico final em 76,5%. Os resultados obtidos foram ao encontro dos achados na literatura, os quais demonstraram que a ultrassonografia é um recurso eficaz na determinação do diagnóstico final ou no manejo dos pacientes, portadores de lesões nodulares inespecíficas dos tecidos moles da região bucomaxilofacial.

Palavras-chave: ultrassonografia, diagnóstico por imagem, patologia oral, lesões nodulares

ABSTRACT

ABSTRACT

Ultrasonography is an innocuous noninvasive diagnostic tool, which is easy to perform and low-cost, and it is widely used in the medical field, indicated especially in the exam of soft tissues. Despite this, it is not usually requested by dental surgeons in the diagnostic investigation of intraoral lesions. The aim of this study was to determine how much this resource contributes to establishing the final diagnosis of nodules located in the oral and maxillofacial region. Accordingly, we evaluated the indication of use and reliability of the procedure in Dentistry, considering the usefulness to reach the definitive diagnosis of these alterations. Sixty-five patients with submucosal or subcutaneous nodules were recruited for the study. They had been indicated for and subjected to regional ultrasonography, since it was not possible to establish a conclusive diagnosis of the lesions only by clinical examination. Ultrasonography was carried out in an imaging diagnostic center utilizing the same apparatus *Toshiba – Aplio 80 – Japan*. The imaging reports were prepared by a single examiner, with wide experience in the interpretation of images of the oral and maxillofacial region. Of the total patients, 43 had a biopsy for histopathologic confirmation of the final diagnosis. In 22 individuals, it was not necessary to perform surgery, since imaging allowed the establishment of the diagnosis and management of the patient. Two investigators evaluated the results obtained with ultrasonography and estimated the scores, which were zero (ultrasonographic diagnosis differed from the final), 1 (contributed to the management of the patient) and 2 (defined the definitive diagnosis). The zero score accounted for 12.3% of the examinations performed, while 41.5 and 46,1% of patients had scores of 1 and 2, respectively, totaling 87.6% of cases where imaging was helpful. The procedure facilitated the diagnosis of vascular lesions in 93.3%, helped with the management of 87.5% of patients with both malignant and benign neoplasms, and had a role in establishing the final diagnosis in 76.5% of cases of mucus retention phenomena. The results obtained were in accordance to findings in the literature, which demonstrated that ultrasonography is an effective resource in determining the final diagnosis or in the management of patients with nonspecific nodular lesions in the soft tissues of the oral and maxillofacial region.

Key words: ultrasonography, diagnosis by imaging, oral pathology, nodular lesions

SUMÁRIO


PUCRS

INTRODUÇÃO

O diagnóstico das inúmeras patologias que acometem a cavidade bucal é parte essencial da prática odontológica (NTOMOUCHTSIS, KARAKINARIS, POULOLPOULOS *et al*., 2010). A mucosa da boca tem sido considerada um espelho da saúde geral e pode ser afetada por uma grande diversidade de doenças, tanto de origem local quanto sistêmica. Temos como exemplo as lesões reacionais inflamatórias, infecciosas, císticas, cancerizáveis, além das neoplasias, que podem, em determinados casos, desencadear relevantes distúrbios no organismo do paciente. Enquanto a maioria das enfermidades orais são auto-limitantes e inócuas, outras são consideradas agressivas, podendo resultar em severas consequências, ocasionando, por vezes, a morte do indivíduo. As neoplasias malignas da cavidade oral apresentam características invasivas no sítio de sua localização e, se diagnosticadas tardiamente ou abandonadas ao próprio curso, são associadas com altas taxas de morbidade e mortalidade (ALI M, DEVIPRIYA, 2012).

O estabelecimento do diagnóstico das patologias da região bucomaxilofacial é um processo que deve ser realizado de maneira minuciosa, seguindo todas as etapas preconizadas, para que nenhuma informação seja omitida. A realização de uma cuidadosa anamnese juntamente com apurado exame físico, possibilitam ao cirurgião-dentista (CD) determinar o diagnóstico clínico da doença. Contudo, em alguns casos, o profissional precisa lançar mão de exames complementares, buscando através deles, subsídios que permitam definir o mesmo.

As lesões proliferativas que ocorrem na superfície da mucosa bucal são extremamente comuns e costumam ser de fácil diagnóstico. Já, as nodulares subcutâneas e submucosas dificultam o seu estabelecimento, uma vez que podem representar diversas doenças sem manifestações patognomônicas. Manjunath *et*

al.(2011) mencionaram que a avaliação clínica, nestes casos, é muito questionada. Isto se deve à variabilidade da localização das lesões, além da possibilidade das mesmas, em seus estágios iniciais, passarem por vezes desapercebidas em virtude das pequenas dimensões. Jinbu *et al*. (2003) descreveram que o mucocele, por exemplo, quando localizado próximo a superfície da mucosa é de fácil diagnóstico, apresentando características clínicas definidas. Contudo, quando situado na intimidade dos tecidos, torna-se de difícil identificação, uma vez que pode mimetizar outras patologias como hemangioma, linfangioma, lipoma, abscessos, entre outras (HODDER, EVANS, PATTON *et al*., 2000; ANAND, CHAUNDHARY, MITTAL *et al*., 2007). Desta maneira, desfavorece a determinação da etiologia do quadro, que pode ser de natureza inflamatória, infecciosa, neoplásica, sendo fundamental esta informação para definir o tratamento e o prognóstico do portador (PELEG, HEYMAN, ARDEKIAN *et al*., 1998; BAURMASH, WORTH, 1999; THIRUCHELVAM, SONGRA, 2002).

Os exames complementares desempenham um importante papel no adequado manejo do paciente. Na rotina dos CDs, as radiografias são os exames mais solicitados, seguidas pela tomografia computadorizada (TC) e ressonância magnética (RM). Entretanto outras alternativas, também podem ser utilizadas, uma vez que fornecem informações relevantes ou até mesmo conclusivas, em relação ao tipo de enfermidade apresentada pelo paciente. Os recursos da medicina nuclear, bem como os exames hematológicos e a ultrassonografia (US) dos tecidos bucais, são ferramentas solicitadas com menor frequência, embora possam contribuir de forma significativa na condução do caso avaliado.

Na tentativa de expor os pacientes a menores taxas de radiação ionizante, sugere-se que o CD realize exames com qualidade suficiente e reduzido índice da mesma (BAHREYNI TOOSI, AKBARI, BAYANI ROODI, 2012). Akyalcin *et*

al.(2013), afirmaram que na seleção do método a ser utilizado, as vantagens devem ser maiores que os riscos relacionados ao uso da radiação. Entretanto as radiografias orais são alguns dos procedimentos imaginológicos mais realizados, tendo o exame periapical completo e a radiografia panorâmica como padrão inicial durante a investigação de alterações da região bucomaxilofacial (ADIBI, ZHANG, SERVOS *et al*., 2012; BAHREYNI TOOSI, AKBARI, BAYANI ROODI, 2012).

Atualmente, a TC Cone Beam também faz parte do cotidiano dos CDs. Por apresentar imagens tridimensionais, ao contrário da radiografia, onde são demonstradas em apenas 2 dimensões, é superior na localização e análise da extensão das patologias, quantidade e qualidade óssea, bem como na relação espacial com estruturas anatômicas adjacentes. Em contrapartida, se for utilizada para avaliar tecidos moles, a mesma não fornece informações suficientes (ADIBI, ZHANG, SERVOS *et al*., 2012). Sendo assim, para a visualização das enfermidades nestes tecidos através dos métodos, tanto a TC médica, quanto na radiografia exigem a prévia ingestão de contraste endovenoso a base de iodo e em ambiente hospitalar. Alerta-se em relação a possibilidade de ocorrerem reações à droga utilizada (CHRISTIANSEN, 2002). As alergias ao contraste são mais predisponentes em indivíduos com fatores de risco, como os que já desenvolveram reações anteriormente, idosos, portadores de asma, cardiopatia, insuficiência renal e usuários de medicações, tais como b-bloqueadores, metformina, agentes nefrotóxicos, entre outros (BEDOLLA-BARAJAS, HERNÁNDEZ-COLÍN, MORALES-ROMERO *et al*., 2013).

Entretanto, embora a US seja considerada por alguns autores como o método imaginológico de escolha na análise dos tecidos moles da face, a maioria dos CDs não o utiliza dentro da sua rotina (CAVALCANTI, 2008; SALMON, LE DENMAT *et al*., 2012). A grande parte dos autores descrevem as vantagens da US como sendo um

recurso não invasivo, indolor e bem tolerado pelos pacientes. Utiliza ondas sonoras em vez de radiação ionizante, não gerando desta maneira, efeitos prejudiciais aos tecidos examinados. Apresenta custo inferior em relação à TC e RM, rápida e fácil execução, podendo assim ser repetida quantas vezes forem necessárias (ZAJKOWSKI, JAKUBOWSKI, BIALEK *et al*., 2000; POZZA, SOARES, OLIVEIRA, 2005; CAVALCANTI, 2008; WONG, LEE, KING *et al*., 2008; CHANDAK, DEGWEKAR, BHOWTE *et al*., 2011; PALLAGATTI, SHEIKH, PURI *et al*., 2012; NISHA, PARTHIBAN, SANTANA *et al*., 2013). Pode ser indicada para determinar a extensão, tamanho e localização das infecções nos tecidos moles intra-orais e dos espaços fasciais da região maxilofacial (NISHA, PARTHIBAN, SANTANA *et al*., 2013). Permite diferenciar lesões císticas de sólidas (CAVALCANTI, 2008), identificar linfonodos metastáticos diminutos (BORGEMEESTER, VAN DEN BREKEL, VAN TINTEREN, 2008), guiar a biópsia por agulha fina (HODDER, EVANS, PATTON *et al*., 2000; BORGEMEESTER, VAN DEN BREKEL, VAN TINTEREN, 2008; CAVALCANTI, 2008; BAHN, LEE, KWON *et al*., 2011; PFEIFFER, RIDDER, 2012) e contribuir efetivamente no diagnóstico das patologias relacionadas com as glândulas salivares (ZAJKOWSKI, JAKUBOWSKI, BIALEK *et al*., 2000; CAVALCANTI, 2008; KOVACEVIC, FABINAVIC, 2010; SODHI, BARTLETT, PRABHU, 2011; PFEIFFER, RIDDER, 2012).

A US é uma ferramenta de diagnóstico onipresente na área médica, porém pouco requisitada na rotina da prática odontológica. De maneira geral, o termo “ultrassom”, quando utilizado pelos CDs, costuma se referir às ponteiras indicadas para o tratamento periodontal e não ao recurso de diagnóstico por imagem. Por ser um exame pouco difundido na odontologia, apresenta escassez de profissionais qualificados para a sua correta realização e interpretação (GHORAYEB, BERTONCINI, HINDERS, 2008;

PALLAGATTI, SHEIKH, PURI, *et al*., 2012). Além disto, o conhecimento das estruturas anatômicas da região da cabeça e pescoço é complexo. Deste modo, a técnica por si só, exige um operador experiente para analisar as imagens obtidas (CAVALCANTI, 2008). Outro fator que provavelmente influencia o seu pouco uso, relaciona-se ao fato de que, quando arquivadas, as imagens são de difícil compreensão, ao contrário da TC e RM, o que as fazem serem, na maioria das vezes, preteridas em relação à US (OEPPEN, GIBSON, BRENNAN, 2010).

Mediante a frequente presença de nódulos nos tecidos moles da região bucomaxilofacial e em virtude de alguns se apresentarem na intimidade tecidual, dificultando seu diagnóstico, buscou-se avaliar a possibilidade do uso de um exame complementar que não faz parte do rotina dos profissionais da área, mas que pode auxíliar no estabelecimento do diagnóstico e favorecer a correta condução do caso.

A presente dissertação compreende 2 artigos científicos. O primeiro deles faz uma revisão de literatura sobre o tema em questão e tem por objetivo fundamentar, com base científica, o uso da US em tecidos moles da região bucomaxilofacial. O segundo, descreve os resultados da pesquisa, a qual buscou avaliar o grau de contribuição da US nestes tipos de lesões.

ARTIGO I

O artigo de revisão a seguir intitula-se **"Use of ultrasonography by the oral surgeon as auxiliary method in diagnosis of lesions of oral soft tissues"** e foi formatado e submetido nas normas do periódico ***Oral Radiology*** (Anexos 4 e 5).

Use of ultrasonography by the oral surgeon as auxiliary method in diagnosis of lesions of oral soft tissues

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Keywords: intraoral lesions, ultrasonography, diagnosis by imaging, oral soft tissue diseases, oral pathology

ABSTRACT

A review was made of the literature about the use of ultrasonography as complementary examination in the area of odontology during the diagnosis of changes in soft tissues of the oral and maxillofacial region. A survey was conducted using the PubMed database, prioritizing scientific articles that reported the indications, advantages and limitations of the use of echography in the oromaxillofacial region. Although ultrasonography is rarely requested by the oral surgeon, the results demonstrated its use as a complementary examination that helps in establishing the differential and/or conclusive diagnosis of innumerable diseases. It can demonstrate the presence of mucous, submucous, cutaneous or subcutaneous nodules, their respective diameter and precise localization. It determines if lesions are solid or contain liquid, differentiates edemas from abscesses, and identifies cysts, pathologies of salivary glands, and vascular lesions, besides contributing to the staging of cervical metastases. Like the available imaging examinations, ultrasonography has specific indications and limitations. However, compared to other methods, it demonstrates widely favorable results for its utilization. It is suggested that this resource be promoted in Dentistry as another alternative for obtaining a clinical diagnosis in oral and maxillofacial changes. Ultrasonography is an innocuous, non-invasive examination, which is readily available and low-cost, with eminent potential of helping in the diagnosis of diseases in soft tissues. However, to date, it is little utilized by the dentist, who is often not aware of its effective indications and advantages in relation to classic methods of diagnosis.

INTRODUCTION

Ultrasonography (US) or echography is a complementary examination utilized in the health area since the end the 1940s. However, until the mid-1970s, it was not

considered a tool for diagnosis routinely used by professionals, which began to happen when grayscale mapping was introduced [1].

Echography reproduces images that not only complement the diagnosis by radiography, but also has numerous advantages in relation to computed tomography (CT) and magnetic resonance imaging (MRI). It utilizes a non-ionized form of radiation and is thus considered safe and with low cost in relation to similar methods. This examination has the capacity of reproducing images in real time, showing millimeter resolution, and giving vascular information when combined with doppler, besides using portable and easily transportable equipment [2,3]. Particularly, this method is utilized for examinations of superficial structures where a spatial resolution is obtained that is better than that of other techniques. Its use at high frequencies (7.5 – 12 MHz) reproduces images with excellent definition and when combined with biopsy techniques, such as fine-needle aspiration [4], it is characterized as having high sensitivity in lymph nodes and salivary gland tumors [3].

Ultrasonographic examination has specific terminology for the description of images, where they are classified as hypoechoic, hyperechoic and anechoic. The intense reflection of sound wave results in a white image called hyperechoic, for example with salivary calculi. The term hypoechoic is utilized when there is moderate to low reflection, where the visualization of pathology detected is less intense in relation to adjacent tissues and is represented in gray tones. Meanwhile, the anechoic expression, represents no sound reflection, making the image of the lesion appear black, as in the case of cystic lesions [5,6]. In virtue of being an accessible examination that is readily accepted by the patient, it is currently the second most utilized modality in diagnosis by imaging in the medical area [1]. It is a truly widespread method, which is utilized, for example, as a routine examination in the area of obstetrics, where it is invariably part of

the pre-natal evaluation in pregnancy. It is also of great help in the diagnosis of patients with biliary or renal calculi, uterine myomas and endometrial polyps, mammography and detection of lesions suspected of malignancy, when the biopsies are usually guided by ultrasound. Furthermore, it can be utilized in areas of orthopedics, angiology, vascular surgery, neurology, ophthalmology, endocrinology and oncology, among others [7].

However, in soft tissues of the oral and maxillofacial region, US is not a routinely requested examination. This is likely due to a gap in academic training, without due training of professionals in the use and interpretation of this resource [8]. In many situations, it is believed that the utilization of this method could effectively contribute to the establishment of the clinical diagnosis, and as a consequence, to the appropriate management and treatment of the patient.

DIFFERENTIATION BETWEEN ABSCESS AND FACIAL CELLULITIS

US can be utilized by oral surgeons in many different situations, for example, to distinguish an abscess from facial cellulitis. The first represents a lesion that is circumscribed or confined to a specific area. However, facial cellulitis is a diffuse infection in soft tissues [9], which shows rapid progression where it can result in severe tissue destruction or risk of death due to bacteremia [10,11], determining the need for incision and drainage. In this way, high resolution US is an effective preoperative tool to confirm the presence of fluids or abscesses in superficial spaces of the face [2] and to distinguish the stage of infection [12], since the presence of pus is determined difficultly by clinical examination [13]. Besides, it also provides the exact dimensions of the cavity, in width as well as depth, and consequently prevents a blind incision, giving information that CT and MRI cannot determine in some cases with such precision [12].

Echography can also differentiate edema originating from infectious conditions, localizing the increase in volume in the deepest planes of soft tissues [14]. Thus, some authors consider it an ideal imaging examination for differentiating superficial infections, which show lower risk than those deeper and consequently more serious, such as Ludwig's angina. This is a severe infection of oropharyngeal cavity that can rapidly progress and compromise upper airways [15]. Evidence that suggests the presence of purulent exudate in edemas in the oral and maxillofacial region includes in acoustic accentuation, which indicates the presence of fluid inside the lesion [10]. Another form of evidence is uneven distribution denoted by the exam, which can suggest a stage of advanced facial cellulitis with the formation of purulent exudate [11]. This allows assessing the severity of pus or inflammatory area [10]. Besides this, tissue destruction correlates with the duration and severity of clinical symptoms, such as fever and erythema, together with information from laboratory findings, for example in case of leukocytosis [11]. Various authors have found values close to 97% sensitivity and 88% specificity, when evaluating the use of US in determining the presence of purulent exudate in increased volume in the oral and maxillofacial region [6,13,15,16]. In the other hand, another study demonstrated a sensitivity of 65% and specificity of 88% in determining the presence of pus [17].

DETERMINATION OF METASTATIC LYMPH NODES

In the treatment of patients with squamous cell carcinoma (SCC), the aim of the surgeon is to cure patient by resection of the pathological tissue. The size of the primary lesion is part of a series of information necessary for establishing the correct plan of treatment. The site of neoplasia, the result of the histopathologic examination and presence or absence of cervical lymph node metastasis are also of utmost importance [18]. Oral SCC is characterized by being aggressive and showing a high rate of

metastasis to the cervical lymph nodes [19]. One of the reasons for this is the lack of a precise analysis by the surgeon, with regard to the tumor extent and invasion, as well as to its relation to anatomic structures. This is possibly favored by virtue of the surgical margins being determined in most cases only by palpation [20].

The identification of metastases in the lymph nodes of cervical region shows a great effect on the prognosis and treatment of head and neck cancer. A survival rate of approximately 5 years is reduced by 50% when the presence of cervical nodules is identified. Therefore, staging of cervical lymphadenopathies is an important consideration in the management of the oral cancer patient, since it favors the determination of the patient's prognosis [21-23]. Its objective is to increase the quality of life as well as the survival rate of patients. [24]. However, the detection of cervical lymph nodes is hindered when they have a diameter less than 1 cm, where they can usually go undetected on physical examination. Studies have demonstrated that clinical examination in the cervical region shows low sensitivity and specificity for detecting the presence of regional lymph nodes [18,23,25].

In dealing with the problem of occult metastases, the surgeon can choose elective surgical treatment of the neck or clinical follow up of cervical region when routine physical examination does not indicate metastatic lymph nodes in the neck region. When follow up of the cervical region is chosen, the primary tumor is surgically removed, while the neck is given a thorough evaluation. When any metastatic cervical lymph node is identified, it is very important to begin oncological therapy immediately [26]. US usually provides good images of the extent of neoplastic disease in soft tissues of the floor of the mouth and tongue. It also allows the accurate analysis of the compromise of muscle and bone tissue, as well the correlation with vessels of the cervical region [27]. Anand *et al.* compared the efficacy of US and CT to evaluate the

presence of metastasis in cervical lymph nodes, finding respective accuracies of 85.9% and 83% [25]. The use of ultrasound-guided aspiration cytology to identify metastatic lymph nodes in the neck region has been popular in Europe since the end of the 1980s and in the United States. The major advantage of the combination of these diagnostic techniques is that echography detects minute lymph nodes, while aspiration cytology determines safely and conclusively the presence of metastasis at the site biopsied [26]. In this way, relevant information is obtained for ideal treatment to be carried out, mainly in the early stages of cancer.

SALIVARY GLANDS

A diverse group of pathologies can compromise the structure of the major or accessory salivary glands. Inflammatory lesions, mucus retention phenomena, and malignant or benign neoplasms can develop in these anatomic regions. Neoplasms rarely occur in the salivary glands, corresponding to less than 3% of lesions in the head and neck region [28]. However, despite showing a low frequency, when they occur, 70 to 80% of cases are benign in nature. Pleomorphic adenoma and Warthin's tumor are the most commonly diagnosed [29]. Some lesions of salivary glands can be treated in a conservative manner, but surgical resection is the treatment of choice for neoplasms. The behavior of these pathologies varies significantly, because it depends on type, phase and degree of tumor, where the histopathologic diagnosis is considered the determinant for defining the type of treatment [28]. Therefore, US is the standard examination, which is conclusive for the majority of diagnoses of salivary gland diseases. It has a high resolution, is done in real time and obtains multiplanar images [28-31]. When utilized in the region of the salivary glands, the examination shows the localization of the pathology present, which can compromise or not the gland,

identifying precisely, for example, cases of sialolithiasis localized close to the ducts or salivary gland itself [4,32]**.**

Among the mucus retention phenomena, plunging ranula is an uncommon lesion that requires greater care, since it can reach large proportions. A definitive diagnosis is difficult, even with the help of imaging resources such as CT or MRI. This condition can mimic other diseases, such as lymphangioma and hemangioma [33]. The differential diagnosis for clinical symptoms related to painless increase in volume present in the submandibular and/or sublingual region, can include abscesses, cystic hygroma/lymphangioma, thyroglossal duct cyst and lipoma [34]. Since the treatment of the lesions mentioned can be different from that utilized for plunging ranula, it is essential to determine the diagnosis, establishing the type of lesion the patient has [33]. Therefore, US becomes the tool of choice for evaluating abnormalities in the submandibular region, since it allows the visualization of adjacent superficial structures, confirming the presence of cystic lesions in submandibular triangle [35] and demonstrating when there is communication of lesion with the mylohyoid muscle (pathognomonic sign of plunging ranula). Considering the importance of visualizing this invasion in mylohyoid muscle, the examination is appropriate for patients that do not know the origin of the edema, since it is reliable, non-invasive and low-cost [33]. The efficacy of this diagnostic resource increases when combined with fine needle aspiration biopsy [36]. In the study by Jain, Morton and Ahmad in 2010, the authors reported limitations presented by MRI and CT, these being attributed to the fact that images obtained by these methods are static. These examinations were not capable of demonstrating the herniation of the sublingual gland, or evaluating the extent on the cervical space. However, US was able to identify clearly the active hernia of the

sublingual gland in subjacent tissues, as well as the extent of spatial involvement with the lesion [35].

Mucocele is also a mucus retention phenomenon and is characterized by the involvement of the minor salivary glands, especially those of the lower lip. In contrast to plunging ranula, it is a common lesion whose presence is usually associated with local trauma. This pathology is clinically characterized by an increase in a superficial, translucent and well-defined volume, with 75% of lesions having a diameter of up to 1 cm. However, when the lesion is deep, it can show coloration similar to that of normal mucosa, or by the presence of edema in the area, mucocele can give a reddish appearance or even look vascular. Thus, it can mimic other lesions, such as hemangioma, lymphangioma, lipoma and abscess in soft tissues [37]. When the lesion is superficial, the history of the lesion and clinical evaluation can lead to a definitive diagnosis, but when it is deep in tissue planes, an imaging examination is necessary to determine type of lesion to be treated. In this way, US has been utilized to evaluate these lesions, because through high-frequency transducers it is capable of demonstrating the internal structures of the lesion more clearly than CT and MRI. Therefore, US can identify the type of lesion and determine its treatment [38].

Neoplasias of salivary glands can be completely delineated by echography, especially when they are localized in the superficial lobe of the parotid [32]. However, this method is incapable of identifying reliably lesions and masses theinvolve the deep lobe of the parotid gland, since it is obscured by the mandible [28]. Still, it allows a dependable differentiation between intra- and extraglandular masses, cystic from solid lesions, and presence of vascularization intraglandular and in adjacent structures [33].

Histopathology is considered a determinant in the choice of treatment of the patient with salivary gland neoplasia. Accordingly, fine-needle aspiration biopsy guided

by ultrasound is effective in making a definitive diagnosis. According to a study by Kovacevic and Fabijanic [30] who detected malignant lesions in the salivary glands, US showed a specificity varying from 86 to 96% and sensitivity of 82 to 85%. Since it is a minimally invasive, precise and low cost technique, ultrasound-guided fine needle aspiration biopsy has been considered the "gold standard" for preoperative evaluation of salivary gland diseases [30]. Despite showing various advantages over other diagnostic methods, it is essential to point out the importance of the skill and adequate training of the professional in obtaining and interpreting the material. Otherwise, the information obtained can impair the use of US and cause variation in the specificity and sensitivity of the method [28].

VASCULAR LESIONS

Hemangioma is a benign vascular tumor which is more common in infants. When present in the head and neck region, it is more easily visualized in the region of lips, where this location is an important esthetic and functional part of the face [34]. A 10-year retrospective study revealed that hemangioma is the lip tumor of greatest prevalence (19.28%) among all benign lesions in the region [35].

Another alteration of vascular origin is caliber persistent labial artery (CPLA), which is an anomaly in which a main artery penetrates the submucous tissue without division or loss of caliber. On physical examination, it appears as an asymptomatic papular or nodular lesion, sometimes ulcerated, generally in the lower lip. It can be confused with a neoplasm and during biopsy, cause severe hemorrhage [36].

In vascular lesions of the head and neck region, US has also been shown as an important resource, mainly with the use of doppler, where it can, in particular cases, differentiate vascular from neoplastic pathologies [37]. The use of doppler has become

essential for evaluating diseases of vascular origin, since it determines the origin of the flow in the lesion (arterial or venous), as well as its velocity (cm/s). It allows a direct visualization in real time of this vascular alteration, without the necessity of intravenous contrast agents. Thus, it avoids biopsies and unnecessary surgical procedures, besides being a non-invasive imaging technique that is well accepted by patients [36].

CONCLUSION

Like all available imaging examinations, US shows specific indications and limitations in its use. However, compared to other methods, it demonstrates widely favorable results for its utilization as an auxiliary resource in the diagnoses in soft tissues of oral and maxillofacial region. With technological advances, ultrasound instruments are made considering a higher frequency, which resulta in increased definition of images. They utilize small, compact probes, allowing their introduction inside the oral cavity.

As it is an innocuous, non-invasive complementary method, of easy access and low cost, with eminent potential of helping in the diagnosis of diseases in soft tissues, it is suggested that this resource be promoted in Dentistry as an alternative for obtaining clinical diagnosis of diseases and appropriate management of patients.

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ARTIGO II

O artigo de pesquisa a seguir intitula-se **“Contribution of ultrasonography to the diagnosis of submucosal and subcutaneous nodular lesions of the oral and maxillofacial region – analysis of cases”** e foi formatado e submetido nas normas do periódico ***Clinical Oral Investigations*** (Anexos 6 e 7).

Contribution of ultrasonography to the diagnosis of submucosal and subcutaneous nodular lesions of the oral and maxillofacial region – analysis of cases.

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Keywords: ultrasonography, nodular lesions, oral pathology, imaging diagnosis

Objective. The aim of this study was evaluate the contribution of ultrasonography in the establishment of the diagnosis of nonspecific nodular lesions of the soft tissues of the oral and maxillofacial region. We determined the indication of use and reliability of ultrasonography in the dental field.

Materials and Methods. We recruited 65 patients from the Oral Medicine Unit of São Lucas Hospital, who had nonspecific nodules located in the submucosa or subcutaneously. They were subjected to a doppler ultrasonography, carried out with standardization of the protocol and equipment. The ultrasonography report was made by an experienced professional. Another 2 calibrated examiners analyzed the data, comparing the ultrasonographic report with the final diagnosis. Accordingly, we used established scoring, where zero corresponded to no contribution to the final diagnosis, 1, helped in its determination, and 2, estabilished the diagnosis.

Results. Zero was obtained for 12.3% of the examinations performed, and 1 and 2 accounted for respectively 41.5% and 46.1%, totaling a contribution about 88%. Ultrasonography was of value in the diagnosis of vascular lesions in 93.3% and of neoplasms in 87.5%. In the salivary gland diseases, it contributed in 75% of cases.

Conclusions. The results obtained demonstrated that ultrasonography is an effective tool in the determination of the definitive diagnosis of nonspecific nodular lesions of the soft tissues of the oral and maxillofacial region.

Clinical relevance. Ultrasonography is an innocuous noninvasive examination, easy to perform and has low cost, which is effective in aiding to the diagnosis of nodular lesions in orofacial soft tissues.

INTRODUCTION

Ultrasonography (US) was more used as a diagnostic tool by health care professionals during the 1970s, when a mapping of gray levels was introduced [1]. While it is widely used in the medical area, it is a resource that is rarely requested by the dentist, who is often unaware of its indications, limitations and advantages [2]. Echography utilizes a nonionized form of radiation and is thus considered safe, where it can be repeated whenever necessary. It shows few artifacts, and it is of low cost in relation to similar methods and painless, being well tolerated by patients. This exam has the capacity to reproduce images in real time and to provide millimetrical resolution and vascular information, if doppler is utilized [3–6].

However, US of the head and neck region is considered one of the most complex examinations to be interpreted, requiring an experienced professional, who should have wide knowledge of the regional anatomy, be informed about the clinical condition of the patient and technically qualified to interpret abnormalities detected [4]. Since it is a dynamic test, the images obtained are better understood live. When archived and reproduced in planes, they can be difficult to interpret, especially if compared with computed tomography and magnetic resonance. It is believed that this is one of the reasons the makes echography an examination less requested than others that also utilize sectioned imaging [5].

Nodular lesions that are located close to tissues of the face can mimic various pathologies. Inflammatory lesions, mucous retention phenomena, and benign and malignant neoplasms are examples of conditions that can develop in this anatomic region, often making a clinical diagnosis difficult [7]. Therefore, the aim of the present study was to evaluate the contribution of US in establishing the diagnosis of nonspecific nodular lesions of the oral and maxillofacial region, as well as making professionals in denstistry aware of the indications and reliability of US.

MATERIALS AND METHODS

We selected 65 patients with nonspecific nodular lesions localized in the oral and maxillofacial region, seen at the Oral Medicine Unit at the São Lucas Hospital (HSL) of the Pontifical Catholic University of Rio Grande do Sul (PUCRS), Brazil, during 18 months.

All patients included in the study had been indicated for US and were subjected to the examination, since it was not possible to establish a definitive diagnosis through clinical examination. US was performed in a diagnostic imaging center utilizing the same apparatus *Toshiba Japan – Aplio 80* with linear probe for examination of soft tissues and frequencies of 7.5 to 12 MHz with a color doppler system for high definition. US was carried out by a single examiner with ample experience in the interpretation of images of the oral and maxillofacial region.

The study was conducted after approval at the Committee of Ethics in Research of PUCRS. Patient information was collected and annotated from medical charts which contained data with regard to clinical characteristics of the lesion, descriptive US report and the final diagnosis, including the anatomopathological examination, whenever needed. All data obtained were kept confidential. The information was tabulated in spreadsheets developed specifically for this study, which included the diagnosis from US and the final diagnosis. Accordingly, each lesion was stratified into scores on the basis of the following criteria:

- Score zero: when the diagnosis obtained with US differed from the final diagnosis.

- Score 1: when the diagnosis obtained with US contributed to establishing the final diagnosis.

- Score 2: when the diagnosis obtained with US defined the final diagnosis.

Later, 2 calibrated examiners performed the data analysis, comparing the US diagnosis with the final diagnosis (confirmed by histopathologic examination, if necessary), so that the scores could be defined.

The pathologies included in the statistical analysis were those that affected 10 or more individuals. The small number of cases for the others made it impossible to carry out mathematical calculations. On the basis of the data obtained, percentages were determined for the 3 scores of impact of US on the final diagnosis of the subcutaneous and submucosal nodular lesions of the oral and maxillofacial region. After obtaining these results, a global *Fisher* exact test was performed to determine the *p* values that revealed if the method showed a statistically significant difference in the definition of the final diagnosis between the diseases detected in the study. Afterwards, for determination of *p* between all lesions, *post-hoc* comparisons were carried out with *Finner-Bonferroni* correction, α being set at 5%.

RESULTS

Of the patients evaluated, 29 were males and 36 females, aged between 4 and 84 years. The individuals who had a histopathologic examination to determine the final diagnosis of the lesion, represented 66.1% (n=43) of the total. Of the 22 remaining patients, 33.8% did not need a biopsy to confirm the definitive diagnosis, since the US descriptive report determined how the patient would be treated (Table 1).

Table 1 Distribution of patients with nonspecific submucosal or subcutaneous nodules underwent surgery and histological examination, and those who were not required biopsy of lesions

PATIENTS	TOTAL	%
CONTAINED PATHOLOGIC EVALUATION	43	66,1
CONTAINED NO PATHOLOGIC EVALUATION	22	33,8
	65	99,9

The zero score, which meant no contribution of echography in the establishment of the final diagnosis accounted for 12.3% of the examinations performed. But the scores 1, indicating US helped in the management of the case, and 2, where it was possible to define the diagnosis through the image, represented respectively 41.5% and 46.1%, totaling 87.6% of cases where US was of value. This demonstrates that of the total of patients analyzed (n=65), in 57 cases US contributed in a significant manner to the appropriate management of the patient (Table 2).

Table 2 Distribution of scores set by the examiners, as well as the percentage that each of them represented in aid of determining the final diagnosis of patients

SCORE	TOTAL (n=65)	%
ZERO	8	12,3
1	27	41,5
2	30	46,1

The diseases of the salivary glands (sialadenitis, sialolithiasis and mucus retention phenomena) represented 26.1% (n=17) of the alterations presented by the patients. The neoplastic lesions (malignant and benign) corresponded to 24.6% (n=16) and the vascular, blood and lymphatic, were diagnosed in 23.1% (n=15) of the individuals. The inflammatory reaction processes made up 21.5% (n=14) of the cases evaluated. The cystic lesions and lymph retention phenomena accounted for only 3.1 (n=2) and 1.5% (n=1), respectively (Table 3).

Table 3 Classification, absolute and percentage distribution of subcutaneous and submucosal nodular lesions

LESIONS	TOTAL (n=65)	%
VASCULAR LESIONS	15	23,1
NEOPLASMS	16	24,6
SALIVARY GLAND DISEASES	17	26,1
INFLAMMATORY PROCESSES REACTION	14	21,5
CYSTIC LESIONS	2	3,1
RETENTION LYMPH	1	1,5

According to the scores determined by the examiners (Table 4), the method contributed to the diagnosis of the vascular lesions in 93.3%. In the neoplasms, ultrasonographiy was useful in the management of the lesions, the malignant as well as the benign ones, in 87.5%. With regard to mucus retention phenomena, US had a role in the establishment of the final diagnosis in 76.5%. The other alterations described were represented by limited numbers of patients, making effective analysis of these data impossible.

The rates of the contribution of US were not the same for the different types of lesions (*p=0.0017)*. It was possible to see that in the pathologies of vascular nature, US demonstrated a statistically greater contribution than in the others. This means that the vascular lesions, when compared with salivary gland diseases, inflammatory reaction processes and neoplasms, showed a statistically significant difference (*p=0.024, p=0.009, p=0.06)*. However, the study did not have appropriate conditions to differentiate the others, despite the nominal values of the neoplasms being less than that of the others, because comparisons of the diagnostic method did not show statistically significant differences.

US was able to determine the contents of the lesions in 80% of the examinations. It indicated the vascular nature of the nodules in 23.1%, the presence of thick fluid or mucus in the vicinity of the lesion in 21.5% and if the nodule was solid in 35.4%. However, some ultrasonographic reports were not considered clear in relation to the contents of the lesions.

Table 4 Distribution of lesions diagnosed in related score contribution of ultrasonography study to establish the final diagnosis

LESIONS	US DIFFERED FROM FINAL	US CONTRIBUTED TO FINAL	US DEFINED TO FINAL
VASCULAR LESIONS	6,7% (n=1)	6,7% (n=1)	86,7% (n=13)
NEOPLASMS	12,5% (n=2)	62,5% (n=10)	25% (n=4)
INFLAMMATORY PROCESSES REACTION	7,1% (n=1)	64,3% (n=9)	28,6% (n=4)
SALIVARY GLAND DISEASES	23,5% (n=4)	35,3% (n=6)	41,2% (n=7)
CYSTIC LESIONS	ZERO	50% (n=1)	50% (n=1)
RETENTION LYMPH	ZERO	ZERO	100% (n=1)

DISCUSSION

High frequency US is a diagnostic tool that is noninvasive, low cost and painless, which is commonly utilized in the medical area, where it is particularly indicated in the examination of soft tissues. However, it is not usually utilized for diagnostic investigation of intraoral lesions [6]. In this study, we evaluated the contribution of US as an auxiliary method in the diagnosis of submucosal or subcutaneous nodular lesions in the soft tissues of the oral and maxillofacial region.

This study did not consider the obligation of performing an anatomopathologic examination as the gold standard in all cases, because in some lesions, especially vascular, ultrasonographic diagnosis was considered definitive for the treatment of the patients. The histopathologic diagnosis was established only in the lesions with surgical indication.

Studies evaluating the use of US have been conducted in different lesions in the facial soft tissues, and despite extremely satisfactory results, they did not emphasize its minimal utilization as a diagnostic method by oral surgeons. This is probably due to an academic gap, lacking due training of the professionals in the use and interpretation of this resource [2].

The result obtained for the extent of the contribution that US showed as a diagnostic tool, in all patients, was 87.6%. In the diseases of possible inflammatory cause, we demonstrated that US was effective in 92.8%. This percentage is in contrast to that obtained by various authors who analyzed nonspecific swelling in orofacial soft tissues. They evaluated lesions of probable inflammatory nature and found a sensitivity of 96%, that is, the fraction of the patients who showed a positive response in the ultrasonographic examination among those individuals who had the disease [8 - 12]. On the contrary, Douglas et al. [13] found a 65% sensitivity for the examination. Along this

same line of research, Pallagatti et al. [14] and Nisha et al. [12] respectively determined an accuracy of 88.9% and 97.1% for US.

According to some authors, US is a complementary examination that helps confirm the diagnosis of abscesses and delineate their anatomic location, differentiating them from of cellulitis [11,15], and thereby demonstrating the presence of fluids or abscesses in the superficial spaces of the face [3] distinguishing the stage of the infection [16].

Among the vascular alterations, the hemangiomas were the most prevalent, representing 23.1% of the lesions studied. The result obtained in this study is similar to that of Ntomouchtsis et al. [17] who studied benign lesions in the lips of 420 patients. The authors found that the hemangiomas were the most common, corresponding to 19.3%. When these lesions are present on the tissue surface, the clinical diagnosis can be favored, especially through a semitechnical procedure called diascopy. However, in deeper lesions, that is, located in the submucosa of the orofacial soft tissues, sufficient information generally cannot be obtained from a clinical diagnosis to determine the vascular origin of the pathology evaluated. For this, we must introduce available imaging resources, including echography. Vascular alterations of the lesions visualized by US using the doppler system were determinant and defined the management of the patient. This means that in 13 (86.7%) of the 15 vascular alterations present in the study, US defined the final diagnosis. The use of the doppler system was essential for evaluation of the diseases of vascular origin, since it determines the origin of the flow in the lesion (arterial or venous), as well as its velocity (cm/s). The examination allows a direct visualization of this alteration in real time, without the need of intravenous contrast agents [18,19].

Salivary gland diseases encompass a wide range of pathologies. Various authors have described imaging methods that can help in making the final diagnosis. A near unanimity of authors consider US the first choice among all available imaging resources in the detection of diseases of the salivary glands [5,7,20-26]. However, the majority of the scholars only refer to its indications, advantages and disadvantages in relation to other imaging examinations. In the present study, the extent that US contributed determined by summing the scores of definition and aid in the management of the patient, was 76.5% of the total cases.

Of the 16 cases of neoplasms, US helped in the management of the patient in 87.5% of cases. The malignant and benign lesions were grouped together, since according to Zengel et al. [27] tumors smaller than 2 cm in diameter usually have a homogeneous structure and show defined borders and can be consequently diagnosed mistakenly as benign lesions. Gritzmann [20] analyzed 302 patients and found a sensitivity of 100% for the examination in the identification of neoplasms. The results of the study were in accordance with those reported by Millesi et al. [28] and Hodder et al. [29], who found values over 90%. Other authors obtained different results; Haberal et al. [30] and Anand et al. [31] found rates over 70%, but Hohlweg-Majert et al. [32] described a sensitivity of 24.5% for US.

In bone tissue, according to Millesi et al. [28], US is capable of evaluating the tissue destruction caused by malignant lesions in the oral and maxillofacial region, with the exception of the lingual side of the mandibular ramus. Compared with other techniques, US can be considered of great value, with a high contribution in particular regions. Ng et al. [33] described a case of mandibular osteosarcoma evaluated by US and concluded that the use of this resource was essential for the visualization of signs of malignancy. They considered echography a useful modality for investigating the early

stages of these pathologies. McCann et al. [34] also mentioned US as an effective tool in the initial analysis of fractures of the orbital-zygomatic complex, thereby reducing the number of X-rays required for the patients. It is known that although echography can be used in the analysis of bony structures, some authors believe that its use is not recommended for diagnosing temporomandibular disorders in a conclusive manner [35].

Some limitations that occurred during the course of the present study should be mentioned. A limited number of patients made up of some groups of analyzed lesions, making it difficult to make comparisons between the groups of nodular lesions and also with other studies previously conducted in this area. However, it was our purpose to bring together a larger number of patients with nonspecific swelling, where the clinical diagnosis represented similar conditions. For this reason, the neoplasms, malignant and benign, including those originating from the salivary glands, as well as metastatic lymph nodes, were grouped together. But in the diseases associated with the salivary glands, they were put in the group exclusively for sialadenitis, sialolithiasis and Sjögren's syndrome.

In the literature, there are still few studies that have evaluated the use of US in investigating nodular lesions in nonspecific clinical diagnosis and have indicated it for professionals in dentistry. In contrast, in the medical area, it is a widely used in the most diverse specialties. Currently, more studies are being conducted on the use of US for evaluation of intraoral lesions and structures, due to the emergence of new technologies, such as the use of higher frequencies and smaller transducers, making it possible to introduce them inside the oral cavity.

The results obtained in this study demonstrated that US supplies quality information during the investigation process and diagnosis, contributing to the

management of the submucosal or subcutaneous nodular lesions. This is a recurring clinical situation in dental practice, and through this examination, the dentist is more able to rapidly and adequately manage the patient. Thus, this resource can be indicated as a viable method in the routine evaluation of the nonspecific swelling of the soft tissues in the oral and maxillofacial region, since it is well tolerated by the patient, has low cost and does not expose to ionizing radiation.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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DISCUSSÃO GERAL

A região bucomaxilofacial pode sediar uma ampla gama de enfermidades com etiopatogenias e características clínicas variadas, o que muitas vezes dificulta o diagnóstico e adequado tratamento do paciente. Não é raro que o CD necessite, durante a investigação da patologia, lançar mão de exames complementares, cujas informações serão somadas àquelas obtidas através da anamnese e do exame físico. Embora uma série de recursos sejam disponibilizados aos clínicos e especialistas nas distintas áreas da odontologia, as técnicas radiográficas intra e extra oral, sejam elas periapicais, interproximais, oclusais e panorâmicas, ainda são as mais utilizadas. Isto ocorre provavelmente em virtude da maioria das doenças regionais acometerem estruturas calcificadas, tais como os tecidos dentários e ósseos. Entretanto, sabe-se que existe um grande número de alterações estabelecidas em inúmeros sítios da cavidade bucal, onde as radiografias não são capazes de fornecer qualquer tipo de auxílio, ou por vezes, não trazem informações suficientes e/ou relevantes, requerendo invariavelmente, subsídios adicionais. Outros exames imaginológicos, como as TCs, RMs, USs ou hematológicos, histopatológicos, entre outros, também podem ser solicitados para elucidar um diagnóstico, pois através dos seus resultados, permitem a correta condução e tratamento do caso.

Neste estudo, enfatizou-se a aplicabilidade clínica da US na odontologia, sugerindo que seu uso faça parte da rotina na investigação de patologias nodulares intra tissulares da região bucomaxilofacial. Buscou-se atentar para a possibilidade deste recurso contribuir ou mesmo, determinar o diagnóstico do paciente.

Em acordo com Cavalcanti (2006), Ghorayeb *et al*. (2008) e Salmon *et al*. (2012), também consideramos a US uma ferramenta imaginológica de diagnóstico pouco requisitada pelos CDs. Assim como Koischwitz *et al*. (2000), supõe-se que isto

ocorra por haver uma lacuna na formação profissional desta área, uma vez que, a maioria deles, desconhece as vantagens, limitações e indicações deste recurso complementar. Além disso, alguns ultrassonografistas que atuam nos centros de atendimento disponíveis, refletem nas suas avaliações e emissões dos laudos, um limitado conhecimento da anatomia de cabeça e pescoço, bem como das patologias que podem acometer a cavidade bucal e estruturas anexas. Isto, sem dúvidas, desfavorece a interpretação das imagens e a diferenciação anatômica regional, uma vez que, em determinados casos, o avaliador não encontra-se apto a distinguir estruturas normais das alterações do padrão de normalidade detectadas durante a US. Considera-se, indubitavelmente, a anatomia da região de cabeça e pescoço extremamente complexa, exigindo, para uma adequada análise, o embasamento e conhecimento prévio da área. Acredita-se que por essas razões, são disponibilizados poucos estudos que indicam o uso da US direcionados aos CDs.

A metodologia do presente estudo contemplou critérios rigorosamente padronizados de inclusão e exclusão dos pacientes. As lesões que compuseram a amostra, incluíram nódulos localizados na intimidade dos tecidos, com aspecto inespecífico. Os exames foram realizados em local específico e os laudos ultrassonográficos emitidos por um único examinador calibrado, no mesmo equipamento, reduzindo a possibilidade de viés nos resultados. Os dados obtidos foram tabulados em fichas próprias desenvolvidas para este estudo. Os 2 examinadores, com experiência em clínica estomatológica que participaram da análise dos dados, avaliaram separadamente, o grau de contribuição da US para o diagnóstico das lesões selecionadas na amostra. Enfatiza-se que, quando ocorreu alguma divergência de opinião nos escores estabelecidos, os casos foram revisados até que houvesse um consenso entre os mesmos. Esperava-se que o número total de indivíduos que participaram da pesquisa

fosse maior. Contudo, isto não foi possível, em virtude dos critérios de seleção contemplarem exclusivamente nódulos submucosos e subcutâneos. Estes, quando sediados na superfície tecidual, são alterações extremamente frequentes, tendo seu diagnóstico clínico facilitado, sem necessidade da indicação da US. Também, o tempo que se dispunha desde a aprovação do projeto até a coleta de dados foi relativamente escasso. Outro fator que contribuiu, foi o descarte de laudos ultrassonográficos realizados em outros centros de imagens, uma vez que utilizavam distintos equipamentos e profissionais, com padrão de obtenção de imagem e critérios de interpretação variados. Agregando a isto, alguns pacientes, por questões particulares, não puderam realizar o exame no local indicado, sendo consequentemente excluídos da amostra.

A literatura menciona, que o diagnóstico clínico de lesões nodulares subcutâneas ou submucosas é de difícil estabelecimento, uma vez que podem representar inúmeras enfermidades. Verifica-se esta situação, principalmente, quando encontram-se em estágios iniciais de crescimento ou ainda, pela própria natureza da patologia, apresentam-se de forma clássica, com pequenas dimensões (JINBU, KUSAMA, ITOH, *et al.*, 2003; MANJUNATH, RAJARAM, SARASWATHI, *et al*., 2011). Por apresentarem características inespecíficas, exclusivamente as lesões com diagnóstico clínico duvidoso, é que foram submetidas à análise ultrassonográfica.

Quando avaliou-se nódulos vinculados a possível causa inflamatória, o percentual de 92,8% demonstrou um expressivo grau de contribuição da US e, por consequência, favoreceu o correto manejo do paciente. Este resultado corrobora com os obtidos por Chandak *et al*. (2011), Mallorie *et al*. (2012) e Nisha *et al*. (2013) que avaliaram lesões onde o diagnóstico clínico direcionava para uma provável origem inflamatória. Mallorie *et al*. (2012) descreveram que o método apresentou sensibilidade

de 96%, quando utilizaram a US em portadores de processos inflamatórios odontogênicos. Chandak *et al*. (2011) e Nisha *et al*. (2013) também relataram resultados semelhantes (97,1%) na investigação de infecções dos espaços fasciais. Em contrapartida, Douglas *et al*. (2005) determinaram em seus estudos uma sensibilidade de 65%, e vincularam o baixo percentual à ausência de um examinador experiente para realizar e interpretar o exame na região.

O hemangioma foi a patologia mais prevalente encontrada, representando 23% do total dos nódulos submetidos à US. Da mesma maneira Ntomouchtsis *et al*. (2010) descreveram o percentual de 19% desta alteração dentre todas as lesões labiais benignas que encontraram. Nossos resultados demonstraram que com a utilização do sistema doppler, a US foi considerada determinante na orientação e manejo de 86,7% dos pacientes. O uso deste recurso tornou-se fundamental nas lesões localizadas em profundidade, pois mesmo com a manobra semiotécnica denominada diascopia, tornava-se impossível determinar, através do diagnóstico clínico, a origem vascular sanguínea da alteração. Buckmiller *et al*. (2010) e Rosdy *et al*. (2010) descreveram em seus estudos exclusivamente as alterações vasculares que podem acometer a região bucomaxilofacial, não determinando algum recurso de diagnóstico por imagem que fosse eficaz na visualização destas patologias.

Conforme Zengel *et al*. (2013), as neoplasias com diâmetro inferior a 2 cm, usualmente apresentam bordos delimitados e estrutura homogênea na imagem da US. Desta forma, podem ser diagnosticadas, de maneira equivocada, como lesões benignas. Por este motivo na classificação das patologias observadas neste estudo, optamos por agrupar as lesões neoplásicas, tanto malignas quanto benignas, visto que muitas delas apresentaram tamanhos diminutos, quando avaliadas na consulta inicial. Conforme mencionado anteriormente, por apresentarem pequenas dimensões, o diagnóstico final

foi invariavelmente determinado através do exame histopatológico. Nestes casos, o laudo ultrassonográfico contribuiu no manejo, descartando a presença de conteúdo líquido ou vascular no seu interior e sugerindo na hipótese diagnóstica a possibilidade de uma neoplasia de natureza mesenquimal. Esta informação, para nós, excluiu um grande número de patologias e contribuiu para a indicação ou não da realização da biópsia da lesão. Muitas vezes, a descrição ecográfica do nódulo, favoreceu para determinar até o tipo de biópsia (incisional ou excisional) que deveria ser executada. Desta maneira, a US colaborou de forma expressiva em (87,5% dos casos), no manejo de portadores de neoplasias. Entretanto, resultados descritos na literatura ainda são escassos e controversos. Millesi *et al*. (1990) e Hodder *et al*. (2000) encontraram valores acima de 90% de contribuição da US no manejo de pacientes que apresentaram este tipo de alteração. Natori *et al*. (2008) analisaram 110 pacientes portadores de lesões ulceradas localizadas na língua com suspeita de malignidade submetidos à US, obtendo o percentual de 82% de auxílio para detectar a presença da neoplasia maligna. Haberal *et al*. (2004) e Anad *et al*. (2007) também descreveram índices favoráveis ao uso do método, que atingiu percentuais acima de 70%.

Na literatura, encontra-se menção a distintas classificações de patologias que podem comprometer a estrutura das glândulas salivares, com suas respectivas características ultrassonográficas e prevalência. Entretanto, os autores em geral, não referem dados percentuais relacionados ao auxílio que este recurso de imagem pode trazer no manejo e diagnóstico do paciente. Em nosso estudo, agrupamos uma categoria denominada "enfermidades não neoplásicas de glândulas salivares" inserindo exclusivamente sialodenites, sialolitítase e os fenômenos de retenção de muco. Desta maneira, estas alterações representaram, aproximadamente, 26% do total, denotando uma contribuição de 76,5%. O resultado expressivo no manejo dos casos de pacientes

submetidos a US, corroboram com as afirmações de Alyas *et al*. (2005), Onkar *et al*. (2013), Orlandi *et al*. (2013), Zengel *et al*. (2013). Concluiu-se, que a US em alta frequência é uma ferramenta de diagnóstico que se pode lançar mão, para alterações sintomáticas das glândulas salivares e estruturas adjacentes. Também pode guiar o profissional na indicação de outras modalidades de exames de imagens, como a TC e a RM, favorecendo a obtenção de um maior número de informações, sempre que necessário.

Visando aumentar o auxílio da US na determinação do diagnóstico, a mesma vem sendo utilizado como guia em biópsias por punção aspirativa com agulha fina. O método mostra-se eficaz na busca do diagnóstico definitivo de neoplasias de glândulas salivares, tendo o estudo de Kovacevic *et al*. (2010) demonstrado especificidade para neoplasias malignas variando de 86 a 96% e sensibilidade de 82 a 85%. A união dos recursos também pode ser utilizada na identificação de linfonodos metastáticos na região de pescoço. A maior vantagem, deve-se ao fato da US detectar linfonodos diminutos, enquanto que a aspiração citológica determinará, de maneira segura e conclusiva, a presença de metástase no local biopsiado (BORGEMEESTER *et al*., 2008)

Com o surgimento de novas tecnologias, como o uso em frequências elevadas e transdutores de menores dimensões, que possibilitam a introdução do mesmo no interior da cavidade oral, a US está cada vez mais sendo inserida no ambiente odontológico. Os avanços dos pesquisadores vislumbram no futuro promissoras perspectivas de implementação do método na rotina desses profissionais. Sabe-se que, ainda são restritas as informações disponíveis, quando comparadas as da área médica, que faz do recurso uma prática corriqueira na análise de alterações teciduais. Estudos disponíveis na literatura enfatizam os benefícios da US em diversas situações. Avaliação de

aumentos de volume facial ou região de glândulas salivares, determinação do fluxo sanguíneo na intimidade das lesões, estadiamento de linfonodos cervicais são algumas possibilidades de uso. Entretanto, ainda hoje, poucos autores explicitam a relevância da implementação do método no cotidiano da odontologia. Contudo, atualmente, pesquisas como as que foram realizadas por Ghorayeb *et al*.(2008), Salmon *et al*.(2012) e Marotti *et al*.(2013), além de reportar as vantagens do exame, chamam a atenção dos CDs para a sua utilização e enfatizam que a US também pode ser utilizada em diversas especialidades odontológicas.

Até o momento, poucos estudos fornecem de forma explícita as indicações e limitações da US na área da odontologia. Isto favorece o amplo desconhecimento dos seus benefícios por parte dos CDs. Desta forma, os dados obtidos neste estudo permitem sugerir que a US seja uma ferramenta viável, capaz de fornecer informações, muitas vezes elucidativas, das lesões nodulares inespecíficas em tecidos moles da região bucomaxilofacial. Além disto, por apresentar custo financeiro inferior em relação às outras modalidades de imagens, não utilizar radiação ionizante, podendo ser repetida quantas vezes forem necessárias e ser bem tolerada pelos pacientes, a US pode ser considerada, em muitos casos, a primeira escolha, dentre todos os recursos disponíveis quando busca-se avaliar tecidos moles da região bucomaxilofacial.


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ANEXO 1

Parecer consubstanciado emitido em 17 de outubro de 2012 pela Comissão Científica e de Ética da Faculdade de Odontologia da PUCRS

Comissão Científica e de Ética
Faculdade da Odontologia da PUCRS

Porto Alegre 17 de outubro de 2012

O Projeto de: Dissertação

Protocolado sob nº:	0048/12
Intitulado:	Aplicabilidade da ultrassonografia como exame complementar no diagnóstico de lesões em tecidos moles da região bucomaxilofacil.
Pesquisador Responsável:	Profa. Dra. Maria Antonia Z. de Figueiredo
Pesquisadores Associados:	Felipe Leal Martins
Nível:	Dissertação / Mestrado

Foi ***aprovado*** pela Comissão Científica e de Ética da Faculdade de Odontologia da PUCRS em *17 de outubro de 2012.*

Este projeto deverá ser imediatamente encaminhado ao CEP/PUCRS

Profa. Dra. Ana Maria Spohr
Coordenadora da Comissão Científica e de Ética da
Faculdade de Odontologia da PUCRS

Av. Ipiranga, 6681, Prédio 06 sala 210
Porto Alegre /RS – Brasil – Cx. Postal:1429
90619-900

Fone Fax (51) 3320-3588
e-mail odontologia-pg@pucrs.br

ANEXO 2

Parecer consubstanciado do Comitê de Ética em Pesquisa da PUCRS emitido em 04 de Dezembro de 2012.

PONTIFÍCIA UNIVERSIDADE CATÓLICA DO RIO GRANDE DO SUL - PUC/RS

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Aplicabilidade da ultrassonografia como exame complementar no diagnóstico de lesões em tecidos moles da região bucomaxilofacial.

Pesquisador: Maria Antonia Zancanaro de Figueiredo

Área Temática:

Versão: 1

CAAE: 09696312.0.0000.5336

Instituição Proponente: Pontifícia Universidade Católica do Rio Grande do Sul - PUC/RS

DADOS DO PARECER

Número do Parecer: 162.937

Data da Relatoria: 09/11/2012

Apresentação do Projeto:

Projeto do programa de pós graduação stricto sensu da Faculdade de Odontologia, buscando verificar 101 o grau de fidedignidade diagnóstica da ultrassonografia, objetivando sua aplicabilidade na área da odontologia, como um exame complementar passível de uso no estabelecimento do diagnóstico clínico e manejo de lesões de tecidos moles bucomaxilofaciais.

Objetivo da Pesquisa:

Objetivo Geral

Avaliar a contribuição da ultrassonografia como um recurso diagnóstico nas lesões em tecidos moles da região bucomaxilofacial.

Objetivo Específico:

> Avaliar a acurácia da ultrassonografia comparando o diagnóstico clínico estabelecido na primeira consulta do paciente com o diagnóstico sugerido após a execução da ultrassonografia e o diagnóstico final através da evolução clínica ou diagnóstico histopatológico, quando indicada a biópsia da lesão.

Avaliação dos Riscos e Benefícios:

Nenhum, pesquisa em registros.

Endereço: Av.Ipiranga, 6681
Bairro: **CEP:** 90.619-900
UF: RS **Município:** PORTO ALEGRE
Telefone: (513)320--3345 **Fax:** (513)320--3345 **E-mail:** cep@pucrs.br

PONTIFÍCIA UNIVERSIDADE CATÓLICA DO RIO GRANDE DO SUL - PUC/RS

Comentários e Considerações sobre a Pesquisa:

Apresenta adequação ética e metodologica para aprovação.

Considerações sobre os Termos de apresentação obrigatória:

Todos presentes.

Recomendações:

Aprovar.

Conclusões ou Pendências e Lista de Inadequações:

Nenhuma.

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

Considerações Finais a critério do CEP:

PORTO ALEGRE, 04 de Dezembro de 2012

Assinador por:
Rodolfo Herberto Schneider
(Coordenador)

Endereço: Av.Ipiranga, 6681
Bairro: **CEP:** 90.619-900
UF: RS **Município:** PORTO ALEGRE
Telefone: (513)320--3345 **Fax:** (513)320--3345 **E-mail:** cep@pucrs.br

ANEXO 3

Parecer da Banca Examinadora no Exame de Qualificação do Projeto de Pesquisa realizado em 14 de Setembro de 2012.

Pontifícia Universidade Católica do Rio Grande do Sul
FACULDADE DE ODONTOLOGIA
PÓS-GRADUAÇÃO

PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA
ÁREA DE CONCENTRAÇÃO: Estomatologia
NÍVEL: MESTRADO
EXAME DE QUALIFICAÇÃO – ATA 25/12

Data: 14/ setembro/2012 – 08 horas

Candidato: FELIPE LEAL MARTINS

Orientadora: Profa. Dra. Maria Antonia Zancanaro de Figueiredo

Título da pesquisa: Aplicabilidade da ultrassonografia como exame complementar no diagnóstico das lesões em tecidos moles da região bucomaxilofacial

Comissão Examinadora: Profa. Dra. Fernanda Gonçalves Salum
Profa. Dra. Maria Ivete Rockenbach

(X) Aprovado

( ) Aprovado com projeto pendente

( ) Reprovado

Ass.: _____
Felipe Leal Martins
Aluno

Ass.: _____
Profa. Dra.
Orientadora

Ass.: _____
Profa. Dra. Fernanda Gonçalves Salum
Professora Avaliadora

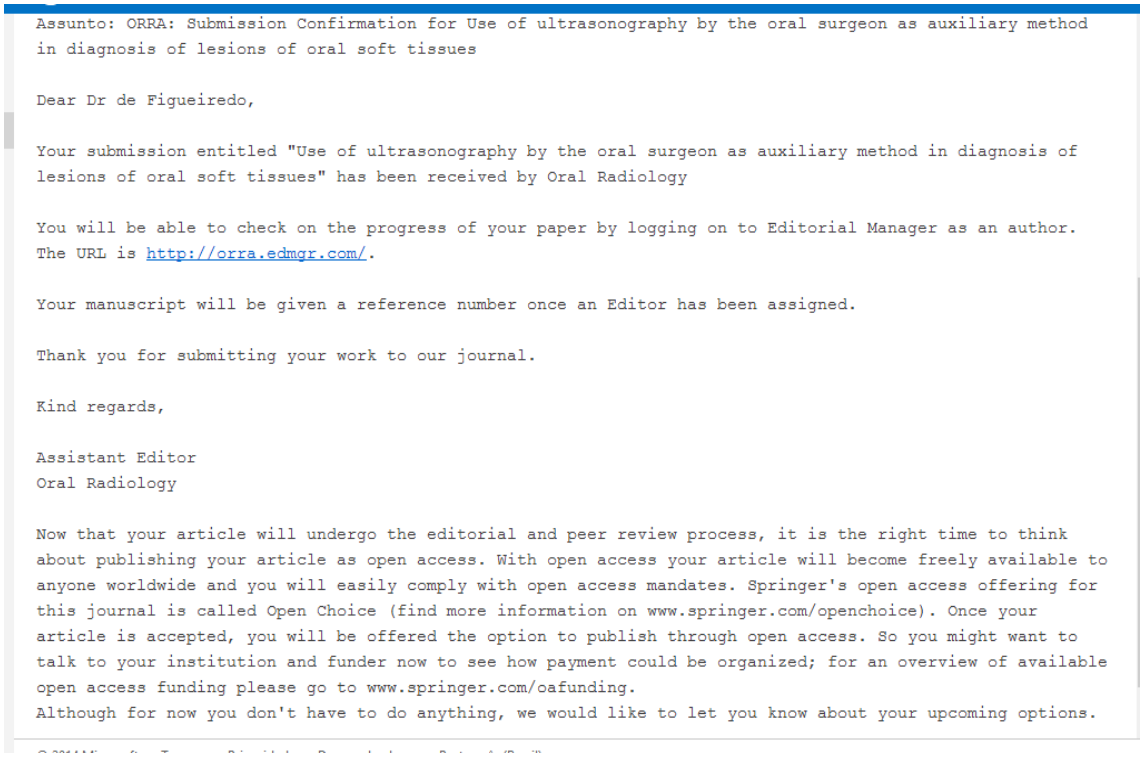
Ass.: _____
Profa. Dra. Maria Ivete Rockenbach
Professor Avaliador

Ass.: _____
Prof. Dr. José Antonio Poli de Figueiredo
Coordenador do Programa de Pós-Graduação em Odontologia

CÓPIA

ANEXO 4

Comprovante de submissão do artigo científico intitulado **"Use of ultrasonography by the oral surgeon as auxiliary method in diagnosis of lesions of oral soft tissues"** ao periódico *Oral Radiology*.



Assunto: ORRA: Submission Confirmation for Use of ultrasonography by the oral surgeon as auxiliary method in diagnosis of lesions of oral soft tissues

Dear Dr de Figueiredo,

Your submission entitled "Use of ultrasonography by the oral surgeon as auxiliary method in diagnosis of lesions of oral soft tissues" has been received by Oral Radiology

You will be able to check on the progress of your paper by logging on to Editorial Manager as an author. The URL is http://orra.edmgr.com/.

Your manuscript will be given a reference number once an Editor has been assigned.

Thank you for submitting your work to our journal.

Kind regards,

Assistant Editor
Oral Radiology

Now that your article will undergo the editorial and peer review process, it is the right time to think about publishing your article as open access. With open access your article will become freely available to anyone worldwide and you will easily comply with open access mandates. Springer's open access offering for this journal is called Open Choice (find more information on www.springer.com/openchoice). Once your article is accepted, you will be offered the option to publish through open access. So you might want to talk to your institution and funder now to see how payment could be organized; for an overview of available open access funding please go to www.springer.com/oafunding.
Although for now you don't have to do anything, we would like to let you know about your upcoming options.

ANEXO 5

Normas para publicação de artigo no periódico ***Oral Radiology***.

Oral Radiology

General

Oral Radiology, the official journal of the Japanese Society for Oral and Maxillofacial Radiology (JSOMR), is a peer-reviewed publication under the supervision of the International Editorial Board of JSOMR, which selects all materials submitted for publication, including advertisements.

No responsibility is accepted by the Editorial Board for the opinions expressed by the contributors.

Oral Radiology accepts material prepared and submitted according to the following instructions to authors while reserving the right to introduce any changes necessary to make the contribution conform to the editorial standards of the journal. Membership in JSOMR is not a prerequisite for submitting material for publication, which should concern head and neck diagnostic imaging or any related fields.

Oral Radiology welcomes original articles, review articles, case reports, technical reports, rapid communications, and letters to the editor not previously published or being considered for publication elsewhere.

When an article is accepted for publication, the author agrees that the copyright of the article is transferred to JSOMR and Springer. The work shall not be published elsewhere in any language without the written consent of the copyright owners.

Certification Form

A certification form can be downloaded from the journal's official Website (http://www.springer.com/journal/11282/), must be signed by all authors of the submitted article.

The certification form must be submitted to the journal's editorial office by uploading it as a PDF file at the same time you submit your manuscript via Editorial Manager.

IMPORTANT: Upon receipt of the Certification for Manuscript Submission, manuscripts are officially recognized as submissions.

Author Submission Checklist

A submission checklist can be downloaded from the journal's official Website (http://www.springer.com/journal/11282/). The submission checklist must be submitted to the journal's editorial office by uploading it as a PDF file at the same time you submit your manuscript via Editorial Manager.

Online Submission

Authors should submit their manuscripts online. Connect directly to the site and upload all of your manuscript files following the instructions given on the screen.

http://www.editorialmanager.com/orra

Please use the Help option to see the most recently updated system requirements.

Because this journal follows a double-blind review policy, author information should not be included in the manuscripts. Authors should submit the title page, the manuscripts, and the acknowledgments separately.

Types of Papers

1. Original articles, technical reports, and case reports should be divided into sections (see below). Articles should be introduced by an abstract with key words (see below).

2. Review articles should include rigorous critical assessment of clinical, educational, and/or laboratory research in a field of interest to the readership of the journal.

3. Rapid communications should not normally exceed 1500 words .

4. Letters to the editor should be on a topic of current interest or should comment on material published in the same issue or a previous issue of the journal. Letters should be limited to 500 words.

Title Page

The title page should include:

-A concise and informative title

-The name(s) of the author(s)

-The affiliation(s) and address(es) of the author(s)

-The e-mail address, telephone and fax numbers of the corresponding author

Manuscripts

Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.

- Use italics for emphasis.

- Do not use double-byte characters.

- Use the automatic page-numbering function to number the pages in the bottom margin (footer).

- Do not use field functions.

- Use tab stops or other commands for indents, not the space bar.

- Use the table function, not spreadsheets, to make tables.

- Use the equation editor or MathType for equations.

Original articles and technical reports should be divided into sections: Abstract, Introduction, Materials and methods, Results, Discussion. Case reports should be divided into these sections: Abstract, Introduction, Case report(s), Discussion.

Each section or component should begin on a new page. Illustrations (including radiographs) should also be submitted in an electronic form.

Permission to reproduce previously published material or to use illustrations that might identify human subjects must be included.

Abstract and Key Words

An abstract of no more than 250 words should be included.

For original articles, the abstract should contain the subheadings Objectives, Methods, Results, Conclusions. For other types of articles, subheadings in the abstract are optional.

The abstract should be followed by three to five key words, which can be used for indexing purposes.

Acknowledgments

Any persons who have made substantive contributions to a study should be acknowledged. Grants or other financial support should also be acknowledged, citing the name of the supporting organization and the grant number.

Ethical Standards

Oral Radiology has adopted the Uniform Requirements for Manuscripts (URM) established by the International Committee of Medical Journal Editors (http://www.icmje.org/). The editors reserve the right to reject manuscripts that do not comply with the below-mentioned requirements. The author will be held responsible for false statements or failure to fulfill the below-mentioned requirements.

Conflict of Interest

When authors submit a manuscript, they are responsible for disclosing all financial and personal relationships that might bias their work. To prevent ambiguity, authors must state explicitly whether potential conflicts do or do not exist.

In adherence to current global standards of practice formulated by the ICMJE, the Editors require all authors to complete and submit a Uniform Disclosure Form (available at: http://www.icmje.org/coi_disclosure.pdf) , and the corresponding author to submit all the Uniform Disclosure Forms at the time of submission.

Information on potential conflict(s) of interest may be revealed to reviewers, or as a note in the published version of the article, at the Editors' discretion.

Each author must indicate whether or not they have a financial relationship with any organization that sponsored the research, or is associated with any product or procedure that is mentioned in the article.

For each source of funds, both the research funder and the grant number should be given.

Conflict of interest statements should be present on every manuscript before the References section. The statement should list each author separately by name.

Recommended wording is as follows:

Author X declares that he has no conflict of interest.

Author Y has received research grants from Drug Company A.

Author Z has received a speaker honorarium from Drug

Company B and owns stock in Drug Company C.

If multiple authors declare no conflict, this can be done in one sentence:

Author X, Author Y, and Author Z declare that they have no conflict of interest.

Human rights statements and informed consent

For studies with human subjects, please include the following statement before the References section: 'All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the

Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all patients for being included in the study.' If doubt exists whether the research was conducted in accordance with the Helsinki Declaration, the authors must explain the rationale for their approach, and demonstrate that the institutional review body explicitly approved the doubtful aspects of the study. Identifying information of patients or human subjects, including names, initials, addresses, admission dates, hospital numbers, or any other data that might identify patients should not be published in written descriptions, photographs, or pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) gives written informed consent for publication. If any identifying information about patients is included in the article, the following sentence should also be included: 'Additional informed consent was obtained from all patients for which identifying information is included in this article.'

Animal rights statements

For studies with animals, include the following sentence in the manuscript before the References section: 'All institutional and national guidelines for the care and use of laboratory animals were followed.'

If the authors did not carry out animal and/or human studies as part of their article they must include the following statement in the manuscript before the References section: 'This article does not contain any studies with human or animal subjects performed by the any of the authors.'

References

Only work closely related to the subject matter of the article should be cited. Exhaustive reference lists should be avoided. References should follow the Vancouver format and should be cited in sequence in the text.

References should be cited using numbers in square brackets on the line, e.g., Ames et al. [1] reported…,or …have been published previously [1, 6].

All references cited should appear in a reference list at the end of the article. The list, double-spaced, should be in numerical order corresponding to the order of citation in the text. For six or fewer authors, all authors should be listed. For seven or more authors, the first six should be listed, followed by et al. Abbreviations for titles of medical periodicals should conform to those used in the latest edition of Index Medicus. The first and last page numbers for each reference should be provided. Abstracts and letters must be identified as such. Articles in press may be included in the list of references. Manuscripts submitted for publication and papers presented at meetings should not be included as references, nor should abstracts of papers presented at meetings not in the public domain. These should be cited parenthetically as personal communications in the text.

Examples of References

Journal article:

1. Chen SK, Chien HH, Lin L. Management of oral and maxillofacial radiology clinics in Taiwan's dental schools. Dentomaxillofac Radiol. 2001;30:336–41.

Journal article in press:

2. Thomas G, Pandey M, Mathew A, Abraham EK, Francis A, Somanathan T, et al. Primary intraosseous carcinoma of the jaw: pooled analysis of world literature and report of two new cases. Int J Oral Maxillofac Surg. In press 2004.

Journal article by DOI:

3. Uchiyama Y, Murakami S, Kishino M, Furukawa S. Ameloblastic fibro-odontoma arising in the mandible: three case reports. Oral Radiol. 2009. doi: 10.1007/s11282-009-0008-y

Entire book:

4. Shafer WG, Hine MK, Levy BM. A textbook of oral pathology. 4th ed. Philadelphia: WB Saunders; 1983.

Chapter in a book:

5. Lovas J. Infection/inflammation. In: Miles DA, Kaugars BS, Van Dis Margot, Lovas JGL, editors. Oral and maxillofacial radiology: radiologic/pathologic correlations. Philadelphia: WB Saunders; 1991. p. 7–20.

Abstract:

6. Mileman PA, Espelid I. Radiographic treatment decisions — a comparison between Dutch and Norwegian practitioners [abstract]. J Dent Res. 1986;65:609.

Conference proceedings:

7. Fuchihata H, Uemura S, Kishi K, Fujishita M, Tanimoto K, editors. Oral and Maxillofacial Radiology Today. Proceedings of the 12th International Congress of Dentomaxillofacial Radiology; 1999 June 26–July 1; Osaka, Japan. Amsterdam: Elsevier; 2000.

Conference paper:

8. Sasaki T. Recent reappraisal on the effect of radiation in the low dose domain. In: Fuchihata H, Uemura S, Kishi K, Fujishita M, Tanimoto K, editors. Oral and Maxillofacial Radiology Today. Proceedings of the 12th International Congress of Dentomaxillofacial Radiology; 1999 June 26–July 1; Osaka, Japan. Amsterdam: Elsevier; 2000. p. 3–8.

Letter to the editor:

9. Taguchi A, Kobayashi J, Suei Y, Ohtsuka M, Tanimoto K, Sanada M, et al. Relationship between estrogen receptor genotype and tooth loss in postmenopausal women (letter). JAMA. 2001;286:2234–5.

Additional examples are available on the web site for the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (www.icmje.org).

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  - For vector graphics, the preferred format is EPS; for halftones, please use TIFF format.

  - MS Office files are also acceptable. Do not supply PowerPoint files as these may be problematic with respect to quality rendering.

  - Use of double-byte characters should be avoided.

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  - Name your figure files with ‘‘Fig’’ and the figure number, e.g., Fig1.eps.

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  Definition: Black and white graphic with no shading.

  - Do not use faint lines and/or lettering, and check that all lines and lettering within the figures are legible at final size.

  - All lines should be at least 0.1 mm (0.3 pt) wide.

  - If provided as scanned images or bitmap images, line drawings should have a minimum resolution of 1200 dpi.

  - Vector graphics containing fonts must have the fonts outlined or embedded in the files.

  Halftone art

Definition: Photographs, drawings, or paintings with fine shading, etc.

- If any magnification is used in the photographs, indicate the magnification by using scale bars within the figures themselves.

- Halftones should have a minimum resolution of 300 dpi.

Combination art

Definition: A combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.

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- Keep lettering consistently sized throughout your final artwork, usually about 2–3 mm (8–12 pt).

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- Avoid effects such as shading, outline letters, etc.

- Do not include titles or captions in illustrations.

Figure placement and size

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- Figures should be 39 mm, 84 mm, 129 mm, or 174 mm wide and not higher than 234 mm

ANEXO 6

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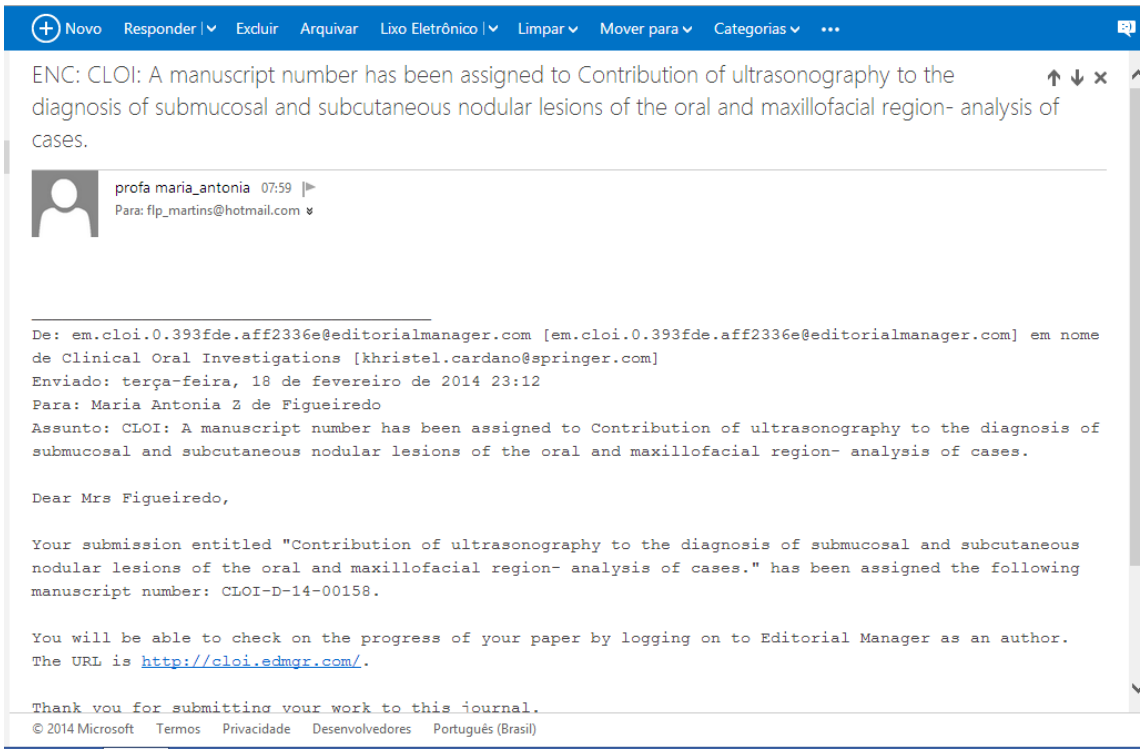

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ANEXO 7

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- Invited reviews
- Short communications
- Letters to the editor

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University of Regensburg

Department of Conservative Dentistry and Periodontology

Franz-Josef-Strauß-Allee 11

93053 Regensburg

Germany

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Please provide a structured abstract of 150 to 250 words which should be divided into the following sections:

- Objectives (stating the main purposes and research question)
- Materials and Methods
- Results
- Conclusions
- Clinical Relevance

These headings must appear in the abstract.

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Always use footnotes instead of endnotes.

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Acknowledgments of people, grants, funds, etc. should be placed in a separate section before the reference list. The names of funding organizations should be written in full.

References

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Reference citations in the text should be identified by numbers in square brackets. Some examples:

1. Negotiation research spans many disciplines [3].

2. This result was later contradicted by Becker and Seligman [5].

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- Book chapter

  Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257

- Online document

  Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb. http://physicsweb.org/articles/news/11/6/16/1. Accessed 26 June 2007

- Dissertation

  Trent JW (1975) Experimental acute renal failure. Dissertation, University of California

Always use the standard abbreviation of a journal's name according to the ISSN List of Title Word Abbreviations, see

- www.issn.org/2-22661-LTWA-online.php

For authors using EndNote, Springer provides an output style that supports the formatting of in-text citations and reference list.

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- Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

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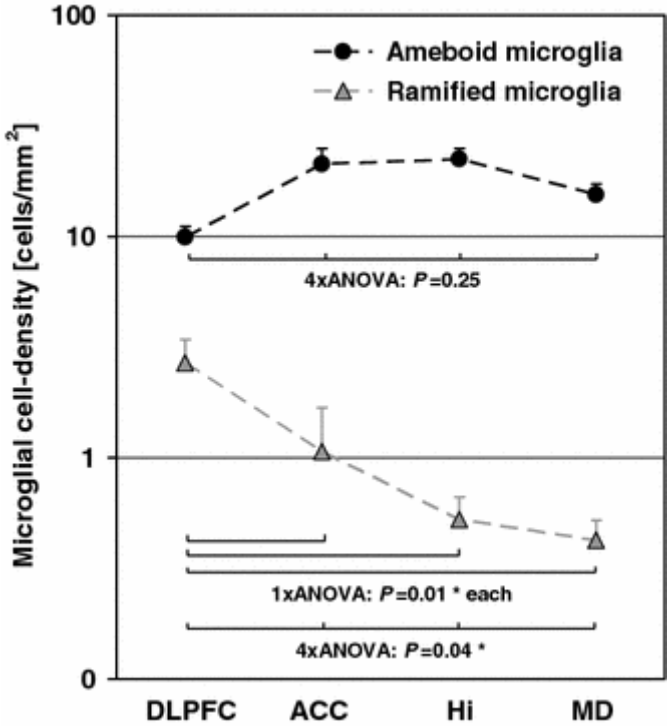

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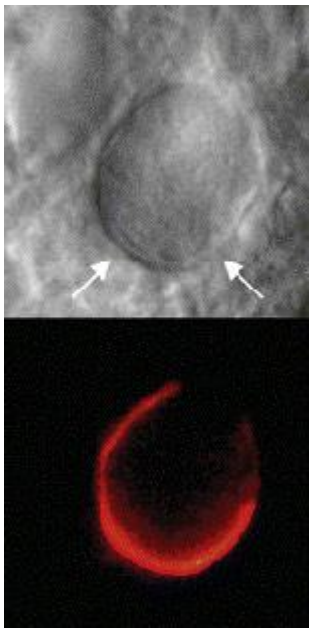

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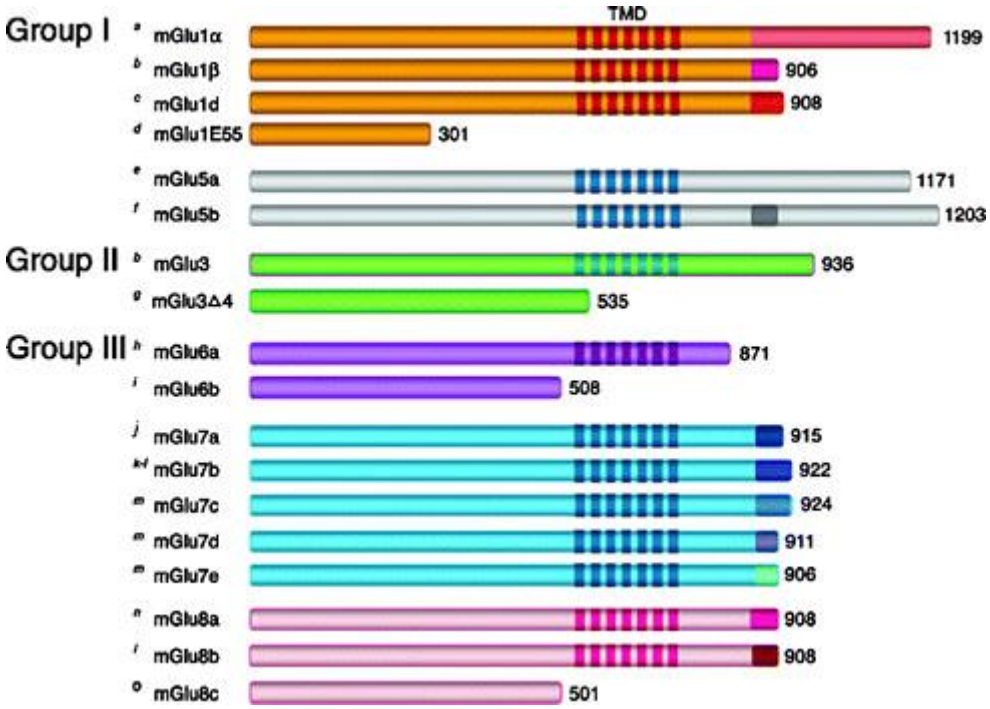

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PUCRS

APÊNDICE A

Ficha confeccionada para coleta dos dados dos pacientes

PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA/PUCRS

ESTOMATOLOGIA CLÍNICA

CONTRIBUIÇÃO DA ULTRASSONOGRAFIA COMO EXAME COMPLEMENTAR NO ESTABELECIMENTO DO DIAGNÓSTICO DE LESÕES NODULARES SUBMUCOSAS E SUBCUTÂNEAS DA DA REGIÃO BUCOMAXILOFACIAL

Profª Drª Maria Antonia Zancanaro de Figueiredo / Mestrando Felipe Leal Martins

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Nº da Ficha: _____

Nome Completo: _____

Sexo: M (____) F (____) **Idade: _____**

Localização da Lesão: _____

Diagnóstico Clínico: _____

Diagnóstico Ultrassonográfico : _____

Padrão predominante da imagem: ( ) Hiperecóica ( ) Hipoecóica ( ) Anecóica

Número do Exame Ultrassonográfico:_____

Descrição do laudo ultrassonográfico ou cópia anexada do mesmo _____

_____

_____

_____

Exame histopatológico: ( ) sim ( )não

Número do exame histopatológico: _____ **Laboratório: _____**

Diagnóstico Histopatológico: _____

_____

Diagnóstico Final: _____

APÊNDICE B

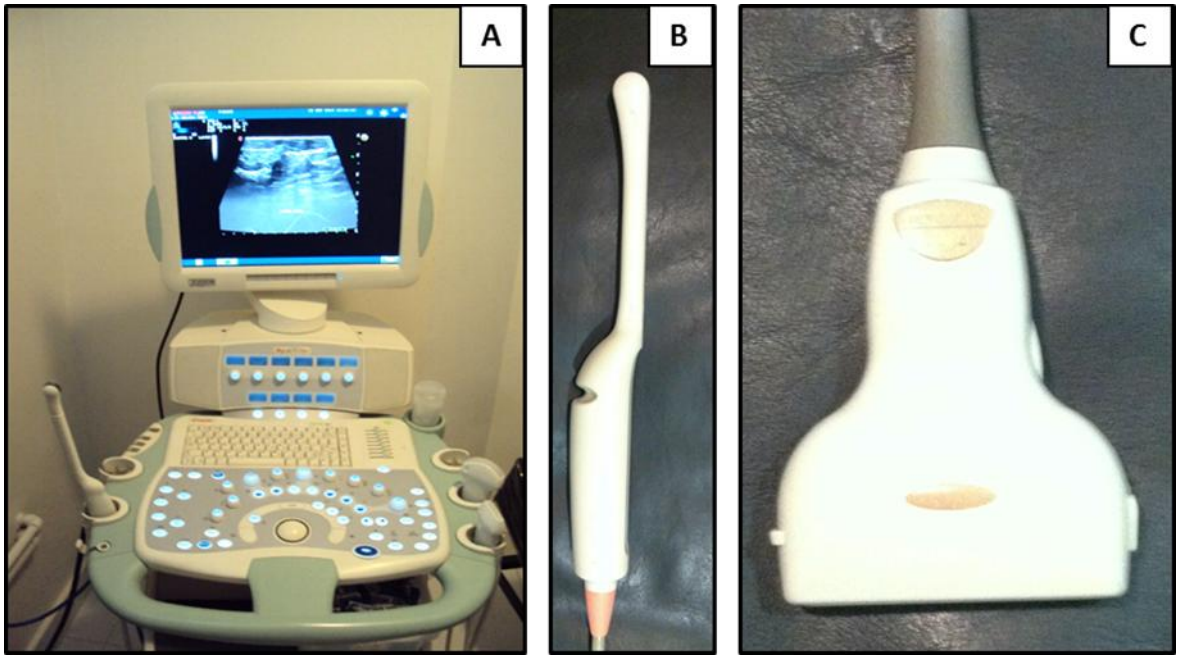

Figura 1: Equipamento de US utilizado na pesquisa, Toshiba – Japan, modelo Aplio 80 (A). Transdutor endocavitário com frequências variando entre 3,5 MHz e 7,5MHz (B). Transdutor linear com frequência variando entre 7,5 MHz e 12 MHz (C).

APÊNDICE C

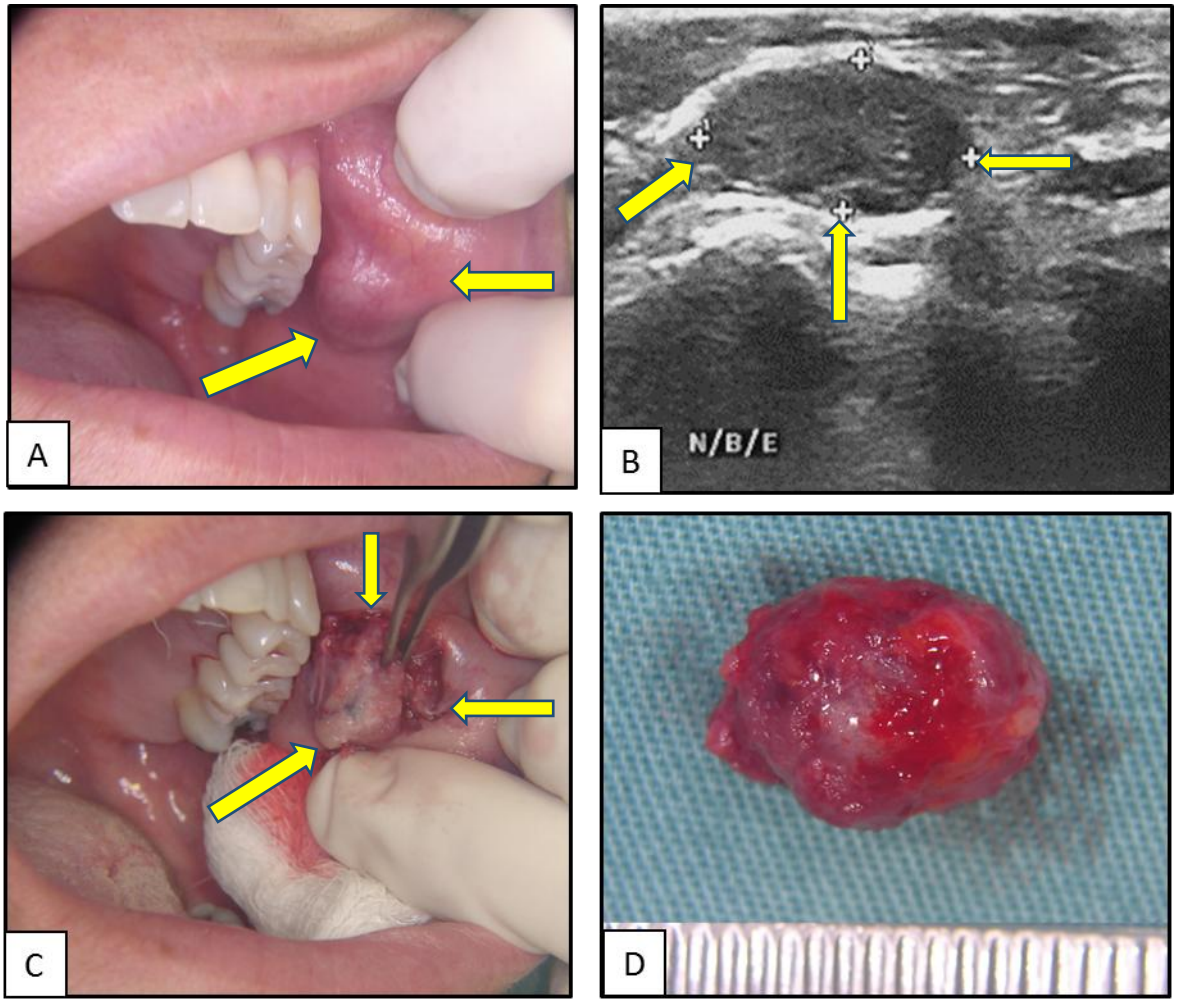

Figura 4: Nódulo inespecífico na mucosa jugal esquerda, com 2 meses de evolução, incluído na amostra (A). US da região referida mostrando lesão predominantemente hipoecóica, homogênea, de localização submucosa (B). Aspecto transcirúrgico (C). Peça operatória cujo diagnóstico histopatológico foi de adenocarcinoma (D).

APÊNDICE D

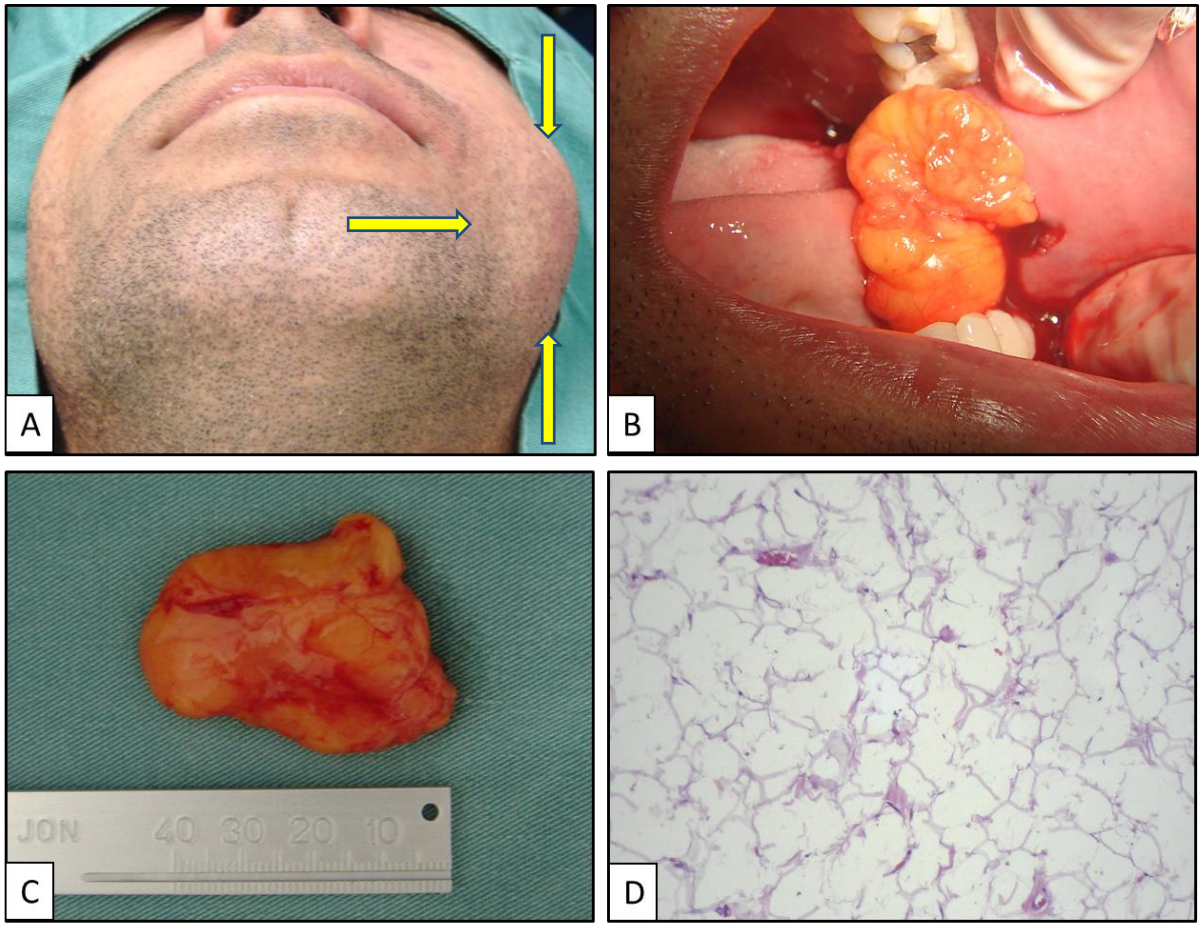

Figura 5: Nódulo subcutâneo, com 1 ano de evolução, comprometendo o lado esquerdo da face, incluído na amostra (A). Aspecto transcirúrgico (B) e macroscópico da peça operatória, obtida mediante biópsia excisional (C). Fotomicrografia evidenciando células adiposas maduras (HE, aumento aproximado de 400X), compatíveis com o diagnóstico de lipoma (D).

APÊNDICE E

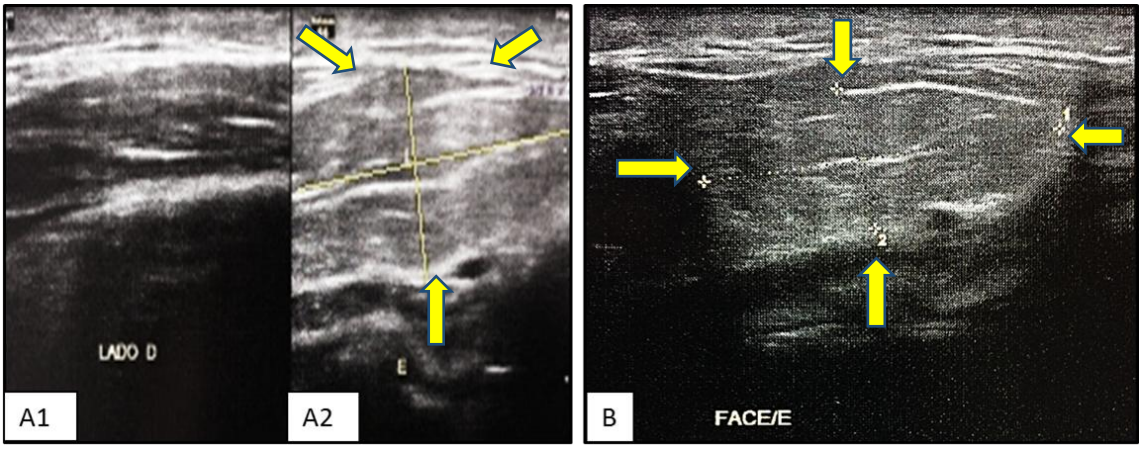

Figura 6: Imagem ultrassonográfica comparativa entre o lado direito e esquerdo da face do paciente referido na figura 5 (A1 e A2). US da lesão nodular esquerda (B).