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Use of fan beam computerized tomography and cone beam computerized tomography in oral and maxillofacial surgery and its indications: A literature review

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Abstract

Introduction: Contemporary dentistry increasingly relies on advanced technology techniques, among these are high-standard imaging exams such as Cone Beam Computed Tomography (CBCT) or "Cone Beam" and Spiral Computed Tomography or "Fan Beam", which are have become an important diagnostic tool for the performance of the Dental Surgeon. In Oral and Maxillofacial Surgery and Traumatology, the detailed visualization of craniofacial anatomical structures is of paramount importance, making it possible to dimension, locate and observe morphological characteristics of bone structures and alterations, in a detailed way, which adds precision to diagnosis and treatment.

Aim: The present study aims to present and evaluate the indications, advantages and disadvantages of CBCT and Fan Beam diagnostic tests and their applicability in the scope of Oral and Maxillofacial Surgery and Traumatology.

Methods: A careful review of the literature available on the PubMed indexing platform was performed, selecting studies from the last 5 years, in addition to a manual search for relevant publications in the reference lists of the selected articles. To this end, the following combination of keywords was used: "Spiral Computed Tomography", "Cone Beam Computed Tomography" and "Oral surgery", obtaining, in the end, 18 studies to compose the scope of this work.

Results: CBCT is the gold standard for hard tissue evaluation, with indications for examinations in smaller sites, such as minor oral surgery, implant dentistry, fractures, temporomandibular joint and endodontics. It has a lower cost, shorter exposure time to X-rays, however, it does not have an assessment for the evaluation of adjacent soft tissues. On the other hand, the Fan Beam (FBT), used for diagnosis of the whole body, has excellent sharpness for structures that overlap, whether soft or hard. It has a higher cost and longer exposure time to X-rays.

Conclusion: The different techniques presented proved to be quite efficient in the use of Dentistry and Oral and Maxillofacial Surgery, with their respective indications.

Keywords: Spiral Computed Tomography; Cone Beam Computed Tomography; Oral Surgery; Fan beam computerized tomography

1. Introduction

The imaging exam is essential as a diagnostic tool and guidance in Oral and Maxillofacial Surgery and Traumatology, where it will be possible to locate pathologies, anatomical alterations and fractures [1, 2]. However, as they are complex and very close anatomical structures, it is necessary to visualize them in more detail, exploring the three dimensions in the sagittal, coronal and axial planes [3].

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In this context, it is worth mentioning the use of Cone Beam Computed Tomography (CBCT) or cone beam, where a set of highly accurate images [4, 5] is formed, enabling their manipulation in 3D using specific software [6]. As an option for imaging examination, there is Spiral Computed Tomography or fan beam, having this name because the X-ray is emitted by the tube in spiral movements around the patient. Both have the main advantage of providing images in sequential sections with no overlapping of anatomical structures, compared to traditional radiographic methods [7].

Fan-Beam Tomography (FBT) has high sharpness, providing high contrast resolution [8, 9]. Regarding Cone Beam Computed Tomography (CBCT), a lower image resolution is found, but with a lower number of artifacts found [10].

However, the decision making for which technique to use, in addition to the applicability of each one of these in Oral and Maxillofacial Surgery and Traumatology, will depend on some factors, such as: costs, technical experience of the operator, familiarity with the diagnosis by the Surgeon-Dentist, evaluation of the benefit to the radiation dose [11, 12] , according to the ALARA principle (As Low as Reasonably Achievable), that is, as little as reasonably possible [13].

In this regard, it is necessary to identify ideal situations for the use of cone beam or fan beam techniques, knowing the specific indication for each one and its applicability, its advantages and disadvantages [14, 15, 16, 17], in addition to a comparison between Cone Beam Computed Tomography and Spiral Computed Tomography in the field of dentistry regarding Oral and Maxillofacial Surgery and Traumatology [9].

The choice of technique to be used should be done with caution [18, 19] taking into account important aspects that will be discussed later. The present study therefore aims to detail important considerations about the use of Cone Beam and Fan Beam diagnostic imaging tools in Oral and Maxillofacial Surgery and Traumatology in the light of recent literature through a systematic review.

2. Methods

A selective search was carried out on the MEDLINE (National Library of Medicine) indexing platform, for relevant studies in the English language from the last five years (2016 - 2021). The following combination of keywords was used: "Spiral Computed Tomography", "Cone Beam Computed Tomography" and "Oral surgery". Initially, 459 studies were found and, when applying the filters "full text", "meta-analysis", "randomized controlled trial", "systematic review" and "five years", 22 articles remained available and, after reading their titles and abstracts, 16 studies were selected.

Subsequently, in order to complement the bibliography used in the present article, a new search was carried out on the MEDLINE platform using the following combination of keywords: “Spiral Computed Tomography” and “Dental”, 346 studies were identified and, when the “full text” and “five years”, remain 28 articles available, 3 of which were selected (Figures 1 and 2)

After a careful reading of the titles, abstracts, methodologies applied, as well as the results found, 22 articles were defined to compose the scope of this article (Table 1).

2.1. Inclusion Criteria

- Articles in english language, carried out in the last 5 years, selected by key-words: “Spiral Computed Tomography", "Cone Beam Computed Tomography" and "Oral surgery;

- The studies defined by methods design were included: randomized controlled clinical trial, systematic review and meta-analysis.

Exclusion Criteria:

- Researches available only by abstracts;

- Researches with unclear, poorly or inappropriate methods.

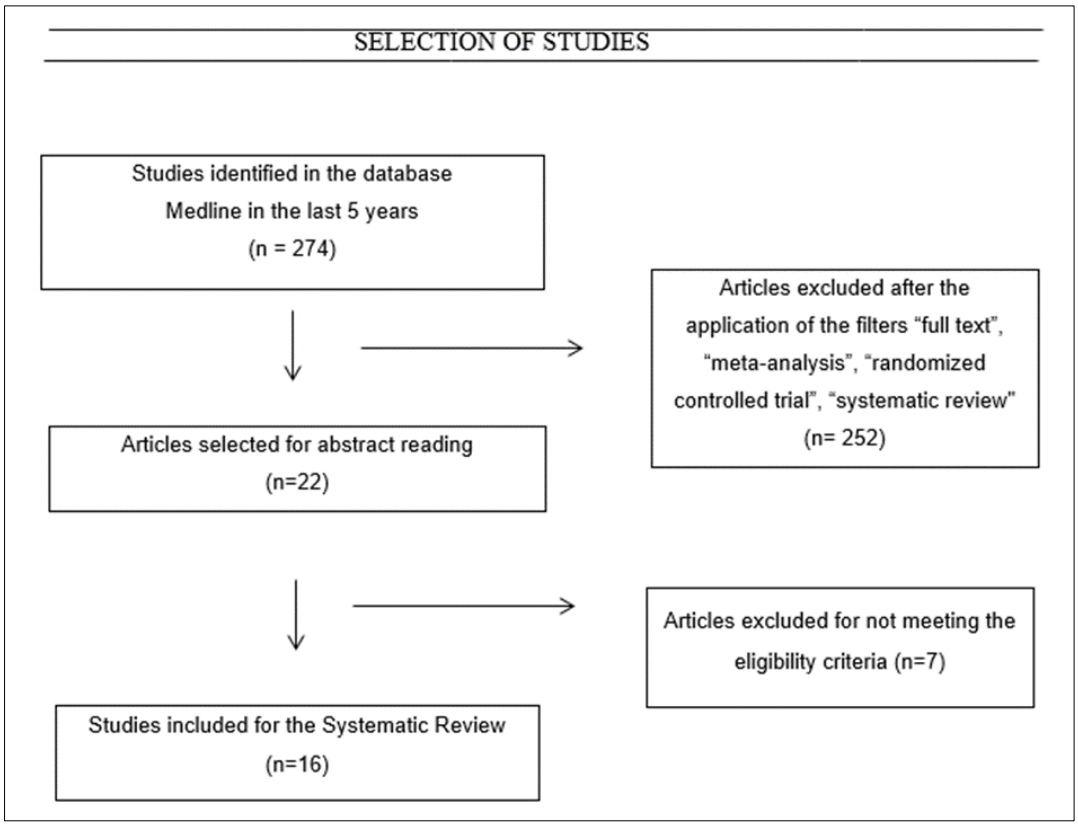

Figure 1 Flowchart of the first selection of studies. Adapted from the PRISMA statement

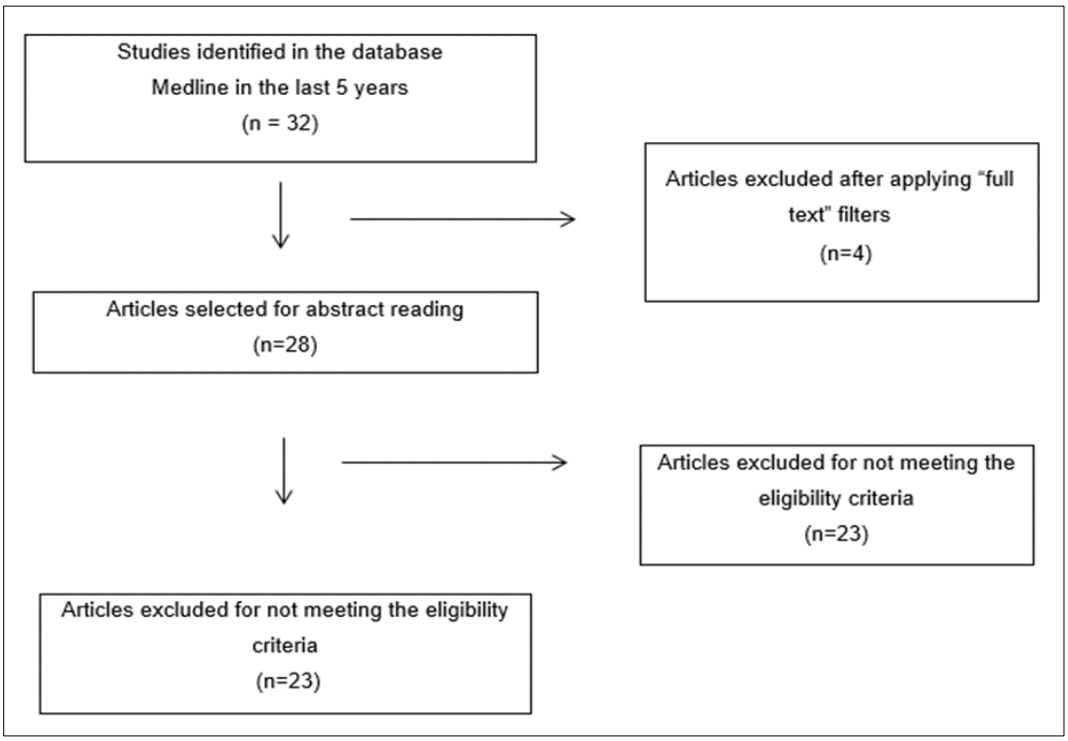

Figure 2 Flowchart of the second selection of studies. Adapted from the PRISMA statement**.**

Studies whose scope was relevant to the topic [20-22], but located outside the period of the search, were included and considered as complementary. These were used as a source of conceptual or illustrative bases in the body of the present study. .

Table 1 Articles that composed the results of this research

Author and year of publication	Kind of study	Goals	Sample	Indications		Benefits		Disadvantages		Conclusion
				CBCT	Fan Beam	CBCT	Fan Beam	CBCT	Fan Beam	
1. Hartlev et al. 2019	Randomized controlled clinical trial	Assessed through CBCT volumetric changes after lateral ridge augmentation using autogenous graft	27 patients chosen by randomization process	Volumetric evaluation and monitoring of facial complex and implanted bone blocks	X	Allowed 3D reconstruction using software	X	Higher number of scans required and presence of small image distortions	X	Bone volumetric changes were not demonstrated from the images generated by CBCT.
2. Kirkham et al. 2018	Systematic review	To compare the accuracy of the panoramic image with the CBCT in the evaluation of the relationship between posterior maxillary roots	Evaluated 5 studies	Assessment of root positioning near or within the maxillary sinus.	X	Allowed three-dimensional evaluation of the roots of the evaluated teeth	X	Increase in cost and exposure to radiation, need for greater professional knowledge	X	CBCT should be requested when OPG does not provide adequate visualization of the superimposed anatomical structures.
3. Araújo et al. 2019	Systematic review	To determine whether the use of CBCT and the information provided modifies the	5 studies were evaluated covering 289 patients	Assessment of the proximity of the lower third	X	Allows location of structures in three dimensions, enabling	X	It has a higher radiation dose when compared to traditional techniques, such as OPG	X	CBCT provides additional information about the positioning

		preoperative assessment of lower third molar removal when compared to OPG		molar to noble anatomical structures		optimal surgical planning and evaluation				of the third molar and mandibular canal, aiding in surgical planning.
4. Eggmann et al. 2016	Systematic review	To evaluate periapical lesion and periodontal disease in the posterior of the maxilla by means of CBCT	20 studies evaluated	Three-dimensional bone assessment	Periapical and periodontal assessment	Bone assessment with quality, 3 dimensions, possibility of visualization of anatomical variations	Has diagnostic validity comparable to CBCT	CBCT image acquisition parameters affect sensitivity of periodontal assessment, higher X-ray incidence	X	CBCT allowed satisfactory evaluation of periapical lesions and periodontal disease, allowing a complete differential diagnosis.
5. Magrin et al. 2020	Randomized clinical trial	Comparing conventional surgery for implant placement with guided virtual surgery performing a CBCT for virtual planning	12 patients were evaluated	Assist in making surgical guide for installation	X	The use of CBCT provides greater precision for planning in implant dentistry.	X	Does not predict clinically visible cumulative errors that could affect rehabilitation	X	The use of CBCT provided less angular deviation in implant installation.
6. Huber et al. 2020	Qualitative, blinded, randomized study	To assess whether UTEMR could replace CBCT as a reference standard in relation to	Nineteen patients diagnosed with MRONJ were evaluated.	Evaluation of bone modification in patients with osteonecr	X	Less presence of artifacts compared to MRI; detailed visualizatio	X	It did not present any disadvantages when compared to MRONJ	X	The evaluation by UTEMR and CBCT of patients with osteonecro

		intraosseous imaging in patients with MRONJ		osis of the jaw		n of bone structures.				sis of the mandible proved to be equivalent.
7. Abolvard et al. 2020	In vitro study	To compare the effectiveness between CBCT and Fan Beam in the detection of foreign bodies in the maxillofacial region	Metal, stone, plastic and glass were used installed in an old woman's head	Indicated when conventional radiographs do not provide enough information	Indicated TCFC does not provide sufficient information	Lower radiation, lower technical cost, fast, widely available and submillimeter resolution	Gold standard for foreign body detection, promotes high contrast accuracy, proper reconstruction of object shape, size and position	Lower geometric projection, sensitivity and resolution than Fan Beam. Deficiency in accurate detection of foreign bodies	High price, limited availability, high radiation doses	Both were accurate in the detection of foreign bodies, considering size, number and composition. However, the Fan Beam showed higher sensitivity and contrast, with no overlaps.
8. Nardi et al. 2017	In vitro study	Evaluate effective dose and image quality CBCT and Fan Beam in head, cervical spine, ear and dental arch scans	*Anderson-Rando Phatom* head	Indicated for dental, craniofacial disorders, surgery planning and implants	Indicated in cases of trauma, inflammation and neoplastic lesions	Lower incidence of X-ray and lower cost.	Provides greater contrast and sharpness	Shows a lot of artifacts when in longer scan time	Higher cost and higher radiation dose	The choice between CBCT and Fan Beam will depend on the clinical consultation. Fan Beam is the object of choice

										when higher resolution and contrast are needed.
9. Leung et al. 2016	In vitro study	Compare the accuracy of radiographic measurements for implant planning using CBCT and Fan Beam	Six pork ribs were used with radiographic markers	Indicated for evaluation and planning in implantology	Indicated for the location of lesions, evaluation of morphology and bone density	Wide visualization of bone structures	There was no overlap	Image distortion was detected at about 0.5mm	X	No difference was found between measurements made with CBCT and Fan Beam. ($p > 0.05$)
10. Kim et al. 2018	Systematic review	To assess current knowledge of the impact of CBCT artifacts on oral and maxillofacial surgical planning and follow-up	11 studies from the MedLine database were reviewed.	Indicated for bone assessment and artifact localization	X	Lower radiation dose	X	Lack of precision in soft tissue, standardized bone density qualification	More artifacts were detected	Artifacts can positively contribute to the location of foreign bodies, aiding in surgical planning.
11. Walter et al. 2020	Systematic review	Comparing CBCT measures of intra-surgical horizontal and vertical bone loss	19 studies were evaluated, with a total of 179 patients.	Assist in periodontal assessment and diagnosis	X	Provides accurate analysis of the morphology of periodontal bone defects	X	It has a higher radiation dose than conventional techniques	X	CBCT was accurate in the assessment of periodontal bone loss.

12. Pitros et al. 2020	Systematic review	To review the incidence of complications after coronecomia	4 studies were analyzed	Evaluate dental element positioning previamente à cirurgia	X	3D visualization	X	High price when compared to traditional radiographic techniques	X	The use of CBCT has increased the value of coronectomy treatment, but it has specificity benefiting surgical planning.
13. Araújo et al. 2020	Systematic review with meta-analysis	Identify whether CBCT reduces sensorineural disturbances (DN) after lower third molar removal when compared to Orthopantomography	6 studies were analyzed, of which analyzed a total of 1052 people	Visualization of the position of the mandibular third molar in relation to the mandibular canal	X	Provides a 3-dimensional image, facilitating the measurement of anatomic position	X	It has a high price and higher radiation index compared to Orthopantomography	X	CBCT was not superior to prevent sensorineural disturbances after mandibular third molar removal.
14. Gottsauner et al. 2018	Systematic review	To describe and compare the different approaches to radiological assessment of the posterior airspace in obstructive sleep apnea	15 studies were analyzed	X	Indicated for whole body assessment	X	Visualization without overlap, accuracy in soft tissue	X	X	The volumetric parameters of SBP did not show significant changes.
15. Stumbras et al. 2020	Randomized and controlle	Evaluate the dimensional changes of the alveolar ridge	40 patients who required anterosupe	Monitoring bone formation	X	Allows assessment of horizontal	X	Not suitable for assessing bone formation	X	With the use of CBCT, it was

	d clinical trial	after 3 months of tooth extraction	rior tooth extraction	after tooth extraction		and vertical alveolar bone changes				possible to observe that all extraction sockets were successfully treated.
16. Bartols et al. 2018	Randomized single-blind controlled trial	Compare bone block grafts fixed at a distance, evaluating frequency, gain and bone resorption by CBCT	30 patients with oropalatal bone width ≤3 mm	Assess bone condition and implant position	X	X	X	X	X	CBCT was effective in the assessment, demonstrating that the BBG-D method is the gold standard for augmenting alveolar ridges.
17. Sanchis et al. 2021	Systematic review with meta-analysis	Determine the thickness of the facial alveolar bone and assess the JCE distance from the alveolar crest	29 studies were evaluated	Assess facial alveolar bone thickness for diagnostic purposes	X	Enables bone assessment before and after tooth extraction, optimizes periodontal and implant planning	X	Lower measurement accuracy due to patient movement, device-specific parameters, artifacts in the presence of metal	X	The use of CBCT provides accurate information about the tooth, local morphology, bone volume and assists in implant planning.

18. Ramis et al. 2021	Systematic review and meta-analysis	Compare results of traditional radiographs and CBCT in the evaluation of apical lesions	27 articles were analyzed, 9903 images diagnosed	Assess bone structure and locate lesions	X	3D image, no geometric distortion and anatomical noise, diagnostic accuracy	X	Higher cost, requires larger space for installation, promotes higher radiation dose		Conventional radiographs promote good performance, but CBCT has greater specificity. It must be carefully evaluated to carry out the indication of the same.
19. Barbosa et al. 2021	Systematic review and meta-analysis	Review the epidemiological, topographical and morphometric aspects of the mental form with CBCT	A total of 66 articles were evaluated, with a sample totaling 14233 people	Assess position of noble anatomical structures	X	X	X	X	X	The DC can make use of quality imaging tests such as CBCT in the management and planning with the patient.
20. Kolk et al. 2014	Longitudinal study	Analyze the indications and advantages of SPECT/CT compared to standard modalities	Thirty patients with HNSCC were longitudinally evaluated	X	Bone invasion assessment in head and neck squamous cell carcinoma	X	It promotes detailed bone delineation, sensitivity of 84% and specificity of 100%, association with	X	It presented false negative results, reducing the sensitivity	Hybrid SPECT/CT showed high specificity providing additional information on the existence

							spectrography allows more accurate localization of bone pathologies.		of the technique	and local extent of malignant bone infiltration in the mandible.
21. Perroti et al. 2021	Clinical trial	To evaluate advantages and disadvantages of two orthognathic surgery methods and three-dimensional imaging evaluation	13 patients undergoing bimaxillary orthognathic surgery	Anatomical assessment of craniofacial structure, localization of anatomical abnormalities	X	3D reconstruction, cephalometric design.	X	Requires specific operator knowledge, overlap can interfere with diagnosis.	X	Cephalometry allows to determine the extent of the skeletal discrepancy in relation to the ideal values, being useful in the classification of the patient's angle.
22. Nowak et al. 2021	Finite Element Analysis (FEA)	Compare reduced tensions according to Huber's hypothesis and assess displacement pattern in the facial skeleton region	6 facial skeleton models were created, among these, 5 with osteotomy variants and 1	X	Indicated for evaluation of craniofacial structure	X	Allows evaluation in multiple slices, 3D reconstruction using software	X	No disadvantages reported	Fan Beam Tomography offers greater surgical predictability, making it possible to perform a computer-

			without. Data from CT scan of a 36-year-old patient							assisted plan. Both surgical techniques analyzed had no impact on the distribution of reduced tensions.

Caption: CBCT: Cone Beam Computed Tomography; OPG: Orthopantomography; MRONJ: Antiresorptive and antiangiogenic medication; UTEMR: Ultrashort Echo-Time Magnetic Resonance; PAS: Upper airspace; BBG-D: Bone block fixed at a distance; JCE: Cement-enamel junction; CD: Dental Surgeon; HNSCC: Squamous Cell Carcinoma of the head and neck

3. Discussion

3.1. Technical Indications

3.1.1. Conical Beam Computerized Tomography (Cbct)

Cone-beam computed tomography emerged in the late 1990s, when the overlap found in two-dimensional radiographic examinations made it difficult to visualize deeper structures[5]. In this way, the technology brought the X-ray beam is projected conically at a fixed point, with the formation of several images segmented in cuts in the three-dimensional planes [12, 15], allowing the detailed anatomical visualization, in addition to the optimization of the visual resources of the image and its spatial manipulation [5].

The CBCT has brought greater accuracy to the diagnosis of craniofacial fractures, making it possible to access the deeper structures affected, planning surgeries for impacted and impacted teeth, as cases frequently observed with third molars and canines [10]. Thus, the planning, evaluation and monitoring of dental implants [5], as well as guided bone regeneration and monitoring of bone quality and quantity subject to alterations due to the use of drugs or treatments [11], evaluation of the temporomandibular joint and also have great application in endodontics [4].

Its relevance is also highlighted in the anatomical evaluation, localization of bone abnormalities, and assistance in the planning and monitoring of orthognathic surgeries, allowing cephalometric design, therapeutic simulations and 3D reconstruction. Three-dimensional cephalometric analysis allows assessing the extent of skeletal discrepancy that may be presented by the patient, as well as determining Angle class before and after surgery [14, 21].

3.1.2. Computerized Spiral Tomography or Fan Beam (Ctfb)

Spiral Computed Tomography can be used as a diagnostic tool both in the head and neck complex and in the rest of the body, being an option for the area of Dentistry and Medicine. The ray is fired and, for the construction of the image, this ray makes several spiral-shaped turns, obtaining axial cuts, allowing multiplanar reconstructions in three dimensions, in addition to excellent image quality, with good sharpness and great contrast. This arrangement of the rays in the form of a spiral or fan, focusing on the area of interest, makes the 3D reconstruction by stacking the obtained slices [9].

The Fan Beam, as well as the Cone Beam Tomography technique, has been indicated for several areas of Dentistry. Due to its high sharpness, contrast and higher resolution, it is possible to more easily distinguish anatomical structures, in addition to allowing the exploration of images generated by software. It can be used as an aid in the diagnosis of oral pathologies such as tumors, anatomical alterations, fractures of the craniofacial complex, especially if they are associated with other fractures throughout the body, localization of foreign bodies in the maxillofacial region, in addition to bone evaluation, whose indication for rehabilitation by implants is desired [7].

Furthermore, it also helps in the planning and monitoring of orthognathic surgery, enabling the reproduction of operative predictability and allowing the observation of anatomical structures of relevance to surgery in a more detailed and expanded way [22].

Despite being more widely applied in the medical and hospital context, aimed at polytraumatized patients, with indication of resections in pathological areas and candidates for the removal of foreign bodies, the Fan Beam can also be a fundamental part in aiding diagnosis and planning in dental cases. Previously mentioned. For example, when two-dimensional images are insufficient or inconclusive, you can use Spiral Computed Tomography, prioritizing diagnostic excellence for the generated image [8, 9].

3.2. Advantages

3.2.1. Conical Beam Computerized Tomography (Cbct)

Because it has been used in Dentistry in recent decades, it has a high level of specificity and technological innovations, allowing the advancement and expansion of therapies in the face and teeth region.

The device used is compact, allowing greater comfort while the patient is seated or standing, which facilitates the performance of the exam in patients with claustrophobia. Its assessment focus is specifically directed to the face and skull region.

Additionally, it allows the exposure time to X-ray to be shorter, due to the smaller area exposed to it and the smaller number of turns of the emitted ray for image formation. This characteristic is in accordance with the radiological principle of ALARA, since the detail of the exam has a great diagnostic benefit with less exposure to other tomographic techniques. Its management must be individualized, according to the needs presented by each patient [2].

Cone Beam Computed Tomography is the gold standard in dentistry for the evaluation of hard tissues, with minimization of overlaps. Studies point to the relevance of this test for diagnostic purposes, follow-up and therapeutic follow-up [6].

The CBCT presents considerably reduced values when compared to the Fan Beam, both in relation to the investment for the acquisition of the machinery and for the patient submitted to the exam [2].

The image obtained by CBCT presents a minimization of artifacts, when the examinee presents metal rehabilitative materials in the oral cavity, such as indirect restorations, amalgams, intra-conduct cores and implants, allowing good visualization of them when present [10].

The image generated in 3D allows the reconstruction of the structures to be evaluated, preserving the anatomical characteristics, as can be seen in figure 3 [18, 25].

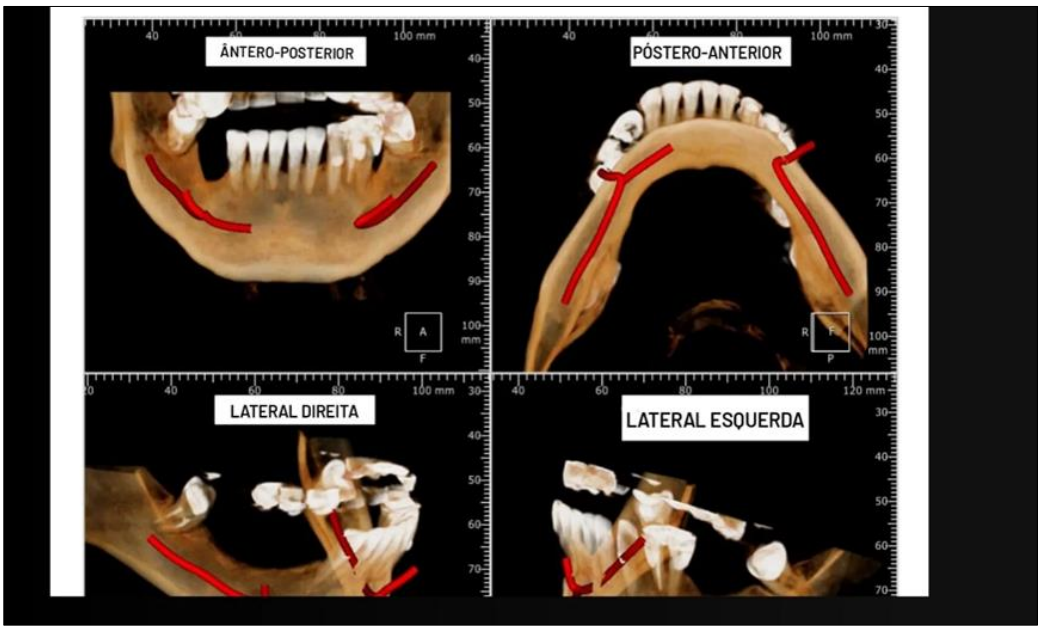

Figure 3 Three-dimensional reformatting of high-resolution CBCT in the mandible region[25]

3.2.2. Computerized Spiral Tomography or Fan Beam (Ctfb)

This imaging technique is widely used in hospital settings and for outpatient medical diagnosis. However, with the growing need to obtain high-quality and accurate images, it is still widely applied in Dentistry [7].

It is formed from a machine that allows the patient to lie on his back, which slowly and continuously passes through the portico while the X-ray waves are emitted in a helical format [7, 8]

Its indication is common in cases of accidents, applicable to multiple trauma patients, that is, fracture of several bone structures, not being exclusive to craniofacial involvement. Depending on their severity, fractures can be evaluated jointly, in other parts of the body, involving bone and soft tissues [7]. In these situations, it is common to find an agglomeration of overlapping anatomical structures, when the need arises for an exam that, in addition to allowing a wide view of all structures, has good sharpness and excellent contrast between soft and hard tissues, with an image in multiple cuts. That allow the three-dimensional reconstruction through software. Furthermore, the literature demonstrates its accuracy in locating foreign bodies [7, 9].

Due to its good sharpness and compatibility with soft and hard tissues, the Fan Beam becomes an option in the diagnosis, localization and monitoring of tumors or other pathologies, in addition to tracking metastases [8].

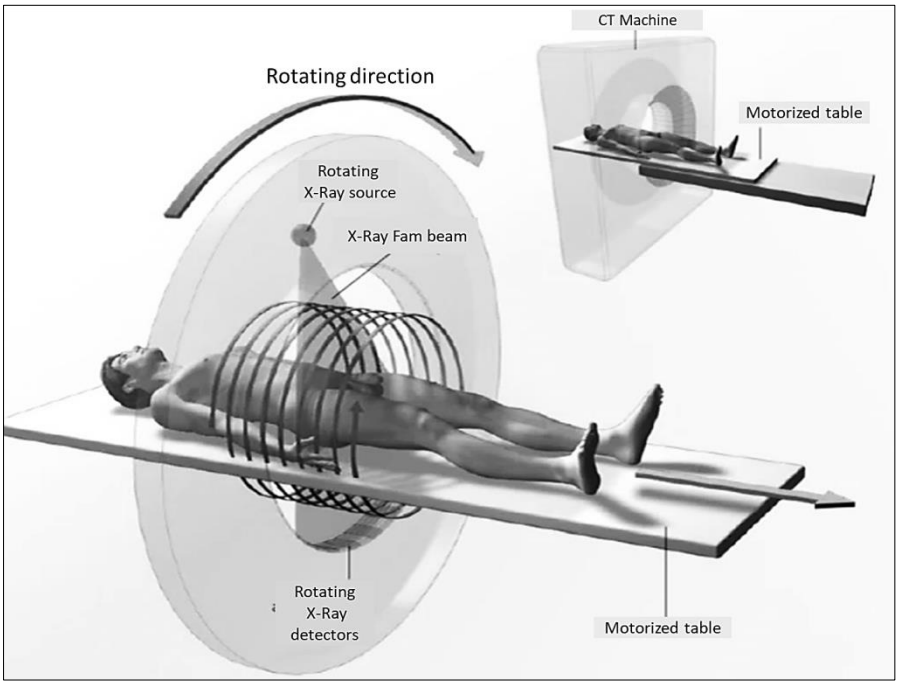

Figure 4 Image of the patient on a CT machine to obtain data during spiral rotation over the patient.

Under this scenario, there is the possibility of associating Fan Beam Computed Tomography with spectrography, enabling the verification of increased metabolism in a given region. The action of the radio isotope associated with CT evidences bone regions with an indication of developing pathologies, demarcating areas where there is intense mitotic proliferation of bone tissue, allowing the identification of tumors and other bone pathologies [20].

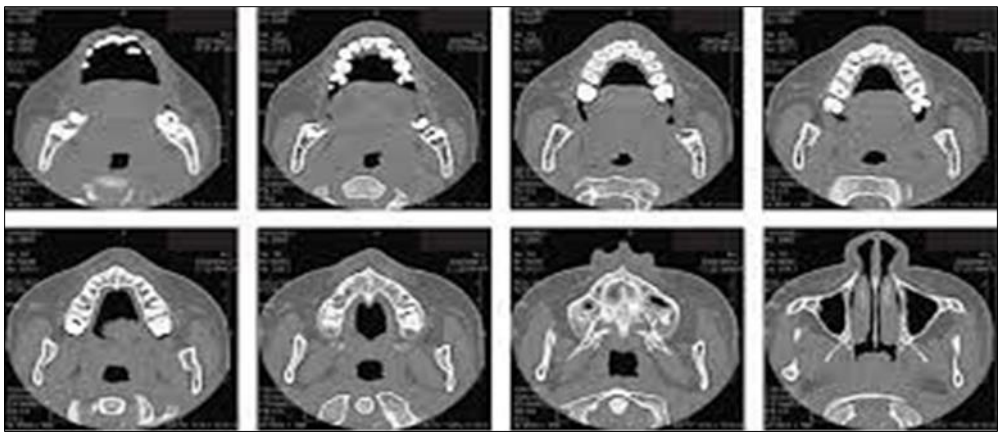

Figure 5 Radiological image made by Fan Beam Computed Tomography of the craniofacial region in sequential section in the axial plane. Modified from Silva et al. 2017 [25]

3.3. Disadvantages

3.3.1. Conical Beam Computerized Tomography (CBCT)

Despite having many advantages and applications in clinical and hospital practice in the field of Dentistry, CBCT has disadvantages that must be taken into account when making the indication.

When compared to simpler radiographic exams, it presents a high cost for the patient who will not always have the financial support to perform it, which results in the option for other complementary exams that, by chance, do not have an accuracy comparable to CBCT [2].

The dose of exposure to X-radiation is also a factor to be taken into account, as it is relatively higher than traditional exams [2].

Despite being the gold standard in the evaluation of hard tissues, CBCT is incapable of recording soft structures, and there is also difficulty in locating anatomical structures, making correct visualization difficult and may generate little precision for locating these structures in the generated image [1,17].

Currently, the volume of acquisition and evaluation has been adapted to smaller and specific regions of the face, making a broad craniofacial evaluation unfeasible, which requires and is determined by a larger FOV, as required by orthosurgical diagnosis, for example. Reformations with acquisitions of different areas of the face are suggested by some manufacturers, but require a greater number of fractional exposures.

Regarding the assessment of bone density, some studies [23] stated that there is no linear relationship between true bone density and that provided objectively by CBCT. However, the values obtained by the evaluation of the Hounsfield density scale, applied to the fanbeam, present a linear correlation with the true density. According to Katsumata [24], it is still difficult to produce accurate density value measurements in CBCT, since the devices have different FOV sizes, with different densities.

3.3.2. Computerized Spiral Tomography Or Fan Beam (CTFB)

Because it has machinery that allows the whole body to enter during the exam, it needs to be robust, taking up more space, consequently, presenting higher costs, both for the acquisition of the equipment, and for the exam that is passed on to the client or institution [7].

When performing spiral movements around the whole body, greater amounts of X-ray are emanated, especially when compared to CBCT. According to the intended acquisition volume, it is not indicated for those patients who underwent other imaging tests or radiotherapy treatments in a close period [8].

Despite its high clarity, lack of overlapping structures and accuracy also in soft tissues, it does not have the same ease when there is the presence of rehabilitating metals in dental or bone structures. More artifacts are formed in the presence of these materials, leading to imprecision in preoperative measurements, such as that necessary for dental implant therapy and endodontic surgery [7].

Generally, it is not indicated for small regions to be examined in Dentistry, in addition to having a high acquisition price, higher radiation doses and common formation of artifacts on metallic areas [8, 9].

3.4. Choice of Technique

The development technology of Computed Tomography, in general, came to revolutionize the complementary exams, modifying the entire structure of the evaluations of each patient. Thus, it increased the diagnostic accuracy and the construction of treatment plans [3, 16].

CBCT was developed specifically for Dentistry, specifically responding to professional needs, giving advantages over CBCT in relation to the diagnosis of alterations, whose therapy is in an outpatient setting

To carry out the indication of the correct technique, the professional must evaluate a series of factors. Often, only a 2D radiographic exam will not be enough for the diagnostic analysis. On certain occasions, Orthopantomography (OPG) or panoramic radiography may be indicated. However, with the need for an assessment of height, width and depth, CT scans become an object of choice [13].

CBCT has specificity for Dentistry and Head and Neck Surgery, being simpler and more objective when compared to CTFB. Both provide very equivalent bone images, however, the diagnostic power, the moment of performance, the need for details in soft tissues, the minimization of metallic artifacts, the area to be evaluated, the costs generated, in addition to the radiation dose for your indications.

Thus, CBCT has been increasingly used in surgical treatment covering: minor oral surgery, craniofacial traumatology, implant ology, temporomandibular joint assessment, implant planning, follow-up of guided bone regeneration or bone defects, surgical situations involving orthodontics, periodontics and endodontics [4,5,10,11,14].

CTFB is widely accepted, especially in complex cases and multiple trauma, where diagnostic intervention will be required in the craniofacial complex and other regions. It will be indicated in cases where CBCT alone was not enough for evaluation, due to its lower sensitivity to soft tissues, overlapping anatomical structures or non-bone tumors [8].

As shown, the CBCT covers more areas of Dentistry, being widely used. It should be noted that it is extremely important to know other viable diagnostic options, where CTFB is carrying out specific diagnoses and planning.

It is up to the professional to know each technique, its advantages and disadvantages, so that the indication is carried out correctly, safely and effectively.

4. Conclusion

- Conical Beam Computerized Tomography
  - Indications

Minor Oral Surgery, diagnosis of craniofacial fractures, evaluation and planning in implant dentistry, evaluation of the Temporomandibular Joint, orthodontics, periodontics and endodontics.

  - **Advantages**

Specificity for dentistry, lower cost, lower incidence of X-rays, 2D and 3D images, good sharpness and accuracy for bone tissues.

  - **Disadvantages**

Ineffective registration of soft structures, with low contrast for the tissue in question.

- Spiral Computerized Tomography
  - **Indications**

Oral and Maxillofacial Surgery and Traumatology, evaluation of very overlapping regions, fractures and tumors.

  - **Advantages**

systemic imaging diagnosis, 3D and 2D multiplanar reconstruction, good sharpness and great contrast in hard and soft tissues, observation of tumor location and activity, when the technique is associated with radioisotope spectrography.

  - **Disadvantages**

High cost, greater exposure to X-ray, generates many artifacts in the presence of metals.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The author have no conflicts of interest to declare.

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