

# New approach in Bisecting angle technique

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## Abstract

Since the conventional radiograph was introduced in 1901, it seems that it has wide spectrum in its use in medical, dentistry & engineering branches.

The importance came from its value in diagnosis and predicate the causes of different effects. This led to more researches for more advanced programs, which continued through last century led to an advanced radiography like digital one, C.T. scan and M.R.I. Still the conventional radiographs are the baseline for this progress a far farther for future progression.

Aim of the study is to prove a new approach in "Bisecting angle technique".

The present study indicates the new approach in using the bisecting angle technique since the old one gives instructions on three main lines:-

- A. Patients positioning in the dental chair.
- B. Positioning of dental intraoral film inside patient mouth.
- C. The position of the cone of X-ray machine in both vertical and horizontal angles.

But Al-Safi method gives instructions number D- about the anatomical landmarks that lead to the apex of the tooth to which central beam is directed, by drawing a line from ala of the nose to the tragus of the ear called ala tragus line indicate the apices of maxillary teeth, for the mandibular arch a line drawn indicate apices of mandibular teeth from the angle of the chin to the angle of the mandible in proper manner.

In present study, two groups of fifth years students in the college of Dentistry in Baghdad had been taken. The first group had given instructions A-B-C-, second group had given instructions A-B-C- and D- according to Al-Safi method.

The statically analysis using t-test shows, a significant difference between the first and second group in the effectiveness of sharpness and alignments artifacts, from the same point of view there were no significant difference between members of second group while there is a significant difference between members of the first group.

The results indicate that the new approach in instructing the second group of students were gave wide predictors for their work and better results in decreasing the technical errors and dental artifacts.

**Key words: Bisecting technique, Angulations, X-Radiation**

## Introduction

The bisecting-angle technique is based on simple geometric theorem, Cieszynski's rule of isometric (1, 2, 3), which state that two triangles are equal where they share one complete side and have two equal angles, (In

addition their corresponding sides are equal). Dental Radiography applies the theorem as follows:

Position the film as close as possible in lingual surface of the teeth resting in the palate or in the floor of the mouth. The plane of the film and the long axis of the tooth form our angle with its

apex at the point where the film is in contact with teeth, when an imaging plane bisects this angle, it forms two congruent angles with the apices of the teeth perpendicular to the bisecting plane ; the two triangles are right-angle triangles and congruent, with the corresponding sides equal (4, 5, 6). Aim of the study is to prove a new approach in bisecting angle technique.

## Materials and methods

For the present study we apply a certain point called point of entrance of central beam on patient face allow the operator for perfect positioning of the angulations of X-ray head in negative by drawing a line called ala-tragus line parallel to occlusal line when the patient in dental chair in up-right position looking forward , these point are for the maxilla:

- 1- For the central incisor and lateral incisors, the tip of the nose.
- 2- For the canines, the ala of nose.
- 3- For the premolars, draw a line from the ala of the nose to tragus of ear which ala tragus line parallel to the occlusal line. Ask the patient looking forward then draw a line from the pupil of eye to be perpendicular on the ala tragus line this point of meeting represent in between the apices of premolars at which the central X - ray beam directed.
- 4- For the maxillary 1<sup>st</sup> molar one cm from the previous point will represent the apex of maxillary 1<sup>st</sup> molar at which central x -ray beam is directed through or one index finger width of the patient.
- 5- For the maxillary 2<sup>nd</sup> molar; also the patient look forward and then draw a line from the angle of the eye to be at right angle with ala-tragus line this meeting point represent point of entry of central X-ray to 2<sup>nd</sup> maxillary molars

apexes.

- 6- For the 3<sup>rd</sup> maxillary molar one cm away from the previous point will representing the point entrance of central X -ray for 3<sup>rd</sup> maxillary molar apexes or one index finger width of the patient.

For the mandibular arch, the following points representing the apexes of mandibular teeth at which central X -ray beam should be directed in vertical angulations.

- 1-Central and lateral incisors: The symfesis menti is the point of entrance of X-ray beam.
- 2-Canines: angle of the chin is the point that representing the entrance of radiation of one lower canine.
- 3-One cm from the angle of the chin will represents the entrance of radiation of lower premolars since this point will located in between the apexes of the lower premolars.
- 4-Two cm from the angle of the mandible will representing the position of apexes of lower 1<sup>st</sup> molar so it will be the entrance of central x -ray beam of 1<sup>st</sup> lower molar (or about one index finger width of the patient from the previous point).
- 5-One cm away from angle of the mandible will represents the position of apexes of lower second molar. Finger width.
- 6-For the lower third molar the angle of the mandible is the point of entrance of the central x -ray beam.

The present study indicate the new approach in using the bisecting angle technique since the old one give an instructions on three main lines:-

- A. Patients positioning in the dental chair.
- B. Positioning of dental intraoral film in side patient mouth.
- C. The position of the cone of X-ray

machine in both vertical and horizontal angle.

But the new approach gives instructions number D- about the anatomical landmarks that lead to the apex of the tooth to which central beam is directed ( point of entrance of central X-ray beam ).

To have a better idea of this approach in dental radiography practice and its effectiveness from points of sharpness and cone alignments artifacts .

Factors causing the unsharpness of the casting image:-

- a. Source of radiation: Should be as small as possible, and any movement in head of X-ray tube may cause the source will form multi-sources of radiation and that cause the unsharpness.
- b. Target object distance: should be as long as possible and constant.
- c. Object film distance: should be as small as possible with no movement of film in patient mouth.
- d. Patient stand still: Any movement of the patient will cause unsharpness.
- e. Good positioning of point of entrance on patient during taking the dental radiography.

Two groups of 5<sup>th</sup> year dental school studied in university of Baghdad have been chosen, 1<sup>st</sup> group undergo cieszynski's rule , while 2<sup>nd</sup> group of students have been given instructions on the new approach .

Both groups have taken radiographs for forty patients coming to our dental radiology department whom their age range between ( 20 - 25 ) years with no teeth missing in maxillary and mandibular arches. Total number of students were 28 , subdivided into 14 students whom had been used 50 dental periapical film in total of 100 dental films using the same dental X - ray machine after

processing in manual processor (time-temperature method) at ( 4 - 5 ) minutes , 68F the temperature of the processing solution .

## Results

Table (1) shows 100 dental periapical films were taken for forty patients in the upper jaw 60 films, and 40 films for the lower jaw, in the anterior premolar and molar regions . Table (2) shows the main four factors were used for comparison between Cieszynski's rule, and the new approach. These factors are :

**1. Sharpness :** Outline of the image should be sharp penumbra : it is amount of unsharpness, its area of partial shadow of casting image, due to partial absorption of light by the object.

Disturbance of focal spot , object film distance or all of them cause penumbra while umbra is area of total shadow .

Applying the above five criteria for sharpness by the first group of students whom given instructions according to Cieszynski's rule , shows 0.5 and t-test  $p < 0.05$  ,while 2nd group of students whom given instructions according to new approach shows for the sharpness 0.081 &  $p < 0.01$  ( Table - 2).

The comparison in sharpness shows in ( Table -3 ) 26% for the first group & 10% for the 2nd group , so less technical artifact in sharpness appear in applying the new approach of teaching.

**2. Over lapping:** That artifact resulting from incorrect horizontal angulations that the central x -ray beam will not be directed at the area in between the teeth either more to the left or more to the right resulting in over lapping sides of teeth on each other .

This factor shows in first group 0.61 &  $p < 0.05$ , while 2nd group show 0.46

&  $p < 0.01$ , so there is a difference in the overlapping. Table-3 shows that the 1st group gave 33% error in overlapping in comparison with the 2nd group who gave less error about 15% in overlapping.

**3. Shortening:** This artifact was resulted from increasing the vertical angulations more than needed position so the teeth appear shorter than its normal length.

Table-2 shows 0.32 &  $p < 0.05$  in the 1st group, and 0.30 &  $p < 0.01$ , so there is a difference between the two groups.

Table-3 shows 65% &  $p < 0.05$  in the 1st group, while it shows 18% &  $p < 0.01$ , so there is a difference between the two groups, and the 2nd shows less error than the 1st one.

**4. Elongation:** this artifact results from decreasing the vertical angulations so the teeth appear longer than its normal length.

Table-2 shows 0.43 &  $p < 0.05$  in the 1st group, while the 2nd group shows 0.23 &  $p < 0.01$ .

Table-3 shows 85% technical error in elongation for the 1st group, while 2nd group give 30%.

**Table (1): No.of dental x-ray film for 40 patients in the anterior, premolar & molar region**

Maxilla position	No. of films	Mandible		No of dental x-ray films
21/12	10	21/12	8	18
3/3	15	3/3	9	24
4/4	20	4/4	12	32
876/876	15	876/678	11	26
	60	sum	40	100

**Table (2): Comparison between Cieszynski's rule and Al-Safi approach according to four factors using t-test value**

Factors	T -test (Cie-rule)	T -test	Al-Safi app.	T -test	Sign.
1 <sup>st</sup>	0.5	$P < 0.05$	0.081	$P < 0.01$	N.S.
2 <sup>nd</sup>	0.61	$P < 0.05$	0.46	$P < 0.01$	N.S.
3 <sup>rd</sup>	0.32	$P < 0.05$	0.30	$P < 0.01$	N.S.
4 <sup>th</sup>	0.43	$P < 0.05$	0.23	$P < 0.01$	N.S.

**Table (3): Comparison between two groups of fifth year students according to the four factors using t-test value**

	1 <sup>st</sup> group	T -test	2 <sup>nd</sup> group	T-test
Sharpness	26%	$p < 0.04$	10%	$p < 0.01$
Overlapping	33%	$P < 0.05$	15%	$P < 0.01$
Shortening	65%	$P < 0.05$	18%	$P < 0.01$
Elongation	85%	$P < 0.05$	30%	$P < 0.01$

## Discussion

This approach called the Al-Safi method which is a new method of teaching in our dental school for about more than 5 years it proves it's effectiveness in easy learning and applying during dental radiography practice for both the

under and post graduating dental students.

According to Arthur (6), who discusses the importance of bisecting angle technique in dental radiography assuring that the instructions should

be strike and specific, unlike Miles in 1999 (5) who depends mainly on the paralleling technique because of lack of effectiveness in bisecting technique.

Langland in 1984 (4) preferred the parallel technique rather than bisecting technique while Goaz in 1987 (2) gave the importance to bisecting technique in dental practice if it can be developed in some manner like Jonson (3), as mentioned in this study.

As a conclusion, in our study the good instructions to the students brought the decrease in the technical artifacts, so this approach proves its effectiveness for faster learning to the students and decreasing the technical artifacts (7, 8).

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