

Evaluation of the Use of Film Holders by Undergraduation Students

Evaluación de la Utilización de Posicionadores de Películas Radiográficas por los Alumnos de Pregrado

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ABSTRACT: Film holder is used for the Intra-buccal Radiographic Technique (Entrance 453, Ministry of Health, Brazil). This procedure seeks radioprotection, lowering technique mistakes. However, patient's collaboration is necessary to adapt the device. The purpose of this research study is to evaluate the effectiveness of HanShin (Japan), Indusbelo and Imagem (Brazil), and Rinn (USA) X-Ray film positioners as: 1) Technical quality and 2) Comfort (adaptation), correlating to patient's cooperation (Discipline of Integrated Clinical Diagnosis -2000 and 2001-FORP/USP). The methodology applied was: 1st) Protocol of Mistake in Radiographic Technique with film holders and 2nd) Interview Questionnaire to obtain information regarding comfort of the film holders (C=Cooperative; LC= Little Cooperative and NC=Non-Cooperative). During clinical activities each student x-rayed three patients (Apparel of X-Rays 70KVp, 10mA, E Film, Radiographic Processing) and in each patient, a film holder brand was used. As a result of 224 patients' studied, 1179 radiographs were obtained, 255 of those presenting "technique mistakes", according to the brand of the film holder: 16% HanShin, 10% Indusbelo, 31% Rinn, 33% Imagem and 33% bisecting line technique (without film holder). Regarding comfort the following results were obtained: HanShin C=95%, LC=4% and NC=1%; Indusbelo C=89%, LC=6% and NC=5%; Imagem C=95%, LC=3% and NC=2% and Rinn C=60%, LC=25% and NC=15%. It was concluded that the brands Hanshin, Imagem and Indusbelo are suitable for dental radiographic exam and that the Rinn brand produces more discomfort, because its size dimensions are not ideal for the size and form pattern of the Dental Arch in the population used in this study.

KEY WORDS: film holder; film; evaluation.

INTRODUCTION

There are over 60.000 dental x-ray devices currently in Brazil, and these devices contribute around 20% of all radiographic exams in health services. These data lead us to an important question regarding quality and risk of procedures applied in dental radiology. International Commission on Radiological Protection (ICRP) established that no practice involving ionizing radiation exposure can be used unless it produces sufficient benefits to the exposed individuals, or to society, so as to superpose this exposure disadvantage (ICRP, 1993).

Regulation 453, of the Health Ministry and the Federal Government Sanitary Commission, say that film holders and x-ray beam conductors should be used when making intraoral radiographs (Brasil, 1998).

The use of film holders' positioners routinely in dental radiology is also one of the international recommendations, being indicated by several radiological norm councils and committees, with the main purpose to effectively reduce chances of error and consequently lower unnecessary patient's exposure to X radiation (Farman & Hines, 1986; Kircos *et al.*, 1987; White, 1992).

As known, its use lowers radiographic errors, avoiding new radiographic takes, sparing the patient from receiving new doses of radiation (Nakfoor & Brooks, 1992; Parks, 1991).

Besides the x-ray device and the radiographic processing, devices used to align beams to the

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radiographic film, are of high utility to obtain quality in a radiographic image when radiographic density, contrast and sharpness are taken into account (Richards & Colquitt, 1983; NRPB, 1994).

Besides diagnostics, which would be the main purpose to indicate them, radiographs also have an important function as documentation for the dentist and for the patient, as well as radiographic exam is also applied in legal odontology.

Countless locating devices are sold in Brazilian and worldwide commerce, with both advantages and disadvantages among each other. The main advantages of these devices for the parallelism technique are: a) technique simplicity; b) adaptability; c) reproducibility; d) accuracy (Updegrave, 1951).

Usually, film positioners are associated to the parallelism technique; when positioning the radiographic film in the mouth is made by the patient,

this action is associated to the bisecting line technique (Sweet, 1952). However, positioners found in commerce are appropriate to use with the bisecting angle technique, requiring certain knowledge and dexterity from the operator. The use of intaoral film holders as routine in dental practice is an international recommendation (ICRP, 1982).

The purpose of the authors was to evaluate the quality of the positioning devices found in Brazilian commerce, regarding sterilization resistance, patients comfort and quality of the obtained radiographs.

MATERIAL AND METHOD

Study material consisted in the analysis of 224 radiographic requests to the Discipline of Integrated Clinical Diagnosis from Faculty of Dentistry of Ribeirão Preto, University of São Paulo, Brazil, made in the years

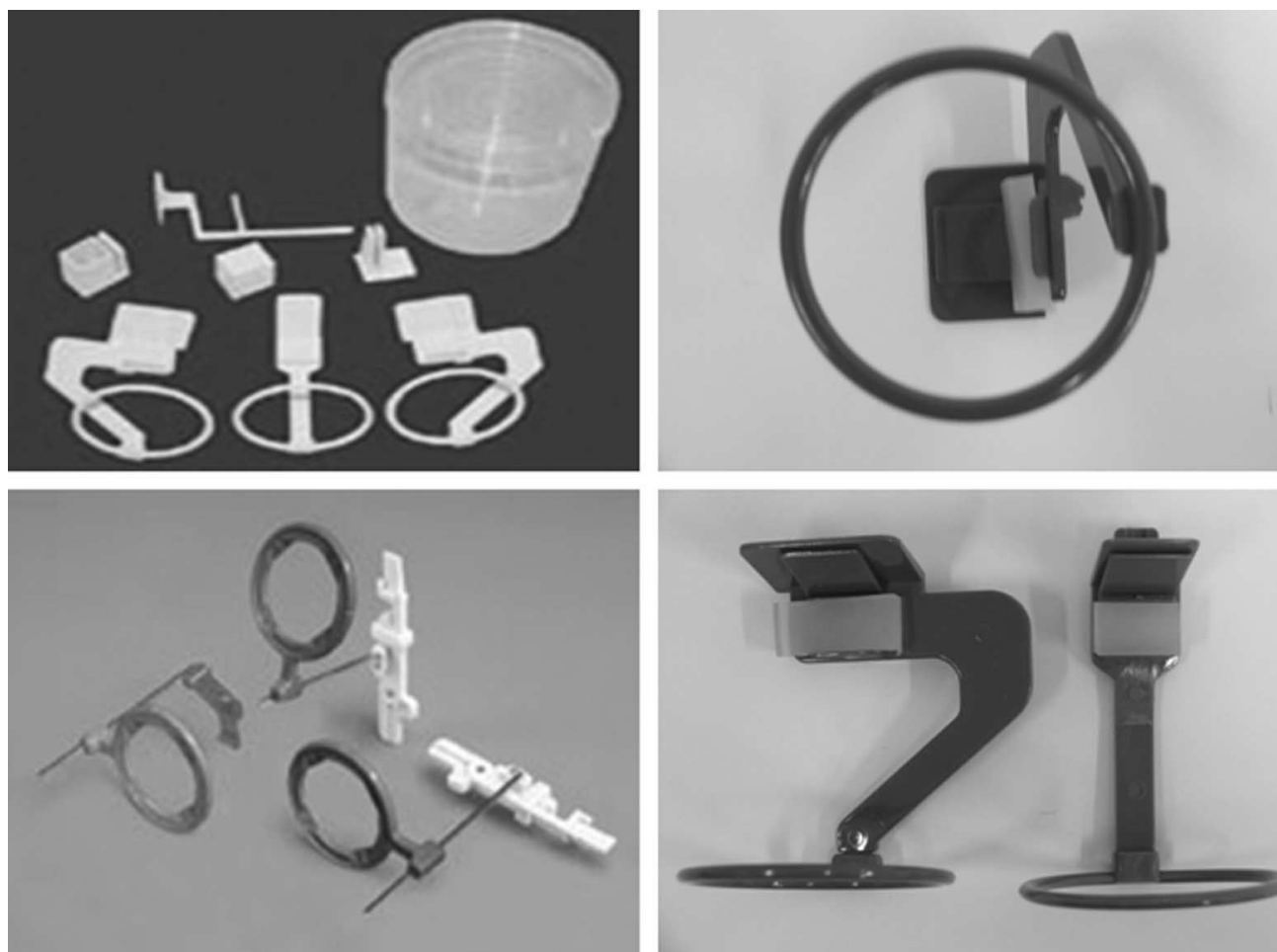


Fig. 1. Different views of the film holder positioners used in this study.

of 2000 and 2001, totalizing 1434 radiographs. These radiographs were obtained and processed by students in the fourth period.

At the end of processing the radiographs, students answered a questionnaire reporting if the patient was cooperative (C), little cooperative (LC) or non-cooperative (NC) at the time of taking the x-ray. Through this, it was possible to evaluate the film holder comfort to the patient. In this questionnaire, the student should also answer if the patient had a small arch (S), a medium arch (M) or a large arch (L). It was a subjective answer since no particular instruments were used to classify the patient's arch sizes.

Radiographic techniques were:

1. Bisecting line technique and the patient held the film.
2. Bisecting line technique using film holders found in the Brazilian market (HanShin, Imagem, Indusbelo and Rinn).

Focus-film distance set was of 20 cm and the film holders manipulation was as according to manufacturer's instructions (imported and non-imported) (Fig. 1). Films from group E of sensitivity were used (Kodak, USA).

Radiographs taken were evaluated by clinical faculty and in case of not presenting good quality for a proper diagnosis they were discarded and new radiographs taken.

The evaluation of the radiographs was conducted according to the following criteria:

1. Angulation mistakes: too much or too little vertical/horizontal projection;
2. Positioning mistakes: not appearance of teeth crowns or root apex;

3. Collimation mistakes: "radiographic halo";
4. Motion mistakes: image distortion caused by motion.

Analyzing the ideal radiographic image, the following factors were taken into account: a) adequate radiographic density, b) great radiographic contrast and c) great sharpness and detail. Radiographic analyses were made in a dark room, using industrial type radiograph viewing equipment, with mask and magnifying glass. To evaluate sterilization resistance, the film positioners were submitted to 20 sterilization cycles at 124 °C, for 30 minutes interspersed with 1-minute rinse, with a hand brush and liquid detergent with neutral pH.

RESULTS

Table I demonstrates the amount of radiographic films used in the period this study was made, indicating the amount of requested radiographs, amount of repeated radiographs, total amount of radiographs and error percentage. The following results were found: Indusbelo (10%), HanShin (16%), Rinn (31%), bisecting line technique (without film holder, 33%) and Imagem (33%).

Table II shows patients' cooperation according to the applied technique. Bisecting line technique, without the film holder, showed 86%(C), 12%(LC), 2%(NC); HanShin film holder 95%(C), 4%(LC), 1%(NC); Imagem film holder 95%(C), 3% (LC) e 2% (NC); Indusbelo film holder 89% (C), 6% (LC), 5%(NC) and Rinn film holder 60% (C), 25% (LC) e 15% (NC).

Patients' arch sizes: 8% of the patients had a large arch, 78% a medium arch and 14% a small arch, according to the students from the fourth period at Faculty of Dentistry of Ribeirão Preto, University of São Paulo, Brazil.

Table I. Amount of periapical radiographic films used for this study.

Radiographic technique	Number of solicited radiographs	Number of repeated radiographs	Total amount of radiographs	Error percentage
Bisecting line	153	76	229	33
HanShin*	760	140	900	16
Imagem*	12	6	18	33
Indusbelo*	236	25	261	10
Rinn*	18	8	26	31
Total	1179	255	1434	100

* Radiographic film holders

Table II. Percentage of the patients' cooperation according to the applied technique.

	Cooperative (C)	Little cooperative (LC)	Non-cooperative (NC)
Bisecting line (without film holder)	86	12	2
HanShin	95	4	1
Imagem	95	3	2
Indusbelo	89	6	5
Rinn	60	25	15

(C) – Cooperative patients; (LC) – Little cooperative patients; (NC) – Non-cooperative patients.

DISCUSSION

The purpose of this study was to evaluate the quality of the positioner devices found in Brazilian commerce, regarding sterilization resistance, patients comfort and quality of the obtained radiographs.

On dental schools, patients should be provided with every possible care and, the educational purposes for graduating a dental surgeon with a wide vision on public health should be followed (American Association of Dental Schools-AADS, 1992).

ADA (American Dental Association) recommendations should be followed, regarding beam conducting positioners and parallelism technique, so that to lower the possibility of mistakes and radiographs retakes. All beam conducting positioners studied allow autoclave sterilization, as Entrance 453 from the Ministry of Health, Brazil, recommends. Beam conducting positioner Rinn has some manipulation difficulty because of several components that require attachments; on the other hand, this characteristic facilitates cleaning.

Another important remark was the fact of causing a lot of discomfort to most of the patients, despite the fact of being a worldwide known brand (Rushton & Horner, 1994a,b). A high percentage of errors found by using these positioners contradict ADA's own recommendation, but we must take into account that these devices were used by undergraduation students with little clinical experience. Besides natural delay to position the device in the patient's oral cavity, the students take too much time waiting for the professors' aid, due to insecurity, which causes anxiety and discomfort to the patient. In another study, Rushton & Horner (1994a,b) found reductions in radiograph mistakes when using film holders, giving support to the use of film holders for periapical radiography. The authors also suggested that the results found in their study could be improved if the manufacturer's provided

better instructions and practical training to General Dental Practitioners. Choksi & Rao (1996) compared other intraoral film-holders and beam-aligners devices. One was a conventional Extension Cone Paralleling (XCP-I) and the other was the Extension Cone Paralleling (XCP-II). They found no significant differences in the total amount of errors between the two devices, but the conventional instrument presented more error in improper film positioning and the other had errors in cone cutting.

A film holder that fulfills the needs for a perfect radiograph is yet to be made. Rinn is one of the most popular devices in dentistry and no new intraoral device has been adopted by general dentists for daily use in recent years. These same results could be contradictory when manipulating positioning devices by experienced professionals in their private practice, and this fact is to be studied in future works.

Patients' exposure to X-rays should be as low as reasonably possible and related to the risk/benefit binomial (Gelskey & Baker, 1984), with the certainty that even low doses of radiation can cause some effect on a living organism (Watanabe *et al.*, 1994). General health care to patients should flank to any clinical and diagnostics procedures. So we can conclude that:

1 – Brazilian beam conducting positioners, "Indusbelo" and "Imagem" brands, and the imported "HanShin" fit the needs for patients care by being capable of autoclave sterilization, also allowing adequate cleaning with brushes, by presenting the lowest levels of mistakes and by being comfortable to the patient.

2 – The imported beam conducting positioner "Rinn" is not adequate to the shape and size of the dental arch of the population in this study and principally when manipulated by dental students.

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RESUMEN: El posicionador porta películas está indicado en la Técnica Radiográfica Intraoral (Resolución 453, Ministerio de la Salud, Brasil). Este procedimiento permite la radio protección, minimizando el error de técnica; sin embargo, es necesaria la colaboración del paciente para la adaptación del dispositivo. El objetivo de esta investigación-enseñanza fue evaluar la efectividad de los posicionadores de marcas HanShin (Japón), Indusbelo, Imagem (Brasil) y Rinn (USA), en relación a: 1) Calidad Técnica y 2) Confort (adaptación) correlacionándolo con la colaboración del paciente (Disciplina de Diagnóstico Clínico Integrado-2000 y 2001-FORP/USP). Como metodología de investigación se utilizaron: 1ª) Protocolo de Errores de Técnica Radiográfica con Posicionador y 2ª) Cuestionario de entrevista para la obtención de las informaciones relativas a la comodidad del posicionador (C=Cooperaba; CP=Cooperaba poco y NC=No cooperaba). Durante las actividades clínicas, cada alumno radiografió a tres pacientes (Aparato de Rayos X, 70kvp, 10mA, Film E, Procesamiento Radiográfico Manual) y en cada paciente se utilizó una marca de posicionador. Como resultado de la atención de 224 pacientes, se obtuvieron 1179 radiografías; de ellas, 255 presentaron "errores de técnica", debido a la marca del posicionador: 16% HanShin; 10% Indusbelo; 31% Rinn; 33% Imagem, y Técnica da Bissetriz, sin posicionador, 33%. En relación al confort, se obtuvieron los siguientes resultados: HanShin C=95%, CP=4% y NC=1%; Indusbelo C=89%, CP=6% y NC=5%; Imagem C=95%, CP=3% y NC=2% y Rinn C=60%, CP=25% y NC=15%. Se concluye que las marcas Hanshin, Imagem e Indusbelo son las indicadas para el exame radiográfico odontológico y que la marca Rinn produce más incomodidad, debido a que su conformación no era la ideal para los patrones de tamaño y forma de la arcada dental de ese grupo de pacientes.

PALABRAS CLAVE: posicionador, película radiográfica, evaluación

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