Clinical Techniques to Reduce Sensor Plate Damage in PSP Digital Radiography

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ABSTRACT

Radiographic images have been an important aid to clinical diagnosis in dentistry for many years. The recent advent of digital imaging has offered new opportunities to record and analyze radiographic data. One digital imaging system uses photo-stimulable phosphor storage plates (PSP) to record the radiographic image for scanning and transfer to a computer. These plates are similar in size and shape to traditional radiographic film but they can be reused numerous times. The main reason for replacement of the plates is damage to the phosphor layer during clinical use. While replacement is warranted when phosphor damage impedes the diagnostic process, frequent replacement of PSP plates would be expensive. This article describes 2 techniques used to aid in reducing the potential for plate damage in clinical use. (*J Dent Child*. 2004;71:169-170)

KEYWORDS: DIGITAL RADIOGRAPHY, PHOTO-STIMULABLE PHOSPHOR PLATES, PSP, DAMAGE REDUCTION

Traditional radiography has been an important tool in the diagnosis and treatment of dental pathology for many years. Numerous improvements in equipment and film have occurred since its inception, but the advent of digital radiography has been revolutionary. Common digital imaging systems use either a charge-coupled device (CCD) receptor or photo-stimulable phosphor plates (PSP). Most CCD receptors are connected by a wire cable to a computer and image processor. This system provides almost instant image availability to the practitioner after exposure of the receptor. However, the intraoral receptor is embedded in a hard plastic protective case, which has a number of drawbacks. It is not always easily positioned in the desired location, can be uncomfortable for the patient, especially children, and is very expensive to replace if damaged.[1-3]

The PSP system employs sensor plates that produce a latent image when exposed to radiation. The stored image is transferred to a computer for viewing by a laser scanner. The PSP plates are made of a plastic coated with a polymer base containing embedded phosphor particles.[4-5] The indirect nature of image acquisition by this system results in increased process time and requires additional equipment.

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However, reports suggest that the PSP system is more comfortable and, therefore, is favored by patients.[6] The system uses plates of similar size, shape, and thickness as conventional radiograph film. They are also more compatible with existing intraoral positioning devices. The reusable plates are placed inside sealed plastic sleeves for infection control purposes. While providing a barrier against contamination and ambient light, these sleeves do not provide adequate protection against damage to the plates from bending, positioning device pressure, or tooth marks. This is of particular concern in pediatric dentistry, where the cooperation of the patient is less predictable. Damage to the phosphor layer results in permanent degradation of all subsequent images recorded with the plate and eventually requires plate replacement. This report seeks to introduce clinical techniques to minimize damage to PSP plates in pediatric dentistry to prevent loss of diagnostic information and to prolong their useful life.

DESCRIPTION

In pediatric dentistry, commonly used techniques for placement of the image receptor uses either an intraoral positioning device or receptor placement similar to occlusal radiography. Intraoral positioning devices, such as the Snap-A-Ray (Dentsply Rinn, Elgin, Ill), are convenient film holding devices in pediatric dentistry. They are scissors-like instruments with teeth on each side of the 2 jaws that hold the film securely during exposure. These teeth do not damage conventional film but

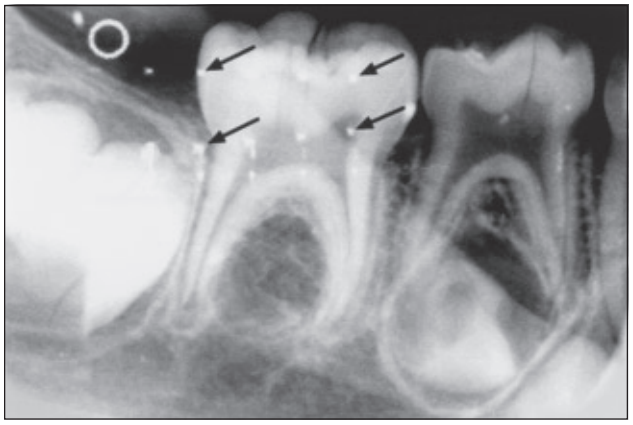

Figure 1. Damage to the PSP sensor caused by the plastic securing teeth of an intraoral positioning device.

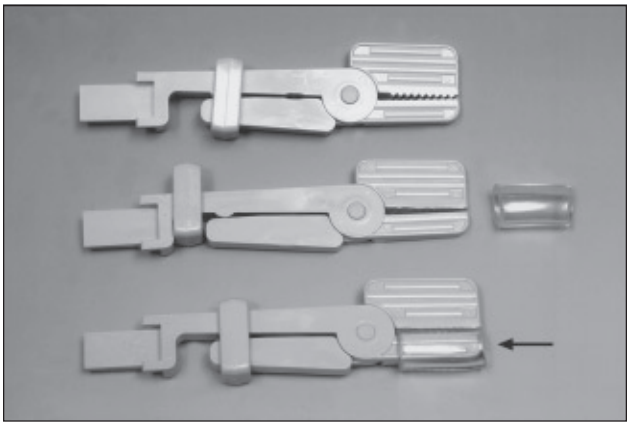

Figure 2. The securing teeth of the intraoral positioning device are removed and a vinyl tube sleeve is placed over the lower jaw.

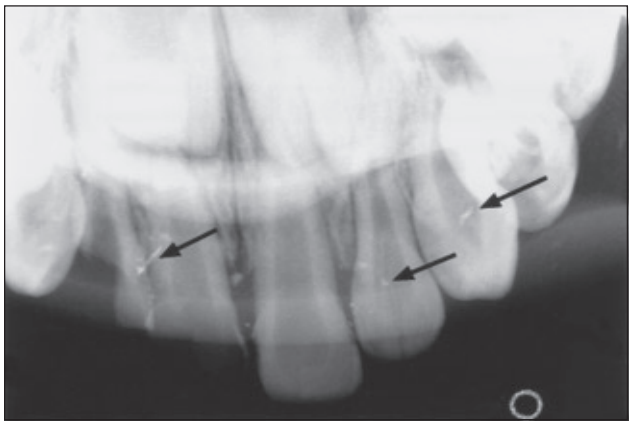

Figure 3. Damage to the sensor plate by the patient's teeth.

Figure 4. Adhesive sponge pads attached to the disposable sensor envelope protects the PSP plates from damage.

can damage PSP plates (Figure 1). An easy modification has eliminated the potential damage and permitted the use of these familiar and useful positioning devices. The teeth from both sides are removed with an acrylic bur and polished. An autoclavable 3/8-inch inside dimension vinyl tubing is cut to length and placed over the smaller jaw (Figure 2). This permits the positioning device to secure the sensor plate by squeezing it tightly but not damaging it. The tubing is snug but it can be easily removed between patients for cleaning and sterilization. This tubing is available at most hardware stores.

A common technique to obtain periapical radiographs of primary incisors is to have the child bite on a size 2 film to hold it in place during exposure. This technique is similar to that of occlusal radiography using the bisecting angle technique. However, it was found that the PSP plates can easily be damaged permanently by bite marks when using this technique (Figure 3). This risk has been reduced by placing adhesive backed sponge-like pads (Edge Ease-X-Ray Comfort Cushions, Strong Dental Products, Corona, Calif) on each side of the disposable sleeve that holds the reusable size 2 plate. These pads protect the plate and also prevent tooth damage (Figure 4).

DISCUSSION

Dentists are rapidly embracing digital radiography into their practices. CCD and PSP systems each offer unique advantages and disadvantages. The receptor plates used in PSP systems can be easily damaged and may require replacement on a regular basis. The expense of replacing the plates can be reduced by the simple methods described in this paper until new devices are manufactured.

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