DOWNLOAD PDF RADIOGRAPHIC IMAGING FOR DENTAL AUXILIARIES

Chapter 1 : Artifacts and misadventures in digital radiography

Radiographic Imaging For Dental Auxiliaries Imaging and x ray goulburn valley health, medical imaging the medical imaging department provides quality imaging services to in patients, out patients and.

This article has been cited by other articles in PMC. Abstract Objective This preliminary study aimed to propose a new analysis of digital panoramic radiographs for a differential diagnosis between functional and morphological mandibular asymmetry in children with and without unilateral posterior crossbite. Methods Analysis is based on linear and angular measurements taken from nine anatomic points, demarcated in sequence directly on digital images. A specific plug-in was developed as part of a larger public domain image processing software ImageJ to automate and facilitate measurements. Since panoramic radiographs are typically subject to magnification differences between the right and left sides, horizontal linear measurements were adjusted for greater accuracy in both sides by means of a Distortion Factor DF. In order to provide a preliminary assessment of proposed analysis and the developed plug-in, radiographs of ten patients 5 with unilateral posterior crossbite and 5 with normal occlusion were analyzed. Results Considerable divergence was found between the right and left sides in the measurements of mandibular length and position of condyles in patients with unilateral posterior crossbite in comparison to individuals with normal occlusion. Conclusion Although there are more effective and accurate diagnostic methods, panoramic radiography is still widespread, especially in emerging countries. This study presented initial evidence that the proposed analysis can be an important resource for planning early orthodontic intervention and, thus, avoid progression of asymmetries and their consequences. INTRODUCTION Advances in medical and biological sciences in recent years and the growing importance of determining the relationship between structure and function have made imaging analysis an increasingly important discipline. Thus, the use and disclosure of an easy-to-use public domain program for analysis of digital images is of paramount importance. ImageJ occupies a unique position as a public domain software www. This software is easy to use, can perform a full set of imaging manipulations and has a huge and knowledgeable user community. Its first release version 0. After developing the Macintosh-based image bank for the National Institutes of Health NIH during 10 years, Rasband made the brave decision to start afresh with ImageJ using the Java programming language the letter J in the name stands for Java , which freed the software from an individual operating system. ImageJ incorporates a number of useful tools for digital image processing, including determination of linear and angular measurements, calculation of areas, particle analysis, cell counts, etc. This tool has been employed in Medicine with more than published researches as well as in other fields of knowledge, such as Engineering, Physics, Astronomy, Computer Science and Chemistry. However, few studies involving the use of ImageJ in the field of Dentistry have been published. Studies suggest that patients with unilateral posterior crossbite often exhibit mandibular asymmetry stemming from a functional deviation of the mandible. Since panoramic radiographs provide this information, such images could be used as a routine tool for diagnosis and treatment planning. Panoramic radiographs have been used to assess right and left height differences in the condyle, ramus and total mandible height for the definition of asymmetries. To this end, digital radiographs from ten patients were analyzed - five with unilateral posterior crossbite and five with normal occlusion. The criteria for patients with normal occlusion were as follows: Class I canine and molar relationships with minor or no crowding, normal growth and development and well-aligned maxillary and mandibular dental arches; presence of all teeth except for third molars; good facial symmetry clinically determined ; no significant medical history; no functional deviation of the mandible; and no history of trauma or previous orthodontic treatment. The criteria for patients with posterior crossbite were as follows: All radiographs were standardized and taken by the same operator. Patients were positioned with the lips in resting position and the head oriented to Frankfurt horizontal plane. Based on the objectives of the study, the following landmarks were used: A plug-in was created to automate and facilitate measurement-taking download and instructions - http: The following linear mm and angular degree measurements were taken on both sides of each digital panoramic radiograph: Linear measurements Morphological variables: Angular measurement Gonial Angle GA:

Chapter 2 : Elna Dental Center | ELNA DENTAIRE

Radiographic Imaging for Dental Auxiliaries / Edition 3 Practical and easy-to-read, the 3rd Edition of this text implements a systematic approach to taking clinical radiographs.

This article is based on material originally presented in: Artifacts and misadventures in digital radiography. Considering the sales hyperbole associated with digital radiography DR , one may wonder if it is even possible to produce a nondiagnostic digital image. Certainly DR is more tolerant of inappropriate exposure factor selection than is conventional film-screen radiology. However, classic technical errors such as malpositioning, patient motion, incorrect patient identification, incorrect examination, and double exposure still occur in the usual frequency. An understanding of the causes of both new and old problems is necessary in order to avoid these inaccuracies and recover unacceptable images. Artifacts and digital systems An artifact is a feature in an image that masks or mimics a clinical feature. The literature classifies artifacts according to causative agent, such as hardware, software, or operator, although artifacts can also be categorized by the mechanism of interference with image acquisition, processing, or display. The reports cited above concentrated on computed radiography CR , that is, any imaging system that relies on photostimulable luminescence to make a radiographic image. In contrast, this article also provides examples of problems that may be encountered with any DR system, including direct digital radiography DDR systems that make digital radiographs from the photoelectric interaction of X-rays with the detector itself, indirect digital radiography IDR systems that are sensitive to the light produced by an intensification screen, and optically coupled direct radiography OCDR systems that use optical components to focus fluorescence onto charge coupled detectors CCD. In this context, DR includes any radiographic image acquired without photographic film, thus excluding film digitizers whose artifacts are described elsewhere. Acquiring good quality images Regardless of the acquisition technology, good radiographic images can be produced only when certain fundamental requirements are met. Appropriate radiographic technique must be used, which includes the proper tube potential kVp , beam current mAs , source-to-image distance SID , collimation, alignment of the X-ray central ray, and positioning of detector and subject for the specific anatomic projection. The detector must receive enough X-rays to make a good image. Too many X-rays are a disservice to the patient and may also produce poor images Figure 3. Although DR is more tolerant of incorrect exposure factor selection, it cannot make up for extra noise, loss in subject contrast, and signal out of its range of adjustment. On the other hand, artifacts are generally not apparent until the exposure exceeds 10 times the appropriate level. Technologists soon learn to avoid the unpleasant circumstance of repeating an underexposed study by routinely increasing the radiographic technique. Thus, the potential for gross overexposure exists in DR. Image optical density OD , the usual indicator of proper exposure, is arbitrary in DR. Managment of exposure factor in DR must rely on the value of a derived exposure indicator, which itself is subject to interference. However, programs that monitor the exposure indicator have been shown to be effective in controlling exposure factor in DR. Every individual DR device must be calibrated for overall gain and uniformity. Acquisition devices should be calibrated for gain or sensitivity, and to compensate for nonuniformity Figures 4 and 5. Display devices should be calibrated to provide output according to the DICOM Part 14 Grayscale Display Function, including hard-copy devices, soft-copy devices, and displays used for quality control QC. Not all vendors adhere to this standard. Calibrated, high-quality QC monitors are essential on every acquisition system and QC workstation. Adjusting image processing on an uncalibrated monitor leads to unsatisfactory images. During the initial installation, it is important to make sure that the DR system is properly configured with the most up-to-date version of software, hardware, and durable goods. Multiple vintages of imaging plates exist for CR, and some are not universally compatible with CR hardware. The software and settings should be consistent with the versions and settings in operation with other individual DR systems at the site, including examination-specific parameter settings Figure 6. All DR systems have an internally calculated estimate of exposure. The DR system may need to be configured to report this value to the digital image management system, and the image management system may need to be configured to display it to the radiologist. When CR is introduced into an imaging operation, phototimers in all X-ray rooms need to be recalibrated to deliver the appropriate exposure. Scheduled and unscheduled service should be done in a thorough and timely manner, including reporting and documenting, cleaning, and repairs. Operator functions include cleaning, reporting service interruptions, removing the unit from clinical service, re-introducing the unit into clinical service, and documenting service events Figure 7. Service engineer functions include performing scheduled maintenance that includes preventive maintenance and software and hardware upgrades, as well as unscheduled maintenance or repairs. On-site support for DR requires a team with expertise not only in image acquisition, but in picture archiving and communications systems PACS , radiology information systems RIS , technologist workflow, image quality, and networks, as well. Training and system operation Digital radiography systems must be operated properly to produce good images. Technologists are often unfamiliar with DR features and functions, and may require additional training beyond vendor applications training. Technologists need to select the proper examination; in addition, they must properly associate demographic and examination information to the image, properly manipulate the detector, and review the image before releasing it to the image management system. Beyond this, technologists need to know how to recover from errors without repeating examinations and need to follow exposure factor control limits. Quality control processes must be in place to detect and correct unsatisfactory images Figures 8, 9, and Digital radiography requires a new approach to QC and study reject analysis. The consequence of double exposure can be either a single repeated examination, when an inanimate object is involved Figure 11 , or two repeated examinations when two patients are involved Figure In DR, double exposures can also be caused by power interruptions and communications errors, as well as by inadequate erasure secondary to overexposure or erasure mechanism failure. Image processing Appropriate digital image processing is key to producing good DR images. All DR systems have extremely wide latitude, which means that connected to a display system with a relatively narrow dynamic range, DR images have extremely low contrast. The primary purpose of image processing is to maximize the contrast of the part of the image that contains relevant clinical details. Errors in collimation can cause mistakes in detection of the boundary, with a dramatic loss of image contrast Figures 13 and The secondary function of image processing is to customize contrast in the region of interest Table 1. This type of image processing includes modifying the image to enhance the contrast and sharpness of some features while compromising the contrast and sharpness of others, as well as modifying the image to make it appear more like a conventional transilluminated film. This secondary image processing is applied in a manner that is usually specific to the anatomic projection. Errors in the selection of the anatomic projection can cause inappropriate processing Figure An auxiliary purpose of image processing is to improve the usability of the digital image. This processing may require a separate QC workstation. Image processing is not a panacea. Misuses of image processing include compensating for inappropriate radiographic technique, compensating for poor calibration of acquisition and display devices, and surreptitious deletion of nondiagnostic images. Image processing to recover nondiagnostic images to prevent re-exposure should be a last resort, not a routine activity. Routine reprocessing indicates a problem with automatic image processing or technical practice. Access to image-processing software is essential to develop and maintain appropriate processing parameters. Automatic image processing involves assumptions about the radiographic technique, the composition of anatomic region imaged, and the use of collimation. A number of factors can interfere with the automatic detection of the boundaries of the radiation field, including nonparallel collimation, use of multiple fields on a single imaging plate, poor centering, implants especially when they overlie the boundary , and violation of collimation rules provided by the vendor. For example, placement of gonadal shields is no longer trivial, but may adversely affect image quality. Conclusions A multitude of factors affect DR image quality, and no device or operator is immune to unacceptable images. Responsibilities for documenting, reporting, and taking corrective action must be clearly established. Wider dynamic range means that technologists have to pay attention to exposure indicator values, instead of brightness and contrast. Without this attention, patient dose will escalate. If exposure indicator logs are available, they need to be evaluated. Vendors need to make such logs available in convenient digital form. New technologies should be developed for dealing with pediatric examinations and patients with prosthetic devices. New image processing strategies may be needed with these special patients, as well. Thorough training and active onsite support of the technical staff are crucial. For many, this is a completely different way of thinking about the imaging process. Technologists are generally eager to become involved and master this new technology, but they need proper training and guidance to use it effectively to produce diagnostic-quality images.

Chapter 3 : Veraview IC5 HD | MORITA

Facts is your complete guide to Radiographic Imaging for Dental Auxiliaries. In this book, you will learn topics such as as those in your book plus much more. With key features such as key terms, people and places, Facts gives you all the information you need to prepare for your next exam.

Arm 22 can be pivoted manually by the operator to any of a number of angular settings or positions 36 that may be defined by means for defining such as stops, detents, holes or labels. In order to appear on the radiographic image, as was described with reference to FIG. In order to use marker 20, the operator mounts marker 20 to the side of receiver 10 so that it does not obstruct the diagnostically relevant image area. The operator then manually sets the position of indicator arm 22 to correspond to the angular inclination of receiver It has been found that precision angular measurement is, in most cases, not necessary; instead, only a reasonably close approximation is needed. Thus, for example, an error of less than 8 or 9 degrees in either direction would be acceptable in many cases. With reference to FIGS. A setting of indicator arm 22 at the 75 degree position FIG. Marker 20 has a substantially flat portion, shown as a radio-opaque plate 28, and an offset rear plate As shown, plates 28, 30 are joined to form a coupling for detachably mounting plate 28 to hold it against the surface of the receiver cassette film or CR receiver or the receiver body DR receiver. Indicator arm 22, or other type of movable indicator, fastens to plate 28 at a pivot Some type of marking is provided to indicate relative inclination angle, such as that provided by holes 26 through plate 28 at position 36 in this embodiment. Here, the end of indicator arm 22 is contoured to fit into any of holes 26, provided as detents so that indicator arm 22 easily can be positioned at one of the seven discrete positions of holes Alternately, indicator arm 22 can be adjusted in a more continuous arrangement, without mechanical detents or other features for defining specific, discrete positions. In order to form marker image 18, as shown in FIG. In the embodiment of FIG. Holes 26 are formed though plate 28, permitting exposure energy to form an image pattern of the holes as was shown in FIG. An opening 32, a quarter-circular sector in the embodiment of FIG. It can be appreciated that a number of alternative embodiments are possible using the overall arrangement of plate 28 shown in FIG. For example, indicator arm 22 could be radio-opaque only near its tip portion, obscuring the appropriate hole Alternately, labels could be provided rather than holes, using radio-opaque numbers or other symbols, with the main body of plate 28 being radio-transparent. Other patterns of radio-opaque markings could be provided so that movable arm 22 position can be readily discerned from the radiographic image. Indicator arm 22 as shown in the Figures is one type of movable indicator element that could be provided for rotation on pivot A rotatable circular disc or portion of a circular disc could alternately be used, with some portion of the movable indicator element being radio-opaque. Detachable coupling to receiver 10 is provided using an offset rear plate 30 in the embodiment of FIG. With this arrangement, marker 20 clips onto receiver 10 so that it is securely positioned, but is also removable when imaging is completed. It can be appreciated that other arrangements are possible, including mounting to receiver 20 using magnets, screw or thumbscrew fasteners, clips, or other types of devices. In practice, marker 20 can be detachably mounted, designed for re-use with each receiver 10 that is used, so that it remains at the operator station. Alternately, of course, marker 20 could be designed as a permanent fixture on the covering of a cassette or other receiver body. Marker 20 is intended to be mounted to receiver 10 over a portion of the imagable area that is not diagnostically relevant. It may be advantageous to be able to position marker 20 to either the right or left of patient 14 FIG. The edges of receiver 10 are indicated in phantom lines for reference. When marker 20 is mounted to the left when facing the patient, the orientation of FIG. When marker 20 is mounted to the right when facing the patient, the orientation of FIG. It can be useful to store information about the inclination angle as metadata for the obtained image. This metadata could be used in conjunction with the image storage in a Picture Archiving and Communications System or other appropriate medical image storage database. Using the apparatus and method of the present invention, it now becomes a straightforward task for image analysis software to determine the inclination angle from the image itself. In a preparatory step , the radiography technician, after placing the patient suitably against the receiver 10 and setting inclination angle

A, places marker 20 against receiver 10 and manually sets the inclination angle appropriately. An imaging step is then executed, providing a digital image of the area of interest. Once the digital image has been obtained, the angle of inclination can be detected automatically from marker image 18 FIG. In a marker detection step , pattern detection algorithms, familiar to those skilled in the imaging analysis arts, can be used to detect the relative position of indicator arm 22 or other movable indicator element used in marker An angle computation step is then carried out based on the detected marker position. In one straightforward embodiment, angle computation step can be carried out by image analysis routines that identify the position of indicator arm 22 at one of one or more positions 36, such as those described earlier with reference to FIG. Finally, a storage step is executed, allowing storage of the angle information as metadata, associated with the image data for the radiographic image. Once this angle information is obtained, it can be made available to the radiography technician for subsequent imaging sessions if needed. This allows a series of images to be available for the diagnostician wherein all of the images are obtained at substantially the same angle of inclination. The apparatus and method of the present invention provide improvements over conventional methods for indicating inclination angle of a radiographic receiver. Because marker 20 can be detachably mounted on the receiver in some embodiments, the operator can set the angle by measurement or observation once the patient is suitably positioned, then clip or otherwise fasten the marker to the receiver before obtaining the radiographic image. Marker 20 is intuitive and can be set visually, since exacting precision for angle measurement is not normally required. A simple pivot construction allows marker 20 to be simple in design, inexpensively constructed from low-cost materials, and durable. The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the scope of the invention as described above, and as noted in the appended claims, by a person of ordinary skill in the art without departing from the scope of the invention. For example, any of a number of materials could be used for fabrication of marker Thus, what is provided is an apparatus and method for indicating inclination angle of a radiographic imaging receiver.

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