Diagnostic accuracy of panoramic maxillary sinus projection in patients with midface fractures in comparison with CT scanning

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Abstract

Background:

Despite society's ever-increasing concern for personal safety, trauma to the facial bones and enveloping soft tissue remains a relatively common occurrence.

Recently, diagnostic imaging has a unique importance in substantiating the clinically suspected existence of the midface fracture.

It is essential not only to understand how to manage patient's problem, but also to be aware of the various procedures available to help initially in establishing an accurate diagnosis, so that appropriate procedures are selected.

Spiral computed tomography scan was introduced with great promise for advanced patient examination by all major aspects (example:- spatial resolution, low contrast detect ability, and acquisition speed) which were improved through change in both hardware and software. The technique is particularly valuable in the maxilla and nasoethmoidal regions but should not be used routinely as it is expensive and exposes the patient to a dose of radiation about 5-10 times higher than a radiographic examination of three or four films.

Panoramic radiographs (orthopantomograms or OPG films) are tomographic images in which the slice of tissue image is curved to conform with the shape of the dental arches. The aim of the technique is to project the whole mandible, the dental arches, the maxillary sinuses and the orbits on a single film.

Digital panoramic maxillary sinus imaging system was chosen to reach the wanted goal for its relative low radiation dose and also software enables the dentist to extract more information from the same image than ever achievable with film.

Aim of the study:

To evaluate the diagnostic sensitivity of panoramic maxillary sinus projection according to computed tomographical findings in patients with midface fractures to be used as an emergency radiographic diagnostic aid.

Subjects and methods:

Total of 50 patients (38 male and 12 female), whose age rang from 18 to 62 years old, presented with a variety of facial injuries based on clinical signs and symptoms of facial fracture and CT examination , thirty patients with a midfacial trauma (60%) of all patients and twenty patients with a trauma subjected to the whole patient`s bodies and suspected for midfacial fractures. All subjects had a CT examination and a panoramic maxillary sinus imaging system. The panoramic radiograph of each subjects were analyzed and reports were recorded as either "positive" or "negative" according to the positive CT midfacial fracture findings, with other indirect signs of fracture if present(hematoma of the maxillary sinus and emphysema). The result were analyzed by various statistical testing methods (for sensitivity, specificity, positive predictive value, and accuracy).

Results:

OPG agree with CT in 72% (36/50) of studies cases. In the remaining cases 28% OPG always under estimates the real number of fracture shown by CT. OPG never over estimates the number of fracture lines in midfacial fracture cases. The OPG was 83.3% sensitive in detecting midfacial fracture line (16.7% false -ve OPG result). OPG was 100% specific with no false positive test results i.e. it can establish the diagnosis of any midfacial bones fracture with 100% confidence in any clinical setting.

Conclusion:

If panoramic imaging is performed as first imaging modality in case of suspected facial fractures by an experienced investigator, the visualization of fracture line can avoid conventional imaging, by this, an overall reduction of radiation exposure seems possible. Digital panoramic radiograph is reliable procedure that if combined with practice management, software enables the dentist to extract more information from the same image than ever achievable with film.