2D and 3D: A Hidden Truth

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Abstract

This article revealed the necessities of 3D cone beam computed tomographic (CBCT) diagnosis of a case with clinical sign and symptoms which presenting possibility of left parasymphysis fracture of mandible. An oblique mandibular fracture was seen extending from the site of avulsed 34 to the retromolar region. The open reduction and internal fixation (ORIF) with plates and screws was carried out to stabilize the fracture sites. For proper diagnosis and management of such cases successfully, 2D orthopantomogram (OPG) is insufficient. This case managed successfully with the aid of 3D CBCT which shows unpredictable diagnosis over OPG.

Key words: Cone beam computed tomography (CBCT), Orthopantomogram (OPG), Fracture

Introduction

Imaging guidance in detecting fractures in patient with motor vehicle accident (MVA) are predominantly on clinical examination and standard two-dimensional (2D) radiograph. However, more severe disfigurement facial fracture required three-dimensional (3D) images which provided by conventional computerized tomography (CT) for preoperative planning. Cone-beam computed tomography (CBCT) which provides a new class of 3D images which gives promising good results in determining facial fractures.

CBCT has been utilized as a new method for maxillofacial imaging which not only produces images with a high diagnostic quality and isotropic submillimetre spatial resolution but to compare with conventional CT, it has lower radiation dose and shorter scanning time [1].

To date, CBCT has been widely used for the assessment of temporomandibular joints, trauma of the facial skeleton and dental implant planning [2,3].

We describe an important of utilization of CBCT as compared to standard 2D radiograph. Standard radiograph provides an approximation of possibilities and position of a fracture but less providing the 3D images which allow precise mapping of facial fractures. However, CBCT provide 3D images that can be reproduced in presenting images for even small fractures [4]. The technique is not only superior in providing 3D image view and the capability of low radiation as compared to conventional CT, nevertheless it suited the principle of As Low As Reasonably Achievable (ALARA).

We use standard orthopantomogram (OPG) and posterioranterior (PA) radiograph of mandible to detect mandibular fracture in a MVA patient but fail to locate the fracture line. As well patient was unable to open his mouth because of that we are unable to take intra oral x-rays. Hence we were in dilemma to detect the nature of fracture. With clinical sign and symptoms which presenting possibilities of left parasymphysis fracture of mandible, we conducted CBCT as confirmation radiograph and the result was unpredictable. An oblique mandibular fracture was seen extending from the site of avulsed 34 to the retromolar region. The open reduction and internal fixation (ORIF) with plates and screws was then carried out to stabilize the fracture sites. The pre and post OPG and CBCT of the fracture were presented (*Figure 1-4*).



Figure 1. Pre surgery OPG showing no fracture or double line on the mandible.



Figure 2. Pre surgery CBCT showing oblique fracture crossing from site of avulsed 34 to the retromolar region.

Advantages of CBCT which includes its lower dose of radiation than conventional CT, its improved accuracy to identify fractures and the relatively lower radiation exposure compared with plain radiograph supports the use of this method for maxillofacial imaging [5].

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Figure 3. Post surgery OPG and reconstruction.



Figure 4. Post surgery CBCT with plates and screws reconstruction.

Recently, it was widely used for image-guided surgery as the images produce sufficient pertinent anatomy and pathology but we advocate using CBCT in assessing a complex region such as facial region in addition to plain radiograph. The CBCT on most occasions is only an adjunct investigation that helps supplement in clinical and standard radiographic investigations.

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