



CBCT EXPLORATION OF UNNOTICEABLE RARE CLINICAL ENTITY - UNILATERAL ZYGOMATIC AIR CELL DEFECT

Radiology

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ABSTRACT

Zygomatic Air cell defect is a rare anatomical variant seen in the zygomatic process of temporal bone. It can be unilateral or bilateral with former being more common. It is important to be aware of this entity, to differentiate it from other pathologies and also to avoid potential complications during surgery in this area.

KEYWORDS

Zygomatic Air Cell Defect, Unilateral, Cone Beam Computed Tomography

INTRODUCTION:

Human anatomy is a fascinating subject wherein every individual is similar and yet unique. Modern diagnostic aids have helped in identifying many anatomical aberrations without the need of invasive procedure. One such aberration found in the human skull is ZACD- Zygomatic Air Cell Defect.

ZACD was first described by Tyndall DA and Matteson SR in 1985 as pneumatized articular eminence of the temporal bone (Tyndall, Matteson, 1985). They subsequently termed it as ZACD in 1987.

Carter LC et al in 1999 defined ZACD as a nonexpansile, nondestructive cyst like radiolucency in the zygomatic process of the temporal bone which appears similar to the mastoid air cells and which does not extend further anteriorly than the zygomaticotemporal suture (Carter et al, 1999). This pneumatization of Zygomatic bone poses challenges during eminectomy or TMJ surgeries. It can be confused with other pathologies; hence significance of knowledge of such aberration cannot be underestimated.

This Case report is an attempt to familiarize with such entity which is easily identifiable in OPG but usually go unnoticed. Therefore, advanced investigative modalities as Computed Tomography (CT) is needed to evaluate the entity in detail.

Case Presentation:

This case study describes a 28 year old male, who reported to the Department of Oral & Maxillofacial surgery at a centre for dentistry complaining of pain in the left cheek while chewing since 2 weeks. Patient has been habitually chewing on the right side since few months. On extra oral examination patient had pain while palpating left masseter muscle.

Clinical Findings:

Patient's medical history was non-significant. Extra orally there was no obvious asymmetry of the face. On intra oral examination the patient complained of pain on palpating the left maxillary vestibule, there was no sign of trismus or trauma to the orofacial region which would explain the pain during chewing. His previous dental history involves restoration of decayed teeth with amalgam 10yrs ago.

Investigations:

Routine preliminary investigation such as an orthopantomograph and complete mouth series intra oral periapical radiographs were performed.

Panoramic radiographic findings:

Orthopantomograph was acquired using Myray x7, Italy. It revealed an unusual and peculiar finding of a multilocular radiolucency in the left zygomatic process which did not co relate with the normalcy compared with the right side (Fig.1). Thereby encouraging, the need for further evaluation of zygomatic complex using computed tomography.



Fig 1. Panoramic radiograph showing white arrow extensive pneumatization of the left zygomatic arch compared to the normal arch on the right side

Three dimensional cone beam computed tomography (3D CBCT): A 3D CBCT by Planmeca Romexis 4.3.0.R scanner, Helsinki, Finland with technical parameters: image volume size 501x501x433, tube current 8 mA, tube voltage 90 kV, exposure time 13.8s. The software used was Planmeca Romexis viewer, for image acquisition.

Analysis of the 3D reconstruction scan confirmed the structural alteration such as presence of large multilocular defect in the left zygomatic arch which was the actual extension of the pneumatization from the mastoid air cells. Along with this Zygomatic air cell defect other significant findings were also found. Bony defect at the level of left retromolar region extending along the external oblique ridge of ramus of mandible was seen (Fig. 2).

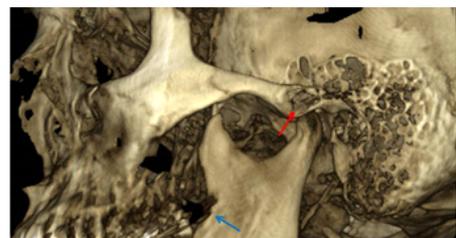


Fig 2. 3D reconstruction of left side showing red arrow extensive pneumatization of mastoid process extending into the zygomatic arch; blue arrow bony defect in the retromolar region

The Axial, Coronal and Sagittal sections confirmed the extensive pneumatization of the mastoid air cells (Fig 3 and Fig 4)



Fig 3. Axial section showing white arrow pneumatization of zygomatic arch, m mastoid air cells



Fig 4. Coronal section showing white arrow pneumatization of zygomatic arch

extending into the left zygomatic arch, not crossing beyond the zygomatico-temporal suture (Fig. 5).

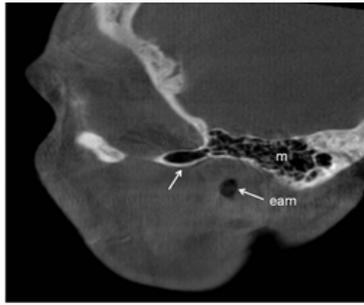


Fig 5. Sagittal section showing white arrow pneumatization of zygomatic arch; m mastoid air cells; eam external auditory meatus

DISCUSSION

Pneumatization is defined as formation of air cells or cavities in the bone, especially in the temporal bone (Dorland's 2007). Period of initiation of pneumatization of bone has been controversial with some claiming it to be at 24th week of gestation and some researchers supporting its presence at birth. Process of pneumatization can be divided into 3 stages namely- Infantile, Transitional and Adult (Virapongse et al, 1985).

According to Wittmaack K, environmental factors like otitis can inhibit pneumatization process and determine the size of the air cell (1931). Cheatele AH considers genetic factors to be responsible for the final presentation of the air cell (1923). The mastoid air system has the function of protecting middle ear by equalising external temperature and pressure changes (Balzeau, Herve 2006). It also helps in cushioning effect during trauma and reducing the weight of the skull (Park et al., 2002).

ZACD is considered to be accessory air cells of mastoid extending into the zygomatic process of temporal bone but not beyond zygomaticotemporal suture [9]. It is classified into 3 types based on their panoramic radiographic appearance as Unilocular, Multilocular and Trabecular type (Zamaninaser 2012).

Clinically it is important to identify ZACD before surgical procedure, like eminectomy, as the bone is fragile leading to unnecessary complication (Stoopler et al., 2003). It can also act as a potential pathway for the spread of infection leading to zygomatic mastoiditis (Sunwoo et al., 2018). According to Al Faleh et al pneumatization in the roof of glenoid fossa makes it fragile and any trauma to the TMJ can lead to penetration of condyle into middle cranial fossa (2007).

According to Srikanth HS et al prevalence rate in south India was found to be 2.5% (HSS 2012). Gupta D et al found 5.7% prevalence in North India (2013). Patient with TMD showed higher prevalence of ZACD in the study conducted by Gupta D et al (2014). According to Kishore M et al prevalence of 2.5% was seen with male predominance (Kishore et al., 2015). Miloglu O et al found 8% prevalence in Turkish population using CBCT concluding that air cell defect can be much common than perceived (2011).

It is important that this entity should be differentiated from pathologies like aneurysmal bone cyst and central haemangioma of the zygomatic region as they have similar radiographic appearance (Zamaninaser et al., 2012). Aneurysmal bone cyst is a rare expansile and multilocular cyst common in mandible than maxilla (Lee 2014). Central haemangioma of zygomatic region appears honey comb or soap bubble appearance in radiograph (Zlotogorski 2005) and as sunburst appearance in CT scan (Moore Sandra 2001).

CONCLUSION

Though Zygomatic Air Cell Defect does not require any intervention, knowledge of its existence is important prior to planning any surgeries in TMJ region. It is also important to differentiate it from pathologies that commonly affect this region. Further research is necessary to probe any association between TMD and ZACD.

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