Zygomatic Air Cell Defect – a Brief Review

The aim of this paper was to analyse the literature published in the research related to zygomatic air cell defect. An internet search using keyword Zygomatic air cell defect was used to obtain details of the published literature in this research area from 1985 to 2016. The data available in the articles were analyzed in terms of ethnicity, prevalence, occurrence (unilateral/bilateral) and gender distribution.

Keywords: Zygomatic air cell defect, prevalence, imaging.

Introduction

Zygomatic Air Cell Defect (ZACD) previously referred to as pneumatised articular eminence, it refers to the formation asymptomatic of air filled cavity within the bone. [1] These are accessory cells in the zygomatic process and articular eminence of the temporal do not extend further anteriorly than the zygomatico-temporal suture. [2] The other synonym is called Pneumatised Articular eminence (PAT) was coined by Tyndall and Matteson in the year 1985. [2] It is believed that the pneumatisation of the bone occurs as a result of opportunistic epithelial expansion into the bone. [3] Mastoid air cells commonly undergo pneumatisation but sometimes accessory air cells develop in the other locations of temporal bone like the zygomatic arch region. [4]

Clinical importance of the zygomatic air cell defect

The ZACDs are located in close proximity to the temporo-mandibular joint TMJ and hence provide a path of least resistance to various pathologies of the joint such as fractures even with minor trauma, inflammation and tumors. [5,6] With recent advances in implants, long zygomatic implants are sometimes used as partial or complete alternative to maxillary bone augmentation procedures. [7] Zygomatic bone is surgically manipulated in esthetic contouring procedures which is popular in Asian population. [8] The air cells are believed to play an important role in the development of temporal acoustic dissipation, protection from external trauma, and minimizes of the skull mass. [9] Another important clinical factor is that the ZACDs must be differentiated from pathologies like aneurysmal bone cyst and central hemangioma of the zygomatic region because they mimic the features of these pathologies as all these lesions needs special concern but in different ways. [4,10]

Al Faleh et al stated that ZACD causes increased fragility of temporo-mandibular joint by structurally weakening the roof of glenoid fossa due to pneumatisation. They also stated that in such cases any massive to the jaws leads to the impingement of the head of the condyle into the middle cranial fossa. [11]

Studies involving zygomatic air cell defect

Studies involving zygomatic air cell defect have been conducted using different imaging modalities over the years also taking into consideration occurrence (unilateral/bilateral) and gender distribution. [12-27] (Table1)
A wide variation of the prevalence rates of zygomatic air cell defect have been observed ranging from as low as 1% (Kaugars et al 1985) to as high as as 65.8% (İlgüy et al 2015) [5,26]. However most of the researchers who evaluated the ZACD using the panoramic radiograph have found prevalence rates lower than 5%.[5,13-19,22-24,27] only one study conducted by Shokri et al in 2013 using panoramic radiography stated a prevalence rate of 6.2%.[12]. In contrast most of the studies using the cone beam computed tomography (CBCT) have reported higher prevalence rates.[20,21,25,26] however only one study by Ribeiro-Nascimento et al (2015) using CBCT has reported lower prevalence rate of 3.3%.[3] Prevalence rate as high as 68.5% also have been reported in studies conducted using CBCT.[26]

Gender variation in the occurrence of ZACD
Most of the studies have reported of a higher rate of occurrence in the female study subjects when compared to male study, however the difference have not been statistically significant in many of these studies.[5,12,13,16,19,20,22-24,26] Some studies have reported no gender predilection between male and female study subjects.[14,17,18,25] However very few studies have shown a higher male predilection.[27]

Occurrence of ZACD (unilateral/bilateral)
In majority of the studies the occurrence of ZACD was unilateral.[13-27]. Equal number of unilateral and bilateral occurrence have been reported rarely.[5]
Ethnicity and occurrence of ZACD

Although studies on ZACD have been conducted at many countries most of the published literature originates from population based studies from Iran [4,12,24,25], Turkey [16,17,18,19,20] India [22,23,27], USA[5,13, 14], Brazil [3,21], Germany [15]. the prevalence rates of ZACD was observed to more in studies conducted on the Iranian, Turkish and American population when compared to Indian population, however it is to be noted that most of the recent studies on the later population has been conducted with CBCT therefore more prevalence was observed owing to better visualization of the ZACD.[26,25]

Imaging modality used to assess ZACD

Majority of the studies published before 2010 have been carried out using panoramic radiography.[13,16,19] However after 2010 researchers have preferred using cone beam computed tomography for their research.[3,20,21,25] The increased use of CBCT by the researchers could be attributed to its higher diagnostic accuracy compared to panoramic radiography especially in areas like the medial portion of the articular eminence.[28] Panoramic radiographs present with disadvantages like superimposition of adjacent structure, distortion, and low resolution. CBCT overcomes the superimposition problem thus is an ideal imaging modality for the assessment of air spaces in the skull base.[20]

With recent advances in the imaging modalities it would be easier to detect the presence of ZACD and differentiate it from other pathologies which may have similar radiographic features thus preventing unnecessary surgical intervention as demonstrated in few published cases.[29]

References


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