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EARLY DIAGNOSIS AND TREATMENT OF ISOLATED MAXILLARY SINUS DISEASES

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INTRODUCTION

The maxillary sinus or antrum of Highmore is a hollow space between the craniofacial skeleton which is lie in the maxillary bone. It is a pyramid shape cavity filled with air in adjacent location to the nasal and oral cavity. Where the base of maxillary forms the inferior part of nasal cavity, and the roof is composed by orbit floor contains infraorbital canal, frequently the apex extended to the zygomatic bone. Maxillary sinus considered as the first and largest cavity to develop paranasal sinuses with a volume about 10 ml located below the cheeks and above the teeth as shown in figure 1. The opening mechanism of sinus depends on ciliary action because the ostium lies high on the medial wall.[1]

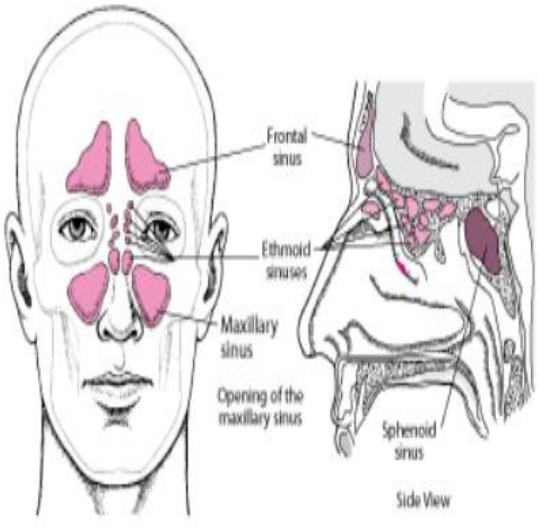

Figure 1: X-ray Image of Paranasal Sinuses.

Patients with maxillary sinus complications may suffering from different clinical symptoms including; epistaxis, unilateral nasal obstruction, orbital symptoms, deformation of facial symmetry. Therefore, clinical evaluation of maxillary sinus disease is based on full history investigation combined with advanced clinical examination including nasendoscopy, computed tomography (CT) and MRI imaging.

Nasendoscopy is mandatory procedure to investigate nasal cavity facilitating the identification of polyps, pus or mass. While CT scan is helpful to distinguish if maxillary sinus complications are originated from odontogenic problems or not. On the other hand, MRI investigation is useful to identify fungal infection, distinguish between fluid and soft tissue. Also, it is playing a significant role to evaluate complicated sinus syndrome. In addition to that, ultrasound assessment can be useful to inspect the presence of fluid in sinus.[2]

METHODOLOGY

Patients with common symptoms and complications are fully investigated in ENT clinic. Besides that, nasendoscopy examination is a mandatory procedure to for maxillary sinus evaluation and play significant role to explore polyps, pus or mass. Furthermore, new technology of radiographic system based on digital imaging including CT and MRI scanners are valuable diagnosis tools to detect anatomical landmarks and distinguish between masses and fluid, soft tissue and mucosa. Also, laboratory investigation helps to reach firm diagnosis based on biopsy with histological analysis.

DISCUSSION

Many clinical symptoms and indications may present with patients with isolated maxillary sinus. The most popular indications include pain and pressure in the face, epistaxis, nasal obstruction and swelling over affected sinus. In addition to that, patients may complain orbital disorders, alerted facial symmetry and oral cavity symptoms. Also, patients may feel fever and chills which suggest that the infection has spread beyond the maxillary sinus.

Infections affected maxillary sinus has been categorized according to the causative pathogen.

In general, viral microorganisms such as *parainfluenza, rhinoviruses and influenza* viruses are the main source to develop sinus infections. On the other hand, bacteria are responsible to develop small ratio of sinus infections. Where the most popular isolated bacteria are *Streptococcus pneumoniae, Prevotella, Haemophilus influenzae, Moraxella catarrhalis and* beta-lactamase producing bacteria. Besides that, modern studies found higher ratio of MRSA and beta-lactamase isolated from chronic and acute maxillary sinusitis are related to smoker patients. Furthermore, Rhinoscleroma is a bacterial infection described as a chronic granulomatous affecting nose and respiratory system and caused by *Klebsiella rhinoscleromatis*. As well as, Fungi and *Pseudomonas aeruginosa* are the most popular fungal pathogens isolated from patients with neutropenic and fungal ball.[3]

Silent sinus syndrome (SSS), usually known as imploding antrum or atelectasis of maxillary sinus. Also, it is defined as a rare progressive condition of enophthalmos and hypoglobus combined with hypoplasia of sinus which pose a diagnosis challenge. Imploding antrum or chronic maxillary sinus atelectasis is rare condition and disease process that pose a diagnostic challenge. Typically, SSS presents among adults between 30 years old to 60 years, without gender selection. (SSS) usually characterized by notable and painless unilateral face asymmetry. Diagnosis is confirmed by radiology techniques including CT scanner or MRI images showing sinus collapse due to enlargement of orbital which is led to create negative antral pressure combined with hypoventilation. Management and treatment plan aim to rebuild outlet for mucous drainage by endoscopic technique through maxillary antrostomy to restore normal ventilation. After few months, sinus configuration restored to normal or near normal situation promoting orbital floor to repair.[4]

In addition to that, maxillary sinus can be affected by numerous benign lesions including the following;
Antrochoanal polyp (ACP) is a situation when mass of soft tissue originated from maxillary antrum with protrude ability from ostium toward choanae through the nasal cavity. Commonly, children and young adults are more suspected to have APCs presenting with clinical symptoms of unilateral nasal obstruction or drainage. However, ACP can be distinguished from common nasal polyps by their dumbbell shaped containing fewer mucous glands and eosinophils causing unilateral nasal obstruction. As well as, rare studies have been reported bilateral antrochoanal polyps.

Diagnosis is performed by clinical investigation based on nasal endoscopy combined with radiology technique using computed tomography scanner or MRI images. Figure 2 shows right side ACP diagnosed by coronal CT scan. Surgical procedures such as polypectomy and a Caldwell Luc procedure are recommended to remove polyp and ensuring removal of its origin via middle meatal antrostomy. Nowadays, sinus endoscopic procedure which is known as functional endoscopic sinus surgery (FESS) has been more preferred technique compared with traditional one which carry high reoccurrence ratio. The essential goal of surgical treatment is to completely remove antrochoanal polyp and clear the maxillary sinus. Follow up is required and ranged between 12 months up to 5 years.

Figure 2: Right-side ACP.

Furthermore, cholesterol granuloma which is rarely occurred can be defined as composed of cholesterol crystal, granulation tissues and giant cells or foreign body that can be affected the petrous apex. Usually, it is represented in temporal bone and rarely found paranasal sinuses. In most cases cholesterol granuloma is benign growth. Regarding treatment options, size and location of the cyst are signification factors, surgical excision is recommended via large middle meatal antrostomy to ensure total removal and reduce the risk of recurrence.[5]

Besides that, Mucoceles which are uncommon and benign cyst lined with mucoperiosteum. Usually, Mucoceles found in frontoethmoidal region which being more common to be affected. Clinical symptoms characterized with elevation of orbital floor which is causing diplopia or in some cases related to facial swelling or dental problems. Also, clinical reports showed that bilateral maxillary mucoceles associated with cystic fibrosis have rarely been notice. However, CT imaging has been reported as a significant diagnosis technique for mucoceles which appeared in airless sinus as expanded lesion with bone thinning as shown in figure 3. Treatment by endoscopic sinus surgery with middle meatal antrostomy promoting sufficient drainage to reduce the opportunity of recurrence and ensure that sinus cavity counters return to its normal situation.[6]

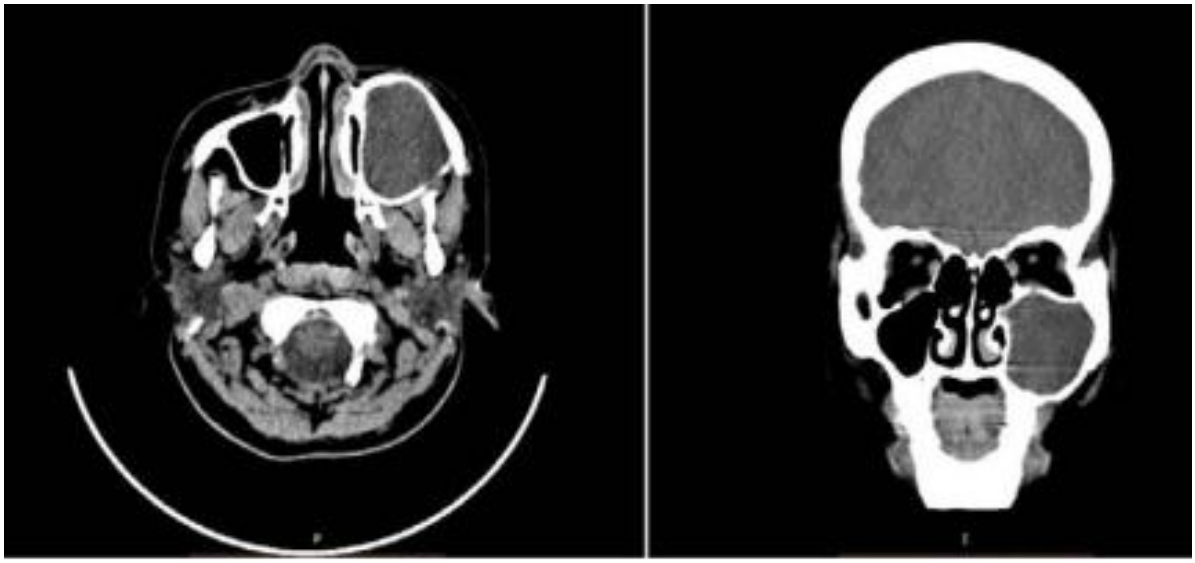

Figure 3: Coronal CT scan with left maxillary mucocele.

Unilateral nasal obstruction and epistaxis have been associated with haematoma combined with the presence with facial swelling or orbital upnormality. Also, patients with other complications related to bleeding dyscrasia or chronic kidney diseases may complain of haemorrhagic pseudotumour. Diagnosis can be performed by radiology based on CT scanner or MRI images.[7] The below figure shows removed haematoma by endoscopic excision.

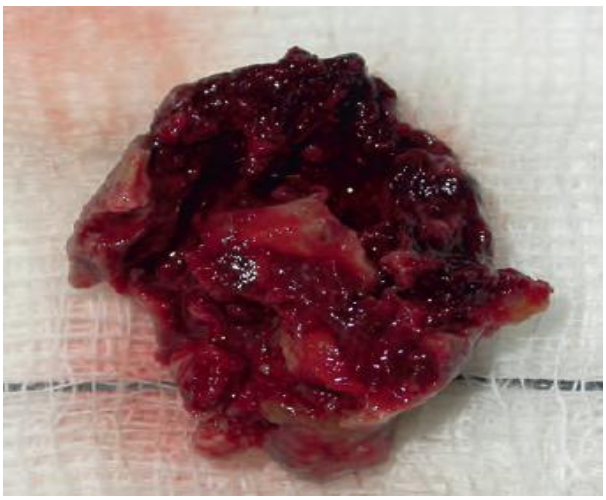

Figure 4: Maxillary haematoma after removal.

On the other hand, patient with maxillary sinus complications may involve with several types of benign tumors such as papillomas which are classified into everted, cylindrical and inverted which is consider as the most common papillomas. Inverted type of papillomas are consider as benign epithelial tumor arising from lateral nasal wall or within the maxillary and characterized by inverted appearance at underlying stroma with intact basement membrane, high rate of recurrence with significant local aggressiveness. Clinical reports demonstrated that 0.5% to 5% of all nasal tumors are diagnosed as inverted papillomas which is significantly less frequent than polyps by 25 times.

Diagnosis of papillomasis including inverted type confirmed by CT scan or MRI imaging combined with laboratory result of histological biopsy. The below figure demonstrates CT scan and MRI for inverted papilloma with cone shape among focal hyperostosis through posterior and interior wall of maxillary sinus. Recommended management procedure is surgical excision by endoscopy for all affected mucosa and subperiosteal dissection to ensure removal of all sclerotic bone to reduce the risk of recurrence. However, clinical follow up is recommended during the next three years after surgical treatment.[8]

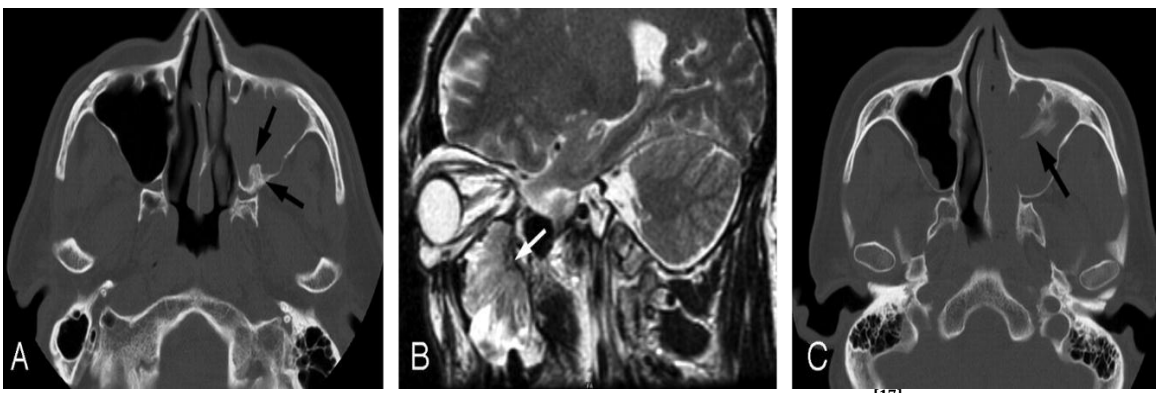

Figure 5: Inverted papilloma Axial CT scan and MRI.[17]

Also, cyclindrical type of papillamas essentially arise at the lateral nasal wall with significant ability to recurrence and malignant transformation. Therefore, it is recommended to perform complete surgical excision. Meanwhile, everted papilomas characterized by stratified squamous epithelium with less potential for malignant transformation.

Moreover, fibro-osseous lesions represent wide variety of clinical disorders and lesions that are affecting sinus, maxi-facial bone and skull and may develop benign tumor. Classification depend on growth features which can be detected by radiographic tools such as CT scanner or MRI. Consequently, fibro-osseous is classified into the following groups ossifying fibroma, osseous dysplasia and fibrous dysplasia. Particularly, osteomas are benign bony tumor presenting in the frontal sinuses and responsible for around 5% of cases. CT scan or MRI imaging are useful tools for diagnosis. Large lesion and symptomatic should be treated surgically by nasendoscopic or sometimes by external surgical procedure. While, ossifying fibroma can be differentiated radiologically regarding to sharp circumscribed with radiolucent center surrounding by eggshell rim. Compared to fibrous dysplasia that shows indistinguishable borders under CT scan.[9] Figure 6.a and 6.b represent typical diagnosis CT scan of ossifying fibroma and fibrous dysplasia respectively.

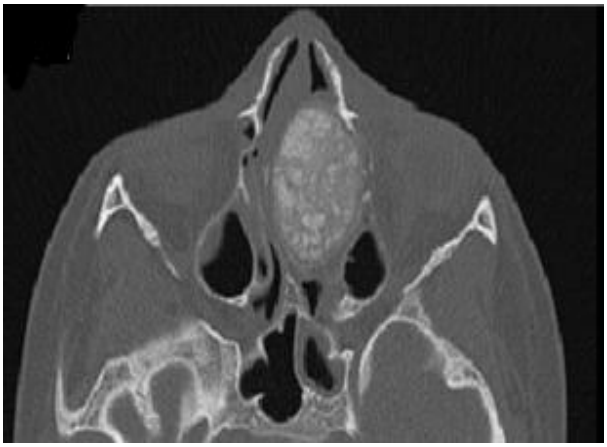

Figure 6.a: Ossifying fibroma.

Figure 6.b: Fibrous dysplasia.

Commonly, fibrous dysplasia described as replacement of normal parts of bone presenting with asymptomatic expanding mass typically with ground glass appearance at CT scan as shown in figure 6.b. Significantly, mass caused by fibrous dysplasia has the potential to grow until the size of lesion causing compression on surrounding tissue or cosmetic modification making surgical treatment mandatory. Moreover, recent studies suggested that cemento-ossifying fibromas have been composed of cementum, bone and fibrous tissues, and originated from the periodontal ligament.[10]

Besides that, salivary gland tumors are considered as pleomorphic adenomas affecting the nasal cavity and rarely affect the maxillary sinus separately. However, their potential to malignant transformation and recurrence have been reported usually. Making complete surgical excision is the best option for treatment. Fortunately, benign mesenchymal lesions including fibromas, lipomas, and myxomas are uncommonly affected maxillary sinuses compared with head and neck. Clinical studies showed high recurrence rate of myxomas with locally significant aggressiveness. Therefore, it is recommended to operate wide local excision.[11]

Vasiform tumors or haemangiopericytomas are rarely affected head and neck, presenting at pericytes and spread around normal vascular channels. Differentiating is difficult from sarcomatous tumors and showing variable malignant transformation potential and have been reported as late recurrences with a ratio of 10% of affected cases. Therefore, surgical management is mandatory for wide local excision with long term follow up.[12] On the other hand, haemangiomas which are a vascular lesion affecting the cavity of sino-nasal and may presenting in maxillary sinus with low ratio. However, surgical endoscopically management is required with preoperative embolization to minimize intraoperative bleeding.

CONCLUSION

Numerous types of maxillary sinuses diseases are commonly affected this anatomical area. Early diagnosis significantly influences the results and outcomes of clinical management and treatment procedures. However, lesions and masses are frequently asymptomatic, allowing them to grow to critical size before clinicals symptoms presented, making treatment options limited and difficult. Consequently, accurate clinical evaluation combined with nasendoscopy examination, high resolution imaging technique including CT scan and MRI, and histological analysis based on biopsy leading to early diagnosis of maxillary sinus disorders, promoting successful management and treatment of maxillary sinus diseases especially lesions which can be treated endoscopically at early stage.

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