بسم الله الرحمن الرحيم

Sudan University for Sciences and Technology

College of Graduate Studies

A study of Para Nasal Sinuses Pathology Using Computed Tomography

دراسة أمراض الجيوب الانفيه باستخدام الاشعه المقطعيه

A Thesis Submitted for Partial Fulfillment of the Requirement of M.Sc. in Diagnostic Radiological Technology

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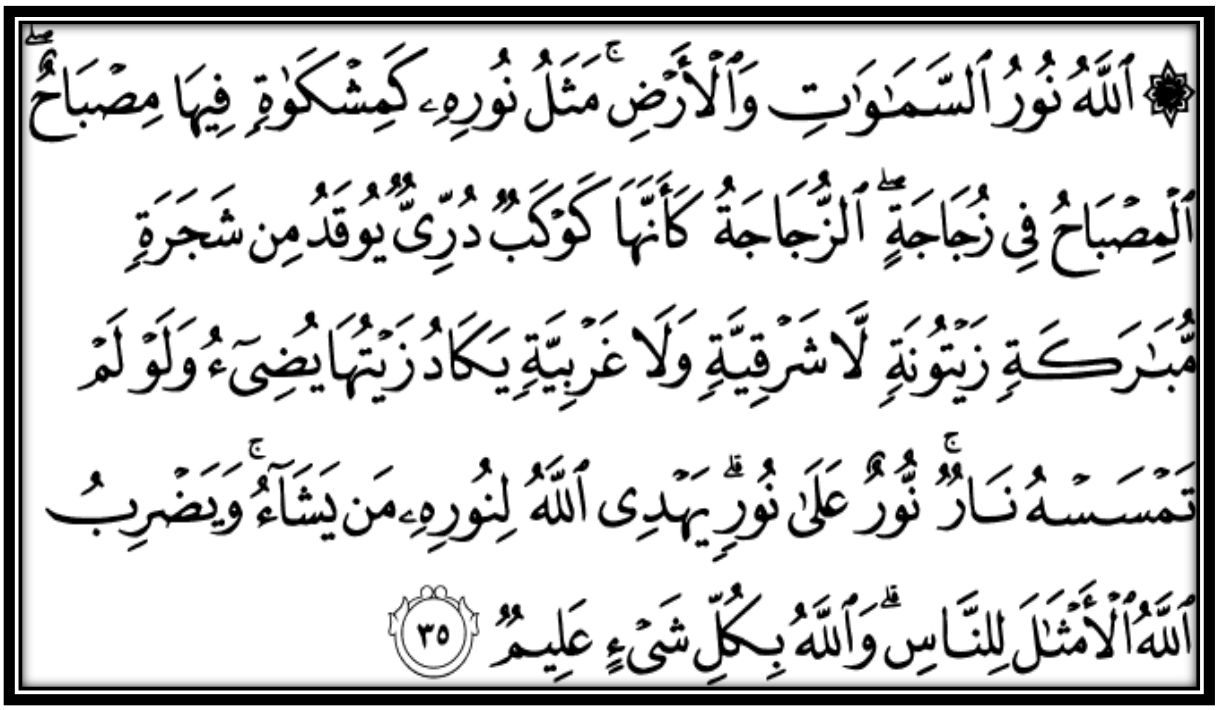
الأية:

بسم الله الرحمن الرحيم

قال تعالى:



صدق الله العظيم

{سورة النور الاية (35)}

Dedication

With my love and appreciation I dedicate this thesis to:

My father: yassir abd algfar
My mother: Eigbal abd alaah

My: sisters

My :brothers

My all friends, family, and to all people those I love and respect

ACKNOWLEDGMENT

This research project would not have been possible without the support of many people .The author wishes to express her gratitude to her supervisor, Dr. Caroline Edward who was abundantly helpful and offered invaluable assistance, support and guidance.

Many thanks extended to the Antalya Hospital staff for their help and support.

Finally, thanks for all those who helped me in the preparation of this thesis specially my friends Sara &Samah .

Abstract

This analytic descriptive study and was conducted in four months during the period from August to December 2016 in Antalya medical center.

The study carried out to evaluate the Para nasal sinuses pathology in sample of 112 patients (38 males and 74females). Were selected randomly, aged from 10 to 70 years, attending the department of computed tomography for Para nasal sinuses scan with different complains.

The objective of study to evaluate the Para nasal sinuses most common pathology using computed tomography and correlated to age and gender.

The results were obtained after collecting and analyzing the data t using computer program of statistical package for social sciences.

The main results of this study were that the Females were affected more than males by Para nasal sinuses pathology, inflammatory changes were most common than other finding and more affected age groups were between 20-29 year.

The study concluded was that Common changes were sinusitis followed by polyp.

The most affected sinuses were maxillary sinus, Mass was the last complaints and was found in 2males& 4 females.

مستخلص الدراسة

ديسمبر إلى أغسطس من الفترة خلال أشهر أربعة وفي التحليلية الوصفية الدراسة هذه أجريت أنطاليا الطبي مركز في 2016.

و74 ذكورا **38** مريضا 112 من عينة في الأنفية الجيوب أمراض لتقييم الدراسة هذه أجريت الذين خضعوا 10-70 عاما، بين أعمارهم تتراوح الذين عشوائي، بشكل اختيارهم تم إناثا لاسباب مختلفة. الأنفية لفحص الاشعه المقطعيه للجيوب

المقطعي التصوير باستخدام شيوعا الأكثر الأنفية الجيوب أمراض لتقييم الدراسة من الهدف والجنس بالعمر وربطها.

الحزمة من كمبيوتر برنامج باستخدام البيانات وتحليل جمع بعد النتائج على الحصول تم الاجتماعية للعلوم الإحصائية.

وكانت الأنفية الجيوب بامراض الذكور من أكثر تأثرت الإناث أن الدراسة هذه نتائج أهم وكانت 20- 29سنة بين تأثرا أكثر العمرية الفئات في من غيرها شيوعا الأكثر الالتهابية التغيرات.

اللحميات تليها الأنفية الجيوب التهاب كانت الشائعة التغيرات أن الدراسة إلى خلصت و.

الفكي. الجيب تضررا الأكثر الجيوب وكانت

List of abbreviations

CT	Computed Tomography
PNS	Para Nasal Sinuses
MPR	Multi Planner Reconstruction
HU	Hounsfield Unit
CTN	CT Number
WW	Window Width
WL	Window Level
OMCS	Osteo Metal Complex's
KV	Kilo Voltage
MA	Mali Ampere
S	Second
PT	Patient
ROI	Region Of Interest
GE	General Electric
MDCT	Multi Detector Computed Tomography
FOV	Field Of View
DICOM	Digital Imaging And Communication In Medicine

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Chapter One

1-1 Introduction:

Computed tomography become the method of choice for many routine and clinical application ,It provides good image quality for body per rotation of 1 to 2 times the x- ray collimation ,using multi planar reformation (MPR) recent advance in CT allows the a quoin of high resolution image in many planes.

CT now is standard examination techniques in diagnosing and treatment of Para nasal sinuses disease, CT scan are special X-ray tests that produce cross sectional images of the body using x ray and a computer, CT produces a volume of data that can be manipulated through a process known as windowing in order to demonstrate varies body structures, CT is non-invasive, safe, and well to leafed .It provides a highly details look at many different parts of the body. (Kennedy et al, 2001).

CT scan is used to evaluate the brain, neck, spine, chest, abdomen, pelvis, and sinuses.

The Para nasal sinuses are hollow air filled spaces located within, the bones of face and surrounding the nasal cavity. And consist of four pairs of sinuses there are only two planes are common for imaging the sinuses coronal and axial (Yousem, 1993).

Many Sudanese people complain of sinuses diseases routinely sent to CT department and obtain cuts which can diagnose the PNS disease accurately.

2-1Research Problem:

Conventional X- ray was more frequently used to detect the bony and Para nasal sinuses disease using more complicated positions than routine skull x-ray more over it can't detect the whole changes and all disease of the Para nasal sinuses is difficult to be diagnosed directly using routine x-ray images of PNS ,so the introduction of computed tomography with advance scanning and the multi detector scanning technique and the multi-detector scanning and image processing capabilities that lead to overcome the detection of varies types of PNS disease using multi-planner images and image reconstruction with small cuts also the use of the complex 3D techniques.

1-3 Objectives

1-3-1General objectives:

The aim of this study is to evaluate the most common Para nasal sinuses pathology in Sudanese population in order to classify the most common finding of its pathology.

1-3-2 Specific objectives:

-To classify the sinuses pathology according to the age and gender.

-To classify the CT finding according to sinuses.

1-4 Significant of this study:

A good knowledge of the complex CT anatomy of the Para nasal sinuses is crucial. This knowledge will provide an accurate assessment of the normal variants and pathological changes.

The prominence of this study is to characterize the most common pathological finding in Para nasal sinus by using multi-detector CT scanner therefore the classification of Sudanese Para nasal sinuses disease according to age and sex is considered more significant issue here.

1-5 Over view of this study:

This study was consisting of five chapters.

Chapter one: consist of introduction; introduce briefly this thesis and it contain, general introduction about the CT scan of Para nasal sinuses, problem of the study, general and specific objectives, significant of the study in addition to the overview of this study.

Chapter two: Literature review which contains the general theoretical background and previous studies about detection of these diseases during computed tomography scans for PNS.

Chapter three: Describe the methodology (materials and methods) will be used in study.

Chapter four: included result of presentation of final finding of study.

Chapter five: included discussion, conclusion and recommendations for future scope in addition to references and appendices

Chapter two

Theoretical background

2-1 Anatomy of the Para nasal sinuses:

The Para nasal sinuses are air-containing cavities within the facial bones and skull that communicate with the nasal cavity. The nasal cavity is responsible for filtering airborne particles as it warms and humidifies air going into the lungs. The sinuses are named after the bones in which they originate: Ethmoid, maxillary, sphenoid, frontal. There is great variance in the size, shape, and development of these sinuses within each individual**.** (Lorrie L. Kelley et.al, 2007)

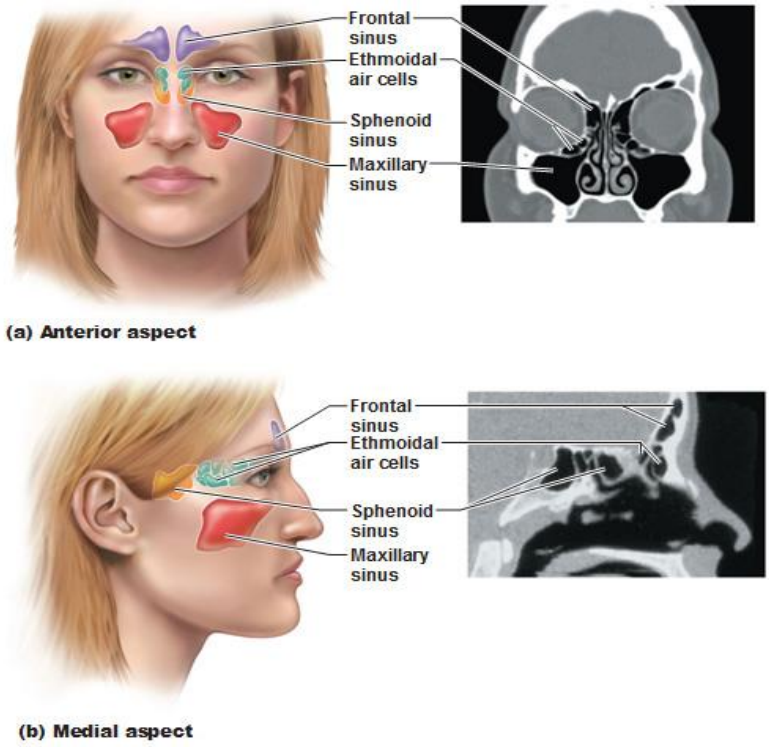

Figure (2.1) shown the structure and component of Para nasal sinuses

2:1:1 Maxillary sinus:

The paired maxillary sinuses (ant rum of Highmore) are located within the body of the maxilla, below the orbit and lateral to the nose. These triangular cavities are the largest of the Para nasal sinuses in adults but are just small cavities at birth. Their growth stops at approximately the age of 15. The maxillary sinuses drain into the middle nasal meatus**.** **(**Lorrie L. Kelley et.al, 2007**)**

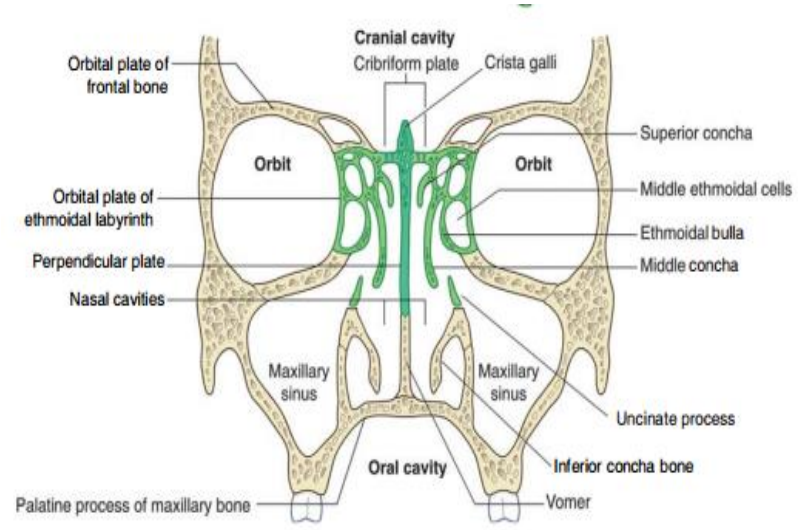

Figure (2.2) shown the maxillary sinus

(Richard Drake, et.al, 2014)

2:1:2 Frontal sinuses:

The frontal sinuses are located within the vertical portion of the frontal bone. These sinuses are typically paired and are separated along the sagittal plane by a septum. The frontal sinuses are rarely symmetric, vary greatly in size, and can contain numerous septa. These sinuses do not form or become aerated in the frontal bone until approximately the age of 6, making them the only Para nasal sinuses that are absent at birth. The frontal sinuses drain into the middle nasal meatus the inferior meatus only receives drainage from the nasolacrimal duct. (Lorrie L. Kelley et.al, 2007)

Their blood supply is from branches of the anterior ethmoidal arteries. (Richard Drake, et.al, 2014)

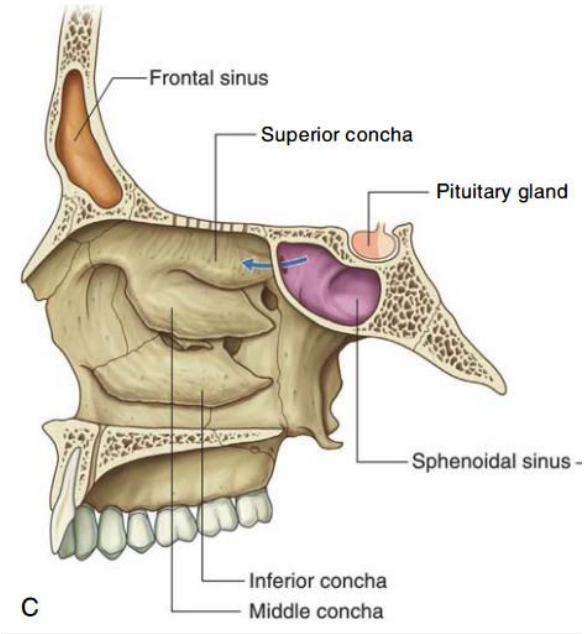

Figure (2.3) shown the frontal sinus (lateral view).

(Richard Drake, et.al, 2014)

2:1:3 Ethmoid sinuses:

The Ethmoid sinuses are contained within the lateral masses (labyrinths) of the ethmoid bone. They are present at birth and continue to grow and honeycomb into a varying number of air cells that can be divided into three groups: anterior, middle, and posterior. The

Anterior and middle groups drain into the middle nasal meatus and the posterior group drains into the superior nasal meatus. (Lorrie L. Kelley et.al, 2007)

The ethmoidal cells receive their blood supply through branches of the anterior and posterior ethmoidal arteries. (Richard Drake, et.al, 2014)

2:1:4 Sphenoid sinuses:

The sphenoid sinuses are present at birth but continue to grow until 10 to 12 years of age. They are normally paired and occupy the body of the sphenoid bone just below the sella turcica. Each sphenoid sinus opens into the spheno-ethmoidal recess directly above the superior concha and drains into the superior nasal meatus. (Lorrie L. Kelley et.al, 2007)

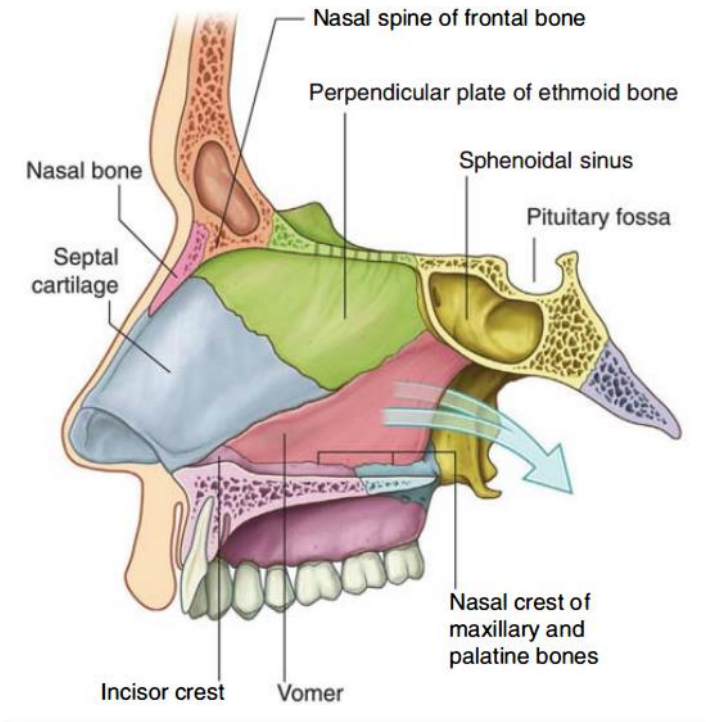

Figure (2.4) shown the sphenoid sinus (lateral view). (Richard Drake, et.al, 2014)

2:1:5 Osteo meatal Complexes:

Drainage of the Para nasal sinuses occurs through various openings or Ostia. The major drainage pathways and structures of these osteomeatal channels form the osteomeatal complex (OMC) there are two osteomeatal channels; the anterior OMC and posterior OMC. The anterior OMC includes the Ostia for the frontal and maxillary sinuses, frontal recess, infundibulum, and middle meatus. The anterior OMC provides communication between the frontal, anterior and middle Ethmoid, and maxillary sinuses. The posterior OMC consists of the sphenoethmoidal recess and the superior nasal meatus. The sphenoethmoidal recess lies just lateral to the nasal septum, above the superior nasal concha, and drains the sphenoid sinuses. Key structures to identify of the OMC include the infundibulum, middle meatus, uncinate process, semilunar hiatus, and Ethmoid bulla. (Lorrie L. Kelley et.al, 2007)

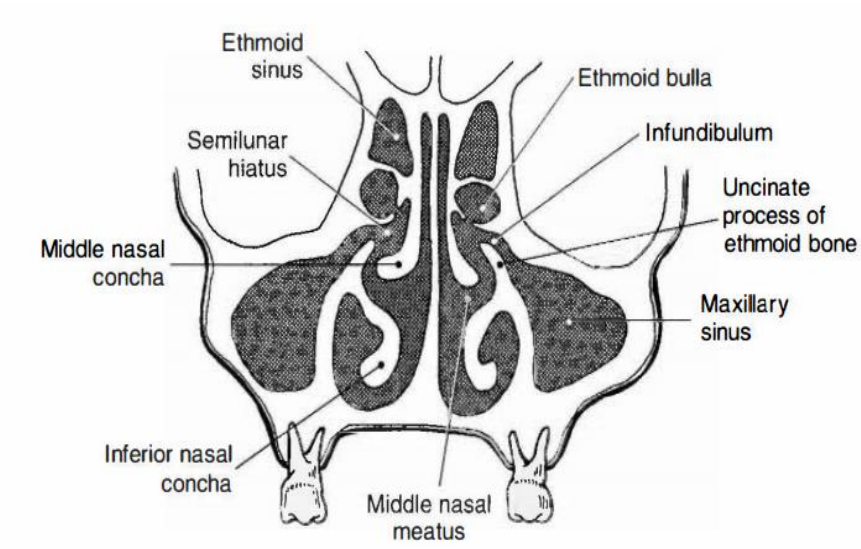

Figure (2.4) showed the structure and component of Osteo meatal Complex

(Lorrie L. Kelley et.al, 2007)

2-2 physiology of the Para nasal sinuses:

It is not clear why nature provided Para nasal sinuses. Probable functions are:

Air-conditioning of the inspired air by providing large surface area over which the air is humidified and warmed.

To provide resonance to voice.

To act as thermal insulators to protect the delicate structures in the orbit and the cranium from variations of intranasal temperature.

To lighten the Skull bones. (Dhingra, 2007).

The nasal cavity and PNS make about 1L of mucus a day. As the mucus moves through the nasal cavity and sinuses, it moisturizes and cleans the mucous membrane, which filters bacteria; dust and other particles from

the air breathed through the nose. The mucus drains into the throat and is swallowed, where the acid in the stomach destroys any bacteria that were in the mucus. (Marieb, E.N, 2006)

2-3 Pathology of the Para nasal sinuses:

2-3-1 Sinusitis:-

Is an inflammation of the mucus of PNS any condition (inflammation, neoplasm, foreign body) that interferes with drainage of a sinus renders it liable to infection. If the ostium of a sinus is blocked, the secretion or exudates accumulate behind the obstruction. There are two types of sinusitis: (David Suttonet.al, 2003)

2-4-1-1AcuteSinusitis:-

It is due to secondary bacterial infection following an upper respiratory tract infection of viral origin. Or from local infection, e.g. an infected tooth of the upper jaw. (David Sutton et.al, 2003)

2-3-1-2 Chronic rhino sinusitis:-

Following the acute infection and is general manifest as thickening of the lining membrane of the sinus with the multiple involvement, and often accompanied by mucosal occlusion of the middle meatus. Acute and chronic sinusitis may be followed by many complications. (David Sutton et.al, 2003)

2-3-2 Sino nasal polyps:

The polyps are soft-tissue pedunculated masses of edematous hyperplastic upper respiratory mucosa. The specific polysaccharide material within the ground substance attracts excess fluid and electrolytes. The commonest site of Sino nasal polyps is the Ethmoid,

followed by the maxillary antra and then the sphenoid sinus. The cause remains unclear but there is an association with atopic rhinitis (allergic and non-allergic), asthma, infection, cystic fibrosis, aspirin intolerance. (David Sutton et.al, 2003)

2-3-3 Mucoceles:-

The term `Mucocele' is defined as the end-stage of a chronically obstructed sinus-an obstructed, airless, mucoid-filled expanded sinus. The most commonly affected sinus is the frontal (66%); about 25% occur in the Ethmoid and 10% in the maxillary antra. Mucocele of the sphenoid sinus is rare. (David Sutton et.al, 2003)

2-3-4 Fungal disease:

A number of mycotic agents are capable of infecting the nose and Para nasal sinuses; the most common of these is the saprophyte aspergillus. It is found in the soil, dust and decaying organic matter, and can be pathogenic in humans, animals and birds. The usual point of entry is the nose.(David Sutton et.al, 2003)

2-3-5 chronic rhinitis:

Repeated bouts of acute rhinitis may lead to chronic rhinitis. In this condition, the nasal mucosa is thickened by persistent hyperemia, mucous gland hyperplasia and infiltration with lymphocytes and plasma cells. (David S. Strayer, 2015)

2-3-6Granulomatous disease:-

The majority of these is infectious and includes tuberculosis, syphilis, leprosy, and rhino scleroma and action mycosis. Other causes include

Wegener's granulomatosis, midline granuloma, sarcoidosis and now the nasal granuloma due to cocaine abuse .A diagnosis of granulomatous disease should be considered-when there is evidence of a nasal sepal mass with septa) erosion on imaging. (David Sutton et.al, 2003)

2-3-7Retention cysts:-

These occur as a result of obstruction of the ducts of the mucosal glands. They are usually small, have a well-defined outline and are seen in approximately 10% of the population. They may occasionally enlarge to fill the sinus. (David Sutton et.al, 2003)

2-3-8 Dermoid Cysts:-

Dermoid cysts are rare in the Para nasal sinuses and generally occur as a secondary extension from a cyst of the nose or orbit**. (**Glyn A. S. Lloyd, 1988)

2-3-9 Benign tumors:

2-3-9-1Osteoma:

These are benign, slowly growing tumors containing mature compact or cancellous bone. They occur most frequently in the frontal sinus, followed by the Ethmoid and maxillary sinuses. They are usually asymptomatic but may block the drainage of sinus, resulting in recurrent infection and/or mucocele. (David Sutton et.al, 2003)

2-3-10Malignant tumors:-

2-3-10-1 Carcinomas:-

of the sinuses and nasal cavity account for 0.2-0.8%of all carcinomas and only 3% of those in the upper aero digestive tract There are multiple risk factors for sin nasal cancer, including exposure to hardwood dust (adenocarcinoma), soft wood dust (squamous carcinoma), nickel refining, chromium working, boot, shoe and textile working, isopropyl oil, volatile

hydrocarbons and snuff taking. There is a male to female predominance of 2 to 1. Human papilloma virus may be a cofactor. (David Sutton et.al, 2003)

2-3-10-2 Malignant melanomas:

Occur more commonly in the Sino nasal cavities. When they do occur, involvement of the nose is more common than the sinus. Local recurrence or metastatic disease within the first year is seen in up to 65% of patients, metastases affecting the lungs, nodes, brain, adrenal glands, liver and skin. Nasal melanomas have a better prognosis than tumors originating in the Para nasal sinuses. (David Sutton et.al, 2003)

2-3-10-3 Olfactory neuroblastoma:

Arises from the olfactory epithelium of the nasal cavity and is a tumor of neural crest origin. There is a bimodal age distribution, with the tumor occurring most frequently in patients aged 11-20 years and 51-60 years. Epistaxis and nasal obstruction are the most common presenting symptoms. The prognosis is related to the extent of disease at presentation. (David Sutton et.al, 2003)

2-4 Equipment:

CT scanners are complex, with many different components involved in the process of creating an image. Adding to the complexity, different CT manufacturer's often modify the design of various components. From a broad perspective, all makes and models of CT scanners are similar in that they consist of a scanning gantry, x-ray generator, computer system, operator's console, and physician's viewing console. Although hard-copy filming has largely been replaced by workstation viewing and electronic archiving, most CT systems still include a laser printer for transferring CT images to film. (Lois, 2011).

The three major components of a CT imaging system are the operating console, the computer, and the gantry. Each of these major components has several subsystems.

2-1-4 Gantry:

Is the ring-shaped part of the CT scanner. It houses many of the components necessary to produce and detect x-rays. Components are mounted on a rotating scan frame. Gantries vary in total size as well as in the diameter of the opening, or aperture. The range of aperture size is typically 70 to 90 cm. The CT gantry can be tilted either forward or backward as needed to accommodate a variety of patients and examination protocols. The degree of tilt varies among systems, but ±15° to ±30° is usual. The gantry also includes a laser light that is used to position the patient within the scanner. (Lois, 2011).

Control panels located on either side of the gantry opening allow the technologist to control the alignment lights, gantry tilt, and table movement. In most scanners, these functions may also be controlled via-the operator's console. A microphone is embedded in the gantry to allow

communication between the patient and the technologist throughout the scan procedure. (Lois, 2011).

2-4-2Computer Components:-

The principal components in a computer are an input device, an output device, a central processing unit (CPU), and memory. Input and output devices are ancillary pieces of computer hardware designed to feed data into the computer or accept processed data from the computer. Examples of input devices are keyboard, mouse, touch-sensitive plasma screen, and CT detector mechanisms. Output devices include monitor, laser camera, printer, and archiving equipment such as optical disks or magnetic tape.

Central Processing Unit the CPU is the component that interprets computer program instructions and sequences tasks. It contains the microprocessor, the control unit, and the primary memory. In the past the CPU design frequently used for CT image reconstruction was the array processor. Also called a vector processor, this design was able to run mathematical operations on multiple data elements simultaneously. Array processors were common in the scientific computing area throughout the1980s and into the 1990s, but general increases in performance and processor design resulted in their elimination. (Lois, 2011).

2-4-3 The Techniques of PNS:

2-4-3-1 Preparation:

PT should wear comfortable clothes to exam. Pt. may give a grown to wear during the procedure. Metal objects including jewelry, eye glasses, dentures and hair pins may affect the CT images and should be left at home or removed prior to exam.

PT may ask to remove hearing aids and removable dental work Straps and pillows may be used to help the patients maintain the correct position and hold still during the exam. (Radiology Info.org, 2016

2-4-3-2 projections of PNS:-

Routine axial and coronal sections are obtained on all patients. Direct coronal scanning is necessary for adequate demonstration of sinus disease. Reformatted views should be reserved for sagittal sections. Which are not directly obtainable with most scanner designs They should only be used to provide coronal scans when direct scanning is for any reason impossible for example if a patient cannot extend the head or cervical spine.**(** Glyn.A.S.Lloyd,1988**)**

2-4-3-2-1 Axial projection:-

Position of the patient's head is adjusted so that the scanning plane forms an angle of 16° caudally from the orbito-meatal line in this way the plane of section will conform to the length of the optic nerve. And will also provide axial views of the optic canals and the adjacent posterior ethmoid cells and sphenoid sinuses**. (**Glyn.A.S.Lloyd, 1988**)**

2-4-3-2-2 coronal projection:-

Coronal scans are performed by hyperextension of the patient's head and angulation of the gantry with the patient either prone or in the supine position. In some patients it is impossible to obtain true coronal scans. Either because the patient cannot achieve sufficient extension of the neck. Or because the angulations may need to be adjusted out of the coronal plane to avoid the effect of metallic dental fillings. These will degrade the image unless suitable computer software modification is available to overcome the problem. For imaging of the sinuses 5-mm sections in both

planes are generally adequate. With contiguous slices through the lesion. Imaging should include both wide window settings for bone detail and narrower window widths for good soft tissue contrast**.** (Glyn.A.S.Lloyd, 1988**)**

2-4-3-5 Contrast medium:-

The CT attenuation values of both normal and abnormal tissues generally show an increase after the administration of intravenous contrast medium. In sinus neoplasia the degree of enhancement varies with tumors of different histology and there is also a considerable variation within the same histological type. Enhancement usually correlates closely with the vascularity of the tissue concerned. So that strong enhancement is to be expected for inflammatory tissue while retained secretion and uninfected mucoceles should not enhance. By Utilizing any differential contrast enhancement a distinction can sometimes be made between tumor and adjacent normal or inflammatory tissue. In practice these differences are often unclear largely because of the wide range of tumor enhancement encountered.**(** Glyn.A.S.Lloyd,1988**)**

2-5 Previous studies:

Fujimoto et al (1991) they studied: patient with total blindness caused by P.N.S disease have rarely been reported. During the past ten years they are identical 17 patients with optic nerve disease and posterior P.N.S disease, 7 of 17 had no light perception. 5 of these 7 had a final visual acuity 20/200 or better, 2 patient showed dramatic visual improvement after end nasal surgery CT should be done at the first visit.

Pediatr (2011) studied the clinical progression of incidental tomography finding in PNS of a symptomatic individuals and result that (50%) of the 106 PT enthralled in this study had opacity, the majority due to mucosal thickening intense pacification was found (suspected) score >15 PT in this subset had a greater risk of developing symptoms during follow up compered on discrete finding.

M.pifferi (2011) had studied agenesis of P.N.S nitric oxide in primary ciliary skin disease (P C d)The results were: out of 86 (42 males) and (46 children) age between (8-17 years) and 40 adults (18-58 years) immunological abnormalities were excluded in all patient no subject had CF or CT gene mutations (the most common mutation in the populations were sought) and careful examination of swallowing problems and spurious phenyl complication of Esophageal reflex.

(Rage et al 2012) studied occurrence of maxillary CT in a symptomatic patient result that abnormalities were diagnosed in 68,2% of cases.

There was a significant different between genders (<_0.001) and there was no difference in age group, mucosal thickening was most prevalent (66%) followed by retention cyst (10.1%) and opacification (7.8%).

Amany (2014) the main objective of her study was to evaluate and assessment of the effectiveness of CT in the diagnosis of PNS disease and compared between two images planes (axial and coronal) when they are applied for the same cases. This study consists of Random samples of 100 patients which categorized to (27 males and 73 females) with age between (10 to 60) years old with different symptoms were chosen axial and coronal cuts done to explain the suitable technique to demonstrate all the Para-nasal sinuses disease clearly.

Alaa et al (2014) her study was to evaluate the PNS disorders using CT on 51patients from 18 to over 50 years old and the result show that - females are most affected by Para nasal sinuses disorder compare with males. There are 37 patients with sinusitis and most common age affected between (18-30) ,13patients with polyps most common age affected between (18-30) and they had one female patient had carcinoma in 26years old.

Chapter Three

Materials and Methods

3.1Material:

112 patients (38 male. 74 female) were enrolled in the study; they were scanned with CT. (All Patients referred for CT of Para nasal sinuses, which were suspected to have Para nasal sinus disease.). This study was conducted at Antalya Diagnostic Center. And was carried out from August to December 2016. Data were analyzed by an independent t-test and by correlation analysis with the use of the SPSS (IBMSPSS version 21.0). All data were presented as tables and figures. The variable were (Patient gender, Age, affected sinuses, pathology and final diagnosis)

3.1.2Machine used:

General Electric device made in America, with 120 kvp and 8slice.

Figure (3.1) CT scan machine show gantry and couch

3.2. Method

3.2.1 Protocol:

Patient was placed in the supine with head extended and chin supported and was moved within the gantry for scanning to perform a lateral scan projection radiograph. Start position from the anterior margin of frontal sinus to the Posterior wall of sphenoid sinus. Gantry angle Parallel to posterior wall of maxillary sinus and at 90° to hard palate.

CT technical parameters included: matrix 512 X 512, field of view (FOV) 20 cm; tube current 60 mAs at 120kV; table feed 5mm/rotation, pitch 10/40mm. Axial and coronal images were analyzed.

5 mm cuts or less were performed from the level of frontal to maxillary sinuses in axial sections and from maxillary to sphenoid in coronal sections.

Bone and soft tissue were printed with different WW and WL.

3.2.2 Ethical approval:

Ethical approval is granted from Antalya hospital where no patient identification data or individual patient detail is published.

Chapter four

Results

Table (4-1): show Age distribution

AGE	*Frequency*	*Percent %*	*Valid Percent %*	*Cumulative Percent %*
10-19	17	15.2	15.2	15.2
20-29	28	25.0	25.0	40.2
30-39	25	22.3	22.3	62.5
40-49	20	17.9	17.9	80.4
50-59	14	12.5	12.5	92.9
60-69	5	4.5	4.5	97.3
>=70	3	2.7	2.7	100.0
Total	112	100.0	100.0	

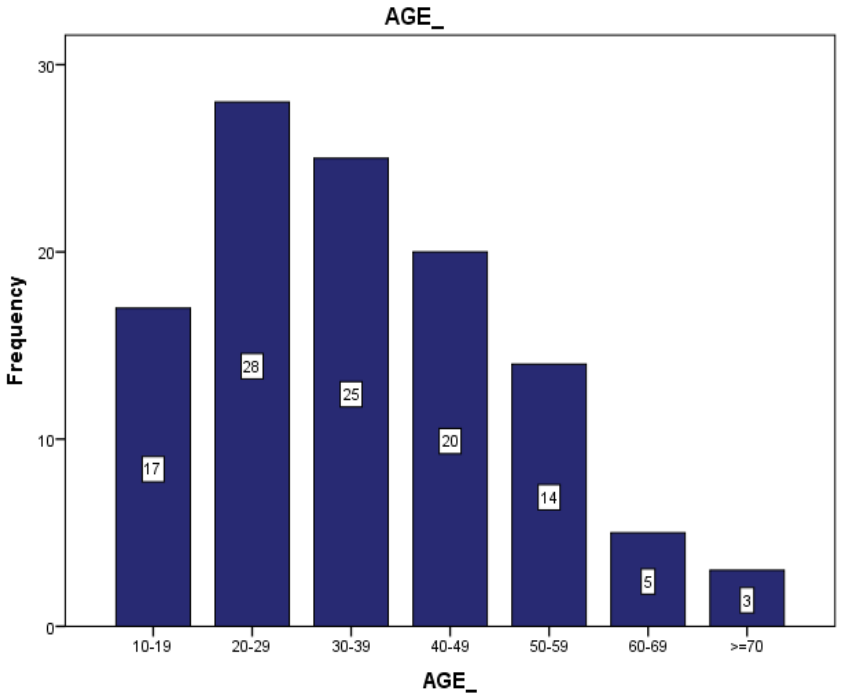

Fig (4-1): bar chart show Age distribution

Table (4-2): show gender distribution

Gender	***Frequency***	***Percent %***	***Valid Percent %***	***Cumulative Percent %***
M	38	33.9	33.9	33.9
F	74	66.1	66.1	100.0
Total	112	100.0	100.0	

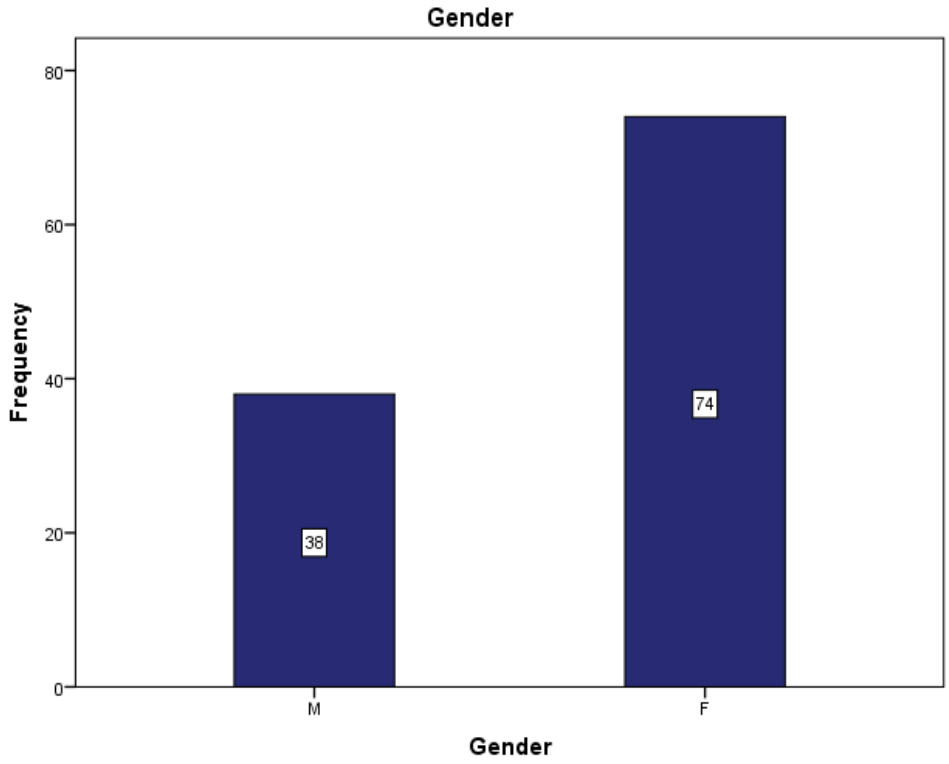

Fig (4-2): bar chart show gender distribution

Table (4-3): show affected sinus distribution

M: Maxillary E: Ethmoid S: Sphoind F: Frontal

Affected sinus	*Frequency*	*Percent %*	*Valid Percent*	*Cumulative Percent*
M	37	33.0	33.0	33.0
E	11	9.8	9.8	42.9
M.S	1	.9	.9	43.8
S	5	4.5	4.5	48.2
M.E	22	19.6	19.6	67.9
M.E.F	5	4.5	4.5	72.3
M.E.S	6	5.4	5.4	77.7
M.E.F.S	22	19.6	19.6	97.3
M.F	1	.9	.9	98.2
E.F	1	.9	.9	99.1
F.S	1	.9	.9	100.0
Total	112	100.0	100.0	

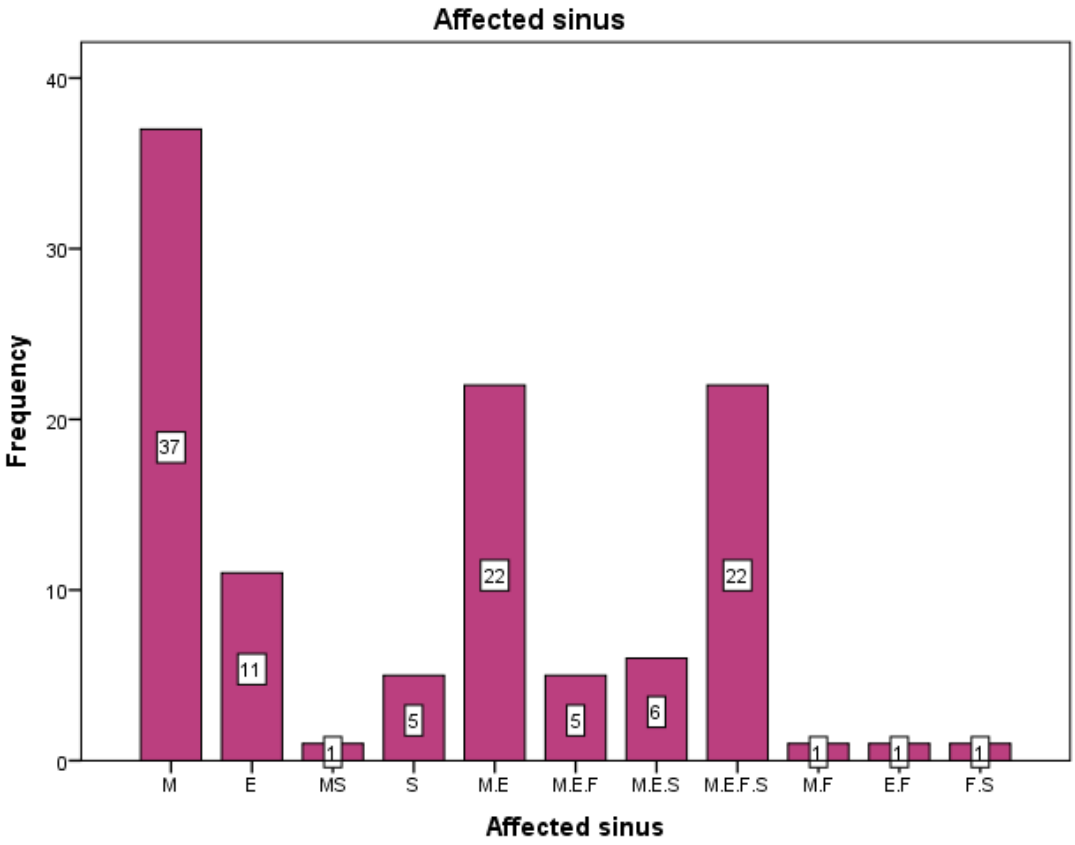

Fig (4-3):bar chart show affected sinus distribution

Table (4-4): show pathology distribution

Path	***Frequency***	***Percent %***	***Valid Percent***	***Cumulative Percent***
inflammatory	77	68.8	68.8	68.8
lesion	27	24.1	24.1	92.9
both	8	7.1	7.1	100.0
Total	112	100.0	100.0	

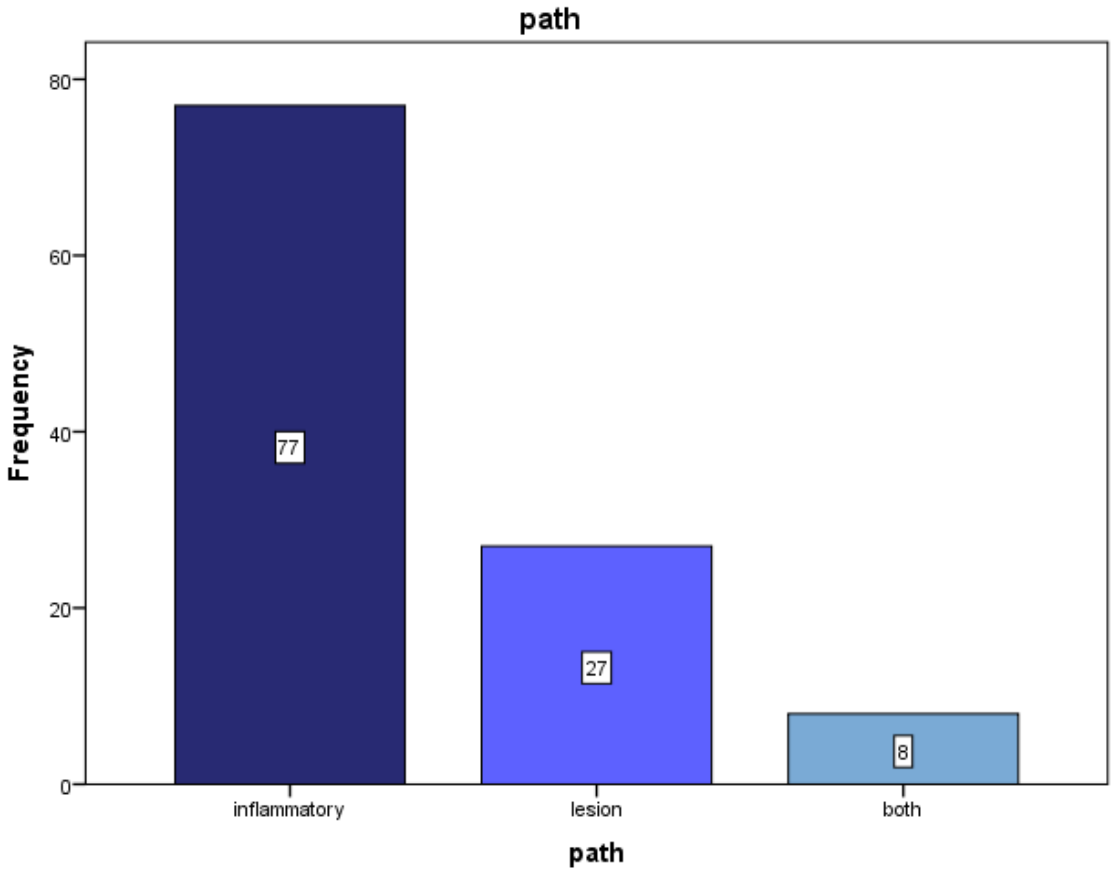

Fig (4-4): bar chart show pathology distribution

Table (4-5): show final diagnosis distribution

Final	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
sinusitis	43	38.4	38.4	38.4
rhinitis	7	6.3	6.3	44.6
Rhinosinusitis	27	24.1	24.1	68.8
Polyp	18	16.1	16.1	84.8
Mass	6	5.4	5.4	90.2
Cyst	2	1.8	1.8	92.0
Sinopolyp	8	7.1	7.1	99.1
Mucocele	1	.9	.9	100.0
Total	112	100.0	100.0	

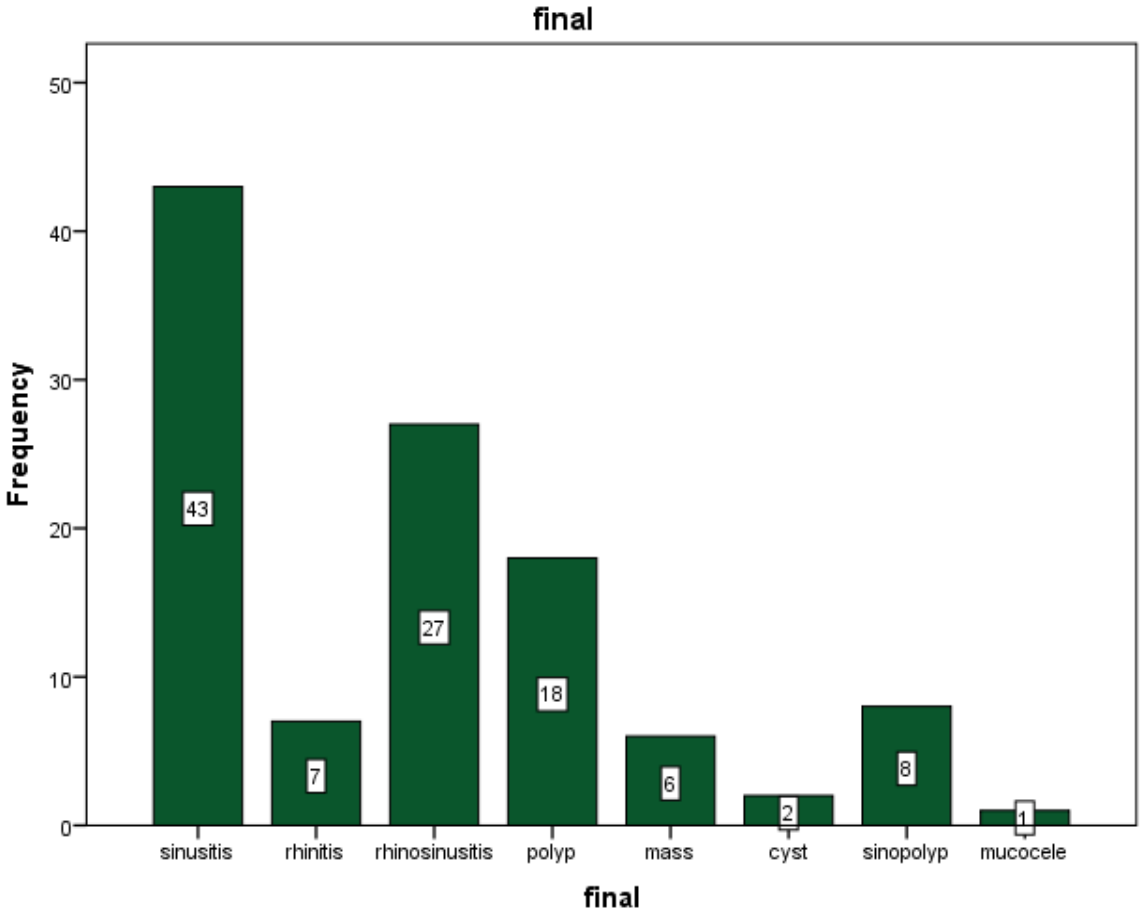

Fig (4-5): bar chart show final diagnosis distribution

Table (4-6): Cross-tabulation table show the correlation between pathology and Age

Pathology	***AGE***						
	10-19	20-29	30-39	40-49	50-59	60-69	>=70
Inflammatory	12	19	18	14	10	3	1
Lesion	5	6	6	3	4	1	2
Both	0	3	1	3	0	1	0
Total	17	28	25	20	14	5	3

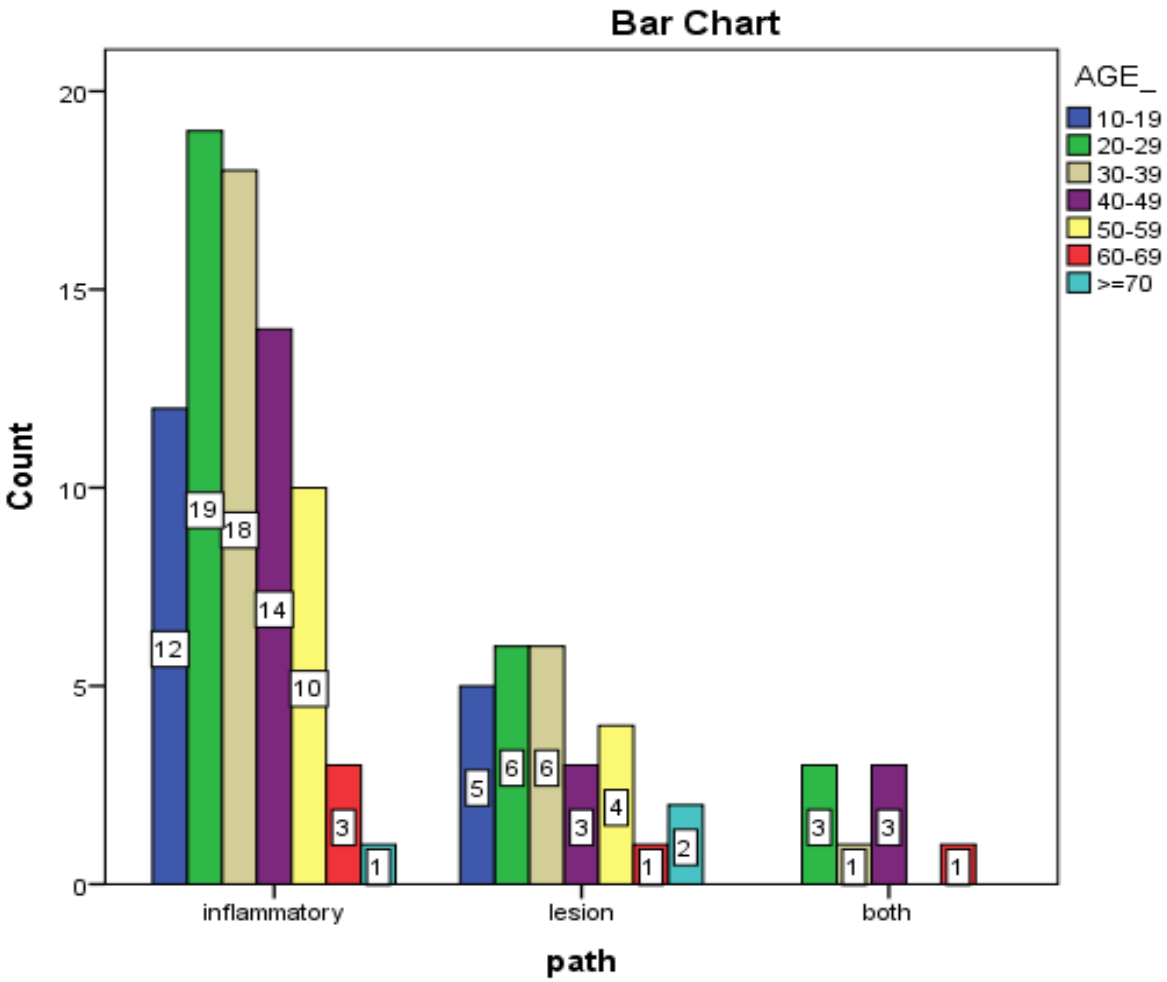

Fig (4-6):bar chart shows the correlation between pathology and Age

Table (4-7): Cross-tabulation table show the correlation between pathology and gender

Pathology	***Gender***		***Total***
	M	***F***	
Inflammatory	24	53	77
Lesion	9	18	27
Both	5	3	8
Total	38	74	112

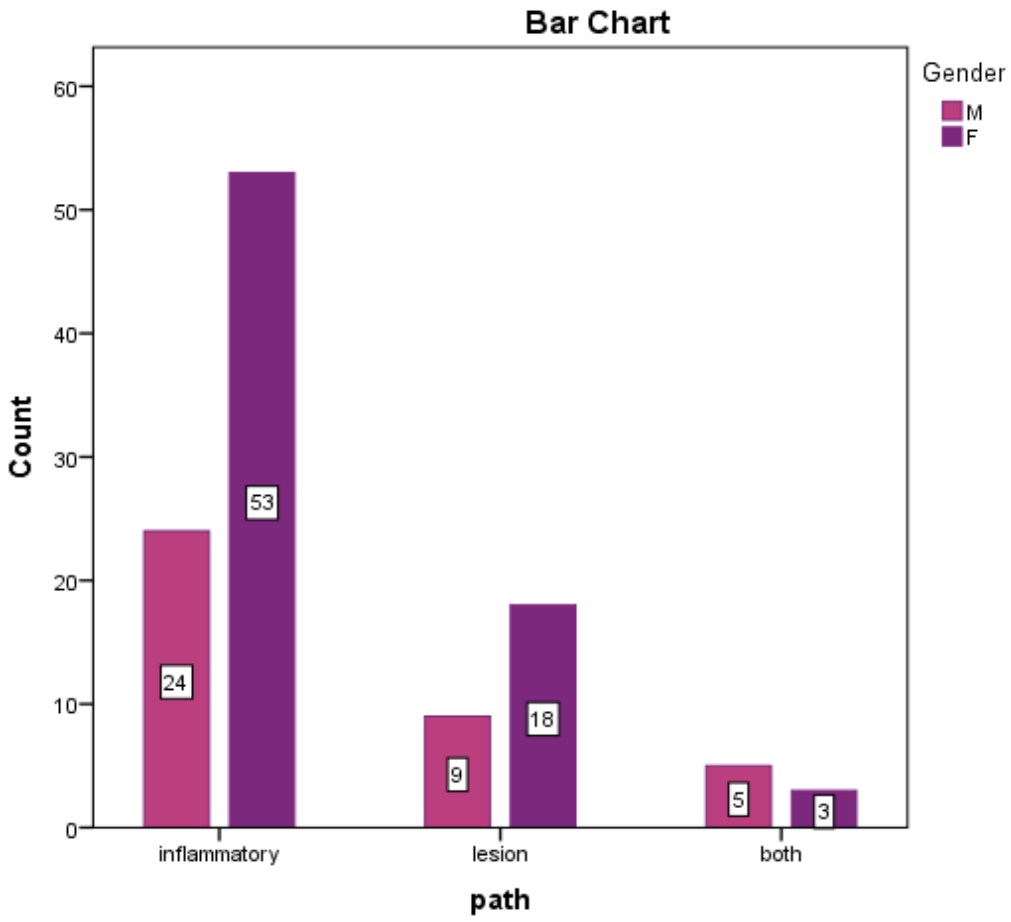

Fig (4-7): bar chart shows the correlation between pathology and gender.

Chapter five

Discussion, conclusion and Recommendation

5.1 Discussion

-The aim of this study to evaluate the common pathology that affects the Para nasal sinuses and the role of spiral computed tomography in the diagnosis it.112 patients with PNS request were investigated in Antalya medical Diagnostic Center.

-The most common age group of the patients was between (20-29) years. Showed in (table (4.1) figure (4.1).

-Inflammatory changes are most common in the Para nasal sinuses than the other finding. Showed in (table (4.4) figure (4.4).

-Sinusitis was seen in 43 patients (32 female) & (11 male) Common on age between (20-29) Showed in (table (4.5) figure (4.5).

-Rhinitis was seen in 7 female patients Common on age between (30-39) Showed in (table (4.5) figure (4.5).

-Rhino sinusitis was seen in 27 patients (14 female) & (13 male) Common on age between (20-29) Showed in (table (4.5) figure (4.5).

-The most common lesion finding is the polyps and it was seen in 18 patients (14 female) & (4 male) Showed in (table (4.5) figure (4.5) Common on age between (20-29).

-masses were seen in 6 patients (4 female) & (2 male).

-retention cyst and Mucoccle were not common Showed in (table (4.5) figure (4.5).

-Sino nasal polyps were seen in 8 patient .Showed in (table (4.5) figure (4.5).

5.2 Conclusion:

112 patients were selected randomly in both genders, aged from 10 to 70 years,

The study aimed to evaluate the Para nasal sinuses disorder using computed tomography.

The results were obtained after collecting and analyzing the data t using computer program of statistical package for social sciences.

- Common affected gender was Females.
- Common affected age groups (20-29).

-Common affected sinuses were maxillary sinus.

-Common inflammatory changes were sinusitis followed by rhino sinusitis followed by rhinitis.

-Common lesion disorder changes were polyps followed by cancer and retention cysts.

5.3Recommendation:

- Large sample can be used to have better overall accuracy.
- We recommended to do other researches depending on bony distraction, osteo metal complex disease, mucosal thickening , polypoidal change to get more information about PNS disorders.
- Use the conventional X-ray &MRI for compares of results with CT finding.

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College of Graduate Studies

A study of Para Nasal Sinuses Pathology Using Computed Tomography

Data collection sheet

NO	Age	Gender	Affected sinuses	inflammatory	lesion	Final diagnose

Fig (5-1) Axial and coronal section with 5mm thickness

33years, male with rhino sinusitis

Fig (5-2) Axial and coronal section with 5mm thickness

48years, male with sinusitis+ polyp.

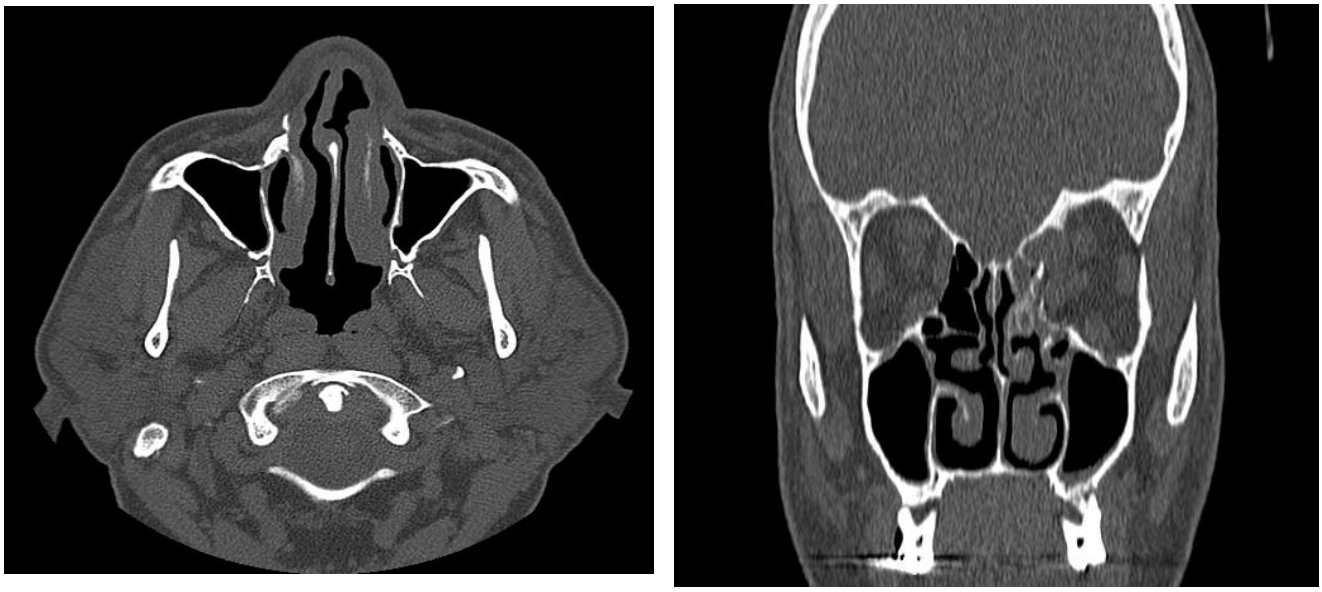

Fig (5-3) Axial and coronal section with 5mm thickness

51years, male with mucocle

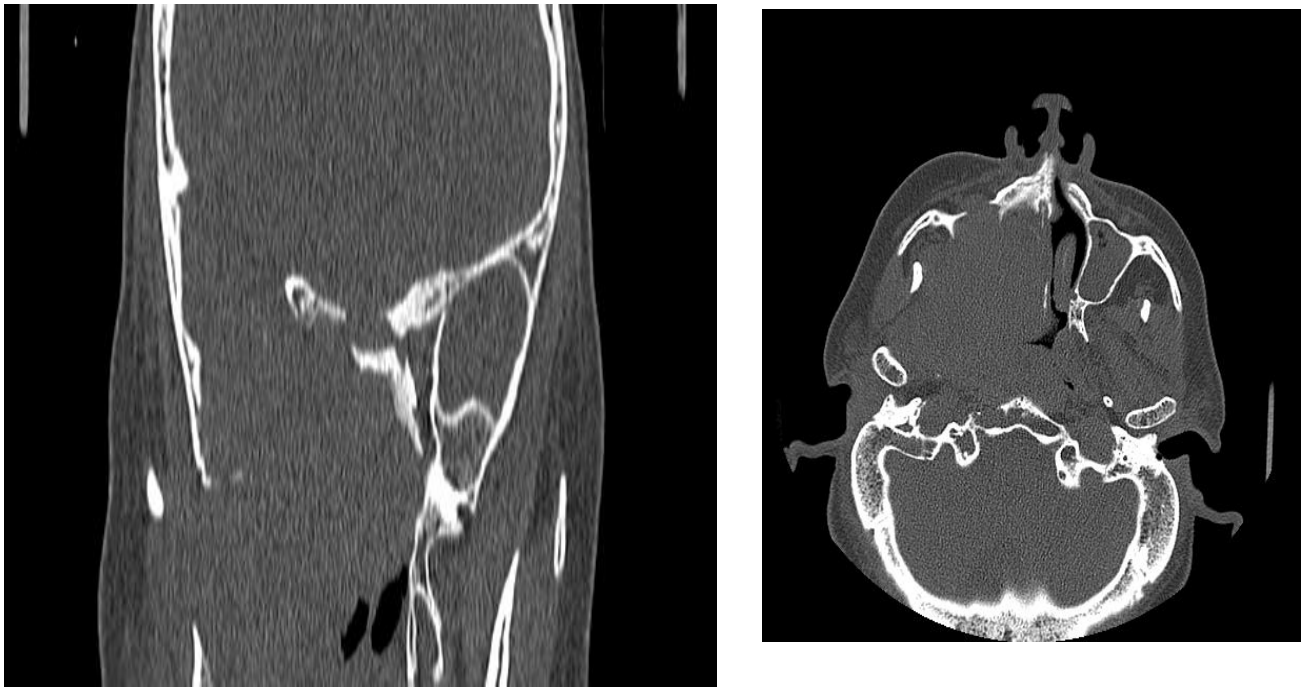

Fig (5-4) Coronal Axial section with 5mm thickness

48years,female with multiple myeloma