

***Sheet no : 3***

***Refer to slide no : 1***

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**كُتِبَتْ هَذِه الشيتْ وفِي القَلْب غَصّه على ~ مُعاذْ ~ودعوة لربّ السماءْ أن يحفظ بلدنا مِن شرّ حاسدٍحاقد**

**دقيقة من وقتك \*\*\* الفاتحة على روح الشهيد - مُعاذ الكساسبة - \*\*\***

اي شي مكتوب وتحته سطر او بخط كبير فهو مهم نوعا ما \*\*

\*\* We moved from the first part that called superficial mycosis to the second part which related to skin and mucosal as systemic infection caused by yeast not by filamentous fungi . and as we see we have different type yeast that including pathogens , opportunistic pathogen , normal flora yeast as well as obligatory pathogen ‘’ which means once isolated these obligate pathogens often should be consider as pathogens which might be associated with symptomatic and asymptomatic infection ,whereas in normal and opportunistic pathogen might be found in any part of our body especially in the oral cavity

**In oral cavity we have 2 type of yeast** :   
 ***1- non pathogen*** : represent by what we called budding yeast ( it is not similar to budding yeast of *Saccharomyces cerevisiae* which used in fermentation in bread production ) .

***2- second type of yeast which belong to genus called Candida*** : it is a yeast and it can excrete certain type of enzymes which associated with change yeast into opportunistic pathogen which means to change structure of this yeast by producing elongation ‘’ filament like structure ‘’ that attach on mucosa by interaction with certain receptor on mucosa . Then it will produce cover over the mucosa which can consider as type of inflammation and ulceration but without developing of pus cells . there will be accumulation of macrophage it is more inflammatory reaction associated with erythemia and this is feature associated with these opportunistic pathogens and its disease , common known as candidiasis (as given in U.S.A lecture ) or candidiosis .

It might associated with dissemination to any part of body and cause related disease as : systemic candidasis ( blood vessels ) , meningitis ( menings ) , cutaneous mycosis (skin ) and so on .

\*\* Keep in mind that candida have many species like : C. albican ,

1. C. albican : causes 70% -80% of candidiasis ( it is the prevalent type of candida species )
2. C. tropicalis , C. glabrata , C. krusei , , etc : causes 20%

**Why C. albican is the prevalence ?**

Because it is the more human adapted for many thousand of year many in addition , it produce more variation of extracellular enzyme which allow it to attach to the mucosa .

Now we have another 2 type of yeast like structure that similar to candida in morphological structure , appearance and related disease :

1. **C. geotrichum**
2. **C. Trichomonas**

\*\* C. geotrichum : this usually associated with U.T.I and can found in female and rarely associated with vaginal candidiasis (known as vulvovaginitis ) which associated with Dishcahrge of fluid (we will talk about it later in this lec )

\*\* C. Trichomonas : rarely associated with infection , it may cause infection to skin , oral cavity , or U.T (but less )

Other type of candida , fewer in number , can found as normal flora , starting from oral cavity (the majority) , and few number through swallowing can reach stomach and intestine . ( in stomach it can survive from the acidity of the stomach , and in intestine it can accumulate but in less amount ) like what we called intestinal normal flora or commensal normal flora . in addition it can found in our skin especially any part of skin that associated with folding in rectum , digital space between the fingers of the foot , etc ..

Sometime , due to excretion of feces which might associated with many type of bacteria due to the fact that ( 50% composition of feces is living dead cells bacteria including few number of yeast ) these few number of yeast especially in ladies might contaminated the vagina through contamination of rectum also in lower part of urethra . The contamination grow up from rectum to vagina ( it present as a part of normal flora of the vagina under normal condition , but any change in normal flora in intestine or vagina or oral cavity or U.T can lead to elongation of yeast and might enhance other disease which produce what we called **mucosal infection** . We called these candida species **APPORTIOUNSTIC pathogen** .

**How normal body flora can be change ?**

\*\*by using antibody : microbiota ( normal flora ) has been established thousand of years in our body , there are certain species of bacteria which adapted to go to intestine , and large intestine ( colon) . in colon ; 99% compose of obligatory anaerobic bacteria but in small intestine u find 95% bacteria and 5% facultative aerobic bacteria in addition to yeast. Yeast under normal condition can’t tolerate anaerobic so it can’t live in colon ( may it live but for short period). Now , following of administration of wide spectrum of antibiotic which effect gram positive or gram negative , they will change intestinal normal flora and increase yeast number , due to change PH. Change in PH (even very low ) can lead candida to increase it’s number . (this refer to fact: the facultative anaerobe bacteria and enterobacter produce certain inorganic compound which reduce PH and allow the yeast not to increase .

In large intestine , the PH is alkaline (almost 9) and candida can’t survive in high alkalinity( live almost 6.5-7) , less than the optimal growth of facultative anaerobic bacteria which is 7.

So yeast will increase in it’s number after administration of antibiotic . and this happen not only in intestine , but also in oral cavity and now started to produce elongate cell . and this elongation can resulting in production of what called pseudomembranous cover the tongue , the lips , gum , soft palate and in certain condition it might spread to throat and may reach larynx and lung but this can only be observed in addition if there is certain immunocomprised condition, certain immunodifieciency . ( under normal condition , not easily candida survive and produce infection to oral cavity or other part of the body ) . so any patient who suffer from candidiasis (whether complete or partial ) , u should ask him to do some investigation or ask him if he suffering from any immunodeficiency because presence of immunodeficiency can’t easily control candidasis in the oral cavity or in the other part of the body . in addition u should ask him if he take any cytotoxic drug as corticosteroid , or expose to radiation which facilitate developing of oral candidasis and might other form of candidiasis

**Rarely candidiasis found in healthy person without presence of predisposing factors.**

In children , under certain condition and using some drug ‘’ especially antibiotic or following diarrhea , plus U.T infection , he may have mucosal oral cavity candidiasis but can be controlled by stopping antibiotic and using topical antifungal .

Slide 23

**\*\*The difference between budding yeast ‘’true yeast ‘’ (left slide ) and the candida germ**

Budding yeast : have rounded cell and oval , maybe some of these cell associated with daughter cell as we see here which consider as one or if we have candida albican , and this can be easily culture by vitro by using human serum or animal serum , where we demonstrate presence of what we call germ tube . it is elongation from oral surface to other structure , later develop to produce pseudohyphea , tube like structure and it is always associated with candida albican , not other type of candida .

If you have elongation of the cell without germ tube , this mean you have candida species rather than candida albican .

In oral cadidiasis easily to recognize in your practice (whitish – grey ) covered tongue in children , in adult It effect any part of oral mucosa especially gum and might edging of the lip .in the presence of whitish batches , this is always associated with presence of filament of **pseudohyphea**  of any type of candida and this mean . before you manipulate any dental procedure , you should treat patient with topical antifungal drugs and ask if he suffering from underlying disease like diabetic because he should control his blood sugar, and ask if he expose to radiation . **WHY WE SAID THIS ?**

Because if we doing any procedure especially ‘’ extraction of the tooth ‘’ , you might produce candida in the blood stream and suffer from severe form of candidemia ( candida in blood ) and may go to meanings and causes meningitis

\*\* Systemic candidiasis might originated not often from oral cavity , rather it originate from using of certain devices , especially : IV catheter , venous needle (which used to introduce fluid to vessels) endoscope present in respiratory tract or GIT ). and these device as you know might be contaminated during procedure , and introduce candidiasis in lung , GIT , etc . due to fact that these endospores can might produce slight damage to flora mucosa and this facilitate candida to attach and produce candidiasis later on .

So candida as opportunistic pathogen easily controlled if it only found on the surface of mucosa or skin , but if it reach blood stream or internal organ it will be difficult to treat . ( it consider danger if the patient suffering from under lying disease or immunodeficiency ) .

**Candidiasis associated with chronic oral cavity** is a very rare , found only in patient who suffering from severe underlying disease and such ptn suffer from malignancy ( like lymphoma, leukemia , etc . ) are treat by cytotoxic drug or liver deficiency , lung deficiency etc .. ( not in healthy person )

**Other type of candida which recognize in infant** ( from age one day to one year ) , these infant developing skin candidiasis in their rectum . this because candida live in intestine and excreted in feces plus the presence of moisture and worm due to using diaper , it will produce damage and inflammation to skin . this is common , u should change diaper and using powder to reduce moisture to reduce candidiasis .

**Vagina candidiasis :** it is so common , there is no single women in the world who has not once develop Vagina candidiasisespecially during pregnancy and following delivery of baby .

We said candida can found in oral cavity and in vagina , any change in PH during pregnancy or during using of certain hormone , even using contraceptive , or any procedure that effect the genital might develop vaginal candidiasis . once establish it is not easily getting rid of it , you can reduce it’s number but not 100% , due to fact ; there will be a few cell rest in mucosa , and any new change in PH or during intersexual course it may come back and grow .

It easily examination : presence of discharge thickly fluid , it might slight brown , white-brown associated with a few number of **pus cell ,** and this fluid is minimum and not that much , but some time produce irritation to vaginal mucosa , and producing itching and sometime pain .

Should be treated by topical and antifungal drug , sometime you should stop antibiotic drug or any type of drug that effect PH , also controlling underlying disease such as diabetes .

**Oral candidiasis** : the presence of denture which associated with inhibition of saliva , and so oral dryness , this help candida to increase and produce biofilm that attached with the denture and if the denture is ill not cleaned each time it may **follow within short period production of large number of filamentous candida .** More dangerous if associated with HIV or any type of malignancy , because it reduce T cell which is important to protect ptn from candida .

\*\* Candida can’t be treated in presence of some oral antibody \*\* , **It controlled by activity of neutrophil ,** not monocytes or macrophages .

In general , all age (Old age, Infants) , presence of any type of organ transplantation , any stem cell therapy , any procedure especially in oral cavity , any using of catheter , all these sometime produce some damage to mucosa of oral cavity or vagina that may develop to candidiasis .

**Prevention :**

1. Restore normal body flora ( not easy , just in certain cases ) .
2. Control underlying disease such as diabetic
3. Stop using antibiotic
4. removing the underlining cause. (such ptn should go to take suitable treatment before treat candidiasis )
5. No vaccine is available.

**No need**  for oral candidisis or vaginal candidiasis to give systemic antifungal drug . first you should give topical antifungal and restore normal flora .

Using of antifungal drug is not your job , it should done under supervision in hospitalization .

**Lab diagnosis :**

1-Not difficult   
2-It can be recognize by examination of oral cavity by your eyes , and recognize presence of pseudomembranous covered over mucosa .   
3- you have to collect a sample and send it to the lab , in the lab : can prepare and culture to see if there is yeast or no yeast .  
\* if there is a yeast , it should culture in special culture media such as ; we can use blood agar . Sabouraud dextrose agar(excellent one ) , ChromCandida agar( can directly find 5 type of candida , C.albican , C.tropican , C.krusi , C. *C. glabrata*, which counted about 99% of all type of candidasis , so this agar can recognize this species easily .we can use blood agar .

\*\*Now , in wet preparation without using serum and u have pseudomembranous candida that cover tongue or any other part , you can recognize the elongated cells associated with smaller cell known as Blastospores , that ending with producing -Chlamydospores . this can demonstration by special culture and may not recognize directly .

Slide 30 :

By using 1- **gram stain** : you can notice elongation of cell like cross well , space between two cell , oval cell between edging of two cell , and this indicated presence of Pseudohyphae .

\*\* so gram stain can be used directly if you collect sample from the oral cavity .

1. **Blastospores and chlamydospores** better recognize by using culture media

Slide 31 :

Notice the colonies , it look like bacteria , but yeast **produce larger colony , more flat , whitish in color** .

It need 20 -48 hours to be culture at 37 c

Examples : **C. albican** , can recognize in green color , C.tropicalis : in blue color , C.glabrata : in red color ,

So change only in its color you van recognize these species .

In research , you need to do more test to be more accurate and sure that is C. albican 100% .

The end ☺