



HEMATOPOIETIC & LYMPHATIC SYSTEM

-NACHAT BATCH-

SUBJECT : HLS . microbiology

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وَقُلْ رَبِّ زِدْنِي عِلْمًا

Yersinia and Rickettsia

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Objectives

- Describe the general characteristics, epidemiology, pathogenesis, clinical presentation and management of *Y. pestis*
- Describe the general characteristics, epidemiology, classification, pathogenesis, clinical presentation and management of Rickettsia



Yersinia and plague

General Characteristics

- The most important species is *Y. pestis* which cause plague الطاعون
- Gram-negative bacillus with a tendency toward pleomorphism differ from one situation to other. * They have the common feature of the endotoxin.
بتقدر تغير شكلها شوي تصير أقرب لـ (cocci) شوي
لكنه هي تصنيفيا (bacilli)
- Nonmotile
- Non-spore-forming كده البكتيريا اللي
متزودا عليها سبوك
- It is a member of the Enterobacteriaceae family

أغلب البكتيريا اللي بتقدر تهرب من جهاز المناعة (gram-Negative)

Epidemiology

- The term plague is often used generically to describe any explosive pandemic disease with high mortality
- Medically, it refers only to infection caused by *Y. pestis*
- *Y. pestis* was the cause of the most virulent epidemic plague of recorded human history, the Black Death of the Middle Ages
- Plague is a disease of rodents transmitted by the bite of rat fleas (*Xenopsylla cheopis*)
The circle of the plague isn't human to human only, but it also has * the rodent fleas within it.
- It exists in two interrelated epidemiologic cycles:
 1. The sylvatic: endemic transmission among wild rodents
يعني مثلا واحد راح على وادي رم قرصته الحشرة وانتقل له المرض هم
 2. The urban: when infected rodents enter a city
مثلا دخلت الحشرة على المدينة وسببت المرض للناس وصهه بالبيوت
- Humans can enter the cycle from the bite of the flea in either environment. However, chances are greater in the urban setting
* This is mostly due to
1. low hygiene measurements
2. health measures
3. general infection control
more in wars where caring of the healthy, environmental aspects gets decreased.

the patient will have lymphadenopathy in the groin area.

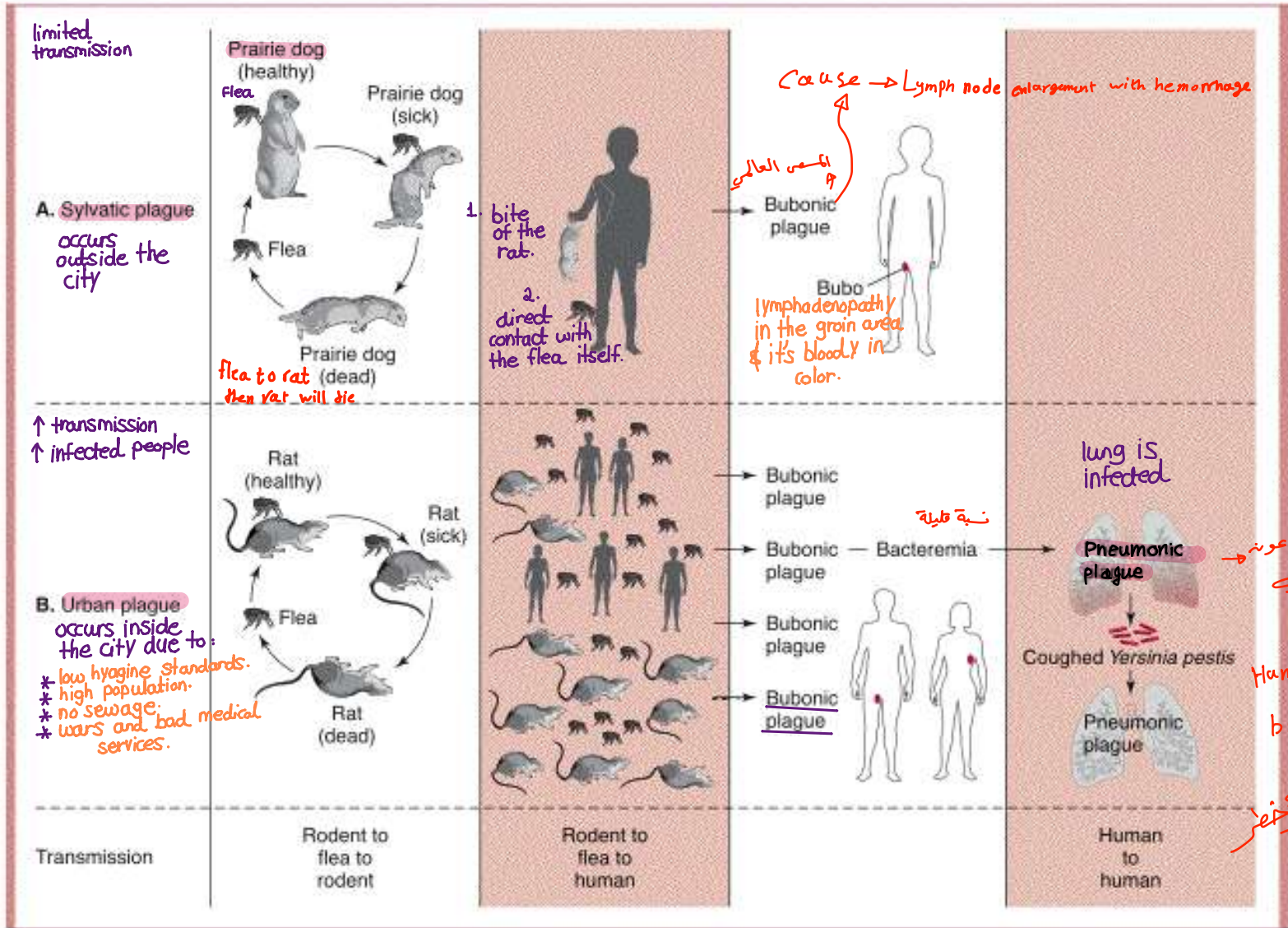
- Transmission can be:

1. Flea to human infection: The bite of the flea is the first event in the development of a case of bubonic plague, which, even if serious enough to kill the patient, is not normally contagious to other humans
2. Human to human: Some patients with bubonic plague develop a secondary pneumonia by bacteremic spread to the lungs. This pneumonic plague is highly contagious person-to-person by the respiratory droplet route

More Dangerous

important.

The Epidemiology of Plague



Pathogenesis

- The plague cycle begins when a rat flea feeds on a rodent infected with *Y. pestis*. Bacteria are taken with the blood meal and multiply in the infected flea. Some virulence factors such as the fibrinolysin and phospholipase are produced
prevents the clotting of blood has anesthetic function
- Once injected past the skin barrier by the flea, *Y. pestis* produces a new set of virulence factors as it senses the change from the ^{1.}temperature and ^{2.}ionic environment of the new host
- The organisms eventually reach the regional lymph nodes, where they multiply rapidly and produce a hemorrhagic suppurative lymphadenitis known clinically as the bubo
bacterial presence within it. Pus وكتيريا فبرينا tender inflammation of the lymph nodes. bleeding within the lymph node mostly in the groin lymph nodes.
- Spread to the bloodstream quickly follows with toxicity due to lipopolysaccharide (LPS) endotoxin (Bacteremia) يتعدى (blood) حاد ام و صلته لل (pneumonic plague) بس بتفشل الرئة عنانه تصير
- The bacteremia causes seeding of other organs, most notably the lungs, producing a necrotizing hemorrhagic pneumonia known as pneumonic plague
necrosis of the lung a patient with hemoptysis.

كيف نشخص أنه معه طاعون:

1- التقيح والاضباب (buboes) الال (Gorain) بسن للأسف المريض ممكن يستحمي وما يتكلمو عشانه منطقة حساسة

2 - وجود ال (blood with Cough) وصعوبة بالتنفس

3- لو تم تسجيل حالات طاعون بالمنطقة اللي هو فيها فرح يزيد الشك لومعه طاعون من أعراضه

Clinical Manifestations

لكنه ال (pneumonic plague) منه ساعات إلى يوم

- The incubation period for bubonic plague is 2 to 7 days after the flea bite
due to the reach of the bacteria to the lymph node.
- Onset is marked by fever and the painful bubo, usually in the groin or, less often, in the axilla
- Without treatment, 50 to 75% of patients progress to bacteremia and die in Gram-negative septic shock within hours or days of development of the bubo
ما قبل الوفاة the blood pressure in addition to the heart rate start dropping down to zero.
- About 5% of victims develop pneumonic plague with mucoid, then bloody sputum
زكزوا عليها they start the second cycle of human to human transmission.

ليس بس 5% منه البشر ليس ما يكونه أكثر النسبة للبشر اللي عندهم بالرئة خصوصا أنه البكتيريا بتحب تعيش بالرئة
! لأنه الأغلب يموت قبل متوصل البكتيريا للرئة أي في مرحلة ال (Bacteremia) في هذه المرحلة يموت 95% من البشر المصابين بالطاعون

Primary pneumonic plague: إلى انتقال بكونه من شخصه إلى شخصه عند طريقه الرذاذ وفترة الحضانة تكونه من ساعات إلى يومين

Secondary pneumonic plague: (Pneumonic plague) بعدها (Bacteremia) بعدها (bubo) الحشرة بتلكه ب...
يعني نزيهه والتهاب (L.N) - (groin) وكونه يحتوي على (Pus with bacteria)

Primary Pneumonic Plague

the patient will directly goes through the pneumonic plague stage.

- Has a shorter incubation period (2 to 3 days)
- Begins with only fever, malaise, and a feeling of tightness in the chest
- Cough, production of sputum, dyspnea, and cyanosis develop later in the course
- Death on the second or third day of illness is common, and there are no survivors without specific therapy
- A terminal cyanosis seen with pneumonic plague is responsible for the term Black Death
- Even today, plague pneumonia is almost always fatal if appropriate treatment is delayed more than a day from the onset

bloody

shortness of breath

lack of O₂

central then to general cyanosis.

pneumonic plague has a 100% death rate.

severe lack of O₂ will lead to the destruction of the lung with bleeding in it too!

primary : إلى انتقال منه شخصه إلى شخصه

من لما يدخل البكتيريا للجسم معاك 24 ساعة بالحقن حاله رح تموت



severe hypoxia & cyanosis.

Blacknosis →

لشدة الإزرقاق



rodents

Diagnosis

* The diagnosis of a plague case isn't easy, causing the doctor to be confident through diagnosis in addition to a report to the MOH.

- The appropriate specimens are bubo aspirate, blood, and sputum
* bubotic plague → through a lymphatic sample
* pneumonic plague → through a sputum sample
- Aspirates from the bubo typically reveal Gram-negative bacilli
- An immunofluorescence technique is available in public health laboratories for immediate identification of smears or cultures
فحصه سريع results are within 3 hours.
- *Y. pestis* is readily isolated on the media used for other members of the Enterobacteriaceae (blood agar, MacConkey agar), although growth may require more than 24 hours of incubation

لما نيجي بدنا نزرعه ما بنستعمل الـ (MacConkey agar) عشانه صاير

الـ (Agar) بطول واد (window) ناعتنا بس ٤ ساعة

فبنعمله (immunofluorescence) اللي بس بتوخذ بضع ساعات technique

Treatment

- Streptomycin is the treatment of choice for both bubonic and pneumonic plague. ^{Alternative Drug} Tetracycline, ^{drug of choice} chloramphenicol, and trimethoprim-sulfamethoxazole are alternatives
- Timely ^{بدلاً من (5%) لتعلاج مباشرة} treatment reduces the mortality of bubonic plague below 10%. Of the 31 human cases of plague reported in the United States in 1984, 6 (19%) died

يُنْعَطَرُ (A b) لكل واحد منهم المريضة خلال الـ ٥ أيام السابقة

Prevention

كل ما قلنا من القوارض يكون أفضل وكل ما قلنا الحشرة يكون أفضل

- Urban plague has been prevented by rat control and general public health measures such as use of insecticides
- Sylvatic plague is virtually impossible to eliminate because of the size and dispersion of the multiple rodent reservoirs. Disease can be prevented by avoidance of sick or dead rodents and rabbits
- Eradication of fleas on domestic pets, which have been known to transport infected fleas from wild rodents to humans, is recommended in endemic areas
- The continued presence of fully virulent plague in its sylvatic cycle poses a risk of extension to the urban cycle and epidemic disease in the event of major disaster or social breakdown
- Chemoprophylaxis with tetracycline is recommended for those who have had close contact with pneumonic plague

- صراي مشى مهمة عشانه لازمها غابات عشانه تنتقل

- مشى مطلوبة بالإمتحانه

- ملاحظه لأسئلة اللاب؛ ركزوا على المايكروبات إاللي كانوا بالـ (lab cases) اللى أخذناهم

باللاب لأشياء ^{غالباً} أرح يكونه منهم الأشياء اللى مش

Rickettsia

موجودة بالنظريه

atypical
bacteria found in the forests.

- ركزوا على الأشياء اللى بتتكرر بكل محاضره لأنه أرح يكونه السؤال بدمع أكثر منه محاضره

- أرح تكونه الأسئلة كويه والمخروضه الكل محلها

- أرح يحاوله الدكتور يعمل كويد يكونه على نمط الإمتحانه

- بالتوفيقه ♥

سلام علیکم