






9: Treatment of Sexually Transmitted Disease

Objectives

1. List the drugs used in the treatment of syphilis & gonorrhea.
2. Describe the mechanism of action and adverse effects of each drug.
3. Describe the contraindications of drugs used
4. Describe the recommended regimens used for the treatment of syphilis & gonorrhea
5. Know the alternative treatments in allergic patients.

Color index

-  **Doctors' notes**
-  **Drugs names**
-  **Extra information and further explanation**
-  **Important**
-  **Mnemonics**



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Special thanks 🥰

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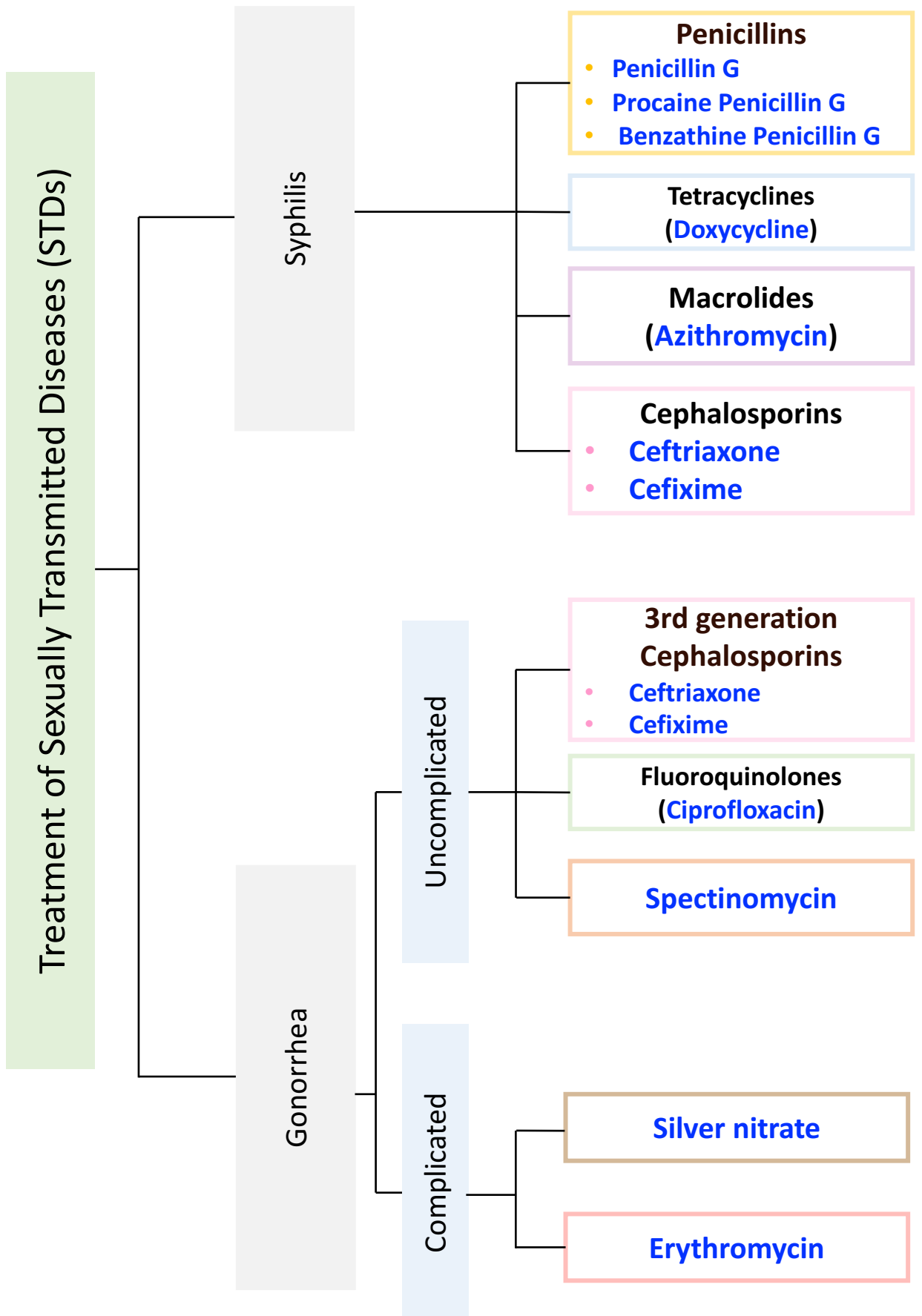
كنا نكلمهم ونزعجهم حتى في نص الليل وما شفنا منهم إلا حسن الأخلاق والتعامل الحسن ♥

وأهم شي شكرًا للجندي المجهول في فريق علم الأدوية

★ **روان سعد القحطاني**

أفضل member في الدنيا 🥰 كانت دايماً تراجع معنا المحاضرات وتضيف الملاحظات وتكتب كل الأسئلة والتشبيهات يكفي إنها اشتغلت على كل محاضرات الفارما حقت سنتين البيسك 🙄♥ ادعوا لها بالتوفيق بالدنيا والآخرة ♥

Overview



Introduction

Syphilis

- **Definition:** Sexually transmitted disease Caused by **Treponema pallidum** (*a spiral-shaped, Gram-negative highly mobile bacterium*) T. pallidum enters the body via skin and mucous membranes through abrasions during sexual contact or blood transfusion or placental transfer from a pregnant woman to her fetus. (only female slides)
- **Signs & symptoms:** The signs and symptoms of syphilis vary depending upon stage of disease, Disease progresses in stages (primary, secondary, latent, and tertiary), May become **chronic** without treatment. (only female slides)

Stages of syphilis

1- Primary stage

- Painless skin ulceration (**a chancre**) on the vulva or mouth
- Infectious stage (sexually only).
- the patient may not feel it so it will left without treatment

2- Secondary stage

- Diffuse skin rash & mucous membranes lesions
- **Palmar/Plantar Rash** (painless but infectious)

3- Latent stage

- In latent syphilis there are little to no symptoms which can last for years.
- 70% may have NO SYMPTOMS (Dangerous and may lead to death) 'only female slides'

5- Congenital syphilis

Woman is pregnant and has symptomatic or asymptomatic early syphilis, disseminating organisms may pass through the placenta to infect the fetus.
Manifestation: Perforation of Palate (only female slides)

4- Tertiary syphilis: (only female slides)

- Approximately 30% of untreated patients progress to the tertiary stage within 1 to 20 years.
- Rare because of the widespread use of antibiotics.
- Manifestations as cardiovascular syphilis (syphilitic aortitis and an aortic aneurysm).

Treatment of Syphilis

β-Lactam Antibiotics (Natural Penicillins)

M.O.A	Inhibits bacterial cell wall synthesis through inhibition of transpeptidase enzyme required for crosslinks . (Bactericidal)		
Uses	<ul style="list-style-type: none"> • 1st line treatment of syphilis • Penicillins bursting the bacterial cell walls by acting directly on peptidoglycans, as you know gram -ve have low peptidoglycans, so Penicillins are not effective on gram -ve 		
Classification	Benzylpenicillin (penicillin G)	Procaine penicillin G	Benzathine penicillin G
	<ul style="list-style-type: none"> • Short duration of action, given I.V. 	<ul style="list-style-type: none"> • Given I.M.¹ - delayed absorption. • Long acting (24-48 hrs) • After adding Procain which is local anaesthetic, the renal excretion decreased → the Half life increase 	<ul style="list-style-type: none"> • Given I.M. • Delayed absorption. • Long acting (every 3-4 weeks), 2.4 million units is given once.
P.K.	<p>All these penicillin preparations are:</p> <ul style="list-style-type: none"> • Acid unstable, so we never give them orally • Penicillinase sensitive (β-lactamase sensitive) • Not metabolized 'only female slides' • Excreted unchanged in urine through acid tubular secretion. May cause convulsions 'only female slides' • Renal failure prolong duration of action 'only female slides'. 		
ADRs	<ul style="list-style-type: none"> 👉 Hypersensitivity, So we have to do skin sensitivity test before administration 🧠 Convulsions when the concentration of the drug in blood is high either because the dose is high or the patient has renal problem 🌿 Super infections (secondary infection e.g. Candidiasis) 		

Drugs used in Allergic Patients To Penicillins:

1. Macrolides e.g. **Azithromycin**
2. Tetracyclines e.g. **doxycycline**
3. Cephalosprins: **Ceftriaxone** – **cefixime**

Next pages





¹ not given I.V. bc it may cause cardiac arrest

Treatment of Syphilis

Tetracyclines (**Doxycycline**)

M.O.A	Inhibit bacterial protein synthesis by reversibly binding to 30 S bacterial ribosomal subunits. (Bacteriostatic).
P.K	<ul style="list-style-type: none"> Given orally (only female slides) Well absorbed orally Long acting 100 mg twice daily for 14 days. Doxycycline has 2 advantages among other tetracyclines: 1-High absorption rate up to. 2- Long half life (only twice a day).
ADRs	<ul style="list-style-type: none"> Brown discoloration of teeth in children Deformity or growth inhibition of bones in children. Hepatic toxicity (prolonged therapy with high dose). Nausea, vomiting ,diarrhea & epigastric pain (given with food) Phototoxicity (only male slides) Vertigo Superinfections.
C.I	<p>Because the tetracyclines accumulate with Ca^{2+} we should not give it to:</p> <ul style="list-style-type: none"> Pregnancy Breast feeding bc it is excreted in milk Children (below 10 yrs)

Macrolides (**Azithromycin**)

M.O.A	Inhibits bacterial protein synthesis by binding to bacterial 50S ribosomal subunits.
P.K	<ul style="list-style-type: none"> Should be given 1 hour before or 2 hours after meals bc it has food drug interaction No effect on cytochrome P450, so no drug-drug interaction. Acid stable Penetrates into most tissues except CSF Half life : 2-4 days Once daily, oral dose
ADRs	<ul style="list-style-type: none">  GIT upset: Nausea, vomiting, abdominal pain & diarrhea.  Allergic reactions: urticaria, mild skin rashes but no need to stop the treatment. It has minor ADRs so it's a good alternative choice in case of penicillin resistance

Treatment of Syphilis

Cephalosporines

		Ceftriaxone	Cefixime
P.K Only female slides		<ul style="list-style-type: none"> • Third generation cephalosporins • Given parenterally (I.V.) “ + IM “ • Eliminated via biliary excretion • Long Half-life 	-
M.O.A	Inhibit bacterial cell wall synthesis (β -lactam inhibitor) Bactericidal		
ADRS	<ul style="list-style-type: none"> 👉 Hypersensitivity reactions (allergic manifestations) 👉 Thrombophlebitis due to injections (temporary) 👉 Superinfections 👉 Diarrhea 		

WHO guideline for the Treatment of Syphilis *

Patients	Treatment option
Early syphilis	
Adult (primary, secondary and early latent syphilis of not more than 2 year's duration)	Benzathine penicillin G (2.4 million units once I.M.)
	Procaine penicillin G (1.2 million units I.M. for 10-14 days)
	If penicillin is not allowed due to allergy, use: <ol style="list-style-type: none"> 1. Doxycycline 100 mg twice daily orally for 14 days 2. or Ceftriaxone 1 g IM once daily for 10–14 days 3. or Azithromycin 2 g once orally.
Pregnant woman	Benzathine penicillin G (2.4 million units once I.M.)
	Procaine penicillin G (1.2 million units I.M. for 10-14 days)
	If penicillin is not allowed due to allergy, use: <ol style="list-style-type: none"> 1. Erythromycin 500 mg orally 4 times daily for 14 days 'female slides' 2. Ceftriaxone 1 g IM once daily for 10–14 days 3. or Azithromycin 2 g once orally.

WHO guideline for the Treatment of Syphilis

Patients	Treatment option
Late syphilis	
Adult (infection of more than 2 years' duration without evidence of treponemal infection)	Benzathine penicillin G (2.4 million units nits I.M. once weekly for 3 consecutive weeks)
	Procaine penicillin G (1.2 million units I.M. for 20 days)
	If penicillin is not allowed due to allergy, use: <ul style="list-style-type: none"> • Doxycycline 100 mg twice daily orally for 30 days
Pregnant woman	Benzathine penicillin G (2.4 million units nits I.M. once weekly for 3 consecutive weeks)
	Procaine penicillin G (1.2 million units I.M. for 20 days)
	If penicillin is not allowed due to allergy, use: <ol style="list-style-type: none"> 1. Penicillin desensitization 2. Erythromycin 500 mg orally 4 times daily for 30 days 3. Ceftriaxone 1 g IM once daily for 10–14 days 4. or Azithromycin 2 g once orally.
Congenital syphilis	
In infants with confirmed congenital syphilis or infants who are clinically normal, but whose mothers had untreated syphilis	Aqueous benzyl penicillin (I.V.) 100,000 – 150,000 U/kg/day for 10 – 15 days
	Procaine penicillin (I.M.) 50,000 U/kg/day single dose for 10 – 15 days

Gonorrhoea

Introduction

- Caused by **Neisseria gonorrhoea** (*Pus producing bacteria , Gram negative cocci*).
- Transmitted during sexual contact with affected person. (only female slides)
- Many people have **no symptoms**. (only female slides)
- Men may have burning with urination, discharge from the penis or testicular pain.
- Women may have burning with urination, vaginal discharge, vaginal bleeding between periods, or pelvic pain. (only female slides)





Treatment of Gonorrhoea

Uncomplicated gonorrheal infections

3rd Generation Cephalosporines

	Cefixime	Ceftriaxone
P.K	400 mg of cefixime, PO ²	500mg ceftriaxone, I.M.
Use	1st line treatment Typically given in combination with a single dose of azithromycin (1gm, PO ¹) or doxycycline (100 mg twice a day 'BD', P.O. ² for 7 days) to prevent resistance or to treat second infection like chlamydia trachomatis	

Fluoroquinolones (Ciprofloxacin, ofloxacin) 2nd choice

M.O.A	All are bactericidal Inhibit DNA synthesis by inhibiting DNA gyrase enzyme (required for DNA supercoiling).
P.K	Single oral dose of : <ul style="list-style-type: none"> Ciprofloxacin (500 mg) Ofloxacin (400 mg)
ADRs	 May damage growing cartilage and cause arthropathy.  Phototoxicity, avoid excessive sunlight  GIT: Nausea , vomiting & diarrhea  CNS: Headache & dizziness
C.1 ³	<ul style="list-style-type: none"> Pregnancy Nursing mothers Children under 18 years (bc they cause damage to growing cartilage)




What is the Alternative treatment in pts that cannot tolerate or be treated with cephalosporins or quinolones ? Spectinomycin

² orally

³ Contraindications because of its effect on cartilage

Treatment of Gonorrhoea

Spectinomycin (3rd choice)

M.O.A	Inhibits protein synthesis by binding to 30 S ribosomal subunits .
P.K	Is given 2 g, I.M, once.
ADRs	 Nephrotoxicity (not common).  Pain at site of injection  Fever, nausea

Complicated gonorrhoeal infections

When complicated gonorrhoea occurs?

If gonorrhoea left untreated, it can spread through blood stream into:

1. Eye
2. Joints
3. Heart valves
4. Brain

Harmful effects of gonorrhoea:

- It can also spread from a mother to a child during birth. Newborn eye infections may lead to conjunctivitis called ophthalmia neonatorum which may lead to blindness

WHO guidelines suggest one of the following options for topical application to both eyes immediately after birth:

1. Silver nitrate 1% solution (1st choice)
2. Or Erythromycin 0.5% eye ointment (2nd choice)
3. Or Tetracycline hydrochloride 1% eye ointment
4. Or Povidone iodine 2.5% solution (water-based)
5. Or Chloramphenicol 1% eye ointment

	Silver nitrate	Erythromycin
M.O.A	It has germicidal effects due to precipitation of bacterial proteins by liberated silver ions. (germicidal effects: to kill the germs 'microorganism')	0.5% ointment for treatment & prevention of corneal & conjunctival infections.
Use	With conjunctivitis in new born Put into conjunctival sac once immediately after birth (no later than 1 h after birth)	

بمجرد انتهاءكم من هذا السلايد تكونون انهيتوا مذاكرة ٨٥ محاضرة فارما!

متخيلين العدد! متخيلين كم اسم دوا حفظتوا 😊 لازم تكونون فخورين بنفسكم يا خارقين 🌟

Summary

TREATMENT OF SYPHILIS

Penicillins (β -Lactam Antibiotics)	Tetracyclines (Doxycycline)	Cephalosporines (Cefixime, Ceftriaxone)	Macrolides (Azithromycin)
<p>Drugs: Benzylpenicillin, Procaine penicillin G, Benzathine penicillin G</p> <p>MOA : Inhibits bacterial cell wall synthesis (Bactericidal).</p> <p>Indication: 1st choice in treating syphilis</p> <p>ADRS :</p> <ol style="list-style-type: none"> Hypersensitivity. Convulsions. Super infections. 	<p>MOA : Inhibit bacterial protein synthesis by reversibly binding to 30S bacterial ribosomal subunits (Bacteriostatic).</p> <p>ADRS : Brown discoloration of teeth in children. Deformity or growth inhibition of bones in children Hepatic toxicity</p> <p>C.I. : Pregnancy. Breast feeding. Children (below 10 yrs.).</p>	<p>MOA : Inhibit bacterial cell wall synthesis (Bactericidal) Cefixime : more effective against gram negative bacteria.</p> <p>ADRS : Hypersensitivity reactions Thrombophlebitis. Superinfections. Diarrhea.</p>	<p>MOA : Inhibits bacterial protein synthesis by binding to bacterial 50S ribosomal subunits.</p> <p>P.K : Should be given 1 hour before or 2 hours after meals.</p> <p>No effect on cytochrome P450</p> <p>ADRS : Allergic reactions: urticaria, mild skin</p>

Uncomplicated gonorrhoeal infections

Cephalosporines	Fluoroquinolones (Ciprofloxacin)	Spectinomycin
<ul style="list-style-type: none"> 1st line treatment Typically given in combination with a single dose of azithromycin or doxycycline 	<p>MOA : Bactericidal. Inhibit DNA synthesis by inhibiting DNA gyrase enzyme (required for DNA supercoiling).</p> <p>ADRS : may damage growing cartilage and cause arthropathy, phototoxicity.</p> <p>Contraindications : Pregnancy, nursing mothers, children under 18 years.</p>	<p>MOA : Inhibits protein synthesis by binding to 30 S ribosomal subunits.</p> <p>Use: gonorrhoeal infection with resistance to Cephalosporines + Fluoroquinolones</p> <p>ADRS :</p> <ol style="list-style-type: none"> Nephrotoxicity (not common).

Complicated gonorrhoeal infections (**conjunctivitis in new born**)

Silver nitrate	Erythromycin
It has germicidal effects	prevention of corneal & conjunctival infections.

With conjunctivitis in new born Put into conjunctival sac once immediately **after birth (no later than 1 h after birth)**

MCQs

Q1: Which one of the following is the drug of choice for treatment of syphilis?

- A. Ceftriaxone . B. Benzathine penicillin G. C. Silver nitrate. D. Ciprofloxacin

Q2: Which one of the following is the drug of choice for treatment of gonorrhea?

- A. Ceftriaxone . B. Benzathine penicillin G. C. Silver nitrate. D. Ciprofloxacin

Q3: Which ONE of the following is used in syphilis patient who is allergic to penicillin?

- A. Amoxicillin. B. Benzathine penicillin G. C. Silver nitrate. D. Ciprofloxacin. E. Doxycycline.

Q4: Which of the following may cause bone deformity as adverse effect ?

- A. Amoxicillin. B. Ciprofloxacin. C. Silver nitrate. D. Doxycycline.

Q5: Which of the following may lead to cartilage damage and arthropathy as adverse effect ?

- A. Amoxicillin. B. Ciprofloxacin. C. Silver nitrate. D. Doxycycline.

Q6: Which ONE of the following is the mechanism of action of silver nitrate?

- A. Bactericidal by Inhibiting bacterial cell wall synthesis. B. Bacteriostatic by Inhibiting bacterial protein synthesis.
C. Bactericidal Inhibiting bacterial DNA synthesis. D. Germicidal by Precipitating of bacterial proteins.

Q7: Which one of the following is best describe the mechanism of action of Spectinomycin?

- A. Bactericidal by Inhibiting bacterial cell wall synthesis. B. Bacteriostatic by Inhibiting bacterial protein synthesis.
C. Bactericidal Inhibiting bacterial DNA synthesis. D. Germicidal by Precipitating of bacterial proteins.

Q8: 28 years old lady has gonorrhea. She gave a birth of her first baby through vaginal delivery. Her baby was born with conjunctivitis. Which one of the following drugs is suitable to be used for the baby ?

- A. Silver nitrate. B. Ceftriaxone. C. Erythromycin D. Both A & C.

Q9: A 26 years old man present with burning micturition and discharge. He was diagnosed with gonococcal urethritis. The lab investigation has revealed there is also other organism which is chlamydia trachomatis. Which one of the following combination of antibiotics is appropriate in his case ?

- A. Ceftriaxone + Ciprofloxacin. B. Ceftriaxone + azithromycin. C. Ceftriaxone + Silver nitrate. D. Ceftriaxone + doxycycline. E. Both B & D.



إِنَّ فِي ذَلِكَ لآيَاتٍ لِّقَوْمٍ يَتَفَكَّرُونَ ﴿٣﴾

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