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Solved Question Papers

Seventh Edition

Singi Yatiraj

Foreword
S Manjunath

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MBBS PHASE II EXAMINATION

OCTOBER 2007

(Revised Scheme 2)

PAPER II

LONG ESSAYS

1. Classify antitubercular drugs with examples for each. What are the principles of antitubercular drug therapy? Describe short course chemotherapy.

Refer Question No. 1 Oct. 2008 (RS2) Paper II.

2. Classify antithyroid drugs with examples. Describe the mechanisms of antithyroid actions of any two groups of antithyroid drugs and state their advantages and disadvantages.

For classification and radioactive iodine

Refer Question No. 2 Oct. 2000 Paper II.

For drugs inhibiting hormone synthesis

Refer Question No. 2 Oct. 2003 Paper II.

SHORT ESSAYS

3. Ulcer protective drugs.

Refer Question No. 10 Oct. 2011 Paper II.

4. Drug therapy of acute migraine.

Refer Question No. 5 April 2015 (RS2) Paper II.

5. Obstetrical uses of prostaglandins with their adverse effects.

Refer Question No. 9 April 2008 (RS2) Paper II.

6. Pharmacotherapy of status asthmaticus.

- Status asthmaticus describes a moderate to severe exacerbation of airway obstruction that fails to improve rapidly (usually within 1 hour) with intensive bronchodilator therapy.

Etiology

- Triggers of asthma exacerbations
  - Environmental factors such as viral upper respiratory tract infections, inhaled allergens, pollutants, smoke exposure and NSAIDs.

Types of Exacerbations

- Slow onset attacks (>6 hours of deterioration)—most common (90%)
- Sudden progression attack (<6 hours of deterioration)—less common (10%).

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Treatment

a. Bronchodilator therapy
   i. β-adrenergic agonists should be started immediately at presentation
      – Short acting, β2 adrenergic agonists (e.g. albuterol) are mainstay
      – 4–8 puffs of albuterol by metered dose inhaler with a spacer device can be given every 20 min for up to 4 hours and then given 1–4 hours as needed thereafter
      – Inhaled route of administration is preferred even when severe obstruction is present.
   ii. Cholinergic antagonists
      – Muscarinic cholinergic antagonists (e.g. ipratropium) should be used as an adjunct to β2 adrenergic agonists during initial treatment of severe exacerbations in emergency department but not recommended once patient is hospitalized
      – 4–8 puffs of ipratropium by metered dose inhaler with spacer every 6 hours as needed or 0.5 mg by nebulizer every 6 hours as needed.
   iii. Methylxanthines
      – Not recommended in asthma exacerbations due to toxicity.
b. Anti-inflammatory therapy with corticosteroids
   – Corticosteroids are essential for treating status asthmasticus and should be started at presentation without delay
   – Oral corticosteroids are as effective as intravenous therapy. However, for critically ill patients admitted in an intensive care unit, guidelines recommend intravenous route because of invariable gastrointestinal absorption of drug
   – For acute exacerbations of asthma, administer methylprednisolone, prednisolone or prednisone at 40–80 mg/day in 1–2 divided doses until PEFR >70% of baseline
   – Total course of systemic corticosteroids may be from 3–10 days. For courses <7 days, tapering of dose is not necessary but for longer duration of therapy, gradually taper and shift patient to inhaled corticosteroids.
c. Other therapy
   i. Oxygen
      – Supplemental oxygen therapy should be started immediately
      – Seemingly, paradoxical, inhaled β2 adrenergic agonists may worsen ventilation-perfusion matching and cause hypoxemia unless supplemental oxygen is given.
   ii. Adjuvant measures
      – Heliox-driven albuterol nebulization is recommended to avoid intubation during severe, life-threatening exacerbations
      – Intravenous $MgSO_4$ is also recommended of same reasons
      – However, administration of adjuvant measures should never delay a needed intubation.
   iii. Mechanical ventilation
      – Indicated in case of worsening hypercapnia, muscle fatigue and deterioration of mental status
      – Heliox (helium-oxygen mixture) administration may decrease need for intubation and mechanical ventilation in some acutely ill patients
      – Oral, rather than nasal route of intubation is preferable and use intubation tube with internal diameter of 8 mm or larger
      – Avoid barotraumas due to dynamic hyperinflation. Controlled hypoventilation (or permissive hypercapnia) is main strategy.
d. Additional and unconventional measures
   – Heliox, general anesthetics, bronchoscopy with therapeutic lavage, hypothermia and extracorporeal life support can be tried if severe airway obstruction does not respond to conventional therapy.

Ref:

1. Richard S Irwin. Manual of Intensive Care Medicine (5th Edition); Lippincot Williams and Wilkins; Pg 282.

7. What are disease modifying antirheumatoid drugs (DMARDs)? Describe the role of any two in rheumatoid arthritis.

Refer Question No. 2 April 2015 (RS2) Paper II.

8. Superinfections with antimicrobial therapy.

- Superinfection is the appearance of a new infection as a result of antimicrobial therapy.

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Mechanism

- Normal flora of the body contributes to host defence by elaborating substances called bacteriocins which inhibit pathogenic organisms
- Moreover pathogenic organism has to compete with the normal microbial flora for nutrients, etc. to establish itself
- Antimicrobials cause some alteration in the normal microbial flora of the body
- This alteration causes unabated invasion of pathogenic bacteria thus establishing superinfection.

Predisposing Factors

- Corticosteroid therapy
- Leukemia and other malignancies treated with anticanner drugs or immunosuppressant
- AIDS
- Agranulocytosis
- Diabetes, disseminated lupus erythematosus.

Commonly Involved Sites

- Oropharynx
- Intestinal respiratory and genitourinary tracts
- Occasionally skin.

Commonly Incriminated Antimicrobials

- Tetracyclines
- Cephalosporins
- Ampicillin
- Newer cephalosporins.

Commonly Incriminated Organisms

Organism	*Associated superinfection*	*Treatment*
• *Candida albicans*	Monilial diarrhea, thrush, vulvovaginitis	Nystatin or clotrimazole
• Resistant staphylococci	Enteritis	Cloxacillin
• *Clostridium difficile*	Pseudomembranous enterocolitis	Metronidazole and vancomycin
• *Proteus* species	Urinary tract infection	Cephalosporins or gentamicin
• *Pseudomonas* species	Urinary tract infection, enteritis	Carbenicillin, piperacillin or gentamicin

Prevention

- Use specific antimicrobials whenever possible
- Avoid using antimicrobials in treating trivial, self-limiting or viral infections
- Do not prolong antimicrobial therapy unnecessarily.

9. Beta lactamase inhibitors.

- β-lactactamase inhibitors are the drugs which inhibit the enzyme β-lactamase produced by many gram-positive and gram-negative bacteria
- These enzymes inactivate β-lactam antibiotics by opening the β-lactam ring
- Clinically available β-lactamase inhibitors are clavulanic acid and sublactam.

a. Clavulanic acid

– It is a β-lactamase inhibitor obtained from *Streptomyces clavuligerus*
– It inhibits wide variety of β-lactamases (class II to class V) but not class I cephalosporinase produced by both gram +ve and gram –ve bacteria.

Mechanism of action:

– Clavulanic acid is a progressive inhibitor, i.e. inhibition increases with time
– Initially it binds reversibly to β-lactamase but later binding becomes covalent

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– It is called a suicide inhibitor, as it gets inactivated after binding to the enzyme
– It permeates the outer layers of the cell wall of gram-negative bacteria and inhibits the periplasmically located β-lactamase.

Pharmacokinetics:
– Rapid oral absorption and 60% bioavailability
– Metabolism by hydroxylation and decarboxylation
– Excreted in urine by glomerular filtration.

Adverse effects:
– Poor GI intolerance
– Candida stomatitis/vaginitis and rashes
– Hepatic damage.

Therapeutic uses:
– Clavulanic acid is added along with amoxycillin to reestablish the activity of the latter against β-lactamase producing resistant *Staph. aureus*, *H. influenzae*, *N. gonorrhoeae*, *E. coli*, *Proteus*, *Klebsiella*, *Salmonella*, *Shigella* and *B. fragilis*
– The combination of clavulanic acid and amoxicillin is called coamoxiclav
– It is used for:
  i. Skin and soft tissue infections, intra-abdominal and gynecological sepsis, urinary, biliary and respiratory tract infections:
    - 250 mg amoxicillin + 125 mg clavulanic acid TDS.
  ii. Gonorrhea including PPNG:
    - 3 g amoxicillin + 0.5 g clavulanic acid + 1 g probenecid single dose.

b. Sulbactam
– It is a semisynthetic β-lactamase inhibitor.
– It is related to clavulanic acid chemically and in activity but 2–3 time potent
– It is highly active against class II to V β-lactamase but poorly active against class I
– It does not induce chromosomal β-lactamases
– Oral absorption is inconsistent and therefore given parenterally.

Adverse effects:
– Pain at the injection site, thromboplebitis of the injected vein, rash and diarrhea.

Therapeutic uses:
– It is combined with ampicillin for use against β-lactamase producing resistant strains.
– Sultamicillin tosylate is absorbed salt of sublactam with ampicillin which can be given orally.
– They are used in:
  i. PPNG gonorrhea
    - Ampicillin 1 g + Sublactam 0.5 g
  ii. Mixed aerobic anaerobic infections, intra-abdominal, gynecological, surgical and skin/soft tissue infections, specially nosocomial infections.

c. Tazobactam
– It is another β-lactamase inhibitor similar to sublactam
– It is used in combination with piperacillin.

10. Advantages of azithromycin over erythromycin. Write briefly on the therapeutic uses of azithromycin.

• Azithromycin is a new azalide congener of erythromycin which is superior to erythromycin (other macrolides) in following respect.

Advantages Over Erythromycin (Other Macrolides)

a. Extended antibacterial spectrum
– Azithromycin is more active against *H. influenzae*, *Mycoplasma*, *Chlamydia penumoniae*, *Legionella*, *Moraxella* and *Campylobacter*, *Chlamydia trachomatis*, *H. ducreyi*, *Calymm granulomatis*, *N. gonorrhoeae*.
– It is also effective against *Toxoplasma gondii*.

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b. Better pharmacokinetics
   - Azithromycin is more acid stable with wider tissue distribution
   - It is rapidly absorbed orally
   - It has good intracellular penetration with drug concentration in most tissues like lung, genital tissue, liver, prostate, phagocytes, macrophages and fibroblasts exceeding plasma concentration
   - It is released slowly from above said tissues and has longer half life thus permitting once a day dosage and shorter duration of therapy
   - Excreted unchanged in bile and renal excretion is only 5–10%.

c. Milder adverse effects
   - Because of better gastric tolerability, the adverse effects due to azithromycin are fewer.

d. Lesser drug interactions
   - Does not inactivates cytochrome P450 in liver thus drug interactions with azithromycin are fewer.

e. Good patient compliance
   - The dosage is only once a day and has shorter duration of therapy (3 days) thus enhancing patient compliance.

For therapeutic uses

Refer Question No. 16 April 2008 (RS2) Paper II.

11. Rifampicin.

Refer Question No. 1 Oct. 2008 (RS2) Paper II.

12. The mechanism of action and adverse effects of sulfonylureas.

Refer Question No. 2 April 2011 (RS2) Paper II.

SHORT ANSWERS

13. State why ergometrine is not suitable for the induction of labor.

- Ergometrine produces sustained tonic contractions at high doses
- It also contracts the lower segment of the uterus
- Its half life (1–2 hours) and duration of action (3–4 hours) is more
- Therefore, ergometrine is not suitable for induction of labor.

14. Ranitidine is preferred to cimetidine in clinical practice. Give the reason

Refer Question No. 21 April 2002 Paper II.

15. Metoclopramide can cause extrapyramidal symptoms. Explain.

- Metoclopramide acts by blocking the D_2 receptors in the CTZ
- This central antidopanergic action of metoclopramide for prolonged duration can cause extrapyramidal symptoms.

16. Explain why anticancer drug therapy is given intermittently (pulse therapy).

- Anticancer drugs are used in high doses as intensive regimes which can result in highly toxic adverse effects on both malignant and normal cells
- To ameliorate these toxic effects, anticancer drugs can be given in pulses with 2–3 weeks intervals in between during which the normal cells can recover whereas the malignant cells take longer to recover thus improving the efficacy of the therapy
- Therefore, anticancer drug therapy is given intermittently (pulse therapy).

17. What is 'sequential block' in the folic acid synthesis?

Refer Question No. 10 Oct. 2002 Paper II.

18. How is radical cure achieved in *Plasmodium vivax* malaria?

- Radical cure in *Plasmodium virax* malaria is achieved by chloroquine 600 mg stat followed by 300 mg after 8 hours and 300 mg daily for next two days
- Followed by primaquine 15 mg daily for 2 weeks.

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19. What are the indications for human insulins?

- Human insulin is insulin produced via recombinant DNA technology having same amino acid sequence as human insulin.

Source

- *Escherichia coli*: Proinsulin recombinant bacterial (prb)
- Yeast: Precursor yeast recombinant (pyr)
- Enzymatic modification of procine insulin (emp).

Indication (Preferred in Special Conditions Considering their Cost)

- Insulin resistance especially when due to large amount of insulin binding antibodies
- Allergy to conventional preparations
- Injection site lipodystrophy as human insulin can resolve it
- Short-term use of insulin in diabetics on other treatment modality in certain conditions like surgical procedure, trauma, infection, ketoacidosis, etc.
- During pregnancy.

20. What are the indications for use of oral contraceptives, besides contraception?

- Dysfunctional uterine bleeding
- Controls menstrual cycle irregularities, such as breakthrough bleeding and amenorrhea
- Acne, hirsutism
- Carcinoma of endometrium, ovaries, colorectal
- Benign breast disease
- Ovarian cyst
- Pelvic inflammatory disease.

21. What are the benefits of hormonal replacement therapy (HRT) in postmenopausal women?

- The health benefits offered by hormonal replacement therapy in post menopausal women are:
  i. Improvement of general physical, mental and sexual well being.
  ii. Arrest of genital and dermal atrophic changes.
  iii. Prevents osteoporosis, restores calcium balance, reduces excess fracture risk.

22. What is the mode of action and therapeutic uses of potassium permanganate?

- Potassium permanganate is a powerful oxidizing agent.

Mechanism of Action

- Potassium permanganate acts as a disinfectant by liberating oxygen which oxidizes bacterial protoplasm and enzymes.

Therapeutic Uses

i. As Condy's lotion (1:4,000 to 1:10,000) for gargling, douching, irrigating cavities, urethra and wounds.
ii. Used for stomach wash in alkaloid poisoning.
iii. Used in high concentration to disinfect water bodies.

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