

METRONIDAZOLE (MNZ) : A BIRD'S EYE VIEW OF IT'S USE IN DENTISTRY

Dr. Gunindra Narayan Bora, BDS,
Dental Surgeon,
Department of dentistry
Phillobari Model Hospital
Phillobari , Tinsukia, Assam-786160
Email: gunin372@gmail.com

Abstract

The role of anaerobic bacteria causing oral diseases has stressed the chemotherapeutic control of them. Metronidazole is a drug which is specifically anti-anaerobic in nature. This paper reviews the literature on metronidazole. This drug is absorbed well from the gastrointestinal tract and can be detected at bacteriocidal levels in blood and saliva within one hour of ingestion. The drug acts specifically against anaerobes but does not disturb commensal aerobic flora; resistance very rarely develops. Recommended dosage use in dentistry is very safe. Concomitant use contraindicated with alcohol, disulfiram and warfarin. Metronidazole has been proved to be efficacious in treating various oral infections basically caused by anaerobic bacteria. Key words : Metronidazole, bacteriocidal, anaerobes.

1. Introduction

Metronidazole (MNZ) is an antibiotic and antiprotozoal medication. It is used either alone or with other antibiotics to treat pelvic inflammatory disease, endocarditis, and bacterial vaginosis. It is effective for dracunculiasis, giardiasis, trichomoniasis, and amebiasis. It is the drug of choice for a first episode of mild-to-moderate *Clostridium difficile* colitis.

Metronidazole was introduced in 1960 and was initially used for the management of trichomonas vaginalis. It belongs to nitroimidazole group.

The effect of metronidazole on anaerobic infection was at first established by Shinn in 1961-1962 when he treated a case of acute ulcerative gingivitis. The use of metronidazole for systemic anaerobic infections such as *Bacteroides fragilis* was pioneered later by Tally et al.

It is on the World Health Organisation's List of Essential Medicines, a list of the most important medication needed in a basic health system.

2. Pharmacokinetics

It can be given for severe anaerobic infections. It is absorbed rapidly and completely if also given through orally. It is distributed very well into mucosa, saliva, bone and CSF. The plasma $\frac{1}{2}$ life of metronidazole is about 8 hours. It is metabolized in liver and excreted through urine.

3. Dosage

Preferred Intravenous dosage for anaerobic infection: A loading dose of 15 mg/kg bodyweight and it is followed 6 hours later by a maintenance dose of 7.0-7.5 mg/kg bodyweight every 6 hours. Per 100ml solution contains 500mg of metronidazole. Oral dose is 7-7.5mg/kg can be given 6th hourly (Maximum 4 doses/per day)

4. Mechanism of Action (MOA)

Metronidazole is of the nitroimidazole class. It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells. This function only occurs when metronidazole is partially reduced, and because this reduction usually happens only in anaerobic cells, it has relatively little effect upon human cells or aerobic bacteria. Thus mechanism of action takes place into 4 phases:

FIRST PHASE—— Enter into the bacterial cell through passive diffusion.

SECOND PHASE—— Reduction reaction of the nitro group of metronidazole

THIRD PHASE—— Cytotoxic effect of the reduced product

LAST PHASE—— Waste out of end products that are inactive.

5. Antibacterial Spectrum :

Antibacterial activity against majority of anaerobic cocci and both anaerobic gram -ve bacilli, including bacteriocidal spp. and also active against anaerobic sporeforming gram+ve bacilli. It is effective against anaerobic organisms causing odontogenic infections, Prevotella spp, Porphyromonas spp, Fusobacterium spp. Even though majority of the obligate anaerobes are sensitive to metronidazole, Propionibacterium spp and Actinomyces spp are not sensitive against metronidazole

Bacteriological cultures give its direction.

6. Medical usage

Metronidazole is primarily used to treat bacterial vaginosis, pelvic inflammatory disease like antibacterials, pseudomembranous colitics, aspiration pneumonia, rosacea (topical), fungating wounds (topical), intra-abdominal infections, long abscess, periodontitis, amoebiasis, oral infections, giardiasis, trichomoniasis, and infections caused by susceptible anaerobic organisms such as Bacteroides, Fusobacterium, Clostridium, Peptostreptococcus, and Prevotella species. It is also often used to eradicate Helicobacter pylori along with other drugs and to prevent infection in people recovering from surgery.

Apart from anaerobic infections, it is used for :-

- Colitis caused Clostridium difficile.
- Amoebiasis, giardiasis.
- Meningitis and brain abscess
- Intra-Abdominal Infections including peritonitis, intra-abdominal abscess and hepatobilliary abscess.
- Skin including its structures structure infections caused by bacteroides species including the B. fragilis group.
- Endometritis, bacterial vaginosis.
- Prophylaxis of postoperative mixed bacterial infections where it has to be combined with other antibiotics for aerobic bacteria.

7. Adverse Drug Reactions

Adverse reactions are uncommon. The most commonly seen are nausea, headache, dry mouth, and a metallic taste. Vomiting, diarrhoea, and abdominal

discomfort are seen Neurotoxic side effects (e.g. Dizziness, vertigo and very rarely.

8. Drug interactions

8.1 Alcohol

Do not consume alcohol while taking metronidazole. This has long been thought to have a disulfiram-like reaction with effects that can include nausea, vomiting, flushing of the skin, tachycardia, and shortness of breath. Consumption of alcohol is typically advised against by patients during systemic metronidazole therapy and for at least 48 hours after completion of treatment. However, some studies call into question the mechanism of the interaction of alcohol and metronidazole and a possible central toxic serotonin reaction for the alcohol intolerance is suggested. Metronidazole is also generally thought to inhibit the liver metabolism of propylene glycol .

Metronidazole has a disulfiram like effect, and some patients will experience abdominal distress, vomiting, flushing or headache if they drink alcoholic beverages during or within 3 days of therapy. Metronidazole and disulfiram or any disulfiram-like drug should not be taken together because confusional and psychotic states may occur.

9. Conclusion

Metronidazole is widely used, because it is less resistant to ranges of bacteria, safe and effective in combating bacteria. Hence, it still continues to be the therapy for anaerobic infections.

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Author

Dr. Gunindra Narayan Bora, BDS (2012) Non-PG Resident Surgeon, Department of Prosthodontics, RDC (GHY-32) 2014, Assam, Dental Surgeon, Department of dentistry, Phillobari Model Hospital, Phillobari , Tinsukia, Assam-786160, Member IDA.