

THE USE OF SYSTEMIC AND TOPICAL FLUOROQUINOLONES

Children 's Hospital 2 – Gastrointestinal Department

OVERVIEW

HISTORY

- Fluoroquinolones are highly active in vitro against both Gram (-) and Gram (+) pathogens and have pharmacokinetic properties that are favorable for treating a wide array of infections
- Drugs: acid nalidixic, norfloxacin, ciprofloxacin, ofloxacin, levofloxacin, moxifloxacin

OVERVIEW

Generation	Drug Names	Spectrum
1st	Nalidixic acid	Gram (-) but not Pseudomonas species
2nd	Norfloxacin Ciprofloxacin Enoxacin Ofloxacin	Gram (-) (including Pseudomonas species), some Gram (+) (S. aureus) and some atypicals
3rd	Levofloxacin Sparfloxacin Gemifloxacin	Same as 2nd generation with extended Gram (+) and atypical coverage
4th	Moxifloxacin	Same as 3rd generation with broad anaerobic coverage

OVERVIEW

HISTORY

- **Nalidixic acid:**
 - **First generation approved by the FDA**
 - **≥ 3 months**

- **Ciprofloxacin:**
 - **Second generation used in children (2004)**
 - **1 - 17 years of age.**

OVERVIEW

In 2006, according to the American Academy of Pediatrics:

- **Parenteral fluoroquinolones: appropriate for multidrug - resistant pathogens**
- **Oral fluoroquinolones: for outpatient management, when other options were intravenous antibiotics**

SAFETY

RCT of Bayer:

- 684 children from 1 – 17 years old
- Compared: (1) intravenous ceftazidime with intravenous ciprofloxacin (2) oral ciprofloxacin with oral cefixime or TMP - SMX.
 - No difference to suggest potential musculoskeletal toxicity with ciprofloxacin

SAFETY

A large cohort of Johnson & Johnson:

- 2523 children in 5 years
 - Community acquired Pneumonia: 6 months - 16 years
 - Acute otitis media: 6 months - 5 years
- No change in height percentile; improvement or deterioration in growth of levofloxacin group

SAFETY

WHO:

- There is no definite evidence to show that they induce sustained injury to developing joints in children.
- Quinolone is safe and effective in children.

USE OF QUINOLONE IN PEDIATRICS

- **Conjunctivitis**
- **External Otitis**
- **Acute Otitis Media, Sinusitis**
- **Lower Respiratory Tract Infections**
- **Gastrointestinal Infections**
- **Urinary Tract Infection**
- **Mycobacterial Infections**

TABLE 4 Most Common Infections for Which Fluoroquinolones Are Effective Therapy (See Text)

Infection	Primary Pathogen(s) ^a	Fluoroquinolone
Systemic antibiotic requirement ^b		
UTI	<i>Escherichia coli</i> <i>Pseudomonas aeruginosa</i> <i>Enterobacter</i> species <i>Citrobacter</i> species <i>Serratia</i> species	Ciprofloxacin ^c
Acute otitis media; sinusitis	<i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i>	Levofloxacin ^d
Pneumonia	<i>Streptococcus pneumoniae</i> <i>Mycoplasma pneumoniae</i> (macrolides preferred for <i>Mycoplasma</i> infections)	Levofloxacin
Gastrointestinal infections	<i>Salmonella</i> species <i>Shigella</i> species	Ciprofloxacin ^e
Topical antibiotic requirement ^{a,f}		
Conjunctivitis	<i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i>	Besifloxacin Levofloxacin Gatifloxacin Ciprofloxacin Moxifloxacin Ofloxacin
Acute otitis externa; tympanostomy tube-associated otorrhea	<i>Pseudomonas aeruginosa</i> <i>Staphylococcus aureus</i> Mixed Gram-positive/Gram-negative organisms	Ciprofloxacin ^g Ofloxacin

GASTROINTESTINAL INFECTION

Shigellosis:

- Ampicillin and TMP - SMX resistance is increasing
- RCT in 201 children compared ciprofloxacin with Ceftriaxone
 - equivalent between 2 groups
- Multi – center RCT in VN: ciprofloxacin and gatifloxacin are similarly effective for the treatment of acute shigellosis.

GASTROINTESTINAL INFECTION

Campylobacter :

- Resistance rates are increasing in many parts of the world
- In Taiwan, Thailand and Sweden rates of 57%, 84%, and up to 88%

GASTROINTESTINAL INFECTION

Gram (-) neonatal sepsis:

- **116 neonates with sepsis were treated successfully with ciprofloxacin.**
- **No adverse events were observed**
 - **used for treating Gram (-) sepsis in neonatal**

H. PYLORI INFECTION

Adult patients: levofloxacin in 2nd line triple therapy

➤ **Children:**

▪ **2007:**

- **110 patients from 6 - 18 years**
- **16.4% failed to respond to the triple and then quadruple regimen was successful with LML (Levofloxacin + Metronidazole + Lansoprazole)**

▪ **2011 NASPGHAN & ESPGHAN: PPI + Levofloxacin (Moxifloxacin) + Amoxicillin (2nd line or salvage therapy)**



THANKS FOR ATTENTION