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Introduction

Infections of the head and neck are a varied group of infections, with overlapping symptoms and etiologic factors. Often otolaryngologists are consulted for management of these various infections, and the management may be surgical or medical. Infections in the head and neck range from harmless to life threatening. As a specialist, the head and neck surgeon must be familiar with these infections, and with the best choices for antimicrobial treatment to maximize patient outcomes. In addition, specialists must be able to quickly recognize these dangerous infections and administer aggressive management to help diminish poor patient outcomes. This paper is a review of current available antimicrobials, common infections treated by the otolaryngologist, and less common but dangerous infections of the head and neck.

Antimicrobial Agents

Penicillins

Penicillin was first isolated from the fungus *Penicillium notatum* in 1929 by Fleming. Since that time, the B-lactam antibiotics have become the most commonly used antibiotic class. They are the least toxic of all antibiotic choices and can be taken orally, IM or IV.

Penicillin V is an acid-stable form of penicillin most commonly used for oral infections. Penicillin G is given IV or IM. The IV form has a half-life of 4 hours and must be given several times per day to maintain therapeutic concentrations. The penicillins are used for treatment of oral infections as they have activity against anaerobic gram-positive cocci such as Peptococcus. They generally have activity against group A, B-hemolytic Strep., group B streptococci, Gram positive Bacilli such as diphtheria, anthrax, and listeria, syphilis, Borrelia (relapsing fever and Lyme disease), and Pasteurella multocida. The major limiting factor for the use of penicillins is the high incidence of reported allergy, although only 10-20% of patients reporting allergy have a true allergy when tested with the skin prick test (Salkind et. al, JAMA 2001). An additional limitation is the treatment of infections with B-lactamase-producing organisms.

Semisynthetic penicillins such as methicillin, nafcillin, and dicloxacillin were created by the alteration of the B-lactam ring to protect it from B-lactamase-producing staphylococci. Methicillin-resistant *Staphylococcus aureus* is an increasingly common pathogen. Its mechanism of resistance is decreased affinity of the penicillin-binding proteins for antibiotics. MRSA bacteria are resistant to all other semisynthetic penicillins and cephalosporins. Methicillin is used infrequently because it causes interstitial nephritis. Nafcillin is generally used IV due to poor absorption PO and IM. These antibiotics are used in the treatment of Staph. infections likely to produce B-lactamase.

The aminopenicillins such as ampicillin and amoxicillin are extended-spectrum penicillins. They are generally active against *Haemophilus influenzae*, *Escherichia coli*, *Salmonella*, and *Shigella* species. Addition of sulbactam to ampicillin (Unasyn) and clavulanic acid to amoxicillin (Augmentin) gives activity against beta-lactamase-producing organisms such as *H. influenzae*, *S. aureus*, *Klebsiella*, *Proteus*, and *M. catarrhalis*. When using these drugs, neutropenia and mild hepatotoxicity are possible adverse side effects, and LFTs as well as CBCs should be checked periodically when starting long term therapy with these drugs.

Antipseudomonal penicillins such as carbenicillin, ticarcillin, azlocillin, mezlocillin and piperacillin are generally used for treatment of Pseudomonal infections. They also have effectiveness against *H. influenzae*, *Niesseria*, *Salmonella*, *Clostridium*, *Actinomyces*, and some oral flora. Piperacillin and Azlocillin are the most effective against *Pseudomonas*. Timentin (Ticarcillin combined with clavulanic acid) is a parenteral preparation that extends activity against B-lactamase-producing *S. Aureus*, and *H. influenzae*, as well as *E. coli*, *Klebsiella*, and *Proteus*. GI absorption is low and IV therapy is the most common form. Platelet aggregation problems, hepatic toxicity, and neutropenia are the common adverse reactions in patients.

Imipenem binds to different penicillin-binding proteins than the antimicrobials (PBP 1a, 1b, 2) mentioned before, allowing for very close inhibitory and cidal concentrations. It is usually combined with cilastatin (Primaxin) which inhibits the half-life of the proximal renal tubular brush border enzyme, dehydropeptidase-I increasing imipenem absorption. Primaxin has the widest spectrum of activity of any B-lactam antibiotic. Most *Staphylococci*, *enterobacteriaceae*, *Pseudomonas*, *H. influenzae*, *N. gonorrhoea*, *Bacteroides*, *Peptococcus*, and *Eikinella* are susceptible to Primaxin. Monitoring chemistries and CBCs are appropriate for patients on Primaxin.

Aztreonam is a monobactam antibiotic with virtually no gram-positive activity but with good gram-negative activity. It is also active against B-lactamase-producing organisms. Penicillin-allergic patients are generally not allergic to aztreonam. As a result, it is often used to treat penicillin-allergic patients with sepsis in combination with vancomycin or clindamycin.

Cephalosporins

The cephalosporins were discovered in 1948 by E. P. Abraham when he extracted cephalosporin C from *Cephalosporium acremonium*, a fungus isolated from a sewage outlet in Sardinia. Cephalosporin C is an acid-stable molecule with antibacterial activity from which other cephalosporins are synthesized. Cephalosporins are the most frequently prescribed class of

antibiotics. The toxicities and adverse reactions of the cephalosporins are similar to those of the penicillins.

The first-generation cephalosporins are characterized by gram-positive activity, including B-lactamase-producing *Staphylococcus aureus* and streptococci. It should be noted that Methicillin-resistant *Staph. aureus*, *S. epidermidis* and enterococci are resistant to all cephalosporins. First-generation cephalosporins have some activity against a limited number of *E. coli*, *Proteus mirabilis*, and *Klebsiella pneumoniae*. Anaerobic gram-positive cocci and rods are also susceptible to these cephalosporins.

The first-generation cephalosporins are Cephalexin, Cephalothin, Cephapirin, Cefazolin, and Cephadrine. Cefazolin is the most commonly used first-generation cephalosporin with a half-life of 2-hours because of its rapid excretion by the kidneys. The other first-generations have similar efficacy to Cephalexin, but must be dosed more often, and are therefore not as common.

The second-generation cephalosporins are used for broader gram-negative control, including coverage for B-lactamase-producing *H. influenzae*. They are less effective than the first-generations in covering *Staph. aureus* and other gram-positive organisms. Caution should be used when administering cefamandole, cefotetan, and cefmetazole as the N-methylthiotetrazole side chain may result in a disulfiram reaction and a vitamin K reversible coagulopathy.

The second-generation cephalosporins are Cefoxitin, Cefamandole, Cefaclor, and Cefuroxime. Cefoxitin is unique among the second-generation cephalosporins because it is active against *B. fragilis* group, but has poor gram-positive activity. Its greatest utility is in the use against mixed gram-negative aerobic and anaerobic infections, such as intra-abdominal infections. Cefaclor is an oral second-generation cephalosporin with greater activity against *H. influenzae* than cephalexin. Cefuroxime is similar to cefamandole, but does not have the N-methylthiotetrazole side chain responsible for disulfiram reactions.

Third-generation cephalosporins display an extended gram-negative spectrum at the expense of decreased activity against gram-positive bacteria. They are often used for treating gram-negative sepsis, as several cross the blood-brain barrier (cefotaxime, ceftizoxime, ceftriaxone). These drugs are also used in treating pseudomonas infections (cefoperazone, cefpiramide, cefsulodin, ceftazidime). Cefoperazone, cefmenoxime, and moxalactam are associated with coagulation problems and disulfiram reactions. Moxalactam is associated with a ten- to one hundred-fold risk of hemorrhagic complications, so bleeding complications should be suspected when using this drug.

The fourth generation cephalosporin currently on the market is cefepime. It has the broadest spectrum activity of all the cephalosporins. It has activity against gram-negative organisms, especially pseudomonas, yet keeps activity against gram-positives including *Staph. aureus*. It is an excellent drug in the treatment of hospital-acquired pneumonias. Cefepime penetrates the blood-brain barrier and is eliminated in urine. Adverse reactions are similar to the above cephalosporins.

Aminoglycosides

Aminoglycosides are bactericidal antibiotics that interfere with protein synthesis by causing misreading of the genetic message and stimulation of faulty production of RNA. In addition, they inhibit cell respiration and cause potassium leakage of cell membranes. Aminoglycosides have an oxygen-dependent transport system and are therefore ineffective against anaerobic bacteria. These antibiotics are used against gram-negative aerobic and facultative bacteria and *Staph. aureus*.

There are three principal toxicities of aminoglycosides: Nephrotoxicity, ototoxicity, and neurotoxicity. Nephrotoxicity occurs as a result of proximal tubular damage and glomerular dysfunction. Persons with kidney disease and taking other nephrotoxic agents should avoid this medication. Ototoxicity, be it cochlear or vestibular, may be caused by all aminoglycosides. Drug accumulates in the perilymph and endolymph and destroys hair cells in the organ of Corti and the ampullae causing permanent ototoxicity. It should also be noted that loop diuretics predispose patients to streptomycin ototoxicity. Neurotoxicity is rare and is seen mostly in patients with myasthenia gravis.

Streptomycin is the drug of choice for tularemia and the plague. It is considered primarily an anti-TB drug. Neomycin is generally used topically during preoperative regimens for bowel surgery because of poor GI absorption. Gentamycin is the most frequently used parenteral aminoglycoside because of its activity against *P. aeruginosa*, and low cost. Tobramycin is similar to gentamycin but is less nephrotoxic and ototoxic.

Tetracyclines

Tetracyclines are bacteriostatic antibiotics that inhibit protein synthesis by binding to the 30S ribosome and preventing binding of tRNA to mRNA. They are generally effective in treating staphylococci, anaerobic infections, enterobacteriaceae, brucella, rickettsia, Chlamydia, mycoplasma, legionella, and *Borrelia burgdoferi*. They are ineffective in treating most streptococci, clostridium, peptostreptococcus, and lactobacillus infections. Tetracyclines are absorbed by the proximal small bowel. Absorption is inhibited by ingestion with divalent and trivalent cations. Tetracyclines also need an acidic environment to be absorbed. For this reason, they should not be taken with milk, antacids, ferrous sulfate, cimetidine, or other B-blockers. Doxycycline is almost completely absorbed in the duodenum and is less affected by foods and divalent and trivalent cations. Tetracyclines penetrate most tissues including those found in the CNS. All tetracyclines except doxycycline should be avoided in renal failure.

Toxicity of tetracyclines includes hypersensitivity reactions, GI symptoms, pseudomembranous colitis, *Candida* superinfection, and photosensitivity reactions. Excessive doses in pregnancy can cause a fatal hepatotoxicity consisting of fatty infiltration. In addition, tetracyclines deposit in calcifying bones and teeth causing permanent discoloration when given to children under the age of 7. Tetracyclines have caused benign intracranial hypertension, neuromuscular blockade in myasthenia gravis, and transitory myopia.

Tetracycline, minocycline, doxycycline, and demeclocycline all have similar efficacy and

antimicrobial spectrums. Doxycycline, as mentioned above, is not affected by foods for absorption and can be given with caution to patients with renal failure.

Macrolides

Erythromycin, azithromycin, and clarithromycin are the macrolides most commonly used. They are bacteriostatic antibiotics that interfere with protein synthesis by binding to the 50S ribosome. They are active against *Staph. aureus*, *Strep. Pyogenes*, *Strep. Pneumoniae*, *Bacillus anthracis*, *Listeria monocytogenes*, the gram-positive anaerobes commonly found in the mouth, and *H. influenzae*. Erythromycin is the drug of choice in treatment of *Bordetella pertussis*, *Campylobacter jejuni*, *Corynebacterium diphtheriae*, *H. ducreyi* (chancroid), and pneumonias caused by *L. pneumophila* and *Mycoplasma pneumoniae*.

Erythromycin frequently causes gastrointestinal disturbances because of its direct stimulatory effects on smooth muscles of the GI tract. This is less common with azithromycin and clarithromycin. Large doses of IV erythromycin have caused transient ototoxicity. Care should be taken when administering erythromycin with prednisone, theophylline, carbamazepine, cyclosporine and warfarin as it can affect metabolism and excretion.

Lincosamides

Lincomycin and clindamycin compose this group of antibiotics. They are bacteriostatic antibiotics that inhibit protein synthesis by attaching to the 50S ribosome. They are active against most gram-positive cocci, including *Staph. aureus*. They are very active against anaerobes, and for this reason are excellent in the treatment of infections of the head and neck. Clindamycin has excellent oral absorption and is metabolized by the liver. It can be used at full doses in mild renal insufficiency but should be halved in anuric patients. The main toxicity with clindamycin use is the development of pseudomembranous colitis caused by the toxin *C. difficile*. This is treated by immediate discontinuation of the drug and oral vancomycin or metronidazole oral or IV.

Chloramphenicol

Chloramphenicol has a wide-spectrum of bacteriostatic activity. Given the fact that chloramphenicol has the potential for fatal bone marrow toxicity, indications for chloramphenicol are limited. There are many effective and safe alternative therapies, however. In addition, chloramphenicol interferes with vitamin K synthesis, iron and vitamin B12 therapy in deficient patients, and can cause Jarisch-Herxheimer reactions. Its indications are limited to brain abscess with penicillin therapy, meningitis with *H. influenzae*, typhoid fever, rickettsial diseases, and acute melioidosis. Its use in head and neck infections is limited.

Sulfonamides and Related Drugs

Bacteria synthesize folate using two enzymes not present in humans: tetrahydroptericoic acid synthetase and dihydrofolate reductase. Sulfonamides act as competitive inhibitors of dihydroptericoate synthetase and are metabolized by the enzyme to inactive analogues.

Trimethoprim interferes with dihydrofolate reductase by the same mechanism.

Although sulfonamides display a broad antibacterial spectrum, many susceptible organisms have developed a resistance. They can be active against *Staph. aureus*, *S. saprophyticus*, *Clostridia* species, *Neisseria* species, *H. influenzae*, and many gram-negative enterics. Sulfamethoxazole is usually combined with trimethoprim into the formulation cotrimoxazole (Bactrim). They are synergistic, and organisms that are resistant to one of the two may be susceptible to the combination. Renal toxicity, hepatic toxicity, GI distress, aplastic anemia, and rare cardiomyopathy have been associated with its use.

There are large numbers of commercially available preparations containing sulfonamide. Sulfamylon cream is used topically in burn patients. Carbonic anhydrase inhibition with this drug can cause metabolic acidosis. Sulfacetamide eye drops are available for bacterial conjunctivitis. Bactrim is useful for UTIs, gram-negative sepsis, bacterial pneumonias, and otitis media. Bactrim is considered combination therapy in patients with MRSA infections.

Vancomycin

In recent years, MRSA infections have plagued hospitals and physicians. Staphylococcal resistance to oxacillin and methicillin occurs when an isolate carries an altered penicillin-binding protein, PBP2a, which is encoded by the *mecA* gene. The alteration of the penicillin-binding protein does not allow penicillin, and in most cases cephalosporin, to bind well to the bacterial cell, causing resistance to B-lactam antimicrobial agents. The answer to this problem has been Vancomycin.

Vancomycin is a bactericidal antibiotic that interferes with the second stage of cell wall synthesis. It also interferes with RNA synthesis and disrupts the cytoplasmic membrane. Vancomycin is used in the treatment of gram-positive infections and is most effective against *Staph.* and *Strep.* infections. Almost all gram-negative organisms are resistant to the antibiotic. Vancomycin is not normally absorbed by the GI tract and is generally given IV except in the treatment of *C. difficile* colitis. It is given IV over 30-60 minutes to avoid “red man syndrome”, which is hypotension and a maculopapular rash of the face, arms, and trunk. This is treated with steroids, antihistamines, and IV fluids. Vancomycin penetrates most tissues well, including the blood-brain barrier. It is excreted by the kidneys and dose adjustments must be made for renal failure. In addition to red man’s syndrome, it is extremely ototoxic. Renal toxicity occurs less frequently with vancomycin than with the aminoglycosides. Vancomycin must be given IV and can cause thrombophlebitis when given through peripheral IVs. Its use has been associated with neutropenia.

Metronidazole

Metronidazole inhibits anaerobic bacteria and protozoa. The exact mechanism is not understood, but it is believed that it interferes with the synthesis of DNA. It penetrates all tissues including those found in the CNS. A reversible peripheral neuropathy may develop with prolonged use, and GI symptoms including furred tongue and metallic taste are common. It produces a disulfiram reaction when alcohol is used, and it interferes in the metabolism of

warfarin. It is commonly used in the treatment of intra-abdominal infections, oral infections, and mixed infections where anaerobic organisms are suspected.

Quinolones

Norfloxacin, ciprofloxacin, and ofloxacin are the most commonly used quinolones. They inhibit type 2 topoisomerase, a DNA gyrase involved in the supertwisting of bacterial DNA molecules, replication, and repair. These enzymes are present in mammalian organisms, but the quinolones selectively inhibit bacteria. They are bactericidal, and bacteriostatic under anaerobic conditions.

Quinolones have a broad range of activity. They are effective against *P. aeruginosa*, Staph., Strep. and the respiratory pathogens including *S. pneumoniae*, *H. influenzae*, *M. pneumoniae*, and *L. pneumophila*. They are also effective against Rickettsial diseases and enteric pathogens. They demonstrate synergy when used with B-lactams, aminoglycosides, and rifampin.

Ciprofloxacin may cause fever, rash, GI complaints, and in one to four percent of people, mild neurological complaints such as insomnia, anxiety, and depression. Animal studies have suggested that chronic therapy may cause phototoxicity, arthritis, and cataract formation.

Use in children is cautioned due to questions of joint toxicity. Several studies suggest the incidence of adverse effects of ciprofloxacin in children is not different that that from adults. Currently the FDA has not approved ciprofloxacin for use in children.

Oxazolidinones

Linezolid is the first of a new class of antibiotics, oxazolidinones, which has activity against a broad spectrum of gram-positive bacteria, including MSSA and MRSA. The mechanism of action of linezolid is unique in its ability to inhibit the initiation complex of bacterial protein synthesis. This is unlike other inhibitors of protein synthesis which interfere with protein synthesis in the elongation or termination stages. The final result is prevention of a functional 70S initiation complex. In a study done by the Shriners Hospital for Children in Galveston, (Heggors, et al 2002) 95% of MRSA, MRSE treated with linezolid were susceptible.

The main advantages of linezolid are its broad spectrum gram positive coverage and its availability in an oral form. Oral linezolid is 100% bioavailable, making it possible to treat MRSA/MRSE infections on an outpatient basis. The main disadvantage is cost, with daily dosing ranging about \$100-150/day. Dosage is 400-600mg BID. The most common side effects are headache, diarrhea, and thrombocytopenia.

Common Infections Treated by the Otolaryngologist

It is impossible to review of all infections of the head and neck. There will be discussion of common infections of the head and neck, as well as treatments, both first line and alternative. Drug choices are cited from the Pocket Guide to Antimicrobial Therapy in Otolaryngology –

Head and Neck Surgery 11th edition by David N.F. Fairbanks, MD and the Academy of Otolaryngology Head and Neck surgery. Common infections treated by the otolaryngologist and antibiotic therapy will be discussed. In addition, malignant otitis externa and supraglottitis will be reviewed.

Acute Otitis Media is caused by *Streptococcus pneumoniae* and *Hemophilus influenzae* in 50% of cases, *Moraxella catarrhalis* in 10-20%, and by *Strep. Pyogenes* or *Staph. aureus* in the remaining cases. Over 70% of cases will resolve spontaneously. Reasons for treatment include relief of pain and prevention of hearing loss, as well as the prevention of mastoiditis which occurs in 1 in 400 untreated children with acute otitis media. Several studies have also suggested the effectiveness of short duration antibiotic therapy of 5-7 days as opposed to longer duration.

Most authorities recommend amoxicillin as the initial treatment of choice for first-time, untreated, uncomplicated acute otitis media. This is despite the fact that 30-40% of *hemophilus* and 90% of *M. catarrhalis* as well as increasing numbers of *S. pneumoniae* are resistant to the drug. For seriously ill patients, patients with frequent otitis media, or those who will use antibiotics for up to 3 months, Augmentin ES or IM ceftriaxone is effective. Pneumococcal strains that are resistant to amoxicillin are generally sensitive to double strength doses of the antibiotic, and this combined with clavulanate will cover *Hemophilus* and *Moraxella*. For penicillin-allergic patients, either erythromycin or the combination of clindamycin plus sulfonamide are effective low cost choices. If Multi-drug resistance is suspected, the quinolones (with consent in children) are a good choice. Infections that fail treatment with the above medications are likely due to highly penicillin resistant pneumococcal strains. Culture directed treatment is recommended in these patients, as well as initial therapy with ceftriaxone, a quinolone, or vancomycin with rifampin. Treatment for children under the age of 3 should include at least 10 day courses. In children older than 3, 5 day courses of antibiotics will generally suffice.

Acute mastoiditis is generally an invasive complication of acute otitis media. Pain and erythema over the mastoid in a patient with previous otitis media should prompt the diagnosis. The microbiology of these infections is slightly different. *S. pneumoniae*, group A beta-hemolytic streptococci (*Strep. Pyogenes*), and coagulase-negative *Staph.* are the predominant pathogens. *Staph. aureus*, *Hemophilus*, *Proteus*, and *Bacteroides* species are also reported. Culture directed therapy is preferred, and penicillin resistant pneumococci should be anticipated. A possible sequela to this infection is intracranial extension, so antibiotic therapy for these infections is aggressive. Primary drug therapy includes vancomycin IV plus ceftriaxone. Alternatives include an IV quinolone, clindamycin IV plus rifampin or ceftriaxone, or Unasyn IV.

Necrotizing otitis externa is a potentially lethal infection usually beginning in the external auditory canal and extending to the skull base. The disease is usually found in elderly diabetic patients in poor metabolic control, although it may be found in any chronically ill or debilitated patient. It usually begins as an acute external otitis that does not resolve and spreads through the fissures of Santorini to the surrounding soft tissues and bone of the skull base.

Patients with the diagnosis of NOE should have Technetium-99m bone scanning and gallium-67 scanning. Tc-99m scanning shows the extent of disease, and Ga-67 is thought to incorporate into sites of active infection. Baseline studies are useful for later determination of the success of therapy. *Pseudomonas aeruginosa* is the most common pathogen. Topical plus oral plus IV anti-pseudomonal antibiotics are recommended over a course of a minimum of 6 weeks up to 1 year. First line therapy is topical ciprofloxacin, cefepime, imipenem, meropenem, ofloxacin plus an oral quinolone plus IV ceftazidime, or piperacillin/tazobactam with gentamicin. Success of treatment is determined by the cessation of pain, normalization of exam findings, and normal Ga-67 scanning. The ultimate predictor of success is diabetic control, and all attempts to normalize glucose should be made.

Sialadenitis is an infection of the salivary glands and is most commonly caused by viral infection. Of these, mumps and less commonly CMV, Coxsackie's virus, and EBV are responsible. Bacterial sialadenitis is usually caused by coagulase positive *S. aureus*. Other less common infections include *S. pneumoniae*, *E. coli*, *H. influenzae*, and oral anaerobic infections. Salivary stasis is believed to be the precipitating event from either obstruction or decreased production. Treatment for these infections includes warm compresses, massage, sialogogues, oral hygiene, antibiotics, and most importantly IV hydration. First line antibiotic therapy includes Augmentin or Unasyn. Alternatives include Clindamycin, a 1st or 2nd generation cephalosporin, or vancomycin and metronidazole.

Acute rhinosinusitis The causative organisms in acute rhinosinusitis are similar to acute otitis media. In a study from Sydnor and Gwaltney (1998), sinus aspiration revealed *H. influenzae* in 38%, *Streptococcus pneumoniae* in 37%, *Streptococcus pyogenes* in 6%, *Moraxella catarrhalis* in 5%, and alpha Strep. and gram-negative bacilli in 3% of aspirated specimens. *Staph. aureus* is frequently found in nasal cultures but rarely in antral puncture cultures, and its role in sinusitis is uncertain. In hospitalized or immunosuppressed patients, *Staph. aureus* is more likely the causative agent. The likelihood of spontaneous resolution in acute rhinosinusitis is similar to otitis media. First line therapy with amoxicillin or erythromycin and Bactrim, or doxycycline is recommended. For treatment failures, for patients in whom the possibility of treatment failure is unacceptable, or for moderately to severely ill patients, Augmentin, the respiratory quinolones, cefpodoxime, cefdinir, cefuroxime, or cefditoren are recommended. It should also be noted that sinusitis can be caused by pneumococcal stains that are sensitive to penicillin at an intermediate level. For these organisms, a double dose of amoxicillin (90mg/kg in children, 3-4 g/day for adults in TID dosing) will generally be effective. This can be added to patients already taking augmentin.

Length of treatment for acute rhino-sinusitis is controversial. Ten to fourteen day courses of antibiotic therapy are frequently prescribed for treatment of sinusitis. Several studies have shown that courses of 3, 4, 5, and 8 days of antibiotics yield similar cure rates as 10 day courses for acute uncomplicated sinusitis and otitis media. Therefore, it is acceptable to try these shorter regimens, but nonresponders (5 days) should be switched to one of the alternative agents, and addition of another agent may be necessary. Patients with previous antibiotic failure and patients under the age of 2 years are more likely to fail antibiotic therapy, and longer courses of antibiotics should be considered.

Epiglottitis or acute supraglottitis is an infection of the larynx and/or the epiglottis, seen in children and less commonly adults. In children, it is most commonly caused by H. influenzae type B although its frequency has diminished since the advent of vaccinations. In adults, Staph aureus is most commonly implicated, but H. influenzae still appears to have some prevalence. In a study by Solomon et al, (1998), the vast majority of throat cultures in adult epiglottitis grew normal flora or no growth. Blood cultures (of 4 positive blood cultures) all grew H. influenzae, and other organisms seen were alpha hemolytic Strep., Strep. pyogenes, Staph. aureus, H. haemolyticus, H. parainfluenzae, and Neisseria. Antibiotic therapy should begin after the airway has been secured. Primary drug choice is Rocephin IV. Alternatives include cefuroxime and Unasyn. The respiratory quinolones should be given IV in patients with a penicillin allergy.

Conclusion

Infections of the head and neck are varied in etiology and severity. While the most common infectious agents are viral, the otolaryngologist should be able to recognize bacterial infections and start effective therapy with antimicrobials. As resistance patterns develop in the near future, first line therapy will evolve. The fluid and varied nature of head and neck infections demand periodic review of the subject by physicians treating these infections.

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