Common Pain Problems in the General Pediatric Setting

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A variety of types of pain are frequently encountered in pediatric health-care settings. This article addresses syndromes in which pain is the presenting, and often most traumatic, symptom of an illness (eg, otitis media and pharyngitis), and pain that results from therapeutic interventions (eg, injections).

Despite its frequency and the anxiety it produces, pain often is not effectively addressed in pediatric patients. Physicians tend to direct their efforts to curing the underlying disease of which pain is a by-product, while focusing little or no attention on the symptom itself. As a result, children may suffer unnecessarily while awaiting disease remission or may experience unnecessary discomfort during procedures.

OTITIS MEDIA

Otitis media is a common pediatric problem. It accounts for approximately 20% of visits to physicians overall and 35% during the first 5 years of life.1 Fifty percent of antibiotics prescribed for children under the age of 10 years are administered for otitis media.2

Ear pain is a common complaint in children with otitis media. In evaluating children with otitis media with effusion, Hayden and Schwartz3 found that 42% had severe pain, 40% had mild to moderate pain, and 17% had no pain. Their research also suggested that younger children tended to have less pain, a finding that is not supported by other pain research in children and very likely resulted from the inadequate measurement techniques of the era.

The frequency and severity of otalgia in otitis media are understandable given the sensory innervation of the ear. The many pain-sensitive structures in the ear make it sensitive to pain associated with inflammation. In the middle ear, the tympanic mem-

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PHARYNGITIS

Acute pharyngitis is a common pediatric problem, accounting for up to 5% of office visits yearly. Inflammation of the pharynx and surrounding lymphoid tissue may be caused by bacteria (often Streptococcus) or viruses. In some studies, only 10% to 30% of pharyngitis was streptococcal in origin. Bertin et al. reported that 80% of children with streptococcal pharyngitis initially rated their pain as 4 or 5 out of 5.

By modifying the source of the pain, antibiotic treatment for bacterial pharyngitis, as with otitis, has a clear analgesic effect. Randolph et al. reported that within 48 hours of the initiation of antibiotic therapy, the pain associated with pharyngitis decreased dramatically. There also have been a few studies of analgesic efficacy in pharyngitis. Bertin et al. compared the analgesic efficacy of acetaminophen, ibuprofen, and placebo during the first 48 hours following antibiotic administration for pharyngitis and viral pharyngitis, which is not sensitive to antibiotics. Spontaneous pain resolved in 80% of the children who took ibuprofen, 70% of the children who took acetaminophen, and 55% of the children who took placebo. Differences between the ibuprofen and the placebo groups were statistically significant.

In a study of adults with sore throat pain, Schachtel et al. found that aspirin with caffeine (Anacin, Whitehall Laboratories Inc, New York, New York) relieved pain more rapidly and more effectively than aspirin alone or placebo. They postulated that ca-

bran, periosteum of the mastoid, and mucoperiosteum of the middle ear are all richly innervated. Inflammatory processes stimulate nociceptors through stretching, irritation, or toxic products, resulting in pain. In the external ear, the skin of the auricle and external auditory canal and the perichondrium of the auricle also are well innervated. Pain associated with external otitis will result when the pinnae are moved. Such pain does not occur, however, in middle ear disease.

The traditional treatment for otitis media is antibiotics. In addition to treating the underlying cause, antibiotics appear to decrease symptoms associated with otitis media. In a placebo-controlled study of otitis media, Burke et al. randomly assigned children to an antibiotic or placebo group. The group that took antibiotics cried significantly less overall. Pain ceased at 2.8 days in the antibiotic group versus 3.3 days in the placebo group, and children in the antibiotic group used fewer analgesics over the course of their illness. Therefore, it appears that antibiotics themselves reduce the discomfort of otitis. Nevertheless, despite antibiotic usage, children typically experience pain for almost 3 days, so other methods of pain control should be considered as part of the treatment of otitis media.

There has been essentially no rigorous investigation of analgesic use or efficacy for otitis despite the frequency of this problem. Acetaminophen is likely the most commonly used systemic analgesic for otitis. It provides analgesia as well as antipyresis but has limited, if any, anti-inflammatory effects. Ibuprofen may be more appropriate because of its anti-inflammatory activity. For more severe pain that does not respond to acetaminophen or ibuprofen, acetaminophen with codeine should be considered. Regardless of the agent, analgesics should be used around the clock (except if the child is sleeping) for the first few days after diagnosis until the effects of the antibiotics have been established.

In addition to systemic analgesics, a number of local treatments have historically been used to provide pain relief for otitis: warm oil in the ear, compresses on the ear, or blowing into the ear. In addition, topical agents such as Auralgan (Wheth-Ayent Laboratories, Philadelphia, Pennsylvania) and Americaine (Fisons Corp, Rochester, New York) otic solutions have been marketed specifically to reduce pain from otitis. Auralgan contains antipyrine, benzocaine, and oxyquinoline sulfate in dehydrated glycerin. It purportedly works by decreasing middle ear pressure through osmosis and by local anesthetic effects on the tympanic membrane. Unfortunately, topical products have not been subjected to methodologically sound evaluation. The use of local anesthetics makes at least theoretical sense, but it is uncertain whether local anesthetic in the external canal affects pain-sensitive structures in the middle ear. With the advent of more sophisticated local anesthetics and iontophoresis, the future treatment of the pain of otitis may emphasize local treatments. For the present, however, these agents have no documented efficacy, and treatment with systemic analgesics is necessary.

In summary, otitis media is a common painful condition for which there have been essentially no formal analgesic studies. Systemic analgesics for the first few days of the illness in conjunction with antibiotics seem to be the most rational approach. Local treatments may have some efficacy but require more detailed study.
Effective techniques of relieving pain due to urinary tract infections include voiding in a warm bath, drinking lots of fluids, and altering the urinary pH by drinking fluids such as cranberry juice.

Feine may increase aspirin absorption and enhance gastric mucosal microcirculation.

Finally, in a recent study on adolescents and adults with pharyngitis, O'Brien et al. found that the addition of dexamethasone to penicillin significantly decreased pain intensity in the first 24 hours and brought more rapid relief (6 hours versus 12 hours) compared with placebo. Because pharyngitis pain seems largely inflammatory in origin, such an approach makes sense, although further studies in adults and children are necessary before it can be uniformly recommended.

Local treatments appear to have some efficacy for pharyngitis as well. Salt water gargles, lozenges, and local anesthetic sprays are used, although no formal studies have examined their value.

In summary, pain associated with pharyngitis requires analgesic therapy whether it is of bacterial or viral origin. Nonsteroidal anti-inflammatory drugs (NSAIDS) or steroids (dexamethasone) may be beneficial. Anecdotal evidence also supports the efficacy of local treatments.

VIRAL INFECTIONS OF THE MOUTH

Oral viral infections often cause painful mouth ulcers that may make eating or drinking uncomfortable. In herpetic gingivostomatitis, vesicles on the gingiva, palate, lips, and tongue eventually become painful mouth ulcers. In herpangina, ulcers develop in the oropharynx and posterior oral cavity. Because of the mouth's rich innervation, these lesions are often extremely painful. If inadequately treated, the pain of herpetic gingivostomatitis and herpangina can decrease oral intake sufficiently to cause dehydration that may necessitate hospitalization. Because these infections are viral in origin, effective treatment directed at their cause is often not available.

A number of symptomatic treatments have been developed for mouth ulcers, although none have been studied formally. The most common are local anesthetic sprays and solutions such as viscous lidocaine. Viscous lidocaine can be swished in the mouth of older children or applied directly to the lesions with a cotton-tipped applicator in younger children. Local anesthetic solutions must be used cautiously as they may impair swallowing and increase the risk of aspiration.

In addition to local anesthetic solutions, a number of "magic mouthwashes" have evolved that reportedly relieve ulcer pain. In general, each mouthwash has at least two components: one intended to adhere to the lesion and at least one to provide local pain relief. Frequently used combinations include diphenhydramine, viscous lidocaine, and Maalox (magnesium and aluminum hydroxide suspension, Rorer, Fort Washington, Pennsylvania) and diphenhydramine and Kapectate (attapulgite suspension, Upjohn, Kalamazoo, Michigan). Anecdotal evidence supports their efficacy, but they have not been formally evaluated.

Children with mouth ulcers should be kept well hydrated. Drinking through a straw is helpful because it limits contact between the mouth and liquid.

URINARY TRACT INFECTIONS

Another common pain problem in children are urinary tract infections. Pain can accompany infection in either the lower urinary tract (i.e., cystitis and urethritis) or upper urinary tract infections (typically pyelonephritis). In lower tract infections, pain is typically the burning pain of dysuria, whereas in upper tract infections, it tends to manifest as back or flank pain. Antibiotic treatment usually is initiated when cultures reveal a specific organism.

A number of symptomatic approaches to the pain of urinary tract infection have been developed, but few have been subjected to rigorous study. Phenazopyridine hydrochloride (Pyridium, Park-Davis, Morris Plains, New Jersey), which reduces pain by its local anesthetic action on the urinary tract, is underused. While there is no specific pediatric dosing regimen, pediatric nephrologists suggest that a 100-mg tablet of Pyridium is appropriate for children as young as 6 years. Phenazopyridine is a dye and therefore comes in a coated tablet; if the pill is crushed, the dye will stain the tongue and mouth. Phenazopyridine has been associated with hemolytic anemia and hepatic toxicity if used for prolonged periods (i.e., more than 1 week) and is contraindicated for children who have glucose-6-phosphatase deficiencies.

Other effective techniques of pain relief include voiding in a warm bath; drinking lots of fluids, which may dilute the urine and reduce burning; and altering the urinary pH by drinking fluids such as cranberry juice. If the child is still experiencing significant discomfort despite these techniques, systemic analgesics are appropriate.

INJECTION PAIN

For many children, medical care is symbolized by a needle. Although many medications now can be administered orally and most interactions with health-
care providers do not result in a child receiving an injection, many children, especially those with chronic disease, are extremely fearful of needles. Most physicians have entered examining rooms to meet young children whose dread of needles dominates the clinical encounter and whose first words are “Will I get a shot?”

Such concerns are not unrealistic. The new schedule of immunizations\(^1\) dictates that a child receive 12 parenteral immunizations by adolescence. If a child has not been immunized in the first year, the schedule calls for four injections during one visit. In addition, injections are extremely common in hospital environments. One study\(^1\) of 26,000 hospitalized pediatric patients revealed that 46% received at least one intramuscular injection and virtually all underwent venipuncture for laboratory testing.

The degree of reaction to injections is influenced by both developmental trends and individual differences. Numerous studies have shown that the younger the child, the more pain and distress he or she experiences from an injection. In addition, our group\(^12\) and others have observed a bell-shaped curve of reaction patterns in children of similar ages with some reacting minimally and some vigorously to needle pain. A host of factors, such as temperament and the environment, at least partially explain this phenomenon.

Site

There is no ideal site for an intramuscular injection. All of the traditional sites (ie, deltoid, gluteal, and vastus lateralis muscles) have drawbacks depending on the age of the child and the volume of the material to be injected. In general, in children older than 18 months, the deltoid muscle is the preferred site. Ipp et al\(^13\) examined the reaction to the combined diphtheria, tetanus, and pertussis vaccine in 18-month-old children randomly assigned to receive the injection in the deltoid muscle or the anterior thigh. Severe pain was identified in 30% of those who received thig injections and in 8% of those who received deltoid injections. When larger volumes of injectate than can be accommodated by the deltoid muscle are required in children older than 3 years, the ventrogluteal area appears safe and is associated with less pain than in the anterior thigh or dorsogluteal area.\(^14\) In younger children, who lack adequate deltoid musculature and for whom use of the ventrogluteal area remains controversial, the lateral thigh is the preferred site.

Properties of the Injected Material

The temperature of the injectate may have a role in determining the pain experienced from an injection. Davidson and Boom\(^15\) reported that warming lidocaine from room temperature (20°C) to body temperature (37°C) significantly reduced the pain associated with its injection. Although no studies have examined the impact of warming vaccines to body temperature prior to injection, this may help reduce some of the associated pain.

The use of lidocaine as a diluent also may reduce some of the pain associated with intramuscular injections. Schichor et al\(^16\) compared ceftriaxone injections using sterile water as a diluent with those using lidocaine and found significantly less pain over the subsequent 24 hours in the group that received lidocaine.

Technique of Administration

The technique of administering an injection appears to affect the amount of pain the patient experiences. Evidence has emerged suggesting that the E-tract intramuscular injection technique significantly reduces the pain associated with injection.\(^17\) In this technique, the skin is pulled taut at the injection site, the drug is injected, and then the skin is released. Theoretically, this seals the medication into the muscle and decreases swelling and induration.

Selection of the appropriate gauge needle is also important. Thin needles cause less discomfort but are more likely to bend and therefore may require increased pressure. Inserting the needle at a 90° angle stabilizes the needle and theoretically minimizes trauma to adjacent tissue. The needle should be darted in quickly so that it goes directly through the epidermis, and it should be removed in one quick smooth motion. Some research suggests that the medication should be pushed in slowly over several seconds. Therefore, rapid insertion and removal of the needle and slow administration of syringe contents appear to minimize pain.

Use of Local Anesthesia

A major advance over the past 2 years that offers the possibility of significantly reduced injection pain is the availability of EMLA Cream (Astra USA Inc, Westboro, Massachusetts). This mixture of prilocaine and lidocaine is absorbed through intact skin when covered with an occlusive dressing for approximately 1 hour. There are now many reports suggesting that the appropriate use of EMLA Cream can allow essentially pain-free needle insertion. It has been studied for venipunctures, lumbar punctures, and reservoir access.\(^18,19\) A recent study by Uhart\(^20\) exam-
ined the efficacy of EMLA Cream versus placebo in reducing the pain associated with intramuscular injection of diphtheria-tetanus-pertussis vaccine. Children receiving EMLA Cream cried less and demonstrated fewer pain behaviors at the time of the immunization and had less tenderness at the vaccination site the next day. Uhari suggests that the use of EMLA Cream may decrease the reluctance of some parents to have their children immunized.

Although application 60 minutes prior to needle insertion is recommended, there are reports in adults suggesting that the use of EMLA Cream for much shorter periods, even as few as 5 minutes, may be somewhat effective. Therefore, application may have value even in situations in which a full 60 minutes is not possible.

In addition to EMLA Cream, other agents have been examined for their ability to provide some anesthesia for needle insertion. A number of investigators have reported on the use of ethyl chloride spray or ice cubes to allow relatively painless needle insertion. The efficacy of these approaches is short-lived, however, and injection must take place almost immediately after application to be effective.

**Use of Behavioral Techniques**

A number of behavioral approaches are beneficial in dealing with the pain associated with injections.

Preparing the child for the procedure, ie, explaining to him or her what will happen, reduces anxiety and may have a positive impact on pain perception in some children. Unfortunately, such preparation tends to be ineffective in young children and may even increase distress in some extremely anxious older children. As a result, preparation should be individualized for the unique characteristics of each child.

Parental presence clearly helps children cope with the pain associated with procedures. If at all possible, parents should be present when their child is receiving an injection or undergoing any painful or anxiety-producing procedure. They should be given a specific job such as "coach" to help comfort the child and may be given materials to help distract the child. This will decrease parental, child, and physician anxiety.

Finally, a number of distraction techniques have been developed specifically for the pain associated with injections. Party blowers, pop-up books, transcutaneous electrical nerve stimulation units, and music through headphones have all been shown to decrease the pain associated with needle insertions in children.

In summary, the pain of needle sticks can be minimized by using appropriate administration techniques, involving parents, and using distraction techniques or local anesthetics.

**SUMMARY**

Pain problems are a routine part of pediatric practice. Physicians should be aware that many common childhood illnesses are painful and that only by addressing the symptoms and the underlying disease concurrently can the legitimate concerns of many children and parents be addressed adequately. Likewise, although needle sticks are necessary for health maintenance, they, too, impose a significant burden on children. The discomfort and dread that injections cause can be reduced significantly through relatively simple and safe approaches. Compassionate medicine dictates that attention be paid to such concerns.

**REFERENCES**