POST OPERATIVE PAIN MANAGEMENT IN PAEDIATRIC PATIENTS

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Introduction

Pain is perhaps the most feared symptom of disease, which a man is always trying to alleviate and conquer since ages. It is defined by the international association for study of pain as an “unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage”.

Children are special in this regard because, in them it is a very complex phenomenon. It is also very difficult to differentiate restlessness or crying due to pain from that of hunger or fear in the children. An effective pain therapy to block or modify the myriad physiologic responses to stress has become an essential component of modern pediatric anaesthesia and surgical practice.

Historically, children have been under treated for pain and for painful procedures because of the wrong notion that they neither, suffer or feel pain, nor responded to or remembered the painful experiences to the same degree that adult did. An unproved safety and efficacy of the analgesics and worries about the risk of opioid induced respiratory depression, added more reasons for the under treatment of pain in children. Popular dogma had suggested that the human child does not feel pain, and that it is dangerous to give him powerful analgesia because of the risk of addiction.

Under treatment of post-operative pain even in the children and newborns may trigger biochemical and physiologic stress response and cause impairments in pulmonary, cardiovascular, neuro endocrinal, gastrointestinal, immunological, and metabolic functions. Finely et al have recently reported that many types of the so called “minor” surgery can cause significant pain in children and that, parents have a number of misconceptions concerning pain treatment.

In spite of all these reports, the postoperative pain in paediatric patient is not adequately managed despite of its cause of morbidity and even some reported mortality.

Swaford and Allen had stated that “Paediatric patients seldom need medication for relief of pain. They tolerate discomfort well...”.

Eland identified significant discrepancies in the treatment of pain in the children and adults. A few years after this, the clinical reports on incidents of pain and analgesic administration in children started emerging. Anand et al described the effects of pain on infants due to minimal anaesthesia surgery in his articles. Similar articles appeared in the editorials of the major medical journals. Soon after these articles, various committees were formed to give recommendations on this subject.

The society of Paediatric Anaesthesia, at its 15th annual meeting at New Orleans, Louisiana (2001) clearly defined the alleviation of pain as a “basic human right”, irrespective of age, medical condition, treatment, primary service response for the patient care or medical institution. Langlade et al suggested that the post operative pain treatment must be included in the anaesthetic planning even before induction of anaesthesia, adopting the idea of ‘managing pain before it occurs’. Now, post-operative pain management is an integral part of practice of paediatric anaesthesia in all major hospitals.

Acute pain is the pain associated with a brief episode of tissue injury or inflammation, such as that caused by surgery, burns, or trauma. In most of such cases, the intensity of pain diminishes steadily over a period of time.

Pain assessment in children

Pain assessment is the most important and critical component of pain management. Assessing pain in children is an ever challenging as well as a difficult task, mainly because so far no reliable method of assessing and measuring child’s pain is available.

However, the child’s self report is the single most reliable indicator of the existence and intensity of pain. Cognitive and emotional developments together with psychological defense mechanisms are important variables to be considered with paediatric pain. Unfortunately, this is possible only in youngsters with sufficient cognitive and communicative abilities. In the infants, or children with cognitive or physical impairments, self-report is not always possible and observational assessment in the form of.

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behavioral or biological methods are the only options available. One such standard approach of assessment of pain is QUESTT which is as follows-

Q – Question the child
U – Use pain rating scales
E – Evaluate child’s behavior
S – Secure parent’s involvement
T – Take cause of pain into account
T – Take earliest action

a. Question the child

Self Report: The child’s verbal statement and description of pain are important factors in assessment of pain. Children up to 2 years can report and locate the pain, although, at this age they will not be able to quantify the intensity. Questioning should be patient and in the words familiar to the child should be used. It is the best to talk to the parents before asking the child and the words that are used to describe the pain in the family should be used. Children, at any age can deny pain if the questioner is a stranger, or are afraid of receiving injections for pain.

b. Use a pain rating scale

Faces scale: Children up to 4-5 years old can use standardized measuring scales. One must introduce and discuss the detailed aspects of the scale to the child and his parents, before using them. Some of the methods available for self report are Hester’s poker chip tool, Faces scale of Bieri et al., faces scale of Kutner and Le Page, Eland’s colour scale, Visual Analog Scale (VAS), Smiley Analog Scale, Oucher Scale of Beyer and Wells, and Work Graphic Scale of Tesler et al. Ideally speaking, no one scale is better than the others.

Children older than 7-8 years can use a zero to ten numeric scale or even VAS scale. Using the above scales, pain is measured for the treatment plan as well as to gauge the success of the therapy instituted in the child.

c. Evaluate behavior and physiologic changes

Behavioral and physiologic changes: Specific distress behaviors eg. cry, ouch, facial expression (grimace), posture (guarding) and body movements are typically associated with pain and are useful in evaluating pain in children with limited communication skills. However, it is difficult to discriminate between behavior due to pain and other types of distress eg. hunger, fear or anxiety.

Many scales for behavioral assessment have been described, namely, Directly Observed Behaviors, Children’s Hospital of Eastern Ontario Pain Scale (CHEOPS), Toddler Preschool Post operative Pain Scale, Ten Item Post operative Pain Score, CRIES scale, facial expression scale of Wong et al and Nurse or Parent rating of pain.

Physiologic changes: As like the behavioral measures, the physiologic changes do not discriminate between physical responses to pain and other forms of stress. Most studies of physiologic measures have assessed to the acute pain but are unreliable indicators of persistent pain. Examples of physiologic changes to pain are increase in heart rate, respiration and blood pressure, crying, sweating,
decrease in oxygen saturation, dilation of pupils, flushing or pallor, nausea and muscle tension. Heart rate is probably the simplest and therefore the most appropriate. Vagal tone\textsuperscript{25} and heart rate variability\textsuperscript{26} such as during breathing have been used as indices of pain and distress. Heart rate initially decreases and then increases in response to short sharp pain.

Surgery also triggers the release of stress hormones (corticosteroids, catecholamines, glucagon and growth hormone). Except in laboratories and researches, these measurements are not been found to be useful clinically to assess and treat the pain.

d. Secure parent’s involvement

Parent’s should be questioned about the early recognition and child’s behavior during pain. They should be also encouraged to get actively involved in assessment, progress as well as treatment strategies of pain in their child.

e. Take cause of pain in to account

Etiology and or procedure may give clues to the expected intensity and type of pain.

f. Take a quick action to relieve the pain

Establish the acceptable pain level in the child and use appropriate methods to relieve it.

Pain Management in paediatrics

There are many different modalities to treat the paediatric pain. But before opting for an appropriate modality of pain relief, one must evaluate the relative risks or benefits, it’s analgesic efficacy, safety, side effects, costs and the course of recovery. The child should be prepared properly for that particular method of pain relief. A good psychological preparation of the child as well as parents, proper premedication and smooth anaesthesia course always helps in reducing the anxiety and needs of pain medications in the post-operative period.

The treatment modalities include general measures, systemic drug therapy, regional techniques and non-pharmacologic approaches.

A. General measures

Child should be made comfortable and less distressed, before surgery as well as during hospital stay. These measures include presence of parent with the child, nursing in a comfortable environment, allowing the child to adopt most comfortable position and feeding if permissible.

B. Systemic drug therapy

I. Non-narcotic analgesics

This group of drugs has become extremely popular for treating postoperative pain in children as they are effective with few side effects and produce an opioid sparing action through decreasing the inflammatory mediators generated at the site of tissue injury. These drugs act peripherally by inhibiting prostaglandin (PGs) and thereby, blocking the afferent pain mediators and impulses. These drugs have a ceiling effect in the higher doses, though this may increase the side effects. These are useful for mild to moderate pain or as adjuncts with narcotics to decrease the side effects of narcotics.

a) Paracetamol (Acetaminophen) : This is the most common analgesic used in the children. It is very useful as a postoperative analgesic specially if used with Ibuprofen. Owing to its safe therapeutic profile, it should be the primary postoperative pain management tool in a majority of surgical procedures.\textsuperscript{27} Though dose response in children is not known, 15-20 mgkg\textsuperscript{-1} can be used safely orally every 4 hours. An injectable formulation of paracetamol also exists as pro-drug paracetamol.\textsuperscript{28} Nephrotoxicity and hepatotoxicity are the commonly encountered complications but, are not seen with short term use.

b) Ibuprofen : This is a better analgesic than acetaminophen. Safety of Ibuprofen for use in children less than 6 months of age is yet to be established. However, the pharmacokinetics in infants over 3 months is similar to adults.\textsuperscript{29} Oral formulations are available and 4-10 mgkg\textsuperscript{-1}dose\textsuperscript{-1}every 6-8 hours is quite effective.

c) Diclofenac : This is more powerful anti-inflammatory drug than acetaminophen and ibuprofen. However, the incidence of nephrotoxicity and GI complications are also higher with this drug. It is available in tablet, syrup as well as suppository form. The oral dose is 1-1.5 mgkg\textsuperscript{-1} 12 hourly.

d) Ketorolac : Ketorolac is a very useful analgesic in children\textsuperscript{30} and it’s opioid sparing effect has been confirmed. Being a non-narcotic and with a duration of action for 4-6 hours, it is routinely prescribed even for children in empirical doses. Recently, IV route has also been declared safe in children. The IV or IM dose of ketorolac is 0.2-0.5 mgkg\textsuperscript{-1} every 6 hours for 48 hours. Maximum permitted total dose per day is 120 mg.

The commonly seen side effects with NSAID’s are increased chances of bleeding, thrombocytopenia, precipitation of asthma attacks, increase in heart rate,
retension of sodium and water, GI ulcerations, bleeding, hepatotoxicity, nephrotoxicity, nausea, vomiting, and dyspepsia etc.

**e) Ketamine** : Ketamine is in use routinely for almost 3 decades. The role of the N-methyl-D-aspartate receptor (NMDA) in the processing of nociceptive input has led naturally to a renewed clinical interest in the NMDA receptor antagonists such as ketamine. It can be administered alone or in conjunction with other agents via the oral, rectal, intramuscular, subcutaneous, intravenous and intraspinal routes. There are evidences about the efficacy of low dose ketamine (of less than 2 mg kg⁻¹ intramuscularly or less than 1 mg kg⁻¹ intravenous or epidurally) in the management of acute postoperative pain. It is been commented that a low dose ketamine may play an important role in postoperative pain management in the future but, some more study may be needed as regards the associated side effects.³¹

### II. Narcotic analgesics

Opioids are the mainstay in the management of post-operative pain and they provide increased tolerance to pain. In newborns, clearance is diminished and elimination half lives are prolonged as compared to the older children. Maturation gets completed by 3-6 months and infants become no more susceptible to respiratory depression.³² But close observation of the infants is still needed, as the titration to the clinical effects is hampered due to difficulty in the pain assessment and also sometimes the presence of high risk factors like cardio-respiratory and neurological abnormalities.

The use of opioids in infants less than two months must be with proper monitoring in the intensive care setting. The elimination half life and clearance of morphine in infants older than two months of age is similar to adults.

In infants from six months up to one year, injection morphine 0.1 mg kg⁻¹ I.M. or 0.05 mg kg⁻¹ I.V. may be used. Careful respiratory monitoring and facilities for resuscitation must be available because of the problem of respiratory depression.

In children 1-6 years, narcotics can be safely used. The intravenous route is the best for the postoperative analgesia as it provides immediate pain relief. Injection morphine 0.1 mg kg⁻¹ or pethidine 1 mg kg⁻¹ I.V. are the usual drugs.

Children more than six years can usually communicate well about the pain perception and can cooperate with the staff in pain management. So, in them, besides all the above techniques, a number of newer techniques can be used.

**a) Morphine** : Morphine still remains the standard opioid for pain relief in infants and children of all age groups. It is considered safest in a dose of 0.1 mg kg⁻¹ intramuscularly in a spontaneously breathing child.³³,³⁴ However, intramuscular injections are discouraged because they result in fluctuating plasma levels and cycles of pain, comfort and sedation.

**b) Codeine** : This drug is used mainly as a powerful antitussive, than analgesic. A single oral dose of 1 mg kg⁻¹ is good enough as both antitussive and analgesic. Respiratory depression is never seen after a single dose.

**c) Pethidine** : Pethidine is not very popular for post-operative pain management in children because practically it offers no advantages over morphine. Injection pethidine in a dose of 1.5-2 mg kg⁻¹ IM is a useful premedicant and in a dose of 1 mg kg⁻¹ I.V. is used for intraoperative and postoperative analgesia.

**d) Fentanyl** : Though fentanyl has been tried in doses of 1-2 mg kg⁻¹, it is not a popular systemic analgesic for conventional post-operative analgesia in children.

**e) Buprenorphine** : In a dose of 3-5 mg kg⁻¹ is a useful analgesic for intra-operative and post-operative analgesia. A tablet form for sublingual administration is suitable for use in older children who do not like injections.

**f) Pentazocine** : A partial agonist, can also be used in a dose of 1 mg kg⁻¹ IM or 0.5-0.75 mg kg⁻¹ I.V. When it is given I.V. in very small infants, careful respiratory monitoring is essential.

Common side effects encountered with opioids are nausea, vomiting, dyspepsia, constipation, urinary retension, respiratory depression, drowsiness, euphoria etc.

### Intravenous analgesia using opioids

Intravenous analgesia provides immediate relief of pain. After an intravenous bolus dose of 0.1 mg kg⁻¹ injection morphine, the child gets relief from pain for 1-3 hours. Intravenous analgesia can be given by two different ways as i) continuous intravenous infusion or ii) patient controlled analgesia (PCA).

**i. Continuous I. V. infusion**

This technique maintains the drug concentration above the therapeutic level so that it avoids the painful periods in between the empirical doses. It requires a careful monitoring of the patient for the therapeutic effects as well as possible complications, so as to titrate the appropriate dosage.

Usually, this can be achieved by an initial dose of 0.05 mg kg⁻¹ IV morphine, followed by an infusion of
0.015-0.025 mgkg⁻¹hr⁻¹ in children < 6 months and 0.025-0.030 mgkg⁻¹hr⁻¹ in older children. This provides a satisfactory analgesia without respiratory depression. If a child is already intubated and being ventilated, higher doses like 0.025 mgkg⁻¹hr⁻¹ can be given even in small babies. In the newborn the dose must not exceed 10 mgkg⁻¹hr⁻¹ as the neonates have a reduced clearance of morphine and increased sensitivity to toxic effects.

‘Apnea monitors’ and pulse oximeters should be used specially, if opioids are being used in infants < 6 months of age, or in children with acute or chronic respiratory dysfunction etc.

ii. Patient controlled analgesia (PCA)

This is another method to ensure a continuous pain relief. Patient-controlled analgesia (PCA) has been studied in the adult clinical setting since 1971. However, it was not until the late1980s that PCA was investigated for use in the paediatric population. 

PCA has been documented as decreasing children’s anxiety about painful intramuscular injections and improving their sense of control postoperatively. This is important because children may tolerate pain rather than request another analgesic injection.

An adequate preoperative preparation of the patient is needed for the use of PCA. Though expensive, still, there is a high degree of patient satisfaction as the patient himself participates in pain management. Following appropriate pre-operative teaching children > 6 years of age can learn to use a PCA pump. An anaesthesiologist states, ‘If a child can play video games, he or she can master the use of PCA’. To use PCA, the child must understand the relationships between a stimulus (pain), a response (pushing the button), and a delayed result (pain relief). It is important that the child understand the expectation of PCA is pain control, not elimination of pain. The children must be carefully screened for their cognitive and physical ability to manage their pain using PCA.

This can be used as either PCA infusion alone or PCA with basal infusion. PCA has been reported to result in lower pain scores, and better satisfaction than intramuscular morphine use, even though, the total morphine used, time to oral intake, incidence of nausea and vomiting or urinary retention is same. Total hourly dose of 0.05 - 0.1 mgkg⁻¹hr⁻¹ of morphine can be used. Giving a basal infusion of 1/3-1/4 of total hourly dose and PCA bolus as remaining hourly dose divided in equal doses at 6-15 minutes of lockout periods works well. A basal morphine infusion of 12-15 mgkg⁻¹hr⁻¹ has been successfully used without any side effects.

Problems and contraindications to paediatric PCA

Contraindications to children using PCA are specific physical or cognitive disabilities or conditions that may prevent safe and effective self administration. This may include the inability to activate the device to deliver the opioid dose or an inability to understand the process. The child must have the ability to comprehend PCA instructions and understand the concepts of “greater than” and “less than” to report pain scores.

Allowing someone other than the patient to activate the PCA button removes a PCA safety mechanism. If patient is the only person pushing the PCA button, and if he falls asleep the dosing will get interrupted. Even, Family Controlled Analgesia (FCA) and Nurse Controlled Analgesia (NCA) have caused oversedation and respiratory depression in some cases. FCA remains a controversial pain management technique.

A 1.7% incidence of respiratory depression was reported in children receiving parent controlled analgesia in combination with nurse controlled analgesia (NCA).

Adverse effects of PCA in the pediatric population

It is difficult to estimate the number of adverse events associated with PCA therapy in pediatrics. However, medication adverse events are grossly underreported, especially in pediatrics. Overall, pediatric patients are at high risk for adverse drug events because of several factors. These include the need for calculation of individualized doses based on age, body weight, BSA, and clinical condition, as well as the unique and rapidly changing pharmacokinetic parameters exhibited by infants and children at various ages and stages of maturational development. Additionally, there is a deficit of published information of Food and Drug Administration (FDA) approved labeling regarding the dosing, pharmacokinetics, efficacy, safety, and clinical use of drugs in the pediatric population.

Respiratory depression in pediatric patients receiving PCA therapy alone has been reported by one reviewer to range from 0 to 1.1%. To decrease such complications due to an inadvertent overdose secondary to supplemental opioid doses, an assessment of the patient’s use of the PCA before the additional dosing or dosing adjustments is necessary. Addition of an adjuvant agent, such as intravenous ketorolac, may improve analgesia without contributing to opioid adverse effects.

C. Regional techniques

Regional blocks are becoming increasingly popular in paediatric surgery. It is also known that supplementing
general anaesthetic with regional or nerve blocks, allows a smooth intra-operative course, decreased requirements for general anaesthesia drugs, decreased stress response, pain free awakening, and avoidance of potentially deleterious side effects that may occur with parenteral administration of narcotics during surgery and above all, an excellent post operative pain relief. If used for thoracic and upper abdominal surgery, regional anaesthesia improves pulmonary function also.

Sometimes, regional anaesthesia is given to a child even without a general anesthesia eg. older and co-operative child who requires emergency peripheral surgery after recent food ingestion, child with chronic airway disease like asthma, child with neuromuscular disease having compromised respiratory reserve and poor pharyngeal and laryngeal reflexes, and a child with family history of malignant hyperpyrexia.

Local anaesthetic drugs are used for regional blocks. One must be aware that in infants less than 2 months, less bupivacaine is bound to the plasma proteins because of low levels of albumin resulting in higher concentration of the free drug. Elimination half life is also prolonged. The myelination of nerves is incomplete in infants.

Various regional techniques which have been used in children are lumbar epidural, caudal epidural, intercostal, ilio inguinal and ilio hypogastric, 3 in 1 block, sciatic nerve block, fascia iliaca block, brachial plexus block, wrist block, penile block, infiltration block and topical analgesia.

Before a regional or nerve block is done, considerations must be given regarding NPO status, emergency airway accesses, intravenous access, standard monitoring of cardio-respiratory function and resuscitative measures like oxygen, suction, equipment for ventilation and intubation, and emergency drugs etc.

Epidural injection

Epidural injection can be done at thoracic, lumbar and caudal levels in children. Single shot caudal blocks are quite popular in the routine clinical practice in the children. The child almost always requires another method of pain relief after 3-4 hours in case of bupivacaine and 8-16 hours in case of morphine injection given caudally.

Sacral epidural (caudal) analgesia

This is the most popular and useful regional block in paediatrics. It is simple to perform and easily adaptable to day-care surgery. Common indications of caudal block are circumcision, hypospadias repair, cystoscopy, anal surgery and club foot repair. Inguinal surgery like hernia, hydrocoel ectomy and orchidopexy can also be performed under sacral epidural analgesia.

For the details of the technique please refer article on "Regional Anaesthesia in Paediatric Patients" (page no. 394-399) of this issue.

Undesired effects like numbness and motor weakness after an epidural injection can be often distressing for the child in the post-operative period. Epidural narcotics in this situation have a more promising role.

Epidural clonidine

Recently, clonidine has been discovered to enhance and prolong the analgesia produced by epidural blocks. A 3 mgkg⁻¹ of clonidine by lumbar epidural route and 5 mgkg⁻¹ by caudal route does not have significant haemodynamic or sedative effect. However, 5 mgkg⁻¹ by lumbar route have been found to cause significant hypotension and bradycardia.

Neuraxial opioids

Morphine, fentanyl and sufentanyl have been used in single bolus doses or by continuous infusions by the epidural route. Pain relief is obtained without any motor or sensory blockade. Neuraxial opioids should be avoided in all infants who are born premature. Moreover, the child should be subjected for monitoring by an apnoea monitor and oximetry under the supervision of a nurse or a doctor.

Caudal epidural morphine can be given in a dose of 0.03-0.05 mgkg⁻¹. Higher dosages like 0.1 mgkg⁻¹ has been reported to cause respiratory depression. Single dose lumbar epidural morphine has been used in doses of 0.05 mgkg⁻¹ for abdominal and lower extremity surgeries and in doses of 0.12-0.15 mgkg⁻¹ for thoracotomies in a volume of 0.05-0.56 mlkg⁻¹ segment. The analgesia lasts for 8-12 hours. For epidural infusion, a bolus of 0.03-0.05 mgkg⁻¹ is injected followed by an infusion of 0.004-0.006 mgkg⁻¹hr⁻¹.

The dose of epidural fentanyl is 0.5-1 mgkg⁻¹ single dose in a volume of 0.05 mlkg⁻¹ but the analgesia lasts for only 3-4 hours. Epidural sufentanil can be given in a single dose of 0.75 mgkg⁻¹ in the same volume as fentanyl but the duration of analgesia is only 2 hours.

The adverse effects due to epidural opioids are almost same like an opioid given by any other route, though they may not be that severe and commoner. Though rare, but the respiratory depression, following epidural opioids is the most serious complication. Nausea and pruritis are also commonly seen and can be taken care as suggested in (table 1).
Urinary retention can occur with both epidural local anaesthetics as well as epidural opioids

Table - 1 : Suggested therapies for adverse effects due to opioids

<table>
<thead>
<tr>
<th>Adverse effect</th>
<th>Treatment options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Depression</td>
<td>Stop opioid + Airway management</td>
</tr>
<tr>
<td></td>
<td>Naloxone – 0.5-1 mg/kg “dose” – as I.V. bolus</td>
</tr>
<tr>
<td></td>
<td>0.5-1 mg/kg ‘hr’ – as infusion</td>
</tr>
<tr>
<td>Sedation</td>
<td>Stop opioid</td>
</tr>
<tr>
<td></td>
<td>Stimulant medication like Methylphenidate</td>
</tr>
<tr>
<td>Dysphoria</td>
<td>Change opioid drug</td>
</tr>
<tr>
<td>Constipation</td>
<td>Stool softener like Cremaffin / enema</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>Promethazine 0.25 mg/kg up to 25 mg I.V./I.M.</td>
</tr>
<tr>
<td></td>
<td>Droperidol 0.01 mg/kg up to 0.625 mg</td>
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<tr>
<td></td>
<td>Ondensetron 0.1 mg/kg I.V. up to 4 mg</td>
</tr>
<tr>
<td>Pruritis / Itching</td>
<td>Diphenhydramine 0.05 mg/kg “dose” s.c.</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>Catheterisation, if needed</td>
</tr>
<tr>
<td></td>
<td>Bethanechol 0.05 mg/kg “dose” s.c.</td>
</tr>
</tbody>
</table>

Continuous intercostal block

This technique provides analgesia in fractured ribs and upper abdominal or thoracic surgery. This block has been shown to accelerate extubation and to improve the vital capacity postoperatively, and thereby to decrease pulmonary complications following thoracotomies.

The catheter is placed by the surgeon with the chest open, medial and superior to the posterior edge of the incision and dorsal to parietal pleura. The tip should be posterior-medial, a few centimeters lateral to spine. Lignocaine dose should be limited to 4-6 mg/kg, while, Bupivacaine should be limited to 0.3-0.4 mg/kg·hr⁻¹.

Nerve block of the penis

i) The dorsal nerve of penis block : This is performed by injections at 10.30 and 1.30 clock positions deep to the Buck’s fascia. 1-3 ml of 0.25% bupivacaine or 1% lignocaine is used on both sides of the midline for the block. It must be ensured that there is no intravascular injection and that the local anaesthetics do not contain epinephrine.

ii) Subcutaneous ring block : This involves subcutaneous infiltration of 0.25% bupivacaine outside Buck’s fascia

iii) Topical lignocaine : Lignocaine jelly has been used to provide analgesia after circumcision and has been used in the post discharge treatment of pain.

Infiltration block and topical analgesia

Subcutaneous infiltration of skin and the underlying tissues at the site of surgical incision is one of the easiest methods of making the patient reasonably pain free after surgery. Similar effect has been seen by simple instillation of the local anaesthetic in the open wound after inguinal hernia repair.55 However, topical application of lignocaine jelly applied on completion of surgery and EMLA cream56 have been found to be less effective than dorsal nerve block of penis for post circumcision analgesia.

Topical analgesia with lignocaine patch 5% or a topical local anaesthetic mixture EMLA (Eutectic Mixture of Local Anaesthetics),57 can penetrate the skin for 5 mm depth, when covered with an occlusive dressing and left undisturbed for 60-90 minutes. A routine perioperative use of topical, local or regional analgesia, alone or as a component of a multimodal approach with NSAID’s or acetaminophen is particularly useful.58

Ilio-Inguinal and ilio-hypogastric nerves block

For the details of the technique please refer article on “Regional Anaesthesia in Paediatric Patients” (page no. 394-399) of this issue.

Others

Important nerve blocks that can be given are 3-in-l block for fracture femur and femoral osteotomies, sciatic nerve block for lower limb analgesia, brachial plexus block and wrist block for upper limbs and para-umbilical or rectus sheath block for umbilical hernia repair (also repair of hernia of the linea alba).56,60

D. Non-pharmacological approaches

Various non-pharmacological approaches eg., psychological interventions like hypnosis, behavioral therapy, Acupuncture, Transcutaneous electrical nerve stimulation (TENS) have been described for post-operative analgesia. As all these techniques need a co-operation from the child, it’s usefulness is limited only in a select group of children. TENS have been seen to reduce postoperative narcotic requirement after thoracotomies.

Conclusion

It is now widely accepted that infants and children require appropriate method of pain relief in the post-operative period for a smoother and rapid outcome. But still there are lot of reservations and skepticism about the technique to be employed, with the result being that child suffers further pain because of inadequate or inappropriate therapeutic intervention. Relatively simpler nerve block techniques, along with analgesic drugs can be employed safely so as to relieve the post-operative pain. Newer modalities of pain management should be also considered whenever possible.

References