THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Requirement of 1st Oral Analgesic Dose after Tonsillectomy by Various Method

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Abstract:
Tonsillectomy is most common procedure in children, but very painful after the procedure. Pain is managed by various drugs by these drugs need of analgesic dose delays and also early discharge. Patients and relatives happy.

1. Introduction & History

Pain is a highly unpleasant sensory and emotional experience and postoperative pain control in children is a big challenge for their inability to express and react. In the past two decades, there has been a considerable progress in the understanding of children's perception of pain and responses to pain and various pharmacological agents and analgesic delivery to avoid under treatment of pain in children. A parallel noteworthy advancement has occurred in the knowledge of anatomy, physiology and pharmacology of regional anesthetic techniques. Some of these techniques are now an integral part of peri-operative and procedure- related pain management in all ages, in part because of a greater concern about postoperative pain management in patients and in part because of technical advances in equipment to perform the blocks.

Thus the present prospective comparative study is designed to evaluate the post operative analgesic efficacy of pre-incisional peritonsillar infiltration using tramadol, ketamine alone and combine with bupivacaine, xylocaine & normal saline.

2. Aims & Objectives

i. To Provide Post Tonsillectomy Analgesia to patients.
ii. To evaluate the post operative analgesic efficacy of pre incisional peritonsillar (PT) infiltration using various agents.
iii. To evaluate the effect of various agents infiltration on start of oral intake and discharge from the hospital after tonsillectomy.
iv. To investigate the possibility of any complication in relation to drugs infiltration into the peritonsillar Fossa.

3. Anatomy and Physiology

3.1. Embryology

Pharyngeal Grooves and Pouches and Their Derivatives. The lateral walls and floor of the cranial part of the early foregut become much altered by the development of the pharyngeal pouches in this region. These pouches first appear as grooves which extend ventrally across, or towards, the middle line. In their later development, however, they become greatly modified to give origin to a number of diverse structures. These include the tympanic (middle ear) cavity, the parathyroid glands, tonsils and the thymus.

3.1.1. Preoperative Assessment

Preoperative assessment in patients undergoing adenotonsillectomy is crucial and may reveal potential problems that may complicate either surgery or the patient's postoperative course. It is crucial to elicit the existence of any coagulation abnormalities. A family history of coagulation disorders or easy bruising may be a warning sign of an underlying bleeding disorder warranting further hematologic evaluation. Routine evaluation of coagulation studies before surgery in patients undergoing adenotonsillectomy is controversial.

Manning and others determined that evidence of coagulation disorders in patients with no clinical history of or examination consistent with a hematologic disorder was extremely low, thereby not justifying routine preoperative coagulation studies

3.1.2. Analgesia

Adequate analgesia is important in the immediate postoperative phase. Narcotics have a potent emetic effect and should be used with caution if at all. A single dose of narcotic may be administered in the recovery phase and codeine may be used in the early postoperative period, but subsequent to this, paracetamole is the drug of choice on the grounds of safety and efficacy. For some children this may not be adequate and a non-steroidal anti-inflammatory drug (NSAID) may be needed. There were concerns that the effect of these drugs on platelet adhesion might increase bleeding from the tonsil bed, but a recent meta-analysis found no such risk and a significant reduction in postoperative nausea and vomiting when compared with other analgesics notably narcotics. Aspirin should not be used in children because of the risk of Reye syndrome.

4. Indications and Contraindications

4.1. Indications

4.1.1. Absolute Indications

- Respiratory obstruction
- Huge hypertrophy causing difficulty in feeding
- Sleep apnea syndrome

4.1.2. Relative Indication

- Peritonsillar abscess
- Chronic tonsillitis
  - failure of medical treatment to reduce the size
  - more than 3-4 acute episodes in per year
  - Acting aseptic focus for rheumatic heart disease, glomerulonephritis, arthritis etc.
- Primary tuberculosis of the tonsil
- Diphtheria carrier
- Tumor of tonsils
- Tonsillar cyst, tonsillolith, embedded FB in tonsils etc.

4.1.3. Surgical Approaches

- Elongated styloid process
- Glossopharyngeal neurectomy
- As a part of Uvulo- palato- pharyngo- plasty (UPPP)

4.2. Contraindications

Active infection/Acute exacerbation, Aneurysm of internal carotid artery, age below 3 years, Active menstruation
Bleeding/Clotting disorders
Cervical spine pathology
Diphtheritic tonsillitis,
Drugs-aspirin, oral contraceptives etc
Endemic of polio
Failure to control systemic diseases like hypertension, diabetes, bronchial asthma, LRTI etc.

5. Material & Methods

After approval of the study protocol by the local Ethical Committee and obtaining fully informed written consents, 60 patients assigned for tonsillectomy enrolled in the study of age group 5 to 35 yr. The study conducted at Department of Otorhinolaryngology, MBS Hospital Kota Rajasthan from Dec. 2010 to Oct. 2012. Patients with history of bleeding diathesis allergy to study drugs, or tonsillar abscesses excluded from the study.

Patients randomly divided into 6 equal study groups (n=10); Group I (Negative control group) included patients assigned to receive PT saline infiltration as placebo, Group II (Positive control group) included patients assigned to receive xylocaine (1 %) PT infiltration. Group III included patients assigned to receive tramadol (2mg/kg) PT infiltration, Group IV included patients assigned to receive ketamine (0.5mg/Kg) PT infiltration, Group V received combination of Bupivacaine (5mg/ml) with Tramadol (2mg/kg), Group VI received Bupivacaine (5mg/ml) with Ketamine (0.5mg/Kg). All medications prepared as 2ml in volume and injected as 1ml per tonsil 3 min. prior to incision (pre-incisional).

All study patients premedicated with midazolan intravenously before the procedure and received nalbufine i.v. immediately after induction of general anesthesia.

6. Operative Techniques

Tonsillectomy operation performed by dissection method. Before making incision, infiltration of tonsillar bed through ant. Pillar with various analgesic agents likes xylocaine, Ketamine. Tramadol & Placebo (Normal Saline), bupivacaine with tramadol/ketamine as their combination (regimen).

7. Review of Literature

Tonsillectomies are done since 3000 years ago in india & also done now a days,now a days surgons are concentrated on the postoprative analgesia after tonsillectomy because after tonsillectomy patients suffer from pain,decrease in oral feeding also in psychological & financial burdon

Alhamarneh(2008) et al[(2)] reported that a significantly greater than normal secondary haemorrhage rate was noted in patients who had undergone tonsillectomy & experienced postoperative pain & concluded that adequate analgesics, for first week posttonsillectomy,is essential in order to keep the secondary haemorrhage rate within an acceptable range

Smith et al(2009) [(3)] reported that after tonsillectomy in children, postoperative pain management is essential yet often challenging task, In addition to discomfort, lack of pain management can leads to delays in oral intake of patients, resulting in external stays & increased costs.

Costas-gastiaburo (1998) et al [(4)] found peritonsillar infiltration decrease intraoprative bleeding & pain independent of the type of solution infiltrated

Dr.Akbar Pizadeh,Mo-Ali.Mohammadi,Sooreh Allaf-Akbari,Masood Entezarias (10)-The Effect Of Ketamine On Post-tonsillectomy Pain in Children:A Clinical Trial; Iranian Journal of Otolaryngology No.1,Vol.24,Serial No.66,winter 2012.

Moller (2010) et al(11) showed that postoperative pain in the preoperative peritonsillar injection with bupivacaine was less compared with the control (placebo) group injected with no .In a large scale study on 1026 patients, pain levels in the ketamine group were shown to be lower than in the control group and patient satisfaction to be more.

8. Drugs

8.1. Lignocaine (Lidocaine)

This is a intermediate potency & duration agent of local anaesthetics(LAs),it is a amide linked LAs.introduced in 1948, currently most widly used,injected around a nerve it blocks conduction within 3 min.it is used for surface application, infitration, nerveblock, epidural, spinal, i.v.(intravenous)and regional block anaesthesia. Cross sensitivity with ester LAs is not seen.early central effect of lignocaine are drowsiness,mental clouding,altered taste & tinnitus.overdoses causes muscle twitching,convulsion,cardiac arrythmias,fall in BP,coma,respiratory arrest lignocaine is popular antiarrythmic

8.1.1. Features of Amide Las (Compared to Ester LAs)-

-produce more intense & longer lasting anaesthesia
-bind to α1 acid glycoprotein in plasma
-not hydrolysed by plasma esterase
-Rarely cause hypersensitivity reaction; no cross sensitivity with ester LAs

8.1.2. Mechanism of Action

-The LAs block nerve condution by decreasing the entry of Na+ ions during upstroke of action potential (AP) as the concentration of LAs is increased, the rate of rise of AP & maximum depolarization decreases causing slowing of conduction. Finally, local depolarization fails to reach the threshold potential & conduction block ensues.

8.1.3. Local Action

The clinically used LAs have no/minimal local irritant action & block sensory nerve endings, nerve trunks, neuromuscular junction, ganglionic synapse & non selective receptors, i.e. structures which function through increased Na+ permeability. They also reduce release of acetylcholine from motor nerve endings. Injected around a mixed nerve they cause anaesthesia of skin & paralysis of voluntary muscle supplied by that nerve.

8.1.4. Addition of a Vasoconstrictor,eg Adrenaline(1:50000 to 1:200000)

1. Prolongs duration of action of LAs
2. Reduce systemic toxicity of LAs
3. Provides a more bloodless field for surgery
4. May raise BP
5. Makes the injection more painful

8.1.5. Systemic Action

Any LAs injected or applied locally is ultimately absorbed & can produce systemic effects depending on concentration attained in the plasma & tissuses

C.N.S. - all LAs are capable of producing a sequence of stimulation followed by depression. Lignocaine on the contrary, usually causes drowsiness & lethargy, but higher doses produce excitation followed by depression
C.V.S.-little effect on contractility & conductivity, it abbreviates effective refractive period (ERP) &is used as an antiarrhythmic

8.1.6. Pharmacokinetics
Surface soluble anesthetics' are rapidly absorbed from mucous membrane & abraded areas, but absorption from intact skin is poor lignocaine is degraded only in liver microsomes by dealkylation & hydrolysis

8.1.7. Adverse Effects
Systemic toxicity on rapid i.v. injection is related to the intrinsic anesthetic potency of the LA. Toxicity after topical application or regional injection is influenced by relative rates of absorption & metabolism.
1.-CNS effects are light headedness, dizziness, auditory & visual disturbance, mental confusion, disorientation, shivering, twitching, tremors, finally convulsion & respiratory arrest.
2.-CVS toxicity of LAs is manifested as bradycardia, hypotension, cardiac arrhythmias & vascular collapse.
3. - injection of LAs may be painful, but local tissue toxicity of LAs is low
4. Hypersensitivity reactions like rashes, angioedma, dermatitis, asthma, & rarely anaphylaxis occurs. Common with ester group rare with lignocaine.

8.2. Bupivacaine
Bupivacaine Hydrochloride is a white, odorless crystalline powder or colourless. Crystals. It is freely soluble in water; freely soluble in alcohol; slightly soluble in acetone and in chloroform. A 1% solution in water has a PH of 4.5 to 6.0 and should be protected from light. A potent & long acting amide LA: used for infiltration, nerve block, epidural & spinal anaesthesia of long duration. It has high lipid solubility; distribute more in tissue than in blood after spinal/epidural injection. Bupivacaine appears to be more cardiotoxic than other local anesthetics. Cardiac arrest due to bupivacaine can be resistant to electrical defibrillation and a successful outcome may require prolonged resuscitative efforts. It is more prone to prolong QTc interval & induce ventricular tachycardia or depression – should not be used for intravenous regional analgesia.
Local nerve blockade by bupivacaine Wong AK (1995) reduces short & long term pain in children undergoing tonsillectomy & adenoidectomy in the presence of general anesthesia.

8.3. Ketamine
It is pharmacologically related to hallucinogen phencyclidine; induces-profound analgesia, immobility, amnesia with light sleep & feeling of dissociation from one's own body & surroundings so called "*DISSOCIATIVE ANAESTHESIA*" the primary action is cortex & sub cortical areas; heart rate, cardiac output & BP are elevated due to sympathetic stimulation. A dose of 1-3(average 1.5) mg/kg i.v. or 6.5-13(average 10) mg/kg i.m. produces the above effect within a min, recovery starts after 10-15 min, and patient remains amnesic for 1-2 hrs., emergence delirium, hallucination, & involuntary movements occur in up to 50%pts., but inj. Is not painful, children tolerate drug better. Its elimination t1/2 is 3-4 hrs. Ketamine also recommended for operation on the head & neck, in those who do not want to lose consciousness & for short operation. It may be dangerous for hypertensive & ischemic heart disease, but good for hypovolemic pts.
Ketamine al Yu M (2007) et al suppressed injury induced tumor necrosis factor (TNF)-α and IL-6prodution & nuclear factor –kappa-B activator.

8.4. Tramadol
It is centrally acting analgesic relieves pain by opioids as well as additional mechanism .its affinity for μ opioids receptor is modest while that for kappa & delta is weak, it inhibit reuptake of NA & 5-HT,& thus activates monoaminergic spinal inhibition of pain. Its analgesic action is only partially reversed by opioids antagonist naloxone. Injected i.v.100 mg tramadol is equanalgesic to 10 mg morphine; oral bioavailability is good (oral: parenteral dose ratio1.2) the t1/2 is 3-5 hrs & effect last 4-6 hrs. Tramadol causes less respiratory depression, sedation, constipation, urinary retention, & rise in inhibitory pressure than morphine it is well tolerated, side effect are dizziness, nausea, sleepiness, dry mouth, & sweating. Safer in compromised cardiovascular function, it is indicated for medium intensity short lasting pain due to diagnostic procedure, injury, surgery as well as chronic pain in cancer, but not effective in severe pain.
Tramadol (Ugur MB(2008) to prevent pain in children undergoing tonsillectomy & found peritonsillar infiltration with tramadol provided good intra-operative analgesic, less post operative pain on awaking &lower analgesics requirements after surgery with no significant difference between both routes of administration for any of these parameters

8.5. Bupivacaine and Ketamine
Bupivacaine (5 mg/kg) & ketamine (0.5 mg/kg), both combination decrease pain & prolong the duration of analgesia without increasing side effects
BUPIVACAINE AND TRAMADOL
Bupivacaine (5 mg/ml) & tramadol (2 mg/kg),

*bupivacaine plus ketamine, bupivacaine plus tramadol Choudhuri AH (2008) for post operative pain management in children having surgery for inguinal hernia & reported that caudally administered 0.5ml\kg bupivacaine 0.25% plus tramadol 1 mg\kg provided significantly longer duration of analgesia without an increase in the adverse effects when compared to bupivacaine alone
All medication prepared as 2 ml in volume & was injected as 1 ml per tonsil 3 min. prior incision.

9. Observation and Results

Patients randomly divided into 6 equal study groups (n=10); Group 1 (Negative control group) included patients assigned to receive PT saline infiltration as placebo; Group 2 (Positive control group) included patients assigned to receive xylocaine (1%) PT infiltration. Group 3 included patients assigned to receive tramadol (2mg/kg) PT infiltration, Group 4 included patients assigned to receive ketamine (0.5mg/Kg) PT infiltration, Group 5 received combination of Bupivacaine (5mg/ml) with Tramadol (2mg/kg), Group 6 received Bupivacaine (5mg/ml) with Ketamine (0.5mg/Kg)
Gp1-normal saline
Gp2-xylocaine (1%)
Gp3-tramadol (2mg/kg)
Gp4-ketamine (0.5mg/kg)
Gp5-bupivacaine (5mg/ml) with tramadol
Gp6-bupivacaine with ketamine
Requirement of 1st oral analgesic dose post-operatively(hrs.)

1ST dose	Hrs.	Mean
Gp 1	6,5,7,4,5,4,6,5,6,4	5.2
Gp 2	11,13,12,11,12,13,13,12,11,14	12.2
Gp 3	15,16,15,16,15,16,16,15,13,16	15.3
Gp 4	17,16,15,17,16,18,17,18,17,17	16.8
Gp 5	22,19,22,18,20,21,18,22,19,19	20
Gp 6	24,23,23,24,21,21,21,22,21,20	22

Table 1

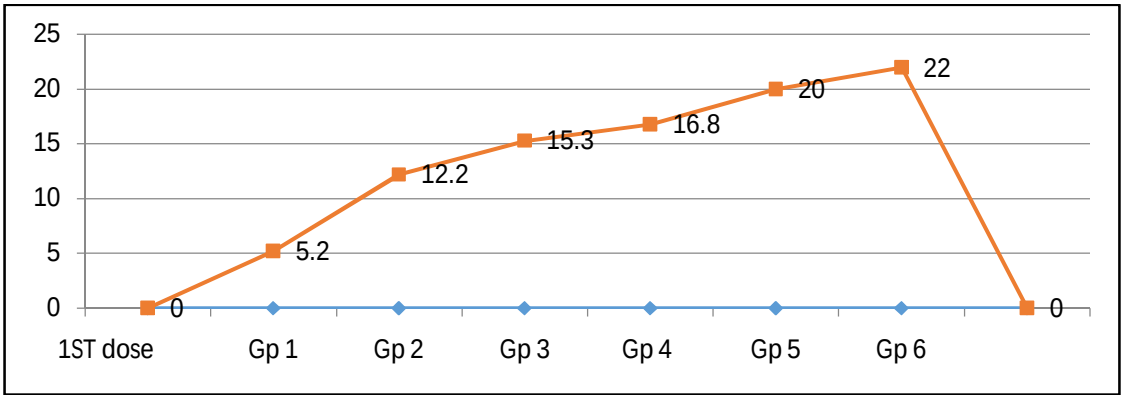

Figure 1

10. Discussion

We have divided patients in six groups according to drugs which were injected to patients preoperatively in tonsillar fossa.
According to Table shows distribution of patients according to requirement of 1st analgesic dose after tonsillectomy. This depends on efficacy of analgesic dose. Patients asked 1st analgesic dose after surgery in gp1 (normal saline) 5.2 hours, in gp2 (xylocaine) is 12.2 hours, in gp3 (tramadol) 15.3 hours, in gp4 (ketamine) 16.8 hours, in gp5 (bupivacaine and tramadol) 20 hours and in gp6 (bupivacaine and ketamine) 22 hours. The analgesic efficacy of combination of drugs in gp5 gp6 is very good. Therefore requirement of 1st analgesic dose was very late, in control group the analgesic dose require very early.
The difference between all groups was statistically significant (P<0.05).
Our study references are similar to the study of Ehab Saaid MD in Ain shams Journal of Anesthesiology in vol.2.2 July 2009 and from the Journal of International medical research 2005; 33:188-195.
According to Ehab Saaid 2009 all patients enrolled in the control groups (gp1) requested for rescue analgesia and 14 patients (46.7%) requested it twice. However, 9 patients (30%) in positive control group (gp2) did not request for rescue analgesia till discharge.18 patients (60%) requested it once and 3(10%) requested it once. No patient in study drugs groups (gp3-6) requested rescue analgesia twice and 68(56.7%) patients; 16, 13, 21 and 18 respectively, did not requested it till discharge and 52 patients (43.3%) requested it once .In total, 77 patients received PT infiltration did not asked for rescue analgesia till discharge and 86 patients received it once with significant difference compared to patients who have received placebo.

Patients receiving PT drug infiltration had significantly longer duration of PO analgesia compared to those who received placebo infiltration. However, patients enrolled in group2 (xylocaine) had significantly shorter duration of PO analgesia compared to gp3 (tramadol), 4 (ketamine) and 6 (bupivacaine and ketamine), but non- significantly shorter compared to gp5 (bupivacaine and tramadol).There was a no-significant difference between duration of PO analgesia reported in gp3 compared to gps4-6; however infiltration of tramadol/bupivacaine produced significantly longer duration compared to ketamine groups, either alone or in combination.

11. Conclusion

- Preincisional infiltrations of various agents are effective method to reduce post-tonsillectomy pain. This method also effective for earlier start of oral feeding and discharge from the hospital
- We recommend the routine use of pre incisional peritonsillar infiltration of various agents in all tonsillectomy cases, irrespective of the age of the patient to reduce the post-tonsillectomy pain and other morbidities

12. Summary

This is prospective, randomized, single blind controlled clinical trial to assess the effect of preincisional peritonsillar infiltration of various agents on pain after tonsillectomy, which was performed on Dec.2010 till Oct.2012 in the department of ENT, Govt. Medical College, Kota.

A volunteer sample of 60 patients, aged 5 to 35 yrs with history of recurrent or chronic tonsillitis was included in this study and planned for tonsillectomy with or without adenoidectomy

Patients were divided into 6 equal study groups (n=10); Group I (Negative control group) included patients assigned to receive PT saline infiltration as placebo; Group II (Positive control group) included patients assigned to receive xylocaine PT infiltration. Group III include patients assigned to receive tramadol (2mg/kg) PT infiltration, Group IV included patients assigned to receive ketamine (0.5mg/Kg) PT infiltration, Group V received combination of Bupivacaine (5mg/ml) with Tramadol (2mg/kg), and Group VI received Bupivacaine (5mg/ml) with Ketamine (0.5mg/Kg).

All medications prepared as 2ml in volume and injected as 1ml per tonsil 3 min prior to incision (pre-incisional).

Postoperative pain was assessed using OPS and ALDRETE score for severity of pain at different time after the surgery. The time of oral intake start and total admission days after the surgery also were noted.

Comparision of various agents for pain, oral intake and postoperative admission days were noted.

No complication of preincisional peritonsillar infiltration of various agents was seen in this study.

13. Acknowledgement

Achieving a milestone for any person alone is extremely difficult. However, there are motivators which come across the curvaceous path like twinkling stars in the sky and make our task much easier. It becomes my humble and foremost duty to acknowledge all of them.

No words would be sufficient to express my gratitude to my Wife Deepti Meena and son saket karol for sharing the journey of development of this project with me, for her deepest love, for understanding my feelings, for always being on my side intense moments, for believing in me and for giving me expert feedback and advice.

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