THE EFFICACY OF PRE-INCISIONAL PERITONSILLAR INFILTRATION OF KETAMINE FOR POST-TONSILLECTOMY ANALGESIA IN CHILDREN.

Thesis presented for partial fulfillment of Master degree in anaesthesiology

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Maged Abde-Wahab Abdel-Aziz

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ASA: American society of Anasthesiologists

CBF: Cerebral Blood flow

CHEOPS: Children's Hospital Eastern Ontario Pain Scale.

CNS: Central Nervous System.

ECG: electrocardiography

ETCO2: endtidal CO2

GA: general anesthesia

GABA: Glycine and γ-amino butyric acid

HQRL: Health related quality of life

ICP: intracranial pressure

IM:intramusclar

IV: intravenous

NMDA:N-methyl D-aspartate

NO:nitric oxide

NSAID:non-steroidal anti inflammatory drugs

p value: probability value

pKa: dissociation constant

PONV: post operatine nausea and vomiting

SD: standard deviation

SpO2: oxygen saturation

WDR:wide dynamic range

α: Alpha

β: beta

δ : delta

Abstract

Background:

Pain control after tonsillectomy in children always remain a challenge for anaesthesiologists, especially for those who are at higher risk of airway obstruction and respiratory depression.

Objectives:

To asses the effect of pre-incisional peritonsillar infiltration of ketamine(0.25mg/kg) on postoperative pain in children undergoing tonsillectomy

Methodology:

This is a double blinded contolled prospective randomized study designed to asses the effect of pre-incisional peritonsillar infiltration of ketamine(0.25mg/kg) on postoperative pain relief compared with peritonsillar saline and adverse effects related to ketamine infiltration in children undergoing tonsillectomy in order to determine the optimal procedure for pain control and reduction of analgesic use post surgery

Fourty patients , aged 4–16 years undergoing adenotonsillectomy under GA were allocated into 2 groups:

- 1st group **(group A; n20)** received preincisional peritonsillar infiltration of Ketamine(0.25mg/kg)..
- 2nd group **(group B; n20)** received preincisional peritonsillar infiltration saline as acontrol group

Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) &Wilson sedation scale used to evaluate pain & sedation respectively postoperatively

Results:

Mean duration of analgesia was significantly higher (15.7±7.95 hours) and pain score was significantly lower at 30 minutes, 60 minutes and 2 hours in groupA (ketamine group) compared to group-B(control group) (p value ≤ 0.05),All patients were fully awake within 30 min, there was no VIIignificant statistical differences as regard nausea and vomting ,but the percentage of dysphagia is significantly higher in group B(control group) than groupA (ketamine)

Conclusion:

We found that preincisional peritonsillar infiltration of low dose of Ketamine (0.25mg/kg) is efficient for postoperative analgesia during 24 hours posoperatively ,decrease need for rescue analgesics , has a good effect on dysphagia postoperatively and doesn't produce hallucinations in children undergoing tonsillectomy.

Keyword: CHEOPS- ECG- GABA- NMDA- SpO2

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Introduction

Postoperative pain management after the surgeries with a suitable analgesic is an important issue for patients especially in pediatrics, Although age specific pain evaluation tools are available, postoperative pain is still undertreated in children[1]

Postoperative pain has not only a pathophysiologic impact but also affects the quality of patients' lives. Improved pain management might therefore speed up recovery and reha bilitation and consequently decrease the time of hospitalization [2].

Where surgery causes tissue damage and subsequent release of biochemical agents such as prostaglandins and histamine. These agents can then stimulate nociceptors, which will send the pain message to the central nervous system to generate the sensation of pain[3,4,5]

Morever neuroendocrine responses to pain can also cause hypercoagulation state and immune suppression, leading to hypoglycemia, which can delay wound healing [2].

Thus the control of the pain of the surgery is very important either during the surgery (intraoperative) and after it (postoperative)where it is called preventive analgesia, which results in accelerated recovery and improvement in the Health-Related Quality of Life (HRQL)[6]

Tonsillectomy is one of the painful operations, which is common in children that requires a potent analgesic drug to prevent this pain and complication related to it as nausea ,vomiting and dyphagia to solids and liquids.[7]

Duration and severity of pain depend on the surgical technique, antibiotic and corticosteroid use, preemptive and postoperative pain management, and patient's perception of pain. [8,9,10]

There is an ongoing question to find the most effective and safe modality of pain relief following tonsillectomy. In order to find the elusive ideal pain relief therapy, various combinations have been tried as an adjunct to general anaesthesia. These include acupuncture[11], antibiotics[12], local anaesthetics[13], NSAIDs[14], opioids[15], speech therapy[16] and steroids[17] , as well as peritonsillar injecton of local anesthetic, opioid [18] BUT none have been singularly effectiive nor has any specific combination therapy been accepted universally.

There are number of studies in which pre-incisional peritonsillar saline infiltration were used as placebo group to establish the effectiveness of peritonsillar infiltrations of other medications as tramadol [19] and bupivacaine[20] in children undergoing tonsillectomy.

Opioids including morphine are sometimes used and have high efficacy to suppress post-tonsillectomy pain, but the important side effects, especially respiratory depression, have limited use of them.[21]

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), including diclofenac, are also used as preventive analgesia, but they increase the risk of site-bleeding after tonsillectomy.[22]

Ketamine is an anesthetic from phencyclidin family, which because of its antagonist effects on N methyl-D-aspartate receptors (that are involved in central pain sensitization) has regulatory influence on central sensitization and opium resistance. It can also band with mu receptors in the spinal cord and brain and cause analgesia[23],Ketamine can be utilized intravenously, intra- muscularly, epidurally, rectally, nasaly and localy infiltrated[24]

Because ketamine is an NMDA receptor antagonist, it is hypothesized to prevent or reverse central sensitization and consequently reduce postoperative pain,The local anaesthetic effects are likely from the blocking action on sodium channels [25]

Dal and Elven showed that low dose ketamine (0.5 mg.kg-1) given I.V. or peritonsillar infiltration perioperatively provides efficient pain relief without significant side effects in children undergoing adenotonsillectomy[26]

Honarmand and Reza studied the effect of peritonsillar infiltration of ketamine in 2 doses (0.5 and 1 mg/kg) versus placebo effect.[27]

This study was conducted to confirm the effectiveness of pre-incisional peritonsillar infiltration of ketamine on postoperative pain relief and asses the effectiveness of lower dose of peritonsillar ketamine (0.25mg/kg) than other studies comparing it with peritonsillar saline and observing adverse effects related to ketamine infiltration in children undergoing tosillectomy.

Aim of work

This is a double blinded contolled prospective randomized study designed to asses the effect of pre-incisional peritonsillar infiltration of ketamine(0.25mg/kg) on postoperative pain relief compared with peritonsillar saline and adverse effects related to ketamine infiltration in children undergoing tonsillectomy in order to determine the optimal procedure for pain control and reduction of analgesic use postoperatively.

Anatomy of oral cavity and tonsillar bed.

The mouth:

The mouth is made up of the vestibule and the mouth cavity, the former communicating with the latter through the aperture of the mouth.

1.the vestibule is formed by the lips and cheeks without and by the gums and teeth within. An important feature is the opening of the parotid duct on a small papilla opposite the 2nd upper molar tooth.

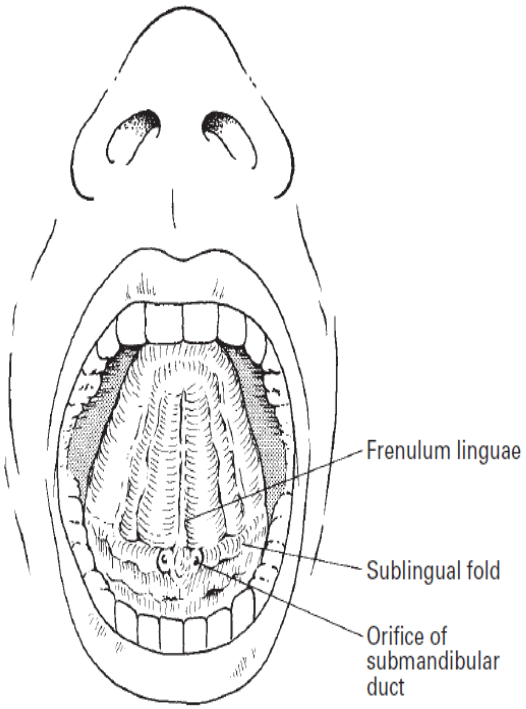
Normally the walls of the vestibule are kept together by the tone of the facial muscles; a characteristic feature of a facial (VII) nerve paralysis is that the cheek falls away from the teeth and gums,enabling food and drink to collect in, and dribble out of, the now patulousvestibule.[28]

2.The mouth cavity ***(Figure- 1)*** is bounded by the alveolar arch of the maxilla and the mandible, and teeth in front, the hard and soft palate above, the anterior two-thirds of the tongue and the reflection of its mucosa forward onto themandible below, and the oropharyngeal isthmus behind.[28]

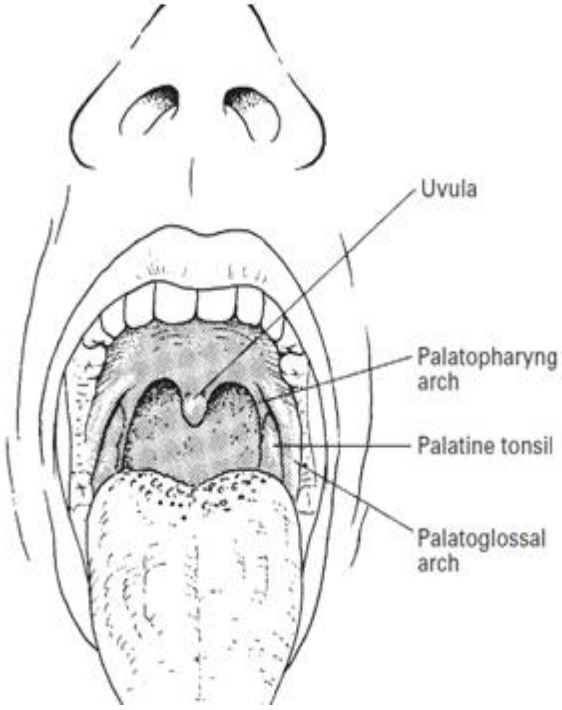
The mucosa of the floor of the mouth between the tongue and mandible bears the median frenulum linguae, on either side of which are the orifices of the submandibular salivary glands **(Figure-2).** Backwards

and outwards from these ducts extend the sublingual folds that cover the sublingual glands on each side.[29]

The majority of the ducts of these glands open as a series of tiny orifices along the overlying fold, but some drain into the duct of the submandibular gland(Wharton's duct).



Figur-1: View of the open mouth with with the tongue elevated.[28]



Fiure- 2 :View of the open mouth with the tongue depressed.[28]

The oropharynx:

The mouth cavity leads into the oropharynx through the oropharyngeal isthmus,which is bounded by the palatoglossal arches, the