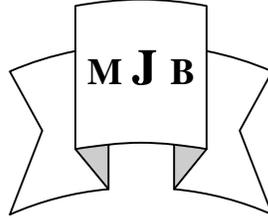


Use of Dexamethasone to Minimize the Morbidity of Tonsillectomy

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Abstract

Objective: To determine the effects of a single dose of dexamethasone on post-operative morbidity in patients undergoing tonsillectomy and/or adeno-tonsillectomy.

Design: prospective, double-blinded, placebo-controlled clinical trail.

Methods: In a period between February 2007 to January 2010 one hundred sixty patients (94 male and 66 female), aged between 4 and 42 years, undergoing tonsillectomy and/or adenoidectomy were randomized to receive a single dose of intravenous dexamethasone 0.4 mg/kg or 8 mg for adult or placebo saline single dose postoperatively and were assessed for post operative pain, nausea and vomiting, tolerance to oral intake, uvular edema, fever and the time of discharge from hospital.

Result: The use of inject able dexamethasone in a dose Of 0.4 mg per kg body weight for children or 8 mg for adult was effective in reducing post operative undesirable symptoms like pain, nausea, vomiting, edema , inadequate oral intake and fever.

الخلاصة

الهدف: دراسة تأثير دواء الدكساميثازون على الأعراض غير المرغوب فيها التي تصاحب عملية رفع اللوزتين مع او بدون رفع الالدينويد.

طرائق البحث: للفترة من كانون الثاني 2007 وحتى شباط 2010 مائة وستون مريضاً (64 ذكراً و 66 أنثى) تتراوح أعمارهم بين الأربع سنوات والاثنتان والأربعون سنة أجريت لهم عملية رفع اللوزتين مع او بدون رفع الالدينويدتم إعطائهم عقار الكساميثازون بجرعة 8 ملغم للبالغين او 0.4 لكل كغم للأطفال او جرعة وهمية هي عبارة عن 5 مل من النورمال سلاين وتم تسجيل الأعراض غير المرغوب فيها كالآلم والغثيان والقيء و الالوديميا وتأخر بدأ التغذية الفموية والحمى.

النتائج: إن إعطاء عقار الدكساميثازون و بالجرع المبيبة له أهمية في تخفيض الأعراض غير المرغوب فيها والتي عادة ماتصاحب عملية رفع اللوزتين مثل فيها الألم والغثيان والقيء و الالوديميا وتأخر بدأ التغذية الفموية والحمى.

Introduction

Tonsillectomy is one of the most frequently performed surgical procedures in all over the world. In 1998, the rate varied from 19 per 10 000 children in Canada to 118 per 10 000 in Northern Ireland. In the United States, about 186 000 procedures are performed on an outpatient basis every year [1]. Tonsillectomy is defined as the complete removal of the tonsil from its

capsule and is derived from the Latin word tonsilla, which means a stake to which boats are tied, and the Greek word ektome which means excision. Aulus Cornelius Celsus, a first century A.D. Roman writer and physician gives the earliest account of the removal of the tonsil using a finger and suggested the use of a knife in situation where the finger proved ineffective. He wrote:

“...[tonsils] should be loosened by scraping around them and then torn out.

When this is not possible, they should be picked up with a little hook and excised with a scalpel....” Following this description the methods for tonsillectomy eventually evolved from the use of specialized knives, wires, strings, tonsillotomes and guillotines of the past to the present day techniques[2] Despite the evolution of anesthetic and surgical techniques available, post-tonsillectomy morbidity remains a significant clinical problem not only for the patient, but the family and physician as well. Pain is an important morbidity of this procedure, and the current methods to relieve pain are limited by side effects and outpatient care. Close to 40% of patients needed to visit their primary care physician or a general physician following surgery due to insufficient analgesia. A study from the Royal College of Surgeons of England demonstrated that pain was poorly controlled in 46% of patients following tonsillectomy[2]. A study in 1997 found that postoperative pain was more troublesome for the non-pediatric age group. An NHS Acute Inpatient Survey submitted by the Picker Institute in May 2003 unveiled that postoperative pain control is often inadequate with almost two-thirds of patients reporting moderate to severe pain which was not, in the opinions of 27% of patients, adequately managed. In addition to pain, nausea, vomiting and inadequate oral intake and fever are common morbidities encountered after tonsillectomy.

The incidence of vomiting after tonsillectomy with or without adenoidectomy has a reported range between 40-70%. The delay in postoperative oral fluid and solid intake as a result of nausea, vomiting, or pain

prolongs the time until discharge and also increases dehydration risks in early and late postoperative periods.

Corticosteroids as a Method to Reduce Post - tonsillectomy Morbidity

Methods for reducing pain, nausea, and vomiting after tonsillectomy are important to improve the standard of care our patients receive. During the past 35 yrs, investigators have studied the effects of systemic corticosteroids in reducing post-tonsillectomy morbidity. Unfortunately, there is no agreement regarding the routine use of corticosteroids in tonsillectomy.[2]

Dexamethasone as an antiemetic:

The mechanism of action of dexamethasone as an antiemetic remains unknown. Some postulate that dexamethasone exerts effects either outside the blood-brain barrier (area postrema of the brainstem) or inside the blood-brain barrier (vomiting center). In spite of the fact that the mechanism is not understood, an antiemetic benefit of corticosteroids is supported by the literature and widely accepted[3].

Dexamethasone as an anti-inflammatory:

In conjunction with antiemetic effects, dexamethasone may reduce inflammation at the operative site, subsequently reducing the release of inflammatory mediators into the circulation. This could also lead to less stimulation of the vomiting center mentioned previously.

Dexamethasone causes inhibition of the inflammatory response blocking factors like bradykinin, prostaglandin, and leukotrienes which results in a decreased level of inflammation and reduction of the accompanying signs and symptoms including pain[3]

Single injection of steroid will reduce post operative morbidity and relative

low cost and safety [4]

Materials and Methods

In this prospective, double-blinded, placebo-controlled clinical trial one hundred sixty patients, ninety-four were male and sixty-six were female, aged 4-42 years, who underwent tonsillectomy with or without adenoidectomy were randomly assigned to receive single dose of 0.4 mg/kg or 8 mg for adult intravenous dexamethasone postoperatively. observing of any need for analgesic, any oedema, fever, tolerating 400 ml of clear fluids milk juice, and the discharge time all these possible unwanted post-tonsillectomy events was recorded. All patients had no contraindication for use of steroid like hypertension or diabetes mellitus Exclusion criteria were patients with coagulopathy, diabetes, gastritis, peptic ulcer, hypertension and cardiovascular or renal disease or on therapy with corticosteroids, oral contraceptive, antiemetics, or aspirin. All were subjected to preoperative evaluation for any bleeding disorder or anemia or recent upper respiratory tract or chest infection. 87 of them were underwent adenoidectomy as well, (33 were male and 34 were female) all these patients fulfilled the routine pre-operative protocol for tonsillectomy/adenotonsillectomy including history, ENT examination, and laboratory work-up such as packed cell volume, prothrombin time and activated partial thromboplastin time, chest x ray, and lateral x ray of post nasal space for those that suspect to have adenoid hypertrophy.

The anesthetic protocol was standardized and did not include any other prophylactic steroid or antiemetic drug. All patients underwent normal oro-tracheal intubation. The surgical

technique was standardized for all patients by using the dissection method and, Hemostasis was achieved by using packs, bleeders were legated using ties with one zero silk sutures, electrocautery was used only to treat persistently active bleeding sites.. When indicated, adenoids were removed using Beckmann adenoid curette (87 patients) antibiotic was used, Amoxicillin intravenously or Claforan for those whom having allergy to penicillin. Analgesia, antiemetic was not given routinely unless the patient needed and those are included in study and monitored.

All patients were monitored in the hospital for at least 24 hrs and the stay may be prolonged depending on the morbidity.

Each patient was monitored post-operatively for the following events. Pain was assessed by the need of post-operative analgesia, *i.e.*, when the patient complained of pain, analgesic was given (paracetamol 300mg every eight hours intramuscularly) or paracetamol syrup (Antipyrol) for children under eight years old and recorded.

Number of episodes of vomiting after 6 hrs following tonsillectomy were recorded. If patient had more than two episodes of vomiting, metoclopramide was given and recorded.

Tolerance to intake of 400 ml of oral fluids after 8 hrs following tonsillectomy was recorded.

Edema as visual impression of swelling and elongation of uvula and soft palate was noted at 6 hrs and 24 hrs post-operatively.

Temperature was recorded 4th hourly for 24 hours. Temperature of > 37.5 OC was considered as fever. Patients were discharged after 24 hrs if good oral intake was achieved and when they were

free from complications like bleeding, fever, pain, dehydration *etc.* Those patients who re-attend with secondary post-tonsillectomy and or post-adenoidectomy hemorrhage, were admitted.

All patients had a regular follow-up visit with on 7th, 14 th post-operative day and information like fever, bleeding, vomiting and oral intake were collected during these visits healing time of the tonsil beds with complete removal of slough and solid food intake with any accompanied symptoms like ear pain, dysphagia was noted at follow-up visit.

Statistical analysis:

Test of difference between two proportions are studied to determine significant difference between the groups.

Results

One hundred sixty patients between 4-42 years of age were randomized to receive dexamethasone and were divided into two groups (A) and (B), (A) is of 84 patients that receive dexamethasone and (B) is of 76 patients that receive placebo (5 ml) of normal saline ,no adverse affect of this drugs were reported in this study .. Dexamethasone was selected because a long half-life of 36 to 48 hours with glucocorticoid activity(4).A single dose lacks side effect like gastritis, adrenal depression, etc., and also has a low cost.

There was no significant difference in gender between two groups male to female ratio was 1:0.66 in the study group and1:0.73in the control group. On the day of operation ,only 12 patients out of 84 need analgesic, where as 36 of 76 in the placebo, thethis implies a statistically significant relative decrease in post operative pain on the day of operation for those patient who received

dexamethasone. (p>0.0001)
Fifty patients in the placebo group had more than two episodes of vomiting after six hrs post-operatively compared to only four patients in the trial group,this implies a significant decrease in postoperative nausea and vomiting (PONV). (p<0.0001).

All patients receiving dexamethasone were able to tolerate 400 cc of oral fluids at 8 hrs following surgery where as non of the patients receiving the placebo could tolerate oral fluids at 8 hrs postoperatively. Thus, dexamethasone significantly improves oral intake in post-tonsillectomy patients (P<0.001).

The incidence of edema was significantly less in the study group (16 Vs 58) so the p<0.0001 at the end of 24 hrs after surgery. On the day of surgery, fever was recorded only in 4 patients from the study group compared to 16 patients in control group(P<0.01). All patients receiving dexamethasone were fit for discharge after 24 hrs post-operatively ,but sixteen patients in the placebo group had to prolong their hospital stay due to morbidities like pain and dysphagia (p<0.0001).Thus dexamethasone significantly promotes early discharge of post-tonsillectomy patients.

Non of patients from the study group got re-admission to hospital (p<0001). A Sixty-six patients of study group completed healing with normal tonsil bed on seventh post-operative day(POD) whereas only sixty-six patients from the control group completed healing after the fourteenth POD.Since none in the control group completed healing on seventh POD,(P>0.05).

Discussion

Tissue injury induced acute inflammation ,nerve irritation and spasm of exposed pharyngeal muscle is known

to play a role in the genesis of post-tonsillectomy pain [4].

By inhibiting phospholipase enzyme, corticosteroid block both the cyclo-oxygenase and lipo-oxygenase pathway and thus prostaglandin production, thereby, leading to pain relief [4].

Corticosteroids reduce the inflammation by inhibiting the early processes of the inflammatory process of the inflammatory response which include edema, fibrin deposition, capillary dilatation, migration of lymphocytes and phagocytic activity[5].

Corticosteroid reduce edema, whether the cause of inflammation is infection, trauma or allergy[6] and are used extensively in otolaryngology in managing airway compromise as a result of epiglottitis laryngeal trauma laryngotracheobronchitis,allergic laryngeal edema,subglottic stenosis and adenotonsillar enlargement secondary to acute infection[7].

When given intravenously before surgery,dexamethasone has been effective in educing postoperative edema ,pain, and trismus in patients who have gone for impacted third molar[8].Given this accumulated information, it seems that dexamethasone given before tonsillectomy would improve the patient's postoperative pain.

Oropharyngeal pain and irritation of gastric mucosa by swallowed blood are the main contributors for high incidence of PONV following tonsillectomy, this was the same as Haris Al (9).Steroid exert anti-emetic activity via prostaglandin,release of endorphins and tryptophan depletion [9] Multiple studies have shown benefits with corticosteroids alone or as adjuvant for chemotherapy induced vomiting, gynecological surgeries,

thyroidectomy,andtonsillectomy induced vomiting.[10-14].

Henzi et al did metanalysis of 17 trails involving use of dexamethasone for prevention of PONV in surgical patients[15]. Local infiltration of steroids and an oral four days course of steroids have shown promising result in tonsillectomy patients [16,17].However the literature regarding the use intravenous corticosteroids for tonsillectomy is conflicting ,most of the studies have either lacked the control group or are not standardized for anesthetic procedure as well as surgical technique. There are controversies about the type and dose of corticosteroid ,whether to use single or multiple doses and whether to use alone or adjuvant to other drug [18].

Mc Keam et al did a double blind randomized controlled trail for intravenous steroid for adult tonsillectomy and concluded that a single dose of 10 mg of dexamethasone given intravenously at induction of anesthesia for adult tonsillectomy significantly decrease the pain scores for the day of operation and the mean pain score for the week post-operatively was significantly reduced in these patients[19].

In this study, there was no difference noted in the time of first ingestion of food and drink same as Ajmee et al[18], also this finding was the same as Anila [20] In our study there was a significantly better quality of oral intake with dexamethasone, perhaps due to less pain and inflammation, and all patients can tolerate 400 ml of oral fluids at eight hours following surgery and none of the saline group was able to tolerate oral fluid eight hours following surgery.

In meta-analysis Steward et al showed that children received

dexamethasone were more likely to advance to soft or solid diet on post-tonsillectomy day one[21], While our study did not show that dexamethasone can be used to control post-tonsillectomy fever this finding agree with Anila et al in study of ninety patients for effects of dexamethasone on post tonsillectomy morbidities [20].

All patients who received dexamethasone were able to discharge after 24 hours, this perhaps due to decrease in overall post tonsillectomy morbidity this agree with al Ajmee et al and Stewart et al [18,21].

Conclusion

From our study we can conclude that the routine use of dexamethasone seems reasonable in minimizing post-tonsillectomy morbidity ,dexamethasone is considered safe and there were no adverse effects associated with single dose of dexamethasone but if this is to be adopted as a routine in minimizing the post tonsillectomy morbidity in clinical practice further studies regarding the effect of intravenous dexamethasone are needed Our results showed that the use of dexamethasone 0.4 mg/kg in patients undergoing tonsillectomy and/or adenoidectomy significantly decreases the incidence of post operative, pain nausea, vomiting, and edema of uvula and soft palate. It also improves oral intake, shortens duration of hospital stay, reduces incidence of readmission and promotes early healing of tonsil bed significantly. Moreover, this single dose of dexamethasone is a safe and inexpensive method for reducing morbidity in tonsillectomy. But in this study, dexamethasone did not appreciably influence the fever in post-tonsillectomy patients Even though a

bigger sample size can increase the statistical power of the study.

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