Original Article

Does the added benefit of Ondansetron over Dexamethasone, to control post-operative nausea and vomiting, justify the added cost in patients undergoing tonsillectomy and adenotonsillectomy?

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Abstract

Objective: To investigate comparative effectiveness of ondansteron and dexamethasone in prophylaxis of PONV in tonsillectomy and adenotonsillectomy patients.

Methods: The study was conducted at Shifa International Hospital Islamabad from 1st January to 30th June 2009, on 60 patients undergoing tonsillectomy or adenotonsillectomy, with their consent. After consecutive alternate sampling, patients were divided into two groups containing 30 patients each. Ondansteron was given in one group, and Dexamethasone in the other group, as anti emetic, at the time of induction. Episodes of PONV were recorded at three specified intervals i.e.; immediate postoperative, 6 hours after surgery and 12 hours after surgery. Data was entered on a pre-designed performa. The data was analyzed in SPSS Version 13.0.

Results: Ondansteron Group had a mean age of 12.7 ± 9.54 years (5-36 years). There were 22 (73.3%) males and 8 (26.7%) females. Dexamethasone Group had a mean age of 14.8 ± 8.4 years (5-35 years) of whom 18 (60.0%) were males and 12 (40.0%) were females. Overall 6 patients who received ondansetron had PONV compared to 7 patients in the dexamethasone group. This difference was statistically insignificant ($p>0.05$).

Conclusion: Dexamethasone was equally effective in controlling PONV in tonsillectomy and adenotonsillectomy patients. The improved benefit of using ondansetron over dexamethasone, on a regular basis, does not justify the added cost (JPMA 60:559; 2010).

Introduction

Postoperative nausea and vomiting (PONV) is a well-recognized morbidity associated with procedures carried out under general anaesthesia, as tonsillectomy, adenoidectomy, strabismus repair, neurosurgical and abdominal procedures. A number of factors contribute to the PONV like post operative pain, carbon dioxide absorption and external bowel compression by high pressures in laparoscopic procedures. The frequency also tends to be higher in the paediatric population with a number of potential complications like dehydration, bleeding from the operation site, aspiration and even wound dehiscence. Another dimension is the increased stress and hospital stay required in patients who develop these complications, particularly in institutions where day care tonsillectomy and adenoidectomy are in practice. Further studies show that at least a third of patients with PONV report a decreased Quality of Life during the first 5 days of recovery.

Considering all these factors, prophylaxis of PONV in high risk patients is commonly practiced in many centers around the world. Even automated reminders have been set for the patients with high risk of PONV.[1] There are a number of agents that have been used including ondansetron, which is a Neurokinin-1 receptor antagonist,[2] serotonin antagonist,[3] dexamethasone, dimenhydrinate, topsider, perphenazine, dolasetron and other similar drugs. The two most commonly used drugs are ondansetron and dexamethasone. These are used either separately or in combination.[4] Ondansetron is more expensive than dexamethasone. Studies have raised the question whether the comparative benefit of ondansetron justifies the increased expenditure as the control of PONV is almost the same for ondansteron, dexamethasone and other commonly used drugs.[5]

The purpose of our study was to investigate the comparative effectiveness of ondansetron and dexamethasone in prophylaxes of PONV in tonsillectomy and adenotonsillectomy patients.

Materials and Methods

The study was conducted at Shifa International Hospital Islamabad from 1st January to 30th June 2009. Reported incidence range of PONV with Ondansteron is 5-10% and with Dexamethasone is 10-15%. For 95% confidence interval and power of 90% the sample size came to 24 in each group. For contingencies, the sample size was increased to 30 in each group. Total of 60 patients, both gender, undergoing elective tonsillectomy and/or adenoidectomy who consented to participate in the study were

included in the study. Informed consent was taken on a specially designed form explaining the protocol of the study. Patients had right to withdraw from the study. As an institutional policy, anonymity and confidentiality of the participants and the collected data was ensured. All the patients fulfilled the other inclusion criteria and belonged to American Society of Anaesthesiology status I-II. The patients who had any of the following were excluded from the study.

History of nausea and vomiting 24 hours before surgery, American Society of Anesthesiology status III or higher, Body mass index more than 35, Patients with history of gastro-esophageal reflux disease, renal diseases, chronic liver disease and diabetes mellitus, Any antiemetic use within 24 hours before surgery, Patients on chemotherapy, Intra-operative use of nitrous oxide, Use of steroids peri-operatively, and those who did not give informed consent.

A Standardized questionnaire was used to obtain basic demographic information and past medical history to screen inclusion/exclusion criteria. Patients were divided into two groups containing 30 patients each. Sampling was done using consecutive alternate sampling technique. In the operation room, after application of standard monitors, each patient received midazolam 0.4 mg/kg intravenously and fentanyl 1 mcg/kg intravenously. Ondansetron was given in one group and Dexamethasone in the other group, as anti emetic, at the time of induction intravenously (I/V). Dose of Ondansteron given to adults (>12 years of age) was 4.0 mg I/V and to paediatric patients (<12 years of age) was 0.1 mg/kg I/V whereas dose of Dexamethasone in adults was 8 mg I/V and in paediatric patients was 0.1 mg/kg I/V.

After giving ondensetron or Dexamethasone, each patient was put to sleep by propofol 2.5mg/kg body weight. This was followed by a muscle relaxant, rocuronium 0.9 mg/kg body weight. When the patient was fully relaxed intubation with endotracheal tube with internal diameter 7 in females and 7.5 in males was carried out and according to age in paediatric group. General anaesthesia was maintained with isoflorane 1 to 2.4 MAC with air and oxygen 1L/min. Nitrous oxide was avoided. At the end of surgery each patient was reversed by neostigmine 0.08 mg/kg body weight combined with glycopyrolate 0.2 mg/mg of neostigmine. Patient was extubated after gaining consciousness.

After the completion of surgery and extubation, all enrolled patients were observed for the next 24 hours.

Episodes of postoperative nausea and vomiting were enquired and recorded at three specified intervals i.e.; immediate postoperative, 6 hours after surgery and 12 hours after surgery. Data was entered on a proforma. The data was analyzed in SPSS Version 13. Pearson Chi-Square test was used for comparing the two study groups for effectiveness of control of PONV ($P<0.05$ considered as significant).

Results and Analysis

Ondansteron Group had a mean age of 12.7 ± 9.5 years (range 5-36 years). There were 22 (73.3%) males and 8 (26.7%) females. Dexamethasone Group had a mean age of 14.82 ± 8.4 years (5-35 years), with 18 (60.0%) males and 12 (40.0%) females. No patient had past history of PONV in both the groups while one (3.3%) patient in Dexamethasone group and two (6.7%) patients in Ondansteron group had history of travel sickness.

Overall 13 patients developed PONV (6 patients in ondansetron group and 7 in dexamethasone group. This difference was statistically insignificant. Five females developed PONV (2 in Ondansteron and 3 in Dexamethasone group) while 8 males (4 in Ondansteron and 4 in Dexamethasone group) developed PONV. No patients with history of travel sickness developed PONV in both the drug groups.

Discussion

PONV has been studied in different surgical procedures with varying outcomes. A number of approaches have been attempted to decrease PONV in procedures ranging from laparoscopic surgery[3] to strabismus repair.[6] Studies have shown that a combination of Ondansetron and Dexamethasone in laparoscopic surgery can prove to be more effective in controlling PONV.[7] A large focus on tonsillectomy and PONV management has developed as more and more institutions progress to doing it as a day care procedure.[8] Since the patients' stay in the hospital setting is short, surgeons want to ensure that the patients remain comfortable even when they return home and to avoid unplanned admissions secondary to PONV. Different factors can lengthen the stay of the patient selected for day care tonsillectomy amongst which PONV is a well-recognized factor.[9] Although studies have suggested that ondansetron is more effective than dexamethasone however question arises whether the added benefit of using ondansetron versus dexamethasone is worth the exponentially greater cost. Our focus was on tonsillectomy and adenotonsillectomy patients.

Different drug regimens and doses have been tested for both ondansetron and dexamethasone. While many studies indicate that multidrug regimens are superior to single drug regimens, but the increased cost makes standard use of such regimens prohibitive in low resource settings. Low dose dexamethasone (0.0625 mg/kg) has been shown to be an optimum dose.[10] We used 8 mg I/V Dexamethasone in adults and 0.1 mg/kg I/V in paediatric patients, while the dose of Ondansetron in adults was 4.0 mg I/V and in paediatric patients was 0.1 mg/kg I/V.

In our study 20% of the patients on ondansetron had PONV versus 23.33% on dexamethasone. In Pakistan, the

relative cost of ondansetron in Rupees is 906/- (8 mg Ampoule) compared to Rs. 15/- (4 mg Ampoule) of dexamethasone. A 4 mg adult dose of Ondansteron costs Rs. 452.5/ while 8 mg adult dose of Dexamethasone costs Rs 30/- . The question arises that does 3.33% improvement in PONV justify the use of a medication that is 15 times more expensive. Studies have shown similar results using dexamethasone and ondansetron with the recommendation that dexamethasone should be used to conserve costs.[11]

A previous history of motion sickness, female gender, and past history of PONV is a known risk factor for PONV.[12] This trend was not seen in our study.

Factors outside the direct influence of the drugs on PONV need to be taken into account also. Dexamethasone has been reported to increase post operative bleeding in patients[13] but at the same time it has the added advantage of reducing pain in ambulatory surgery patients and superior control of delayed PONV due to its longer half-life.[14-16] There are a number of confounding factors that could have affected the results. Anaesthetic agents like opioids, nitrous oxide and inhalational agents are all factors known to influence PONV.

Conclusion

Our results show that the improved benefit of using ondansetron over dexamethasone in tonsillectomy and adenotonsillectomy patients is marginal and does not justify the added cost on a regular basis. A number of PONV stratification systems have been studied and the use of dexamethasone for PONV control as a standard medication with use of ondansetron only in patients with very high risk for PONV, is the optimum approach to PONV prophylaxis.

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