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Comparison between Dexmedetomidine and Esmolol for Hypotensive Anaesthesia during Functional Endoscopic Sinus Surgery in Children

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Abstract

Background: The nasal surgery in pediatric patient's caries a major challenge to both anesthesiologist and surgeon. The surgeon faces small nostrils and narrow nasal passages. The anesthesiologist has to produce condition which facilitate the surgery, decrease the operative time by minimize the intraoperative bleeding to allow better visualization this can be achieved by controlled hypotensive anesthesia which is the key issue in the success of nasal surgery in pediatric age group. Controlled hypotension is a technique used to limit intraoperative blood loss to provide the best possible field for surgery.

Aim: The aim of this study is to compare between dexmedetomidine and esmolol for controlled hypotensive anaesthesia in children undergoing functional endoscopic sinus surgery.

Methods and Material: This study was carried out on 60 children, 8-12 years, ASA I-II, scheduled for elective functional endoscopic sinus surgery under general anesthesia. Patients were randomized into two equal groups (30 patients in each group): Group D (I): (Precedex®, Meditera, 200μg/2mL) patients received loading dose of dexmedetomidine 1 μg/kg diluted in 10ml 0.9% saline infused over 10min before induction of anesthesia, followed by continuous infusion of (0.4 μg/kg/h). Group E (II): (Brevibloc®, Eczacibasi, 100mg/ 10mL) patients received esmolol as a loading dose 1mg/kg diluted in 10ml 0.9% saline was infused over 1min befor induction of anesthesia followed by continuous infusion of (50 μg/kg/h).

In all patients, anaesthesia was induced with propofol 2 mg/kg and fentanyl (1 μg/kg) and cis-atracurium 0.15mg/kg. The lung was mechanically ventilated for 3 minutes then endotracheal intubation was done with suitable sized tube. The tidal volume and respiratory rates were adjusted to maintain end tidal CO_2 between (32-35mmHg). All patients were mechanically ventilated with 100% O_2. Anaesthesia was maintained with isofurane 1.2% and oxygen.

Demographic data: Haemodynamics included heart rate, mean arterial blood pressure at base line, 5min. after infusion of loading dose, 5, 15, 30, 45, 60mins after induction of anaesthesia, at end of surgery and 30mins after recovery.

The quality of the surgical field was assessed using a predefined category scale adopted from Fromme et al.

The total blood loss was measured from the suction apparatus.

Duration of surgery: Recovery profile including: Time of extubation, emergence time "eye opening and response to verbal command".

Post-operative analgesia:

Post-operative sedation: Post operative complications: All patients were checked for complications which were recorded and managed as nausea, vomiting, hypotension and bradycardia.

Results: Our results showed that dexmedetomidine and esmolol can induce statistically significant decrease in heart rate and mean arterial blood pressure comparing to the base line after infusion of the loading dose and during the targeted intraoperative period and so good visualization of the surgical field with no statistically significant difference in blood loss or duration of the surgery or post-operative complication however, dexmeditomidine group showed statistically significant prolonged time of first analgesic request and better post-operative sedation.

Conclusions: Our study concluded that, both dexmedetomiden and esmolol were safe and effective agents in inducing controlled hypotesion in pediatric patients undergoing functional endoscopic sinus surgery. Both drugs were effective in optimizing the surgical condition and inducing dry surgical field allowing better visualization. Dexmedetomidine was associated with prolongation of the time of first call for analgesic request and better post-operatve sedation, however esmolol was associated with rapid recovery.

Key Words: *Dexmedetomidine – Esmolol – Hypotensive anesthesia – Functional endoscopic sinus surgery in pediatrics.*

Key Message: *Both dexmedetomiden and esmolol were safe and effective agents in inducing controlled hypotesion in pediatric patients undergoing functional endoscopic sinus surgery surgery.*

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Introduction

FUNCTIONAL Endoscopic Sinus Surgery (FESS) is becoming a widely performed operation [1]. Its introduction associated with enhanced illumination and visualization has dramatically improved surgical dissection. However major complications have been reported for FESS under general anesthesia resulting from impaired visibility due to excessive bleeding [2].

Controlled hypotension is a technique used to limit intraoperative blood loss to provide the best possible field for surgery [3,4]. Hypotensive techniques are safe and effective in inducing controlled hypotension in children [5]. Benefits for controlled hypotension for FESS include reduction in blood loss with improved quality of surgical field. Various agents e.g., magnesium sulfate [6]. Vasodilators (sodium nitroprusside), [4] nitroglycerine, [7] high doses of potent inhaled anesthetics, [8] and beta adrenergic antagonist [3] have been used to achieve controlled hypotension. Some disadvantages have been reported of these techniques including delayed recovery from inhaled anesthetics, resistance to vasodilators, tachyphylaxis, and cyanide toxicity for nitroprusside.

Esmolol is an ultrashort acting selective (3 1 adrenergic antagonist that reduces heart rate and blood pressure. It has rapid onset of action of bolus i.v. injection and infusion. Upon termination of infusion gradual recovery of arterial blood pressure to the pre infusion level occurred without development of rebound hypertension [9,10].

Dexmedetomidine (DEX) is a potent highly selective a 2 adrenergic receptor agonist. It has sedative, analgesic and anesthetic sparing effect, and sympatholytic properties [11]. The central and peripheral sympatholytic action of (DEX) is mediated by a 2 adrenergic receptor and is manifested by dose-dependent decrease in arterial blood pressure, heart rate, cardiac output and norepinephrine release [12,13].

The present work was designed to compare the efficacy and safety of dexmedetomidine and Esmolol as a hypotensive agent in FESS with attention on the amount of blood loss, quality of the surgical field and recovery profile in pediatric patients.

Aim and objectives:

The aim of this study is to compare between dexmedetomidine and esmolol for controlled hypotensive anaesthesia in children undergoing functional endoscopic sinus surgery. The primary outcome was the quality of surgical field while the haemodynamic changes, post-operative analgesia, sedation and post-operative complication were the secondary outcome.

Material and Methods

This study was carried out in Tanta University Hospitals for six months from (February to August) 2016 on sixty of pediatric patients of both sex aged (8 years-12 years) ASA physical status I & II scheduled for elective functional endoscopic sinus surgery. A written informed consent was obtained from the parents. Every patient received an explanation to the purpose of the study and had a secret code number and the photos were applied only to the part of the body linked to the research to ensure privacy to participants and confidentiality of data.

Research results were only used for scientific purposes. Procedures were approved by both the Institutional and the regional Ethical Committees. Any unexpected risks appeared during the course of research were clarified to the participants and the Ethical Committee in time and appropriate measures were taken to minimize or avoid these risks.

Waste materials were disposed according to parameter of infection control in Tanta University Hospitals.

Justification of sample size:

The sample size calculation was performed using Open Epi provided online by World Health Organization (WHO) and by Centers for Disease Control and Prevention (CDC).

The calculated sample size is 30 per group based on the following considerations:

- 95% level of significance.
- 80% power of the study.
- 1:1 for each study groups.

Inclusion criteria:

Children, ASA I & II, age 8-12 years, scheduled for elective functional endoscopic sinus surgery.

Exclusion criteria:

- Parents refusal.
- Patients with recurrent sinus surgery.
- Renal, hepatic or cerebral insufficiency and patients with coagulopathies.
- Receiving drugs influencing blood coagulation.

Pre-operative assessment was done by:

- Medical & surgical histories of the patient were evaluated.
- Clinical examinations were performed.
- Laboratory investigation was done:

Complete blood count , prothrombin time, INR prothrombin activity, renal function test, liver function test, bleeding and coagulation time.

The patients were allowed to fast for 6 hours for solids, 4 hours for semisolids, 2 hours for clear fluid.

Randomization:

Patients were randomly classified using closed sealed envelope into two equal groups each group contained thirty patients according to sample size calculation.

The anesthetic solution was prepared by an anesthesist, not involved in the study. All observations were carried out by a single investigator, who was blinded to the treatment groups.

The same surgeon performed all operations to ensure consistency in the estimation of the surgical field. He was blinded to the hypotensive agent used. The study drugs were stopped 15 minutes before the end of the operation to allow good haemostasis.

Group D (I): (Precedex®, Meditera, 200 μg/2mL) patients received loading dose of dexmedetomidine 1 μg/kg diluted in 10 ml 0.9% saline infused over 10min before induction of anesthesia, followed by continuous infusion of (0.4 μg/kg/h).

Group E (II): (Brevibloc®, Eczacibasi, 100 mg/10mL) patients received esmolol as a loading dose 1mg/kg diluted in 10ml 0.9% saline was infused over 1min followed by continuous infusion of (50μg/kg/h).

In both groups infusion rate was titrated to maintain MAP 20% below the base line of the patient.

Intraoperative:

On entering operation room two intravenous lines were inserted, one for infusion of dexmedetomidine or esmolol and the other for administration of fluids and other drugs.

In all patients, anaesthesia was induced with propofol 2mg/kg and fentanyl (1 μg/kg) and cis-atracurium 0.15mg/kg. The lung was mechanically ventilated for 3 minutes then endotracheal intubation was done with suitable sized tube. The tidal volume and respiratory rates were adjusted to maintain end tidal CO_2 between (32-35mmHg). All patients were mechanically ventilated with 100% O_2. Anaesthesia was maintained with isofurane 1.2% and oxygen.

Top up doses of cis-atracurium and fentanyl was given as needed.

Patients received lactated Ringer's at 5ml/kg/hr and were placed in a 15º reverse Trendlenburg position to improve venous drainage. In both groups cotton soaked with epinephrine in a concentration of 1:100.000 was inserted into the nasal cavity and in between the polyps to minimize blood loss.

Monitoring:

ECG, pulse oximetry, non-invasive blood pressure and end tidal carbon dioxide were applied to all patient.

At the end of the surgery inhalational anaesthesia was closed and muscle relaxant were reversed by atropine (0.01mg/kg) and neostigmen (0.05mg /kg) then extubation was done when the patient fulfill the criteria of extubation and the patient was transferred to post Anaesthesia Care Unite.

Measurements: In all groups:

I- Demographic data.

II- Haemodynamics included heart rate, mean arterial blood pressure at base line, 5min. after infusion of loading dose 5, 15, 30, 45, 60mins after induction of general anaesthesia, at end of surgery and at 30mins after recovery.

III- The quality of the surgical field using a predefined category scale adopted from Fromme et al. **[14]**.

Average category scale for assessment of intraoperative surgical field:

0- No bleeding.

1- Slight bleeding-no suctioning of blood required.

2- Slight bleeding-occasional suctioning required. Surgical field not threatened.

3- Slight-bleeding-frequent suctioning required. Bleeding threatens surgical field a few seconds after suction was removed.

4- Moderate bleeding-frequent suctioning required. Bleeding threatens surgical field directly after suction was removed.

5- Sever bleeding-constant suctioning required Bleeding appeared faster than removed by suc-

tion. Surgical field severely threatened and surgery not possible.

The ideal category scale values for surgical conditions were determined to be two and three.

IV- The total blood loss was measured from the suction apparatus.

V- Duration of surgery.

VI- Recovery profile including: Time of extubation, emergence time "eye opening and response to verbal command."

VII- Post-operative analgesia.

VIII- Post-operative sedation using Ramasay score [15]. 1=anxious, agitated, or restless; 2= cooperative, oriented, and tranquil; 3=responsive to commands; 4=a sleep, but with brisk response to light, glabellar tap, or loud auditory stimulus; 5=a sleep, sluggish response to glabellar tap, or auditory stimulus; and 6=a sleep, no response 15, 30, 60mins after recovery.

IX- Post-operative complications: All patients were checked for complications which were recorded and managed as nausea, vomiting, hypotension and bradycardia.

Results

There was no statistical significant difference between the three groups as regards to demographic data (age, sex and weight).

In both groups, in comparison with base line, mean arterial blood pressure showed statistically significant decrease after infusion of the loading dose and along the targeted intraoperative period and 30mins after recovery.

In both groups, in comparison with base line, heart rate showed statistically significant decrease after infusion of the loading dose and along the targeted intraoperative period and 30mins after recovery.

Average category scale was in the accepted range during the targeted intra operative period in both groups.

As regard to duration of surgery, the difference between the two groups was statistically insignificant.

As regard to time of first analgesic request, it was statistically significant shorter in group I in compare to group II.

As regard to post operative sedation score, it was statistically significantly higher in group I at 15mins and 30mins than group II.

As regard to post-operative complications, there was no significant difference in both groups regarding post-operative complications.

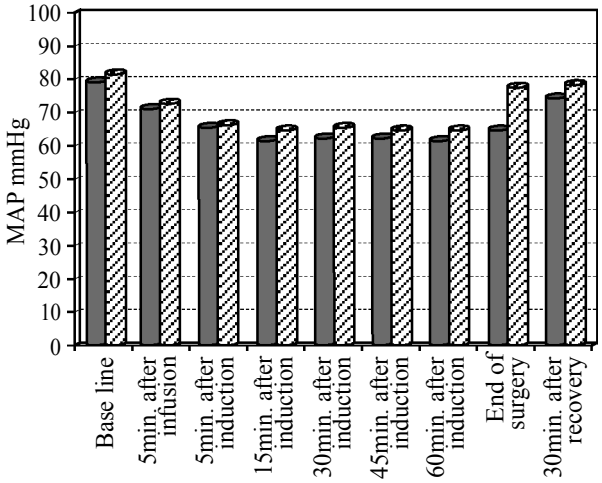

Fig. (1): There was no statistically significant difference between both groups regarding mean arterial blood pressure after infusion of the loading dose till the end of infusion.

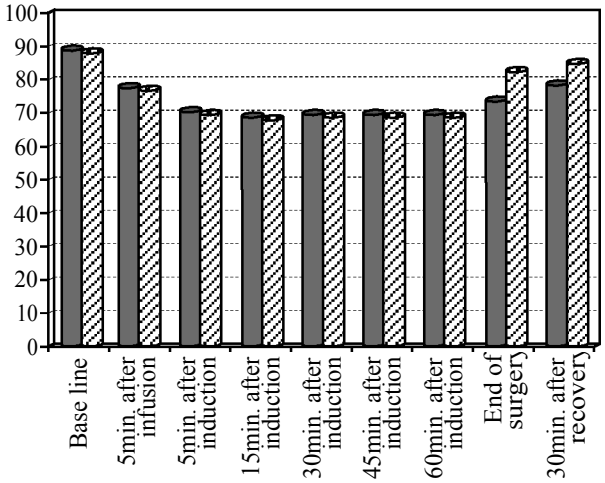

Fig. (2): There was no statistically significant difference between both groups regarding heart rate as after the loading dose and during the targeted intraoperative period.

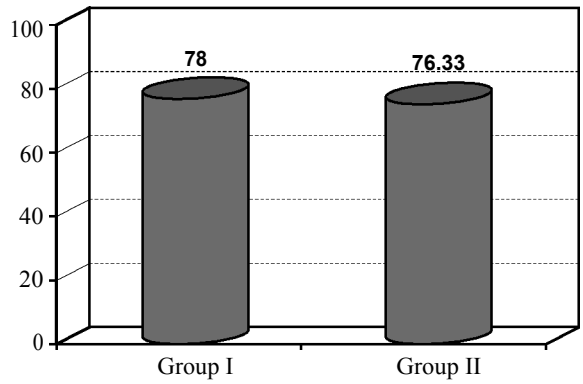

Fig. (3): As regard to amount of blood loss the difference between the two groups was statistically insignificant.

Table (1): There was no statistically significant difference in comparing quality of surgical field between both groups.

	15	30	45	60
Group I:				
Range	2-3	1-3	1-2	1-3
Median	2	2	2	2
Group II:				
Range	1-3	1-2	1-2	1-3
Median	2	2	2	2
p-value	0.13	0.12	0.11	0.09

Table (2): As regard to emergence and extubation time, there was statistically significant shorter emergency and extubation time in group II.

No.	Group I	Group II
1	9	5
2	7	4
3	9	4
4	8	5
5	8	4
6	6	5
7	6	6
8	7	4
9	7	4
10	6	5
11	8	5
12	8	5
13	8	4
14	9	4
15	9	5
16	6	3
17	7	5
18	7	4
19	8	4
20	7	4
21	8	4
22	8	4
23	8	5
24	9	4
25	9	5
26	8	4
27	7	5
28	7	4
29	7	3
30	7	4
Range	6-9	3-6
Mean	7.60	4.36
SD±	0.96	.66
p-value	0.0001*	

Discussion

Our results suggested that both dexmedetomidine and esmolol were effective and safe in inducing controlled hypotensive anaethesia in functional endoscopic sinus surgery in children. Both provide good visualization of surgical field with stable haemodynamics.

Dexmedetomidine was significantly better in providing post-operative sedation and prolongation of the time of first call for post-operative analgesia.

As regard to haemodynamics our study showed that both agent were effective in reducing the mean arterial blood pressure and the heart rate to the target level with no significant difference between both groups.

Patients who were treated with dexmedetomidine before induction of anesthesia had significant decrease in mean arterial blood pressure and heart rate after administration of loading dose. This hemodynamic profile of dexmedetomidine can be attributed to the known sympatholytic effect of α2 agonists. The α2-receptors are involved in regulating the autonomic and cardiovascular systems. Alpha 2 receptors are located on blood vessels, where they mediate vasoconstriction, and on sympathetic terminal, where they inhibit, norepinephrine release **[16]**.

Our results were in agreement with Bajwa et al., **[17]** who studied the effect of Nitroglycerine, esmolol and dexmedetomidine for induced hypotension during functional endoscopic sinus surgery and they found that dexmedetomidine and esmolol provided better hemodynamic stability compared to nitroglycerin during FESS.

Amin et al., **[18]** studied controlled hypotensive anesthesia in children undergoing nasal surgery and they found that dexmedetomidine and esmolol are safe and effective agents for inducing controlled hypotension as regard to hemodynamic stability.

GAO et al., **[19]** studied the effect of dexmedetomidine as an adjuvant of sevoflurane for controlled hypotension in endoscopic sinus surgery. They found that the heart rate values were lower in dexmedetomidine group compared to control group and they concluded that dexmedetomidine is safe and effective in assisting controlled hypotension during endoscopic sinus surgery.

Jamaliya et al., **[20]** studied the efficacy and hemodynamic response to dexmedetomidine as a hypotensive agent in posterior fixation surgery following traumatic spine injury found that dexme-

detomidine is an effective and safe agent in achieving controlled hypotension.

Tobias et al., [21] found that, Dexmedetomidine was proved to be an effective agent used alone without need for beta blockers for controlled hypotensive anesthesia during anterior spinal fusion.

Ulger et al., [22] also found that dexmedetomidine was a good hypotesive agent regarding hemodynamic stability during the study to compare the effect of dexmedetomidine on providing controlled hypotension and surgical field quality, liver and kidney function in middle ear microsurgery, with nitroglycerine.

Guven et al., [23] also found that dexmedetomidine was a good hypotesive agent regarding hemodynamic stability during the study to evaluate the effects of dexmedetomidine on hemodynamic parameters during Functional Endoscopic Sinus Surgery (FESS).

Patients who were treated with esmolol before induction of anesthesia had significant decrease in mean arterial blood pressure and heart rate after administration of loading dose. This esmolol induced hemodynamic profile can be explained as esmolol is an ultrashort acting selective (3 1 adrenergic antagonist that reduces heart rate and blood pressure. It has rapid onset of action of bolus i.v. injection and infusion. Upon termination of infusion gradual recovery of arterial blood pressure to the pre infusion level occurred without development of rebound hypertension [24,25].

Esmolol is an ultra-short acting intravenous cardioselective beta-antagonist. It has an extremely short elimination half life (mean: 9 minutes; range 4-16 minutes) and a total body clearance approaching 3 times of cardiac output and 14 times of hepatic blood flow [26].

Erbesler et al., [27] studied the effects of esmolol and dexmedetomidine on the clinical course and cost for controlled hypotensive anaesthesia and found that esmolo is a good hypotensive anaesthetic agent with no significant difference was present in hemodynamic conditions.

Ibraheim et al., [28] found that both agents were good hypotensive anaesthetic agent during the study of esmolol versus dexmedetomidine in scoliosis surgery as regard to hemodynamic stability.

As regard to the total amount of blood loss and the quality of the surgical field we found that good quality of the field in both groups with no statistically significant difference neither in the quality of the surgical field nor in the amount of blood loss.

Surgical bleeding can result from cut in capillary so; the amount of blood loss will depend on blood flow in the capillary bed. The blood loss results from the arterial injury depend on mean arterial blood pressure. Venous blood loss will be dependent on venous return and venous tone [3].

The hypotensive anesthesia induced with beta blocker results in increase in the sympathetic tone due to increase norepinephrine release, enhance endocrinal and metabolic responses, which leads to vasoconstriction of arterioles and precapillary sphincters that result from unopposed alpha-adrenergic effects. Beta blockers decrease CO and therefore decrease the blood flow to the tissue. So, beta blocker would be appropriate for decreasing the bleeding which result from capillary injury [29,30].

These results were agreed by Guven et al., [23] studied evaluation of outcomes in patients given dexmedetomidine in functional endoscopic sinus surgery and found it effective in providing a dry surgical field.

Goksu et al., [31] investigated the haemodynamic effects of perioperatively administered dexmedetomidine in patients for functional endoscopic sinus surgery found dexmedetomidine effective in providing comfortable surgical field.

Erbesler et al., [27] they found that both esmolol and dexmedetomidine were effective in providing good visualization of surgical field with no significant difference between them.

Bajwa et al., [17] they found that dexmedetomidine and esmolol provided better hemodynamic stability and operative field visibility compared to nitroglycerin during FESS.

Kol et al., [32] studied controlled hypotension with desflurane combined with esmolol or dexmedetomidine during tympanoplasty in adults and found both esmolol and dexmedetomidine, combined with desflurane, provided an effective and well-tolerated method of achieving controlled hypotension to limit the amount of blood in the surgical field in adult patients undergoing tympanoplasty.

Jamaliya et al., [20] they found that dexmedetomidine was an effective agent for providing good visualization of surgical field in hypotensive anaesthsia.

Amin et al., [18] also found that both dexmedetomidine and esmolol were effective in optimizing surgical condition and induce dry surgical field allow better visualization, and reduce operative time in pediatric patients undergoing nasal surgery.

As regard to post-operative analgesic requirement and sedation revealed that there was statistically significant difference in sedation postoperatively proving that dexmedetomidine provide good post-operative sedation and prolongation of time of first analgesic request.

Our results were in agreement with Unlugenc et al., [33] who studied the effect of pre-anaesthetic administration of intravenous dexmedetomidine on post-operative pain in patients receiving patient-controlled morphine and they found that a single intravenous dose of dexmedetomidine (1 µg kg) given 10min before induction of anaesthesia significantly reduced post-operative morphine consumption at identical pain scores compared to control.

Goyal et al., [34] did a comparative evaluation of intravenous dexmedetomidine and fentanyl in breast cancer surgery and found that Dexmedtomidine can be used as suitable alternative to fentanyl in breast cancer surgeries due to better hemodynamic stability and a narcotic sparing effects.

Amin and El-Mawy [35] studied optimizing surgical field during cochlear implant surgery in children by dexmedetomidine versus esmolol and found that the time to first analgesic request was statistically significant longer in dexmedetomidine group.

Taghinia et al., [36] studied the effect of dexmedetomidine in aesthetic facial surgery and found that dexmedetomidine was effective as a hypotensive agent and also decrease the need of post-operative analgesia.

The sedative and post-operative analgesic sparing effect mostly as dexmedetomidine has sedative and analgesic sparing effects via central actions in the locus ceruleus and in the dorsal horn of the spinal cord [37] the analgesic effects also may occur via activation of the a2 receptors by accentuating the action of opioids [38].

As regard to recovery profile and emergence time we found that there was statistically significant decrease in emergence time and time to recover from anaesthesia in esmolol group.

Our results were in agreement with Richa et al., [13] studied comparison between dexmedetomidine and remifentanil for controlled hypotension during tympanoplasty and found that that extubation time was significantly slower in patients receiving dexmedetomidine compared with those receiving remifentanyl for controlled hypotension.

Kol et al., [32] studied controlled hypotension with desflurane combined with esmolol or dexmedetomidine during tympanoplasty in adults and found esmolol was associated with significantly shorter extubation and recovery times.

As redard to post operative complications our study revealed that both esmolol and dexmeditomidine were safe hypotensive agents with no significant difference between both groups as regard post-operative nausea and vomiting.

Our results were in agreement with Gurbet et al., [39] who did a study to assess of dexmedetomiden as a controlled hypotensive agent and they found no increase in incidence of side effects.

However, previous studies [40,41] reported that, the incidence of post-operative nausea and vomiting was less in children receiving dexmedetomidine in comparison with those receiving fentanyl during extracorporeal shock wave lithotripsy. This could explained by that fentanyl may the cause of increased in the incidence of PONV.

Conclusions:

Our study concluded that, both dexmedetomiden and esmolol were safe and effective agents in inducing controlled hypotesion in pediatric patients undergoing functional endoscopic sinus surgery. Both drugs were effective in optimizing the surgical condition and inducing dry surgical field allowing better visualization. Dexmedetomidine was associated with prolongation of the time of first call for analgesic request and better post-operatve sedation, however esmolol was associated with rapid recovery.

Conflicts of interest:

No conflicts of interest declared.

Authors' contributions:

All authors had equal role in design, work, statistical analysis and manuscript writing.

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مقارنة بين عقار الديكسميديتومدين والآزمولول للتخدير بضغط منخفض آثناء جراحة المنظار الموظيفى للجيوب الآنفية للآطفال

المقدمة: جراحة المنظار الوظيفى للجيوب الآنفية عملية واسعة الإنتشار وإجراؤها مصحوبا بتعزيز فى الإضاءة والرؤية آثبت تحسنا كبيرا فى الآداء الجراحى ولكن مضاعفات كبيرة تم تسجيلها لتلك العملية عند إجرئها تحت التخدير الكلى نتيجة خلل فى مجال الرؤية نتيجة نزيف زائد.

الآزمولول هو عقار شديد قصير المدى ومضاد متخصص لمستقبلات بيتا ١ ويقلل عدد ضربات القلب وضغط الدم. يختص بسرعة الفاعلية عند الحقن الوريدى دفعة واحدة آو بالتنقيط وعلاوة على ذلك فإن آنهاء التنقيط يؤدى إلى عودة تدريجية لمستوى ضغط الدم قبل الحقن مع عدم حدوث إنتكاسه بإرتفا ع ضغط الدم.

عقار الديكساميديتوميدين عقار محفز قوى عالى التخصص لمستقبلات آلفا ٢ وله تآثير مهدئ ومسكن للآلم غير مخدر وله تآثير مثبط لعمل الجهاز العصبى السمبثاوى. إن التآثير المركزى والطرفى لعقار الديكسامديتومدين يظهر كإنخفاض معتمدا على الجرعة لضغط الدم وعدد ضربات القلب وضخ القلب وإفراز النورابينفرين.

الهدف من العمل: الهدف من هذه الدراسة هو مقارنة تآثير إضافة عقار الديكسامديتومدين آو إضافة عقار الآزمولول للحصول على تخدير بضغط دم منخفض آثناء عملية المنظار الوظيفى للجيوب الآنفية فى الآطفال.

المرضى وطريقة الدراسة: لقد تم تنفيذ هذه الدراسة فى مستشفيات جامعة طنطا بقسم الأنف والأذن والحنجرة لمدة ستة أشهر على ستين مريضا من الأطفال من كلا الجنسين الذين تتراوح أعمارهم بين (٨ سنوات–١٢ سنة) بحالة بدنية من الدرجة الأولى والثانية طبقا لتصنيف الجمعية الأمريكية للتخدير مقرر لهم عملية إختبارية منظار وظيفى للجيوب الأنفية.

- المجموعة الأولى D: تلقى المرضى جرعة تحميل ١ميكروجرام/كج ديكسامديتومدين مخففة فى ١٠مل ٠.٩٪ محلول ملحى التى سيتم تنقيطها على أكثر من ١٠ دقائق قبل التخدير، تليها التنقيط المستمر من (٠.٤ميكروجرام/كج/ساعة).
- المجموعة الثانية E: تلقى المرضى عقار أزمولول كجرعة تحميل ١ملج/كج سيتم إعطاؤها على أكثر من ١ دقيقة تليها التنقيط المستمر ل ٥٠ميكروجرام/كج/ساعة).

المحلول المخدر تم تحضيره من قبل طبيب تخدير غير مشارك فى الدراسة وكل الملاحظات تد تنفيذها من خلال باحث واحد غير مدرك لمجموعات البحث.

أثناء العملية: عند دخول غرفة العمليات تم إدراج خطين وريدين، واحد لضخ ديكسامديتومدين أو أزمولول والآخر للتحكم بالسوائل والأدوية الأخرى.

فى كلا المجموعتين تم التحكم فى معدلات تنقيط العقاقير للحصول على متوسط ضغط دم أقل من ضغط دم المريض عند بداية الجراحة بنسبة ٢٠٪. تم إعطاء جميع المرضى الفنتانيل ٢ميكروغرام/كغ ومخدر البروبوفول بجرعة من ٢ملج/كغ وعقار سيس اترا كيوريم بجرعة ٠.١٥ملج/كج. تم إجراء تنفس صناعى للرئتين لمدة ثلاث دقائق ثم وضع أنبوبة حنجرية مناسبة الحجم معدلات ونسب التنفس وتم تعديلها للحفاظ على نسبة ثانى أكسيد الكربون ٣٢–٣٥مم زئبق بنهاية الزفير. كل المرضى خضعوا للتنفس الصناعى تحت ١٠٠٪ أكسوجين. وتم الحفاظ على التخدير بواسطة الأيزوفلوران ١.٢٪ والأكسوجين ١٠٠٪ وعقار سيزاتراكيوريم وفنتانيل حسب الحاجة.

القياسات: فى جميع المجموعات:

i – قام الجراح بتقييم جودة المجال الجراحى مستخدما مقياس عيارى محدد مسبقا فورم وآخرون المقياس العيارى لتحديد جودة المجال الجراحى:

- تم قياس مجموع فقدان الدم من جهاز الشفط.
- تغيرات الدورة الدموية متضمنة معدل ضربات القلب ومتوسط ضغط الدم.
- الإفاقة متضمنة وقت إزالة الأنبوبة الحنجرية والقدرة على فتح العينين والإستجابة للأوامر اللفظية.
- المسكنات ما بعد الجراحة.
- المهدئات ما بعد الجراحة.
- مضاعفات ما بعد الجراحة: تم تسجيلها وعلاجها كالغثيان والقئ وإنخفاض ضغط الدم ومعدل ضربات القلب.

النتائج: إن المجموعة الأولى قام عقار الديكسمديتومدين بالتخدير بضغط منخفض بكفائة فيما يتعلق بالدورة الدموية ومعدلات فقدان الدم وأيضا فى التهدئة ما بعد الجراحة وتقليل إستهلاك المسكنات بعدها.

المجموعة الثانية قام عقار الأزمولول بالتخدير بضغط منخفض بكفائة فيما يتعلق بالدورة الدموية ومعدلات فقدان الدم إلا أنه أقل من المجموعة الأولى فيما يتعلق بالتهدئة ما بعد الجراحة وخفض معدلات إستهلاك المسكنات بعدها.

الإستنتاج: لقد أشارت الدراسة إلى أن كلا العقارين تم إستخدامها بكفائة وأمان فى التخدير بضغط منخفض للأطفال الخاضعين لإجراء عملية المنظار الوظيفى للجيوب الأنفية وإن عقار الديكسميديتومدين أفضل فى التهدية ما بعد الجراحة وأفضل فى تقليل إستهلاك المسكنات بعد الجراحة ولكن عقار الأزمولول مصحوبة بإفاقة أسرع للمريض من تبعات التخدير الكلى.