IJBC 2021; 13(2): 40-43

Iranian Journal of Blood & Cancer

Journal Home Page: www.ijbc.ir

ORIGINAL ARTICLE

Evaluation of Nasopharynx Bleeding after Nasotracheal Intubation in Dental Patients with Corrected Coagulopathy

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ARTICLE INFO

Article History:
Received: 03.02.2021
Accepted: 15.05.2021

Keywords:
Coagulopathy
Bleeding
Nasotracheal intubation
General anesthesia

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ABSTRACT

Background: Tracheal intubation for general anesthesia induction can be performed via oral or nasal routes. There is a controversy about nasal route especially in children with corrected coagulopathy because of the probable stimulation for bleeding. We aimed to determine naso-pharynx bleeding in patients with corrected coagulopathy after nasotracheal intubation.
Methods: This quasi-experimental study, was conducted on 23 children aged 4-16 years with history of treated coagulopathy needing extensive dental treatment scheduled for a general anesthetic session. Bleeding volume was measured by detailing absorbed amount on a 4×4 inch gauze as well as the volume collected in a nasal bleeding collecting bottle for 24 hours and recorded every four hours. Data were analyzed using Friedman test.
Results: Scarce nasal bleeding was observed at the nasal intubation site in patients with hemophilia A. No significant differences were observed on nasal bleeding times in the these patients (P=0.583)
Conclusion: Nasotracheal intubation can be performed in patients with hemophilia A after stabilization of the coagulation status with no serious risk of bleeding.

Please cite this article as: Mahdavi SAR, Fallahinejad Ghajari M, Ansari G, Eshghi P, Rezvani Y. Evaluation of Nasopharynx Bleeding after Nasotracheal Intubation in Dental Patients with Corrected Coagulopathy. IJBC 2021; 13(2): 40-43.

Introduction

Dental procedures of children with several systemic diseases require to be planned for a single session at a general anesthetic set up. Children with bleeding disorders are among those most benefited from such arrangement. Induction of general anesthesia for dental procedures is usually performed through nasotracheal intubation and occasionally by oral cavity.[1] Numerous techniques are used for nasal and oral intubation throughout recent years.[2] Oral intubation is the most common route for surgical procedures providing that the oral cavity is not the field of operation.[3] The shape and anatomy of the nasal cavity increases the incidence of trauma during the nasotracheal intubation.[4] However, nasal intubation has the advantage of full access and space for the operating dentist.[5]

Trauma to the nasal turbinates can cause potential bleeding as well as bacteremia during nasotracheal intubation.[6] As a result, nasotracheal intubation is commonly used in children for dental, oral and maxillofacial surgeries.[7] Although the operator's expertise has a high impact on the degree of trauma and probable bleeding during the procedure of nasotracheal intubation, some degrees of trauma and bleeding is not deniable.[8] Watt and colleagues reported that introducing telescopic nasotracheal catheters minimizes bleeding during nasotracheal intubation in children.[9]

Use of local analgesia prior to performing pain-

provoking dental procedures requiring general anesthesia seems to help the patient's homeostasis. This may help in providing a safer anesthesia environment for medically compromised children undergoing the same procedures under general anaesthesia.[10]

Hemophilia is the most common severe bleeding disorder caused by deficiency of blood coagulation factors VIII and IX with the estimated frequency of 1 in 10,000 live male births. The other disorders with bleeding tendency include Von Willebrand disease, afibrinogenemia, prothrombin mutations, and deficiency in V, VII, X and XIII coagulation factors.

Dental treatment of a child with hemophilia is categorized as a complex procedure specifically when planned under general anesthesia and requires a teamwork including the hematologist, pediatrician, anesthesiologist, and pediatric dentist. Considering the small size of the oral cavity in children, oral intubation is not recommended for dental procedures.[10] Factor replacement therapy is critical to optimize blood coagulation.[11] It is highly recommended to be prepared for bleeding before performing any kind of surgery.[12] We aimed to evaluate the amount of nasopharyngeal bleeding following nasotracheal intubation in patients with history of bleeding disorders who have received their prophylactic regimen preoperatively.

Materials and Methods

This was a Quasi-experimental study (ethical code: IR.SBMU.RETECH.REC.1396.1363) conducted on 23 children aged 4-16 years with bleeding disorders who had their coagulopathy treated before receiving extensive dental procedure. The inclusion criteria were children suffering from hemostatic disorders in need of dental procedures including patients with hemophilia A and B, Von Willebrand disease, Bernard-Soulier syndrome and Glanzmann's thrombasthenia who were treated with the relevant factors in advance before undergoing general anesthesia. An informed consent was signed by all parents before any attempt to start the study. General anesthesia was induced using Fentanyl, Propofol and Atracurium. Nasotracheal tube was placed using a spiral tube and Isofluoran anesthetic gas was used for induction of general anesthesia.

Bleeding was measured through the operation using a surgical suction. This suction device had 2 chambers: one for collecting blood from nasotracheal region and the other to collect blood from the operation field (oral space). The bleeding from nasotracheal intubation was collected by a series of 4×4-inch gauzes and total bleeding was calculated by calculation the combination of the surgical suctions and the above-mentioned gauzes. 25 gauzes (4×4-inch), numbered from 1-25, dye staining with methylene blue were used for precise measurement of the amount of the bleeding.[13] Blood collected in the chambers was measured accordingly. The final amount of the blood was then calculated from the total number of the used gauzes to remove all the clots. Bleeding related to the dental procedure was not included in these measurements. The volume of the bleeding was scored as: scarce: 0-2 cc/kg, low: 2-4 cc/kg, moderate: 4-6 cc/kg, high: 6-8 cc/kg and very high >8 cc/kg. This scoring was assigned by the experience of the anesthesiologist of the team. The amount of post-operative nasal bleeding was also recorded in the same way using gauzes every 4 hours up to 24 hours by parents and was reported for further calculation. Collected data were then analyzed using non-parametric Friedman test.

Results

23 patients were analyzed of whom; 10 hemophilia A, 3 hemophilia B, 4 factor VII deficiency, 2 patients with factor X and XIII deficiency and four patients with Von Willebrand disease, Bernard-Soulier syndrome, Glanzmann's thrombasthenia and one with an unknown bleeding disorder were enrolled into the study.

Bleeding events were observed in just two patients: one with Glanzmann thrombasthenia that the bleeding occurred during the dental operation and the other in patient with Von Willebrand disease who developed bleeding during intubation and dental operation since 4-20 hours after the procedure. None of these two patients had bleeding after 24 hours. The other patients did not develop any bleeding episode. According to the above-mentioned scoring system, the amount of blood loss in the patient with Von Willebrand disease was about 4.16 cc during nasotracheal intubation and about 100 cc in the patient with Glanzmann thrombasthenia from 4-24 hours following dental procedure. There was not any report of active bleeding during the recovery period in any patient. Interestingly no bleeding was observed 24 hours after nasotracheal intubation in these patients.

For the management of the bleeding in the patient with Glanzmann thrombasthenia, we used tranexamic acid to control the nasal bleeding. In the patient with Von Willebrand disease, the patient was hospitalized for two days and besides nasal tampon, received VWF factor to control the bleeding and also to calculate the volume of the bleeding in determined timing intervals (during nasotracheal intubation and dental procedure). There was no significant difference in the bleeding amount of the patients in the determined timing intervals (P=0.583, Table 1).

Table 1: The comparison of bleeding in determined intervals between patients with Glanzmann and VWD

Timing	Mean rank (cc)
During nasotracheal intubation	5.00
During dental procedure	5.11
Recovery	4.82
4 h post nasotracheal intubation	5.14
8 h post nasotracheal intubation	5.14
12 h post nasotracheal intubation	5.07
16 h post nasotracheal intubation	5.00
20 h post nasotracheal intubation	4.91
24 h post nasotracheal intubation	4.82
P value	0.583

Discussion

Haemophilia A is characterized by coagulant factor VIII deficiency which is the most serious hereditary

coagulation disorder.[14] Intravenous replacement of factors VIII or IX are the main treatment options for these cases using purified plasma-derived concentrates.[10] Patients with hemophilia are at high risk of bleeding if massive surgical procedures are planned including multiple dental extractions.[14] Danger of bleeding in patients with hemophilia remains as a daily concern for routine dental procedures as the use of rotary instruments can cause injury to surrounding highly vascularsoft tissues.[15] Any dental surgical procedure for children with bleeding tendency increases the chance of trauma and subsequent bleeding.[11] The required dosage of the coagulant factor is directly dictated by the severity of the injury and duration of the procedure.[12]

Israels and colleagues reported that the rate of the bleeding can be measured using a pre-fabricated vacuum-shaped splint. Oral intubation is one of the methods for dental surgical procedures.[16] As mentioned before, the main limiting factor for intranasal intubation could be the potential trauma and bleeding in patients with coagulopathies. Findings of an earlier investigation indicated that those with severe hemophilia A had spontaneous bleeding during nasotracheal intubation, while mild and moderate cases (2-10% factor VIII) developed excessive bleeding only after receiving a trauma or surgery.[17]

Based on our findings, bleeding resulting from nasal intubation was scarce among the patients except mainly one case with VWD. However, it should be emphasized that attempts are made routinely to avoid any trauma while performing intranasal intubation.[18] Delgado and Sanders stated that nasotracheal intubation is inexpensive, nonproprietary and rapid while reducing epistaxis and nasopharyngeal trauma if performed by standard norms in children with factor IX deficiency.[19] Ashburn et al. compared performance of a group of emergency physicians with residents in estimating blood loss on different surfaces using 4×4-inch gauze sponge method. Based on their findings, no significant difference was found between the residents and physicians.[13] Elwood and co-workers reported that bleeding was reduced in the catheter-guided group during nasotracheal intubation. The main concern in the procedure of nasotracheal intubation is blood aspiration into the lungs.[2] Silicon-based wire-Reinforced tracheal tube reduces the risk of nasal canal damage as it requires fewer attempts compared to the polyvinyl chloride tracheal tubes.[2]

Conclusion

Nasotracheal intubation can safely be performed in patients with bleeding disorders after stabilization of the coagulation status.

Acknowledgment

Authors express their acknowledgement to the research center of anesthesiology at Shahid Beheshti University of Medical Sciences for Scientific and financial support of this research.

Conflict of Interest: None declared.

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