DENTAL MANAGEMENT OF HAEMOPHILIC PEDIATRIC PATIENTS

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ABSTRACT

The aim of the study was to evaluate the effectiveness of a standard protocol to prevent bleeding episode / s after dental procedures.

Eighty-six pediatric patients (5-13 yrs) of both genders requiring minor invasive dental procedures were screened by the Haemophilic Center and referred to Dental Department of Children's hospital, Pakistan Institute of Medical Sciences (PIMS), Islamabad. Protocols observed to provide correct homeostasis included pre-operative intravenous factor replacement therapy and post-operative local and systemic application of tranexamic acid.

Treatment outcome rated as excellent (achievement of normal haemostatic with local and orally agents) was achieved in 57% patients. A good outcome (mildly abnormal haemostatis requiring systemic agents but not requiring factor therapy) was found in 39% while only 3 patients exhibited a poor outcome (severely abnormal haemostatis requiring factor therapy). No bleeding event required hospitalization.

It was concluded that strict observance of this protocol can be termed successful in achieving haemostatis in haemophilic patients undergoing minor invasive dental treatment.

Key words: Haemophilia, Antifibrinolytic agents, Dental management, Pediatric patient.

INTRODUCTION

Haemophilia is a hereditary disease of the mechanism of blood clotting, clinically manifested as a tendency to bleed which presents a serious challenge in a dental practice.¹ The normal mechanism for blood clotting is a complex series of events. When a blood vessel is injured, platelets collect over the injured area and form a temporary plug to prevent further bleeding. This temporary plug, however, is too disorganized to serve as a long-term solution, so a series of chemical events occur, resulting in the formation of a more reliable plug. The final plug involves tightly woven fibers of a material called fibrin. The production of fibrin requires the interaction of several chemicals, in particular a series of thirteen proteins called clotting factors. In hemophilia, certain clotting factors are either decreased in quantity, absent, or improperly

formed. Since the clotting cascade uses amplification to rapidly plug up a bleeding area, absence or inactivity of just one clotting factor can greatly increase bleeding time.²

Haemophilia A is the deficiency of factor VIII and Haemophilia B, also called Christmas disease, is the deficiency of factor IX. Haemophilia C, involving factor XI, is very rare but much milder than haemophilia A or B. The normal plasma concentration of factors is 50-100 IU/dl. When the plasma concentration falls below 1 IU/dl, disease manifestations are severe; ranges between 2-4 IU/dl, moderate and a range between 6-40 IU/dl, mild.³ In haemophilia, laboratory investigations reveal isolated prolongation of activated partial thromboplastin time (APTT), although the bleeding time, prothrombin time (PT) and thrombin time (TT) are usually normal.⁴

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The most common cause of bleeding in haemophilic patients in a dental office is procedure-induced trauma. Major oral surgeries in haemophilia patients with antibodies counteracting coagulation agents take place in a haemophilia treatment centre. However, minor uncomplicated oral surgery in haemophilic patients can be carried out in the dental clinic but ideally in collaboration with a haematologist.⁵ Special protocols before, during and post procedure must be observed to provide correct homeostasis for an invasive dental treatment. As with all replacement therapies, the halflife of each of the different factors is an aspect that must be kept in mind as it is central to the dental treatment plan e.g. the half-life of F-VIII is 10-12 hrs, which indicates that the dental treatment sessions should be comprised of extensive treatments grouped on consecutive days.1

Generally, two main approaches have been followed; the first is based on the use of systemic intravenous replacement therapy of the deficient clotting factors such as DDAVP or FVIII concentrates.⁶ The second approach is based on improvement of homeostasis at the sites of oral bleeding through local applications of tranexamic acid (TA) and fibrin glue (FG), mainly in addition to or, less frequently, instead of replacement therapy.⁷ According to many authors, the role of antifibrinolytic agents in haemophilic patients has significantly reduced the number of bleeding complications after dental treatments; even the use of crushed tablets of tranexamic acid placed in socket after dental extraction has been found to be effective.⁸

We here describe our experience with a standard local prophylactic regimen during minor oral surgery with a wide spectrum of haemophilia types, over a period of one and a half year. The purpose of this study was to evaluate the effectiveness of this protocol to prevent bleeding episode after dental procedures in pediatric haemophilic patients in a tertiary care hospital in Islamabad. To the best of our knowledge, this is the first study of its kind in Islamabad, Pakistan.

METHODOLOGY

The study was conducted in the Dental Department in collaboration with the Haemophilia Center of the Children's Hospital, Pakistan Institute of Medical Sciences (PIMS), a tertiary care level hospital in Islamabad. Inclusion criteria were children of both genders between the age groups of 5-13 years who were referred to the dental department, for minor oral surgery and other invasive dental procedures from the PIMS Haemophilic Center. Referral was made after complete screening and blood tests by the center. An exclusion criterion was haemophilic patients that did not need an invasive dental procedure which would result in bleeding such as fissure sealants, class I, III, IV and V fillings or those requiring major oral surgery. Another exclusion criterion was patients suffering from any other medical disorder that may affect heamostatis. The study was reviewed by the ethics committee of the Pakistan Institute of Medical Sciences, Islamabad and granted permission.

A total of 86 patients were selected from May 2009 to September 2010 and they underwent 144 different dental procedures including full mouth scaling, class II fillings, root canal treatment and extractions. Standard protocols of informed consent from the guardians/ parents of the selected subjects were observed. Subjects' parents/guardians were informed of their right of option to drop out from the study at any point they see fit. They were also advised to report any complication occurring during the study. All dental procedures were carried out free of cost, hence no participatory fee was offered.

Detailed patient medical history was taken followed by laboratory tests including complete blood picture, blood vitamin Klevel, Hepatitis B/C screening and plasma factor concentration. If the laboratory tests revealed factor deficiency that fell within the moderate and severe range³ then factor replacement therapy was given to the patients prior to any dental procedure to normalize the plasma concentration of factors. Patients identified with Vitamin K deficiency (< 0.10 ng mL⁻¹)⁹ were placed on vitamin K supplements, recalled at three months intervals and after their Vitamin K level normalized, they were included in this study. Precautions observed to prevent accidental damage to the oral mucosa during the dental treatment included careful use of saliva ejectors, care in the placement of X-ray films particularly in the sublingual region, protection of soft tissues during restorative treatment by using a rubber dam or applying yellow soft paraffin wax.

Protocols to minimize bleeding differed with each dental procedure. Supra-gingival scaling of full mouth was carried out in two or three separate visits prevent excessive bleeding. After scaling tranexamine pack was placed to prevent bleeding. Mouthwash containing tranexamic acid was advised to each patient for four

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times a day (QID) for one week and 1 g of tranexamic acid given orally QID for 7 days after the procedure. The patients were kept under observation for 1-1 $\frac{1}{2}$ hours post operative after each visit.

Teeth with periapical infection were treated endodontically. Most were deciduous teeth but in some patients the first molar was also included. All the patients were managed with local antifibrinolytic agents of mouthwashes containing tranexamic acid QID for 7– 8 days post procedure. Carefully working length of the root canal was calculated to ensure that instruments did not cross the canal apex to minimize the bleeding. Class II carious teeth were filled with glass ionomer cement with careful placement of matrix bands and wedges to minimize tissue injury. However, when the cavities extended deep to the gingiva and instrumentation caused gingival bleeding, additional systemic antifibrinolytic treatment was used.

Teeth were extracted with minimal tissue injury. The usual treatment for all extraction cases was a tranexamine injection, dosage calculated at 10 ml/Kg, and 1 g of tranexamic acid orally QID a day prior to surgery. Following extraction, a tranexamine pack was immediately placed in the socket and patient advised to take 1 g of tranexamic acid orally QID for 7 days combined with tranexamic acid mouthwashes QID for 7 days. The patients were kept under observation for 1-1 $\frac{1}{2}$ hours post operative.

Treatment outcome was rated as excellent (achievement of normal haemostatis with local and orally agents), good (mildly abnormal haemostatis requiring systemic agents but not requiring factor therapy), or poor (severely abnormal haemostatis requiring factor therapy) as a measure of overall efficacy.

RESULTS

The characteristics of the study population are summarized in table 1. Different blood groups were involved but the most common blood group was A+. The most common factor involved was factor VIII. The results are summarized according to the dental treatment carried out.

Supra-gingival scaling was done in 28 patients and no patient had severe bleeding complication. Deep scaling was performed on two patients who then required additional tranexamine injections after the procedure. Rest all patients (92%) were managed successfully according to the protocol and none of the patients required additional therapy. Conservative and root canal treatment was carried out in 52 patients. Additional 1 g of tranexamic acid orally QID 7 days were given to 11(21%) patients after the procedure and one of them got an additional tranexamine injection post-procedure when bleeding didn't stop after 30- 40 minutes. Rest all patients (77%) were managed successfully according to the protocol without requiring additional therapy.

Extractions were done in 64 patients. Patients who received additional tranexamine injection after the procedure were 39 (61%). The bleeding didn't stop after 25-30 minutes in two (3%) patients who were then given additional factor therapy. Of these two, one had severe haemophilia and the other had moderate haemophilia. Rest all patients (36%) were managed successfully according to the protocol without requiring any additional therapy.

Overall out of 86 patients, excellent outcome results was achieved in 49 (57%) patients, good treatment outcome was achieved in 34 (39.6%) patients and poor outcome was achieved in 3 (3.4%) patients, as summarized in table 2. We recorded a total of 3 bleeding complication (poor outcome) two cases occurred in patients after extractions and with severe/moderate haemophilia A. One case occurred after deep scaling. In remaining all dental procedures the result outcome was rated as excellent/good. No bleeding event required hospitalization.

DISCUSSION

Dental management of patients with hereditary bleeding disorders involves a close cooperation between hematologists and oral surgeons. In fact, the former must provide the latter with the appropriate prophylactic regimen to prevent secondary local bleeding during oral interventions and oral surgeons must carry out all techniques to reduce the probability of surgery-related bleeding.⁶

In the present study, we found a low incidence (3.4%) of bleeding complications after oral procedures. Even considering only oral surgery, the rate of bleeding events remained a low 3% (2 out of 64), a result similar to that observed in the few studies published so far.¹⁰ In our opinion, the good results of our protocol are mainly due to the use of local and systematic use of antifibrinolytic drugs. This fact has been demonstrated by several authors who claim that these agents actively improve local homeostasis and thus can significantly reduce the rate of systemic therapy use and of bleeding complications during oral surgery.¹¹

In our study patients who underwent scaling were successfully managed simply by the tranexamine containing mouthwashes and oral tranexamic acid for 5-7 days. This is congruence with findings in previous studies.¹² Moreover in patients with advance gingivitis, bleeding episodes can be reduced after surgery by substitution therapy with factor concentrate, supported by local and systemic antifibrinolytic treatment with tranexamic acid.¹³ In this study patients who had their teeth extracted were found to be more susceptible for bleeding episode but only three developed complications that required factor therapy post procedure. The rest, with a pre-operative infusion of tranexamic acid along with factor therapy proved to effective, again a result in congruence with a previous study.¹⁴ Our patients who had endodontic treatment gave excellent results with the pre-procedure factor replacement therapy. This result was similar to a study that advised this protocol since a inferior alveolar nerve local anesthesia carries a risk of bleeding into the muscles along with potential airway compromise due to a hematoma in the retromolar or pterygoid space.15

TABLE1: CHARACTERISTICS OF	STUDY
POPULATIONS (N=86)	

Characteristics	No of patients
Age (years)	5–13 (median 8)
Mae	67 (78%)
Female	19~(22%)
Type of disease:	
Haemophilia A	75 (87%)
Mild	35(47%)
Moderate	17 (10)
Severe	23~(30%)
Haemophilia B	11 (13%)
Mild	06~(55%)
Moderate	01 (9%)
Severe	04 (36%)
Vitamin k deficiency	03~(3.4%)

In this study three patients had vitamin K deficiency, so prior to the dental procedures these patients were received vitamin K supplement to reduce the post operative complications. According to some authors patients presenting with certain illnesses, such as hepatic failure or renal failure, or those taking anticoagulant medications, aspirin, antiplatelet medications and/or nonsteroidal anti-inflammatory drugs, are prone to bleeding during delivery of dental treatment.¹⁶ These patients should be treated after careful medical history.

CONCLUSIONS

On the basis of the results the following conclusions may be drawn:

- 1. Prior to any dental procedure the patient should be refered to the haemophilic department to rule out the etiology of disease and obtain a blood complete picture to rule out deficient clotting factors, Vitamin K deficiencies and their plasma concentrations.
- 2. Surgical treatment, including a simple dental extraction, must be planned to minimize the risk of bleeding, excessive bruising, or hematoma formation. Emergency surgical intervention in dentistry is rarely required as pain can often be controlled without resorting to an unplanned treatment. All treatment plans must be discussed with the haemophilia unit if they involve the use of prophylactic cover.
- 3. After dental procedures blood loss of all kinds can be controlled locally with direct pressure or periodontal dressings with or without topical antifibrinolytic agents.
- 4. If the patient exhibits heavy bleeding especially after extraction, then tranexamine injection should be given immediately after the procedure.

Outcome Results	Number of patients	Treatment of bleeding episode
Excellent	49	Local and Orally tranexamic acid
Good	34	Additional tranexamine injection
Poor	03	Additional factor therapy

TABLE 2: TREATMENT OF POST OPERATIVE BLEEDING EPISODES IN 86 PATIENTS

- 5. If bleeding doesn't stop then patient should be hospitalized for further factor therapy.
- 6. Six months follow up is very important for these patients as the progression of disease in these patients is very high compared to normal individuals.

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