Assessment of knowledge, importance and management of uncontrolled bleeding in dental surgical procedures among dental professionals

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DOI: https://doi.org/10.22271/oral.2021.v7.i4e.1388

Abstract
Background: Uncontrolled bleeding can cause risks of morbidity and complications in dental surgical procedures, therefore it is very important to have adequate knowledge about handling and management of such scenarios if and when they occur. The purpose of this study was to assess the knowledge, importance and management of uncontrolled bleeding in dental surgical procedures among dental health professionals in Pune.

Materials and Methods: A questionnaire study was conducted among dental health professionals in Pune city. A structured, self-administered, close-ended questionnaire was designed to collect the data which consisted of two parts and comprised of 23 questions related to knowledge, attitudes and practices in management of uncontrolled bleeding. The reliability statistics were calculated and Cronbach alpha value was 0.751. Statistical analysis was done using descriptive statistics.

Results: In this study, there were a total of 166 participants of age 21 and above. 92.8% of the participants were aware with some of the medical conditions associated with uncontrolled bleeding in dental surgical procedures while the others were unaware or not sure. 92.2% of the participants agreed that medical history plays and important role in dental surgical procedures while the others disagreed to it.

Conclusion: The most of the participants are aware about the causes of uncontrolled bleeding although there is a need for guidance about the management of uncontrolled bleeding, especially in patients on anticoagulant therapy where the matter is still not well defined despite of guidelines.

Keywords: anticoagulant therapy, bleeding disorders, dental surgical procedures, medical condition, uncontrolled bleeding

Introduction
Dental surgeries include procedures from simple dental extraction to alveoloplasties it may present with risk of complications such as Pain, nerve injury, swelling, infections and bleeding. Risk of morbidity and complications in surgery can occur due to uncontrolled bleeding, therefore it is very important to have knowledge about management of uncontrolled bleeding during dental surgical procedures [1] and also there must be an awareness about the impact of it [2]. Risk factors contribute to uncontrolled bleeding in patients who are on anti-platelet, anti-coagulant medication as well chemotherapeutic agents, local causes such as poor oral hygiene, infection or local trauma [3] also who have uncontrolled hypertension, liver disease, platelet deficiency, Von Willebrand factor deficiency and hemophilia [4]. Hemophilia is the most common inherited lifelong bleeding disorder with frequency of 1 in 5000-30000 births which is characterized by excessive bleeding and prolonged clotting time into mucosa and soft tissue and also been associated with morbidity and mortality as well as numerous impact on overall health [5]. Ischemic events in heart, lungs and brains are caused by thrombotic and thromboembolic occlusion of blood vessels, which is prevented by anti-platelet and anti-coagulant therapies, long term use leads to increase in the bleeding time and also associated with risk of post-operative hemorrhage [6]. Therefore it is important to consult physician to assess the patient’s need for any dental surgical procedure [7].
Dental and medical evaluations, history and investigations should be done before any dental surgical procedures to minimize risk of complications in patient that present with personal and/or family history, abnormalities in laboratory reports suggestive of inherited or acquired bleeding disorder and also in patients on anticoagulants/antiplatelet medications. Knowledge about management procedures in cases bleeding disorders plays an important role in reducing complications, and also decision to interrupt continue antiplatelet therapy for a dental surgical procedure in patient by referring to their physician. A broad range of hemostatic agents are available to avoid complications when long lasting bleeding occurs despite if the proper use of traditional techniques of hemorrhage control, as adjunctive measures to enhance hemostasis in the course of dental surgeries. Therefore, the study aimed to assess the knowledge, importance and management of uncontrolled bleeding in dental surgical procedures among dental health professionals in Pune.

Materials and Methods

A questionnaire study was conducted among dental health professionals in Pune city to assess knowledge, importance and management of uncontrolled bleeding in dental surgical procedures. The objectives of this study were to estimate the knowledge, importance about uncontrolled bleeding and to create awareness about the possible complications in dental surgical procedures. The study duration was about three months. The participants were selected based on the following inclusion criteria: i) The practicing dentists, ii) Participants who are willing to participate in the study. Non-practicing dentists, dental students and dental auxiliaries are excluded from the study. The input parameter for sample size calculation used as follows: 80% power of the study, alpha error 0.05, effect size 0.3 (medium), and degree of freedom as 5. The calculated sample size was 156 using G*Power software version 3.1.9.2 (Heinrich Heine University, Düsseldorf). The final considered sample size for the study was around 166. The convenient sampling technique was used in the study. A structured, self-administered, close-ended questionnaire was designed to collect the data which consisted of two parts and comprised of 23 questions related to knowledge, attitudes and practices in management of uncontrolled bleeding. The first part consisted of demographic data such as age, gender, qualification and experience and the second part consisted of questions based on knowledge, attitude and practice in management of uncontrolled bleeding. The reliability statistics were calculated and Cronbach alpha value was 0.751. The questionnaire was prepared using Google forms (Google LLC, Mountain View, California, United States) and the link was distributed to the selected participants via e-mail, WhatsApp number and other social media platforms (Instagram, Telegram, etc.). A brief introduction about the study was given and informed consent was also taken from all the participants. Data collected were entered in a spreadsheet (Microsoft Excel, 2016). Statistical analysis was done using descriptive statistics (number and percentage). SPSS (Statistical Package for the Social Science) 23.0 version software (IBM Chicago, Illinois, United States). The p value was set at 0.05.

Results

In table 1, there were a total of 166 participants out of which 137 were of age group 21-40 years and 22 were of age group 41-60 years while the rest were from 60 years and above. There were 106 female participants and 60 male participants. Majority of the participants were BDS (62%), MDS were 35.5%, PhD were 2.4%. 41% of participants had an experience of 10 years, 3.6% had an experience more than 10 years. In table 2, 92.8% of the participants were aware of some of the medical conditions associated with uncontrolled bleeding in dental surgical procedures while the others were unaware or not sure. Around 84.9% of the participants thought that the causes for uncontrolled bleeding were hypertension, bleeding disorder and clotting disorder while 1.2% was unaware. Around 65.1% of the participants thought that Vitamin K, Injection Pause and Ethamsylate are the systemic agents used in chemical methods to control hemorrhage. In table 3, 92.2% of the participants agreed that medical history plays and important role in dental surgical procedures while the others disagreed to it. Around 88% of participants agreed that it is important to perform medical test on patients with underlying disorder prior to dental surgical procedures while 4.8% of participants disagreed to it. In table 4, 46.4% of dental health professionals suggest performing International Normalized Ratio/Activated Partial Thromboplastin Time while 7.8% are unaware. Around 91.6% of participants prefer pressure pack as a primary method and 72.9% prefer adrenaline to control hemorrhage.

Table 1: Demographic details of study participants (N=166).

| Sr. No. | Demographic details | Response | N   | %    | Total N (%) |
|---------|---------------------|----------|-----|------|-------------|
| 1       | Age                 | 21-40 years | 137 | 82.5%| 166 (100)   |
|         |                     | 41-60 years | 22  | 13.3%|             |
|         |                     | 61 and above years | 7  | 4.2% |             |
| 2       | Gender              | Male     | 60  | 36.1%| 166 (100)   |
|         |                     | Female   | 106 | 63.9%|             |
| 3       | Education           | BDS      | 103 | 62%  | 166 (100)   |
|         |                     | MDS      | 59  | 35.5%|             |
|         |                     | PhD      | 4   | 2.4% |             |
| 4       | Experience          | Less than one year | 68 | 41%  | 166 (100)   |
|         |                     | 1-5 years | 65  | 39.2%|             |
|         |                     | 5-10 years | 27  | 16.3%|             |
|         |                     | More than 10 years | 6  | 3.6% |             |

Note: N – number, % - percentage.
Table 2: Knowledge related questions responses of study participants (N=166).

| Sr. No. | Questions                                                                 | Responses                          | N    | %      | Total  |
|---------|---------------------------------------------------------------------------|------------------------------------|------|--------|--------|
| 1       | What is the average volume of blood in normal adult?                      | 4.5-5 Litres: 126 (75.9%)          | 5.5-6 Litres: 23 (13.9%)          | 3.5-4 Litres: 3 (1.8%)          | 4-5.5 Litres: 14 (8.4%)          |
| 2       | Are you aware of some medical conditions associated with uncontrolled bleeding during dental surgical procedures? | Yes: 154 (92.8%)                  | No: 9 (5.4%)                      | Not sure: 3 (1.8%)               |
| 3       | What are the causes for uncontrolled bleeding during dental surgical procedures? | Hypertension: 7 (4.2%)           | Bleeding Disorder: 11 (6.6%)       | Clotting disorder: 5 (3.1%)       | All of the above: 141 (84.9%)     | None of the above: 2 (1.2%)       |
| 4       | What is the most common inherited bleeding disorder seen in dental Outpatient Department? | Haemophilia: 64 (38.6%)            | Disseminated intravascular coagulation (DIC): 11 (6.6%) | Haemophilia and DIC: 86 (51.8%)   | None: 5 (3%)                      |
| 5       | What is the normal prothrombin time and activated partial thromboplastin time? | 10-20 seconds, 5-10 minutes: 29 (17.5%) | 5-7 seconds, 3-5 seconds: 20 (12%) | 5-10 minutes, 20-30 seconds: 15 (9%) | 11-14 seconds, 30-34 seconds: 102 (61.4%) |
| 6       | In which condition prothrombin time and activated partial thromboplastin time is prolonged? | Anticoagulant therapy: 141 (84%)   | Disseminated intravascular coagulation: 113 (68.1%) | Liver disease: 87 (52.4%)        | Hypertension: 31 (18.7%)         | Diabetes Mellitus: 25 (15.1%)     |
| 7       | Anticoagulant drugs are given in which condition?                         | Stroke: 2 (1.2%)                  | Ischaemic heart disease: 17 (10.2%) | Pulmonary embolism: 5 (3%)       | All of the above: 140 (84.3%)     | None of the above: 2 (1.2%)       |
| 8       | What is the natural anticoagulant produced in the body?                   | Heparin: 139 (83.7%)              | Warfarin: 16 (9.6%)               | Coumarin Derivative: 8 (4.8%)     | Ethylenediamine tetraacetic acid: 3 (1.8%) |
| 9       | What are the most commonly prescribed antiplatelet drugs among the following? | Aspirin: 25 (15.1%)               | Clopidogrel: 9 (5.4%)             | Heparin: 6 (3.6%)                | Aspirin and Clopidogrel: 126 (75.9%) |
| 10      | Aspirin is contraindicated in which of the following medical conditions?  | Bleeding Disorder: 66 (39.8%)      | Clotting Disorder: 36 (21.7%)      | Bleeding and Clotting Disorder: 59 (35.5%) | None: 5 (3%)                      |
| 11      | What are the systemic agents used in chemical methods to control haemorrhage? | Vitamin K: 32 (19.3%)             | Injection Pause: 9 (5.4%)         | Ethamsylate: 5 (3%)              | All of the above: 108 (65.1%)     | None of the above: 3 (1.8%)       | I don’t know: 9 (5.4%)            |
| 12      | Embolization of vessels can be done with the help of                      | Angiography: 151 (91%)           | X-Ray: 5 (3%)                     | C.T Scan: 5 (3%)                 | M.R.I: 5 (3%)                     |

Note: N – number, % - percentage, CT scan - Computed Tomography, MRI - Magnetic Resonance Imaging.
Table 3: Attitude related questions responses of study participants (N=166).

| Sr. No. | Questions                                                                 | Responses                  | N   | %    | Total |
|---------|---------------------------------------------------------------------------|----------------------------|-----|------|-------|
| 1       | Do you think medical history plays an important role in dental surgical procedures? | Strongly Agree: 119 (71.7%) |     |      | 166 (100) |
|         |                                                                           | Agree: 34 (20.5%)          |     |      |       |
|         |                                                                           | Neutral: 7 (4.2%)          |     |      |       |
|         |                                                                           | Disagree: 2 (1.2%)         |     |      |       |
|         |                                                                           | Strongly Disagree: 4 (2.4%) |     |      |       |
| 2       | Do you think it is important to know about anticoagulant therapy and its protocol before proceeding with dental surgical procedures? | Yes: 153 (92.2%)          |     |      | 166 (100) |
|         |                                                                           | No: 6 (3.6%)               |     |      |       |
|         |                                                                           | Not sure: 7 (4.2%)         |     |      |       |
| 3       | Do you think that blood thinners weaken your immune system?               | Strongly Agree: 68 (41%)   |     |      | 166 (100) |
|         |                                                                           | Agree: 27 (16.3%)          |     |      |       |
|         |                                                                           | Neutral: 39 (23.5%)        |     |      |       |
|         |                                                                           | Disagree: 24 (14.5%)       |     |      |       |
|         |                                                                           | Strongly Disagree: 8 (4.8%) |     |      |       |
| 4       | Do you think Diurnal variation of blood pressure is also one of the causes of uncontrolled bleeding post extraction? | Strongly agree: 82 (49.4%) |     |      | 166 (100) |
|         |                                                                           | Agree: 40 (24.1%)          |     |      |       |
|         |                                                                           | Neutral: 30 (18.1%)        |     |      |       |
|         |                                                                           | Disagree: 12 (7.2%)        |     |      |       |
|         |                                                                           | Strongly Disagree: 2 (1.2%) |     |      |       |
| 5       | Do you think it is important to perform medical test on patients with underlying disorder prior to dental surgical procedures? | Strongly agree: 120 (72.3%) |     |      | 166 (100) |
|         |                                                                           | Agree: 26 (15.7%)          |     |      |       |
|         |                                                                           | Neutral: 12 (7.2%)         |     |      |       |
|         |                                                                           | Disagree: 3 (1.8%)         |     |      |       |
|         |                                                                           | Strongly disagree: 5 (3%)   |     |      |       |

Note: N – number, % - percentage.

Table 4: Practice related questions’ responses of study participants (N=166).

| Sr. No. | Questions                                                                 | Responses                      | N   | %    | Total |
|---------|---------------------------------------------------------------------------|--------------------------------|-----|------|-------|
| 1       | A patient comes to your OPD for dental procedure with lab. Report showing decreased platelet count and increased bleeding time, it is suggestive of? | Bleeding Disorder: 67 (40.4%)  |     |      | 166 (100) |
|         |                                                                           | Clotting Disorder: 61 (36.7%)  |     |      |       |
|         |                                                                           | Bleeding and Clotting Disorder: 32 (19.3%) |     |      |       |
|         |                                                                           | Not sure: 6 (3.6%)            |     |      |       |
| 2       | According to you dental procedures in patients on anticoagulants should/can be performed | With consent of physician: 153 (92.2%) |     |      | 166 (100) |
|         |                                                                           | Without consent of physician: 8 (4.8%) |     |      |       |
|         |                                                                           | I don’t care: 4 (2.4%)        |     |      |       |
|         |                                                                           | I’m unaware: 1 (0.6%)         |     |      |       |
| 3       | If a patient comes to your clinic with a toothache has a history of valve replacement surgery (prosthetic valve) and is on blood thinner, which lab investigation will suggest? | Activated partial thromboplastin time & bleeding time: 24 (14.5%) |     |      | 166 (100) |
|         |                                                                           | Prothrombin time & activated partial thromboplastin time: 24 (14.5%) |     |      |       |
|         |                                                                           | Prothrombin time/International normalised ratio: 28 (16.9%) |     |      |       |
|         |                                                                           | International normalised ratio/activated partial thromboplastin time: 77 (46.4%) |     |      |       |
|         |                                                                           | I don’t know: 13 (7.8%)       |     |      |       |
| 4       | What do you prefer as primary method to control haemorrhage?              | Pressure pack: 152 (91.6%)   |     |      | 166 (100) |
|         |                                                                           | Ligation: 1 (0.6%)           |     |      |       |
|         |                                                                           | Sutures: 6 (3.6%)            |     |      |       |
|         |                                                                           | Other: 7 (4.2%)              |     |      |       |
| 5       | What is your treatment approach for patients on anticoagulant therapy before and after dental surgical procedures? | Stop medication 3 days prior & start 2 days later: 96 (57.8%) |     |      | 166 (100) |
|         |                                                                           | Stop medication 2 days prior & start 2 days later: 19 (11.4%) |     |      |       |
|         |                                                                           | Stop medication 5 days prior & start 2 days later: 44 (26.5%) |     |      |       |
|         |                                                                           | Other: 7 (4.2%)              |     |      |       |
| 6       | Which chemical agent do you prefer to control haemorrhage?               | Adrenaline: 121 (72.9%)      |     |      | 166 (100) |
|         |                                                                           | Gelatine sponge: 18 (10.8%)  |     |      |       |
|         |                                                                           | Bone wax: 12 (7.2%)          |     |      |       |
|         |                                                                           | Other: 15 (9%)               |     |      |       |

Note: N – number, % - percentage.

Discussion
Uncontrolled bleeding in susceptible patients is a great matter of concern to the dentist before performing any dental surgical procedure [11]. Causes for uncontrolled bleeding are Hemostasis disorder and also antiplatelet and anticoagulant therapies [5, 6]. Dental health professionals practice local hemostatic measures and systemic agents to control hemorrhage [7]. The purpose of this paper is to assess knowledge, importance and management of uncontrolled bleeding in dental surgical procedures among dental health professionals. In the present study 92.8% of the dental health professionals were aware about the bleeding disorders; this was 87% in the study done by George A et al. [12] (2017). According to Gopalasamy K et al. [3] (2015) most participants thought that the main cause for uncontrolled bleeding were bleeding and clotting disorders, this study showed the similar
reports. In study from Gorge A et al. (2017) showed that 53 participants out of 100 encountered hemophilia as the most common bleeding disorder in their clinical practice, and a similar result is seen in this study with 64 participants out of 166. About 71.7% of the participants in this study thought that it was important to obtain medical history since it pays an important role in dental surgical procedures, whereas according to Okoye HC et al. (2021) around 83.9% of participants thought the same.

Around 52.53% of the dental students were aware about the normal International Normalized Ratio test (which is currently the selected method for reporting Prothrombin Time values) according to Potdar S et al. (2016) when compared to this study 61.4% of dental health professionals were aware of normal prothrombin time. Cerebrovascular disease and ischemic heart conditions are managed by antplatelet and anticoagulant medications. The question remains whether to stop anticoagulant regimen before dental surgical procedure. What should be done by the dentist in such cases, whether the type of dental procedures matter. According to Shah AH et al. (2015) around 85% of the practitioners were of the opinion to stop antplatelet drugs before dental procedure while in our study 95.8% of the participants were of the same opinion. Some studies reported high risk of immediate bleeding in patients on anticoagulant regimen like Thomason et al. (1997) excessive hemorrhage was seen in one patient with two surgical procedures on aspirin 150mg/day and also in study by Lemkin et al. (1974) one patient with 18 extractions on 12-20 aspirin tablets daily, where platelet transfusion was done in both cases. While several others stated that minor oral procedures can be done without the risk of bleeding in such patients, hence it is life threatening as thromboembolism. In the present study, around 92.2% of the participants thought that it is important to seek consent from physician before dental surgical procedures similarly a study conducted by Potdar S et al. (2016) around 82.5% of the participants thought it was important to suggest physicians consent and a similar result is shown in a study conducted by Gopalsamy K et al. (2015) with 70%. In study done by George A et al. (2017) around 77.4% of the dental health professionals manage the bleeding disorder by applying pressure and from this study 91.6% of the participants used the same method. The limitation of this study was the small sample size; the study can be done using a large population with different variables.

Recommendations
1. Proper medical and dental history should be obtained from patients, appropriate lab investigations should be suggested by the dentist before and dental surgical procedures in susceptible individuals along with proper physician’s consent.
2. Availability of agents used in chemical, mechanical, thermal methods to control hemorrhage. And knowledge of Intravenous drug administration among dental health professional in order to prevent any medical emergencies and dependencies.

Conclusion
The most of the participants are aware about the causes of uncontrolled bleeding although there is a need for guidance about the management of uncontrolled bleeding, especially in patients on anticoagulant therapy where the matter is still not well defined despite of guidelines. They should therefore be encouraged to thoroughly screen the patients, especially prior to any surgical intervention, in order to avoid unexpected complications or events.

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