

Knowledge about post-extraction complications among dental students

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ABSTRACT

Introduction: The most common dental procedure done in the dental clinics is the extraction of teeth. Each dental practitioner should know the various complications that can happen during these procedures. Post-extraction complications generally do not occur; however, there are times when the dentist is faced with post-extraction complications. In such instances, the dentist should be aware of the treatment procedures and management of post-extraction complication. **Aim:** The aim of the study was to evaluate the knowledge of dental students regarding post-extraction complications and their management. **Materials and Methods:** A random sample of 150 dental students was taken. A short pretested questionnaire of 13 questions was given to them. The questionnaire was designed to assess their basic knowledge about the post-extraction complications and its management. Data obtained was tabulated, statistically analyzed and results obtained. **Results:** About 40% of dental students reported bleeding to be the most common post-operative complication, followed by pain 30%, swelling 16.6%, and dry socket which is 13.3%. All 150 dental students agreed that thorough medical history can be useful for treating complications. About 39% of dental students responded that localized pressure by biting on gauze arrest bleeding. Majority of students were aware that displacement of the tooth into maxillary sinus is highly seen during extraction of maxillary 1st molar. **Conclusion:** This study revealed that knowledge about post-extraction complications among most of the undergraduate dental students was adequate. Good quality of treatment can be maintained, if future dentists have a good knowledge of post-extraction complications and the methods of preventing and managing them.

KEY WORDS: Bleeding, Dry socket, Extraction, Pain

INTRODUCTION

The most common dental procedure done in dental clinics is the extraction of teeth.^[1] Each dental practitioner should know the various complications that can happen during these procedures. Post-extraction complications generally do not occur; however, there are times when the dentist is faced with post-extraction complications. In such instances, the dentist should be aware of the treatment procedures and management of post-extraction complication. Adequate training is imparted to the dental doctors during the course of their curriculum and during training in internship. The difficulties of extractions may be multifactorial. Surgical removal of impacted third molars is one of the most common procedures carried out in oral and maxillofacial

surgery. Most third molar surgeries are performed without complications. However, such procedure can lead to serious complications to the patient, such as hemorrhage, persistent pain and swelling, infection, dry sock, dentoalveolar fracture, paresthesia of the inferior alveolar nerve, infection of the extraction site, and even mandibular fracture. Complication rates may vary, which are influenced by different factors, includes age and health condition of the patient, gender, tooth impact level, surgeon's experience, smoking, intake of contraceptive medicine, quality of oral hygiene, and surgical technique, among others.^[1] It seems that female patients show higher accident and complication rates.^[1] Deliverska and Petkova revealed that the incidence of post-operative edema in female patients (12.7%) is significantly higher than in male patients (1.4%).^[2]

Dry socket also called as alveolar osteitis is defines as a severe pain in and around the site of an extracted tooth, intensifying anytime between the 1st and

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3rd operative days, accompanied by partial or total blood clot loss in alveolar socket. The pain is usually throbbing in nature. Several risk factors that affect the incidence of alveolar osteitis after tooth extraction have been identified. The most important identified risk factors are smoking, drinking, poor oral hygiene, age, etc. Dry sockets are much more common among smokers.^[3] Nonsteroidal anti-inflammatory drugs may be taken by mouth if additional pain relief is needed. People who are under anticoagulants such as warfarin or aspirin should inform before the dentist a week before any surgical procedure because these drugs will increase the tendency to bleed. Use of bisphosphonate drugs in high doses or for long periods causes osteonecrosis of the jaw which may also occur spontaneously. This condition occurs in rare cases. The most common of these drugs are bisphosphonates such as alendronate, risedronate, ibandronate, and zoledronate. Bisphosphonates seem to have a higher risk of causing osteonecrosis of the jaw in people who undergo oral surgery of the lower jaw while taking intravenous bisphosphonates, who have previously been given high doses of bisphosphonates by vein, or who have been taking bisphosphonates for a long period of time. The risk of developing osteonecrosis of the jaw is much lower in people who are given bisphosphonates in standard doses for osteoporosis.

The most common complications following dental extractions are as follows:

Bleeding

One of the most common complications of all surgeries is post-operative bleeding. Post-operative bleeding from dental extraction is commonly due to venous bleed from nutrient blood vessels in the supporting bone but can also be due to an arterial source. Other causes of post-operative bleeding may include the failure to debride all granulation tissues from the socket, torn soft-tissue, and rebound vasodilatation following the use of epinephrine-containing anesthetics. Patient factors can also contribute to excessive and prolonged post-operative bleeding. Patients who are on medications such as Coumadin, aspirin, Plavix, and chemotherapeutic agents may have prolonged bleeding. Patients who have uncontrolled hypertension, liver diseases, platelet deficiency, hemophilia, von Willebrand factor deficiency, or Vitamin K-deficiency may also pose a significant risk for post-operative bleeding.^[3] Therefore, it is very important in the pre-operative consultation to elicit a thorough medical history and obtain appropriate medical consults as indicated.

Surgical Swelling and Infection

Post-operative soft-tissue swelling can be a normal part of the healing process. The wound heals by the inflammatory process, which has four cardinal signs:

Tumor (swelling), rubor (redness), dolor (pain), and calor (heat). The initial clot serves as a wound protector as well as scaffolding for the formation of granulation tissues. Granulation tissues are highly vascularized tissue beds that help bring nutrients and fibroblasts to the wound for repair. Due to the increased blood flow, increased hydrostatic pressure, and increased transudate that contains all the immune cell types and chemotactic factors, swelling is ensured. Particularly during surgical extraction of third molars, the removal of bone and the elevation of periosteum can cause significant swelling in the post-operative period. This swelling will increase throughout the first 3–4 post-operative days. Elevation of the head and neck during this period is recommended to minimize swelling. Ice packs may be used on alternating sides every 20 min during the first 24–48 h but may do little to alleviate swelling associated with oral surgery. Administration of steroids has been shown to decrease post-operative swelling.^[4] Surgical swelling should slowly diminish from post-operative day 3 or 4 onwards until it finally disappears by day 7–10. This process may be expedited using a warm pack on the swollen area. Nonsurgical post-operative swelling is usually due to infection of the surgical site. It usually manifests as an increase in swelling beyond post-operative day 3 or 4 with increasing pain, presence of purulent drainage from the wound, and fever and chills. The causes of post-operative infection can be multiple and can range from an immunocompromised host (diabetics, cancer patients, HIV-positive individuals, patients under chemotherapy, or radiation therapy, etc.) to poor surgical techniques or poor instrument sterilization. Management of post-operative infection depends on the extent of the disease. Acute localized abscess may be treated initially with a course of antibiotics targeted toward the most common oral flora (mainly Gram-positive cocci), whereas more extensive infection may require incision and drainage of the infective material in addition to antibiotic therapy. Chronic infection tends to involve multiple organisms including Gram-negative bacilli. Multi-drug therapy may be indicated in this setting. Whenever an infection of the oral cavity is encountered, one must be cognizant of the potential life-threatening compromise of the airway. If the patient expresses difficulty in breathing, shortness of breath, or an inability to tolerate oral secretions, immediate referral to the emergency room is mandated. More extensive incision and drainage, airway management, intravenous antibiotics, and hospitalization would be the appropriate treatment at that time.^[5]

Dry Socket

Dry socket also called as alveolar osteitis is defines as a severe pain in and around the site of an extracted tooth, intensifying anytime between the 1st and 3rd operative days, accompanied by partial or total blood clot loss in alveolar socket. The pain is usually throbbing in nature.

Several risk factors that affect the incidence of alveolar osteitis after tooth extraction have been identified. The most important identified risk factors are smoking, drinking, poor oral hygiene, age, etc. Dry sockets are much more common among smokers.^[5]

Sinus Perforation

The maxillary sinus is a potential source of complication during the extractions of upper molars. The floor of the sinus is usually the closest to the palatal root of the upper first molars.^[6] The floor of the sinus may be so close to the roots that part of it can be removed with the tooth during routine extractions. Breathe out through their nose with their mouth wide open is the easiest way to test the presence of sinus perforation during which the patient is asked to squeeze close the nostrils. If the sinus is perforated, air will leak from the nasal passage through the sinus into the oral cavity. Using indirect vision with the help of a mouth mirror, one would see bloody air bubbles. However, this test should only be limited to the initial evaluation of sinus perforation and should not be encouraged in the post-operative course.

Root Tip in Maxillary Sinus

As mentioned above, the floor of the sinus is closely associated with the maxillary molar roots. If a root tip is pushed into the sinus during extractions, place the patient in an upright position to allow gravity to draw the root tip closer to the perforation. Ask the patient to blow the nose with nostrils closed, then watch for the root tip to appear in view near the perforation for suctioning. One can also try antral lavage, in which saline is injected into the sinus in an attempt to flush the root tip out. If these local measures are unsuccessful, the patient may require a Caldwell-Luc procedure, in which the ipsilateral canine fossa is entered for a direct visualization of the sinus and removal of the root tip.^[6]

Nerve Injury

The inferior alveolar nerve and artery are both contained within the inferior alveolar canal. The course of this canal is such that it usually runs buccal and slightly apical to the roots of the mandibular molars. During extraction of the mandibular molars, due to the proximity of the roots, the nerve can be traumatized. Some radiological findings predict the close proximity of never to the roots of the tooth. The lingual nerve travels medial to the lingual plate near the second and third molars region. Overzealous dissection of the lingual gingiva or aggressive sectioning of the molar during extraction can result in injury to the lingual nerve.^[7] Fracture of the lingual plate during elevation can also traumatize this nerve. The overall incidence of inferior alveolar nerve and lingual injury during mandibular molar extractions ranges between 0.6 and 5%.^[8] In the present study, we tried to evaluate the knowledge of dental students regarding post-extraction complications. Dental extractions are considered minor surgical procedures

and difficulties following extractions and complications are unpredictable. Hence, this issue is very significant, as it is concerned with the quality of treatment.

MATERIALS AND METHODS

A self-administered questionnaire of 13 questions was administered to 150 students, belonging to third, final year, and internship trainee of the undergraduate dental program in Saveetha Dental College and Hospitals, Saveetha University, Chennai. The questionnaire consisting of 13 validated questions and was personally distributed to the students. Their responses were collected and descriptive statistical analysis was done. The questionnaire was divided into two sections. The first section is assessing the knowledge of graduating dental students and the second section assessing the attitude of graduating dental students in knowing more about the complication following extraction and their management. Data extracted was statistically analyzed using SPSS and results obtained.

Questionnaire

The questionnaire was designed to collect the data regarding the basic knowledge and attitude of undergraduate dental students about the post-extraction complications and its management. The data from the participants were collected, statistically analyzed, and the results were obtained.

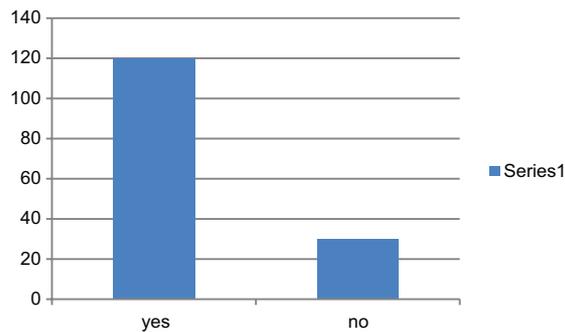
Description of Questionnaire

1. Is the following conditions are the complications of tooth extraction?
Prolonged bleeding, infection, dry socket, jaw fracture, and sinus perforation.
A) Yes
B) No
2. Most common post-extraction complication?
A) Prolonged bleeding
B) Dry socket
C) Pain
D) Swelling
3. Having a thorough medical history before extraction will allow the dentist to better deal with the complication that may arise.
A) Yes
B) No
4. Pattern of pain experience following tooth extraction
A) No pain
B) Mild pain
C) Moderate pain
D) Severe pain
5. Which of condition make the extraction more difficult?
A) Grossly decayed tooth
B) Abnormal root morphology
C) Teeth exhibiting hypercementosis
D) Endodontic treated tooth

6. Displacement of tooth into the maxillary sinus is highly seen during the extraction
 - A) Maxillary 1st molar
 - B) Maxillary 2nd molar
 - C) Maxillary 3rd molar
 - D) All of the above
7. Ecchymosis is most commonly seen in?
 - A) Elderly patients
 - B) Younger patients
 - C) All age group
8. What is dry socket?
 - A) Alveolar osteitis, where a blood clot fails to develop in the tooth socket
 - B) Throbbing pain in the gum
 - C) Bad smell or taste coming from the tooth socket
 - D) All of the above
9. Which of the following conditions can favor dry socket after extraction?
 - A) Women taking oral contraceptive
 - B) Patient with uncontrolled diabetes mellitus
 - C) Patient age between 30 and 40
 - D) All of the above
10. Does smoking have any effect on incidence of dry socket?
 - A) Yes
 - B) No
 - C) Do not know
11. How is dry socket treated?
 - A) Irrigation with warm saline
 - B) Curettage of the extraction site
12. What substance should never be placed into the extraction socket?
 - A) Petroleum-based compounds and tetracycline powder
 - B) Adrenaline
 - C) Hemostatic agent
13. How will you manage prolonged bleeding?
 - A) Direct pressure over the socket
 - B) Suturing
 - C) Crushing the foramen socket with hemostat
 - D) Applying hemostatic agents

RESULTS

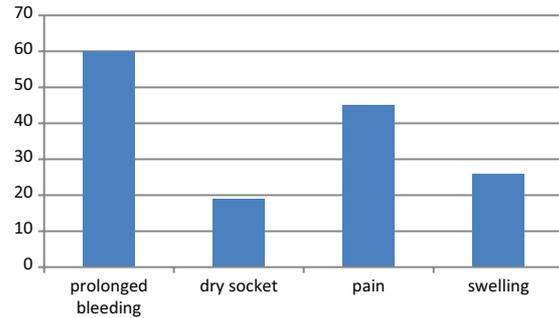
Question: 1



In answer to Question number 1, 120 (80%) responded to the question correctly saying that all

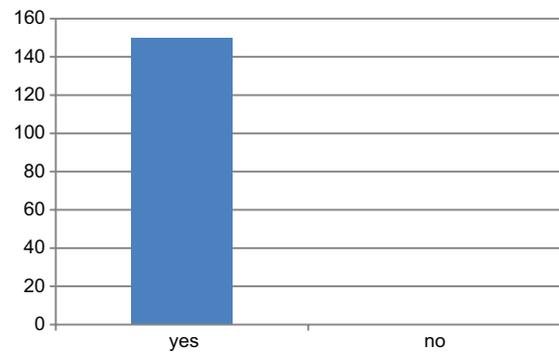
the conditions such as prolonged bleeding, pain, swelling, and dry socket are the complication of post-extraction and the rest 20% students replied no to the question.

Question: 2



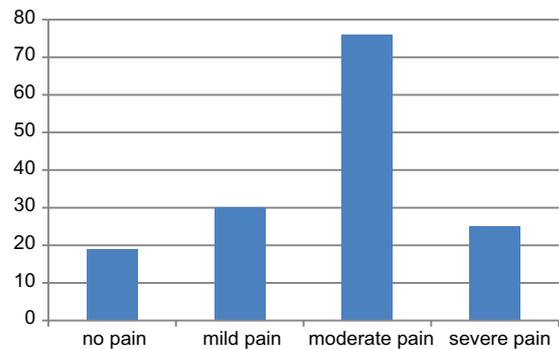
The number of students giving the correct response to Question number 2 was 40% prolonged bleeding; which is followed by 30% pain, 16.6% swelling, and 13.3% dry socket.

Question: 3



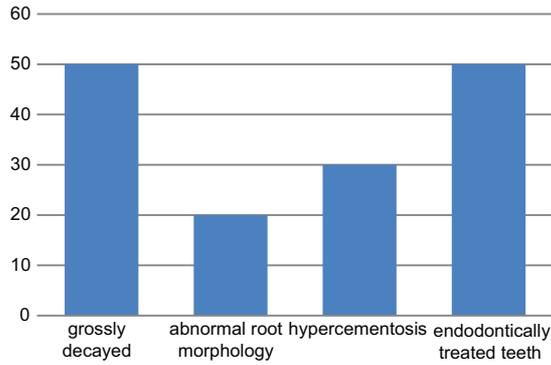
All 150 students said yes that having a thorough history before extraction will allow the dentist to better deal with the complication that may arise.

Question: 4



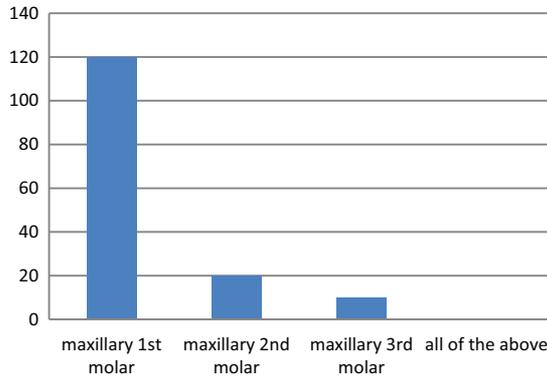
Pattern of pain experience following tooth extraction is reported 50.6% of moderate pain, 20% of mild pain, 16.6% of severe pain, and 12.6% of no pain.

Question: 5



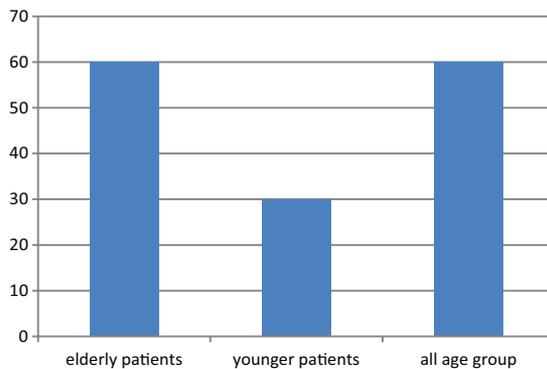
About 33.3% of student says that grossly decayed tooth and endodontically treated tooth make the extraction more difficult followed by hypercementosis 20% and 13.3% abnormal root morphology.

Question: 6



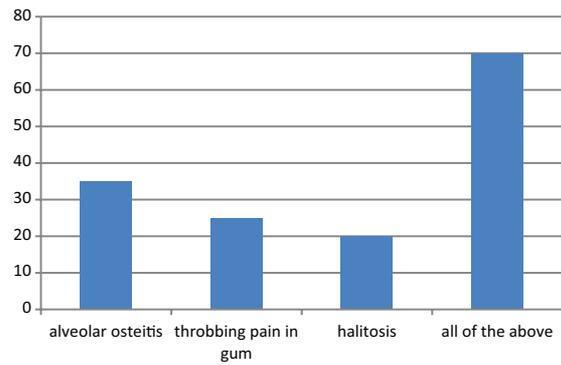
About 82% of respondents reported that the displacement of tooth into the maxillary sinus is highly seen during the extraction of maxillary 1st molar.

Question: 7



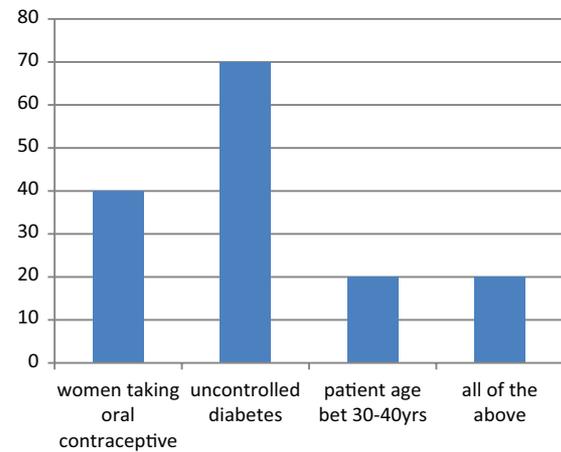
Ecchymosis is commonly seen in elderly patients. About 40% of the respondents reported correctly.

Question: 8



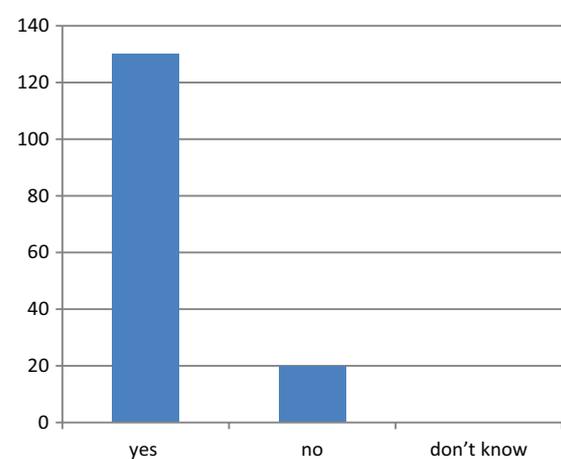
Dry socket is a painful complication otherwise called as alveolar osteitis. Pain is throbbing in nature with bad breath. About 46.6% of students mentioned all of the above, followed by 23.3% (alveolar osteitis), 16.6% (throbbing pain in gum), and 13.3% (halitosis).

Question: 9



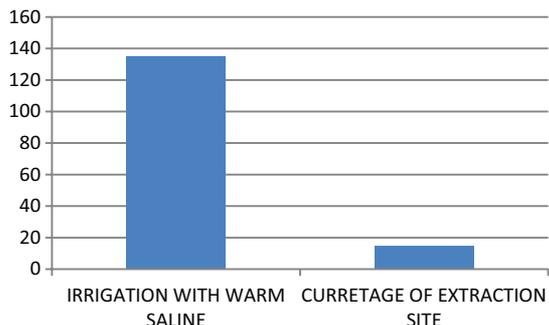
Patient with uncontrolled diabetes mellitus can favor dry socket after extraction. Among 150 dental students, 46.6% of the student gives the correct answer.

Question: 10



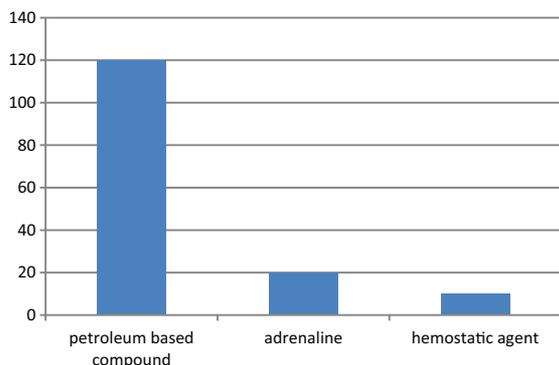
About 86.6% of dental students responded that smoking has an effect on incidence of dry socket.

Question: 11



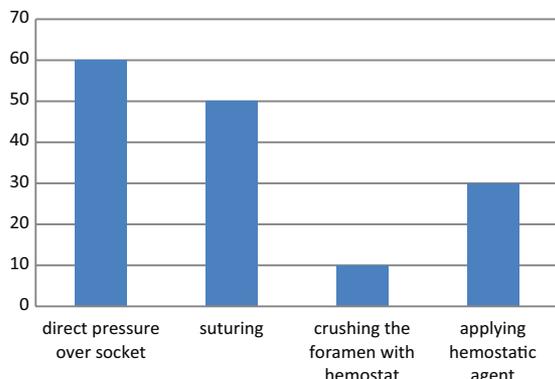
Dry socket is a common complication after 3rd molar extraction and it is treated by simple irrigation with warm saline. About 90% of the respondents responded correctly to the question.

Question: 12



About 80% of the respondents responded correctly to the Question no: 12 stating that petroleum-based compounds and tetracycline powder are the substances should never be placed into the extraction socket.

Question: 13



Localized pressure by biting on gauze is useful in the arrest of hemorrhage post-extraction in healthy patients. 40% of respondents responded correctly to this question.

In this study, among 150 dental students, almost 120 (80%) responded to the question correctly saying

that all the conditions such as prolonged bleeding, pain, swelling, and dry socket are the complication of post-extraction and the rest 20% students replied no to the question. About 40% of respondents given the correct answer as prolonged bleeding as a common complication of extraction; which is followed by 30% pain, 16.6% swelling, and 13.3% dry socket. All 150 students said yes that having a thorough history before extraction will allow the dentist to better deal with the complication that may arise. The pattern of pain experience following tooth extraction is reported by 50.6% of moderate pain, 20% of mild pain, 16.6% of severe pain, and 12.6% of no pain. About 33.3% of student says that grossly decayed tooth and endodontically treated tooth make the extraction more difficult followed by hypercementosis 20% and 13.3% abnormal root morphology. About 82% of respondents reported that the displacement of tooth into the maxillary sinus is highly seen during the extraction of maxillary 1st molar. Ecchymosis is commonly seen in elderly patients. About 40% of the respondents reported correctly. Dry socket is a painful complication otherwise called as alveolar osteitis. Pain is throbbing in nature with bad breath. About 46.6% of students mentioned all of the above, followed by 23.3% (alveolar osteitis), 16.6% (throbbing pain in gum), and 13.3% (halitosis) for the question what is dry socket? Among 150 dental students, 46.6% of the student gives the answer that patient with diabetes mellitus can favor dry socket. About 86.6% of dental students responded that smoking has an effect on incidence of dry socket. Dry socket is a common complication after 3rd molar extraction and it is treated by simple irrigation with warm saline. About 90% of the respondents responded correctly to the question. Localized pressure by biting on gauze is useful in the arrest of hemorrhage post-extraction in healthy patients. About 40% of respondents responded correctly to this question.

DISCUSSION

The most commonly performed surgical procedure in dental clinics is the dental extractions. Post-extraction complications generally do not occur; however, there are times when the dentist is faced with post-extraction complications. In such instances, the dentist should be aware of the treatment procedures and management of post-extraction complication. Adequate training is required to the dental students during the course of their curriculum and during training in internship. The difficulties of extractions are multifactorial and it is unpredictable.^[9] In the present study, we tried to evaluate the knowledge of dental students regarding post-extraction complications. Dental extractions are considered minor surgical procedures and the difficulties following these extractions are the complications which are unpredictable.^[10] Having a

thorough medical history before surgery will allow the dentist to better deal with the complications that may arise during and after the treatment procedure. To avoid complications, the dentist should be certain to always follow proper surgical techniques and know limitations before begin any extraction.^[11] Complications such as pain, dry socket and swelling, paresthesia of the lingual or inferior alveolar nerve, bleeding, and infection are most common. For the general dental practitioner, it is important to be familiar with all the possible complications following the treatment procedure. This improves patient education and leads to prevention, early recognition and management.

In this study, among 150 dental students, about 22.3% of dental students mentioned that they have encountered complications after tooth extraction in the dental office. About 59.1% of dental students reported that bleeding to be the most common post-operative complication, which is followed by pain 19.1%, swelling 11.67%, and dry socket which is 10%. About 78.3% of dental students agreed that thorough medical history can be useful for treating post-operative complications. Among 150 dental students, about 60% of them reported that they use gelatin sponge for achieving hemostasis during excess bleeding of the socket. Only about 44.1% of 150 dental students mentioned that moist heat is used to apply for treating ecchymosis.

There is also a distinctive association between age and observed postoperative complications. The associations between the age and the postoperative complications result from the fact that the intervention in older patients lasts longer due to increased bone density. Azenha *et al.* stated that older patients have more pain, edema, and trismus as post-operative complications.^[1]

It seems that female patients show higher accident and complication rates.^[12] Monaco *et al.* reported that the incidence of post-operative edema in female patients (12.7%) is significantly higher than in male patients (1.4%).^[13] Before any surgical procedure starts, the patient must be informed about the possible incidence of accidents and complications that may occur during the surgical treatment, being aware of the fact that any unexpected situation should be dealt with the best possible way.^[14]

One of the most common procedures carried out in dental clinics and the most frequent task done at oral and maxillofacial surgery clinics is the extraction of wisdom teeth. This procedure is frequently followed by complications in the mandible^[15-17] including both iatrogenic (e.g., nerve injury and bone fractures) and inflammatory ones, those include pain, bleeding,

swelling with infection, dry socket, nerve injury, and delayed injury. Pain is also one of the most common post-operative complications of extraction^[18-20] and might be caused by the release of pain mediators from the injured tissues.^[21] Pain is an important factor in clinical practice and could even discourage patients from seeking dental treatment.^[22,23] It begins after the anesthesia subsides and reaches its peak levels during the 1st post-operative day.^[24]

The most common complication following dental extraction is prolonged bleeding. Once the tooth is removed, the socket should be inspected for the presence of any specific bleeding. A complete hemostasis can be achieved if there is no blood vessel tear in the extraction field. If the blood vessel is turned off then the adequate pressure over the extraction socket which can assist in achieving hemostasis.^[25] Bleeding from isolated vessels within the bone can occur and treatment involves crushing of the foramen socket and application of bone wax.^[26]

The most frequently reported sequelae observed after any surgical procedure was swelling of the soft tissues around the operation site which often persists for 48 h and has been reported in 18.8% patients. Post-extraction complications will be encountered most commonly after any form of surgery which includes post-operative bleeding 1.7%, hematoma 1.7%, post-operative pain 1.5%, and purulent discharge 1.5%.^[27]

The next complication after extraction is dry socket otherwise called as alveolar osteitis. There is about 5–68.5% incidence case of dry socket has been reported in the literature by many investigators. The average is approximately 3% of all extractions.^[28] A dry socket also referred to as alveolar osteitis is a post-operative complication that interferes with the healing process that takes place after a tooth extraction. Blum in 2002 defined dry socket as an “post-operative pain in and around the extraction site, which increases the pain in severity at any time between the 1st and 3rd day after the extraction, accompanied by a partial or total disintegrated blood clot within the alveolar socket with or without halitosis.”^[29]

CONCLUSION

Although the knowledge of dental students in relation to awareness of common complications post-extraction is adequate, they must update their knowledge regarding some rare complications that may occur following extractions. Continuing dental education must include lectures and videos regarding managing some rare complications that can occur during dental surgical procedures.

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