

# Prevalence and Management of Post-Extraction Complications

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## ABSTRACT

**Introduction:** Simple tooth extraction is one of the most common procedures performed by general dentists and Oral and Maxillofacial surgeons throughout daily practice. However, although it is a simple procedure, tooth-related complications could occur at any time. These complications are categorized into immediate and delayed complications.

Immediate complications are due to either tooth-related or dentist-related factors and require prompt actions and immediate management. Tooth-related factors depend on tooth morphology and tooth structure conditions. Dentist-related factors depend on the proper selection and application of the instruments. On the other hand, delayed complications might occur after two days or more following the extraction.

**Objective:** To evaluate the prevalence, prediction of risk factors complications, prevention and management of possible immediate and delayed post-extraction complications occurring in our Oral Surgery clinics at King Abdulaziz University Dental Hospital.

**Method:** An observation and assessment of the extraction procedure, data collected via validated survey were used to gather the following: Demographic data, medical history, cause of extraction, number of tooth/teeth extracted, complications if any, and who did the procedure. For each patient who underwent dental extraction, a survey was filled out, by a doctor other than the operator and the procedure was assessed under observation to record any complications that occurred during the procedure and assess the undertaken management in such a case without intervention. Data was analyzed using Chi-square test through SPSS.

**Result:** We observed 172 extraction procedures with 160 different patients, 12 had extraction more than once. A total 350 teeth were extracted from 160 patients, we observed 92 complications (53.4%) between immediate and delayed, 7 patients had both, the most common immediate complication was soft tissue injury with (81.7%) 67/82, and for the delayed complications the most common was dry socket (64.7%) 11/17 patients.

**Conclusion:** In conclusion, we found a significant association between the number of post-operative complications, their management, and the experience of the operator.

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How to cite this article: Assiry M, Aloqbi M, Albrahim H, Alnabulsi A, Abdel-Alim HM, Al-Sebaei MO, Al-Ghamdi MY, Bassyoni L (2023) Prevalence and Management of Post-Extraction Complications Journal of Complementary Medicine Research, Vol. 14, No. 2, 2023 (pp. 90-97).

## INTRODUCTION

Simple extraction is one of the most common procedures performed throughout daily practice. However, although it is a simple procedure, complications could occur at any time.

It is categorized into immediate and delayed complications. Immediate complications which happen at the same time during extraction and must be managed right away, while delayed complications might occur after two days following the extraction or more. For example, the quality of training they have received and some other factors in terms of their knowledge or education. We aspire to put the spotlight on the most common complications that undergraduate students during teeth extraction, and how they handle and manage the complications.

### KEYWORDS:

Tooth extraction and complications, postextraction complications and level of dentist experience, immediate vs delayed postextraction complication.

## LITERATURE REVIEW:

The literature has been reviewed to learn more about post-extraction complications and it is related to age, gender, medical history, dental history, tooth structure condition, root morphology, and operator experience.

As dental caries is the demineralization of the tooth surface. It results from the acid-producing bacteria that are present in the dental plaque, which accumulates on the uncleaned tooth surface. The cariogenic

bacteria use the free sugar in the diet to produce lactic acid, which with time causes demineralization of the tooth hard structure through dissolving the minerals. Tooth decay is considered one of the worldwide common epidemic diseases. It is estimated that around two billion people are suffering from dental caries, and it is more common in young individuals.<sup>1</sup> The prevalence of dental caries is higher in developing countries, it may refer to several causes such as low fluoride exposure and a low level of awareness of the importance of oral hygiene.

The prevalence of dental caries in Saudi Arabia among children has been reported in a systematic review study undertaken by Al Agili<sup>2</sup>, with a high incidence recording at (80%) in primary teeth, and (70%) in permanent teeth.<sup>2</sup> All these factors made dental caries the most common cause of dental tooth extraction.

Researches related to post extraction complications categorized complications into immediate and delayed.

Immediate complications occur during the procedure and require prompt actions and immediate management.<sup>3</sup> They include tooth fracture, dentoalveolar fracture, soft tissue injury, luxation of a neighboring tooth, wrong tooth extraction, fracture of adjacent tooth's restoration, dislodgment of the neighboring tooth's crown, dislocation of the mandible, oro-antral communication, displacement into important anatomical spaces and nerve injury.

Immediate complications are either tooth-related or dentist-related factors. Tooth-related factors depend on root morphology such as divergent rooted teeth, ankylosis, or hypercementosis, which make the extraction more difficult and prone to complications and tooth structure condition either sound, caries or restored or even endodontically treated tooth which makes tooth structure weakened, brittle and more prone to fracture or even ankylosed. Furthermore, doctor knowledge regarding applied anatomy, for example, root approximation to vital structures such as inferior alveolar canal and maxillary sinus might play an important role in the occurrence of these complications which include but are not limited to inferior alveolar nerve injury, oro-antral communication or displacement of the root to the maxillary sinus. The Dentist related factors depend on the proper selection and application of the surgical instruments, as well as the applied undue or uncontrolled extraction forces.

The establishment of immediate oro-antral communication between the oral cavity and the maxillary sinus is a frequent risk factor. It might occur with different degrees of severity, ranging from the performance of just an incision of the antrum mucosa to root dislodgement or whole tooth displacement into the maxillary sinus. The risk of sinus approximation is increased in association with mesio-angular angulation of the tooth or type III root-sinus classification (RS)<sup>4</sup>. The management

of displaced teeth to the sinus is achieved by the Caldwell Luc technique. It is performed by approaching the anterior wall of the maxillary sinus via an incision of a flap extending from the canine to the molar. After the flap reflection, the anterior wall of the maxillary sinus becomes visible, then the bone is removed from the canine fossa since it is the thinnest area. The created bone window could be widened according to the case. Moreover, removing of a maxillary molar by root sectioning might increase the risk of oroantral communication in case of improper handling of the surgical instruments.

Several researches has stressed pre-operative evaluation, using CT scan in relation to RS and Archer classifications, prior to proceeding towards surgical removal, especially of the maxillary third molar, rather than limiting the imaging to orthopantomography alone, for accurate prediction of the potential occurrence of the oroantral communication.<sup>5</sup>

Moreover, the high reported frequency of wrong tooth extraction 21.1%, is mainly attributed to the miscommunication between the referring dentist and the oral surgeon. The inadequate properly defined referral or cognitive failure is misleading<sup>6</sup>. The associated complication could be readily prevented by strictly following the universal protocol of performing the irreversible procedure. It states *first*, a pre-operative verification process, *second*, marking the operative site, and *third*, time-out.<sup>6</sup>

Dento-alveolar fractures are often associated with abnormal root morphology, ankylosed root, inaccurate extraction technique, and/or applying excessive force. Immediate management in such a case is best achieved by digital repositioning of the segment, followed by confirmation radiograph and flexible splinting for 4-6 weeks. Tearing of the inter-dental papilla is considered the most common type of soft tissue injury during dental extraction. It is usually due to faulty technique and/or lack of experience in tissue handling. If such a complication happened, the patient should not be dismissed from the clinic, without suturing the injured soft tissue and appropriate instructions to avoid loss of the suture. Luxation or extraction of adjacent teeth are due to inappropriate selection and /or application of the dental elevator. The incorrect application of this instrument may result in excessive uncontrolled forces that could affect and luxate the adjacent teeth.<sup>7</sup> In these cases, the doctor is ethically and legally obligated to inform the patient about the situation and take the responsibility of re-splinting the tooth and following the condition.

On the other hand, delayed complications might occur after two days from the extraction or more, it includes spontaneous bleeding, infection, pain, swelling, trismus, or dry socket<sup>8</sup>. Dry socket is defined as the dislodgement of the blood clot leading to exposed socket bone, this occurs due to multifactorial causes such as, traumatic extraction, use of infected instrument, not following post-operative instruction and smoking. In the literature they found that dry socket is not associated with

### ARTICLE HISTORY:

Received : Dec 16, 2022

Accepted : Jan 17, 2023

Published: Feb 18, 2023

DOI:

10.5455/jcmr.2023.14.02.14

age, sex, significant medical history, extraction site and reason for extraction rather than surgeon skills, smoking, amount of local anesthesia and/or patient compliance with post-operative instructions.<sup>9</sup> Moreover, the prevalence of dry socket was found to be higher in cases of single tooth extraction in comparison to multiple teeth extraction cases.<sup>9</sup> Patients with dry socket complain of severe throbbing pain and bad odor. Clinically, the socket content is yellowish gray in color. It is empty, dry, or full of food debris and necrotic material. It should be treated by cleaning and irrigation with chlorhexidine or saline and loose packing with eugenol dressing or Alveogel. Analgesic should be prescribed to alleviate pain in addition to antibiotics (metronidazole) in case of systemic involvement.<sup>10, 11</sup> In the literature, controversy regarding using saline irrigation routinely after tooth extraction. Some researchers believe, it might reduce the incidence of dry socket and potential infection. Others claim that no extra benefits are definitive in using saline irrigation more than two times per day.<sup>12</sup>

Prolonged postoperative healing in or without association with wet or dry socket, is among the most common complications in the smoker population. It can be interpreted based on the vasoconstriction effect of nicotine, which leads to an ischemic effect on the wound site and results in low blood flow and required elements for wound healing to the area, despite other harmful effects of the other chemical components.<sup>13</sup> A further factor related to retarded post-extraction wound healing constituted a debatable area of research in the literature regarding diabetes. Supporting evidence was based on the fact that diabetes has an effect on collagen formation which is reducing the number of fibroblast cells, which are the principal cells of forming the collagen, others attributed the delay in wound healing to the reduced amount of vascular supply.<sup>14, 15</sup>

Post extraction bleeding is a complication that might occur immediately after extraction usually due to nutrient canal during root sectioning or lingual artery injury when the surgeon crosses the lingual plate of the bone. A delayed bleeding complication might continue for about 8 to 12 hours, following the dental extraction period. The incidence of bleeding varies from 0% to 26%, which could be due to systemic factors as mentioned previously or due to local factors that are related to the extraction site itself such as soft tissue laceration of bony fragment which impaired wound healing and \ or food debris impacted in the surgical site. The patient may have oozing bleeding after the extraction, but with the salivary flow, it appears as profound bleeding. It usually occurs in association with smokers and in patients suffering from congenital bleeding disorders such as hemophilia and Von Willebrand disease. Acquired bleeding is sometimes related to medications such as anticoagulants. Drug withdrawal for a few days before extraction is imperative to avoid potential severe bleeding after extraction, which has been recorded as 7-times more common when compared with normal patients<sup>16</sup>. However, this might put these patients, especially in coronary artery implantation of drug-eluting stents (ADAPT-DES), at risk of serious complications. The prolonged post-extraction bleeding can be managed by local hemostatic measures with favorable outcomes<sup>17</sup>.

Infection as a post-operative complication is occasionally occurring after tooth extraction as a risk factor. It is usually correlated with the relative complexity of the extraction, surgeon experience<sup>18</sup>, and cause

of tooth extraction either dental caries or periodontal disease, in some periodontal diseases antibiotic prescription may require reducing post extraction infection, on the other hand, administration of prophylactic antibiotic prior dental extraction reduces the risk of postoperative infection, dry socket, and pain that result in increased mild and transient adverse effect<sup>19</sup>.

The presence of preoperative infection and using infected instruments increase the chance of post-operative infection. Pain, swelling, and trismus are often encountered after surgical tooth extraction, especially with impacted third molar extraction which depends on the amount of bone removal and size of the impacted tooth. Extensive studies in the literature reported their occurrence, as transient complications<sup>20</sup>.

Throughout the literature reviewed, interestingly despite the extensive research, the complications associated with teeth extraction remain a dynamic research area that requires additional information and evaluation regarding their incidence, causes, risk factors, prevention, and management.

### Research Question:

Did post-operative complications happen more frequently among undergraduate students, interns, general practitioners or consultants in King Abdulaziz University Dental Hospital, Jeddah?

### Research Hypothesis

Postoperative complications happened more frequently among undergraduate students.

### Research Objectives

To evaluate the prevalence, prediction of risk factors complications, prevention and management of possible immediate and delayed post-extraction complications occurring in our Oral Surgery clinics at King Abdulaziz University Dental Hospital.

## AIM OF THE STUDY

The present study is based on observing the extraction procedure aiming at assessing:

- The ability of the operator, to predict any potential complication from the provided patient medical history, dental history, radiograph, clinical examination.
- The prevalence, causes, prevention, and management of possible immediate and delayed post-extraction complications
- Compare the knowledge and experience of the operators to prevent or deal if such a case that has been faced, in our Oral Surgery clinics at King Abdulaziz University Hospital.

## Significance of the Study

- The study may help identify the frequency of complications occurring among various levels of practitioners.
- Evaluate their ability to identify complications, risk factors and their knowledge in dealing with it if such a case occurred.

- Furthermore, the result of this study may influence the reinforcement of prevention and management protocols.

**Impact of the Study**

Reduce the occurrence of post-extraction complications and enhance the correct management rate of the complications if occurred by spotting light on the most common complications.

**METHODOLOGY**

This observational cross-sectional study aimed to evaluate the prevalence of post-extraction complications in King Abdulaziz University Dental Hospital, Jeddah, Saudi Arabia. A random selection of patients, who underwent dental extraction over a six-month period extending from November 17<sup>th</sup> to April 17<sup>th</sup>, in the oral surgery clinic, department of oral and maxillofacial surgery, was carried out. A validated survey was used to gather the following data: patient name, age, medical history, medications, cause of extraction, number of tooth/teeth extracted, complications if any, and the name of the operator. Data were collected individually from 160 individual patients by a blinded dentist other than the operator during the extraction and follow-up appointment accordingly, if applicable. For each patient who underwent dental extraction with undergraduate students, interns, general dentist, or a consultant, both genders in the study period in dental university hospital were included in the study.

Data was collected by filling out the survey, and the procedure was assessed under observation to record any complications that occurred during the procedure and assess the undertaken management in such a case.

The survey was composed of detailed questions including patient gender, age, significant medical history, medication, tooth identification, cause of extraction, operator level, and if complications occurred or not.

If any complications were faced, they were divided into two categories: immediate and delayed complications. Immediate complications include but are not limited to uncontrolled bleeding, soft tissue injury, tooth fracture, dent alveolar fracture, luxation of the adjacent tooth, oroantral communication, dislocation of the mandible, wrong tooth extraction, and tooth displacement into anatomical spaces. On the other hand, delayed complications include but are not limited to spontaneous bleeding, dry socket (alveolar osteitis), pain, swelling, trismus, and infection. If any complications were recorded, then we had to assess the management that has been taken by the operator without any intervention from the observer doctor, during performing the extraction procedure, their attitude towards dealing with difficulties, their methods of prevention of potential complications, and their readiness in dealing with those complications to assess their attitude afterward.

Data were analyzed using the Chi-square test through SPSS® version 25, for Windows statistical software.

**RESULTS**

We observed 172 extraction procedures on 160 different patients, 12 of them had more than one extraction. The age

distribution revealed that (60%) 103/172 ranged from 18 to 35 years old. The gender showed a slightly higher male preponderance, since (56%) 96 were male. The extractions were done by the 5th, 6th-year students, interns, GPs, and specialists/consultants. Related to the medical history of the patients 52/172 (30%) had significant conditions, while (23.8%) had either hypertension, diabetes mellitus, or smoker as shown in Table 1.

Table 1: Basic Summary of patients

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Group	Frequency	Percentage
<b>Age</b>		
18-25	56	32.6%
26-35	47	27.3%
36-45	31	18.0%
46 and above	38	22.1%
<b>Gender</b>		
Female	76	44%
Male	96	56%
<b>History</b>		
No	120	70%
Yes	52	30%
<b>History Type</b>		
DM	10	19.2%
Smoker	10	19.2%
Hypertension	9	17.3%
Anemia	4	7.7%
DM, Hypertension	3	5.8%
Asthma, Allergy	2	3.8%
Hypothyroidism	2	3.8%
ADHD	1	1.9%
Allergy	1	1.9%
Chemotherapy	1	1.9%
DM, Allergy	1	1.9%
DM, Asthma	1	1.9%
DM, Hypertension, Hypothyroidism	1	1.9%
Hernia surgery	1	1.9%
Hypertension, Anemia	1	1.9%
Hypertension, Asthma	1	1.9%
Hypertension, Glucoma	1	1.9%
Hypertension, Hypothyroidism	1	1.9%
Multiple sclerosis	1	1.9%

A total of 350 teeth were extracted from 160 patients, with the most tooth being extracted was the lower right first molar; 28/350 (8%), while the second most extracted tooth was the upper right premolar 26/350 (7.4%). We noticed that the right side had more extractions than the left, where 203 extracted teeth were in the right quadrants and 147 in the left. The rest of the data is presented in Table 2.

Table 2: Distribution of the impacted teeth

Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Teeth
#11 (2)	#21 (2)	#31 (0)	#41 (1)	CI = 5
#12 (1)	#22 (5)	#32 (0)	#42 (2)	LI = 7
#13 (2)	#23 (3)	#33 (2)	#43 (5)	C = 12
#14 (26)	#24 (16)	#34 (14)	#44 (11)	P1 = 67
#15 (17)	#25 (10)	#35 (10)	#45 (14)	P2 = 51
#16 (20)	#26 (15)	#36 (24)	#46 (28)	M1 = 87
#17 (14)	#27 (12)	#37 (12)	#47 (18)	M2 = 56
#18 (23)	#28 (11)	#38 (11)	#48 (19)	M3 = 64
Q1 = 105	Q2 = 74	Q3 = 73	Q4 = 98	T = 350

The primary cause of extractions was dental caries with 138 cases/172 (80.2%) followed by orthodontic reasons in 11 cases (6.4%), periodontal involvement in 7/172 (4%), and then endo failure in 3/172 (1.7%). as presented in figure 1.

Regarding the complications, we observed 92 cases (53.4%) between immediate and delayed, 7 patients had both as summarized in figure 2.

The most common immediate complication was soft tissue injury with (81.7%) 67/82 cases, followed by 13 (15.8%) cases of tooth fracture, then uncontrolled bleeding 5 patients out of 82 (6.1%), as presented in figure 3.

Moreover, for the delayed complications the most common was dry socket (64.7%) 11 cases out of 17 patients, while the second most common delayed complication was pain in 6 cases/17 (35.3%), as presented in figure 4.

For the rate of complications between the healthy and the medically compromised patients, it was found that 24 of the complications occurred in patients with significant medical history (26.1%), on the other hand, the complications rate in

the healthy group was 68/92 (73.9%). If we sought the rate of complications regarding who did the extractions, the results revealed that most of the complications occurred in the consultants' group 7/9 (77.7%), while the least complications are in the 5th-year students' group 19/42 (45.2%) and for other groups the results presented in Table 3.

Regarding the management of these complications, it was found that 67 cases/92 (72.8%) were referred. Figure 5, However 58/67 (86.5%) of the managed cases received the proper treatment. The results further depicted that the right management in relation to the total complications was 58/92 cases (63%).

Moreover, the total number of extractions, number of complications happened and the percentage of correct management of these complications for each group presented in Table 3.

The *p*-value of the test is 0.015 which is significant at 5% level of significance. Therefore, the test implies that there is a strong association between standard management and the operator level.

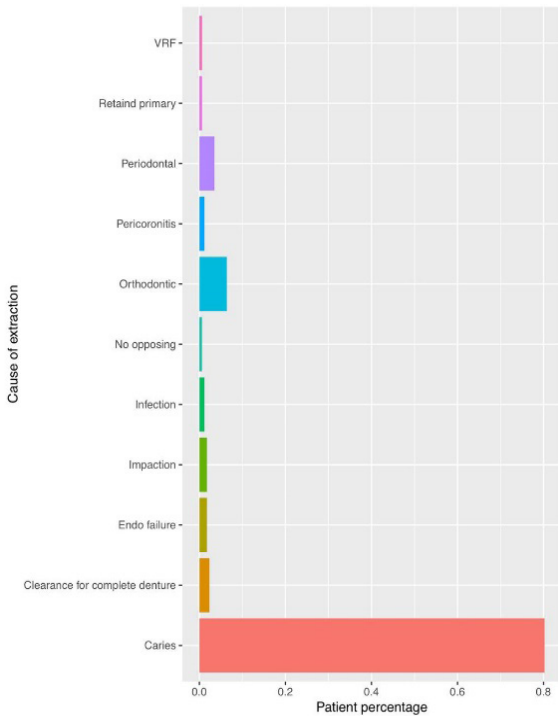


Fig.1: Cause of teeth extraction

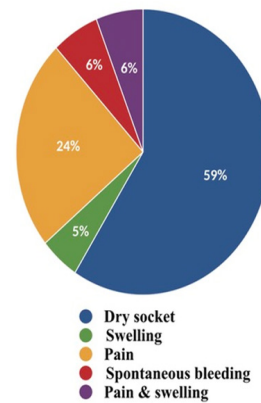


Fig. 4: Distribution of delayed complications

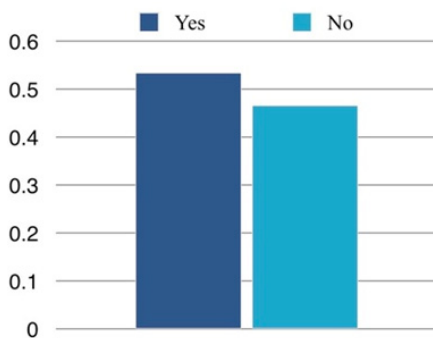


Fig. 2: Occurrence of complications

Table 3: Distribution of the dentist's level who did the complications

	5th Year	6th Year	Interns	GPs	Consultants
<b>Total</b>	<b>42</b>	<b>94</b>	<b>21</b>	<b>6</b>	<b>9</b>
<b>No</b>	23	42	10	3	2
<b>Yes</b>	19 (45.2%)	52 (55.3%)	11 (52.3%)	3 (50%)	7 (77.7%)
<b>Correct</b>	17 (89.4%)	46 (88.4%)	4 (36.3%)	2 (66.6%)	7 (100%)

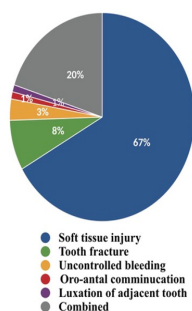
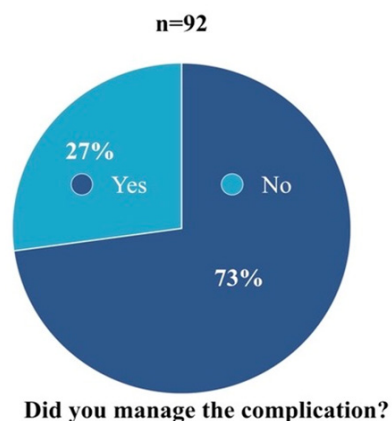


Fig. 3: Distribution of complications



Did you manage the complication?

The *p-value* of the test is  $3.7767174 \times 10^{-11}$  which is highly significant at both 1% and 5% level of significance. Therefore, the test implies that there is a strong association between complications and the correct management.

## DISCUSSION:

A dental extraction is a common procedure that any dentist can encounter in his daily practice. The associated complications could happen unexpectedly. The general practitioner should be able to manage simple cases at the time of occurrence of the complication. We aimed in this study is to evaluate the prevalence, prediction of risk factors complications, prevention and management possible immediate and delayed post-extraction complications. Moreover, the study aimed at enumerating of the most common complications, their causes, frequency, and the role of the practitioner's experience in preventing complications from occurring or managing it if any complications faced. All data were recorded while observing tooth extraction in our Oral and maxillofacial Surgery clinics at King Abdulaziz University Faculty of dentistry Hospital, Saudi Arabia, Jeddah. We obtained an interesting result which showed that 56% of the patients who came for extraction were male, which could highlight the fact that females take more care about their oral health and teeth maintenance. This is like previous results reported by Saravanan's <sup>21</sup>, where (67.5%/74) were males, while (55.8%/120) in Passarelli's results proved to be males as well.<sup>22</sup>

Almost two-thirds of the sample size aged under 36 years old, which may indicate the oral status and poor oral hygiene that ends up with extraction of their teeth.

In the present results, it was found that the lower right and left first molar were the most common teeth to be extracted. This could be attributed to the early eruption of these teeth at an early age (at 6 years), which leads to their exposure to multiple cariogenic factors for a lengthy period, in addition to inadequate care from the parents neglecting the importance of tooth brushing of their kids. For the second most common tooth extraction which is the right upper first premolar, it could be due to the fact this tooth erupts before second molar and premolar and even before the canine in most of the time, having said it gets exposed to cariogenic media for a longer time and become carious more easily than these teeth. The other factor to be taken into consideration is that this tooth is involved in crowding and orthodontic need imposes its extraction. (58%) of the extracted teeth were in right quadrants, this variable may be since most people are right-handed, so they might be eating more frequently in the right quadrants, which could result in more potential involvement with dental caries.

The results depicted that the cause of extraction, was mostly due to dental caries in 138 (80.2%) teeth, followed by orthodontic extractions in 11 (6.4%) cases, periodontal causes in 7 (4%) teeth, and endodontic failure in only 3 (1.7%) cases. Equivalent results were previously reported in Passarelli's research, which recorded 289 (52.2%) of teeth extracted due to dental caries, 198 (35.7%) of teeth extracted because of periodontal disease, and 38 (6.9%) of teeth extracted because of endo failure.<sup>22</sup> On other hand, other work stated that periodontal disease was the most common cause of dental extraction <sup>23</sup>. The difference may be due to different age groups, medical status of the

patients, the difference in treatment planning, and possible race-related factors, all these elements may contribute to this difference.

Regarding the incidence of complications, it occurred in (53,4%) of the extraction cases. Soft tissue injury recorded the higher results, (81.7%) of the total complications, while tooth fracture was limited to (15.8%), this could be explained by the low level of experience 5th and 6th year students when dealing with elevators, other surgical instruments, and importance of soft tissue handling.

Only 5 cases out of 82 (6.1%) had uncontrolled bleeding. In our observations, any tearing in the interdental papilla was considered a soft tissue injury which indicates poor soft tissue handling. So, that may explain the high percentage of complications. For the delayed complications, the most common as previously mentioned was dry socket (64.7%/17 cases), which may be a result of traumatic extraction, infected instruments, and the more valid reason is insufficient post-operative instructions, or the patient simply doesn't follow the instructions. The pain came in the second place after the dry socket with (35.3%) delayed complications. In the literature, the incidence of post-extraction complications was (6.04%/2355) according to Miclotte's findings. He stated that the most common complication is surgical wound infection with (1.7%) and (0.93%, 0.60%, 0.51%) for pain without a clear cause, bleeding, and dry socket respectively 24. This difference could relate to many reasons such as a large sample size, extractions took place in the outpatient clinic of the Department of Oral and Maxillofacial Surgery at University Hospitals of Leuven, which indicates a higher level of experience than our operator in the study which most of them still undergraduate students. Another reason is that the study design which is a retrospective cohort depends on the available records and cannot examine any patients as the author stated in the research limitations, in addition to some patients who do not seek medical care for small complications, so results may be underestimated.

When we compare the rate of complications among the medically free patients and patients with significant history, we found that 24 of the complications occurred in this group (26.1%), on the other hand, the complications rate in the healthy group was (73.9%). This could be attributed to the fact that the medically free group constituted the larger number of the sample, 68/92.

Regarding the rate of complications among different groups of operators, we ended up with the consultant's group having the highest percentage due to the nature of cases that consultants deal with, and the second reason is the low sample size compared to the student's groups. The lowest complication rate was found in 5<sup>th</sup>-year student's group, which gave an indication that these students are under good selective supervision, avoiding handling difficult cases, and close monitoring by the consultants. About 6<sup>th</sup>-year students and intern's groups the percentage of complications are higher than 5th year students which might be because the 6<sup>th</sup>-year students and interns are working on more severe and difficult cases, although they work with less supervision compared to the 5<sup>th</sup>-year students.

Moving to the management of the complications its rate was (72.8%) of the cases, which were managed despite the type of

treatment, yet the correct management was observed in 58 cases out of the total managed cases which are 67, in other words, the correct management was found in (63%)/92 total number of cases that ends up with complications. Observing the high rate of correct management among students' groups proved the high-quality education and supervision they received during their practice at the school. While the lowest right management of complications was found in the intern's group, that could be due to many factors the most important of which are overconfidence, working with minimum supervision, and the long time since they got the scientific materials regarding the management of different postoperative complications.

## LIMITATION OF THE STUDY:

We have faced some limitations in this study, since extraction difficulty cannot be standardized in all cases, in other words, there are some teeth that have a curved multirooted which is at higher risk of fracture, in addition to the endo treated and badly decayed teeth. Another limitation we have encountered is that the complications and soft tissue injury are more prone in surgical extraction than simple ones. Also, sometimes the shortage of extraction instruments or lack of supervision on junior students may affect the quality of treatment provided. Fourthly, there are some patients who don't care a lot about their situation, if they had a minor complication they don't come back, so we cannot assess the delayed complications accurately. A further limitation in our results is the various levels of operator experience, a 5<sup>th</sup>-year student cannot be fairly compared to an experienced general practitioner or consultant. Regarding the operator, our results are not well distributed throughout different groups.

## RECOMMENDATIONS

A comprehensive idea about the prevalence, causes, management, and prevention of post-extraction complications, should be understood by dental care providers. A close supervision with junior students, especially with their early extractions is highly recommended to prevent or minimize the complications and secure proper management if they occur.

## CONCLUSION

In conclusion, a significant correlation between the number of post-operative complications, their management, and the experience of the operator was found.

**Funding:** This research received no external funding.

**Conflict of interest:** We have no conflicts of interest

**Ethical Approval:** Ethical approval was obtained from the research ethical committee no. 42-50405.

**Informed consent:** This is an observational study requiring no consent

**Authorship contribution:** All authors contributed with equal roles in this work

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