

Knowledge and Awareness of Avulsed Tooth Management Among Dental Surgery Assistants at the Universiti Kebangsaan Malaysia (UKM) Dental Polyclinic
(Pengetahuan dan Kesedaran Pengurusan Avulsi Gigi dalam Kalangan Pembantu Pembedahan Pergigian di Poliklinik Pergigian Universiti Kebangsaan Malaysia (UKM))

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Abstract

Tooth avulsion is a dental emergency that needs prompt treatment to minimise complications. This study aims to evaluate the knowledge and awareness of avulsed tooth management among dental surgery assistants at the UKM Dental Polyclinic. This survey research design of a 19-item questionnaire was distributed to 59 dental surgery assistants (DSAs). The questionnaire consisted of demographic profile questions and questions regarding awareness and knowledge of tooth avulsion and its immediate management. The results showed that 78% of DSAs at the Institute know about first aid management of avulsed teeth, with the majority being taught during their training course. Moreover, 96.2% of the DSAs know what tooth avulsion is and recognise it as a dental emergency. Although 75% of the DSAs have never previously handled any avulsed tooth case, 50% are confident in advising the public on what to do with an avulsed tooth at the time of injury. As for the specific management questions of an avulsed tooth, the responses from the DSAs varied according to the questions, ranging from 50% to 85%. DSAs at the Institute have varying levels of awareness and knowledge regarding tooth avulsion. Therefore, regular education programmes on dental trauma and its management will help improve the DSAs' current knowledge and ability to manage avulsion injuries better in emergencies.

Keywords: Awareness; Dental trauma; Dental assistant; Knowledge; Tooth avulsion

Abstrak

Avulsi gigi adalah kecemasan pergigian yang memerlukan rawatan segera untuk meminimumkan komplikasi. Kajian ini bertujuan untuk menilai pengetahuan dan kesedaran pengurusan avulsi gigi dalam kalangan pembantu pembedahan pergigian (DSA) di Poliklinik Pergigian UKM. Reka bentuk kajian tinjauan berdasarkan 19-item soal selidik telah diedarkan kepada 59 DSA. Soal selidik ini terdiri daripada soalan-soalan profil demografi dan soalan-soalan mengenai kesedaran dan pengetahuan akan gigi teravulsi dan pengurusan kecemasan avulsi gigi. Keputusan menunjukkan 78% daripada DSA di institusi ini tahu tentang pengurusan kecemasan avulsi gigi, dengan majoriti daripada mereka diajar semasa kursus latihan asas. Selain itu, 96.2% daripada DSA tahu apa itu avulsi gigi dan dapat mengiktirafnya sebagai kecemasan pergigian. Walaupun 75% daripada DSA tidak pernah mengendalikan mana-mana kes avulsi gigi sebelum ini, namun 50% daripada mereka yakin untuk menasihati orang ramai tentang apa yang perlu dilakukan sekiranya kejadian avulsi gigi berlaku. Berkenaan pengurusan khusus tentang gigi teravulsi, maklum balas daripada DSA adalah berbeza-beza mengikut soalan, antara 50% hingga 85%. Para DSA di Institusi ini mempunyai tahap kesedaran dan pengetahuan yang berbeza-beza mengenai pengurusan avulsi gigi. Oleh

itu, program pendidikan berterusan secara berkala berkenaan trauma pergigian dan pengurusannya dapat membantu meningkatkan pengetahuan terkini dan keupayaan para DSA untuk menguruskan kecederaan avulsi gigi dengan lebih baik.

Kata kunci: Kesedaran; Trauma pergigian; Pembantu pergigian; Pengetahuan; Avulsi gigi

1.0 INTRODUCTION

Tooth avulsion is defined as the complete displacement of a tooth from its socket due to trauma, constituting 0.5-16% of all traumatic dental injuries (Fouad et al. 2020). It occurs most frequently in children aged 7 to 9, particularly boys, with the upper central incisors frequently involved (Eyuboglu et al. 2009 & Altun et al. 2009). Losing a front tooth can lead to functional and aesthetic consequences that should be addressed soon, especially in young patients, as losing the tooth may have a significant medical, social, and psychological impact on a patient's quality of life (El-Kalla et al. 2017).

The prognosis of an avulsed tooth depends on the steps performed during the accident and what happens during the extra-alveolar time, which is a period between the accident and the time the avulsed tooth is placed back into its socket (Nene & Bendgude 2018). Proper management helps to prevent complications such as pulpal necrosis and degeneration of periodontal ligaments (PDL) cells that lead to periapical inflammation and root resorption (Müller et al. 2020). Although many avulsed teeth are usually lost to replacement resorption eventually, tooth replantation helps to retain the alveolar bone height, making prosthodontic replacement much more manageable later (Andreasen et al. 2008). Ideally, the most appropriate treatment for an avulsed tooth is immediate replantation into its socket. Nevertheless, this action is not efficiently executed because of the concomitant injuries, ignorance of knowledge, or panic response of those at the accident site (Sardana et al. 2014). Often, the affected child is brought to the dentist with the tooth either stored in a suitable medium or not. Various storage mediums have been used and researched widely, including saliva, normal saline, tap water, milk, and culture media. Some storage mediums have been proven to maintain cell viability, especially the

periodontal ligament (Is Khinda et al. 2017). According to the International Association of Dental Traumatology (IADT) 2020 guidelines, the best transport medium to store avulsed teeth is Hank's balanced salt solution (HBSS). However, the HBSS is expensive and might not be readily available at the accident site for usage (Fouad et al. 2020).

Traumatic tooth avulsion is generally related to falls, collisions, and accidents at home, school, or playgrounds (Karayilmaz et al. 2013). Parents, schoolteachers or sport-trainers are the first to attend to the affected children in such situations. As for professional care, healthcare professionals, such as medical nurses and medical doctors, are the ones to whom the children are taken for emergency treatment. Several studies have assessed the knowledge of the most expected population groups usually involved in the emergency management of avulsed teeth, such as dentists (Abdullah et al. 2016), emergency physicians and nurses (Iyer et al. 2017), medical doctors (Yeng et al. 2020), schoolteachers (Salarić et al. 2021)¹⁴, parents (Ozer et al. 2012 & Nikam et al. 2014), and athletic coaches (Tian et al. 2022 & van Vliet et al. 2022). However, studies evaluating the dental surgery assistant's knowledge of avulsion injuries were fewer (Halawany et al. 2014 & Abraham et al. 2020), and none has been found in Malaysia.

Research into dental avulsion is a topic of significance, as it was found that approximately 5% of injuries sustained to the human body occur in the oral cavity (Andersson et al. 2013).²¹ Dental trauma care is often costly and time-consuming. Inappropriate management may lead to adverse consequences that complicate the treatment further (Andersson et al. 2013). We often assume that training schools for dental auxiliaries would train them in the emergency management of traumatic dental injuries. However, we are unaware of the

depth of knowledge these auxiliary staff have or retain throughout their career. Dental surgery assistants (DSAs) are dental auxiliaries who assist the dentist with their duties and work closely with the patients. The DSAs are an integral part of the auxiliary dental team and are often the first responders to dental emergencies before the dentist or the specialist arrives. Therefore, the DSAs must have adequate knowledge in managing traumatic dental injuries, especially tooth avulsion. Their competencies in emergency management have a significant bearing on the success of the treatment. To the best of our information, there has been no study that specifically assessed the DSAs' knowledge of the management of tooth avulsion injuries in Malaysia, particularly at our Institute.

Therefore, this research aims to assess the knowledge and awareness of DSAs working at our Institute. The findings of this study will provide the institute management with an idea of the preparedness of the DSAs to handle traumatic dental injuries, especially during the initial stages. Since this is a preliminary study to be conducted amongst DSAs in Malaysia, the research outcomes would also assist healthcare planners in devising appropriate strategies to enhance DSAs' awareness and competencies in managing such dental emergencies.

2.0 MATERIAL AND METHODS

The present study was approved by the Secretariat of Research and Innovation Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM). (JEPUKM; JEP-2021-375). The sample size was calculated using Slovin's formula for a survey, incorporating a 5% margin of error (e), 95% confidence interval (z), 0.5 population proportion (p) and population size of 69 (N), yielding 58 DSAs from the UKM Dental Polyclinic.

Written consent from each participant was obtained before the study. This cross-sectional, observational study uses a self-administered English and Malay-language questionnaire with 19-item questions (Figure 1). Following content validation, the questionnaire was subjected to face and content validations and pretested in a group of 15 people of various backgrounds, five each from the paediatric specialist registrar, dental officer and undergraduate dental student groups, respectively. Their responses were used to identify the ease of comprehension of the questionnaire, appropriate language usage and relevance of the questions to the subject matter. Some modifications were made to the initial questionnaire accordingly. After the modifications, the questionnaire was pretested on the same individuals. All respondents agreed upon the questionnaire, and the content and face validity indices were 1 for all the questions. As for the inter-rater reliability, Fleiss's kappa scores were 0.8 for the undergraduate student group and one for the paediatric dentist and dental officer groups, respectively.

The questionnaire had two parts: Part A consisted of two demographic questions; Part B had 17 questions divided into three subsections, B1, B2 and B3. Subsection B1 has three questions on knowledge and first aid management of dental trauma. There are four questions in Subsection B2 on knowledge and awareness of tooth avulsion, and Subsection B3 has ten questions on knowledge of immediate management of tooth avulsion.

Only participants who answered 'Yes' to any of the questions in Subsection B1 could proceed to questions in Subsections B2 and B3. The survey was conducted amongst DSAs that were available during the research period of study based on a convenience sampling model.

Instruction:

Tick (/) in the box for the answer related to a question.

PART A: DEMOGRAPHIC PROFILE

- 1. Gender:**
Male
Female
- 2. Years of working experience as a DSA:**
Less than 10 years
More than 10 years

PART B (I): KNOWLEDGE AND AWARENESS OF TOOTH AVULSION

- 1. Do you have any knowledge of the first aid management of dental trauma?**
Yes
No
- 2. Were you taught about first aid management of dental trauma during your DSA training?**
Yes
No
- 3. Did you attend any dental trauma seminar/ workshop after your DSA training?**
Yes
No

If the answer is 'YES' for any one of the questions above, proceed to answer the following questions. If the answer is 'NO' for all the above questions, you do not have to answer the remaining questions.

PART B (II): KNOWLEDGE AND AWARENESS OF TOOTH AVULSION

- 1. What is tooth avulsion?**
Fractured tooth
Loose tooth
Tooth completely out of its socket
- 2. Is tooth avulsion a dental emergency?**
Yes
No
- 3. Have you handled any cases of tooth avulsion before?**
Yes
No
- 4. Have you given any advice to anyone about first aid management for tooth avulsion?**
Yes
No

PART C: KNOWLEDGE OF EMERGENCY MANAGEMENT OF TOOTH AVULSION

- 1. What is the best immediate first aid treatment for a clean avulsed tooth at the site of the trauma?**

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Call for help |
| <input type="checkbox"/> | No treatment required |
| <input type="checkbox"/> | Immediate replantation of the tooth in its socket |
| <input type="checkbox"/> | Not sure what to do |

- 2. What would you do if the avulsed tooth is covered with dirt at the site of the trauma?**

- | | |
|--------------------------|--------------------------------|
| <input type="checkbox"/> | Rinse the tooth with tap water |
| <input type="checkbox"/> | Wash the tooth with soap |
| <input type="checkbox"/> | Would not do anything |
| <input type="checkbox"/> | Not sure what to do |

- 3. What is the most appropriate method to transport an avulsed tooth from the trauma site to a dental clinic?**

- In patient's hands
 Wrapped in clean cloth
 In water-filled container
 In milk filled container
4. **What is the most appropriate and easily available storage medium to transport an avulsed tooth from the trauma site to the clinic?**
- Tap water
 UHT milk
 Distilled water
 Condensed milk
5. **How fast should we replant an avulsed tooth into its socket for good healing?**
- Less than 30 minutes
 30 to 60 minutes
 1 to 2 hours
 More than 2 hours
6. **How would you clean a dirty avulsed tooth in the clinic?**
- Wipe the tooth with tissue paper
 Rinse gently the dirty tooth with running tap water
 Clean the tooth with a toothbrush
 Wipe the tooth with a clean gauze
7. **How would you hold the avulsed tooth when cleaning its dirt at the clinic?**
- Hold the crown of the avulsed tooth
 Hold the root of the avulsed tooth
 Hold the crown and root of the avulsed tooth
 Not sure what to do
8. **Do we need to replant an avulsed primary tooth?**
- Yes
 No
9. **Are you confident to advise the public regarding the handling of avulsed teeth?**
- Yes
 No
10. **Do you think you need more training/ courses in handling avulsed teeth?**
- Yes
 No

Figure 1 Research questionnaire.

The study was conducted over four months. Two of the co-investigators approached the prospective participants individually, who assessed their willingness to participate voluntarily in the study by completing the anonymous questionnaire. Verbal and written consent was obtained from the willing participants before distributing the questionnaire. The participants were briefed on the questionnaire and asked to answer all questions in Subsection B1 after completing Part A. Only participants who answered 'Yes' to any of the questions in Subsection B1 were allowed to answer questions in Subsections B2 and B3. The participants answered the questionnaire individually without any help or interference from others. Completed questionnaires were collected immediately to prevent the DSAs from seeking answers elsewhere. The data obtained from the completed questionnaires were tabulated and analysed using the Statistical Package for the Social Sciences software, version 26.0 for Windows (IBM; SPSS Inc., Chicago, IL, USA).

3.0 RESULTS

Invitations to participate in this study were extended to all 69 DSAs in the UKM Dental Polyclinic, Faculty of Dentistry, National University of Malaysia. The participants need to have formal training certificates in dental assisting. Participants who did not want to participate or understand the questionnaire's content were excluded from the study. Fifty-nine DSAs agreed to participate in the survey, with a rate of 88.1%. There were 45 female DSAs (76.3%) and 14 male DSAs (23.7%). Forty of the DSAs have more than ten years of working experience in the dental field.

Almost two-thirds of the DSAs, 46 (78%), responded that they knew first aid management of dental trauma, with the majority of them, 38 (83.1%), having previously received education regarding

dental trauma management during their DSA training. Twenty-five (54.2%) of the DSAs with dental trauma first aid knowledge had attended seminars or workshops after their DSA training. Only seven of the 59 DSAs (12%) do not have any knowledge of the management of dental trauma and did not receive or attend any seminar or workshop related to dental trauma management during and after their DSA training [Part B (I): Knowledge and Awareness of Tooth Avulsion]. The respondents without knowledge of dental trauma management were excluded from answering the remaining questions in Part B (II): Knowledge and Awareness of Tooth Avulsion) and Part C: Knowledge of Immediate Management of Tooth Avulsion).

Fifty-two DSAs (88.1%) answered questions in Part B(II) and Part C of the questionnaire. Most DSAs knew what tooth avulsion was and knew it was an emergency that needed to be managed urgently. Three-quarters of them have not handled any cases of tooth avulsion before. Slightly less than half of the DSAs have advised others on what to do after a tooth avulsion. The findings of Part B (II), knowledge and awareness of tooth avulsion, are shown in Table 1.

Table 1 Knowledge and Awareness of Tooth Avulsion

Part B (II): Awareness of Tooth Avulsion		n	%
1. What is tooth avulsion?	A fractured tooth	1	1.9
	A loose tooth	1	1.9
	A tooth completely out of its socket	50	96.2
2. Is tooth avulsion a dental emergency?	Yes	50	96.2
	No	2	3.8
3. Have you handled any cases of tooth avulsion before?	Yes	13	25.0
	No	39	75.0
4. Have you advised anyone about first aid management for tooth avulsion?	Yes	22	42.3
	No	30	57.7

Concerning immediate management after a tooth avulsion, three-quarters of DSAs knew an uncontaminated avulsed tooth needed to be replanted into its socket quickly. Many also knew contaminated avulsed teeth must be washed with running tap water before replanting. Slightly more than half of the DSAs were aware of the appropriate medium of storage to transport avulsed teeth. Nearly a quarter of the DSAs knew the avulsed teeth needed replanting within 30 minutes after trauma.

In terms of handling the avulsed teeth in a clinic, more than three-quarters of DSAs knew that they had to hold the avulsed tooth by its crown and wash the root with running water. Slightly more than half of the DSAs said yes regarding the replantation of avulsed primary teeth.

As for the importance of continuous professional development related to dental trauma, most DSAs want more educational programmes to enhance their knowledge. Knowledge enhancement is crucial because only half of the DSAs have the confidence to advise others on what needs to be done following tooth avulsion.

The survey findings about immediate management after a tooth avulsion in a clinic are shown in Table 2.

Table 2 Knowledge of Immediate Management of Tooth Avulsion

Part C: Knowledge of Immediate Management of Tooth Avulsion			
		<i>n</i>	%
1. What is the best immediate first aid treatment for a clean, avulsed tooth at the site of the trauma?	Call for help	4	7.7
	No treatment required	3	5.8
	Immediate replantation of the tooth in its socket	40	76.9
	Not sure what to do	5	5
2. What would you do if the avulsed tooth is covered with dirt at the site of the trauma?	Rinse the tooth with tap water	44	84.6
	Wash the tooth with soap	0	0.0

	Would not do anything	4	7.7
	Not sure what to do	4	7.7
3. What is the most appropriate method to transport an avulsed tooth from the place of accident to a dental clinic?	In the patient's hands	0	0.0
	Wrapped in a clean cloth	14	26.9
	In water-filled container	6	11.5
	In milk filled container	32	61.5
4. What is the most appropriate and readily available storage medium to transport an avulsed tooth from the trauma site to the clinic?	Tap water	14	26.9
	Pasteurised/box milk	29	55.8
	Distilled water	7	13.5
	Condensed milk	2	3.8
5. How fast should we replant an avulsed tooth for good healing?	Less than 30 minutes	11	21.2
	30 to 60 minutes	26	50.0
	1 to 2 hours	15	28.8
	More than 2 hours	0	0.0
6. How would you clean a dirty, avulsed tooth in the clinic?	Wipe the tooth with tissue paper	1	1.9
	Rinse the dirty tooth gently with running tap water	40	76.9
	Clean the tooth with a toothbrush	0	0.0
	Wipe the tooth with a clean gauze	11	21.2
7. How would you hold the avulsed tooth when cleaning its dirt in the clinic?	Hold the crown of the avulsed tooth	43	82.7
	Hold the root of the avulsed tooth	1	1.9
	Hold the crown or root of the avulsed tooth	6	11.5
	Not sure what to do	2	3.8
8. Do we need to replant an avulsed primary tooth?	Yes	30	57.7
	No	22	42.3
9. Are you confident to advise the	Yes	26	50.0

public on handling avulsed teeth?	No	26	50.0
10. Do you need more training/ courses in handling patients with avulsed teeth?	Yes	50	96.2
	No	2	3.8

4.0 DISCUSSION

Dental trauma is often disregarded as an emergency outside the scope of dentistry, especially in young children. As children transition from mixed to permanent dentitions, missing or losing teeth is often regarded as transient and can be overcome later. This misconception has significant implications regarding the complexity of treatment and costs later. Therefore, appropriate emergency treatment of traumatised teeth helps to minimise future adverse consequences. Although dentists are trained to handle traumatic dental treatment, the role of dental auxiliaries, particularly the DSAs, cannot be ignored. The DSAs are the bridge that links the general public and the dentist. Although the DSAs are not frontliners, they are crucial in educating the general public regarding dental emergencies. It is unclear how much of the DSA educational curriculum covers topics related to dental trauma. The curriculum may vary from country to country depending on the emphasis on the job scope expected of the DSAs in the respective countries.

Over the past decades, most studies that surveyed the knowledge and awareness of traumatic dental injuries, particularly tooth avulsion, focused primarily on target groups such as school teachers (Salarić et al. 2021), parents (Ozer et al. 2012 & Nikam et al. 2014) and sports trainers (Tian et al. 2022 & van Vliet 2022). The findings of these studies demonstrated that the target groups had insufficient knowledge about tooth avulsion. Studies on knowledge and awareness of tooth avulsion among dental support staff were fewer in number (Halawany et al. 2014 & Abraham et al. 2020), and the studies showed the DSAs

have sufficient knowledge on managing tooth avulsion either through formal education or years of working experience in the dental field. In Malaysia, the knowledge and awareness of tooth avulsion among DSAs is yet to be studied. Generally, most DSAs in Malaysia had formal training at the Malaysia Dental Training College in Penang. As most of the DSAs in our Dental Institute are the produce of Malaysia Dental Training College in Penang, they have awareness and knowledge of tooth avulsion. However, many have yet to handle cases related to tooth avulsion in their profession. The training college provides trainees with theoretical knowledge about traumatic dental injuries but little practical exposure. The current study showed that over two-thirds of the DSAs (78%) knew the first aid management of dental trauma. The higher awareness and knowledge of traumatic dental injuries among the DSAs can be attributed to the fact that they had received formal education during their DSA training, and some had attended seminars and workshops after their training. One can deduce that with the acquired knowledge, these DSAs at our Institute can advise others on what to do in dental emergencies, particularly in tooth avulsion cases.

One of the traumatic dental injuries that are often regarded as a true emergency is tooth avulsion (Fouad et al. 2020). Tooth avulsion often leads to adverse consequences if not treated urgently, such as undesirable dental aesthetics, migration of teeth that results in loss of dental space, and disturbance in phonetics and mastication (Eltahir et al. 2022). All these can indirectly affect the quality of life of individuals (El-Kalla et al. 2017). Early treatment of tooth avulsion may dictate the success of the treatment. The treatment succeeds by restoring the apical vascular supply and reattaching the severed periodontal ligament to the socket alveolar bone (Fouad et al. 2020). For this success to happen, prompt advice should be given to

the responsible parties to take appropriate and timely action.

In the current study, almost all the DSAs knew tooth avulsion was an emergency. However, less than half of them have advised others on what to do if a tooth avulsion happens. DSAs who had direct experience handling tooth avulsion cases personally were limited, with 25% of them having experience handling such cases at least once before. Overall, the findings show that not many DSAs at our Dental Institute had the opportunity to advise others about what to do during a tooth avulsion. Even those who had previously advised others, we are unsure whether the advice was appropriate with the current guidelines for dental trauma management. In the study by Hallawany (2014), their DSAs had higher knowledge about managing avulsed teeth because the DSAs were primarily expatriates from the Philippines with dental degree qualifications. The correct answers to the questions related to the emergency management of an avulsed tooth at the time of the accident in the present study ranged from 21 to 85%. Many DSAs knew that an avulsed tooth needed to be replanted into its socket immediately, and if soiled, the tooth needed to be washed with running tap water before replanting. Ideally, a soiled tooth should be washed with milk, saline, or the patient's saliva, as the International Association of Dental Traumatology 2020 guidelines recommend. However, milk and saline usually are not readily available at the site of the accident, and it is not possible to get enough saliva from the affected child. Although not ideal, water is a practical option to remove tooth dirt from a soiled tooth in an emergency (Fouad et al. 2020). There were mixed responses concerning the storage medium used to transport an avulsed tooth and how fast the affected patient needs to attend the dental clinic. Almost two-thirds of the DSAs knew that milk had to be used as a storage medium, but only half knew that pasteurised milk

had to be used. Concerning the urgency to seek treatment, only one-fifth of the DSAs knew that the patient needed to seek treatment at the nearest dental clinic within less than 30 minutes after the occurrence of a tooth avulsion. Overall, most DSAs had sound knowledge concerning emergency management of an avulsed tooth at the accident site that can help minimise the risk of complications following tooth replantation. However, advice on the urgency to seek immediate treatment is still lacking because of their unawareness of the current guidelines and the adverse consequences of delayed treatment.

As for handling the avulsed tooth in the clinic, more than three-quarters of the DSAs knew they needed to hold the tooth by its crown and wash the dirt on the tooth surfaces gently under running water. As for the replantation of an avulsed primary tooth, more DSAs thought the tooth needed to be replanted, too. However, avulsed primary teeth are not replanted because of the practical difficulties related to children's cooperation and tooth size. Furthermore, there is a greater infection risk to their permanent successors. These findings showed a disparity of knowledge among the DSAs concerning handling avulsed teeth in the clinic.

Although most of the DSAs could answer the questions correctly, only half of them were confident in giving advice related to tooth avulsion to others. Most DSAs felt they needed more training on managing tooth avulsions and staying well-informed with the latest guidelines for managing traumatic dental injuries. The lack of confidence among some of the DSAs could be attributed to exposure to actual trauma cases in their daily practice.

5.0 CONCLUSION

The DSAs at the UKM Dental Polyclinic have a reasonable level of awareness and knowledge in managing tooth avulsion

cases. However, some aspects of clinical handling, such as methods to transport the avulsed tooth in appropriate storage medium, timing of replantation of the tooth after avulsion and trauma management in primary dentition, need to be relearned and updated with the recommendations in the latest trauma guidelines.

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REFERENCES

1. Abdullah, D., Soo, S.Y., Kanagasingam, S. 2016. Knowledge of managing avulsed tooth among general dental practitioners in Malaysia. *Singapore Dental Journal* 37:21-26. doi: 10.1016/j.sdj.2016.01.001.
2. Abraham, Y., Christy, R., Gomez-Kunicki, A., Cheng, T., Eskarous, S., Samaan, V., et al. 2020. Management of dental avulsion injuries: a survey of dental support staff in Cairns. *Australian Dental Journal (Basel)* 30;9(1):4. doi: 10.3390/dj9010004.
3. Altun, C., Ozen, B., Esenilk, E., Guven, G., Gürbüç, T., Acikel, C., et al. 2009. Traumatic injuries to permanent teeth in Turkish children, Ankara. *Dental Traumatology* 25(3):309–313. doi:10.1111/j.1600-9657.2009.00778.x.
4. Andersson, L. 2013. Epidemiology of traumatic dental injuries. *Journal of Endodontics* 39(3 Suppl):S2-5. doi: 10.1016/j.joen.2012.11.021.
5. Andreasen, J.O., Malmgren, B., Bakland, L.K. 2008. Tooth avulsion in children: to replant or not. *Endodontic Topics* 14(1):28-34. doi: 10.1111/j.1601-1546.2008.00224.x.
6. El-Kalla I.H., Shalan, H.M., Bakr, R.A. Impact of dental trauma on quality of life among 11-14 years schoolchildren. *Contemporary Clinical Dentistry* 8(4):538-544. doi: 10.4103/ccd.ccd_428_17.
7. Eyuboglu, O., Yilmaz, Y., Zehir, C., Sahin, H. 2009. A 6-year investigation into types of dental trauma treated in a paediatric dentistry clinic in Eastern Anatolia Region, Turkey. *Dental Traumatology* 25(1):110-114. doi:10.1111/j.1600-9657.2008.00668.x.
8. Fouad, A.F., Abbott, P.V., Tsilingaridis, G., Cohenca, N., Lauridsen, E., Bourguignon, C., et al. 2020. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dental Traumatology* 36(4): 331–342. doi: 10.1111/edt.12573.
9. Halawany, H.S., AlJazairy, Y.H., AlHussainan, N.S., AlMaflehi, N., Jacob, V., Abraham, N.B. 2014. Knowledge about tooth avulsion and its management among dental assistants in Riyadh, Saudi Arabia. *BMC Oral Health* 14:46. doi:10.1186/1472-6831-14-46.
10. Is Khinda, V., Kaur, G.S., Brar, G., Kallar, S., Khurana, H. 2017. Clinical and practical implications of storage media used for tooth avulsion. *International Journal of Clinical Pediatric Dentistry* 10(2):158-165. doi: 10.5005/jp-journals-10005-1427.
11. Iyer, S.S., Panigrahi, A., Sharma, S. 2017. Knowledge and Awareness of First Aid of Avulsed Tooth among Physicians and Nurses of Hospital Emergency Department. *Journal of Pharm Bioallied Science* 9(2):94-98. doi: 10.4103/jpbs.JPBS_343_16.
12. Karayilmaz, H., Kirzioglu, Z., Erken Gungor, O. 2013. Aetiology, treatment patterns and long-term outcomes of tooth avulsion in children and adolescents. *Pakistan Journal of Medical Sciences* 29(2):464-8. doi: 10.12669/pjms.292.3283.
13. Eltahir, M. A., Ibrahim, R.F.E., Alharbi, H. 2022. Perspective chapter: teeth avulsion. In: Molla A., editor. *Dental Trauma and Adverse Oral Conditions*. IntechOpen, doi: 10.5772/intechopen.105846.
14. Müller, D.D., Bissinger, R., Reymus, M., Bücher, K., Hickel, R., Kühnisch, J. 2020. Survival and complication analyses of avulsed and replanted permanent teeth. *Scientific Reports* 10(1):2841. doi: 10.1038/s41598-020-59843-1.
15. Nene, K.S., Bendgude, V. 2018. Prognosis of replanted avulsed permanent incisors: a

- systematic review. *International Journal of Pedodontic Rehabilitation* 3:87-98.
16. Nikam, A.P., Kathariya, M.D., Chopra, K., Gupta, A., Kathariya, R. 2014. Knowledge and attitude of parents/caretakers toward management of avulsed tooth in Maharashtrian population: a questionnaire method. *Journal of International Oral Health* 6(5):1-4.
 17. Ozer, S., Yilmaz, E.I., Bayrak, S., Tunc, E.S. 2012. Parental knowledge and attitudes regarding the emergency treatment of avulsed permanent teeth. *European Journal of Dentistry* 6(4):370-5.
 18. Salarić, I., Medojević, D.T., Baždarić, K., Kern, J., Miličević, A., Đanić, P., et al. 2021. Primary school teachers' knowledge of tooth avulsion. *Acta Stomatologica Croatica* 55(1):28-36. doi: 10.15644/asc55/1/4.
 19. Sardana, D., Goyal, A., Gauba, K. 2014. Delayed replantation of avulsed tooth with 15-hours extra-oral time: 3-year follow-up. *Singapore Dental Journal* 35:71-76. doi: 10.1016/j.sdj.2014.04.001.
 20. Tian, J., Lim, J., Moh, F., Siddiqi, A., Zachar, J., Zafar, S. 2022. Parental and training coaches' knowledge and attitude towards dental trauma management of children. *Australian Dental Journal Suppl* 1:S31-S40. doi: 10.1111/adj.12913.
 21. van Vliet, K.E., Brand, H.S., Lobbezoo, F., de Lange, J. 2022. Knowledge about the emergency management of dental injuries among field hockey coaches. *Dental Traumatology* 38(6):526-531. doi: 10.1111/edt.12774.
 22. Yeng, T., O'Sullivan, A.J., Shulruf, B. 2020. Medical doctors' knowledge of dental trauma management: a review. *Dental Traumatology* 36(2):100-107. doi: 10.1111/edt.12518.