

ASSESSMENT OF KNOWLEDGE AND PRACTICE ABOUT MANAGEMENT OF AVULSED TEETH WITH SPLINTING AMONGST DENTISTS IN CENTRAL INDIA

Dentistry

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ABSTRACT

Aim- To assess the knowledge and practice about management of avulsed teeth with splinting among dentists in central India. **Materials And Methods-** A self administered web based close ended questionnaire was conducted among the dentists in central India. The participants comprised of total 219 Dental Health Care Professionals (DHCPs) including General Dental Practitioners (GDPs), Post Graduate Students (PGs), and Specialists. The data were statistically analyzed by Chi Square test. **Results-** In this survey, among all the participants (61.5%) of GDPs, (87.9%) of PGs and (95.5%) of Specialists have knowledge about IADT guidelines regarding management of avulsed teeth. PGs and Specialists have significantly ($p < 0.001$) better practice for management of avulsed teeth with splinting than GDPs as they have more traumatic injury cases in practice. **Conclusions-** The knowledge level on the management of avulsed teeth with splinting among general dental practitioners in central India needs to be improved. Utilization of International Association of Dental Traumatology guidelines for the management of dental traumatic injury should be recommended to increase the knowledge level and to ensure good treatment outcome.

KEYWORDS

Splinting, traumatized teeth, dental avulsion, IADT guidelines, knowledge, survey.

INTRODUCTION

Traumatic dental injuries (TDIs) are serious and often complex manifestations of injuries of dento-alveolar systems. TDIs occur frequently in children and young adults, comprising 5% of all injuries. Avulsion, also known as Exarticulation is the total displacement of a tooth from its socket; is one of the most serious traumatic dental injuries. Avulsion of permanent teeth accounts for 0.5–3% of all dental injuries.¹

Prognosis of a avulsed tooth majorly depends on the promptness of actions at the site of an accident and time elapsed prior to commencement of management. Treatment choices largely depend upon the viability of periodontal ligament (PDL) cells. Reimplantation of the avulsed tooth is the treatment of choice in most of the situations. Immediate reimplantation will allow the PDL to reform the connection within the alveolus. An appropriate emergency action and its awareness in both patient as well as dentist will contribute to successful management and favorable prognosis.^{2,3}

Splinting is essential in all the emergency dento-alveolar trauma cases. A splint is a rigid or flexible aid used to protect, support and immobilize the teeth that have been weakened, traumatized, reimplanted, or fractured. When there are injuries to the periodontal tissue, such as subluxation, luxation, or avulsion, a splint is recommended. A dental therapist must have thorough knowledge about situations that require splint as a means of immobilization.⁴

Guidelines should be readily understandable and practical to assist dentists, healthcare professionals and patients in correct decision making to deliver appropriate care as effectively and efficiently as possible. The International Association of Dental Traumatology (IADT) Guidelines for the emergency management of avulsed teeth are useful for delivering the best care possible in an efficient manner and for favorable outcome.⁵

MATERIALS AND METHODS

The study was approved by the Institutional Ethics Committee. The study population comprised group of dentists in central India. The study was designed for scientific purposes only, and the submitted personal data was considered confidential, as stated on the first page of the online questionnaire.

A customized self-administered questionnaire was designed using Google Forms which were validated by independent subject experts and circulated amongst dental practitioners all over Central India, both in electronic form via e-mail or WhatsApp and in manual form.

The questionnaire was divided into two parts:

Part I was used to identify the sociodemographic and professional profiles of respondents including age, professional background and years of experience. Part II comprised of 19 questions about management of avulsed teeth. With reference the Dental Trauma Guidelines proposed by the IADT.⁶

Statistical Analysis

The data obtained from the survey was analysed question wise, and their percentage values were calculated. SPSS version 20.0 and chi-square test were selected as the statistical tools for data analysis with significance level established at $p < 0.05$.

RESULTS

270 participants were asked to fill out the questionnaire. Responses from 245 participants were received but 25 responses were excluded due to incomplete data. Hence, 220 participants were finally included. Two hundred twenty questionnaires were analysed.

Socio-Demographic Characteristics -

Of total recruited 220 participants, 91 (41.4%) were general dentist / practitioners (BDS), 107 (48.6%) postgraduate students (PGs) and 22 (10%) Other specialists. Further among these participants, 173 (78.6%) had a age of 20-30Y, 44(20%) had a age of 31-40Y and 3(1.4%) had a age of 41-50Y. (Table 1)

Table 1 – Sociodemographic profile

	Frequency (N)	Percentage(%)
Age distribution of study population		
20-30Y	173	78.6%
31-40Y	44	20%
41-50Y	3	1.4%
Educational Qualification		
BDS	91	41.4%
Post –Graduate Student	107	48.6%
Other specialty	22	10%

Response Rate –

The first part of the questionnaire (Q1-Q3) was focused on an exposure of cases and knowledge of management of avulsed tooth. Results revealed that 15.3% BDS, 25.3% of PGs and 22.7% of other specialists were routinely exposed to the avulsed tooth cases. But, majority of BDS (52.7%) referred the cases to a specialist. Among all, 78.20% aware of International Association of Dental Traumatology Guidelines (IADT) for management of avulsed tooth. Specifically, 61.5% of BDS, 87.9% of PGs and 95.5% of other specialist.

The second part of the questionnaire included questions (Q4-Q7)

Table 2 summaries the descriptive Statistics for the answers to the questionnaire survey.

Sr. No.	Questions	Response								P Value
				BDS		PG Student		Specialist		
		N	%	N1	%	N2	%	N3	%	
1.	How often you come across traumatic injuries cases in your practice?									p<0.001* *
	a) Routinely	129	58.6%	13	14.3%	26	24.3%	5	22.7%	
	b) Occasionally	44	20%	43	47.3%	68	63.6%	17	77.3%	
	c) Seldom	47	21.4%	35	38.5%	13	12.1%	0	0%	
2.	Do you know the International Association of Dental Traumatology guidelines for management of avulsed teeth?									p<0.001* *
	a) Yes	172	78.2%	56	61.5%	94	87.9%	21	95.5%	
	b) No	48	21.8%	35	38.5%	13	12.1%	1	4.5%	
3.	What would you do, if you come across a tooth avulsion?									p<0.001* *
	a) Refer to a specialist	54	24.5%	48	52.7%	4	3.7%	2	9.1%	
	b) Instruct the patient to preserve it in a medium	102	46.4%	25	27.5%	36	33.6%	3	13.6%	
	c) Instruct the patient to rinse it & reimplant it immediately	64	29.1%	18	19.8%	67	62.6%	17	77.3%	
4.	What transport medium do you suggest for storage of avulsed teeth?									P =0.023*
	a) Saliva	155	70.5%	38	41.8%	21	19.6%	7	31.8%	
	b) HBSS	133	60.5%	31	34%	46	42.9%	8	36.3%	
	c) Milk	139	63.2%	49	53.8%	23	21.5%	3	13.6%	
	d) Saline	65	29.5%	22	24.2%	19	17.75%	11	50%	
5.	Maintaining PDL viability after avulsion is necessary.									p<0.001* *
	a) Agree	194	88.2%	68	74.7%	103	96.3%	22	100%	
	b) Disagree	26	11.8%	32	25.3%	4	3.7%	0	0%	
6.	For how much time do you think PDL cells are viable?	126	57.3%	33	36.3%	78	72.9%	15	68.2%	p<0.001* *
	a) 15 min									
	b) 60 min	86	39.1%	54	59.4%	26	24.3%	6	27.3%	
	c) 24 hrs	8	3.6%	4	4.4%	3	2.8%	1	4.5%	
7.	Do you prefer reimplantation, if extra oral dry time is more than 60 min?									p=0.585
	a) Yes	48	21.8%	21	23.1%	20	18.7%	6	27.3%	
	b) No	172	78.2%	70	76.9%	87	81.3%	16	72.7%	
8.	Do you consider splinting as treatment of choice for tooth avulsion?									p=0.071
	a) Yes	211	95.9%	84	92.3%	105	98.1%	22	100%	
	b) No	9	4.1%	7	7.7%	2	1.9%	0	0%	
9.	Do you check for any alveolar socket fracture before reimplantation?									p<0.001* *
	a) Yes	188	85.5%	65	71.4%	104	97.2%	18	81.8%	
	b) No	32	14.5%	26	28.6%	3	2.8%	4	18.2%	
	If Yes , then how do you check for it?									
	a) With blunt instrument	176	91.2%	56	86.1%	98	94.2%	17	94.4%	
	b) With sharp instrument	17	8.8%	9	13.8 %	6	5.8%	1	5.6%	
10.	What all type of splint do you prefer for avulsed tooth?									p=0.014*
	a) Rigid	125	56.8%	43	47.2%	26	24.3%	11	50%	
	b) Semirigid	183	83.2%	56	61.5%	57	53.3%	7	31.8%	
	c) Flexible	137	62.3%	35	38.5%	73	68.3%	15	68.2%	
11.	Which type of splint would you to stabilize reimplanted tooth without alveolar fracture?									p= 0.103
	a) Flexible	31	14.1%	15	16.5%	11	10.3%	5	22.7%	
	b) Semirigid	43	19.5%	23	25.3%	15	14%	5	22.7%	
	c) Rigid	14	6.4%	7	7.7%	7	6.5%	0	0%	
	d) Both a & b	132	60%	47	50.5%	74	69.2%	12	54.5%	

12.	Optimal duration to stabilize reimplanted tooth without alveolar fracture?								p<0.001*
	a) Less than 1 week	34	15.5%	21	23.1%	11	10.3%	2	9.1%
	b) Upto 2 weeks	124	56.4%	34	37.4%	72	67.3%	17	77.3%
	c) Upto 4 weeks	57	25.9%	33	36.3%	24	22.4%	1	4.5%
	d) Upto 6 weeks	5	2.3%	3	3.3%	0	0%	2	9.1%
13.	Which type of splint would you to stabilize reimplanted tooth with alveolar fracture?								P =0.006*
	a) Flexible	14	6.4%	10	11%	4	3.7%	0	0%
	b) Semirigid	43	19.5%	26	28.6%	12	11.2%	5	22.7%
	c) Rigid	133	60.5%	44	48.4%	74	69.2%	15	68.2%
	d) Both a & b	30	13.6%	11	12.1%	17	15.9%	2	9.1%
14.	Optimal duration to stabilize reimplanted tooth with alveolar fracture?								p=0.143
	a) Less than 1 week	13	5.9%	4	4.4%	9	8.4%	0	0%
	b) Upto 2 weeks	52	23.6%	22	24.2%	25	23.4%	5	22.7%
	c) Upto 4 weeks	119	54.1%	43	47.3%	60	56.1%	15	68.2%
	d) Upto 6 weeks	36	16.4%	22	24.2%	13	12.1%	2	9.1%
15.	Which type of rigid splint do you prefer?								p = 0.072
	a) Suture splints	64	29.1%	36	39.5%	19	17.8%	8	36.3%
	b) Arch bar splints	71	32.3%	29	31.8%	31	28.9%	11	50%
	c) Acrylic splints	116	52.7%	22	24.2%	42	39.2%	14	63.6%
	d) Composite splints	131	59.5%	34	37.4%	26	24.3%	9	40.9%
16.	Which type of semirigid splint do you prefer?								p = 0.214
	a) Ortho bracket & arches splints	68	30.9%	37	40.6%	39	36.4%	12	54.5%
	b) Wire & composite splints	92	41.8%	26	28.5%	38	35.5%	9	40.9%
	c) Fiber splints	120	54.5%	33	36.2%	44	41.1%	15	68.2%
	d) Titanium trauma splints	100	45.5%	25	27.4%	47	43.9%	10	45.45%
17.	Do you advice Root Canal Treatment in avulsed teeth?								p=0.052
	a) Yes	204	92.7%	80	87.9%	102	95.3%	22	100%
	b) No	16	7.3%	11	12.1%	5	4.7%	0	0%
	According to you, in which cases do you advice Root Canal Treatment?								p=0.302
	a. Open apex	15	7.2%	6	7.5%	9	8.9%	1	4.5%
	b. Closed apex	103	49.8%	39	48.75%	53	51.9%	10	45.5%
	c. Both a & b	89	43%	35	43.75%	40	39.2%	11	50%
18.	If you have to carry out root canal treatment on a replanted tooth, when would you start the treatment?								p<0.001*
	a) Immediately after replanting the tooth	17	7.9%	17	18.7%	23	21.5%	2	9.1%
	b) 7-10 days after replantation	125	57.1%	13	14.3%	2	1.9%	2	9.1%
	c) Before splint removal	57	26%	37	40.7%	73	68.2%	16	72.7%
	d) 6 months after replantation	20	9.2%	24	26.4%	9	8.4%	2	9.1%
19.	What are the possible sequelae of replantation of avulsed teeth?								p=0.034*
	a. Pulpal necrosis	21	9.5%	8	8.8%	11	10.3%	2	9.1%
	b. Ankylosis	24	10.9%	7	7.7%	16	15%	1	4.5%
	c. Root resorption	20	9.1%	15	16.5%	3	2.8%	3	13.6%

p>0.05 – no significant difference *p<0.05 – significant **p<0.001 – highly significant
Q4, Q10, Q15, Q16 multiple options were given

regarding storage media and the proper cleaning of the avulsed tooth and dental socket management prior to reimplantation. Majority of the respondents indicated patients Saliva itself (70.5%) and milk (63.2%) are the correct storage of the respondents indicated patients Saliva itself (70.5%) and milk (63.2%) are the correct storage media for avulsed tooth.

Q4. Transport medium for storage of avulsed teeth?

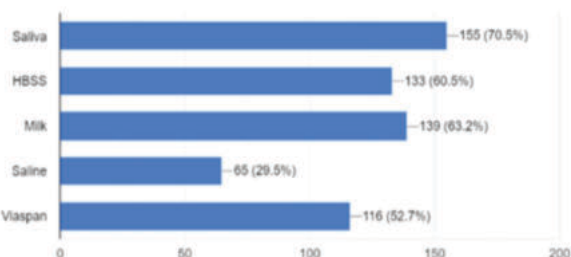


Figure 2 - Q4. Transport medium for avulsed teeth

Specifically (74.7%) of BDS, (96.3%) of PGs and (100%) of other specialists agreed that maintaining PDL viability is necessary. Among that, (36.3%) of BDS, (72.9%) of PGs and (68.2%) Other specialists perceive that the PDL cells are viable for a duration of 15 minutes. Majority of respondents (78.2%) did not prefer reimplantation of tooth if extra oral dry time was more than 60 min.

The third part of questionnaire (Q8-Q9) focused on management aspects of avulsed tooth including splinting, type of splinting, duration of splinting and complications. Majority of respondents (95.9%) consider splinting as a treatment of choice for avulsed tooth management and (85.5%) respondents consider that it is necessary to check alveolar socket fracture before reimplantation.

Among all the participants majority of respondents (83.2%) prefer semirigid type of splint. In avulsed tooth cases where alveolar bone is not fractured (60%) of respondents and where alveolar bone is fractured (60.5%) of respondents preferred both flexible and semirigid type of splinting for optimal duration up to 2 weeks (56.4%) and up to 4 weeks (54.1%) respectively. Among the rigid type of splint composite splint (59.5%) was the most preferred. While among the semirigid type

of splint, Fiber splint (54.5%) was highly preferred by majority of dentists.

Majority of respondents (92.7%) advice Root Canal Treatment (RCT) for avulsed tooth and (55.7%) participants consider 7-10 days after reimplantation as the suitable time for RCT.

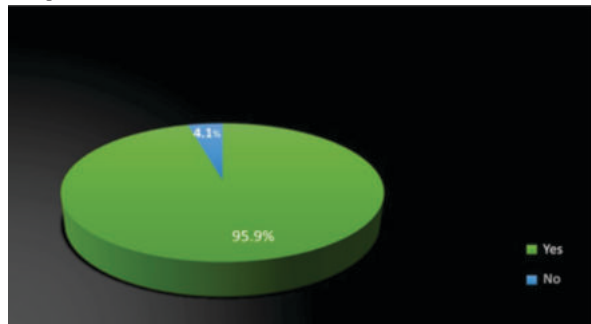


Figure 3 - Q8. Consideration of Splinting as a treatment of choice for avulsed tooth

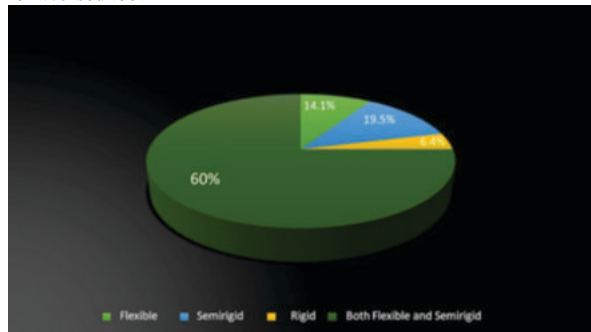


Figure 4 - Q11. Type of splint to reimplant avulsed tooth without alveolar bone fracture.

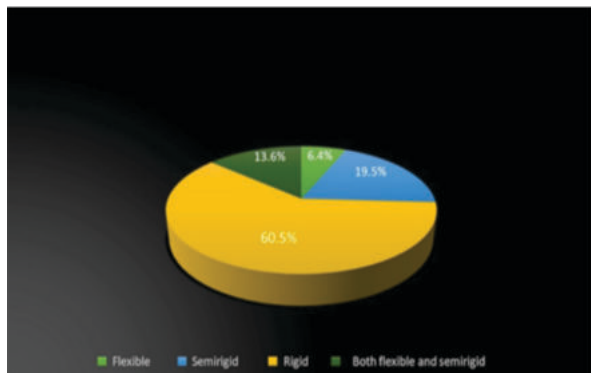


Figure 5 - Q13. Type of splint to reimplant avulsed tooth with an alveolar bone fracture

DISCUSSION:

The present study aimed at providing a baseline information on the existing knowledge of management of avulsed tooth with splinting among general practitioner (BDS), Post Graduates (PGs) and other Specialists in central India. The overall response rate for questionnaire was around. 81.48% excluding incomplete responses. The results of the study demonstrated that although 78.2% respondents claimed that they had knowledge about management of avulsed tooth according to IADT guidelines. Similarly, results reported by R.C. Hartmamet et al, which showed that 61.5% of participants were having knowledge regarding management of avulsed tooth.⁷

The current survey showed that the storage medium, the suitable splint and the timing of RCT of avulsed reimplanted tooth were the critical steps of avulsion trauma management. According to Trope et al., the storage media for avulsed tooth (in descending order) included Hank's Balanced Salt Solution (HBSS), milk, saline and saliva.^{6,9} However, in the present study, majority of respondents (70.5%) chose saliva as the transport medium when the tooth cannot be reimplanted at the site of injury. Similar result was reported by Westphalen et al., who justified their results based on immediate availability of saliva.¹⁰

A review by Barrett and Kenny reported that a delay in reimplantation of an avulsed tooth of as little as 8 min would decrease the probability of periodontal healing to less than 50%.¹¹ According to IADT guidelines, if the extraoral dry time of a tooth exceeds 60min, all periodontal cells become non-viable.⁶ In the present study (78.2%) of respondents prefer the reimplantation within 60min of extra oral dry time.

After reimplantation, the tooth should be splinted. In the present study, (91.2%) of respondents consider splinting as first treatment of choice. (56.8%) of respondents would apply a rigid splint. Berude et al., reported that prolonged rigid splinting of tooth in monkeys would lead to ankylosis.¹²

Ideally, many authors recommend the use of semirigid splint in cases of dental avulsion when no bone fracture is detected.^{13,14,15} As it allows the physiological functional mobility of traumatized tooth, which is more favorable for the healing of periodontal ligament (PDL) and thereby the risk of ankylosis or external root resorption is reduced.

60% of respondents correctly stated that both flexible and semirigid type of splinting should be performed for 2 weeks (56.4%) in cases without alveolar bone fracture. Whereas, (60.5%) of respondents consider 4 weeks (54.1%) in case with reimplantation with alveolar bone fracture.

Chappuis et al., proposed that a splinting period of 10 days is adequate for an avulsed tooth.¹⁶ This suggestion was based on the findings of a one year follow up study of reimplanted tooth which found tooth with Splinting period of more than 10 days significantly presented with replacement resorption. IADT suggested splinting of an avulsed tooth for up to 2 weeks in cases where alveolar bone is not fractured and 4 weeks in alveolar bone fractured cases.

Among all the four types of semirigid splint: ortho bracket and arches splints, wire splints, composite splints, fiber splints, titanium splints - Fiber splints (54.4%) were most preferred due to ease of application and removal represented by shorter chair-side time which may benefit dental practitioner alike.^{17,4}

The IADT also suggested initiation of RCT 7-10 days after reimplantation of avulsed permanent tooth with closed apex.⁶ Berrett and Kenny reported that the timing and nature of endodontic treatment for a reimplanted tooth was designed to control infection and therefore prevent inflammatory root resorption.¹¹ In this study, (92.7%) of the respondents consider RCT but only (49.8%) of respondents considered closed apex indication for performing RCT. 55.7% respondents would perform RCT after 7-10days while, (18.3%) respondents would perform RCT before reimplanting the tooth. The majority of respondents were aware of the possible sequelae of avulsed tooth which include ankylosis, pulpal necrosis and root resorption.

The outcome of this study indicates that general practitioner in central India need to enhance their knowledge of emergency treatment of avulsed tooth. Prevention of trauma and further education in the care of avulsed tooth is an important part of a lifelong learning process for enhancing knowledge and clinical abilities.

In terms of limitations of this study, there may be a chance of reporting bias as participants might have answered what they do not follow in actual practice. However, this bias may be eliminated by the fact that the present study design comprised of comparative assessment of knowledge amongst dental practitioners, PGs and other specialists.

The study compared rigid and non-rigid splinting outcome. And also, the prognosis of tooth RCT done before implantation and after implantation.

CONCLUSION

Within the limitations of this study, it can be concluded that satisfactory awareness on management of avulsion injuries exists amongst GDPs in Central India. However, enhancement in knowledge base and clinical management protocols regarding use of splints complying to IADT guidelines is necessitated amongst GDPs in Central India. Utilization of International Association of Dental Traumatology guidelines for the management of dental traumatic injury should be recommended to increase the knowledge level and to ensure better treatment outcome.

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