Abstract for AADR Annual Meeting
Los Angeles, CA, March 16-19, 2016

Correlation between symptoms and external cracked tooth characteristics: National-Dental-PBRN study

Objectives: To determine which external tooth/crack characteristics correlate with cracked teeth being symptomatic.

Methods: Dentists in National Dental Practice-Based Research Network. (PBRN; www.NationalDentalPBRN.org) enrolled subjects each with a single, vital posterior tooth with at least one observable external crack. Data were collected at the patient-, tooth- and crack- level. Teeth were determined to be symptomatic if they were spontaneously painful, or painful to cold and/or bite testing. Frequencies according to whether or not symptomatic were obtained and odds ratio calculated. Stepwise regression using generalized model to adjust for clustering was performed; characteristics with $p<0.05$ were retained.

Results: 209 network dentists enrolled 2,780 subjects/cracked teeth (one per patient) with a symptomatic or asymptomatic cracked posterior tooth. 1,234 (44%) of these enrolled teeth were symptomatic.1,013 (36%) of the population were male, average age was 54(SD=12); range 19-85 years. The number of external cracks per enrolled tooth: 1: 992(36%); 2: 736(26%); 3: 487(18%); 4: 301(11%); 5: 147(5%); 6: 66(2%); 7 or more cracks 51(2%). Distribution of tooth surfaces with a crack: mesial: 1,249(45%); distal 1,394(50%); occlusal 1,198 (43%); facial 1,392(50%); lingual 1,429(51%). Of 1,234 symptomatic, 352 (28%) had spontaneous pain. The following table presents frequencies, and crude and adjusted associations of various tooth/crack characteristics to a cracked tooth being symptomatic:

	Asymptomatic (N=1546)		Symptomatic (N=1234)		Crude	
Characteristic	N	%	N	%	Odds Ratio[1]	p-value
Tooth level						
Molar	1,200	78%	1,076	87%	1.96	<.001
Maxillary	634	41%	514	42%	1.03	.7
Restoration present	1,427	92%	1,137	92%	0.98	.8
In occlusion	1,505	97%	1,210	98%	1.37	.2
Wear facet through enamel	351	23%	325	26%	1.22	.03
Exposed root	363	23%	256	21%	0.85	.08
RPD abutment	16	1%	4	0%	0.31	.03
FPD abutment	0	0%	3	0%	8.70	.052
NCCL present	163	11%	86	7%	0.64	.001
Crack level						
Stained	1,265	82%	977	79%	0.84	.08
Blocks transilluminated light	948	61%	861	70%	1.46	<.001
Tactilely perceptible	1,060	69%	853	69%	1.03	.7

Connects with restoration	1,114	72%	914	74%	1.11	.2
Horizontal direction	470	30%	399	32%	1.09	.3
Vertical direction	1,430	92%	1,169	95%	1.46	.02
Oblique direction	145	9%	132	11%	1.16	.2
Surfaces						
Mesial	685	44%	564	46%	1.06	.5
Occlusal	645	42%	553	45%	1.13	.10
Distal	718	46%	676	55%	1.40	<.001
Facial	772	50%	620	50%	1.01	.9
Lingual	761	49%	668	54%	1.22	.01

[1]Odds ratio for symptomatic/asymptomatic.

In adjusted analysis, being on molar (OR= 1.84; p<0.001), blocking trans-illuminated light (OR= 1.47; p=0.005), caries present (OR= 1.36; p= 0.02), on distal surface (OR= 1.28; p<0.001), or wear facet through enamel (OR= 1.22; p= .01) were associated with increased odds of being symptomatic. Conversely, if NCCL was present (OR= 0.65; p=0.02) or if stained (OR=0.69; p<0.001) were associated with decreased odds of being symptomatic.

Conclusions: A number of tooth- and crack-level characteristics are significantly associated with symptomatic cracked teeth. Support: U19-DE-22516.

Key Words: Cracked Teeth, Dental PBRN, National Dental PBRN

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Abstract for AADR Meeting
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Correlation between internal and external cracked tooth characteristics: National-Dental-PBRN study

Objectives: To determine which external tooth/crack characteristics correlate with presence of internal cracks. (PBRN; www.NationalDentalPBRN.org).

Methods: Dentists in the National Dental Practice-Based Research Network (PBRN; www.NationalDentalPBRN.org). enrolled subjects each with a single, vital posterior tooth with at least one observable external crack. Data were collected at the patient-, tooth- and crack- level. Teeth requiring invasive treatment were examined at the time of tooth preparation for presence of internal cracks. Frequencies according to presence of internal cracks were obtained and odds ratios calculate. Stepwise regression using generalized model to adjust for clustering were performed; characteristics with $p<0.05$ were retained.

Results: 209 network dentists in National Dental PBRN enrolled 2,780 subjects/cracked teeth (one per patient) with a symptomatic or asymptomatic cracked posterior tooth. 383 (14%) of these enrolled teeth required treatment that allowed assessment of internal cracks. The number of observable external cracks: 1:992(36%); 2:736(26%); 3:487(18%); 4:301(11%); 5:147(5%); 6:66(2%); 7+:51(2%), and the number of internal cracks per treated tooth allowing assessment: 1: 201(52%); 2: 112(29%); 3: 38(10%); 4: 30(8%); 5+: 2(1%). Of the 383 teeth with internal cracks, 260 (68%) were symptomatic.

The following table notes correlations of various tooth/external crack characteristics to the presence of internal cracks:

	Presence of Internal Cracks				Crude	
	No (N=2397)		Yes (N=383)		Odds Ratio[1]	P-value
Characteristic	N	%	N	%		
Tooth level						
# External Cracks >=3	905	38%	147	38%	1.03	.8
Molar	1,949	81%	327	85%	1.34	.055
Maxillary	972	41%	176	46%	1.25	.046
Restoration present	2,204	92%	360	94%	1.37	.2
In occlusion	2,341	98%	374	98%	0.99	.9
Wear facet through enamel	577	24%	99	26%	1.10	.4
Exposed root	559	23%	60	16%	0.61	<.001
Caries Present	177	7%	128	33%	6.29	<.001
RPD abutment	18	1%	2	1%	0.69	.5
FPD abutment	1	0%	2	1%	12.58	.008
NCCL present	224	9%	25	7%	0.68	.07
Crack level						
Stained	1,932	81%	310	81%	1.02	.8

Blocks transilluminated light	1,546	64%	263	69%	1.21	.12
Tactilely perceptible	1,641	68%	272	71%	1.13	.2
Connects with restoration	1,734	72%	294	77%	1.26	.07
Horizontal direction	723	30%	146	38%	1.49	.002
Vertical direction	2,246	94%	353	92%	0.79	.3
Oblique direction	245	10%	32	8%	0.80	.2
Surfaces						
Mesial	1,042	43%	207	54%	1.53	<.001
Occlusal	1,000	42%	198	52%	1.49	.001
Distal	1,173	49%	221	58%	1.42	.001
Facial	1,232	51%	160	42%	0.68	<.001
Lingual	1,219	51%	210	55%	1.17	.15

[1]Odds ratio of presence of internal cracks/no internal cracks present.

In the adjusted model, a tooth with 3 or more external cracks (OR=0.57; p=.01) or having one or more external cracks with an exposed root (OR=0.58; p=.007) was less likely to have internal cracks. Conversely, if a cracked tooth had a crack on mesial (OR=1.86; p<.001), occlusal (OR=1.34; p=.01), or distal (OR=1.63; p=.003) or lingual surface (OR=1.47; p=.01), or the crack ran in a horizontal direction (OR=1.31; p=.009), or if the tooth had caries present (OR=6.46; p<.001), it was more likely to have internal cracks.

Conclusions: Specific externally observable tooth- and crack-level characteristics are significantly associated with presence of internal cracks. Support: U19-DE-22516.

Key Words: Cracked Teeth, Dental PBRN, National Dental PBRN

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