

THE EFFECT OF DESENSITIZING AGENT ON DEGREE OF SENSITIVITY AFTER CROWN PREPARATION ⁺

تأثير مضاد التحسس على درجة تحسس الاسنان المحضرة لغرض وضع التيجان
دراسة سريرية

Bushra H. Sadik*

Salma I. Dahem**

Sabah M. Dhumad

**

Abstract:

This study showed that the effect of desensitizing agent (soother) on the degree of sensitivity of the prepared teeth. Sixty teeth of ten patients were included in the study , and the patients were divided into male and female groups. Temporary crowns and bridge were made for prepared teeth to be used during the stages of the research . Three visits were controller to the patients, the 1st visit should be directly after preparing the teeth and the soother desensitizing agent was applied according to manufacture instruction .Then the test was done by the application of ice sticks and air of dental syringe on the prepared teeth, record the results . The 2nd visit after one week ; by applying a new caot of desensitizing agent and repeat the same procedure in first visit with record the results. The 3rd visit : after 2 weeks and the same procedures had applied , then the results were recorded through the questioner the patient about the severity of pain (mild, moderate, sever or no pain).

This study revealed that the degree of sensitivity of the prepared teeth decreased gradually after the application of desensitizing agent surfaces of the prepared teeth and the result showed that

- There is a significant decrease in sensitivity of teeth especially in the 2nd and 3rd visit .
- There is no significant different between male and female in response to sensitivity after applying the desensitizing agent .

Aim of this study:

This study was carried out to evaluate the effect of desensitizing agent on the degree sensitivity after crown preparation in vivo study .

المستخلص:

هذه الدراسة أظهرت تأثير مضاد التحسس على درجة تحسس الأسنان المحضرة . عشرة مرضى وستون سنناً مشمولون بالدراسة وقد تم تقسيم المرضى إلى مجموعة ذكرية وأخرى أنثوية . تيجان و جسور مؤقتة قد عملت لاستخدامها خلال البحث للأسنان المحضرة للمرضى . ثلاث زيارات نظمت لهؤلاء المرضى . الزيارة الأولى مباشرة بعد تحضير الأسنان و وضع مادة التحسس والفحص يتم بوضع ثلج أو

⁺Received on 11/8/2008 , Accepted on 9/9/2009 .

*Ass. Professor / Institute of Medical Technology / Baghdad

**Ass . Lecturer/ Institute of Medical Technology / Baghdad

هواء نيدل جهاز الاسنان بواسطة وضعهما على سطوح الأسنان بعد تلك النتائج تسجل طبقاً لإجابات المرضى بعد السؤال منهم .

الزيارة الثانية تتم بعد أسبوع واحد وذلك أيضا بوضع طبقة من مادة مضاد التحسس وتسجيل النتائج كما في الزيارة الأولى .

الزيارة الثالثة بعد أسبوعين وتطبق نفس الإجراءات السابقة ، أظهرت هذه الدراسة بأن درجة حساسية الأسنان المحضرة تقل تدريجاً بعد استعمال مضادات التحسس و وضعهما على أسطح الأسنان المحضرة خاصة خلال الزيارة الأولى والثانية وتقليل التحسس يكون أكثر في الزيارة الأولى مباشرة بعد تحضير الأسنان ، كذلك أظهرت بأن تأثير مضادات التحسس اقل فعالية عند استخدام قطع الثلج مقارنة في استخدام هواء نيدل جهاز الأسنان .

Introduction:

Dentin sensitivity is a common problem that effect between 10 and 20% of population. Various theories have explained the mechanism of dentin sensitivity[1].

Currently , the hydrodynamic theory is widely accepted . It is a displacement of tubular content such as fluid that might produce a deformation of never fibers wrapped a around the adontoblast cells[2].

Thus , products that occlude tubules to any extent can significantly reduce fluid filtration across the dentin and reduce pain[3].

A variety if materials , such as calcium hydroxide, cavity varnish, topical florid , florid ion trophorsis, laser radiation and potassium nitrate dentifrices have been used in an attempt to reduced dentin sensitivity[4]. Oxalate, qlutaraldehyde and dentin bonding agent with and without resin-base composite are some of the material currently being used for the treatment of this condition[5]. Combaining a resin adhesive with a previous application of desensitizing agent seem to be contradictory at first sight, since effective adhesive are expected to seal the etched dentin surface by intertubular and peritubular hypridization and by resin tags formation in opened dentin tubules [6]. This seal prevents fluid shift a cross the tubules occurring in response to mechanical, thermal or osmotic stimuli. However, if the tags within the dentin tubules were too long, it could cause post-operative pain with the continued properties, desensitizing agent dentin hypersensitivity[7].

Christensen, has described the desensitizing of teeth after crown preparation in an attempt to ovoid post-operative sensitivity. Current trend of desensitization trend to concentrate on tubules occluding[8]. One way of relieving the post-operative sensitivity in clinic is adjunctive use of oxalate or potassium nitrate desensitizers on acid etched dentin prior to adhesive application[9].

So this study was conducted to find out the effect of the desensitizing agent on the degree of sensitivity after crown preparation.

Materials & Method:

Ten patients were selected after they have been examined in the consultant dental clinic of the instituted of medical technology. Patients were selected according to the following criteria :

- a. Each patient should be indicated for fixed restoration with age range from (20-55).
- b. Abutment teeth were prepared for fixed restoration and temporization.

- c. The patient must have good general health and good oral hygiene.
- d. The patient should have no big carious or heavily filling abutment tooth .
- e. The abutment tooth should vital or with root canal treatment.
- f. The patient should not have excessive gingival inflammation or allergy against the treatment agent.
- g. The selected patient should sign a consent form and answer.

A total of ten questioner patients with total sixty teeth were included in this recent study.

The patients were divided into two groups, six males and four females according to cases available. The teeth already prepared to be tested with pain producing stimuli by air or syringe.

Putting the ice stick in contact with the prepared teeth in the center of surfaces for 10 seconds or until the patient felt any discomfort, while the air was applied by a single blow using air syringe of dental unit by placing the tip of syringe at a half of the a labial surface of the tooth to word the center, this procedure are made immediately after preparation the teeth. Then the first coat of desensitizing nitrate which content florid ions 0.11% water 78.29% thickener 15.0% and sodium benzoate 0.10% these agent was applied for 2 minute and left about 10 minute unwashed and then allow patient to resin for 2 seconds according to manufacture instruction the result were recorded before and after application of desensitizing agent , after that was placed the temporary restoration& give the patient another appointment.

- After one week the temporary restoration was removed and the tooth was cleaned, then a new tow coat of desensitizing agent were applied and result by asked the patient about the response of patients to ice and air stimuli were recorded . The temporary restoration was placed agent. After two weeks, placed two other coats of desensitizing agent and the result were recorded in the same way . After cementation of the permanent restoration the patient were asked for recall visit after one month to evaluate the hypersensitivity.

Table-1: The response to stimuli with air syringe:

Type of teeth preparation	age	sex	Tooth formula		Immediately after preparation	After one week	After one week
Incisores	30	male	21	12	Moderate pain	Mild pain	No pain
	32	male		1	Moderate pain	No pain	Mild pain
	27	male	1	12	Sever pain	Mild pain	No pain
	44	male		12	Mild pain	No pain	No pain
	26	female		12	Sever pain	Moderate pian	Mild pain

	26	femal e	3		Sever pain	Mild pain	Mild pain
	47	femal e			Moderate pian	Moderate pian	No pain
				3			
	31	femal e	3	3	Mild pain	Moderate pian	No pain
				3			

Table-4: The response to stimuli with ice air syringe

Type of teeth preparation	age	sex	Tooth formula		Immediately after preparation	After one week	After one week
Premolar	24	male		45	Sever pain	Sever pain	Moderate pain
			5				
	30	male		45	Sever pain	Moderate pain	No pain
	32	male	54		Sever pain	Mild pain	No pain
	27	male			Sever pain	No pain	Moderate pain
			5				
	52	male			Sever pain	Mild pain	No pain
			5	5			
	44	male		4	Moderate pain	No pain	No pain
26	female	4	45	Sever pain	Mild pain	Mild pain	
35	female	5	45	Moderate pain	No pain	No pain	
47	female	5		Moderate pain	No pain	No pain	
			4				
31	female	4		Mild pain	Moderate pain	No pain	
			45				

Table-5: The response to stimuli with air syringe

Type of teeth preparation	age	sex	Tooth formula		Immediately after preparation	After one week	After one week
Premolar	24	male		45	Sever pain	Moderate pain	No pain
			5				
	30	male		45	Sever pain	Mild pain	No pain
	32	male	54		Moderate pain	Mild pain	No pain
27	male			Sever pain	Mild pain	No pain	
		5					
52	male			Sever pain	Moderate	No pain	

			5	5		pain	
	44	male		4	Mild pain	No pain	No pain
	26	female	4	45	Moderate	Mild pain	No pain
	35	female	5	45	Moderate	No pain	No pain
	47	female	5		Moderate	No pain	No pain
				4			
	31	female	4		Sever pain	Mild pain	No pain
				45			

Table-6: The response to stimuli with ice stick

Type of teeth preparation	age	sex	Tooth formula		Immediately after preparation	After one week	After one week
Molar	24	male		67	Sever pain	Mild pain	Moderate pain
	32	male			Sever pain	Mild pain	No pain
				67			
	27	male			Sever pain	Mild pain	No pain
			6	67			
	52	male			Moderate pain	No pain	No pain
			76	6			
35	female			Moderate pain	Moderate pain	No pain	
			7				
47	female	75		Moderate pain	No pain	No pain	
31	female			Mild pain	Moderate pain	No pain	
				6			

Table-7: The response to stimuli with air syringe

Type of teeth preparation	age	sex	Tooth formula		Immediately after preparation	After one week	After one week
Molar	24	male		67	Sever pain	Sever pain	Moderate pain
	32	male			Sever pain	Mild pain	No pain
				67			
	27	male			Sever pain	Mild pain	No pain
			6	67			
	52	male			Moderate pain	No pain	No pain
			76	6			
35	female			Moderate pain	Moderate pain	No pain	
			7				
47	female	75		Moderate pain	No pain	No pain	
31	female			Mild pain	Moderate	No pain	

				6		pain	
--	--	--	--	---	--	------	--

Discussion:

The purpose of this study was to look at effect of application of coating desensitizing agent (soother) on degree of sensitivity after crown preparation.

Combining a resin adhesive with application of desensitizing agent seems to contradictory at first sight, since effective adhesive are expected to seal the etched dentin surface by intertubular and peritubular hyperdization and by resin tags formation in the opened dentinal tubules[10]. This seal prevent fluid shift across the tubules occurring in response to mechanical, thermal or osmotic stimuli . However, if the tags formed with in the dentin tubules were too long, it could cause post-operative pain. When comparison with using the desensitizing agent which may be useful treatment option in the management of persistent dentin hypersensitivity by effect of dentin permeability and allow the efficacy of desensitizing agent in obliteration dental tubules[11].

Greenhill and Pashley , evaluated dentin desensitizer in term of their ability to reduced the rate of fluid flowing through the specimens treated with potassium oxalate presented the largest reduction in the hydrolytic conduct reduction probably resulted from the deposition of insoluble calcium oxalate on the dentin surface, these permeability of the exposed dentin[12]

Other studies have used scanning electron microscopy (SEM) to verify the morphology of dentin . Addy et al evaluated the formation of an impermeable layer on the dentin surface by potassium oxalate after etching. No uniform impermeable layer ; as result , the effect of the desensitizing agent were analyzed only at the dentin surface and were fewer ions on the surface might react[13] .

Pereira et al,observed in laboratory study when longitudinally sectioned specimens , the dentin disc treated with potassium oxalate revealed partial occlusion of dentin tubules by crystal below the surface . the dentin treated with calcium phosphate solution produces a thick smear layer of precipitated a phosphate that covered most of the tubules [14] .

Gillam DG, suggested that multiple application were necessary in deep dentin (closure to plup) to gain better effect, by cause the potassium oxalate had a super facial coating with no blocking of dentin tubules at deeper layer[15]. So this result was disagreement with our study.

Yoshiyama et al , concluded that precipitated of oxalate crystals may occur not only on the dentin surface but also in the dentinal tubules. The oxalate precipitation can remain for up to 1 week , if the smear layer removed by acid etching before applying the agent, so most effective more than 1 month and effected of desensitizing agent also depend on age of patient[16]. So we can see the result of our study , finding the properties of young dentin especially at age (20-30 years) have more sensitivity of teeth even after applying the desensitizing agent due to have wider dentinal tubules. So these tubules begin to fill with mineral deposited with age, these phenomenon is known as transparency[17]. So the micromechanical properties of younger dentin different from older. So in our study also show no evidence deference in response to agent between mal and female patient. Because the structure and properties of dentinal tubules of tow sex mostly the same[18].

Also the configuration or type of teeth also effected in which the anterior teeth more sensitive than premolar or molar teeth because the diameter of dentinal tubules

affected by reduce the diameter of teeth. The rang of diameter of these tubules rang from 2.5mm to 1.2mm in the mid portion[19].

Swift et al, found in their study that retention of last metal crown cemented with zinc-phosphate cement and glass-inomer cement were not effected if applied desensitizing agent before the cementation[20].

Conclusion:

In this study:

- The desensitizing agent were significantly effective in reducing the dentin hypersensitivity.
- A second application of agent reduced the dentinal hypersensitivity level or completely resolve the symptom.
- Less effective in reduction dentinal hypersensitivity with ice stick than the air syringe test.
- Desensitizing agent should be used routinely on all abutment which were restored with fixed restoration not only prevent dentin hypersensitivity but important to minimize bacterial contamination to reach the pulp (closure the dentinal tubules).
- Multiple application of desensitizing agent can give better effect in reducing dentin hypersensitivity according to our finding.
- The sensitivity of teeth also effected by age patient.

References:

1. Yoshixama M, Noirix, Ozaki: The transmission electron microscopi characterization human dentin, *J Dent Res, jun; 69:129: 1990.*
2. Jain P, Vagas AM, Denhy DG: Dentin desensitizing agent MA, SEM and X-ray microanalysis assessment. *AM J Dent, 10(1);12-26, 1997.*
3. Prime T, Ozyazici M, Balogle: The efficacy of three desensitizing agent in treatment of dentin hypersensitivity ; *J Dlin pharether-feb; 30(1) 6-73, 2006.*
4. Jain P, Reinhard : JW. Krell KV : Effect of desensitizing agent and bonding agent on dentin permeability , *AM J. Dent. Feb; 13(1): 7-12,2000 .*
5. Schupdach P. Lutz, Finger WJ: Closing 19 of dentinal tubules by Gluma desensitizer , *Eur J Oral sosi. Oct: 195 (5PI) ; 21-41, 1997.*
6. Brunton PA, Kalsi KS, Walts DC, Walson NH : Resistance of two dentin-bonding agent and dentin desensitizer to acid erosion in vitro. *Dent, Mater, Sept; 16(6): 5-35;2000>*
7. Pashley DH, Garaho RM, Perera JC: The clinic use of oxalate to reduce dentin permeability under adhesive restoration , *AM J Dent, 14; 89-94, 2002 .*
8. Christensen GJ: Intraoral television camers presenting major new use. *J Tom Dent. Assoc; 125(4) 439; 1994.*
9. Tay FR, Pashley DH, Make XF; Integrating oxalate desensitizer with total etch two step adhesion : *J Dent Res, 2003: 82(9): 2003.*
10. Dondiadall, Orologio G, Loane Az , Finger WS: Clinical evaluation of role of glatarldahyde in one bottle adhesive, *AM J Dent, (5), 330-334:2002.*
11. Lehmann N, Degrange M: Effect of four dentin desensitizer on the shear bond strengin of three bonding system: *European cells and materials vol(9); 52-53:2005.*
12. Greenhill DJ, Pashley DH. The effects of desensitizing agents on the hydraulic conductance of human dentin . *In vitro . J Dent Res 60:686-688: 1991*

13. Addy M. A cross-sectional study of dentin hypersensitivity. *J Clin periodontal* 2002;29:997-1003.
14. Feilzer AJ , Degee AJ : Relaxation by hygroscopic expansion . *J Dent Res* , 1994 , 69- 36-39.
15. Gillam DG, Mordan NJ, Sinodinou AD, Tang JY, Knowles JC, Gibson IR. The effects of oxalate-containing products on the exposed dentine surface : an SEM investigation. *J Oral Rehabil* 28:1037-1044: 2001.
16. Yoshiyama M, Nakajima M, Pashley DH. The micro-tensile bond test : a review . *J Adhes Dent* 1:299-309: 1999.
17. Zhang Y, Agee K, Pashley DH, Pashley EL. The effects of pain free Desensitizer dentine permeability and tubule occlusion over time , in vitro. *J Clin periodontol* 25: 884-891: 1998.
18. Johnson GH, Powell LV: Evaluation and control of post cementation pulpal sensitivity: zinc phosphate and glass ionomer luting cements. *JADA* 1993;124(11)38-46
19. Mausner IK, Goldstein GR : Effect of two dentinal desensitizing agents on retention of complete cast coping using four cements. *J Prosthet Dent* 1996;75:129-3
20. Swift EJ, Lloyd AH, and Felton DA: The effect of resin desensitizing agents on crown retention, *J Am Dent Assoc* 1997;128;195-200.