

3M-Z350纳米复合树脂充填材料与3M-Z100复合树脂充填材料用于活髓前牙美容修复：敏感性及疼痛程度评价*

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3M-Z350 Nano-resin and 3M-Z100 composite resin for cosmetic restoration of anterior teeth with vital pulp: Evaluation on postoperative sensitivity and pain

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Abstract

BACKGROUND: Resin filling, full crown and veneer are used in cosmetic restoration of anterior teeth. Doctors prefer resin because of its perfect clinical effect and small hurt. Some patients complain of sensitivity after resin filling and we are interest in choosing a better resin with less sensitivity.

OBJECTIVE: To compare the incidence of postoperative sensitivity and the difference of the patients' self sensitivity after cosmetic restoration of anterior teeth with vital pulp by 3M-Z350 Nano-resin and 3M-Z100 composite resin.

METHODS: A total of 112 teeth with vital pulp because of caries or traumatic tooth fractures of 68 patients demanding cosmetic restoration were selected from the Department of Endodontics, Stomatological Hospital of Luzhou Medical College from August to December 2006. The teeth were random divided into 3M-Z350 group and 3M-Z100 group, with 56 teeth in each group. 3M-Z350 nano-resin and 3M-Z100 composite resin were used for cosmetic restoration of anterior teeth with vital pulp. Ryge criteria were used to evaluate the sensitivity to the cold stimulation following cosmetic restoration, and the level of pain was detected by the pain ruler.

RESULTS AND CONCLUSION: Compared with 3M-Z100 group, the incidence of sensitivity and self-pain level were decreased in the 3M-Z350 group at 1 day, 1 week, and 1 month after restoration ($P < 0.01$ or $P < 0.05$). There was no significant difference in the sensitivity and self-pain level between the two groups ($P > 0.05$). Anterior teeth with vital pulp were well restored by 3M-Z350 nano-resin which might reduce the incidence of postoperative sensitivity.

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摘要

背景: 对于前牙美容修复, 树脂充填材料具有牙体损伤小、美观效果佳等特点, 但活髓牙充填后常出现敏感等问题, 如何选择一种刺激性较小的树脂充填材料尤为关键。

目的: 比较 3M-Z350 纳米复合树脂充填材料与 3M-Z100 复合树脂充填材料进行活髓前牙美容修复后的敏感发生率及患者自觉疼痛程度的差异。

方法: 选择 2006-08/12 就诊于泸州医学院附属口腔医院口腔内科因龋坏或外伤牙折要求行前牙美容修复的活髓牙患者 68 例, 患牙 112 颗, 随机分为 3M-Z350 组、3M-Z100 组, 56 颗患牙/组。两组分别对应用 3M-Z350 纳米复合树脂充填材料及 3M-Z100 复合树脂充填材料行前牙美容修复。采用 Ryge 评价标准在修复后不同时间记录对冷刺激的敏感性, 采用疼痛程度标尺记录患者自觉疼痛程度。

结果与结论: 与 3M-Z100 组比较, 修复 1 d、1 周、1 个月后 3M-Z350 组敏感发生率及患者自觉疼痛程度均明显降低 ($P < 0.01$ 或 0.05), 修复 3 个月后上述两项指标无明显差异 ($P > 0.05$)。提示在活髓前牙美容修复过程中, 使用 3M-Z350 纳米复合树脂充填材料在获得良好美容修复效果的同时, 可明显降低充填后的敏感发生。

关键词: 牙髓反应; 术后敏感; 复合树脂; 纳米; 充填材料; 生物材料

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0 引言

近年来光固化复合树脂作为一种齿科美容修复材料, 因色泽逼真、操作简单、成形准确、少磨或不磨牙体等优点已被广泛应用于前牙美容修复^[1-29], 但树脂修复活髓牙后的术后敏感问题始终存在^[30]。20世纪90年代中期, 随着材料科学的发展, 将纳米技术引入到树脂材料中, 使树脂材料取得了明显进步。

实验以术后敏感发生率及术后敏感程度为观察指标, 探讨3M-Z350纳米树脂充填材料与3M-Z100复合树脂充填材料进行前牙美容修复后的敏感情况。

1 材料和方法

设计: 材料学对比实验。

材料: 选择2006-08/12就诊于泸州医学院附属口腔医院口腔内科的68例患者活髓患牙112颗, 男38例, 女30例, 年龄12~60岁, 牙周健康, 无全身系统性疾病。全部患者对实验和治疗均知情同意, 采用抽签法随机分为3M-Z350组、3M-Z100组, 56颗患牙/组。

纳入标准: ①诊断为中龋或深龋、不伴牙髓充血以及牙髓炎症状、X射线片显示龋坏离髓腔大于1 mm者。②外伤牙折未暴露牙髓, 牙髓活力正常, 不伴牙髓充血以及牙髓炎症状, X射线片显示牙断段离髓腔大于1 mm者。③需行前牙美容修复者。

排除标准: ①牙齿敏感症病史患者。②牙周炎患牙。③不能按时复诊患者。

3M-Z350纳米复合树脂、3M-Z100复合树脂、3M自酸蚀黏结剂、3M复合树脂抛光系统、聚酯薄膜条为3M ESPE Dental Products 公司产品; Dentsply Dycal双糊剂型氢氧化钙、Dentsply LED光固化灯为DENTSPLY 公司产品。

实验方法:

牙体预备: 对于龋坏前牙要求彻底去净龋坏组织, 并于窝洞边缘牙釉质上预备宽约1 mm短斜面。对于去净龋坏后过于敏感患牙, 使用Dentsply Dycal双糊剂型氢氧化钙护髓; 对于外伤牙折前牙在牙折断端处预备宽约3 mm短斜面, 断面近髓; 过于敏感患牙以Dentsply Dycal双糊剂型氢氧化钙护髓。以聚酯薄膜条分隔患牙, 并辅助成形^[31]。

酸蚀粘接: 各组分别根据厂家说明严格操

作, 用3M自酸蚀粘结剂酸蚀处理30 s, 光照固化20 s。

树脂修复: 比色后, 两组分别用3M-Z350纳米复合树脂和 3M-Z100复合树脂分层充填, 每层固化40 s, 修复过程中严格按照前牙美容修复要求操作, 尽量恢复患者前牙美观。调咬合, 使用3M复合树脂抛光系统抛光, 严格按照材料说明由粗到细逐步抛光, 最后邻面磨光。

术后敏感的评价: ①术后敏感发生率采用Ryge评价标准^[32], 用压缩空气距患牙修复体2.0~3.0 cm吹2 s, 相邻牙齿用棉球遮挡。A级: 不敏感; B级: 一过性敏感, 刺激去除后敏感消失; C级: 敏感, 刺激去除后敏感不消失。②患者自觉疼痛程度采用疼痛程度标尺, 用0~10表示, 0为无疼痛, 10为疼痛最严重^[33]。所有患者于治疗后1 d、1周、1个月、3个月对牙髓敏感情况进行评估。

主要观察指标: ①不同复合树脂充填材料行前牙美容修复后的敏感发生率。②不同复合树脂充填材料行前牙美容修复后的患者自觉疼痛程度。

设计、实施、评估者: 实验设计、实施均由泸州医学院附属口腔医院口腔内科医师完成, 采用单盲法评估, 统一由另一位未参与修复治疗的医师完成。

统计学分析: 由第二作者应用SPSS 12.0软件进行统计处理, 计量资料以 $\bar{x} \pm s$ 表示, 术后敏感发生率行 χ^2 检验, 术后疼痛程度采用两样本 t 检验。

2 结果

2.1 患牙数量分析

3M-Z350组: 修复后1个月失访1例, 患牙1颗; 修复后3个月失访2例, 患牙3颗。

3M-Z100组: 修复后1个月失访2例, 患牙2颗; 修复后3个月失访4例, 患牙4颗。

失访病例按照无效记录结果, 即失访病例修复后敏感程度记为C级, 自觉疼痛记为10, 因此所有病例的患牙均进入结果分析。

2.2 不同复合树脂充填材料行前牙美容修复后的敏感发生率 与3M-Z100组比较, 修复1 d、1周、1个月后3M-Z350组敏感发生率均明显降低($P < 0.01$ 或 0.05), 修复3个月后敏感发生率差异无明显显著性意义($P > 0.05$), 见表1。

表 1 不同复合树脂充填材料前牙美容修复后敏感发生率的比较
Table 1 Incidence of the sensitivity between 3M-Z350 group and 3M-Z100 group (n=56, %)

Group	1 day			1 week		
	A	B	C	A	B	C
3M-Z350	91	5	4	94	5	1
3M-Z100	75	19	6	82	16	2
χ^2	9.875			9.457		
P	< 0.01			< 0.01		

Group	1 month			3 months		
	A	B	C	A	B	C
3M-Z350	96	3	1	93	2	6
3M-Z100	84	12	4	91	2	7
χ^2	6.985			2.524		
P	< 0.05			> 0.05		

A, B and C mean the sensitive grade postoperatively

2.3 不同复合树脂充填材料行前牙美容修复后的患者自觉疼痛程度与3M-Z100组比较, 修复1 d、1周、1个月后3M-Z350组患者自觉疼痛程度显著降低($P < 0.01$), 修复3个月后患者自觉疼痛程度差异无显著性意义($P > 0.05$), 见表2。

表 2 不同复合树脂充填材料前牙美容修复后患者自觉疼痛程度标尺值的比较
Table 2 Patients' self-pain between 3M-Z350 group and 3M-Z100 group ($\bar{x} \pm s$, n=56)

Group	1 day	1 week	1 month	3 months
3M-Z350	2.42±0.07	1.91±0.04	1.68±0.06	1.00±0.06
3M-Z100	2.89±0.04	2.12±0.05	1.82±0.04	1.01±0.04
t	4.015	3.875	2.231	1.000
P	< 0.01	< 0.01	< 0.01	> 0.05

3 讨论

日益增加的美容需求以及对保存健康牙体组织的需求, 加之光固化复合树脂作为一种齿科美容修复材料具有色泽逼真、操作简单、成形准确、少磨或不磨牙体等优点, 使得患者和医生更多地选择复合树脂进行前牙修复。近年来很多学者研究了3M-Z350纳米复合树脂用于各类牙体缺损的修复, 发现其美观效果均较普通复合树脂为佳^[34-38], 但同时也应该注意到复合树脂在进行活髓牙修复治疗后所出现的术后敏感问题^[39]。

关于活髓牙修复后所出现的敏感症状, 目前认为主要与修复过程中和修复后发生的牙本质损伤有关^[40]。导致牙本质损伤的原因主要有以下几个方面: 窝洞制备过程中产生的热量对牙本质-牙髓复合体的刺激; 细菌侵入牙本质小管以及牙本质玷污层的影响; 复合树脂固化不全, 残留单体对牙髓的刺激^[41-42]; 充填体边缘

微渗漏所引起的充填术后敏感。Bergenholtz等^[43]认为现代复合树脂刺激轻微, 其对牙髓的刺激小于牙体预备。Cox等^[44]研究了复合树脂等多种材料活体修复后的牙髓反应, 发现微渗漏导致的牙髓反应大于材料本身对牙髓的刺激, 而且发生严重反应的患牙窝洞中均存在细菌, 故认为细菌是刺激牙髓的主要因素。目前越来越多的学者认为边缘微渗漏是引起牙本质损伤、导致修复后敏感出现的主要原因。有研究提出良好的边缘适合性、修复体的光洁程度以及修复体边缘微渗漏的控制对于降低术后敏感发生率是至关重要的。

随着材料学的进步尤其是将纳米技术引入复合树脂材料中, 使得符合树脂的填料直径达到纳米级, 显著提高了树脂的性能, 如抗压强度、可抛光性以及边缘适合性。3M-Z350纳米复合树脂充填材料的直径为0.005~0.01 μm , 低于可见光的波长。由于粒度小, 可进入聚合链之间, 可以不使用石英化填料, 从而不产生凝聚成丛现象, 同时由于其良好的可抛光性能, 抛光后其表面光洁度远高于普通填料复合树脂, 因而其出现微渗漏现象也少, 对牙髓的刺激小, 修复后敏感发生率相对较低。而Z100复合树脂充填材料粒由亚微米组成, 含量为70%~80%(质量比), 填料中有较大颗粒存在, 进行牙体修复时尤其是在抛光时会出现难以肉眼察觉的微小缝隙, 其宽度大约为10 μm 。口腔内的细菌、水分等均可进入微漏中, 造成牙髓损害。雷丽珊等^[45]研究了纳米复合树脂(Filtek Z350)对人牙髓细胞的毒性, 发现Filtek Z350细胞毒性为0级, 小于Dyract-AP和TPH复合树脂。黄晓晶等^[46]研究了Filtek Z350纳米复合树脂对犬牙髓组织的生物相容性, 发现其生物相容性和Dyract-AP复合体及玻璃离子水门汀相似, 优于TPH复合树脂。陈维旭等^[47]比较了Z350纳米复合树脂与Z100复合树脂对活髓牙龋病充填后的敏感发生率, 发现对于中龋或深龋患牙, 使用Z350纳米树脂可明显降低充填后敏感发生率, 获得较好的疗效。

实验通过对临床常用的两种复合树脂进行活髓前牙美容修复后敏感发生率和敏感程度比较, 发现3M-Z350和3M-Z100充填后敏感主要出现在修复后1 d、1周及1个月内。实验发现3M-Z350组和3M-Z100组前牙美容修复后1 d、1周、1个月敏感的发生率差异有显著性意义($P < 0.01$ 或0.05); 修复后3个月两组敏感发生率基本相似。在修复后1 d、1周、1个月, 3M-Z100组患者自觉疼痛程度明显高于3M-Z350组; 修复后3个月两组患者自觉疼痛程度基本相似。在实验中由于采用的窝洞预备、粘结修复技术以及粘结剂基本相同, 两组在修复后敏感发生率以及敏感程度上的差异主要是因为采用的不同树脂材料引起, 据此认为活髓前牙美容修复, 使用Z350纳米树脂在获得良好美容修复效果的同时,

可明显降低充填术后的敏感发生。

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