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·口腔医学·

玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩对前牙大面积缺损的修复效果及美学效果*

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摘要 目的：探讨玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩对前牙大面积缺损的修复效果及美学效果。**方法：**选取我院2021.1-2024.1收治的90例前牙大面积缺损患者进行回顾性分析，依照患者选择的治疗方式分为玻璃陶瓷组和金属组，各45例。金属组采取烤瓷熔附金属（钴铬合金）全冠桥联合铸造金属桩核治疗，玻璃陶瓷组采取玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩治疗。对所有患者进行6个月门诊复查随访，比较其近远期疗效，修复前后龈沟液相关标志物，牙周状况，咀嚼功能与美学评分及并发症发生率。**结果：**通过对比近远期疗效发现，玻璃陶瓷组总有效率95.56%，金属组总有效率93.33%，两组比较无明显差异（$P>0.05$），玻璃陶瓷组修复成功率91.11%，金属组修复成功率75.56%，璃陶瓷组高于金属组（$P<0.05$）；通过对比修复前后龈沟液相关标志物发现，修复前玻璃陶瓷组、金属组ALP、ICAM1、MMP-2比较无明显差异（$P>0.05$），修复后两组患者ALP、ICAM1、MMP-2水平均升高，但玻璃陶瓷组低于金属组（$P<0.05$）；通过对比修复前后牙周状况发现，修复前玻璃陶瓷组、金属组CAL、PD及SBI水平比较无明显差异（$P>0.05$），修复后两组患者CAL、SBI、PD水平均升高，但玻璃陶瓷组低于金属组（$P<0.05$）；通过对比咀嚼功能与美学评分发现，修复前玻璃陶瓷组、金属组美学评分、咀嚼功能评分比较无明显差异（$P>0.05$），修复后两组患者美学评分、咀嚼功能评分均升高，玻璃陶瓷组高于金属组（$P<0.05$）；通过对比6个月内并发症发现，玻璃陶瓷组并发症发生率低于金属组（$P<0.05$）。**结论：**前牙大面积缺损采取玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复远期效果更优，且可减轻对患者龈沟液和牙周组织影响，提升咀嚼功能，改善牙周美学效果，安全性高。

关键词：玻璃陶瓷；全瓷冠桥；多根管玻璃纤维桩；前牙大面积缺损；修复效果；美学效果；咀嚼功能

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The Restoration Effect and Aesthetic Effect of Glass Ceramic All Ceramic Crown Bridge Combined with Multiple Tube Glass Fiber Posts on Large-area Anterior Tooth Defects*

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ABSTRACT Objective: To investigate the restoration and aesthetic effects of glass ceramic all ceramic crowns and bridges combined with multiple tube glass fiber posts on large-area anterior tooth defects. **Methods:** A retrospective analysis was conducted on 90 patients with extensive anterior tooth defects admitted to our hospital in the 2021.1-2024.1. According to the treatment method chosen by the patients, they were divided into a glass ceramic group and a metal group, with 45 cases in each group. The metal group was treated with porcelain fused to metal (cobalt chromium alloy) full crown and bridge combined with cast metal post and core, while the glass ceramic group was treated with glass ceramic full ceramic crown and bridge combined with multiple tube glass fiber posts. Conduct a 6-month outpatient follow-up for all patients to compare their short-term and long-term efficacy, gingival crevicular fluid related markers before and after restoration, periodontal condition, chewing function and aesthetic scores, and incidence of complications. **Results:** By comparing the short-term and long-term efficacy, it was found that the total effective rate of the glass ceramic group was 95.56%, and the total effective rate of the metal group was 93.33%. There was no significant difference between the two groups (P>0.05). The repair success rate of the glass ceramic group was 91.11%, and the repair success rate of the metal group was 75.56%, with the glass ceramic group being higher than the metal group (P<0.05); By comparing the gingival crevicular fluid related markers before and after repair, it was found that there was no significant difference in alkaline phosphatase (ALP), intercellular adhesion molecule 1 (ICAM1), and matrix metalloproteinase 2 (MMP-2) levels between the glass ceramic group and the metal group before repair (P>0.05). After repair, the levels of ALP, ICAM1, and MMP-2 increased in both groups, but the glass ceramic group was lower than the metal group (P<0.05); By comparing the periodontal conditions before and after restoration, it was found that there was no significant difference in the levels of clinical attachment loss (CAL), probing depth (PD), and gingival bleeding index (SBI) between the glass ceramic

group and the metal group before restoration (P>0.05). After restoration, the levels of CAL, SBI, and PD increased in both groups, but the glass ceramic group was lower than the metal group (P<0.05); By comparing the chewing function and aesthetic scores, it was found that there was no significant difference in aesthetic scores and chewing function scores between the glass ceramic group and the metal group before restoration (P>0.05). After restoration, the aesthetic scores and chewing function scores of both groups of patients increased, with the glass ceramic group being higher than the metal group (P<0.05); By comparing the incidence of complications within 6 months, it was found that the incidence of complications in the glass ceramic group was lower than that in the metal group (P<0.05). **Conclusion:** The long-term effect of using a glass ceramic all ceramic crown bridge combined with multiple tube glass fiber posts to repair large anterior tooth defects is better, and it can reduce the impact on the patient's gingival crevicular fluid and periodontal tissue, improve chewing function, enhance periodontal aesthetics, and have high safety.

Key words: Glass ceramics; All ceramic crown bridge; Multiple tube fiberglass piles; Large area defect of anterior teeth; Repair effect; Aesthetic effect; Chewing function

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前言

前牙大面积缺损多由外伤、龋齿等原因导致,不及时修复科导致临牙位移,还对患者美观程度、正常发音及咀嚼功能产生不良影响[1]。以往临床对于前牙大面积缺损多以铸造金属桩核与金属冠桥进行修复,其价格较低,尤其在基层医疗单位应用率较高[2,3]。随着人们生活水平提高,人们对于牙齿修复也提出了更高要求,传统铸造金属桩和金属冠桥虽然可满足短期内牙齿的修复需求,但随着时间推移可出现变色、磨损等老化情况,且美观程度较差,无法达到患者与其要求[4]。近年来,不影响核磁成像检查、生物相容性良好的玻璃纤维桩材料逐渐替代了金属桩核材料,研究显示[5],采用玻璃纤维桩联合全冠修复对于牙体缺损的治疗疗效显著,且修复成功率较高。另外含有研究显示[6],玻璃陶瓷全瓷冠具有生物相容性高、耐磨、美观性好等优势被广泛应用于牙体缺损修复中。因此,为进一步改善前牙大面积缺损的修复效果及美观效果,我院对该类患者采取玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩治疗,现将导报如下。

1 资料与方法

1.1 一般资料

选取我院 2021.1-2024.1 收治的 90 例前牙大面积缺损患者进行回顾性分析,依照患者选择的治疗方式分为玻璃陶瓷组和金属组,各 45 例。玻璃陶瓷组男 31 例,女 14 例;年龄为 21~65 岁,平均(43.24± 4.21)岁;患牙位置侧切牙 13 例,中切牙 32 例。金属组男 33 例,女 12 例;年龄为 23~68 岁,平均(43.59± 3.62)岁;患牙位置侧切牙 15 例,中切牙 30 例。两组患者一般资料比较无明显差异(P>0.05),可对比。

1.2 纳排标准

纳入标准:符合前牙牙体缺损诊断标准[7];单牙缺损;缺损面位牙齿 1/3 以上,且剩余牙体组织位于龈上 1 mm 以上;年龄为 18 岁以上;

口颌发育正常；临牙牙周良好；患牙无明显松动；临床资料完整；患者对治疗方案知情，签署同意书。

排除标准：合并凝血功能障碍者、严重感染性疾病者、恶性肿瘤者、肝肾功能异常者、无法控制的高血糖、高血压者；合并精神类疾病或交流障碍者；妊娠期或哺乳期女性；合并根尖病变或牙髓病变者；合并严重四环素牙及氟斑牙者；有正畸治疗史。

1.3 方法

1.3.1 预备前操作 所有患者均采取龈袋冲洗、去除牙菌斑等操作，个别病理需要采取翻瓣手术治疗，并消除局部炎症。

1.3.2 牙体预备和根管预备 实施局部麻醉后进行根管预备，尽可能保留牙体组织来增加固位形和抗力形。牙齿开髓之后，拔除根髓和室髓，采用 Protaper 镍钛扩大针逐渐将髓孔扩大，形成根管，应用木榴油或樟脑酚对根管进行消毒，采用蒸馏水和次氯酸钠交替冲洗，并进行干燥处理。随后应用牙胶尖与根充糊剂进行严密填充，观察 1 周后，去除大部分牙胶，实施根管内成型预备。依照根管预备一般原则，依照粗细不同来选择适合的根管预备成形钻与引导钻实施预备，根尖部分需要留 4 mm 根充材料。两组患者均选择 1~2 根根管预备，金属组采用铸造纯钛桩核进行根管预备，注意尽可能保留牙本质肩领。并在根管内逐级制备超过 2 号 Peeso 钻后，实施硅橡胶印模。最后，根管内采用 70%乙醇进行清洁，无菌纸尖干燥之后采用剥离离子对金属桩核进行黏固。玻璃陶瓷组选择相应的玻璃纤维桩，注意各个纤维桩之间不要相互阻碍，且纤维桩的使用和牙根粗度相适应的专用扩根钻进行逐级预备，采用 Relay Unicem 自粘接树脂水门汀进行纤维桩粘接，并在唇舌面与纤维桩顶端各光照 20 s 后应用金刚砂车对形态进行修整，最后抛光，完成多根管玻璃纤维桩核。所有患者均在粘接固化完成后实施牙体预备，制作全瓷冠桥或金属全冠桥。

1.3.3 牙体预备与全冠佩戴 完全固化之后依照全冠要求实施牙体预备，首先，应用 3-0 排龈无药线进行 3~5 min 排龈处理，并采取硅橡胶取模、比色，进行临时冠制作，灌注超硬石膏模型。玻璃陶瓷组患者制作玻璃陶瓷全冠，金属组制作烤瓷熔附金属（钴铬合金）全冠，完成后进行试戴，玻璃陶瓷组采用玻璃离子水门汀进行全冠黏固，金属组采用 Variolink Ⅱ树脂黏固剂进行黏固。每一种修复材料都需依照严格的实验室设计进行规范化操作，患者试戴时需要关注形状、边缘密合度及咬合，确认良好后应用粘固剂进行固定处理。

1.4 观察指标

（1）近远期疗效。修复后 7 d 评估其近期疗效，X 线片检查无透射区域，咀嚼功能良好，牙体密合性良好的显效；X 线片检查存在轻微透射区域，咀嚼功能对日常生活无影响，牙体密合性良好为有效；未达到上述标准为无效。总有效率 =（显效人数 + 有效人数）/ 总人数 × 100%。修复后 6 个月对患者进行门诊复查随访，X 线下牙根区域显示正常，未发现桩断裂、松动及脱离情况，未发现牙根断裂情况，修复体边缘密合性好，牙齿咀嚼功能正常，外观正常为修复成功；X 线片检查牙根可见病变区域，桩核松动或脱离，或牙根断裂，或冠松动或脱离，丢失咀嚼功能为修复失败。

（2）龈沟液相关标志物。修复前、修复 6 个月后采集两组患者龈沟液，离心处理后应用酶联免疫吸附试验法检测龈沟液中 ALP、ICAM1、MMP-2 水平，检测步骤依照试剂盒（生产企业：上海信帆生物科技）说明书标准完成。

（3）牙周状况。记录并评价两组患者修复

前、修复 6 个月后牙周状况，其中包括 CAL、PD 及 SBI。

（4）咀嚼功能与美学评分。修复前、修复 6 个月后采用牙齿美学评分评价患者美学情况，要求牙齿及周围软组织的位置、质地、颜色和形态进行评价，位置理想与对照牙一致为 0 分，位置偏离 1.5 mm 以内为 1 分，偏离 1.5 mm 以外为 2 分；质地颜色与对照牙一致为 0 分，质地颜色与对照牙有所差异，但肉眼难以观察为 1 分，质地颜色和对照牙差异明显为 2 分；形态与对照牙一致为 0 分，形态与对照牙具有不明显差异为 1 分，形态与对照牙差异明显为 2 分，美学评分总分为 0~6 分，分数越高代表美学效果越好[8]。采用咀嚼功能试验来评价患者拒绝功能，方法为：让患者拒绝 3 g 干燥花生，吞咽时将食团突出，重复三次，对食物残渣进行洗涤，防止在试验筛子上进行 10 min 振筛，依照不同直径筛孔，并利用食物比重来对咀嚼功能进行评价，分数越高表示咀嚼功能越好[9]。

（5）记录两组修复后 6 个月内桩核松动、根折、牙龈炎、全冠松动等并发症发生情况。

1.5 统计学方法

应用统计学软件 26.0 分析本研究数据，正态分布计量资料采用 t 检验，非正态分布采用方差检验；计量资料采用卡方检验，等级资料采用铁和检验；以 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 两组患者近远期疗效比较

通过对比近远期疗效发现，玻璃陶瓷组总有效率 95.56%，金属组总有效率 93.33%，两组比较无明显差异（$P>0.05$），玻璃陶瓷组修复成功率 91.11%，金属组修复成功率 75.56%，璃陶瓷组高于金属组（$P<0.05$），如表 1 所示。

表 1 两组患者近远期疗效比较（n，%）

Table 1 Comparison of Short - and Long term Efficacy between Two Groups of Patients (n, %)

Groups	n	Short-term effects			Long-term effect		
		Significant effect	Effective	Invalid	Total efficiency	Repair successful	Repair failed
Glass ceramic group	45	26(57.78)	17(37.78)	2(4.44)	43(95.56)	41(91.11)	4(8.89)*
Metal group	45	24(53.33)	18(40.00)	3(5.00)	42(93.33)	34(75.56)	11(24.44)

Note: compared with the Metal group, *$P<0.05$.

2.2 两组患者修复前后龈沟液相关标志物水平比较

通过对比修复前后龈沟液相关标志物发现，修复前玻璃陶瓷组、金属组 ALP、ICAM1、MMP-2 比较无明显差异（$P>0.05$），修复后两组患者 ALP、ICAM1、MMP-2 水平均升高，但玻璃陶瓷组低于金属组（$P<0.05$），如表 2 所示。

2.3 两组患者修复前后牙周状况比较

通过对比修复前后牙周状况发现，修复前玻璃陶瓷组、金属组 CAL、SBI、PD 水平比较无明显差异（$P>0.05$），修复后两组患者 CAL、SBI、PD 水平均升高，但玻璃陶瓷组低于金属组（$P<0.05$），如表 3 所示。

2.4 两组患者修复前后咀嚼功能与美学评分比较

通过对比咀嚼功能与美学评分发现，修复前玻璃陶瓷组、金属组美学评分、咀嚼功能评分比较无明显差异（$P>0.05$），修复后两组患者美学评分、咀嚼功能评分均升高，玻璃陶瓷组高于金属组（$P<0.05$），如表 4 所示。

表 2 两组患者修复前后龈沟液相关标志物水平比较($\bar{x}\pm s$)

Table 2 Comparison of gingival crevicular fluid related markers levels between two groups of patients before and after repair($\bar{x}\pm s$)

Groups	n	ALP(mg/L)		ICAM1(μg/L)		MMP-2(μg/L)	
		Before repair	After repair	Before repair	After repair	Before repair	After repair
Glass ceramic group	45	404.94± 35.49	425.59± 47.24*#	38.75± 6.25	43.58± 6.12*#	101.37± 17.25	124.31± 15.35*#
Metal group	45	406.67± 42.41	478.12± 37.52#	39.27± 5.21	62.21± 3.21#	103.24± 16.16	153.70± 20.28#

Note: compared with the Metal group, *$P<0.05$; compared with the Before repair, #$P<0.05$.

表 3 两组患者修复前后牙周状况比较($\bar{x}\pm s$)

Table 3 Comparison of Periodontal Conditions between Two Groups of Patients Before and After Restoration($\bar{x}\pm s$)

Groups	n	CAL(mm)		SBI		PD(mm)	
		Before repair	After repair	After repair	Before repair	After repair	After repair
Glass ceramic group	45	1.37± 0.16	1.53± 0.32*#	2.18± 0.35	2.46± 0.32*#	2.43± 0.35	2.82± 0.24*#
Metal group	45	1.34± 0.21	1.76± 0.26#	2.20± 0.52	2.81± 0.37#	2.51± 0.52	3.45± 0.32#

Note: compared with the Metal group, *$P<0.05$; compared with the Before repair, #$P<0.05$.

表 4 两组患者修复前后咀嚼功能与美学评分比较($\bar{x}\pm s$,分)

Table 4 Comparison of masticatory function and aesthetic score before and after repair in the two groups ($\bar{x}\pm s$, points)

Groups	n	Aesthetic rating		Chewing function score	
		Before repair	After repair	Before repair	After repair
Glass ceramic group	45	5.37± 1.16	13.53± 1.32*#	50.18± 6.35	92.46± 4.32*#
Metal group	45	5.34± 1.21	9.76± 1.26#	50.20± 5.52	81.81± 6.37#

Note: compared with the Metal group, *$P<0.05$; compared with the Before repair, #$P<0.05$.

2.5 两组患者并发症发生率比较

通过对比 6 个月内并发症发现，玻璃陶瓷组并发症发生率低于金属组($P<0.05$)，如表 5 所示。

表 5 两组患者并发症发生率比较(n,%)

Table 5 Comparison of the incidence of complications in the two groups (n,%)

Groups	n	Loose pile core	Root fracture	Gingivitis	Full crown looseness	Total
Glass ceramic group	45	1(35.00)	2(38.33)	1(6.67)	1(3.33)	5(96.67)*
Metal group	45	4(26.67)	4(51.67)	3(16.67)	3(5.00)	14(95.00)

Note: compared with the Metal group, *$P<0.05$.

3 讨论

当前临床上对前牙大面积缺损治疗时，多以全冠修复作为首先修复形式，该修复方案不仅美观性高、适合性好，且长期效果显著。随着牙科材料的不断发展，具有化学稳定性、生物相容性、机械强度及良好透光性的全瓷冠逐渐渠道金属冠，成为临床热门应用材料[10]。而全瓷冠目前常用的主要包括玻璃陶瓷和氧化锆陶瓷，

玻璃陶瓷主要以二硅酸锂制作，其具有出血的切削性能，大量研究显示[11-13]，玻璃陶瓷冠与金属管相比治疗牙体缺损具有更好的适合性。另外，氧化锆为无玻璃基质的高强度多晶陶瓷，有研究显示[14]，其断裂韧性高于玻璃陶瓷，但针对牙体缺损的治疗方面与玻璃陶瓷效果比较尚存在一定争议。另外，关于桩核方面，虽然以往修复多以金属桩核为主，但随着临床口腔科学发展，人们发现玻璃纤维桩稳定性、抗折性均优于金属桩核，但由于经济原因，剥离纤维与金属桩核均被应用于牙体缺损的修复中，但哪种针对前牙大面积缺损的修复效果更优，尚存在一定争议[15,16]。因此，为进一步探究前牙大面积缺损的更优治疗方案，本研究对我院前牙大面积缺损患者展开回顾性分析，将常规金属桩与金属冠修复的效果与玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复的近远期效果、美学效果等进行比较，以期为临床提供参考意见。

本研究显示，玻璃陶瓷组与金属组总有效率比较无明显差异（$P>0.05$），玻璃陶瓷组修复成功率高于金属组（$P<0.05$）。证明，玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复前牙大面积缺损其远期疗效更优，与 Tsintsadze N 等[17]研究结果相符。Tsintsadze N 等研究显示，陶瓷全冠联合玻璃纤维桩治疗前牙缺损修复成功率更高。原因为，传统金属桩虽然机械性强、经济优惠，但随着时间推移可游离出金属离子，导致牙龈染色情况，且易发生根折，远期稳定性较差[18]。而采取纤维桩修复，其弹性模量与天然牙本质接近，长期受外力作用后，可确保外力均匀传导，避免应力集中，降低桩核和牙根断裂风险[19]。另外，玻璃陶瓷全冠桥具有耐腐蚀性特点，远期效果更优。ALP 为分布在人体胎盘、肠等多种组织中的酶，其水平升高可反应机体炎症反应程度[20]。ICAM1 为介导黏附反应中黏附分子，能够促进炎症位置黏连性[21]。MMP-2 为锌依赖性酶，可对细胞外基质成分，可对牙周组织产生破坏作用[22]。本研究显示，修复后两组患者 ALP、ICAM1、MMP-2 水平均升高，但玻璃陶瓷组低于金属组（$P<0.05$）。也证明了，采取玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复可改善患者治疗后炎症反应程度，减轻对牙周组织的破坏，与 Mishra L 等[23]研究结果部分一致。分析原因为，口腔环境潮湿，采用金属材料修复后易发生腐蚀情况，刺激牙龈，产生炎症反应。而玻璃陶瓷和玻璃纤维桩不含有金属离子，耐腐蚀性高，生物相容性好，可缓解对牙龈的刺激，减轻口腔炎症反应，对于龈沟液的影响较小[24]。本研究显示，修复后两组患者 CAL、SBI、PD 水平均升高，但玻璃陶瓷组低于金属组（$P<0.05$）。也证明了，玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复可改善牙周健康水平，与 Giok KC 等[25]研究结果部分一致。Giok KC 等研究显示，与传统金属材料相比，采用全瓷冠修复可改善患者远期牙周健康水平。本研究发现，修复后两组患者美学评分、咀嚼功能评分均升高，玻璃陶瓷组高于金属组（$P<0.05$）。证明，玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复后可进一步改善患者拒绝功能与牙齿美学评价。这是因为，金属材质弹性较差，弹性模量可超过牙本质，易影响咀嚼功能，且颜色与本体牙齿颜色差异较大，美观程度受到影响[26]。而玻璃陶瓷及玻璃纤维桩的应用，其弹性模量与自身牙体组织类似，韧性良好，咬合力分散，可提升咀嚼效率的同时，其颜色、质地与自体牙齿接近，美学效果更好[27]。最后，本研究发现，玻璃陶瓷组并发症发生率低于金属组（$P<0.05$）。也证明了玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复安全性更高。

综上所述，前牙大面积缺损采取玻璃陶瓷全瓷冠桥联合多根管玻璃纤维桩修复远期效果

更优,且可减轻对患者龈沟液和牙周组织影响,提升咀嚼功能,改善牙周美学效果,安全性高。

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