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# 即刻种植修复与延期种植修复对上颌单前牙患者牙周组织健康、美学效果以及炎症因子的影响\*

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**摘要 目的:**探讨即刻种植修复与延期种植修复对上颌单前牙患者牙周组织健康、美学效果以及炎症因子的影响。**方法:**回顾性分析 2017 年 3 月~2018 年 12 月期间收治的 80 例上颌单前牙患者的临床资料,根据种植修复方式的不同分为 A 组(n=40,延期种植修复)和 B 组(n=40,即刻种植修复),比较两组患者植牙成功率、牙周组织健康、美学效果、炎症因子及并发症。**结果:**两组植牙成功率比较无差异( $P>0.05$ )。两组修复后 1 个月、3 个月、6 个月、12 个月牙周袋深度依次降低( $P<0.05$ );B 组修复后 1 个月、3 个月、6 个月、12 个月牙周袋深度均低于 A 组( $P<0.05$ )。两组修复后 1 个月、3 个月、6 个月、12 个月红色美学指数(PES)评分依次升高( $P<0.05$ );B 组修复后 1 个月、3 个月、6 个月、12 个月 PES 评分均高于 A 组( $P<0.05$ )。两组修复前、修复后 7 d、修复后 30 d 血清肿瘤坏死因子- $\alpha$ (TNF- $\alpha$ )、C 反应蛋白(CRP)水平均呈升高后降低趋势,B 组修复后 7 d、修复后 30 d 血清 TNF- $\alpha$ 、CRP 水平均低于 A 组( $P<0.05$ )。两组均未见严重并发症发生。**结论:**与延期种植修复相比,即刻种植修复治疗上颌单前牙患者对其牙周组织健康改善效果更佳,且炎症反应更轻微,美学效果更好,疗效显著且安全性好。

**关键词:**即刻种植修复;延期种植修复;上颌单前牙;牙周组织健康;美学效果;炎症因子

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## The Effect of Immediate Implant and Delayed Implant Restoration on Periodontal Tissue Health, Aesthetic Effect and Inflammatory Factors in Patients with Maxillary Single Anterior Teeth\*

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**ABSTRACT Objective:** To investigate the effects of immediate and delayed implant restoration on periodontal tissue health, aesthetic effect and inflammatory factors in patients with maxillary single anterior teeth. **Methods:** The clinical data of 80 patients with maxillary single anterior teeth from March 2017 to December 2018 were retrospectively selected, and patients were divided into group A (n=40, delayed implant restoration) and group B (n=40, immediate implant restoration) according to the different ways of implant restoration. The success rate of dental implant, periodontal tissue health, aesthetic effect, inflammatory factors and complications were compared between the two groups. **Results:** There was no significant difference in success rate of dental implant between the two groups ( $P>0.05$ ). The periodontal pocket depth decreased successively at 1 month, 3 months, 6 months and 12 months after restoration in the two groups ( $P<0.05$ ). The periodontal pocket depth in group B at 1 month, 3 months, 6 months and 12 months after restoration were lower than that in group A ( $P<0.05$ ). The scores of red aesthetic index (PES) in the two groups increased successively at 1 month, 3 months, 6 months and 12 months after restoration ( $P<0.05$ ). The scores of PES in group B were higher than those in group A at 1 month, 3 months, 6 months and 12 months after restoration ( $P<0.05$ ). The levels of serum tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and C-reactive protein (CRP) in the two groups showed an increasing and decreasing trend before, 7 d after and 30 d after restoration. The levels of serum TNF- $\alpha$  and CRP in group B were lower than those in group A at 7 d and 30 d after restoration ( $P<0.05$ ). There was no significant complication in both groups. **Conclusion:** Compared with delayed implant restoration, immediate implant restoration has a better effect on the periodontal tissue health in patients with single maxillary anterior teeth, with less inflammatory reaction, better aesthetic effect,

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significant curative effect and good security.

**Key words:** Immediate implant restoration; Delayed implant restoration; Maxillary single anterior teeth; Periodontal tissue health; Aesthetic effect; Inflammatory factors

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## 前言

口腔种植修复技术是修复牙列缺损及牙列缺失的最有效临床方法之一,上颌单前牙作为口腔重要美观区域,在外伤后若出现牙缺失,不仅可影响患者美观度,造成患者抑郁、自卑等负性心理,同时还会对患者口腔功能产生一定的影响,严重影响患者生活质量<sup>[1-3]</sup>。以往常用的延期种植修复虽然可获得一定的治疗效果,但治疗周期较长,加上患者牙槽骨在拔牙后3个月存在吸收情况,可引起牙龈萎缩,进而影响种植效果<sup>[4-6]</sup>。即刻种植修复是近年来新兴的种植技术,治疗周期短,主要是指在患牙拔除后将种植体植入新鲜拔牙创内的一种种植技术<sup>[7,8]</sup>。本研究通过对比延期种植修复、即刻种植修复治疗上颌单前牙患者的疗效,以期为临床上颌单前牙种植修复方式的选择提供数据支持。

## 1 资料与方法

### 1.1 一般资料

回顾性分析2017年3月~2018年12月期间中国人民解放军总医院第四医学中心及沧州市人民医院口腔分院收治的80例上颌单前牙患者的临床资料,纳入标准:(1)均为单颗上颌前牙需种植修复者,无种植禁忌症者;(2)牙龈健康,牙尖处无明显炎症;(3)软、硬组织无明显缺损者;(4)无夜磨牙,紧咬牙习惯。排除标准:(1)伴有明显全身系统性疾病者;(2)急性牙周病者;(3)治疗依从性较差,中途退出治疗者;(4)既往有吸烟等不良习惯者;(5)与拟种植部位直接相连牙或对侧牙已存在不良修复体者;(6)正在进行全牙矫正治疗者。上述患者根据种植修复方式的不同分为A组( $n=40$ ,延期种植修复)和B组( $n=40$ ,即刻种植修复),其中对照组男24例,女16例,年龄25~49岁,平均 $(36.71\pm 4.52)$ 岁;体质量指数 $21\sim 26\text{ kg/m}^2$ ,平均 $(23.51\pm 0.73)\text{ kg/m}^2$ 。研究组男22例,女18例,年龄23~48岁,平均 $(36.32\pm 3.98)$ 岁;体质量指数 $20\sim 26\text{ kg/m}^2$ ,平均 $(23.83\pm 0.68)\text{ kg/m}^2$ 。两组一般资料对比无差异( $P>0.05$ )均衡可比。

### 1.2 方法

A组给予延期种植修复治疗,术前常规消毒、铺巾、麻醉,选牙槽嵴顶偏腭侧作切口,拔除患牙,种植窝制备好后植入植体,植入扭矩为 $35\sim 50\text{ N}\cdot\text{cm}$ ,随后置入骨粉,采用海奥生物膜覆盖,行减张缝合关闭伤口。术后予以漱口水及抗感染处理,7d后拆线,术后6个月复诊,行二期种植手术。B组给予即刻种植修复治疗,术前操作同A组,作角形切口,拔除患牙,拔除后患处采用生理盐水冲洗干净。种植窝制备好后植入植体,植入深度超牙槽窝底 $3\sim 5\text{ mm}$ ;唇舌侧保留骨壁;种植体冠方低于牙槽嵴顶 $0.5\text{ mm}$ ;扭矩 $\geq 35\text{ N}\cdot\text{cm}$ 。随后置入骨粉,并覆盖海奥生物膜,即刻种植基台。采用树脂制备临时冠,位置调整好后采用中央螺丝固定,邻近的牙齿固定采用树脂粘结。术后予以漱

口水及抗生素等常规处理,1周后拆线。术后6个月取膜并完成牙冠修复。两组均以门诊复查的形式随访1年。

### 1.3 观察指标

(1)记录两组患者植牙成功率。种植成功标准:种植体无松动,种植体周围牙槽骨横向骨吸收不超过其厚度的 $1/3$ ,经X线检查显示种植体周围无透射区;患者无疼痛、异物感、麻木,可正常咀嚼;无种植体相关感染;种植体1年内未脱落<sup>[9]</sup>。(2)记录两组修复后并发症发生情况。(3)于修复后1、3、6、12个月评测患者牙周组织美学效果以及健康程度。美学效果采用红色美学指数(PES)<sup>[10]</sup>评估,PES共包含7个变量,每个变量 $0\sim 2$ 分,总分范围 $0\sim 14$ 分,分值越高,提示美学效果越好。牙周组织健康程度反馈指标为牙周袋深度,采用纯钛牙周探针,探测种植义齿的牙龈边缘到袋底的距离。(4)于修复前、修复后7d、修复后30d抽取患者清晨空腹静脉血 $5\text{ mL}$ ,经 $3500\text{ r/min}$ 离心 $12\text{ min}$ ,离心半径 $13\text{ cm}$ ,分离上清液,置于 $-40^\circ\text{C}$ 冰箱中待测。参考试剂盒(武汉博士德生物科技有限公司)说明书步骤,采用酶联免疫吸附试验检测血清肿瘤坏死因子 $-\alpha$ (TNF- $\alpha$ )、C反应蛋白(CRP)水平。

### 1.4 统计学方法

数据统计分析软件为SPSS 23.0。计数资料以例数及率表示,组间比较采用 $\chi^2$ 检验。计量资料以均数 $\pm$ 标准差表示,采用t检验。 $P<0.05$ 为差异具有统计学意义。

## 2 结果

### 2.1 两组植牙成功率比较

两组植牙成功率比较差异无统计学意义( $P>0.05$ );详见表1。

### 2.2 两组牙周组织健康程度比较

两组修复后1个月、3个月、6个月、12个月牙周袋深度依次降低( $P<0.05$ );B组修复后1个月、3个月、6个月、12个月牙周袋深度均低于A组( $P<0.05$ );详见表2。

### 2.3 两组美学效果比较

两组修复后1个月、3个月、6个月、12个月PES评分依次升高( $P<0.05$ );B组修复后1个月、3个月、6个月、12个月PES评分均高于A组( $P<0.05$ );详见表3。

### 2.4 两组炎症因子水平比较

两组修复前血清CRP、TNF- $\alpha$ 水平比较无差异( $P>0.05$ );两组修复前、修复后7d、修复后30d血清CRP、TNF- $\alpha$ 水平呈升高后降低趋势,B组修复后7d、修复后30d血清CRP、TNF- $\alpha$ 水平均低于A组( $P<0.05$ );详见表4。

### 2.5 两组修复期间并发症发生情况比较

两组均未见严重并发症发生。

## 3 讨论

表 1 两组植牙成功率比较

Table 1 Comparison of the success rate of dental implant between the two groups

| Groups          | Success | Destruction | Success rate (%) |
|-----------------|---------|-------------|------------------|
| Group A( n=40 ) | 40      | 0           | 100.00           |
| Group B( n=40 ) | 40      | 0           | 100.00           |
| $\chi^2$        |         | 0.000       |                  |
| $P$             |         | 1.000       |                  |

表 2 两组牙周组织健康程度比较( $\bar{x}\pm s$ , mm)Table 2 Comparison of periodontal tissue health between the two groups( $\bar{x}\pm s$ , mm)

| Groups        | 1 month after restoration | 3 months after restoration   | 6 months after restoration    | 12 months after restoration    |
|---------------|---------------------------|------------------------------|-------------------------------|--------------------------------|
| Group A(n=40) | 2.27 $\pm$ 0.24           | 2.03 $\pm$ 0.22 <sup>a</sup> | 1.81 $\pm$ 0.18 <sup>ab</sup> | 1.56 $\pm$ 0.24 <sup>abc</sup> |
| Group B(n=40) | 1.63 $\pm$ 0.27           | 1.51 $\pm$ 0.26 <sup>a</sup> | 1.39 $\pm$ 0.26 <sup>ab</sup> | 1.25 $\pm$ 0.19 <sup>abc</sup> |
| $t$           | 11.205                    | 9.656                        | 8.400                         | 6.405                          |
| $P$           | 0.000                     | 0.000                        | 0.000                         | 0.000                          |

Notes: compared with 1 month after restoration, <sup>a</sup> $P<0.05$ ; compared with 3 months after restoration, <sup>b</sup> $P<0.05$ ; compared with 6 months after restoration, <sup>c</sup> $P<0.05$ .

表 3 两组美学效果比较( $\bar{x}\pm s$ , 分)Table 3 Comparison of aesthetic effects between the two groups( $\bar{x}\pm s$ , scores)

| Groups        | 1 month after restoration | 3 months after restoration   | 6 months after restoration     | 12 months after restoration     |
|---------------|---------------------------|------------------------------|--------------------------------|---------------------------------|
| Group A(n=40) | 7.78 $\pm$ 0.25           | 8.71 $\pm$ 0.19 <sup>a</sup> | 9.93 $\pm$ 0.25 <sup>ab</sup>  | 11.16 $\pm$ 0.22 <sup>abc</sup> |
| Group B(n=40) | 8.92 $\pm$ 0.23           | 9.93 $\pm$ 0.26 <sup>a</sup> | 11.57 $\pm$ 0.21 <sup>ab</sup> | 13.09 $\pm$ 0.24 <sup>abc</sup> |
| $t$           | 21.224                    | 23.961                       | 31.768                         | 37.492                          |
| $P$           | 0.000                     | 0.000                        | 0.000                          | 0.000                           |

Notes: compared with 1 month after restoration, <sup>a</sup> $P<0.05$ ; compared with 3 months after restoration, <sup>b</sup> $P<0.05$ ; compared with 6 months after restoration, <sup>c</sup> $P<0.05$ .

表 4 两组炎症因子水平比较( $\bar{x}\pm s$ )Table 4 Comparison levels of inflammatory factors between the two groups( $\bar{x}\pm s$ )

| Groups        | CRP(mg/L)          |                              |                               | TNF- $\alpha$ (ng/mL) |                              |                               |
|---------------|--------------------|------------------------------|-------------------------------|-----------------------|------------------------------|-------------------------------|
|               | Before restoration | 7d after restoration         | 30d after restoration         | Before restoration    | 7d after restoration         | 30d after restoration         |
| Group A(n=40) | 0.84 $\pm$ 0.15    | 3.97 $\pm$ 0.23 <sup>a</sup> | 2.09 $\pm$ 0.18 <sup>ab</sup> | 3.15 $\pm$ 0.22       | 7.28 $\pm$ 0.43 <sup>a</sup> | 5.66 $\pm$ 0.22 <sup>ab</sup> |
| Group B(n=40) | 0.87 $\pm$ 0.17    | 2.82 $\pm$ 0.24 <sup>a</sup> | 1.48 $\pm$ 0.17 <sup>ab</sup> | 3.19 $\pm$ 0.28       | 5.89 $\pm$ 0.31 <sup>a</sup> | 4.23 $\pm$ 0.21 <sup>ab</sup> |
| $t$           | 0.837              | 21.880                       | 15.582                        | 0.710                 | 16.584                       | 29.737                        |
| $P$           | 0.405              | 0.000                        | 0.000                         | 0.480                 | 0.000                        | 0.000                         |

Notes: compared with before restoration, <sup>a</sup> $P<0.05$ ; compared with 7 d after restoration, <sup>b</sup> $P<0.05$ .

种植修复患者的主要治疗目标在于提高牙齿的咀嚼能力、恢复口腔健康、提高整个口腔美学区域的美观状态<sup>[11-13]</sup>。上颌单前牙种植由于位置特殊,因此要求牙体长期稳定、功能理想,且随着生活品质的提高,人们越来越注重牙体的美观度<sup>[14,15]</sup>。迄今为止,单颗牙齿的种植修复已经被证明是一种疗效确定且成功率较高的方法。且越来越多的医生和患者也从传统的治疗方案转而倾向于更短的治疗周期以及更加简单微创的手术过程。传统的延期种植修复在拔牙后 3~6 个月牙槽窝完全愈合后行种植体置入,此类种植修复方式可为初期的稳定性提供保

障<sup>[16-18]</sup>。但也有临床实践表明<sup>[19,20]</sup>,在拔牙后 6~12 个月,牙槽嵴高度降低 2.0~4.5 mm,患者牙槽嵴舌向吸收 5~7 mm,从而造成失牙区牙槽骨量不足。而失牙区牙槽骨量不足会直接导致牙龈萎缩,影响修复效果。即刻种植近年来成为口腔种植领域研究的热点,即刻种植是指拔牙后立即植入种植体<sup>[21]</sup>。然而无论是延期种植修复,还是即刻种植修复,在修复过程中均不可避免的对机体原有组织产生破坏,致使机体作出防御反应,分泌的细胞因子极易进入血液与体液中<sup>[22]</sup>。故本研究通过对比延期种植修复、即刻种植修复对上颌单前牙患者牙周组织健康、美学

效果以及炎症因子的影响,以期明确两种种植修复方式的优劣。

本研究中,两组种植修复方式植牙成功率均为 100%,且均未见明显的并发症发生。表明两种种植修复方式均实用性高,效果确切。本研究中两种种植修复方式均可改善牙周袋深度,且即刻种植修复的改善效果更好。主要是因为即刻种植修复无需待拔牙创面愈合,可有效缩短治疗时间,进而避免牙槽嵴被吸收;同时即刻种植修复可有效防止制备种植床导致的牙槽骨损伤情况的发生<sup>[23,24]</sup>。上颌前牙区是重要口腔美观区域,本研究中即刻种植修复治疗的美学效果更好,可能是因为该种植修复方式及时植入种植体后可使软组织有效维持丰满度及高度,减少牙槽骨吸收,使牙龈乳头维持正常形态,利于美观程度的提高<sup>[25-27]</sup>。本次研究结果还显示,两种种植修复方式均会产生一定程度的炎症刺激,但即刻种植修复的炎症反应更轻微。其中 CRP 主要用于检测机体受到刺激后产生的炎症变化,TNF- $\alpha$  为最常见的炎症因子之一,可促进细胞因子的大量分泌。可能是因为即刻种植修复可最大程度的保留种植体周围软硬组织支持,支撑起塌陷的牙龈,对牙龈进行塑形,且在永久修复时可形成一个良好的袖口形态,此外,即刻种植修复中临时修复体的存在也可对种植体周围软组织起按摩作用,减少修复带来的刺激作用<sup>[28-30]</sup>。值得注意的是,即刻种植修复中的临时修复体制作时应注意临时修复体颈部形态需光滑,同时应减少其对周围牙龈的压力,以防影响血供。临时修复体植入后一定要精细调整,使其处于无功能负载状态。此外,即刻种植修复对于位点局部解剖条件要求很高,牙龈薄的高笑线以及唇侧骨板缺损患者尽量避免采用此技术治疗。本研究尚存在观察期较短、样本量偏少的缺陷,今后将通过延长随访时间、增加样本量的方式改进后续研究,以期获得更加精确的数据。

综上所述,与延期种植修复相比,即刻种植修复治疗上颌单前牙患者对其牙周组织健康改善效果更佳,且炎症反应更轻微,美学效果更好,疗效显著且安全性好。

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