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· 防治实践 ·

数字化即刻种植修复与角度螺丝通道基台在美学区的应用1例并文献回顾

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【摘要】　目的　通过回顾1例上前牙即刻种植即刻修复病例资料以及相关文献复习，探讨数字化即刻种植即刻修复以及角度螺丝通道基台在美学区种植中的应用及相关影响因素。**方法**　上前牙难治性慢性根尖炎1例拟拔除患牙后即刻种植即刻修复，通过CBCT和口内扫描获得患者数字化信息，根据患者信息进行术前评估，制定治疗方案，进行微创拔牙，数字化全程导板下植入种植体，即刻戴入临时修复体。术后6个月个性化取模，完成角度螺丝通道固位最终修复体。观察修复后美观度、软硬组织及牙龈轮廓维持效果，于修复完成后6个月复查，结合相关文献进行回顾性分析。**结果**　该患者龈缘以及牙龈乳头的高度、牙龈轮廓维持较好，红白美学效果良好，修复后6个月牙龈无红肿、种植体周围软硬组织无明显改变，患者满意。回顾相关文献结果表明，基于CBCT及口内扫描数据结合数字化软件进行的术前设计和全程数字化导板使更加精准、安全，它不仅可以规避重要的解剖结构、避免严重的手术并发症，还可以将种植体植入到最佳的三维位置。此外，数字化印模技术和CAD/CAM的应用使得口腔印模更加高效、快捷、精确、简便、舒适，并且使得临时及最终修复体更加精密、制作更加快捷，极大提高了临床效率。**结论**　美学区牙缺失后采用数字化即刻种植即刻修复并结合角度螺丝通道基台修复，可以很好地恢复缺失牙美观和功能，并能避免粘接剂残留带来的并发症，是一种良好的修复方法。

【关键词】　数字化即刻种植；　种植修复；　角度螺丝通道基台；　术前评估；　美学区；　牙龈轮廓维；　牙龈乳头；　美学效果；　粘接固位；　螺丝固位
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Application of digital immediate implant restoration and angle screw channel abutment in the aesthetic area: case report and literature review

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【Abstract】　Objective　To investigate the application of digital immediate implant and angle screw channel abutment in the aesthetic area and the related influencing factors by reviewing the data of one case of immediate implant repair of the upper anterior teeth and related literature. **Methods**　One case of refractory chronic apicitis of the upper anterior teeth involved immediate implantation after extraction. The digital information of the patient was obtained by CBCT and intraoral scanning. According to the information from the patients, a preoperative evaluation was performed; a treatment scheme was formulated; a minimally invasive extraction was performed; implants were placed under a digital guide plate; and temporary restoration was immediately performed. Six months after the operation, the patients underwent individualized mold removal, and angle screw channel fixation was completed. We observed the cosmetic effects and soft and hard tissue and gingival contour maintenance effects after restoration and reexamined the patients 6 months

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after restoration. In addition, the relevant literature was reviewed. **Results** The height of the gingival margin and gingival papilla and gingival contour of this patient were well maintained. The red and white aesthetic effect was good. There was no redness or swelling of the gingiva nor obvious changes in the soft and hard tissues around the implant 6 months after restoration, and the patient was satisfied. The results in the literature review show that a preoperative design based on CBCT and intraoral scanning data combined with digital software and a whole digital guide plate make the procedure more accurate and safer. These factors can not only avoid important anatomical structures and serious surgical complications but can also result in implantation in the best three-dimensional position. In addition, the application of digital impression technology and CAD/CAM increases the efficiency, speed, accuracy, simplicity, and comfort of oral impressions and the construction of temporary and final prostheses more precise and faster, greatly improving clinical efficiency. **Conclusion** Digital immediate implant and angle screw channel abutment is a good method to restore the aesthetics and function of missing teeth and to avoid the complications caused by adhesive residue.

【Key words】 digital immediate implant; implant repair; angle screw channel abutment; preoperative evaluation; aesthetic area; gingival contour dimension; gingival papilla; aesthetic effect; cement-retained; screw-retained
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目前，种植修复已成为牙缺失后的首选治疗方案，即刻种植即刻修复特别是美学区的即刻种植即刻修复、数字化技术是目前口腔种植领域的两大热点。研究表明即刻种植即刻修复不仅美观效果好[1]，对于缺牙区软硬组织保存[2]以及轮廓维持更优于传统种植[3]，受到越来越多口腔医师及美学区牙缺失患者的青睐。而数字化技术的引入更是大大推动了即刻种植即刻修复的发展，它为种植提供了更加精准、安全、高效的个性化诊疗方案，大大提高了口腔种植的成功率，其优越性在美学区即刻种植即刻修复中表现尤为突出[4]。角度螺丝通道（angulated screw channel，ASC）基台，是一种使用CAD/CAM（computer aided design/computer aided making）设计制作的个性化基台，它可以在0°～25°范围内将可能位于切端或者唇侧的穿出位点转移到舌腭侧，减少了粘接固位所带来的生物学并发症[5]。本文结合1例病例探讨美学区数字化即刻种植即刻修复结合ASC基台最终修复的临床应用及相关影响因素。

1　资料与方法

1.1　病例资料

患者，男性，26岁。主诉：上颌前牙反复瘘管2年余。现病史：患者幼时上颌前牙外伤，行根管治疗。近年来反复出现唇侧瘘管，1年前行根管再治疗及根尖手术，之后唇侧瘘管仍然反复发作。既往史：既往体健，否认药物过敏。专科检查：21唇侧错位，变色，松（－），叩（－），唇侧瘘管，CBCT示根尖近中暗影、可用骨宽度约7.6 mm、可用骨高度＞15 mm。31、41先天缺失，下颌中线偏右侧，覆合覆盖正常，高笑线（图1）。诊断：21慢性根尖炎。

a: patient's smile image; b: intraoral profile image; c: intraoral front image; d: root position of the patient showed in CBCT

Figure 1　The condition at the first diagnosis of the patient of refractory chronic apicitis of the upper anterior teeth

图1　上前牙难治性慢性根尖炎患者初诊情况

1.2　术前评估

患者牙根矢状位为Ⅱ类[6]，牙根部存在足够骨组织以满足种植体初期稳定性、牙槽窝及唇侧骨壁完整、且无急性炎症牙槽骨，可采用即刻种植即

刻修复方案。SAC系统评价:前牙区即刻种植即刻修复手术,且在临床检查中发现患者为高笑线、中厚龈型,对美观要求高,综合评价为高难度病例。该患者美学风险评估情况详见表1。

表1　美学风险评估表

Table 1　Esthetic risk assessment

Aesthetic risk factors	Low	Middle	High
Health status	Health*	–	Immunocompromise
Smoking habit	No*	A few(< 10/d)	A lot of(> 10/d)
Patients′ aesthetic expectations	Low	Middle	High*
Lip line	Low	Midlle	High*
Gingival biotype	Low arc,thick gum	Middle arc, middle thick gum*	High arc, thin gingiva
Dental crowns form	Squircle squoval*	–	Pointed round
Site infection	No	Chronic*	Acute
Alveolar ridge height of adjacent teeth	To the point of contact <5 mm	To the point of contact 5.5-6.5 mm*	To the point of contact ≥ 7 mm
Repair status of adjacent teeth	No restoration*	–	Have restoration
The width of the gap between the missing teeth	Single tooth(≥ 7 mm)*	Single tooth(< 7 mm)	Two or more teeth
	Single tooth(≥ 5.5 mm)	Single tooth(< 5.5 mm)	
Soft tissue anatomy	Soft tissue integrity*	–	Soft tissue defect
Anatomy of alveolar ridge	No bone defect	Horizontal bone defect	Vertical bone defect*

*: the presence of factors in the patient′s aesthetic evaluation

1.3　治疗计划

21拔除后即刻种植即刻修复,术前不翻瓣微创拔除21,数字化全程导板下植入Nobel Active 3.5 × 13 mm植体1枚,同期唇侧跳跃间隙植骨。植入后将预先按照数字化导板制作的临时基台及临时冠戴入、不考虑即刻负重,术后6个月取模最终修复。

1.4　治疗过程

1.4.1　术前准备　首先收集术前影像资料,拍摄术前口内及面部照片,患者轻咬合状态进行CBCT(西诺德,德国)扫描,扫描结果以DICOM(digital imagingand communication in medicine)格式导出,使用数字化扫描仪(3shape,丹麦)扫描获得口内全牙列及正中咬合数据,将CBCT及口内扫描数据导入Nobel Clinician软件、配准数据,按照以修复为导向的原则设计种植体位置、制定种植及修复计划,并按照设计打印全程导板、制作临时修复体(图2a、2b)。数字化设计可见采用常规直基台设计螺丝通道开孔位于腭侧靠近切端,为保证切端牙冠强度,最终修复体设计ASC基台。

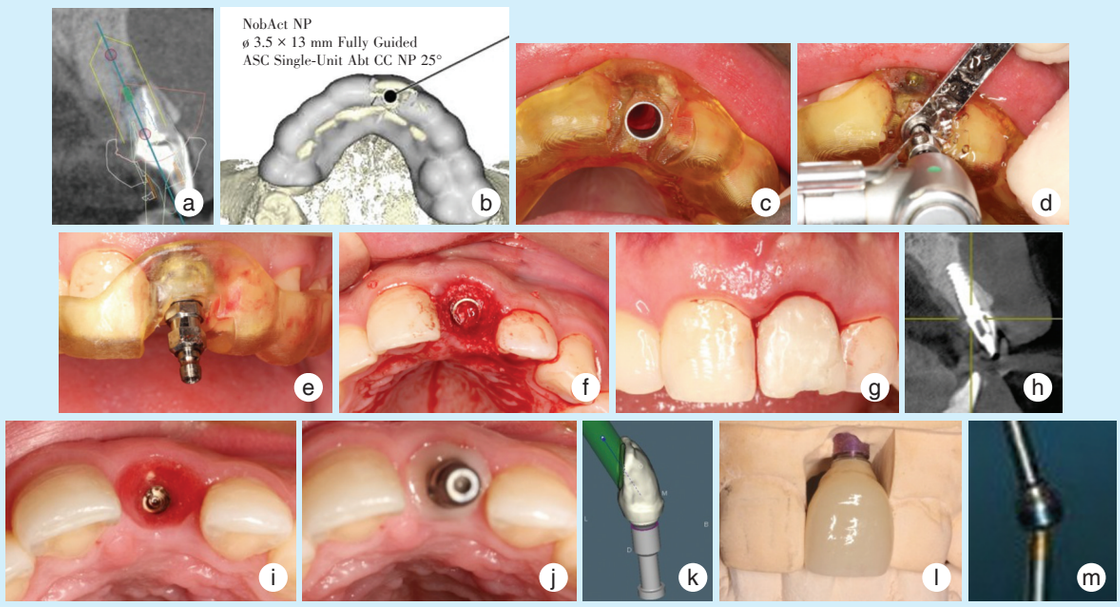
1.4.2　即刻种植、即刻修复　种植手术常规消毒、铺巾,上颌前牙区甲哌卡因肾上腺素局部浸润麻醉,充分分离牙周膜,不翻瓣微创拔除21,见唇侧骨壁完整,刮净拔牙窝内炎症组织、大量生理盐水冲洗。就位种植导板,导板完全就位后使用与导板配套的种植器械逐级预备种植窝,而后植入种植体(Nobel Active 3.5 × 13 mm)、植入扭矩(55 N·cm)初期稳定性良好、达到即刻修复要求,种植体与唇侧骨板间跳跃间隙植入Bio-oss骨粉(Geistlich公司,瑞士)。临时冠及基台就位,扭紧中央固位螺丝,扭矩(30 N·cm),最后封闭螺丝孔,可见临时冠螺丝通道开孔位于切端稍偏腭侧,检查咬合,确保正中咬合、前伸咬合及侧方咬合均无接触(图2c ~ 2h)。标准转移杆个性化取模,为了将位于靠近切端的螺丝通道转移到腭侧,按照治疗计划设计ASC基台并制作基台一体冠,完成最终修复(图2i ~ 2m)。

2　结　果

患者完成修复后可见:种植体与骨结合良好,龈缘以及牙龈乳头的高度、牙龈的轮廓得到较好的维持,修复体形态、色泽良好并纠正了其唇倾状态,咬合关系正常,患者对形态及功能非常满意,并实现了螺丝通道开孔位于腭侧(图3a ~ 3f)。术后6个月复查患者牙龈无明显炎症、牙槽骨稳定(图3g ~ 3j)。

3　讨　论

随着种植体设计的发展及表面处理技术的成熟,即刻种植即刻修复的成功率大大提高,研究发现即刻种植即刻修复的3年存留率达97.6%,与常规种植修复的累计存留率相近[7]。即刻种植即刻修复受到越来越多的关注,关于即刻种植的适应



a: implant placement was designed based on restoration-oriented principles; b: make planting and restoration plan and design guide board as planned; c: full guide plate in place; d: prepare holes step by step under guide plate; e: implant under guide plate; f: interstitial bone graft at the lip; g: temporary prosthesis immediately; h: CBCT image after impanting; i: gingival contour of 21# tooth was good; j: mold with personal shift lever; k: design of ASC abutment; l: complete the restration; m: angle between abutment screw and screw channel

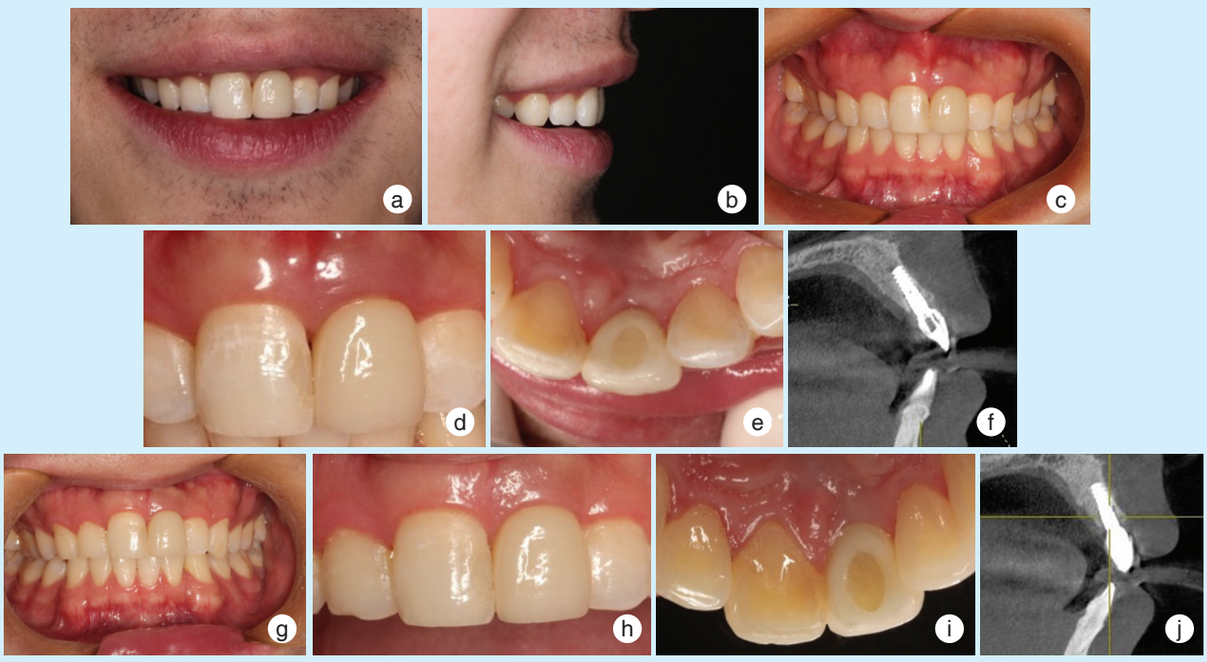
Figure 2　Treatment process of digital immediate implant immediate restoration combined with angle screw channel abutment restoration after extraction of teeth with refractory chronic apicitis of upper anterior teeth

图2　上前牙难治性慢性根尖炎拔除患牙后进行数字化即刻种植即刻修复并结合角度螺丝通道基台修复治疗过程

证，2013年第5次ITI研讨会达成共识：①拔牙窝骨壁必须完整，唇侧龈缘下3 mm骨壁无缺失；②颊侧骨壁至少有1 mm厚度；③厚软组织生物学类型；④拔牙位点/种植位点无急性感染；⑤拔牙窝腭侧及根方至少有3～5 mm的骨量能够为种植体提供足够的初期稳定性。即刻种植在植入扭矩大于35 N·cm时可完成不负重的即刻修复。即刻种植即刻修复特别是美学区的即刻种植即刻修复有许多延期种植难以比拟的优点：①即刻种植即刻修复能够有效地缩短治疗时间，减少就诊次数，获得较好的美学效果[8]；②即刻种植即刻修复种植体周骨吸收更少、能够更好地维持牙龈及龈乳头等软组织的形态[2,3,9]、保持种植牙与天然牙相协调[10]；③种植体植入后即刻修复不仅能恢复患者的美观和功能，对于患者的心理也有很大的帮助[11]。

当前数字化技术已渗透口腔医学各个领域，促使口腔疾病的诊疗模式突破传统，向更加高效、精准、自动化的方向发展，这在口腔种植技术中的表现尤为突出[12]。基于CBCT及口内扫描数据结合数字化软件进行的术前设计和在此基础上生成的全程数字化导板使口腔种植更加精准、安全，它不仅可以规避重要的解剖结构，避免严重的手术并发症，还可以将种植体植入到最佳的三维位置[13]，减少因种植位置方向不佳引起的种植体暴露等并发症[14]，数字化技术的应用还大大缩短了手术时间，使手术更加微创。此外，数字化印模技术和CAD/CAM的应用使得口腔印模更加高效、快捷、精确、简便、舒适[15]，并且使得临时及最终修复体更加精密、制作更加快捷，极大提高了临床效率。

粘接固位和螺丝固位是目前口腔种植修复中常用的两种固位方式，两种固位方式各有优缺点。粘接固位的优势在于：机械并发症较少、美观性好、容易被动就位、成本相对较低，而它的缺点也较突出——粘接剂残留易引发种植体周围炎、不便于维护，螺丝固位则反之[16]。由于美学区种植修复冠边缘多位于龈下，为了避免粘接剂引发的系列问题，目前其固位多倾向于采用螺丝固位



a: patient's smile image after treatment; b: intraoral profile image after treatment; c-e: the condition of mouth after treatment; f: the CBCT image after treatment; g-i: the condition of mouth after 6 months of treatment; j: the CBCT image after 6 months of treatment

Figure 3　The condition of mouth and CBCT in patient with with intractable chronic apicitis of upper anterior teeth after extraction and immediate digital implant repair combined with angle screw channel abutment repair after final restoration was put in

图3　上前牙难治性慢性根尖炎拔除患牙后进行数字化即刻种植即刻修复并结合角度螺丝通道基台修复最终修复体戴入患者口内及CBCT情况

或预留螺丝通道的粘接固位方式，但由于受美学区牙槽骨骨量及方向限制，大量病例螺丝通道开孔只能位于切端或唇侧，这会严重影响修复体的强度及美观。ASC基台能够在25°范围内修正修复角度，将可能位于切端或者唇侧的螺丝开孔转移到舌侧，从而避免由于粘接剂残留所带来的的风险、美观性高[17]、便于后期维护，取得了较好的临床效果[18]。目前ASC基台主要应用于前牙螺丝通道开孔位于唇侧及后牙张口受限的病例。

本例中对比术前设计及植入后种植体位置，可发现实际植入位置略偏唇侧。术后研究导致该结果出现的主要原因可能是：①上前牙即刻种植植入位点一般位于拔牙窝腭侧壁、腭侧骨板较厚且骨质硬；②全程导板固位略欠，导板在钻针的作用力下会略向唇侧移位。避免对策：①在导板下行第一钻预备后取下导板，利用球钻对植入位点腭侧牙槽骨进行修整；②设计导板时将种植体位置略偏腭侧；③增加全程导板的固位钉等固位装置。通过对比术后即刻CBCT与最终修复及修复后6个月复查的CBCT，可以发现唇侧牙槽骨高度及宽度都略有丧失，这可能与植入后植体位置略偏唇侧且植入深度略有不足有关。

笔者将数字化技术与即刻种植即刻修复结合应用，并在最终修复时采用了ASC基台，在病例中充分运用了各项技术的优点，取得了很好的临床效果。但无论是即刻种植即刻修复还是数字化技术、ASC基台都有严格的适应证，临床中术前要综合考虑患者情况进行治疗方案设计，才能发挥其最大优势。

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