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·综述·

唇腭裂伴牙槽突裂患者裂隙邻近牙的发育异常和错位特征及治疗进展

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【摘要】　唇腭裂是常见的先天颌面部发育异常疾病，在新生儿中发病率较高。受裂隙影响，牙槽突裂附近牙齿常表现出不同程度的畸形。本文就唇腭裂牙槽突裂隙附近中切牙、侧切牙、尖牙的发育异常和错位特征与治疗进展进行综述，以期为相关临床治疗和研究提供依据。文献复习结果表明，唇腭裂患者牙槽突裂隙邻近中切牙、侧切牙和尖牙均具有不同类型和程度的畸形。牙槽突裂邻近中切牙近远中径、牙根长度、牙根体积显著小于非裂隙侧，冠根比显著大于非裂隙侧，表现为显著的远中和舌侧倾斜。牙槽突裂邻近侧切牙是裂隙附近最常见的缺失牙和阻生牙，且常表现为过小牙。牙槽突裂邻近尖牙牙齿全长、牙根长度显著小于非裂隙侧，冠根比显著大于非裂隙侧，表现为显著的近中倾斜和唇侧倾斜，低位及靠近中线。对于发育异常特征，中切牙阻生可通过正畸间隙准备促使患牙萌出或对牙冠进行手术暴露和正畸牵引。侧切牙缺失可通过正畸治疗关闭间隙或保留间隙修复治疗。当裂隙侧侧切牙出现过小、锥形牙、牙内陷等发育缺陷时，需综合决定是否保留修复或拔除。植骨术后尖牙阻生的治疗包括拔除或牵引促进萌出。对于错位特征，植骨术前正畸治疗可矫正裂隙侧过于倾斜或扭转的牙以提高植骨术疗效；部分患者植骨术后正畸治疗可提高植骨术疗效的稳定性。目前已有许多研究对唇腭裂患者牙齿特征进行探讨，但仍存在适用性、针对性不强等问题，未来还需开展更多相关研究。

【关键词】　唇腭裂；　牙槽突裂；　中切牙；　侧切牙；　尖牙；　牙齿发育异常；　错𬌗畸形；　牙槽突植骨术；　正畸治疗
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Developmental abnormality and malposition characteristics of teeth adjacent to the alveolar cleft in patients with cleft lip and palate and treatment progress

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【Abstract】　Cleft lip and palate (CLP) are common congenital craniofacial developmental disorders with a high incidence rate among newborns. Due to the influence of the cleft, an increased frequency of anomalies occurs in cleft-adjacent teeth. This review summarizes the abnormality of tooth development and malposition characteristics of the central incisors, lateral incisors, and canines adjacent to the alveolar cleft in CLP patients and treatment progress in order to provide information for related clinical treatment and research. The literature reveals that central incisors, lateral incisors, and canines adjacent to the alveolar cleft exhibit various types and degrees of abnormalities. The alveolar cleft-adjacent central incisors show significantly smaller mesiodistal diameters, root lengths, and root volumes compared to the non-alveolar cleft side, while the crown-to-root ratio is larger. Further, they are inclined distally and lingually com-

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pared to the non-alveolar cleft side. The alveolar cleft-adjacent lateral incisor is the most common missing or impacted tooth and is often affected by microdontia. The total length and root length of the alveolar cleft-adjacent canines are significantly smaller, while the crown-to-root ratio is larger on the alveolar cleft side. In addition, they are inclined mesially and buccally compared to the non-alveolar cleft side. Further, they are higher positioned and located closer to the midline. For developmental anomalies, impacted central incisors can be addressed by orthodontic space preparation to facilitate eruption or surgical crown exposure and orthodontic traction. Treatment of missing lateral incisors can involve orthodontic closure of the gap or preservation of the space for subsequent prosthetic restoration. When lateral incisors present with developmental defects, such as microdontia, peg-shaped teeth, or invaginated teeth, a comprehensive decision is necessary to determine whether to retain and restore or extract the malformed lateral incisors. Treatment of impacted canines after bone grafting involves either extraction or traction to facilitate the eruption of the impacted tooth. For malposition, presurgical orthodontic treatment can correct teeth with excessive inclination or rotation on the cleft side to improve the effectiveness of bone grafting surgery. Postsurgical orthodontic treatment can enhance the stability of bone grafting surgery. Although numerous studies have explored the dental characteristics of patients with CLP, the lack of applicability and specificity still need to be elucidated, thus indicating the need for further research.

【Key words】 cleft lip and palate; alveolar cleft; central incisor; lateral incisor; canine; abnormality of tooth development; malposition; alveolar bone grafting; orthodontic treatment

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唇腭裂是口腔颌面部最常见的先天性畸形，每500～2 000名新生儿中就会出现1例唇腭裂患者[1]。唇腭裂严重影响患者的语言、听力、外表和心理[2]，受到医生和科研工作者的广泛关注。受裂隙影响，牙槽突裂附近牙齿常表现出不同程度的畸形[3]，相对非裂隙侧和正常人群的牙齿存在明显的发育异常和错位特点。

唇腭裂患者牙槽突裂邻牙发育异常的发生率较高[4]，包括牙齿数目异常、形态异常、结构异常和萌出异常[5-9]。随着锥形束CT等技术的发展，牙根长度和牙冠高度等指标有了更精确的测量方法，进一步丰富了牙槽突裂隙邻牙的形态特征[10-11]。同时，牙槽突裂隙附近牙齿常存在错位，相对非裂隙侧在牙齿近远中向和唇舌向角度等方面存在显著差异。

分析总结唇腭裂患者的牙齿特征对于制定合理的治疗方案具有重要意义，牙齿形态大小、萌出位置角度的不同都可能对预后效果产生影响[12-13]。因此，本文旨在对唇腭裂患者牙槽突裂隙附近中切牙、侧切牙、尖牙的发育异常和错位特征进行综述，并分类探讨治疗进展，以期为唇腭裂患者临床治疗和研究提供依据。

1　唇腭裂患者牙槽突裂邻近中切牙特征

1.1　中切牙发育异常特征

1.1.1　中切牙数目异常特征　唇腭裂患者裂隙附近中切牙存在一定的缺牙率。Papaefthymiou等[6]探讨唇腭裂患者牙颌畸形的分布情况，观察到66%的受试者出现先天缺牙，其中右上中切牙缺失多见于右侧和双侧唇腭裂患者，左上中切牙缺失多见于双侧唇腭裂患者。

1.1.2　中切牙形态异常特征　中切牙形态异常特征主要表现为牙齿大小及牙根长度、牙根体积和冠根比。Lewis等[14]探讨唇腭裂患者前牙大小，观察到裂隙侧中切牙近远中径显著小于非裂隙侧。Kaplan等[15]评估唇腭裂患者中切牙牙冠大小，得出相似结果，裂隙侧中切牙近远中接触点之间的距离明显更小，且切缘至龈缘垂直距离明显更大。Antonarakis等[16]通过meta分析进一步证实裂隙侧中切牙近远中径小于非裂隙侧。

在牙根发育方面，Zhang等[12]观察到裂隙侧中切牙牙根长度显著小于非裂隙侧，且差异在早期发育阶段最明显，并随着牙齿的成熟而降低。Huang等[17]测量了唇裂患者中切牙的牙冠长度和牙根长度，并计算冠根比，观察到裂隙侧中切牙冠根比显著大于非裂隙侧。Celebi等[18]评估了唇腭

裂患者中切牙牙根体积，发现裂隙侧中切牙牙根体积显著小于非裂隙侧。此外，Zhou等[19]观察到唇腭裂患者裂隙侧中切牙非典型牙根形态发生率较高，包括牙根扭曲。由此可见，牙槽突裂隙附近中切牙表现为更小的牙根长度、牙根体积和更大的冠根比。

1.1.3　中切牙结构异常特征　唇腭裂患者中切牙结构异常主要表现为牙釉质发育不全。Shen等[20]比较了唇腭裂患者牙齿釉质发育不全情况，观察到中切牙是最常受影响的牙齿，裂隙侧中切牙釉质发育不全发生率显著高于非裂隙侧。

1.1.4　中切牙萌出异常特征　唇腭裂患者裂隙附近中切牙存在阻生情况。Herrera-Atoche等[21]统计了192例唇腭裂患者阻生牙的患病率，发现19.51%的阻生牙为中切牙。然而上述研究只统计了中切牙未能完全萌出到正常功能位置的阻生牙数目，有关中切牙具体阻生特点的研究仍较少。

1.2　*中切牙错位特征*

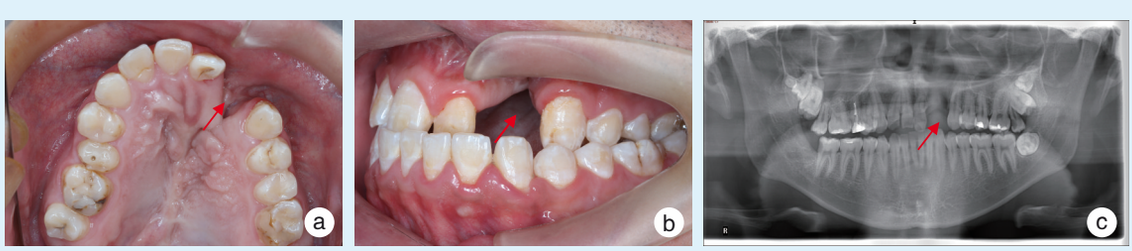
1.2.1　中切牙近远中向角度和唇舌向角度特征　对于单侧完全性唇腭裂患者，随着年龄增长，裂隙邻近中切牙牙冠会逐渐向裂隙方向倾斜。Sezici等[22]对唇腭裂患者中切牙近远中向角度进行测量，发现裂隙侧中切牙向远中倾斜。进一步，Tayyar等[23]观察到裂隙侧中切牙相对于非裂隙侧中切牙表现为远中和舌侧倾斜。

1.2.2　中切牙扭转特征　Suri等[24]评估唇腭裂患者上颌恒中切牙的扭转，发现77.14%裂隙侧中切牙扭转方向为近中舌侧、远中唇侧扭转，而82.19%非裂隙侧中切牙扭转方向为远中腭侧扭转。

2　唇腭裂患者牙槽突裂邻近侧切牙特征

2.1　*侧切牙发育异常特征*

2.1.1　侧切牙数目异常特征　唇腭裂患者裂隙侧侧切牙缺失率极高（图1）。多项研究[5, 6, 9, 21, 25-27]均观察到侧切牙为唇腭裂患者裂隙侧常见的缺失牙。在Antonarakis等[16]对56例唇腭裂患儿进行的横断面研究中，26例患者发生侧切牙缺失，缺失率将近50%。进一步，Deepti等[28]观察到侧切牙缺失率随裂隙严重程度的增加而增加。尽管唇腭裂患者裂隙侧侧切牙缺失率较高，仍有许多患者表现出侧切牙区多生牙（图2）。Lasota等[29]发现26.55%的唇腭裂患者存在多生牙，且该异常仅在上颌侧切牙区中观察到。由此可见，侧切牙区多生牙也是唇腭裂患者裂隙附近的重要特征。



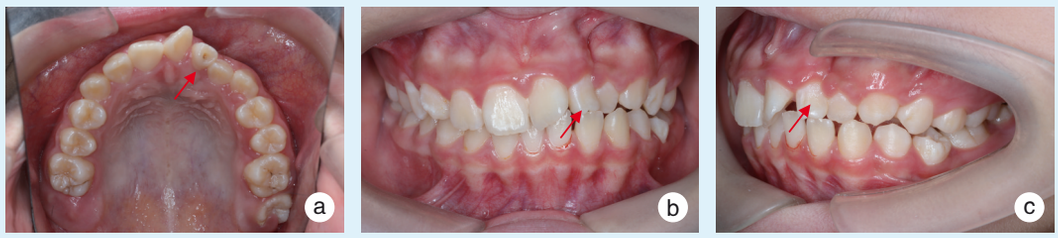
a: upper view of a case of missing lateral incisor adjacent to the alveolar cleft. b: left lateral view of a case of missing lateral incisor adjacent to the alveolar cleft. c: panoramic tomography of a case of missing lateral incisor adjacent to the alveolar cleft. The alveolar cleft is located on the left side with the lateral incisor missing

Figure 1　Intraoral photographs and a panoramic tomography of a typical case of missing lateral incisor adjacent to the alveolar cleft

图1　牙槽突裂邻近侧切牙缺失典型病例口内像及曲面断层片

2.1.2　侧切牙形态异常特征　唇腭裂患者裂隙侧侧切牙形态异常特征较为复杂，主要表现为过小牙（图3）及牙内陷。Knüppe等[30]评估唇腭裂区域侧切牙牙冠大小，观察到在6～9岁时，相对非裂隙侧，裂隙侧侧切牙常沿牙槽突裂萌出，表现为过小牙。Lewis等[14]观察到唇腭裂患者裂隙侧侧切牙近远中径显著小于非裂隙侧。Antonarakis等[16]通过meta分析进一步证实裂隙侧侧切牙近远中径显著较小。Zhou等[19]观察到唇裂患者裂隙侧侧切牙的牙根长度和牙冠高度均显著小于非裂隙侧。相似地，Zhang等[12]观察到裂隙侧侧切牙牙根长度和牙齿全长显著较小。而在Antonarakis等[31]对56例唇腭裂患儿进行的横断面研究中，19例患者的侧切牙表现为锥形牙（图4）。

此外，唇腭裂患者裂隙侧侧切牙还存在许多其他形态异常。牙内陷是一种罕见的发育异常，



a: upper view of a case of supernumerary lateral incisor adjacent to the alveolar cleft. b: frontal view of a case of supernumerary lateral incisor adjacent to the alveolar cleft. c: left lateral view of a case of supernumerary lateral incisor adjacent to the alveolar cleft. The alveolar cleft is located on the left side with supernumerary lateral incisor

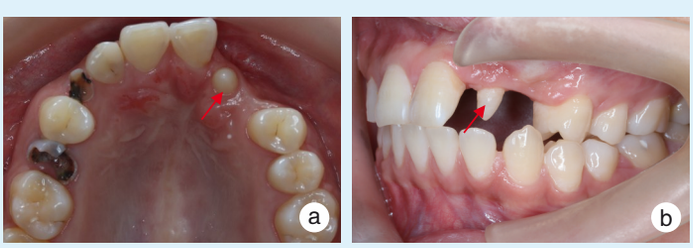
Figure 2　Intraoral photographs of a typical case of supernumerary lateral incisor adjacent to the alveolar cleft

图2　牙槽突裂邻近侧切牙区多生牙典型病例口内像

a: upper view of a case of a microdontic lateral incisor adjacent to the alveolar cleft. b: left lateral view of a case of a microdontic lateral incisor adjacent to the alveolar cleft. The alveolar cleft is located on the left sideand the left lateral incisor ismicrodontic (tooth is significantly undersized but calcified normally)

Figure 3　Intraoral photographs of a typical case of a microdontic lateral incisor adjacent to the alveolar cleft

图3　牙槽突裂邻近侧切牙为过小牙典型病例口内像



a: upper view of a case of a peg-shaped lateral incisor adjacent to the alveolar cleft. b: left lateral view of a case of a peg-shaped lateral incisor adjacent to the alveolar cleft. The alveolar cleft is located on the left sideand the left lateral incisor ispeg-shaped (a malformed tooth with a conical shape)

Figure 4　Intraoral photographs of a typical case of a peg-shaped lateral incisor adjacent to the alveolar cleft

图4　牙槽突裂邻近侧切牙为锥形牙典型病例口内像

其特征是牙冠或牙根表面出现深凹陷，在唇腭裂患者中发病率较高。Ickow等[32]报道了4例唇腭裂患者出现上颌侧切牙的牙内陷，提示牙内陷可能是唇腭裂裂隙侧侧切牙的发育异常特征之一。由此可见，唇腭裂患者裂隙附近侧切牙形态异常情况较为复杂，需要更多研究进一步验证。

2.1.3　侧切牙萌出异常特征　唇腭裂患者裂隙附近侧切牙萌出异常表现为发育显著延迟。Knüppe等[30]评估了唇腭裂区域侧切牙的萌出路径和牙齿发育情况，观察到在6～9岁时，裂隙侧上颌侧切牙发育显著延迟，相对非裂隙侧，这些侧切牙常沿牙槽突裂萌出。同样，Deepti等[28]对侧切牙牙根发育情况进行影像学分析，观察到裂隙侧侧切牙牙根发育较非裂隙侧延迟。

此外，Herrera-Atoche等[21]统计了192例唇腭裂患者阻生牙的患病率，结果显示最常见的阻生牙为上颌侧切牙，概率达到53.65 %。然而，在Mangione等[33]对法国74例唇腭裂患者的研究中，最常见的阻生牙是尖牙。这一差异可能与人种区别、唇腭裂类型、二期牙槽突裂植骨等因素相关[34]。

2.2　侧切牙错位特征

关于侧切牙角度测量的研究较少，这可能与侧切牙缺失率较高有关。此外，在Sezici等[22]对唇腭裂患者牙齿近远中向角度的测量中，并未观察到裂隙侧与非裂隙侧的差异，表明唇腭裂患者裂

隙附近侧切牙的角度特征可能并不明显。

3　唇腭裂患者牙槽突裂邻近尖牙特征

3.1　尖牙发育异常特征

3.1.1　尖牙形态异常特征　唇腭裂裂隙侧尖牙形态异常特征主要表现为牙冠大小及牙齿全长、牙根长度和冠根比。Kaplan等[15]分析了唇腭裂患者的牙冠大小，观察到裂隙侧尖牙的近远中径、颊舌向厚度和牙尖至牙龈缘高度均显著小于正常人群，但裂隙侧与非裂隙侧并无显著差异。同样，Lewis等[14]对30名唇腭裂患者上颌前牙进行测量，发现裂隙侧尖牙的近远中径小于正常人群，但裂隙侧与非裂隙侧并无显著差异。

在牙齿长度方面，李放等[35]对20名唇腭裂患者牙齿长度进行测量，观察到上颌尖牙的全长、牙根长度以及冠根比在裂隙侧和非裂隙侧之间均有统计学差异，裂隙侧尖牙根长受影响更大。相似地，Zhang等[12]探究40名唇腭裂患者牙齿发育过程，发现裂隙侧尖牙的牙根长度和牙齿全长均显著小于非裂隙侧。此外，Baetzela等[36]还发现裂隙侧尖牙根尖区牙根外吸收评分显著高于非裂隙侧。Vandersluis-Solomon等[37]比较了唇腭裂患者裂隙侧和非裂隙侧的牙根发育情况，发现尖牙发育评分差异在10岁左右达到最大，裂隙侧牙根发育相对非裂隙侧更加缓慢。

3.1.2　尖牙萌出异常特征　多项研究表明，唇腭裂患者裂隙侧尖牙相对非裂隙侧尖牙萌出更慢，非裂隙侧尖牙常能自然萌出，而裂隙侧尖牙存在阻生情况（图5），需要手术及正畸等干预[38-39]。Pastuszak等[40]统计唇腭裂患者上颌尖牙异常萌出的概率，结果显示尖牙阻生的概率为5.36%。Hereman等[41]比较了唇腭裂患者裂隙侧和非裂隙侧尖牙的位置，观察到裂隙侧尖牙阻生时尖牙根尖位置超过相邻侧切牙牙根的1/3，且尖牙与面中线以及第一前磨牙的角度分别大于23.82°和16.1°。Weismann等[42]根据上颌尖牙异位萌出的检查标准[43]，观察到唇腭裂患者上颌未萌尖牙的异位萌出风险显著高于对照组，且尖牙在冠状面上的倾斜角是异位萌出的良好预测指标。Alqerban等[44]分析多个研究结果，发现尖牙阻生和经手术成功完成牵引的概率差异较大，可能与阻生情况及医生技术水平有关。许多学者认为，侧切牙的缺失、发育不全或多生牙均可对尖牙阻生造成影响[45-46]，但也有部分学者对此持怀疑或反对态度[47]。此外，尖牙阻生可以一定程度上引起其他牙齿畸形。Hadler-Olsen等[48]发现侧切牙牙根吸收与上颌尖牙阻生有关，若尖牙相对侧切牙长轴向近中偏斜，则发生牙根吸收的概率更大。总的来说，尖牙阻生与多种因素相关，且可导致其他牙齿畸形，对骨移植手术等治疗手段的预后产生影响[49]。

a: upper view of a case of impacted canine adjacent to the alveolar cleft. b: frontal view of a case of impacted canine adjacent to the alveolar cleft. c: left lateral view of a case of impacted canine adjacent to the alveolar cleft. d: panoramic tomography of a case of impacted canine adjacent to the alveolar cleft. The alveolar cleft is located on both sides with the canine impacted

Figure 5　Intraoral photographs and a panoramic tomography of a typical case of impacted canine adjacent to the alveolar cleft

图5　牙槽突裂邻近尖牙阻生典型病例口内像及曲面断层片

3.2　尖牙错位特征

3.2.1　尖牙近远中向角度和唇舌向角度　唇腭裂患者裂隙侧尖牙常存在倾斜角度异常。Kadi等[38]测量了唇腭裂患者尖牙的角度，观察到裂隙侧尖牙与面部中线的夹角相对非裂隙侧更大，预测裂隙侧尖牙成为阻生牙的风险更高，该结果对于临床预防和治疗有一定参考意义。Sezici等[22]同样发现唇腭裂患者裂隙侧尖牙偏向近中方向。进一步，Tayyar等[23]对32例混合牙列晚期患者进行分析评估，发现相对非裂隙侧，裂隙侧尖牙不仅表现出显著的近中倾斜，还表现出显著的唇侧倾斜。Caceres等[50]使用曲面断层片测量尖牙长轴与双侧眶下点构成的水平线所成的锐角，发现裂隙侧该角度显著小于非裂隙侧。上述研究表明裂隙侧尖

牙显著近中、唇侧倾斜，且一定程度上与其他畸形关联，可作为预测牙齿发育情况的参考，对于临床治疗和预后有重要意义。

3.2.2　尖牙牙齿位置特征　Rizell等[51]对148名唇腭裂患者进行研究，观察到裂隙侧尖牙相比非裂隙侧更低位、靠近中线，并指出尖牙位置与侧切牙发育不全、腭咽闭合和骨移植手术等因素相关，提示临床工作中应重点关注患者的尖牙位置，并选择合适的治疗方案。Caceres等[50]同样观察到裂隙侧尖牙相对非裂隙侧更低位。此外，Chang等[9]对132名唇腭裂儿童上颌尖牙进行调查统计，结果显示上颌尖牙的扭转率为10.6%。

4　治疗进展

4.1　发育异常治疗进展

4.1.1　中切牙阻生的治疗　既往文献中关于唇腭裂患者中切牙阻生的研究较少，中切牙阻生的治疗包括正畸间隙准备，消除阻碍因素以促使患牙自然萌出；若去除阻碍因素且有足够间隙时，阻生中切牙仍未自行萌出，则需对阻生牙牙冠进行手术暴露、黏结附件和正畸牵引[52]。同时，唇腭裂患者裂隙侧中切牙牙根发育较非裂隙侧差，且牙冠可能存在釉质发育不全等缺陷，正畸治疗时存在牙根吸收加重的风险，是否保留需综合评估。

4.1.2　侧切牙缺失的治疗　唇腭裂患者常见侧切牙单侧或双侧先天缺失，可通过正畸治疗关闭间隙或保留间隙修复治疗[53]，应考虑患者年龄、错𬌗类型、前牙关系、面型、尖牙大小形状和色泽，微笑线高度等因素综合确定[54]。侧切牙缺失的治疗应在牙槽突裂植骨术后进行，对于植骨后骨量仍不足的患者，可根据水平和/或垂直缺损考虑进行三期植骨。当侧切牙缺失处近远中间隙较小时，优先考虑正畸间隙关闭。若预留间隙用于修复治疗，则需保留近远中间隙6～7 mm，当牙槽突有足够骨量且邻牙牙根不影响种植体植入时，种植修复通常是最佳选择，如果需要额外的植骨，则建议种植体植入的时机为植骨后2～6个月之间[55]。若条件无法满足，则建议固定/活动义齿修复[56]。修复治疗通常要等到患者青少年晚期再进行，对于种植牙甚至需要至更晚的时间[57]。

4.1.3　侧切牙过小/内陷的治疗　当唇腭裂患者裂隙侧侧切牙出现过小、锥形牙、牙内陷等发育缺陷时，需综合决定是否保留修复或拔除发育异常的侧切牙，需要考虑的关键临床因素包括侧切牙发育情况及预后、垂直向高度、颊腭侧位置、咬合关系等[57]。拔牙后间隙的修复管理与缺牙的处理类似，包括正畸关闭间隙或正畸打开间隙并行修复治疗[58-59]。

当保留过小牙/锥形侧切牙时，正畸治疗通过调整间隙及优化牙齿近远中、颊舌和冠根方向位置，为修复治疗提供支持[60]。尽管修复治疗常在正畸治疗后进行，但正畸治疗前使用复合树脂对过小牙进行修复，以调整其大小和形状，有助于托槽的准确定位，为后续修复治疗创造有利条件。

侧切牙牙内陷的治疗取决于病变深度，治疗原则为保存具有生理功能的活髓，控制感染[61]。Oehler Ⅰ型病变，使用预防性窝沟封闭剂来保护向内折叠的部分免受口腔环境影响，或清除向内折叠部分及周围牙本质内的细菌，再进行充填。Oehler Ⅱ型病变，若已累及牙髓，则进行根管治疗。Oehler Ⅲ型病变的治疗包括根管治疗、根尖手术，当异常牙齿形态无法进行根管治疗，可考虑进行再植术。当根管治疗无法成功进行或异常牙冠形态导致美学或功能差时，则考虑拔除[32, 62]。

4.1.4　尖牙阻生的治疗　Hereman等[41]指出，当唇腭裂患者裂隙侧尖牙垂直位置较邻近侧切牙根尖1/3低位，且尖牙与中线、第一前磨牙的角度分别大于23.82°和16.1°时，裂隙侧尖牙阻生风险较大，提示医生做出干预决策。正畸医生需要通过全景片而非患者年龄来评估阻生牙的阻生模式以决定对阻生牙的适当干预时机[63]。牙槽突裂植骨术后尖牙阻生的治疗包括拔除或通过牵引促进阻生牙萌出[64]。考虑因素包括病史、年龄、病理情况、阻生位置、周围软硬组织状况、错𬌗类型、拥挤程度等。准确评估上颌尖牙的位置有助于确定阻生严重程度、治疗难度及预后。若确定尖牙异位萌出的早期迹象，拔除乳尖牙可作为一种阻断性措施，以促进恒尖牙的萌出，或至少使其位置变得更有利，建议在以下情况下拔除乳尖牙：患者年龄在10～13岁之间；上颌尖牙在正常位置无法触及，X线检查显示尖牙异位于腭侧[65]。

4.2　错位特征相关治疗进展

受裂隙影响，裂隙侧中切牙常表现为远中、舌侧倾斜和近中舌侧、远中唇侧扭转；裂隙侧尖牙常表现为近中、唇侧倾斜，低位和靠近面中线。裂隙附近拥挤错位的牙齿可能阻挡牙槽突裂植骨手术入路，为提高植骨手术疗效，可在术前对裂隙附近错位的牙齿进行调整，矫正过于倾斜或扭转的牙

以扩大手术入路[66]。

在牙槽突裂植骨术前纠正裂隙邻牙的错位特征，包括扭转、舌倾、牙齿长轴偏离中线、垂直向及近远中向倾斜等，部分正畸治疗还可改变裂隙宽度以提高植骨术成功率。许多研究表明，唇腭裂患者上颌前牙存在扭转和切牙舌倾[67]，使用固定矫正器可显著改善舌倾，有效纠正扭转和牙长轴偏离中线[68-69]；殆垫舌簧等活动矫治器也可矫正前牙舌倾，改善反殆[70]。对于不影响植骨术开展的患者，可在恒牙期正畸综合治疗时一并调整[71]。植骨术前正畸治疗应轻力缓慢移动牙槽突裂隙邻近的牙齿，避免牙齿移入裂隙区。

为了确定治疗的最佳时机，有必要定期对牙槽裂缺损、唇腭裂相邻的尖牙或侧切牙的发育情况，以及上颌牙齿的状况和位置进行临床和影像学评估。目前临床上公认的进行骨移植的最佳时间为混合牙列期，尖牙牙根发育至其最终长度的1/2～2/3时[72-73]。然而，由于侧切牙的萌出在传统牙槽突裂二期植骨之前，侧切牙萌出无足够骨量支持，常异位萌出随后导致恒侧切牙的丧失或拔除[74]；若侧切牙的牙胚处于裂隙区，并能从植骨区骨桥处萌出，可提前牙槽突裂植骨时机以促进侧切牙的萌出[75-78]。牙槽突裂植骨术后牙齿的异位萌出可增加手术失败的风险[79]。此外，牙槽突裂植骨也可能导致恒尖牙阻生[51, 80]。

若患者存在裂隙宽度不足或裂隙附近牙齿扭转度、倾斜度过大并影响植骨效果时，正畸治疗需要在植骨术之前，即早期混合牙列期完成[81]。骨移植前的正畸治疗应在移植前几个月开始，以便为所需的牙齿移动留出足够的时间。在此期间，可以进行其他治疗，如移植前拔除位于裂隙部位的乳牙、多生牙及畸形的侧切牙，以改善黏膜的体积和质量，从而便于手术缝合。虽然这些牙齿可以在植骨手术时拔除，但有研究表明，这可能导致植骨影像学结果较差[82]。如需拔牙，尤其是与唇腭裂尖牙紧密相关的牙齿，应在植骨前约3～6个月进行，以促进愈合，但又不宜过早，以免尖牙过早萌出[83]。骨移植术后需要再次评价患者错殆情况，植骨术后正畸治疗可提高植骨术疗效的稳定性[84]，需根据植骨区术后情况综合判定治疗时机。当移植体成骨的迹象出现时，正畸治疗最早可在手术后八周开始，或直至移植区域有足够的骨骼影像学证据；当X线显示骨质量良好时，通常在骨移植后3～6个月开始正畸治疗[85]。另外，若患者存在严重的颌面畸形或早期矫正后复发，则需要在成年后进行正畸正颌联合治疗[86]。

5　结　语

综上，本文总结了唇腭裂患者牙槽突裂邻牙发育异常和错位特征与治疗进展（图6）。牙槽突裂隙侧中切牙尺寸较小，牙釉质发育不全发生率较高，表现为远中和舌侧倾斜；牙槽突裂隙侧侧切牙是裂隙附近最常见的缺失牙和阻生牙，发育延迟，常表现为过小牙。牙槽突裂隙侧尖牙全长和牙根长度较小，表现为近中和唇侧倾斜、低位、靠近中线。针对发育异常特征，临床上已有部分治疗方法，但相关研究仍较少。中切牙阻生的治疗包括正畸间隙准备，消除阻碍因素以促使自然萌出或对阻生牙牙冠进行手术暴露和正畸牵引。侧切牙缺失可通过正畸治疗关闭间隙或保留间隙修复治疗。当裂隙侧侧切牙出现过小、锥形牙、牙内陷等发育缺陷时，需综合决定是否保留修复或拔除。植骨术后尖牙阻生的治疗包括拔除或牵引促进萌出。针对错位特征，可根据实际情况，在牙槽突裂植骨术前、术后调整邻牙错位，提高植骨术成功率或稳定术后疗效。

【Author contributions】 Zheng SY collected the references, conceptualized and wrote the article. Wang SY collected the references, conceptualized and wrote the article. Yu QY, Li WR, Huang YP conceptualized and reviewed the article. All authors read and approved the final manuscript as submitted.

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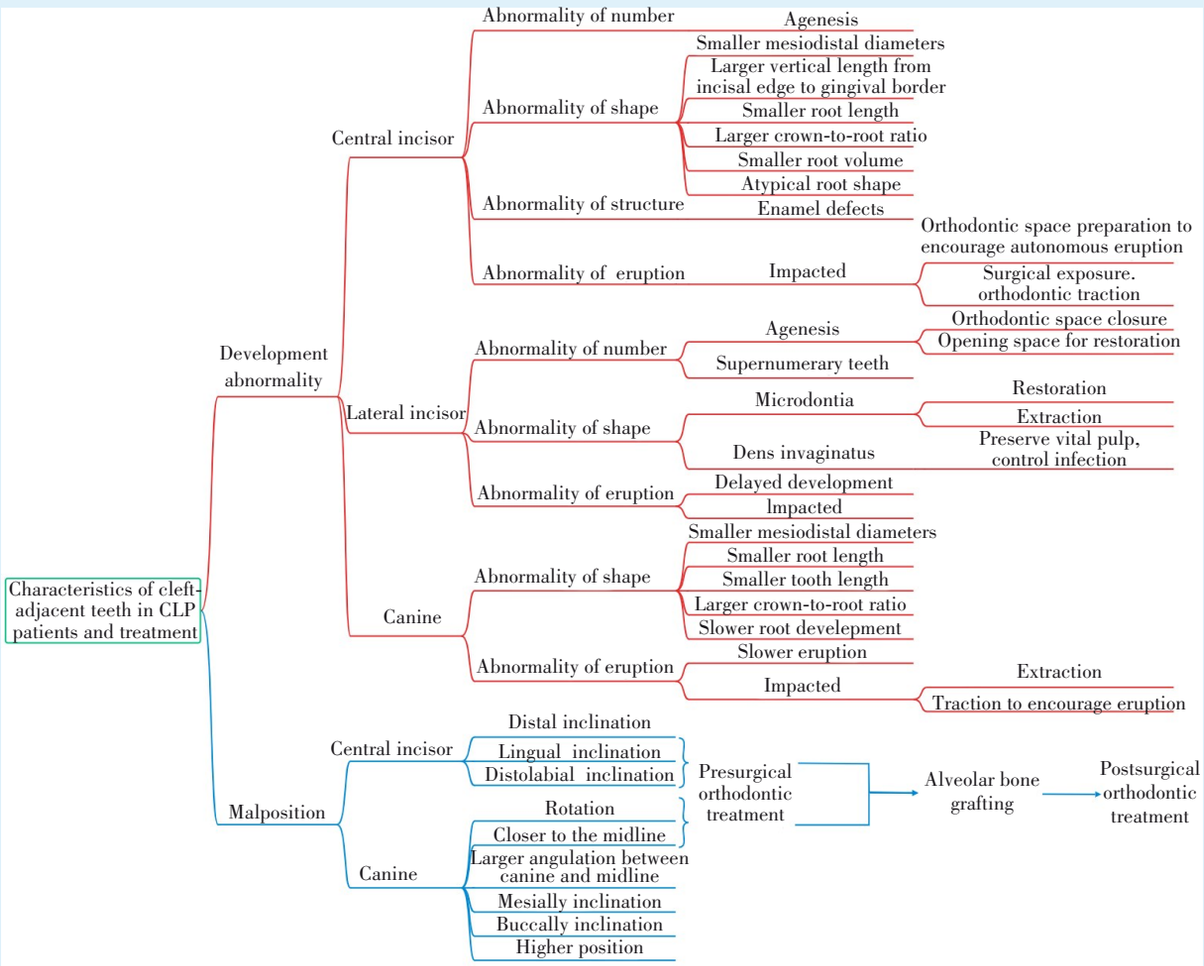

CLP: cleft lip and palate

Figure 6　Developmental abnormality and malposition characteristics of cleft-adjacent teeth in CLP patients and treatment

图6　唇腭裂患者牙槽突裂邻牙发育异常特征和错位特征与治疗

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