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• 临床研究 •

不同前额形态高角患者面下1/3理想矢状向位置的研究

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【摘要】 目的 探讨不同前额形态的高角正畸患者面下1/3的最佳矢状向位置,为临床治疗提供参考。方法 获得患者知情同意及肖像授权,并通过单位伦理审查批准。将额部形态分为4种:直线形、圆弧形、I型角度形(前额转角位于额中份)和II型角度形(前额转角位于额上1/3)。收集不同前额形态高角正畸患者的侧貌图片,以上中切牙牙冠唇面中心点(facial axis point, FA)落在目标前界线(goal anterior-limit line, GALL)上时为初始位置,经轮廓化后,用软件将侧貌的面下1/3进行前后向移动,分别向前移动1、2、3、4 mm和向后移动1、2、3、4 mm,加上初始轮廓图片,得到每位患者的9张图像。根据调整后的侧貌图片设置美学评分问卷,邀请30位正畸医生及30位非专业人员对图片进行评分。结果 4种前额形态高角正畸患者面下1/3的不同移动距离的侧貌评分差异均有统计学意义($P < 0.05$)。总体上直线型或II型角度形前额的高角患者面下1/3未移动时评分更高。圆弧形前额高角患者面下1/3后移2 mm时在正畸医生中获最高评分,后移4 mm时在非专业人员中获最高评分。I型角度形前额高角患者面下1/3后移4 mm时在正畸医生中获最高评分,后移3 mm时在非专业人员中获最高评分。正畸医生与非专业人员对4种不同前额形态侧貌评分的差异无统计学意义($P > 0.05$)。结论 前额形态和面下1/3的矢状向位置会影响侧貌美学,对于直线型或II型角度形前额的高角患者,FA点落在GALL线上时为最佳面下1/3矢状向位置;而对于圆弧形或I型角度形前额的高角患者,面下1/3更靠后的软组织侧貌更为理想。

【关键词】 前额; 侧貌美学; 高角; 骨性I类; 切牙位置; 面部轮廓; 正畸学; 评分系统

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【Abstract】 **Objective** To explore the ideal sagittal position of the lower third of the face in high-angle patients with different forehead forms and to provide a reference for clinical treatment. **Methods** Informed consent and portrait authorization were obtained from all patients, and the study passed the ethical review of the unit. We categorized forehead forms into four types: straight, rounded, type I angular (angled at the middle third of the forehead) and type II angular (angled at the upper third of the forehead). Profiles of high-angle patients with different forehead forms were collected. The initial position was when the facial axis point (FA point) was positioned at the goal anterior-limit line (GALL). After being silhouetted, the lower third of the face was moved forward and backward by 1 mm, 2 mm, 3 mm, and 4 mm each,

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plus the initial silhouetted picture, to obtain 9 images for each patient. A survey was created with these lateral profile silhouettes, and the silhouette images were ranked by 30 orthodontists and 30 laypersons. **Results** There were significant differences in profile scores at different movement distances of the lower third of the face among high-angle patients with different forehead shapes ($P < 0.05$). Overall, high-angle patients with straight or type II angular foreheads had higher scores when the lower third of the face did not move. For high-angle patients with a rounded forehead, orthodontists and laypersons gave the highest scores when the lower third of the face was moved backward by 2 mm and 4 mm, respectively. For high-angle patients with a type I angular forehead, orthodontists thought the scores of backward movement of 4 mm were the highest, and laypersons thought the scores of backward movement of 3 mm were the highest. No significant difference was found in scores between orthodontists and laypersons ($P > 0.05$). **Conclusion** The forehead forms and the sagittal position of the lower third of the face will affect the face's profile aesthetics. Patients with straight and type II angular foreheads has the best profile when the FA point is located on the GALL line. For patients with rounded and type I angular foreheads, a posterior location of the lower third of the face is more desirable than the initial position.

【Key words】 forehead; profile esthetic; high angle; skeletal Class I; position of incisor; facial silhouettes; orthodontics; scoring system

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排齐牙列、改善咬合、改善面型是大部分正畸患者的求诊动机^[1-3]。在正畸过程中,得到整齐的牙列及良好的咬合关系并不等同于获得良好的面型,而患者往往更看重面型的改善。因此,对侧貌的评价分析是正畸诊断的重要组成部分。在软组织侧貌分析上,面下 1/3 的矢状向位置是颌面部美学的重要决定因素^[4-5]。Andrews 六要素中的要素 II 描述了根据额部倾斜度决定上下颌骨理想前后向位置的办法。当前额倾斜度 $\leq 7^\circ$ 时,目标前界线(goal anterior-limit line, GALL)为自然头位(natural head position, NHP)下过前额临床中心点(the forehead's facial-axial point, FFA)的垂线;当倾斜度 $> 7^\circ$ 时,每增大 1° ,此线前移 0.6 mm,但最前不超过眉间点。Andrews 认为在上下中切牙满足要素 I (每颗牙牙根位于基底骨中央;无间隙,无拥挤;Spee 曲线深度 0 ~ 2.5 mm;尖窝交错形成良好咬合关系;上下弓形匹配)的前提下,上中切牙 FA 点落在 GALL 线上时为上下颌骨最适合的矢状向位置^[6-7]。然而有研究发现,有些很好或较好的侧貌形态,其测量分析值与参考标准值有一定差别^[8-9],还有研究显示部分各项指标正常的患者其面型却没有符合审美标准^[10]。这种差异由许多因素导致,其中前额形态和垂直骨面型对侧貌的影响不容忽视。目前国内关于前额形态的研究较少,制定正畸矫治计划很多时候也忽略了额部形态的影响,关于不同前额形态高角患者面下 1/3 的

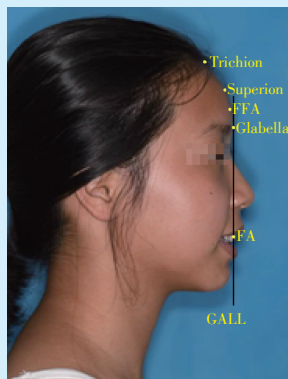
理想矢状向位置的研究更是少有报道。本研究通过对不同前额形态高角患者侧貌轮廓的面下 1/3 进行前后向移动并评分,探究其理想的面下 1/3 矢状向位置,为临床治疗提供参考。

1 资料和方法

1.1 资料收集

收集 300 份在华西口腔正畸科进行正畸治疗的患者的初诊侧貌照片,在额部标注发际点(trichion)、额上点(superion)、前额临床中心点(the forehead's facial-axial point, FFA)、牙冠唇面中心点(facial axis point, FA)及眉间点(glabella)(图 1),并根据相互位置关系将额部形态进行分类统计。将额部形态分为 4 种类型:直线形、圆弧形、I 型角度形和 II 型角度形(图 2)。从中选取不同前额形态的 4 位高角女性患者并符合以下纳入标准:①年龄 17 ~ 25 岁;②磨牙 I 类关系,覆殆覆盖正常,上下中切牙角度正常(符合 Andrews 在要素 I 中所描述的上颌中切牙位置);③骨性 I 类关系,高角(前颅底平面与下颌平面所成的角度 SN - MP $> 40^\circ$);④FA 点落在 GALL 线上(符合 Andrews 在要素 II 中所描述的上颌中切牙位置)。本研究经四川大学华西口腔医院伦理委员会审查批准(审批号:WCHSIRB-D-2016-137),所有患者签署知情同意书,并获得患者肖像授权。

照片均按照自然头位标准由同一位专业人员



FFA: the forehead's facial-axial point; FA: facial axis point;
GALL: goal anterior-limit line

Figure 1 Landmarks on the frontal profile of orthodontic patients

图1 正畸患者侧貌前额的标志点

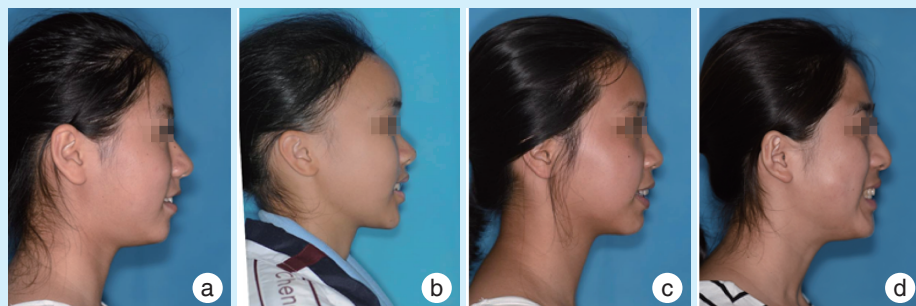
拍摄^[11-13],选取每个病人的两张侧貌照用于研究。一张为露出前牙的微笑状态下的侧貌照,用于研究上切牙与前额的最佳关系,纳入研究的上中切牙FA点应恰位于GALL线上。另一张为自然放松

状态下的侧貌照,该照片通过 Adobe Photoshop CC 进行调整(图3)。

1.2 图片修改

通过 Adobe Photoshop CC 将自然放松状态下的侧貌照轮廓化,除了侧貌轮廓,患者照片上的其他信息都去除。这种照片处理方法移除了一些侧貌判断的干扰因素,比如头发、皮肤颜色以及妆容等^[14]。这种侧貌的二维轮廓已被常规应用于评估侧貌美学上^[15-17],通过 Adobe Photoshop CC 对侧貌轮廓的图像进行前后向移动,创建出一系列带有不同面下部前后向位置的图像用于美学分析。

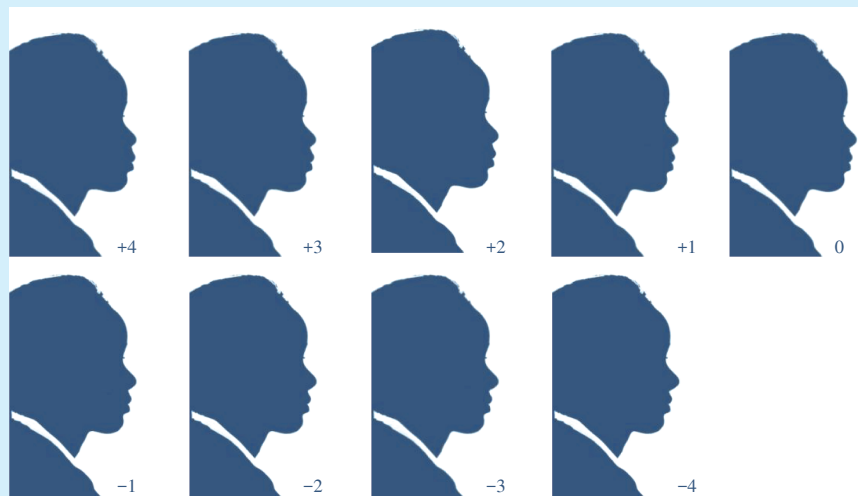
为与实际观察获得真实的比例,所有照片与真人按 0.625:1 的比例进行处理,因此本试验在水平面上将4位患者轮廓照片的面下1/3分别向前后各移动0.6、1.3、1.9、2.5 mm,改变其前后位置,反映实际向前移动1、2、3、4 mm(分别记作+1、+2、+3、+4)和向后移动1、2、3、4 mm(分别记作-1、-2、-3、-4)的改变,加上初始轮廓图片(记作0),得到每位患者的9张图像(图3)。所有图像改变完成后,将不同前额形态的9个侧貌图像都分别打印出来,评分



a: straight forehead; b: rounded forehead; c: type I angular forehead (angled at the middle third of the forehead); d: type II angular forehead (angled on the upper third of the forehead)

Figure 2 Profile photos of different forms of the forehead

图2 不同前额形态患者的微笑侧貌照



+4: forward movement of 4 mm of the lower third of the face; +3: forward movement of 3 mm; +2: forward movement of 2 mm; +1: forward movement of 1 mm; 0: no movement; -1: backward movement of 1 mm; -2: backward movement of 2 mm; -3: backward movement of 3 mm; -4: backward movement of 4 mm

Figure 3 Images of a high-angle patient with a rounded forehead in which the lower face is altered with linear movement anteriorly and posteriorly

图3 圆弧形前额高角患者面下1/3前后向移动后的侧貌轮廓图片

之前将图像随机放置。

1.3 图像评定

将图像评定人员分为正畸专业组和非专业组,每组有30人。专业组是由在华西口腔医院正畸科实习的硕士博士研究生组成,非专业组是由在华西口腔医院正畸科就诊的患者及其监护人组成。两组人员年龄在18~30岁之间。

每个观察者都使用7级Likert-type量表对图像的美观度吸引力进行评定^[18],7级量表中1级代表最低分,7级是最高分。1级:极其缺乏吸引力;2级:非常缺乏吸引力;3级:略缺乏吸引力;4级:

既不具有吸引力,也不缺乏吸引力;5级:略有吸引力;6级:非常有吸引力;7级:极其有吸引力。

1.4 评分系统的可信度分析

为了检验该评分系统的可信度,从每组图片中随机选出一张图片,让评分人员(30位医生及30位非专业人员)评分,一周后同样的评分人员再次进行评分,通过重测信度检验量表的可信度,使用皮尔逊积差相关系数表示信度的大小。本试验总量表 and 不同前额形态评分量表的相关系数均大于0.5,可以认为该量表用于本试验时可信度较高(表1)。

表1 Likert-type评分量表的重测信度
Table 1 Test-retest reliability of the Likert-type rating scale

	Total scale	Straight	Rounded	Type I angular forehead	Type II angular forehead
Correlation coefficient	0.846	0.810	0.808	0.818	0.754
P	< 0.001	< 0.001	< 0.001	< 0.001	0.001

1.5 统计学分析

用SPSS 20.0对数据进行分析,各组数据基本符合正态分布,使用两因素重复测量的方差分析进行比较,专业与非专业评分人员属于组间变量,移动量为组内变量,检验水准 $\alpha = 0.05$ 。

2 结果

2.1 正畸人群的不同前额形态构成

本研究正畸人群中,角度形前额患者所占比例较大,直线型次之,前额圆弧形患者最少见,其中I型和II型角度形前额的患者比例相当(表2)。

表2 正畸人群的不同前额形态构成

Table 2 Proportion of forehead forms in orthodontic patients

Forehead forms	Number	Percent
Straight	69	23.0%
Rounded	8	2.7%
Type I angular forehead	110	36.7%
Type II angular forehead	113	37.7%

2.2 不同前额形态高角患者面下1/3前后向位置的改变对侧貌的影响

通过Likert-type量表对每张图像进行评分,结果见表3。高角患者不论哪一种额部形态,移动量的主效应均显著($P < 0.001$),说明面下1/3矢状向的位置会对患者的面形美观度产生影响。直线形、圆弧形和II型角度形组中组别(指专业组和非专业组)和移动量的交互效应不显著($P >$

0.05); I型角度形组中存在两个变量的交互效应($P = 0.041$),进一步的简单效应分析显示移动量的简单效应在专业和非专业组均显著($P < 0.05$),组别的简单效应则大部分不显著,说明评分的差异主要还是由移动量改变导致。

在直线形前额形态组中,多重比较发现移动距离为0,即FA点位于GALL线上时,侧貌评分的均值最高,该结果与Andrews的判断结果一致。

在圆弧形前额形态组中,移动量的多重比较发现非专业组中面下1/3向后移动时侧貌评分更高;在专业组中,也表现出了向后移动时侧貌评分更高的趋势,但对前移2 mm的评分与后移2 mm的评分差异无统计学意义($P > 0.05$)。总体而言,侧貌的评分结果与Andrews的判断标准不一致,如果以Andrews六要素的要素II为标准,FA点位于GALL线后时的软组织侧貌评分更高。

在I型角度形前额形态组中,无论专业组还是非专业组,未移动和向后移动时侧貌评分均高于前移,后移时有最高分。

在II型角度形前额形态组中,移动量的多重比较表明,在专业组中,移动距离为0时,侧貌评分的均值最高,符合Andrews六要素的要素II;在非专业组中,后移3 mm时评分最高,但与移动距离为0时的评分差异无统计学意义($P > 0.05$),基本符合要素II。

同时,侧貌的评分结果还显示高角患者不论

表3 不同前额形态高角患者面下1/3前后向位置的改变对侧貌的Likert-type评分
Table 3 Likert-type scores of profiles for anteroposterior position changes of the lower third of the face in high-angle patients with different forehead forms

Forehead forms	Distance/mm	Professional	Laypersons	F-test for repeated measures			Forehead forms	Distance/mm	Professional	Laypersons	F-test for repeated measures			$\bar{x} \pm s$
				F	P	Partial η^2					F	P	Partial η^2	
Straight	+4	2.63 ± 1.13	2.33 ± 1.35				Rounded	+4	2.03 ± 1.10	2.47 ± 1.28				
	+3	2.83 ± 1.26	3.10 ± 1.45					+3	2.37 ± 1.22	3.13 ± 1.46				
	+2	3.20 ± 1.06	3.50 ± 1.33					+2	2.60 ± 1.22	3.50 ± 1.64				
	+1	3.40 ± 1.52	3.63 ± 1.33					+1	2.80 ± 1.19	3.20 ± 1.24				
	0	3.87 ± 1.55	4.00 ± 1.51					0	2.90 ± 1.32	3.40 ± 1.35				
	-1	3.83 ± 1.68	3.43 ± 1.48					-1	3.30 ± 1.49	4.07 ± 1.53				
	-2	3.23 ± 1.33	3.10 ± 1.40					-2	3.87 ± 1.53	3.47 ± 1.50				
	-3	3.73 ± 1.39	3.90 ± 1.35					-3	3.43 ± 1.38	3.63 ± 1.52				
	-4	3.83 ± 1.60	3.77 ± 1.33					-4	3.67 ± 1.47	4.13 ± 1.80				
	Group main effect			0.008	0.928	< 0.001		Group main effect			2.857	0.096	0.911	
Movement main effect				11.050	< 0.001	0.160	Movement main effect				15.748	< 0.001	0.214	
Group * Movement				0.825	0.581	0.014	Group * Movement				2.118	0.051	0.035	
Forehead forms	Distance/mm	Professional	Laypersons	F-test for repeated measures			Forehead forms	Distance/mm	Professional	Laypersons	F-test for repeated measures			$\bar{x} \pm s$
				F	P	Partial η^2					F	P	Partial η^2	
Type I angular forehead	+4	1.47 ± 0.63	2.03 ± 1.07				Type II angular forehead	+4	1.77 ± 0.86	2.67 ± 0.94				
	+3	1.97 ± 1.00	2.23 ± 1.19					+3	2.13 ± 1.07	2.07 ± 0.94				
	+2	2.03 ± 0.89	2.67 ± 1.18					+2	2.53 ± 1.25	2.93 ± 1.34				
	+1	2.67 ± 1.21	2.93 ± 1.23					+1	2.63 ± 1.25	2.57 ± 1.43				
	0	3.63 ± 1.52	3.60 ± 1.38					0	2.77 ± 1.25	3.00 ± 1.11				
	-1	3.73 ± 1.34	3.37 ± 1.27					-1	2.37 ± 1.50	3.07 ± 1.26				
	-2	3.53 ± 1.31	3.53 ± 1.38					-2	2.70 ± 1.15	2.90 ± 1.09				
	-3	3.57 ± 1.25	4.10 ± 1.49					-3	2.37 ± 1.10	3.20 ± 1.38				
	-4	4.00 ± 1.39	3.83 ± 1.51					-4	2.50 ± 1.31	2.66 ± 1.10				
	Group main effect			0.652	0.423	0.011		Group main effect			1.561	0.217	0.026	
Movement main effect				47.335	< 0.001	0.449	Movement main effect				9.763	< 0.001	0.144	
Group * Movement				2.207	0.041	0.037	Group * Movement				2.213	0.054	0.035	

+4: forward movement of 4 mm of the lower third of the face; +3: forward movement of 3 mm; +2: forward movement of 2 mm; +1: forward movement of 1 mm; 0: without movement; -1: backward movement of 1 mm; -2: backward movement of 2 mm; -3: backward movement of 3 mm; -4: backward movement of 4 mm

是哪一种前额形态,面下1/3后移的评分均值整体高于前移,前移越多,侧貌评分越低。

2.3 专业与非专业人员之间的评价差异性

在重复测量的方差分析中,专业和非专业人员为组间变量,4种前额形态的组别主效应均不显著($P > 0.05$),表明专业和非专业人员的评分基本没有差异。

3 讨论

患者进行正畸的主要原因之一是让面部更漂亮,更有吸引力。正畸医生除了要改善患者的咬合功能,还要注重改善患者的面型。正畸医生必须具备良好的“面部协调感”,并且引导患者建立

正确的面部美学意识,因此口腔正畸医生对于面部美学特征的理解就显得尤为重要,其中,对于侧貌美学的认识与分析尤其重要。在本研究中,笔者尝试了解高角患者的前额形态、面下1/3位置和面部侧貌美学之间的关系,探究不同形态前额高角患者的理想面下1/3矢状向位置。

在正畸诊治中,医生容易关注面下部软硬组织而忽略额部形态,然而多项研究显示,额部形态与上下颌骨以及上颌切牙位置的相对关系对侧貌美学有重要影响^[9, 19, 20]。Andrews把前额的形状分为3类:平直、成角和弧形^[21]。笔者发现成角形的前额由于成角位置的不同,GALL线的位置也多有较大差异。因此笔者把临床中的患者前额形态分

为四种类型:直线形、圆弧形、Ⅰ型角度形(前额转角位于额头中份)和Ⅱ型角度形(前额转角位于额上1/3)。

本研究结果发现,对于直线形和Ⅱ型角度形前额的高角患者,理想面下1/3位置均符合Andrews六要素的要素Ⅱ,都是FA点落在GALL线上时有最高评分。可能受头发的影响(因为Ⅱ型角度形前额形态的前额转角位于额上1/3),其前额形态本身就与直线形的前额形态接近。此外,面下1/3的前后向位置对这两种类型的患者影响较小,前移不同距离的侧貌评分基本无明显差异,后移不同距离的侧貌评分也无统计学差异,一定程度上说明小范围的面下部前突或后缩对侧貌并无明显影响。

而对于圆弧形或Ⅰ型角度形前额的高角患者,侧貌的评分结果也有相似性,但结果与Andrews六要素的要素Ⅱ不一致。以FA点落在GALL线上时的侧貌为标准,整体而言面下1/3更靠后的软组织侧貌更为理想,这对于指导高角正颌手术患者的目标位置有重要意义^[22-23]。

对西方人而言,面下1/3靠后比靠前更受欢迎^[24-25]。本研究也显示高角患者不论是哪一种前额形态,面下1/3偏后的侧貌通常会比面下1/3靠前的侧貌更美观,且面下1/3越靠前,越影响整体侧貌的美观度。考虑到高角患者的拔牙指征相对较宽松,这给临床一个很重要的提示,即非手术高角患者在正畸治疗时应考虑尽可能避免前牙唇倾。

本试验专业组与非专业组的评分基本一致,说明对于侧貌美学的看法,专业与非专业人员都有统一的认识。对此,部分学者持有相同看法^[26],但也有研究显示专业人员与非专业人员在面部美学的感知上存在明显差异^[27-28]。因此,对于其中感知具有差异性的类型,正畸医生应充分认识,避免出现治疗计划与患者预期不符的问题。

本试验可能还存在诸多限制:图片按照NHP标准改变大小与方向后可能产生变化;研究对象仅限于中国成年女性;仅限于骨性Ⅰ类高角患者;可能还需更大样本量进行验证。但在国内关于前额形态的研究较少,通过本试验可以让医生认识到额部形态在整体侧貌美学中的重要作用,对矫治计划的制定有一定的参考意义。

综上所述,高角患者的前额形态与侧貌美学有紧密的联系,不同前额形态的高角患者面下1/3

理想矢状向位置不同。直线形和Ⅱ型角度形前额的高角患者在FA点落在GALL线上时面下1/3矢状向位置最为理想,圆弧形或Ⅰ型角度形前额的高角患者面下1/3更靠后时更为理想。正畸医生在制定正畸方案以及在正畸治疗过程中,应充分考虑前额形态对侧貌的影响。

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