

上颌结节在不同年龄阶段发育特征的对照研究

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摘要 目的 对上颌结节在不同年龄阶段的发育进行研究,并进行组间比较,得出上颌结节的发育特征。方法 全部病例均采用同一台牙科 X 线机拍摄全口曲面断层片,拍摄条件选择 1.1 倍恒定放大率模式。根据纳入标准选择病例样本 180 例,按年龄分为 6 个实验组,各实验组再按性别分组,对比组间各测量指标的差异。结果 男、女性别组均在 M1、M2、M3、L4、L5、L7、L8、L10、L11 等测量指标中存在显著性差异。结论 上颌结节的发育并不是随着年龄的增长而平稳增长的,其发育存在高峰期,即 10-11 岁年龄段,在此年龄段上颌结节在垂直和水平距离上都有快速的发育。而其因素主要来自于上颌第二、第三磨牙的牙冠和牙根发育,其次来自于骨骼的净增长。

关键词 上颌结节 年龄 发育 全口曲面断层片

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Developmental Characteristics of Maxillary Tuberosity at Different Ages

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ABSTRACT Objective: To study the development of maxillary tuberosity at the different ages, and to compare the features of maxillary tuberosity between the different groups. **Methods:** All cases were observed with the same oral dental X-ray film to obtain panoramic radiographs. The constant shooting condition is 1.1 times magnification mode. A total of 180 cases fulfilled with eligibility criteria. They were divided into 6 experimental groups according to the age. Then, each group was classified according to the sex. We compared the difference among these groups. **Results:** There was a significant difference of M1, M2, M3, L4, L5, L7, L8, L10, L11 and other measurement indicators among the different age groups. **Conclusion:** The development of the maxillary tuberosity is not at a steady growth with increasing age. The developmental peak is at 10-11 years old. The development of maxillary tuberosity at this age is very fast in both vertical and horizontal distance. Associated factors are primarily the crown and root development of the maxillary second and third molars, and secondly the net increase of the bone.

Key words: Maxillary tuberosity; Age; Development; Panoramic radiographs

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前言

上颌结节区是上颌骨向下向后发育延伸的重要区域。其前界为最后一颗磨牙的远中和上颌窦,后界为翼腭裂和腭骨锥突^[1-5]。随着人们年龄的增长,上颌结节的前界由第一磨牙发展为第三磨牙,可见,上颌结节的发育与上颌磨牙有着密不可分的关系。有研究表明,上颌牙齿发育迟缓则上颌骨发育不足,而上颌牙齿发育加速则可促进上颌骨的发育^[6-10]。另外,上颌结节的发育还与骨缝间的增长、骨膜的增长和上颌窦的形成有关^[11-13]。本实验从上颌骨和上颌磨牙的发育入手,研究上颌结节发育的特征,为正畸临床推磨牙向后的时机以及为解除后牙段牙列拥挤提供参考。

1 材料和方法

1.1 临床资料

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实验样本均来自我院正畸科 2009~2011 年期间的病例,全部病例均采用放射科同一台牙科 X 线机拍摄全口曲面断层片,拍摄条件选择 1.1 倍恒定放大率模式。本实验样本按年龄分组,分为 8-9 岁,10-11 岁,12-13 岁,14-15 岁,16-17 岁,18-20 岁六个年龄组,各期选择 30 例正畸患者作为受试对象,男 15 例,女 15 例。并确定受试对象的纳入标准:①所选病例样本均为 I 类骨面型;②上颌第一磨牙为中性关系,无错位扭转;③第二磨牙发育正常,无错位扭转;④上颌有第三磨牙牙胚;⑤两侧上颌骨骨骼发育对称无偏斜。

1.2 方法

1.2.1 全口曲面断层片放大率的核定 为核定全口曲面断层片的放大率,选择 30 例正畸科初诊病例,男 15 例,女 15 例,年龄 8~20 岁。在所有病例上颌第一磨牙、第二磨牙、第三磨牙(第三磨牙已萌出者)牙合面用蜡粘固直径为 5 mm 的不锈钢小珠,选用 1.1 倍恒定放大率模式拍摄全口曲面断层片。

全口曲面断层片不同牙位的放大率 = 该位置全口曲面断层片所测钢珠直径 / 钢珠实际直径^[14-17]。

1.2.2 用硫酸描图纸描记全口曲面断层片上与本实验相关的标志点,制定测量指标并进行数据测量。

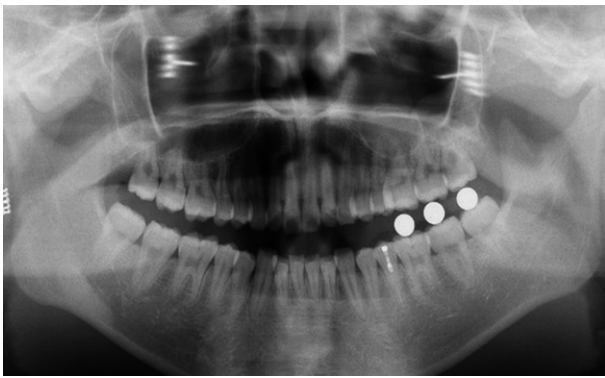


图1 全口曲面断层片放大率核定示意图

Fig.1 The schematic diagram of the panoramic radiographs magnification

1.3 统计学处理：

分别测量全口曲面断层片中不同磨牙的放大率,采用单因素方差分析法对比不同部位放大率,并与机器参数对照。统计男女性别各年龄组测量指标的均值及标准差,并作 t 检验。

2 结果

2.1 本实验所用牙科 X 线机所拍摄全口曲面断层片中后牙不同牙位放大率的对比结果见表 1。

表1 口腔全景片后牙段不同牙位放大率对比

Table 1 Comparison of times magnification of different morls on panoramic radiographs

测量部位 / Measurement site	放大率 / Magnification
第一磨牙区 / The first molar area	1.1 $\pm$ 1.0
第二磨牙区 / The second molar area	1.1 $\pm$ 1.1
第三磨牙区 / The third molar area	1.1 $\pm$ 0.9

经方差分析,后牙区不同部位全口曲面断层片放大率间无显著性差异,与机器参数 1.1 倍一致。

2.2 男女不同年龄组有关上颌结节发育特征的参数测量结果见表 2、表 3。

2.3 男女不同年龄组上颌结节垂直向、矢状向生长曲线图见图 4、图 5。

统计分析显示:男、女性别组均在 M1、M2、M3、L4、L5、L7、L8、L10、L11 等测量指标中存在显著性差异。上颌结节的发育并不是随着年龄的增长而平稳增长的,其发育存在高峰期,即 10-11 岁年龄段,在此年龄段上颌结节在垂直和水平距离上都有快速的发育。在垂直方向上,上颌结节在 8-20 岁间的增长由第一、第二、第三磨牙分别表现为:男性 11.06mm、19.66 mm、9.53 mm;(表 1 M1、M2、M3) 女性 10.08 mm、19.00 mm、9.97 mm(表 3 M1、M2、M3)。而第二磨牙增长最为明显,这是因为研究时间涵盖了其从牙冠发育直至萌出的整个过程,其次为第三磨牙、第一磨牙。在水平方向上,上颌结节的上下界到颧骨上颌脊的距离增加分别为:男性 3.79mm 3.78mm(表 2 L5 L7),女性 4.76mm 3.90mm(表 3 L5 L7)。上颌结节的面积在发育

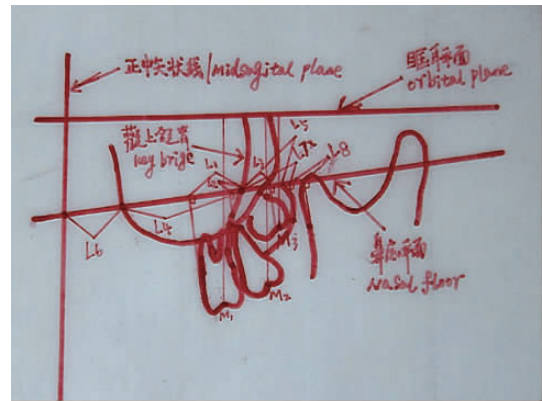


图2 相关测量指标示意图

Fig.2 The schematic diagram of the parameters

M1、M2、M3 分别为第一、二、三磨牙到眶耳平面的垂直距离；

(M1, M2, M3 is vertical parameters to orbital plane of the first/second/third molar)

L1、L2、L3 分别为第一、二、三磨牙至颧骨上颌脊的水平距离；

(L1, L2, L3 is horizontal parameters to key ridge along the nasal floor of the first/second/third molar)

L4 为上颌窦前缘至颧骨上颌脊的水平距离；

(L4 is horizontal parameters to key ridge along the nasal floor of the anterior wall of the maxillary sinus)

L5 为通过上颌结节最上端做与鼻底平面的垂线,交点沿鼻底平面至颧骨上颌脊的水平距离；

(L5 is superior maxillary tuberosity to key ridge along the nasal floor)

L7 为通过上颌结节最下端做与鼻底平面的垂线,交点沿鼻底平面至颧骨上颌脊的水平距离；

(L7 is inferior maxillary tuberosity to key ridge along the nasal floor)

L6 为上颌窦前缘至正中矢状线的水平距离；

(L6 is the anterior wall of the maxillary sinus to midsagittal plane along the nasal floor)

L8 为上颌结节最下端切线与鼻底平面交点至喙突标记点向鼻底平面做垂线的交点的距离；

(L8 is inferior maxillary tuberosity to coronoid process along the nasal floor)

L9、L10 分别为第二、三磨牙在上颌结节内面积；

(L9, L10 is the area located in the maxillary tuberosity of the second/third molar)

L11 为第一磨牙远中至上颌结节最远端的骨骼面积；

(L11 is the bone area of the maxillary tuberosity)

L12 为 L11- (L9+L10) 即上颌结节的净骨骼增长量的面积。

(L12 is the net bone area of the maxillary tuberosity)

高峰期增长量为:男 59.8mm² (L11) 女 57.1 mm² (L11), 分别占上颌结节总增长面积的 68.89%、74.7%。在研究的整个过程中,上颌结节的增长主要来自于上颌第二、第三磨牙的牙冠和牙根发育,其次来自于骨骼的净增长。

3 讨论

全口曲面断层片是正畸临床中常规的检查项目之一,它能较清晰的显示上下颌骨的发育、骨质密度的不同以及颌骨发育的对称性,能较清楚的识别上颌窦、上牙列牙齿和牙胚、上颌结

表 2 不同年龄组男性测量指标统计表 ($\bar{X} \pm S$)

Table 2 The male parameters table in different age groups

测量项目 Measurements	8-9 岁 15 例 8-9years 15cases	10-11 岁 15 例 10-11years 15cases	12-13 岁 16 例 12-13years 16cases	14-15 岁 15 例 14-15years 15cases	16-17 岁 17 例 16-17years 17cases	18-20 岁 18 例 18-20years 18cases
M1	38.32± 0.58	44.87± 0.56 **	45.64± 0.56	48.37± 0.55 *	49.35± 0.24	49.38± 0.12
M2	25.66± 1.05	34.05± 1.10 **	37.37± 1.05 *	40.38± 1.12	44.45± 1.12 *	45.32± 1.15
M3	13.97± 0.28	18.76± 0.44 **	20.52± 0.82	23.47± 1.05	23.55± 1.67	23.50± 2.00
L1	10.75± 0.77	12.55± 0.67	13.88± 0.65	14.20± 0.66	16.25± 0.46 *	16.28± 0.55
L2	3.3± 0.3	3.2± 0.28	3.3± 0.4	3.0± 0.5	4.6± 0.8 *	4.7± 0.8
L3	9.6± 0.2	10.2± 0.4	10.2± 0.4	10.5± 0.6	10.4± 0.5	9.8± 0.4
L4	22.6± 0.6	25.5± 0.8 **	26.65± 1.05	26.86± 1.10	28.46± 0.80	30.55± 1.08 *
L5	12.35± 0.70	16.58± 0.72 **	16.75± 0.70	16.35± 0.65	16.27± 0.67	16.14± 0.68
L6	26.68± 1.56	26.72± 1.25	25.85± 1.25	24.77± 1.18	22.46± 0.98	22.45± 0.86
L7	13.22± 0.66	16.86± 0.68 **	16.90± 0.65	16.58± 0.70	16.92± 0.78	17.00± 0.68
L8	6.88± 1.25	4.43± 1.20 *	4.21± 0.72	4.55± 1.05	4.37± 0.88	4.38± 0.55
L9	126.8± 6.39	128.6± 5.32	120.2± 5.42 *	117.6± 5.43	110.8± 4.39 *	108.3± 4.70
L10	46.7± 5.10	78.8± 4.92 **	89.6± 4.66	110.8± 4.27 **	108.2± 4.37	108.5± 4.76
L11	280.8± 12.37	340.6± 10.04 **	360.42± 12.33 *	360.5± 14.22	366.8± 13.30	367.6± 13.46
L12	135.8± 7.23	159.6± 7.60 *	175.3± 7.70	175.8± 7.51	176.7± 8.28	180.6± 8.20

Note *:P<0.05 ** P<0.01

表 3 不同年龄组女性测量指标统计表 ($\bar{X} \pm S$)

Table 3 The female parameters table in different age groups

测量项目 Measurements	8-9 岁 16 例 8-9years 16cases	10-11 岁 17 例 10-11years 17cases	12-13 岁 15 例 12-13years 15cases	14-15 岁 18 例 14-15years 18cases	16-17 岁 15 例 16-17years 15cases	18-20 岁 16 例 18-20years 16cases
M1	40.56± 0.68	45.33± 0.57 **	48.58± 0.57 *	49.45± 0.46	50.45± 0.20	50.64± 0.15
M2	26.68± 1.13	35.10± 1.14 **	37.35± 1.05 *	41.28± 1.11 *	45.64± 1.10 *	45.68± 1.15
M3	14.95± 0.55	19.87± 0.46 **	23.75± 0.80 *	24.56± 1.10	24.73± 1.65	24.92± 1.22
L1	11.73± 0.56	13.63± 0.43	14.96± 0.67	16.23± 0.75 *	17.38± 0.55 *	17.87± 0.58
L2	4.2± 0.50	4.4± 0.26	4.70± 0.43 *	4.76± 0.52	4.78± 0.75	4.80± 1.0
L3	10.7± 0.2	11.3± 0.5	11.4± 0.6	11.6± 0.4	11.2± 0.4	10.0± 0.5
L4	23.5± 0.8	26.2± 0.85 **	27.72± 1.10	27.85± 0.67	29.55± 0.92 *	30.48± 1.10
L5	13.56± 0.86	17.62± 0.70 **	17.73± 0.62	17.82± 0.66	18.25± 0.45	18.32± 0.64
L6	27.65± 1.37	25.75± 1.28	25.54± 1.26	24.75± 1.22	22.40± 1.02	22.03± 0.88
L7	14.35± 0.72	17.85± 0.69 **	17.88± 0.66	17.95± 0.74	18.05± 0.75	18.25± 0.66
L8	6.35± 1.08	4.38± 0.75 *	4.30± 0.69	4.26± 1.08	4.22± 0.85	4.16± 0.57
L9	125.4± 6.60	120.5± 7.66 *	118.5± 5.47	116.2± 5.50	109.6± 4.50 *	107.8± 3.75
L10	48.5± 4.20	79.6± 3.87 **	90.7± 3.02	108.0± 2.50 *	105.6± 2.40	104.8± 2.80
L11	292.4± 11.76	349.5± 10.1 **	375.6± 10.45 *	370.7± 12.35 *	368.2± 11.70	368.8± 11.55
L12	136.6± 7.40	160.2± 5.78 **	177.6± 6.48 *	178.8± 6.60	180.6± 7.60	183.8± 6.54

Note *:P<0.05 ** P<0.01

节区骨骼的发育、颞下颌骨关节等组织结构。本实验采用全口曲面断层片作为检查手段对上颌结节的发育进行研究,克服了头颅侧位片双侧组织结构重影的影响。另有实验表明,在全口

曲面断层片上第三磨牙区的角度稳定,在第三磨牙区临床定量研究有效,全口曲面断层片能够得到和头颅侧位片无显著差异的可靠实验数据^[18-19]。本研究结果表明,全口曲面断层片上颌后

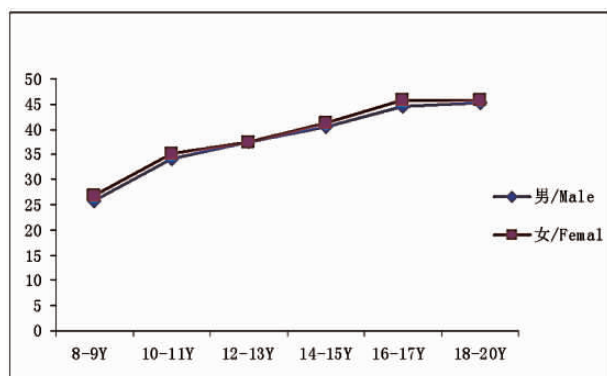


图3 男女不同年龄组
上颌结节垂直向生长曲线图(M2)

Fig.3 The vertical growth curve between male and female in different age groups(M2)

段不同区域的放大率较为恒定,保证了上颌结节区域测量数值的准确性。

实验表明,上颌结节的发育存在显著的高峰期,即10-11岁年龄段,其发育并不是随着年龄的增长而平稳增长的,在8-20岁之间,上颌结节除在10-11岁年龄组间发育快速外,其余年龄组均呈缓慢增长趋势。所以在临床正畸中,要有效地把握上颌结节发育的黄金年龄段,为临床推磨牙向后提供可行的生长发育条件。在此阶段,上颌推磨牙向后可获得明显的矫正效果。同时可以有效预防因推上颌第一磨牙远可能引起的第二磨牙阻生或异位。

在正畸临床中,为解除后牙段牙列拥挤,可采取扩弓、临面去釉、减数拔牙以及推磨牙向后等矫正方法,当扩弓、临面去釉不足以解除牙列拥挤时,选择拔牙矫治还是推磨牙向后的方式来解除拥挤,这就需要考虑到患者的年龄以及上颌结节发育的潜力,准确评估上颌结节的发育阶段与发育的潜力有助于为患者提供正确的矫治计划,从而提高正畸的矫治质量。可见,推磨牙向后的矫治方法与上颌结节的发育有着密切联系,只有对上颌结节的发育有了明确的认识才能在临床正畸中适时的选择该矫正方式。

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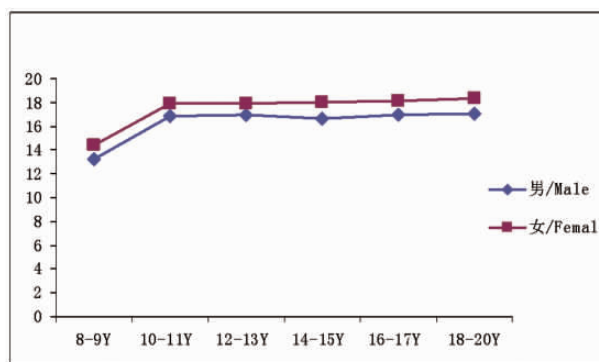


图4 男女不同年龄组上颌结节矢状向生长曲线图(L7)

Fig.4 The horizontal growth curve between male and female in different age groups(L7)

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