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## 青海地区藏汉族人群下颌第二磨牙根管形态的锥形束 CT 研究 \*

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**摘要 目的:**采用锥形束 CT(Cone Beam CT,CBCT)技术探讨青海地区藏汉族人群下颌第二磨牙根管形态、数量以及 C 型根管发生率和髓腔差值的异同。**方法:**从 2016 年 5 月到 2018 年 12 月青大附院口腔门诊牙齿 CBCT 扫描结果中选择藏、汉民下颌第二磨牙各 300 颗,其中汉族 150 例,藏族 150 例。按照 Vertucci 分类对根管进行分型,探究青海地区藏、汉族人群下颌第二磨牙根管形态特点,同时对牙根类型、C 型根管数量和发生率进行统计研究。**结果:**青海地区藏汉族人群下颌第二磨牙牙根类型以双根牙为主,且其在藏族人群中的发生率高于汉族人群。青海地区藏汉族人群下颌第二磨牙的根管分型以 I 型和 C 型根管所占比例最高。在青海地区汉族人群和藏族人群下颌第二磨牙中,C 形根管所占比率分别为 40.7%和 27.0%,汉族人群 C 型根管发生率显著高于藏族人群( $P<0.05$ )。在青海地区藏汉族人群下颌第二磨牙中,女性的发生率显著高于男性( $P<0.05$ )。青海地区藏族人群的 MB-DB、DB-P 平均值显著高于汉族人群( $P<0.05$ )。**结论:**青海地区藏汉族人群下颌第二磨牙根管形态基本类似,C 型根管发生率汉族人群是远远大于藏族人群的,具有一定的种族差异性。但是 C 型根管发生率在青海地区藏族人群中都是女性大于男性。同时藏族人群髓腔差值也具有一定的种族差异性。

**关键词:**青海地区;藏族;汉族;下颌第二磨牙;牙根管

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## A CBCT Study on the Root Canal Morphology of Mandibular Second Molar in the Tibetan and Han Nationality in Qinghai\*

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**ABSTRACT Objective:** Cone beam CT (CBCT) technique was used to investigate the similarities and differences of root canals, the incidence of C-type root canals and the difference of medullary cavity in Tibetan and Han populations in Qinghai area. **Methods:** From May 2016 to December 2018, the CBCT scan results of the teeth of the oral outpatients of the Qingda Affiliated Hospital were selected from 300 Tibetan and Han people's mandibular second molars, including 150 Hans and 150 Tibetans. The root canal was classified according to Vertucci classification. To explore the root canal morphology of the mandibular second molar in Tibetan and Han nationalities in Qinghai, and the root root type and C-type root canal number and incidence rate were statistically studied. **Results:** The root types of the mandibular second molars in the Tibetan Han population in Qinghai area are mostly double root teeth. And its incidence rate in the Tibetan population is higher than that in the Han population. The root canal classification of the mandibular second molars in Tibetan and Han nationalities in Qinghai has the highest proportion of I-type and C-type root canals. In the mandibular second molars of the Han and Tibetan populations in Qinghai, the proportion of C-type root canals was 40.7% and 27.0%, respectively. The incidence of C-type root canals in the Han population was significantly higher than that in the Tibetan population ( $P<0.05$ ). And in the mandibular second molars of Tibetan and Han people in Qinghai, the incidence of females was significantly higher than that of males ( $P<0.05$ ). The mean MB-DB and DB-P of the Tibetan population in Qinghai were significantly higher than those in the Han population ( $P<0.05$ ). **Conclusion:** The root canal morphology of the mandibular second molar in the Tibetan-Han population in Qinghai is similar. The incidence of C-type root canal is far greater than that of the Tibetan population, and it has certain racial differences. However, the incidence of C-type root canal is higher in women than in men in Tibetan and Han people in Qinghai. At the same time, the differences in the medullary cavity of the Tibetan population also have certain racial differences.

**Key words:** Qinghai area; Tibetan; Han nationality; Mandibular second molar; Root canal

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## 前言

下颌第二磨牙处于牙列的最后端,位置比较隐匿,容易受到外在因素的影响,使得牙根尖周疾病与牙体牙髓病的患病率较高,不仅影响患者的口腔健康,也影响患者的外貌<sup>[1-3]</sup>。根管治疗术是治疗牙体牙髓病及根尖周疾病的有效方法,可以延长患牙的保留时间,但在治疗过程中需要对根管系统进行彻底清理<sup>[4,5]</sup>。目前存在三种根管:三维预备根管、充填根管与彻底消毒根管<sup>[6,7]</sup>。锥形束CT(Cone Beam CT,CBCT)又称锥形束容积体层成像技术或锥形束计算机断层扫描,能够客观地反映物体的真实结构形态<sup>[8,9]</sup>,在牙科的应用不仅能反映牙体的三维,还能提供三个甚至三个以上多平面重建影像,从而有利于了解根管的数目、形态,从而有利于指导治疗<sup>[10,11]</sup>。

本研究选择青海地区藏族和汉族人群下颌第二磨牙的CBCT图像为研究对象,按照 Vertucci 分型方法对根管进行分型,探究青海地区藏、汉族人群下颌第二磨牙根管形态特点,同时通过影像学分析对青海地区藏、汉族人群下颌第二磨牙的牙根形态、根管数量、C型根管数量和发生率进行统计研究,以期为该地区人群下颌磨牙的临床治疗提供参考依据。现总结报道如下。

## 1 资料与方法

### 1.1 研究对象

选择2016年5月到2018年12月在青大附院口腔门诊拍摄口腔CBCT的青海地区藏汉族人群各150例(各300颗牙)作为研究对象。纳入标准:既往无口腔治疗史;拍摄部位为下颌第二磨牙;医院伦理委员会批准了此次研究;年龄18-70岁;每例患者选择2颗(左侧\右侧)下颌第二磨牙;拍摄资料完整;牙冠未经充填,根管未经治疗;牙冠、牙根完整,根尖孔发育成熟;牙体无任何形式的充填体及修复体;CBCT图像清晰可辨。排除标准:临床资料缺乏者;有正畸治疗史者;妊娠与哺乳期妇女。

藏族150例患者中,男80例,女70例,平均年龄 $37.49 \pm 2.58$ 岁,汉族150例患者中,男75例,女75例;平均年龄 $36.92 \pm 2.87$ 岁。两组一般资料经过统计学对比均无显著性差异。

### 1.2 CBCT 方法

所有患者都按照同一组放射专业医生拍摄标准,应用同一CBCT(意大利 NEWTOM VGI)设备进行拍摄。全牙列范围扫描参数:曝光时间14.7 s,电流5 mA,电压120 KV,体素尺寸 $0.25 \text{ mm} \times 0.25 \text{ mm} \times 0.25 \text{ mm}$ 。所有图像均应用意大利 NEWTOM VGI 软件进行冠状位、矢状位和横断面图像的重建和测量。

### 1.3 观察指标

(1)牙根类型:根分叉 $< 1/3$ 为一个牙根,根分叉 $\geq 1/3$ 为两个独立的牙根。下颌第二磨牙牙根常为2根,有时聚成一锥形,极少数分叉为3根。

(2)根管类型:根据 Vertucci 根管分型。I(1-1)型:由髓腔延伸至根尖孔的单一根管;II(2-1)型:2个分开的根管离开髓腔,再合为一个根管,根尖为一个根尖孔;III(1-2-1)型:一个根管离开髓腔,后分为2个,再合成一个,根尖为一个根尖孔;IV(2-2)型:2个分开的根管从髓腔延伸至根尖,根尖为2个根尖孔;V(1-2)型:一个根管离开髓腔,后分为2个,根尖为2个根尖孔;VI(2-1-2)型:2个分开的根管离开髓腔,后合为1个,再分成2个,根尖为2个根尖孔;VII(1-2-1-2)型:1个根管离开髓腔,后分为2个,再合成1个,再分成2个,根尖为2个根尖孔;VIII(3-3)型:由髓腔延伸至根尖孔的3个独立根管;其他:不能归入上述各型者,如C形。

(3)C形根管的发生率:根据性别和牙位分组,采用 Melton 的分类方法,C型根分为C1、C2、C3三类,比较C形根管发生率<sup>[12]</sup>。

### 1.4 统计学分析

选择 SPSS 22.00 软件进行统计学分析,计量数据比较采用t检验,计数数据采用卡方分析,以 $P < 0.05$ 为差异有统计学意义。

## 2 结果

### 2.1 牙根类型

青海地区藏汉族人群下颌第二磨牙牙根类型多以双根牙出现,在藏汉人群中所占的比例分别为69.7%和56.7%,藏族人群双根牙的发生率显著高于汉族人群( $P < 0.05$ )。见表1。

表1 青海地区藏汉族人群下颌第二磨牙牙根类型

Table 1 Root type of mandibular second molar in Tibetan and Han ethnic groups in Qinghai

| Root morphology | Han nationality |                   | Zang nationality |                  |
|-----------------|-----------------|-------------------|------------------|------------------|
|                 | Quantity        | Proportion(100%)  | Quantity         | Proportion(100%) |
| Double root     | 170             | 56.7              | 209              | 69.7             |
| Three root      | 8               | 26.7              | 10               | 33.3             |
| Four root       | 0               | 0                 | 0                | 0                |
| C-shaped root   | 122             | 40.7 <sup>#</sup> | 81               | 27.0             |
| Total           | 300             | 100               | 300              | 100              |

Note: Compared with the Tibetan population, <sup>#</sup> $P < 0.05$ .

### 2.2 根管类型

青海地区汉族人群下颌第二磨牙的根管分型I、II、III、IV、V、VI、VII型和C型根管分别占40.0%、0.3%、12.7%、0.7%、4.7%、0.3%、0.7%和40.7%。藏族人群下颌第二磨牙的根管分型

I、II、III、IV、V、VI、VII型和C型根管分别占44.0%、2.3%、13.3%、2.7%、10.0%、0.3%、0.3%和27.0%。见表2。

### 2.3 C型根管数量和发生率

青海地区汉族人群下颌第二磨牙300颗牙齿中,C形根管

所占比率为 40.7%,C1、C2、C3 型各自发生率分别为 23.0%、13.0%及 4.7%。并且在 122 颗有 C 型根管的牙齿中,女性和男性所占的比例为 59.0%和 40.9%,即女性 C 型根管发生率高于男性患者( $P<0.05$ )。

而青海地区藏族人群下颌第二磨牙 300 颗牙齿中,C 形根

管数为 81 例,所占比率为 27.0%,其 C 型根管发生率是小于汉族人群的。C1、C2、C3 型各自发生率分别为 13.7%、8.3%及 5.0%。并且在 81 颗有 C 型根管的牙齿中,女性和男性所占的比例为 59.3%和 40.7%,即女性 C 型根管发生率高于男性患者( $P<0.05$ )。见表 3。

表 2 青海地区藏汉族人群下颌第二磨牙各根管类型发生率

Table 2 Incidence of root canal types of mandibular second molars in Tibetan and Han populations in Qinghai

| Root canal<br>typing | Han nationality |            |       |                  | Zang nationality |            |       |                  |
|----------------------|-----------------|------------|-------|------------------|------------------|------------|-------|------------------|
|                      | Double root     | Three root | Total | proportion(100%) | Double root      | Three root | Total | proportion(100%) |
| I type               | 116             | 4          | 120   | 40.0             | 130              | 2          | 132   | 44.0             |
| II type              | 1               | 0          | 1     | 0.3              | 6                | 1          | 7     | 2.3              |
| III type             | 36              | 2          | 38    | 12.7             | 38               | 2          | 40    | 13.3             |
| IV type              | 1               | 1          | 2     | 0.7              | 6                | 2          | 8     | 2.7              |
| V type               | 14              | 0          | 14    | 4.7              | 28               | 2          | 30    | 10.0             |
| VI type              | 1               | 0          | 1     | 0.3              | 1                | 0          | 1     | 0.3              |
| VII type             | 1               | 1          | 2     | 0.7              | 0                | 1          | 1     | 0.3              |
| C type               | -               | -          | 122   | 40.7#            | -                | -          | 81    | 27.0             |
| Total                | 170             | 8          | 300   | 100              | 209              | 10         | 300   | 100              |

表 3 青海地区藏汉族人群下颌第二磨牙中 C 型根管数量和发生率

Table 3 Number and incidence of C-type root canals in mandibular second molars of Tibetan and Han nationalities in Qinghai

| nationality |        | Han nationality |        |      |        |      |        | Zang nationality |        |      |        |      |  |
|-------------|--------|-----------------|--------|------|--------|------|--------|------------------|--------|------|--------|------|--|
| Types       | C1     | C2              |        | C3   |        | C1   |        | C2               |        | C3   |        |      |  |
| Sexs        | Female | Male            | Female | Male | Female | Male | Female | Male             | Female | Male | Female | Male |  |
| Quantity    | 44     | 25              | 17     | 22   | 11     | 3    | 21     | 20               | 21     | 4    | 6      | 9    |  |
| Total       | 69     |                 | 39     |      | 14     |      | 41     |                  | 25     |      | 15     |      |  |
| Total       |        |                 |        | 122  |        |      |        |                  | 81     |      |        |      |  |

## 2.4 髓腔差值变化

在 600 颗牙齿中,MB-DB 最小值 1.03 mm, 最大值 4.43

mm;DB-P 最小值 1.62 mm, 最大值 6.26 mm。藏族人群 MB-DB、DB-P 平均值显著高于汉族人群( $P<0.05$ )。见表 4。

表 4 青海地区藏汉族人群下颌第二磨牙髓腔差值对比(mm,均数± 标准差)

Table 4 Comparison of the difference in the medullary cavity of the mandibular second molar in the Tibetan-Han population in Qinghai

(mm, mean ± standard deviation)

| Groups           | Number(n) | MB-DB      | DB-P       |
|------------------|-----------|------------|------------|
| Zang nationality | 300       | 2.59± 0.45 | 4.36± 0.75 |
| Han nationality  | 300       | 2.36± 0.32 | 4.16± 0.84 |
| t                |           | 7.215      | 3.076      |
| P                |           | <0.001     | 0.002      |

## 3 讨论

牙髓病和根尖周病是口腔的常见疾病之一,根管治疗为主要的方 法,治疗中要求对根管进行彻底清理、消毒等操作,以提高治疗效果<sup>[13,14]</sup>。特别是下颌第二磨牙根管系统复杂多样,容易出现各种感染性疾病与潜在疾病,导致根管治疗困难<sup>[15,16]</sup>。当前下颌第二磨牙根管的成像方法包括切片技术<sup>[17]</sup>、透明牙技术<sup>[18]</sup>、

X 线扫描技术<sup>[19]</sup>、常规 CT 扫描技术等<sup>[20]</sup>。CBCT 可对根管信息进行方向角度的定位,具有操作简便、快速、经济等优点,对临床治疗具有重要的意义<sup>[21]</sup>。本研究显示青海地区汉族人群下颌第二磨牙的根管分型 I、II、III、IV、V、VI、VII型和 C 型根管分别为 120 颗、1 颗、38 颗、2 颗、14 颗、1 颗、2 颗和 122 颗。藏族人群下颌第二磨牙的根管分型 I、II、III、IV、V、VI、VII型和 C 型根管分别 132 颗、7 颗、40 颗、8 颗、30 颗、1 颗、1 颗和 81 颗。

根管类型比较多样,包括下颌第二磨牙四根管外、双根管、单根管,给临床治疗提供了很大帮助。而 CBCT 具有清晰的三维成像,能够观察到根管的细微结构,弥补了常规摄片的二维局限性<sup>[2]</sup>。而且该方法可以明确下颌磨牙与下颌窦、下颌管、下颌磨牙的关系,可为术前评估、定位提供帮助,为下颌磨牙的拔除或者外科手术提供指导<sup>[23]</sup>。

下颌第二磨牙根管系统解剖结构的复杂多变,治疗视野不佳,位置特殊<sup>[24]</sup>。与传统扫描方法相比,CBCT 的空间分辨率高、扫描时间短,辐射剂量低,能更好的展现根管的内部结构,对于颌面部牙体组织成像质量较高<sup>[25]</sup>。有研究显示 CBCT 对牙及牙周组织的细小解剖结构成像质量高,CBCT 辐射剂量仅为螺旋 CT 的 1/30-1/100,对于小骨性结构能提供更加优质的图像质量更加适用于口腔临床的需要,也能够获得精确的线性用以颌面骨性结构的测量<sup>[26]</sup>。CBCT 可以清晰根管影像,再现髓腔形态,也可呈现多根管的变异等<sup>[27]</sup>。青海地区藏汉族人群下颌第二磨牙的根管分型以 I 型和 C 型根管所占比例最高。在青海地区汉族人群和藏族人群下颌第二磨牙中,C 形根管所占比率分别为 40.7%和 27.0%,汉族人群 C 型根管发生率是远远大于藏族人群的。但是在青海地区藏汉族人群下颌第二磨牙中,女性的发生率均是显著高于男性的。

下颌第二磨牙根管系统变异复杂,运用先进影像学设备可根管变异进行探查可彻底清除根管污染物和封闭根管是,更加直观、真实地了解根管解剖形态,有助于提高根管治疗效果<sup>[28]</sup>。CBCT 系统是一种新型加速器图像引导系统,具有组织分辨率更高、射线剂量更少、图像更为清晰等优点,且可提供更多解剖信息<sup>[29]</sup>。本研究显示不同民族人群的 MB-DB、DB-P 平均值藏族人群显著高于汉族人群。从机制上分析,藏族人群的牙齿在早期就可因磨耗、创伤等外界刺激而形成继发性牙,导致根部透明牙增加与根管钙化,诱发出牙骨质的增厚,导致 MB-DB、DB-P 平均值增加<sup>[30]</sup>。不同种族之间的下颌第二磨牙根管发生比率不同,也可能与种族差异有关<sup>[31]</sup>。但运动、位置、放射剂量强度等因素也会对 CBCT 图像质量产生影响,并且 CBCT 对于具体的根管形态的细小分支的重现也有一定的局限性<sup>[32]</sup>。

综上所述,CBCT 可在多个层面显示下颌第二磨牙根管系统解剖结构,也是了解根管形态的精确手段,青海地区藏汉族人群下颌第二磨牙根管形态基本类似,但 C 型根管发生率和髓腔差值具有一定的种族差异性。

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