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· 临床研究 ·

# 不同年龄段儿童功能性构音障碍辅音错误特点及疗效分析

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**【摘要】** 目的 分析不同年龄段功能性构音障碍儿童辅音错误特点及语音训练效果,为临床治疗提供参考。方法 本研究遵循医学伦理,并获得患者知情同意。对388例功能性构音障碍患者的语音资料进行回顾性研究,以6岁为界将其分为两组即学龄前组(4~6岁)226例、学龄组(6~13岁,含6岁)162例。从平均错误个数、发音部位、发音方式、错误类型4个方面分析其辅音发音错误特点,并对其进行一对一语音训练,训练频率1周1次,1次30 min;训练方法按照音素训练→音节训练→词汇训练→句子训练→短文、会话训练的顺序进行。比较2组语音训练效果的差异。结果 按发音部位分析:两年龄组均为舌尖后音错误频率最高;而错误频率最低的学龄组为唇齿音,学龄前组为双唇音。按发音方式分析:两年龄组均为送气性塞擦音错误频率最高,鼻音错误频率最低。按错误类型分析:两年龄组均以置换、省略为主。相较于学龄前组,学龄组大部分辅音从发音部位、发音方式及错误类型三个方面均有好转的趋势。腭化和侧化两种错误类型则是学龄组错误频率高于学龄前组,但侧化学龄组升高趋势无统计学意义。学龄前组及学龄组通过6.7次和5.5次语音训练后,发音均能得到明显改善,学龄组治愈率为84.9%(118/139),学龄前组治愈率为77.1%(91/118),两组间治愈率差异无统计学意义。结论 功能性构音障碍随着年龄增长会有所改善,但并不会完全自愈。不同年龄段患儿在经过科学合理的语音训练均能得到较好的治疗效果。

**【关键词】** 学龄前; 学龄; 儿童; 功能性构音障碍; 辅音; 发音部位; 发音方式; 语音训练

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**Analysis of the characteristics and therapeutic effect of consonant errors in children with functional articulation disorders at different ages** WU Xiaolu<sup>1</sup>, YU Guoxia<sup>1</sup>, CHEN Renji<sup>2</sup>, WANG Li<sup>1</sup>, HAO Jingping<sup>1</sup>. 1. Beijing Children's Hospital, Capital Medical University, Beijing 100045, China; 2. Beijing Stomatological Hospital Affiliated to Capital Medical University, Beijing 100050, China

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**【Abstract】 Objective** Analyzing the characteristics of consonant errors in children with functional dysarthria in different age groups and the effect of speech training provides a reference for clinical treatment. **Methods** This study followed medical ethics, and informed consent has been obtained from patients. Speech data from 388 patients with functional dysarthria were retrospectively studied. They were divided into two groups at the age of 6, namely, the preschool group (4-6 years old) of 226 patients and the school age group (6-13 years old, including 6 years old) of 162 patients. The characteristics of consonant pronunciation errors from four aspects were analyzed: average number of errors, pronunciation location, pronunciation method, and error type. One-on-one speech training was conducted, with a training frequency of once a week and once for 30 minutes. The training method was carried out in the order of phoneme training,

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syllable training, vocabulary training, sentence training, and short text and conversation training. The effects of speech training in the two groups were compared. **Results** Analysis by pronunciation location: both age groups had the highest frequency of errors in tongue tip posterior sounds; the school age group had the lowest error frequency for labiodental consonants, and the preschool group had the lowest error frequency for bilabial consonants. According to the analysis of pronunciation mode, both age groups had the highest error frequency of aspirated affricate and the lowest error frequency of nasal sound. Analysis by error type: both age groups are mainly characterized by substitution and omission. Compared with the preschool group, most consonants of patients in the school group tend to improve in terms of pronunciation location, pronunciation mode, and error types. Compared with the preschool group, the two types of errors-palatalization and lateralization-increased in frequency in the school group, but the trend of increased lateralization was not statistically significant. After 6.7 and 5.5 sessions of speech training, the pronunciation of the preschool group and the school-age group significantly improved; the cure rate of the school-age group was 84.9% (118/139), and that of the preschool group was 77.1% (91/118). There was no statistically significant difference in the cure rate between the two groups. **Conclusion** Functional dysarthria may improve with age, but it may not completely self-heal. Children of different age groups can achieve good treatment results through scientific and reasonable speech training.

**【Key words】** preschool age; school age; children; functional articulation disorders; consonant; pronunciation position; pronunciation method; speech training

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功能性构音障碍 (functional articulation disorders, FAD) 指患者的构音器官无形态异常, 听力、智力均在正常水平, 但表现为发音不清, 并且找不到明确病因的构音障碍, 临床多见于儿童, 特别是学龄前儿童<sup>[1-3]</sup>。国内研究发现其患病率为0.78%~10%<sup>[4]</sup>。国外报道FAD的患病率为3%~10%<sup>[5-7]</sup>。本研究对388例FAD患者语音资料进行回顾性研究, 分析不同年龄段功能性构音障碍儿童辅音错误特点及疗效, 为临床治疗提供参考。

## 1 资料和方法

### 1.1 纳入和排除标准

**纳入标准:**符合FAD的诊断标准<sup>[1,5]</sup>, 即构音器官形态无异常, 构音器官运动功能无异常, 听力、智力无异常, 年龄在4岁以上, 构音错误成固定状态。

**排除标准:**智力、听力障碍; 存在腭裂、舌系带过短等构音器官形态异常者; 语言发育迟缓等。

### 1.2 研究对象

选取2018年5月至2021年5月就诊于首都医科大学附属北京儿童医院口腔科, 符合FAD诊断的388例患者的语音资料, 按年龄将其分为两组: 学龄前组226例, 年龄4~6岁, 平均年龄(4.9±0.4)岁, 其中男156例, 女70例; 学龄组162例, 年龄6~13岁, 含6岁, 平均年龄(7.5±2.0)岁, 其中男

114例, 女48例。本研究遵循医学伦理并在取得所有患儿家属知情同意下进行。

### 1.3 治疗方法

对患儿的治疗方法包括: 口部运动功能治疗、构音运动治疗、构音语音训练。语音训练方法按: 音素训练→音节训练→词汇训练→句子训练→短文、会话训练的顺序进行<sup>[1]</sup>。训练方式为1对1, 训练频率为1周1次, 1次30 min, 并且教会家长一些发音技巧以便协助训练达到治疗目的。

### 1.4 语音评估

**1.4.1 评估方法** 采用王国民<sup>[8]</sup>编制的语音清晰度字表作为录音材料。使用专业录音软件及设备采集患者语音信息, 语音检测时环境噪音在50 dB以下, 检测用隔音室安静、舒适、通风、光线充足, 按照医院语音清晰度测试表录音, 确认无生字后, 能自行朗读的患者独立朗读评估材料, 不能独立完成的患者由治疗师领读。由3名治疗师独立判断和评估, 判断其所读音节的正误, 记录结果, 3名治疗师判断结果不一致时需要重新判断, 最终取统一的结果。

**1.4.2 评估指标** ①错误个数: 两年龄组辅音错误个数。②发音部位: 根据发音部位的不同, 可将辅音分为双唇音(/b/, /p/, /m/)、唇齿音(/f/)、舌尖前音(/z/, /c/, /s/)、舌尖中音(/d/, /t/, /n/, /l/)、舌尖后音(/zh/, /ch/, /sh/, /r/)、舌面音(/j/, /q/, /x/)、舌根音

(/g/, /k/, /h/)<sup>[1]</sup>, 根据此分类, 记录两组每一类音发生错误情况。③发音方式, 根据发音方式的不同, 可将辅音分为不送气塞音(/b/, /d/, /g/)、送气塞音(/p/, /t/, /k/)、不送气塞擦音(/z/, /zh/, /j/)、送气塞擦音(/c/, /ch/, /q/)、擦音(/f/, /s/, /sh/, /x/, /h/, /r/)、鼻音(/m/, /n/)、边音(/l/)<sup>[1]</sup>, 根据此分类, 记录两组每一类音发生错误情况。④错误类型, 记录两组主要错误类型, 包括置换、省略、腭化、不送气化、侧化、歪曲、声门停顿。⑤语音训练效果及训练次数, 训练效果包括治愈(所有错误发音均被纠正)和明显好转(大于80%的错误发音被纠正)。

### 1.5 统计学处理

采用SPSS26.0软件对数据进行分析, 比较2组发音部位、发音方式辅音错误频率差异及2组主要错误类型、治疗效果的差异, 计数资料比较采用卡方检验,  $P < 0.05$  为差异有统计学意义。

## 2 结果

### 2.1 两年龄组错误辅音平均个数

学龄前组错误辅音7~11个, 平均(9.00 ± 2.06)个; 学龄组错误辅音平均5~7个, 平均(6.00 ± 1.03)个。

### 2.2 发音部位辅音错误特点

按发音部位辅音错误频率由高到低顺序如下。

学龄组: 舌尖后音 > 舌尖中音 > 舌尖前音 > 舌根音 > 舌面音 > 双唇音 > 唇齿音。

学龄前组: 舌尖后音 > 舌尖中音 > 舌尖前音 > 舌根音 > 舌面音 > 唇齿音 > 双唇音。

两年龄组中, 均为舌尖后音错误频率最高, 而错误频率最低的学龄组为唇齿音, 学龄前组为双

唇音。各种发音部位辅音错误频率, 学龄组均小于学龄前组, 差异具有统计学意义( $P < 0.05$ ), 即各种发音部位辅音错误频率随着年龄增长有好转的趋势(表1)。

### 2.3 发音方式辅音错误特点

按发音方式辅音错误频率由高到低顺序如下。

学龄组: 送气塞擦音 > 擦音 > 不送气塞擦音 > 边音 > 送气塞音 > 不送气塞音 > 鼻音。

学龄前组: 送气塞擦音 > 擦音 > 不送气塞擦音 > 边音 > 送气塞音 > 不送气塞音 > 鼻音。

两年龄组中, 均为送气性塞擦音错误频率最高, 鼻音错误频率最低, 并且各种发音方式辅音错误频率, 学龄组均小于学龄前组, 除鼻音外, 差异具有统计学意义( $P < 0.05$ ), 即各种发音方式辅音错误频率随着年龄增长有好转的趋势, 而鼻音随年龄增长好转趋势不是很明显(表2)。

### 2.4 错误类型特点

按错误类型频率由高到低顺序如下。

学龄组: 置换 > 省略 > 腭化 > 不送气化 > 侧化 > 歪曲。声门停顿为0。

学龄前组: 置换 > 省略 > 腭化 > 不送气化 > 侧化 > 歪曲 > 声门停顿。

各种错误类型中, 两年龄组中均以置换、省略为主。相较于学龄前组, 学龄组腭化和侧化两种错误类型错误频率升高, 其余错误类型错误频率下降。除侧化及声门停顿两种类型, 其余类型差异具有统计学意义( $P < 0.05$ ), 即置换、省略、歪曲、不送气四种错误类型, 随着年龄增长, 有好转趋势, 差异有统计学意义( $P < 0.05$ )。腭化和侧化两种错误类型则是随着年龄增长, 错误频率是升

表1 两年龄组各发音部位错误频数及频率

Groups	Bilabial	Labiodental	Blade-alveolar	Velar	Palatal	Dental	Blade-palatal
School age	17(10.49%)	14(8.64%)	104(64.20%)	68(41.98%)	53(32.72%)	88(54.32%)	108(66.67%)
Preschool age	49(21.68%)	63(27.88)	183(80.97%)	143(63.27%)	109(48.23%)	176(77.88%)	199(88.05%)
$\chi^2$	8.222	21.946	13.792	17.255	9.339	24.077	26.128
$P$	0.003	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001

表2 两年龄组各发音方式错误频数及频率

Groups	Aspirated plosive	Unaspirated plosive	Aspirated affricative	Unaspirated affricative	Fricative	Lateral	Nasal
School age	84(51.85)	78(48.15)	122(75.31)	119(73.46)	121(74.69)	105(64.81)	9(5.56)
Preschool age	169(74.78)	159(70.35)	204(90.27)	198(87.61)	200(88.50)	170(75.22)	15(6.64)
$\chi^2$	21.862	19.573	16.828	11.694	13.577	4.515	0.190
$P$	< 0.001	< 0.001	< 0.001	0.001	< 0.001	0.022	0.416

高的,但侧化升高趋势无统计学意义(表3)。

### 2.5 两年龄组语音治疗结果及平均训练次数

学龄前组,入组 226 例,因各种原因未行语音

训练的有 87 例,进行语音训练的有 139 例,语音训练平均次数为 6.7 次,其中治愈 118 例,明显好转 21 例,治愈率达 84.9%。

表3 两年龄组各错误类型频数及频率

Table 3 Frequency and rate of error types in the two age groups

Groups	Substitute	Omit	Distort	Palatalization	Lateralization	Unaspirated	Glottic pause	n (%)
School age	139(85.80)	49(30.25)	3(1.85)	48(29.63)	11(6.79)	21(12.96)	0(0.00)	
Preschool age	209(92.48)	92(40.71)	14(6.19)	43(19.03)	9(3.98)	67(29.65)	5(2.21)	
$\chi^2$	4.547	4.464	4.248	5.909	1.522	14.976	3.631	
P	0.025	0.022	0.031	0.011	0.158	<0.001	0.066	

学龄组,入组 162 例,因各种原因未行语音训练的有 44 例,进行语音训练的 118 例,语音训练平均次数为 5.5 次,其中治愈 91 例,明显好转 27 例,治愈率达 77.1%。

两年龄组语音训练治愈率差异无统计学意义( $P > 0.05$ )(表4)。

表4 两年龄组治愈情况

Table 4 Curing results in two age groups

Groups	Cure	Improvement	n
School age	118	21	
Preschool age	91	27	
$\chi^2$		1.560	
P		0.640	

### 3 讨论

功能性构音障碍(FAD)是临床常见的构音障碍,以4~6岁多发。目前,临床尚未完全明确儿童功能性构音障碍的发病机制,一般认为是儿童在学习发音的过程中因某种原因学会了错误的构音动作,且这种构音错误成为习惯<sup>[9-11]</sup>。FAD患儿虽然不存在生理缺陷,但是这种发音不清通常也会影响日常沟通、学习,乃至孩子的心理健康,所以受到越来越多家长的重视<sup>[12-13]</sup>。通常家长多会理所当然地认为:“年龄大了,自然会好”。事实是这样的吗?本研究将病例分为学龄前组(4~6岁)和学龄组(6~13岁,包含6岁),从总体发音错误趋势来看,在错误个数、发音部位、发音方式、错误类型4个方面,相较于学龄前组,学龄组大部分发音错误都是呈下降趋势,且差异具有统计学意义,提示年龄对FAD有显著影响,年龄越小,发音错误越多、障碍程度越严重。随着年龄的增长,患儿的发音错误情况有所改善,障碍程度减轻,虽然上学、年龄增长等因素会使年龄大的儿童发音错误程度

降低<sup>[11-13]</sup>,但本研究表明在学龄组依然存在严重的构音问题,并且也有研究发现成年后的构音障碍患者也并不少见<sup>[14-16]</sup>。杜志宏等<sup>[17]</sup>、徐丽娜等<sup>[18-20]</sup>在研究中也发现构音错误在大年龄段并不会自愈倾向。Preston等<sup>[21]</sup>也认为学龄前儿童存在的构音错误,在几年甚至成人之后依然存在。所以家长认为“年龄大了,自然会好”理论是不科学的,构音问题一定要及早发现,及时干预,以免对孩子的身心造成不良的影响。

从发音部位来看,两个年龄组中发音错误频率最高的是舌尖后音,错误频率最低的为唇齿音及双唇音,这可能与儿童语音习得顺序及舌尖后音的发音位置隐蔽、发音技巧困难有关。并且本研究发现相较于学龄前组,学龄组各发音部位的辅音错误频率是有所下降的,但并没有消失,尤其像舌尖后音、舌尖中音在学龄组错误频率仍高于60%。

从发音方式来看,两个年龄组的错误频率高低的顺序也大致相同,即错误频率最高的是送气塞擦音,最低的是鼻音,这也基本符合汉语普通话儿童辅音习得规律<sup>[21-22]</sup>。与年龄关系来看,两组间各发音方式的错误频率也是随着年龄增大而有所下降的,有好转的趋势。

从错误类型来看,两个年龄组都是以置换和省略为主,这也符合FAD的发音错误特点<sup>[1]</sup>。并且这两种错误类型在两个年龄组中的差异也是具有统计学意义的。而不同的是,腭化和侧化两种错误类型,在学龄组的频率高于学龄前组。这一规律与Eadie等<sup>[23]</sup>的研究结果是一致的。在发擦音或塞音时如果舌位置不够准确,舌后缩、舌前部或后部向硬腭拱起,可形成腭化音;舌尖抵上或下牙龈,同时舌体上抬与腭部形成封闭,气流由齿缝中间流出变为从舌与两颊间的嘴角一侧或两侧流

出,出现口角一侧或两侧向两旁牵动,会形成侧化音<sup>[23-24]</sup>。之所以学龄组这两种错误类型频率较高的原因,可能与腭化与侧化发音技巧本身就有一定的困难有关系,并且也说明通过患儿自身的练习去纠正至正确发音也确实存在一定困难,所以出现这两种错误类型时更需要及时尽早并加强语音训练。

FAD的治疗主要通过语音训练来纠正发音,基本原则是按照音素训练→音节训练→词汇训练→句子训练→短文、会话训练的顺序进行<sup>[25-27]</sup>。具体训练方法倾向于按发音部位分类进行,如按照双唇音、唇齿音、舌面音、舌根音、舌尖前音、舌尖中音直至舌尖后音。而且在训练中按发音方法由易到难,塞音-擦音-塞擦音进行,将发音部位作为基础,以发音方式为重点开展治疗<sup>[28-30]</sup>。本研究中,学龄前组与学龄组比较,发音得到明显改善的平均治疗次数要多于学龄组,这可能跟学龄前患儿错误率高、年龄小配合程度低、技巧习得慢有关系。语音的习得是一个循序渐进、孰能生巧的过程,语音训练固然重要,但是毕竟训练时长有限,所以教会家长发音技巧,以便于家长课后带患儿大量反复的练习也是治疗过程中必不可少的一部分。

综上所述,学龄期患儿辅音错误频率虽然在大多数方面与学龄前组相比是有所下降的,但是某些错误频率仍然较高,即随着年龄增长,辅音错误频率只是有所改善,并没有完全消失,仍需要给予高度关注,及时干预,积极治疗。

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