

doi: 10.13241/j.cnki.pmb.2023.11.012

儿童气管支气管异物临床特征、延迟诊断因素及并发症高危因素分析*

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摘要 目的:探讨儿童气管支气管异物临床特征、延迟诊断因素及并发症高危因素分析。**方法:**以我院 2014 年 5 月到 2022 年 7 月收治的 167 例疑似气管支气管异物患儿作为研究对象。167 例患者中男性 112 例,女性 55 例,平均年龄(25.10 ± 21.51)月。按照患儿支气管镜检查检查结果将患儿分为异物组($n=140$)和非异物组($n=27$)。按照患儿入院时气管支气管异物的确诊时间是否在 24 h 内将患儿分为延迟诊断组($n=100$)和早期诊断组($n=40$)。并依据气管支气管异物患儿是否发生并发症将所有患儿分为并发症组($n=122$)和未发生并发症组($n=18$)。采用 χ^2 检验和独立样本 t 检验进行亚组分析。采用 logistics 回归模型进行回归分析。**结果:**异物组和无异物组患儿性别、年龄、发病后就诊时间无显著差异($P>0.05$);异物组和无异物组患儿的物滞留部位、CRP、PCT、首诊时影像学检查、患儿居住地、异物吸入史差异显著($P<0.05$);以患儿是否发生延迟诊断作为因变量多因素 logistics 回归结果显示,年龄、首诊时影像学检查、患儿居住地、异物吸入史是独立危险因素($P<0.05$);以患儿是否发生并发症作为因变量,多因素 logistics 回归结果显示,年龄、首诊时影像学检查、患儿居住地、是否延迟诊断及异物吸入史是独立危险因素($P<0.05$)。**结论:**儿童气管支气管异物存在较明显的年龄特征,延迟诊断和并发症受年龄、异物吸入史和影像学检查等复杂因素影响。

关键词:儿童气管支气管异物;临床特征;延迟诊断因素;并发症

中图分类号:R725.6 **文献标识码:**A **文章编号:**1673-6273(2023)11-2063-05

Analysis of Clinical Features, Delayed Diagnosis Factors and Risk Factors of Complications of Tracheobronchial Foreign Body in Children*

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ABSTRACT Objective: To explore the clinical characteristics, delayed diagnosis factors and complication risk factors of children with tracheobronchial foreign body. **Methods:** A total of 167 children with suspected tracheobronchial foreign bodies, admitted to our hospital from May 2014 to July 2022, were used as the study subjects. Among the 167 patients, 112 were male and 55 were female, with a mean age (25.10 ± 21.51) months. According to the results of bronchoscopy, the children were divided into foreign bodies ($n=140$) and non-foreign bodies ($n=27$). The child was divided into delayed diagnosis group ($n=100$) and early diagnosis group ($n=40$) according to whether the diagnosis time of the child was admitted within 24h. All children were divided into complications ($n=122$) and complications ($n=18$). **Results:** There were no significant differences between the foreign body group and the non-foreign body group in terms of gender, age, and time to see a doctor after onset ($P>0.05$). There were significant differences in the retention site, CRP, PCT, imaging at the first diagnosis, residence of the children and the history of foreign body inhalation($P>0.05$). The multivariate logistics regression, with whether delayed diagnosis was the dependent variable, showed that age, imaging at first diagnosis, residence of the child, and history of foreign body inhalation were independent risk factors ($P>0.05$). The results of multifactorial logistic regression with the occurrence of complications as the dependent variable showed that age, imaging at the first visit, the child's place of residence, delayed diagnosis and history of foreign body aspiration were independent risk factors($P>0.05$). **Conclusion:** Children with tracheobronchial foreign bodies have obvious age characteristics, delayed diagnosis and complications are affected by complex factors such as age, foreign body inhalation history and imaging examination.

Key words: Children tracheobronchial foreign body; Clinical features; Delayed diagnostic factors; Complication

Chinese Library Classification(CLC): R725.6 **Document code:** A

Article ID: 1673-6273(2023)11-2063-05

* 基金项目:广东省医学科学技术研究基金项目(B2022233)

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(收稿日期:2023-01-12 接受日期:2023-01-31)

前言

支气管异物是指外源性物体通过鼻或口腔误吸进入支气管或气管内进而导致的疾病^[1]。流行病学研究显示^[2],支气管异物好发于儿童群体,支气管内异物可继发导致患儿出现咳血、慢性咳嗽、反复喘息、肺部感染和肺气肿等恶性并发症,严重者可危及患儿生命。预防并发症的发生和降低患儿死亡风险是临床治疗的主要目标,早诊断、早治疗和明确支气管异物患儿并发症的相关危险因素是有效预防并发症的关键^[3]。研究证实^[4],异物吸入呛咳史的确定是支气管异物准确诊断评估的关键,但儿童患者常常难以对异物吸入呛咳史做出准确描述,致使本病存在较高的延迟诊断率。故积极明确支气管异物患儿临床发病特征,并深入分析其诊断延迟因素和并发症风险因素尤为重要。然而,支气管异物患儿的临床特征、延迟诊断因素及并发症发生高风险因素仍未被系统阐明。基于此背景,本次研究以纳入气管支气管异物患儿作为研究对象,以期明确患儿临床特征、延迟诊断因素及并发症高危因素,旨在为后续临床提高对该患儿的早期诊断率和并发症预防水平奠定理论基础。

1 资料与方法

1.1 一般资料

以我院 2014 年 5 月到 2022 年 7 月收治的 167 例疑似气管支气管异物患儿作为研究对象。167 例患者中男性 112 例,女性 55 例,平均年龄(25.10 ± 21.51)月。按照患儿支气管镜检查检查结果将患儿分为异物组($n=140$)和非异物组($n=27$)。按照患儿入院时气管支气管异物的确诊时间是否在 24 h 内将患儿分为延迟诊断组($n=100$)和早期诊断组($n=40$)。并依据气管支气管异物患儿是否发生并发症将所有患儿分为并发症组($n=122$)和未发生并发症组($n=18$)。本次研究经我院伦理委员会知情同意。

纳入标准:① 符合中国儿童气管支气管异物的专家共识相关诊断标准^[5];② 患儿具备良好的沟通能力可配合完成试验者;③ 有明显的异物吸入病史或无明显异物吸入病史,有反复咳嗽、喘息症状,呼吸音减弱或者消失、哮鸣音、喘鸣音、拍击音、吸气性三凹征等阳性体征;④ 经肺部听诊、CT 扫描和胸部 X 线确诊;⑤ 首次发病,且依从性良好患者;⑥ 患者家属自愿签署之前同意书。

排除标准:① 年龄 >15 岁者;② 患儿家属拒绝产于本次研究者;③ 近期内有严重外伤者;④ 近期内手术史者;⑤ 伴有严重发育不良者。

1.2 方法

1.2.1 临床资料采集 ① 患儿一般信息:姓名、性别、年龄、居住地、籍贯、民族、起病诱因、发病时间、发病后就诊时间等。② 临床表现:咳嗽、发热、气促、气喘、发绀等,肺部啰音情况。③ 血常规、CRP、降钙素、肝肾功能、电解质、血气分析、灌洗液病原学结果。④ 影像学结果:X 光结果、胸部 CT 结果。⑤ 手术情况:术中使用工具情况(异物钳、网篮、球囊导管等);手术时机选择,麻醉方式,术中镜下所见:是否肉芽、痰栓形成、出血等,手术时间。

1.2.2 支气管镜检查 所有患儿入院后 24 h 内行支气管镜检查。患儿全麻下行支气管镜检查,经喉罩插管,并参考患儿年龄选择不同型号的软式气管镜进行检查。事先对异物的信息进行

推测,并依据可能的异位位置及大小选择不同取异物工具,包括异物钳、螺旋网篮、导管球囊等,进入后对患儿支气管、气管和喉部进行详细探查,并在探寻到异物后将其取出。随后再对两侧支气管进行探查,确定无异物残留后对患儿分泌物进行灌洗操作,并留取灌洗液进行病原学检查,随后缓慢退出支气管镜,并在退出过程中密切观察,再次确定是否有异物残留。

1.3 统计学方法

应用 SPSS20.0 软件分析数据,以表示计量资料,两两组间比较采用独立样本 t 检验,同组间比较采用配对样本 t 检验;计数资料用百分比表示,两两组间比较采用 χ^2 检验。采用 χ^2 检验和独立样本 t 检验进行儿童气管支气管异物的单因素分析。采用 logistics 回归模型分析儿童气管支气管异物的延迟诊断因素和并发症发生因素。 $P<0.05$ 为差异具有统计学意义。

2 结果

2.1 儿童气管支气管异物的临床特征分析

异物组和无异物组患儿性别、年龄、发病后就诊时间无显著差异($P>0.05$);异物组和无异物组患儿的异物滞留部位、CRP、PCT、首诊时影像学检查、患儿居住地、异物吸入史差异显著($P<0.05$),详情见表 1。

2.2 气管支气管异物延迟诊断的单因素 logistics 回归分析

以患儿是否发生延迟诊断作为因变量(未发生延迟诊断=0,发生延迟诊断=1)纳入 logistics 回归模型,结果显示,性别、年龄、异物滞留部位、首诊时影像学检查、患儿居住地、异物吸入史是危险因素($P<0.05$)。详情见表 2。

2.3 气管支气管异物延迟诊断的多因素 logistics 回归分析

以患儿是否发生延迟诊断作为因变量(未发生延迟诊断=0,发生延迟诊断=1)将单因素具有统计学意义的变量纳入多因素 logistics 回归模型,结果显示,年龄、首诊时影像学检查、患儿居住地、异物吸入史是独立危险因素($P<0.05$)。详情见表 3。

2.4 气管支气管异物并发症的单因素 logistics 回归分析

以患儿是否发生并发症作为因变量(未发生并发症=0,发生并发症=1)纳入 logistics 回归模型,结果显示,性别、年龄、异物滞留部位、首诊时影像学检查、患儿居住地、异物吸入史和延迟诊断是危险因素($P<0.05$)。详情见表 4。

2.5 气管支气管异物并发症的多因素 logistics 回归分析

以患儿是否发生并发症作为因变量(未发生并发症=0,发生并发症=1)纳入多因素 logistics 回归模型,结果显示,年龄、首诊时影像学检查、患儿居住地、是否延迟诊断及异物吸入史是独立危险因素($P<0.05$)。详情见表 5。

3 讨论

气管支气管异物是临床儿科常见急重症之一,本病好发于儿童群体严重可危及患儿生命^[6]。现阶段,及时取出异物是本病治疗的关键,但受疾病发生突然性等复杂客观因素影响致使本病的临床治疗仍未达预期。咀嚼功能不完善和儿童磨牙未萌出是导致儿童气管支气管异物高发的重要原因^[7,8]。本次研究结果显示,年龄因素是气管支气管异物患儿最典型的临床特征,这之前研究基本一致。支气管镜检查后发现 167 例患者存在 27 例误诊。亚组分析结果显示,CRP、PCT、首诊时影像学检查、异物吸入史是导致临床误诊的风险因素。考虑:儿童误吸异物

表 1 儿童气管支气管异物的临床特征分析

Table 1 Clinical characteristics of tracheobronchial foreign bodies in children

Dimension	Foreign body group (n=140)	No foreign body group (n=27)	χ^2/t	P
Gender (male/female)	97/43	15/12	1.360	0.243
Age (month)	25.12± 1.12	25.01± 1.13	0.23	0.820
Foreign body retention site				
Trachea	24	3	6.96	0.031
Left bronchus	55	18		
Right bronchus	61	6		
Time to visit doctor after onset (h)	31.23± 10.35	31.52± 10.21	0.07	0.950
CRP(mg/L)	5.65± 0.32	3.71± 0.21	21.51	<0.01
PCT(ng/L)	0.72± 0.16	0.51± 0.12	3.58	<0.01
Imaging examination at first diagnosis				
Undone	3	0	7.87	0.049
X-ray	10	0		
Chest CT	85	12		
X-ray+Chest CT	42	15		
Residence of children				
City	86	22	3.98	0.046
Rural area	54	5		
History of foreign body inhalation				
Provide	106	5	33.22	<0.01
Not provided	34	22		

表 2 气管支气管异物延迟诊断的单因素 logistics 回归分析

Table 2 Single factor logistics regression analysis of delayed diagnosis of tracheobronchial foreign body

Projects	Assignment	Prognostic survival		
		OR	95%CI	P
Gender	male =0; female =1;	1.321	0.564~1.657	0.654
Age	1 to 6 years old =1; 7 to 14 years old =0	5.621	1.654~6.547	<0.001
Foreign body retention site	Trachea =0; Left bronchus =1; Right bronchus =03	1.231	0.687~1.654	0.575
Imaging examination at first diagnosis	Do not do =0; X =1; Chest CT=2;	3.654	1.987~6.457	<0.001
Residence of children	City =0; Rural =1;	3.654	1.789~6.456	<0.001
History of foreign body inhalation	Provide =0; =1 is not provided;	4.654	1.635~5.687	<0.001

表 3 气管支气管异物延迟诊断的多因素 logistics 回归分析

Table 3 Multi-factor logistics regression analysis of delayed diagnosis of tracheobronchial foreign body

Variable	β	SE(β)	Wald χ^2	OR	95%CI	P
Age	3.231	0.462	4.123	3.123	1.321~5.123	<0.001
Imaging examination at first diagnosis	3.654	0.432	5.354	3.123	1.521~6.125	<0.001
Residence of children	2.354	0.421	4.364	2.654	1.621~5.213	<0.001
History of foreign body inhalation	3.546	0.415	5.123	4.132	1.725~4.654	<0.001

后,气管内停留的异物可导致局部应激反应被激活,从而导致局部炎症水平升高,进而表现为 CRP 和 PCT 表达升高。影像学检查是确诊误吸的重要手段,这项研究支持了先前的研究观点,即及时的影像学诊断可有效提高诊断准确率,从而使患儿

得到及时的治疗^[9,10]。患儿或家长的异物吸入史信息是辅助临床医师诊断的关键信息,这与先前研究基本一致^[11,12]。故临床可综合考虑相关因素,从而降低误诊率,进而减低后续不必要的支气管镜介入治疗。

表 4 气管支气管异物并发症的单因素 logistics 回归分析

Table 4 Single factor logistics regression analysis of complications of tracheobronchial foreign body

Projects	Assignment	Prognostic survival		
		OR	95%CI	P
Gender	male =0; female =1;	1.231	0.123~1.231	0.231
Age	1 to 6 years old =1; 7 to 14 years old =0	4.654	1.531~6.421	<0.001
Foreign body retention site	Trachea =0; Left bronchus =1; Right bronchus =03	0.312	0.256~1.687	0.654
Imaging examination at first diagnosis	Do not do =0; X =1; Chest CT=2;	4.212	1.654~7.452	<0.001
Residence of children	City =0; Rural =1;	3.564	1.751~6.424	<0.001
Delayed diagnosis or not	Yes =1; No =0	4.654	1.954~6.456	<0.001
History of foreign body inhalation	Provide =0; =1 is not provided;	3.545	1.654~4.654	<0.001

表 5 气管支气管异物并发症的多因素 logistics 回归分析

Table 5 Multi-factor logistics regression analysis of complications of tracheobronchial foreign body

Variable	β	SE(β)	Wald χ^2	OR	95%CI	P
Age	4.212	0.431	4.654	3.264	1.654~4.654	<0.001
Imaging examination at first diagnosis	4.123	0.492	4.235	3.694	1.987~5.264	<0.001
Residence of children	4.351	0.512	4.521	3.654	1.879~6.452	<0.001
Delayed diagnosis or not	4.263	0.451	4.223	3.954	1.648~7.256	<0.001
History of foreign body inhalation	4.654	0.654	4.654	4.354	1.534~6.264	<0.001

延迟诊断是指患儿未在误吸发生后 24 h 内得到有效的确诊。本次研究结果显示,多因素 logistics 回归分析结果显示,年龄、首诊时影像学检查、患儿居住地、异物吸入史是导致延迟诊断的独立危险因素。影像学检查是辅助临床医师诊断气管支气管异物的可靠方案,然而,部分患儿家属受疾病认知影响仍存在拒绝开展相关影像检查的可能,故导致难以做出准确诊断并导致延迟诊断的发生^[13-15]。气管支气管异物的临床诊断中患儿或家长的异物吸入主诉是辅助临床医师判断的关键依据,但受患儿年龄影响,即部分年龄较小的婴幼儿难以用语言表述,导致在年龄较小群体中和无法完成吸入史主诉的群体中发生延迟诊断风险明显更高^[16-18]。留守儿童是我国农村的普遍现象,而高龄的老人受认知和知识背景影响在儿童发生误吸事件后难以及时做出正确的送医就诊操作,致使本次研究结果发现,农村地区儿童发生延迟诊断风险明显更高^[19,20]。

肺炎、阻塞性肺气肿是支气管异物的常见并发症,严重的并发症主要为胸腔积液、纵隔气肿和肺不张等^[21,22]。本次研究结果显示,多因素 logistics 回归分析结果显示,年龄、首诊时影像学检查、患儿居住地、是否延迟诊断、异物吸入史是导致患儿出现并发症的独立危险因素,这与既往研究结果基本一致。王宁波等^[23]研究结果显示,病程较长和低龄是导致儿童气管支气管异物术后并发症的独立危险因素。考虑年龄、首诊时影像学检查、患儿居住地和异物吸入史是导致延迟诊断发生的独立危险因素,而延迟诊断是导致异物在患儿气管停留更长时间的主要因素^[24,25]。研究显示^[26,27],异物吸入后可刺激支气管黏膜导致强烈的应激反应,同时异物多为不洁净的污染物,外来细菌侵入后随着异物在气道停留时间的增加,细菌生长并根治和随着气道向肺部转移从而引起肺部相关并发症的发生。此外异物对支气管造成的机械损伤亦为细菌的根治提供了环境,故针对儿童

气管支气管异物应积极提高早期确诊率从而缩短患儿发病至异物取出的时间,进而为降低并发症的发生奠定基础^[28-30]。

综上所述,儿童气管支气管异物的发生存在明显的年龄特征,即年龄更小群体发生风险更高,但除此之外儿童气管支气管异物仍缺乏更多特异质临床症状,致使患儿亦发生延迟诊断现象,临床可通过识别相关风险因素以降低延迟诊断的发生和降低并发症发生风险。但本次研究仍存不足,即本次研究未对异物种类进行更进一步分析,这将在今后的研究中进一步完善。

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