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白内障术后感染性眼内炎的致病菌分析及影响因素研究*

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摘要 目的:分析白内障术后感染性眼内炎的致病菌分布情况,并对其影响因素进行分析。**方法:**选取2016年8月~2019年3月期间于我院行白内障手术的患者2936例,统计白内障术后感染性眼内炎的发生情况。分析术后感染性眼内炎患者的病原菌分布情况及病原菌耐药情况。单因素及多因素 Logistic 回归分析术后感染性眼内炎发生的影响因素。**结果:**本研究中,共发放2936份调查问卷,回收2931份,回收率为99.83%(2931/2936)。其中53例患者患有感染性眼内炎,发生率为1.81%(53/2931),根据患者是否患有感染性眼内炎分为感染组($n=53$)和未感染组($n=2878$)。感染性眼内炎的病原菌检出41株,其中革兰阳性菌37株,占90.24%;共检出4株真菌,为白色假丝酵母菌,占比9.76%。37株革兰阳性菌中,头状葡萄球菌、表皮葡萄球菌以及腐生葡萄球菌对利福平、利奈唑胺以及万古霉素的敏感度达100.00%。感染组和未感染组在性别、住院时间、玻璃体溢出方面比较差异均无统计学意义($P>0.05$);两组在麻醉药时间、年龄、手术切口、手术时间、高血压、糖尿病方面比较差异均有统计学意义($P<0.05$)。多因素 Logistic 回归分析结果显示:年龄 ≥ 66 岁、手术切口为透明角膜、手术时间 ≥ 15 min、合并糖尿病均是发生感染性眼内炎的危险因素($OR=2.759, 2.676, 1.601, 1.261, P<0.05$)。**结论:**白内障术后感染性眼内炎的致病菌较多,以革兰阳性菌为主,革兰阳性菌对利福平、利奈唑胺、万古霉素的敏感度较高,年龄 ≥ 66 岁、手术切口为透明角膜、手术时间 ≥ 15 min、合并糖尿病均会增加术后感染性眼内炎发生的风险。

关键词:白内障;术后;感染性眼内炎;致病菌;影响因素

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Study on Pathogenic Bacteria and Influencing Factors of Infective Endophthalmitis after Cataract Surgery*

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ABSTRACT Objective: To analyze the pathogenic bacteria of infective endophthalmitis after cataract surgery, and analyze the influencing factors. **Methods:** 2936 patients who underwent cataract surgery in our hospital from August 2016 to March 2019 were selected, the incidence of infective endophthalmitis after cataract surgery were counted. The distribution and drug resistance of pathogens in patients with postoperative infectious endophthalmitis were analyzed. Single factors and Multivariate Logistic regression were used to analyze the influencing factors of infectious endophthalmitis. **Results:** In this study, 2936 questionnaires were sent out and 2931 were recovered, the recovery rate was 99.83% (2931/2936). 53 of them had infective endophthalmitis, the incidence was 1.81% (53/2931). According to whether they had infective endophthalmitis, they were divided into infection group ($n=53$) and non infection group ($n=2878$). 41 strains of pathogenic bacteria were detected in infective endophthalmitis, of which 37 were Gram-positive bacteria, accounting for 90.24%. 4 strains of fungi were detected, which were *Candida albicans*, accounting for 9.76%. Among the 37 Gram-positive bacteria, *Staphylococcus capitis*, *Staphylococcus epidermidis* and *Staphylococcus saprophytius* were 100.00% sensitive to vancomycin, rifampicin and linezolid. There was no significant difference between the infected group and the uninfected group in gender, hospital stay and vitreous overflow ($P>0.05$). There were significant differences between the two groups in anesthesia time, age, operation incision, operation time, hypertension and diabetes ($P<0.05$). Multivariate Logistic regression analysis showed that: age greater or equal to 66 years old, operation incision of sclera tunnel, operation time greater or equal to 15 minutes, diabetes mellitus were all risk factors of infectious endophthalmitis ($OR=2.759, 2.676, 1.601, 1.261; P<0.05$). **Conclusion:** There are many pathogenic bacteria of endophthalmitis after cataract surgery, mainly Gram-positive bacteria. The sensitivity of Gram-positive bacteria to vancomycin, rifampicin and linezolid are high, age greater or equal to 66 years old, the operation incision of surgery is sclera tunnel, the operation time greater or equal to 15 minutes, and diabetes mellitus will increase the risk of postoperative infectious endophthalmitis.

Key words: Cataract; Postoperative; Infective endophthalmitis; Pathogenic bacteria; Influencing factors

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前言

白内障主要指晶状体发生混浊,是临床常见的致盲性眼病^[1-2]。目前临床中针对白内障的治疗多以手术治疗为主,通过手术治疗后不少患者的视力可得到有效恢复^[3,4]。但白内障手术后的并发症仍屡见不鲜,其中以感染性眼内炎最为常见^[5]。感染性眼内炎是一种严重感染,病情进展迅速,可导致视力损害、眼球萎缩,甚至眼球摘除,影响眼病术后治疗效果^[6-8]。感染性眼内炎的发生主要是因为眼部组织受到微生物的侵害,微生物在眼部组织生长繁殖,进而引起炎症反应^[9,10]。因此针对白内障术后感染性眼内炎的病原菌分布及相关影响因素的研究至关重要。鉴于此,本研究通过探讨白内障术后感染性眼内炎的致病菌分布情况和耐药性,并分析其影响因素,以期对白内障患者术后感染性眼内炎的防控提供参考。

1 资料与方法

1.1 一般资料

选取2016年8月~2019年3月期间于我院行白内障手术的患者2936例,年龄44~74岁,平均(63.67±4.22)岁。纳入标准:(1)均符合白内障的相关诊断标准^[11];(2)均具备手术指征,手术均由同一组医师完成;(3)临床治疗完整者;(4)均为单眼患者。排除标准:(1)眼外伤以及视网膜脱落者;(2)既往有精神病史及意识障碍史者;(3)术前即出现眼内感染者;(4)免疫功能异常者;(5)合并心肝肾等重要脏器功能障碍者;(6)未能完成本次研究者。此次研究已获取我院伦理学委员会批准进行,患者均签署知情同意书。

1.2 感染性眼内炎诊断标准^[11]

白内障手术后出现视力减退、玻璃体呈灰白色颗粒状浑浊、眼部疼痛、房水浑浊和(或)伴有前房积脓、瞳孔区呈灰白或黄白色反光等症状。经B超声波等检查确诊。微生物培养为阴性。

1.3 方法

(1)病原菌分布:由同一位医师在严格的无菌状态下收集感染性眼内炎患者的房水或者玻璃体标本,将刮取标本置于培养基上进行培养,温度为28℃,相对湿度为40%,采用VITEK-2Compact全自动微生物鉴定及药敏分析系统(法国生物梅里埃公司生产)分析感染性眼内炎患者的病原菌分布和耐药性。药敏结果依据为美国临床实验室标准化委员会制定标准^[11]。(2)临床资料:采用我院自制的调查问卷统计患者基本治疗情况,包括:手术切口、麻醉药时间、住院时间、年龄、高血压、性别、手术时间、有无玻璃体溢出、糖尿病等情况。执行问卷调查的相关医护人员需进行统一培训,培训合格后开始调查,经检查无误后回收问卷。

1.4 统计学方法

采用SPSS25.0统计软件进行分析,以[n(%)]或绝对数描述计数资料,采用 χ^2 检验;计量资料以($\bar{x}\pm s$)描述,采用t检验;采用单因素和多因素Logistic回归分析白内障术后感染性眼内炎发生的危险因素, $\alpha=0.05$ 为检验水准。

2 结果

2.1 感染性眼内炎发生情况

本研究中,共发放2936份问卷调查,回收2931份,回收率为99.83%(2931/2936)。其中53例患者患有感染性眼内炎,发生率为1.81%(53/2931),并将患有感染性眼内炎的患者53例纳为感染组,未患有感染性眼内炎的患者2878例纳为未感染组。

2.2 感染性眼内炎患者的主要病原菌分布情况

本次研究术后发生感染性眼内炎53例,病原菌检出41株,其中检出4株真菌,为白色假丝酵母菌,占比9.76%;革兰阳性菌37株,占90.24%,以头状葡萄球菌、腐生葡萄球菌、表皮葡萄球菌为主。详见表1。

表1 感染性眼内炎患者的主要病原菌分布情况

Table 1 Distribution of main pathogenic bacteria in patients with infectious endophthalmitis

Pathogenic bacteria(n=41)		Number of strains	Constituent ratio(%)
Gram-positive bacteria	Staphylococcus epidermidis	19	46.34
	Staphylococcus saprophytius	6	14.63
	Staphylococcus capitis	8	19.51
	Enterococcus faecalis	4	9.76
Fungi	Candida albicans	4	9.76
Total	-	41	100.00

2.3 常见病原菌药敏分析结果

革兰阳性菌中,头状葡萄球菌、表皮葡萄球菌、腐生葡萄球菌对利福平、万古霉素以及利奈唑胺的敏感度达100.00%,其次对达福普汀、左氧氟沙星敏感度达50.00%,而对四环素、红霉素、氨苄西林、青霉素、庆大霉素敏感度较低。详见表2。

2.4 白内障术后感染性眼内炎发生的单因素分析

感染组和未感染组在性别、住院时间、玻璃体溢出方面比较差异均无统计学意义($P>0.05$);两组在麻醉药时间、年龄、手术切口、手术时间、高血压、糖尿病方面比较差异均有统计学意义

($P<0.05$)。详见表3。

2.5 白内障术后感染性眼内炎发生的多因素分析

以白内障术后是否发生感染性眼内炎作为因变量(是=1,否=0),将单因素分析中有统计学意义的因素作为自变量并进行赋值(赋值说明见表4),纳入多因素Logistic回归分析,结果显示:年龄 ≥ 66 岁、手术切口为透明角膜、手术时间 ≥ 15 min、合并糖尿病均是术后发生感染性眼内炎的独立危险因素($P<0.05$)。详见表4。

表 2 常见病原菌药敏分析结果 [株(%)]

Table 2 Drug sensitivity analysis results of common pathogenic bacteria strains[n(%)]

Antibacterial drugs	Staphylococcus saprophytius(n=6)	Staphylococcus capitis(n=8)	Staphylococcus epidermidis(n=19)
Penicillin	0(0.00)	2(25.00)	3(15.79)
Levofloxacin	3(50.00)	4(50.00)	10(52.63)
Erythromycin	2(33.33)	3(37.50)	4(21.05)
Ampicillin	2(33.33)	4(50.00)	4(21.05)
Tetracycline	1(16.67)	1(12.50)	3(15.79)
Linezolid	6(100.00)	8(100.00)	19(100.00)
Gentamicin	1(16.67)	3(37.50)	2(10.53)
Vancomycin	6(100.00)	8(100.00)	19(100.00)
Li Fuping	6(100.00)	8(100.00)	19(100.00)
Dafoe Putin	3(50.00)	5(62.50)	9(47.37)

表 3 白内障术后感染性眼内炎发生的单因素分析

Table 3 Single factor analysis of infectious endophthalmitis after cataract surgery

Factors	n	Infection group(n=53)	Non infection group(n=2878)	χ^2	P
Gender					
Male	1486	28	1458	0.009	0.925
Female	1445	25	1420		
Hospital stay(d)					
>3	1536	30	1506	0.022	0.883
≤ 3	1395	23	1372		
Anesthesia time					
Control	1623	14	1609	41.644	0.000
Uncontrol	1308	39	1269		
Age(years)					
≥ 66	1438	41	1397	20.728	0.000
<66	1493	12	1481		
Operation incision					
Scleral tunnel	1506	18	1488	6.817	0.009
Transparent cornea	1425	35	1390		
Vitreous overflow					
Yes	1386	26	1360	1.336	0.248
No	1545	27	1518		
Operation time(min)					
≥ 15	1493	42	1451	15.593	0.000
<15	1438	11	1427		
Hypertension					
yes	1106	38	1068	26.500	0.000
no	1825	15	1810		
Diabetes					
yes	1197	35	1162	14.185	0.000
no	1734	18	1716		

表 4 白内障术后感染性眼内炎发生的多因素分析

Table 4 Multiple factors analysis of infectious endophthalmitis after cataract surgery

Variable	Assignment	β	SE	Wald χ^2	OR(95%CI)	P
Age	≥ 66 years=1, < 66 years=0	1.336	0.635	4.571	2.759(0.679-3.258)	0.016
Operation incision	Transparent cornea=1, Vitreous overflow=0	1.031	0.421	6.217	2.676(0.259-3.623)	0.009
Operation time	≥ 15 min=1, < 15 min=0	0.949	0.254	13.423	1.601(0.263-2.957)	0.000
Diabetes	yes=1, no=0	1.656	0.713	5.329	1.261(0.133-2.752)	0.012

3 讨论

白内障是眼科最常见的疾病之一,且随着年龄的增长,其发病率呈增长趋势^[12]。目前已有不少研究证实^[13,14],白内障的病机与年龄、电离子辐射及中毒等因素有关,在上述各种因素的影响下,机体晶状体代谢产生浑浊,引发白内障病变。现临床有关白内障的治疗方案多样,但以手术治疗为主。其中超声乳化吸除术在临床普及较为广泛,具有损伤小、手术时间较短、术后视力恢复快等优点^[15,16]。但也有部分患者术后易发生并发症,其中以感染性眼内炎较为严重,临床手术治疗白内障至今仍无法做到完全避免术后感染性眼内炎发生^[17]。术后感染性眼内炎的发生率虽然低,却是白内障术后最严重的并发症之一,如果治疗不及时,可能导致失明甚至丧失眼球^[18]。目前医学界普遍认为患者一旦临床确诊感染性眼内炎,应即刻局部和(或)全身给予抗生素,同时应提取患眼前房水和玻璃体标本进行细菌学检测^[19,20]。因此了解感染性眼内炎致病菌及耐药情况并进行早期预防对于改善手术治疗白内障患者的预后具有积极的临床意义。

本研究中入院且完成调查的白内障患者中约有术后感染性眼内炎患者 53 例,感染性眼内炎发生率为 1.81%。这与杨乾军等人报道的发病率不尽相同,大多在 0.037%~0.95%之间^[21]。本研究的发生率略高,这可能与本次研究纳入病例存在个体差异性有关,后续报道将通过采取扩大样本量,严格控制病例筛选标准的措施,以获取更为精确的数据。由于玻璃体无血管,代谢产物清除缓慢,致病菌易于繁殖,故了解致病菌及耐药情况对于防治感染性眼内炎具有积极的临床意义^[22,23]。本次研究结果发现发生感染性眼内炎的病原菌以革兰阳性菌为主,且对利福平、万古霉素以及利奈唑胺的敏感度高达 100%。这提示了该类手术术前预防性用药除参照常规指南外,还应结合本地区或本院结膜囊分离菌的药敏结果进行对症治疗。单因素分析结果显示,麻醉药时间、年龄、手术切口、手术时间、高血压、糖尿病均与感染性眼内炎的发生关系密切,进一步的多因素 Logistic 回归分析结果显示,年龄 ≥ 66 岁、手术切口为透明角膜、手术时间 ≥ 15 min、合并糖尿病均是发生感染性眼内炎的独立危险因素。分析其原因,伴随着患者年龄不断增加,身体各项机能衰退,机体抵抗力也明显下降,故感染性眼内炎的几率也会有所增加^[24,25]。而当患者合并糖尿病时,因机体长期处于高血糖状态,患者伤口愈合的速度比较慢,为病原体生长及繁殖提供了良好的环境^[26,27]。而当手术时间过长时可增加手术范围内的病原菌数量,从而增加了发生感染性眼内炎的几率^[28,29]。手术切口为透明角膜与空气的接触面积增加,易于被细菌附着而诱发感染^[30]。

综上所述,白内障术后感染性眼内炎的致病菌以革兰阳性菌为主,同时引起其发生的危险因素主要包括手术切口为透明角膜、年龄 ≥ 66 岁、手术时间 ≥ 15 min、合并糖尿病。临床可采取相应干预措施,以降低感染性眼内炎的发生风险。

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