

doi: 10.13241/j.cnki.pmb.2019.03.020

缺血性脑卒中患者介入治疗后并发相关性肺炎的病原菌分布及药敏分析*

王梓晗¹ 邓剑平² 李淑敏¹ 蔺建文¹ 赵红玲¹

(1 大连医科大学附属大连市中心医院神经内一科 辽宁 大连 116033;

2 空军军医大学第二附属医院神经外科一病区 陕西 西安 710032)

摘要 目的:探讨缺血性脑卒中患者介入治疗后并发相关性肺炎的病原菌分布情况及其耐药性,为临床合理选择抗菌药物进行抗感染治疗提供参考。**方法:**选择 2016 年 5 月-2018 年 6 月大连医科大学附属大连市中心医院神经内一科收治的 182 例缺血性脑卒中患者介入治疗后并发相关性肺炎患者,对患者痰标本进行细菌培养和鉴定,并对培养阳性的病原菌进行药物敏感性试验。**结果:**182 例患者共送检痰标本并进行细菌培养 276 次,其中阳性检出 199 次,阳性检出率为 72.10%,检出病原菌 215 株,革兰阴性杆菌 153 株,占 71.16%,其中鲍氏不动杆菌是主要病原菌,占 24.19%,其次为肺炎克雷伯菌,占 20.93%;革兰阳性球菌 62 株,占 28.84%,其中金黄色葡萄球菌为主要的病原菌,占 11.16%,其次为溶血葡萄球菌,占 7.91%。革兰阴性杆菌和革兰阳性球菌中的主要病原菌对抗菌药物的耐药性较严重,且存在多药耐药性的现象。**结论:**缺血性脑卒中患者介入治疗后并发相关性肺炎的病原菌以革兰阴性杆菌为主,且存在多药耐药率高的现象,临床应合理选取抗菌药物进行治疗。

关键词:缺血性脑卒中;介入治疗;相关性肺炎;病原菌;耐药性

中图分类号:R743;R563.1 **文献标识码:**A **文章编号:**1673-6273(2019)03-486-04

Distribution and Drug Resistance of Pathogenic Bacteria Causing Associated Pneumonia in Patients with Cerebral Ischemic Stroke after Interventional Therapy*

WANG Zi-han¹, DENG Jian-ping², LI Shu-min¹, LIN Jian-wen¹, ZHAO Hong-ling¹

(1 The First Department of Neurology, Dalian Central Hospital Affiliated of Dalian Medical University, Dalian, Liaoning, 116033, China;

2 The First Ward of Department of Neurosurgery, The Second Affiliated Hospital of Fourth Military Medical University, Xi'an, Shaanxi, 710032, China)

ABSTRACT Objective: To explore the distribution and drug resistance of pathogenic bacteria causing associated pneumonia in patients with cerebral ischemic stroke after interventional therapy, so as to provide reference for rational selection of antimicrobial drugs in anti-infective treatment in clinic. **Methods:** 182 patients with cerebral ischemic stroke complicated associated pneumonia after interventional therapy in First Department of Neurology in Dalian Central Hospital Affiliated to Dalian Medical University from May 2016 June 2018 were selected. Bacterial culture and identification of sputum specimens were carried out, and drug sensitivity tests were carried out to culture positive pathogens. **Results:** A total of 276 cases of bacteria culture and sputum specimens were performed from 182 patients. The positive rate was 199 times, and the positive detection rate was 72.10%. 215 strains of pathogenic bacteria were detected, there were 153 strains of gram-negative bacteria, accounting for 71.16%, in which *acinetobacter baumannii* was the main pathogenic bacteria, accounting for 24.19%, followed by *klebsiella pneumoniae*, accounting for 20.93%. There were 62 strains of gram-positive bacteria, accounting for 28.84%, in which *staphylococcus aureus* was the main pathogenic bacteria, accounting for 11.16%, followed by *staphylococcus haemolyticus*, accounting for 7.91%. The main pathogenic bacteria of gram-negative bacteria and gram-positive bacteria are more resistant to antibacterials, and there is a phenomenon of multidrug resistance. **Conclusion:** The gram-negative bacteria are the main pathogenic bacteria causing associated pneumonia in patients with cerebral ischemic stroke after interventional therapy, and the pathogenic bacteria has a phenomenon of multiple drug resistance, so it is important to select the antibacterials rationally for the clinical treatment.

Key words: Cerebral ischemic stroke; Interventional therapy; Pneumonia; Pathogenic bacteria; Drug resistance

Chinese Library Classification(CLC): R743; R563.1 **Document code:** A

Article ID: 1673-6273(2019)03-486-04

* 基金项目:辽宁省科技攻关项目(2015229031)

作者简介:王梓晗(1983-),女,硕士,主治医师,从事神经病学、神经介入方面的研究, E-mail: oqtey@163.com

(收稿日期:2018-08-07 接受日期:2018-08-30)

前言

缺血性脑卒中是临床常见的难治性疾病,该病危害严重,进展较快,且其发病率有逐渐升高的趋势,严重危害人类的生命健康^[1-3]。介入治疗是目前临床治疗缺血性脑卒中中最常见的方式,它能明显缓解患者的症状,降低致残率,促进预后^[4,5]。但是研究发现介入治疗后的缺血性脑卒中患者容易并发相关性肺炎,从而加重患者的病情,增加患者的疾病负担^[6,7]。随着介入治疗在临床的普及以及抗生素的广泛使用,缺血性脑卒中介入治疗后相关性肺炎的发生率有逐渐上升的趋势,且病原菌呈多耐药性,为临床合理使用抗菌药物带来了巨大的挑战^[8,9]。本研究通过痰标本培养探讨缺血性脑卒中介入治疗后并发相关性肺炎患者的病原菌分布情况及其耐药性,为临床合理使用抗菌药物提供参考。现整理结果如下。

1 资料与方法

1.1 一般资料

选择 2016 年 5 月-2018 年 6 月大连医科大学附属大连市中心医院神经内一科收治的 182 例缺血性脑卒中介入治疗后并发相关性肺炎患者,纳入标准:①经临床 CT 和 MRI 检查证实为缺血性脑卒中的患者;②均接受介入手术治疗;③患者于治疗前未发生肺部感染;④患者及家属知情,并签署知情同意书。排除标准:①出血性脑卒中的患者;②合并有脑外伤、恶性肿瘤等疾病者;③合并有其他感染性疾病的患者。其中男 137 例,女 45 例;年龄 43-77 岁,平均(58.3±11.9)岁。本次研究符合大连医科大学附属大连市中心医院伦理委员会的要求。

1.2 方法

1.2.1 介入治疗 对患者两侧的腹股沟进行消毒并以局部麻醉,然后采用 Seldinger 技术进行穿刺,随后通过全脑血管造影以确切掌握侧肢的循环和血管栓塞情况,并进行溶栓治疗;在动脉泵的辅助下向导管中注入 25-100 万 IU 的尿激酶,在 30 min 内注入半量,然后再以相同方式进行血管造影,并适当按照血管的充盈程度以 1 万 IU/min 的速度维持输注,直到血管再通,或者达到最大输注剂量后停止输注。在输注的过程中每间隔 15 min 对以血管造影进行复查,一旦患者意识障碍缓解,或者肌力恢复就停止手术。

1.2.2 标本采集 在无菌条件下收集痰标本,并将送检的痰标本采用 phoenix100 细菌鉴定仪(美国 BD 公司提供)进行菌株的培养和鉴定。采用 K-B 纸片(英国 Oxoid 公司提供)扩散法进行细菌的药物敏感性试验,质控菌株为粪肠球菌 ATCC25922 以及金黄色葡萄球菌 ATCC25923(杭州微球生物技术有限公司提供),药物敏感性试验结果根据美国临床实验室标准化研究所标准进行判定。

1.3 肺炎感染判断标准

缺血性脑卒中介入治疗后并发相关性肺炎的诊断标准^[10]:脑卒中发生后胸部影像学检查结果证实有新出现或者进展性的肺部浸润性病变,同时合并有 2 个以上的临床感染症状:①排除其它公认的原因所致的发热(体温≥38℃);②肺实变体征和(或是湿罗音);③原有呼吸道疾病症状或者新出现的咳嗽、咳痰加重,伴或者不伴有胸痛;④外周血中的白细胞减少(白细

胞减少<4000WBCs/mm³)。同时排除某些如肺部肿瘤、肺水肿、肺栓塞等与肺炎的临床症状相似的疾病。

1.4 统计学方法

采用 SPSS21.0 软件进行统计分析,计数资料的描述采用率(%)表示。

2 结果

2.1 细菌培养结果

182 例脑卒中介入治疗后并发相关性肺炎患者共送检痰标本并进行细菌培养 276 次,其中阳性检出 199 次,阳性检出率为 72.10%,检出病原菌 215 株。

2.2 病原菌分布情况

215 株病原菌中,革兰阴性杆菌 153 株,占 71.16%,其中鲍氏不动杆菌是主要的病原菌,占 24.19%,其次为肺炎克雷伯菌,占 20.93%;革兰阳性球菌 62 株,占 28.84%,其中金黄色葡萄球菌为主要的病原菌,占 11.16%,其次为溶血葡萄球菌,占 7.91%。见表 1。

表 1 病原菌的分布及构成比(%)

Table 1 Distribution and constituent ratio of pathogenic bacteria(%)		
Pathogenic bacteria	n	Constituent ratio
Gram-negative bacteria	153	71.16
<i>Acinetobacter baumannii</i>	52	24.19
<i>Klebsiella pneumoniae</i>	45	20.93
<i>Pseudomonas aeruginosa</i>	29	13.49
<i>Escherichia coli</i>	16	7.44
<i>Enterobacter cloacae</i>	7	3.25
Other	4	1.86
Gram-positive bacteria	62	28.84
<i>Staphylococcus aureus</i>	24	11.16
<i>Staphylococcus haemolyticus</i>	17	7.91
<i>Staphylococcus epidermidis</i>	10	4.65
<i>Enterococcus faecalis</i>	5	2.33
<i>Streptococcus pneumoniae</i>	4	1.86
Other	2	0.93
Total	215	100.00

2.3 主要革兰阴性杆菌的耐药性分析

鲍氏不动杆菌主要对头孢曲松、头孢哌酮、头孢他啶以及哌拉西林等抗菌药物耐药,耐药率分别为 96.15%、78.85%、76.92%以及 65.38%,对美罗培南的耐药率相对较低,仅为 9.62%;肺炎克雷伯菌主要对头孢哌酮、头孢他啶以及庆大霉素耐药,耐药率分别为 95.56%、93.33%以及 75.56%,对美罗培南的耐药率较低,仅为 2.22%;铜绿假单胞菌主要对头孢曲松、头孢哌酮耐药,耐药率分别为 96.55%、75.86%;大肠埃希菌主要对头孢曲松、头孢哌酮以及庆大霉素耐药,耐药率分别为 87.50%、68.75%以及 62.50%。见表 2。

表 2 主要革兰阴性杆菌的耐药率(%)
Table 2 Resistance rate of the main gram-negative bacteria(%)

Antiseptic drugs	<i>Acinetobacter baumannii</i> (n=52)		<i>Klebsiella pneumoniae</i> (n=45)		<i>Pseudomonas aeruginosa</i> (n=29)		<i>Escherichia coli</i> (n=16)	
	n	Constituent ratio	n	Constituent ratio	n	Constituent ratio	n	Constituent ratio
Piperacillin	34	65.38	8	17.78	9	31.03	5	31.25
Gentamicin	28	53.85	34	75.56	13	44.83	10	62.50
Amikacin	23	44.23	10	22.22	7	24.14	8	50.00
Ceftazidime	40	76.92	42	93.33	9	31.03	7	43.75
Cefoperazone	41	78.85	43	95.56	22	75.86	11	68.75
Ceftriaxone	50	96.15	11	24.44	28	96.55	14	87.50
Levofloxacin	25	48.08	24	53.33	16	55.17	6	37.50
Tobramycin	21	40.38	13	28.89	14	48.28	9	56.25
Meropenem	5	9.62	1	2.22	13	44.83	4	25.00

2.4 主要革兰阳性球菌的耐药性分析

金黄色葡萄球菌主要对四环素、青霉素、红霉素、氨苄西林以及庆大霉素等抗菌药物耐药,耐药率均大于 80.00%,对利奈唑胺、万古霉素、替考拉宁的耐药率较低,分别为 0.00%、

4.17%、4.17%;溶血葡萄球菌主要对青霉素、红霉素、苯唑西林、庆大霉素以及氨苄西林等药物耐药,耐药率均大于 80.00%,对万古霉素、利奈唑胺、替考拉宁的耐药率均为 0.00%。见表 3。

表 3 主要革兰阳性球菌的耐药率(%)
Table 3 Resistance rate of the main gram-positive bacteria(%)

Antiseptic drugs	<i>Staphylococcus aureus</i> (n=24)		<i>Staphylococcus haemolyticus</i> (n=17)	
	n	Constituent ratio	n	Constituent ratio
Ampicillin	21	87.50	14	82.35
Trimethoprim	6	25.00	7	41.18
Vancomycin	1	4.17	0	0.00
Linezolid	0	0.00	0	0.00
Penicillin	23	95.83	17	100.00
Erythromycin	22	91.67	17	100.00
Gentamicin	20	83.33	16	94.12
Oxacillin	17	70.83	17	100.00
Tetracycline	24	100.00	3	17.65
Rifampicin	5	20.83	1	5.88
Teicoplanin	1	4.17	0	0.00
Moxifloxacin	13	54.17	5	29.41

3 讨论

缺血性脑卒中是指由各种原因所致局部组织血液供应障碍,进而导致的脑组织缺血缺氧性病变及坏死,具有发病率高、致残率高以及病死率高的特点^[11-13]。目前临床以介入治疗作为缺血性脑卒中的首选治疗方式,在较短的时间内溶栓就可以缓解动脉血栓,从而改善患者缺血区域的血氧供应状态以保护大脑细胞^[14,15]。有研究报道缺血性脑卒中介入手术后并发相关性肺炎是影响患者预后,降低生命质量的重要因素^[16]。因此,及时有效的发现术后相关性肺炎感染的病原菌分布,并根据病原菌

的耐药性情况制定针对性的干预策略,是控制患者感染、促进预后的关键^[17]。

本研究回顾性分析 2016 年 5 月-2018 年 6 月我院收治的缺血性脑卒中介入治疗后并发相关性肺炎患者细菌培养和药物敏感性试验结果,资料显示,182 例患者共送检痰标本及细菌培养 276 次,其中阳性检出 199 次,阳性检出率高达 71.10%,检出的病原菌 215 株。在检出的病原菌中,革兰阴性杆菌 153 株,占 71.16%,即革兰阴性杆菌是缺血性脑卒中患者介入治疗后发生肺部感染的主要病原菌^[18]。革兰阴性杆菌中鲍氏不动杆菌是首位的病原菌,占 24.19%,其次为肺炎克雷伯菌,

占 20.93%。姚绍鑫等^[19]人的研究结果表明脑卒中患者介入治疗后肺炎感染的病原菌中, 鲍氏不动杆菌是最主要的病原菌, 占 22.88%, 与本研究结果基本相符。本研究结果还显示, 革兰阳性球菌占有病原菌比例的 28.84%, 其中金黄色葡萄球菌是主要的病原菌, 占 11.16%, 因此, 临床也应该重视缺血性脑卒中患者介入治疗后对革兰阳性球菌引起的肺炎感染的预防^[20,21]。

了解肺部感染病原菌的分布情况是临床医师合理选择抗菌药物治疗的基础, 但是随着抗菌药物以及免疫抑制剂的广泛使用, 菌落的细菌谱发生了改变, 并且多数病原菌存在不同程度的耐药性^[22-24]。因此根据药物敏感性试验的结果合理调整抗菌药物的使用, 是控制感染、缓解患者病情的关键^[25,26]。本研究对痰标本培养阳性的病原菌进行了药物敏感性试验, 结果显示, 缺血性脑卒中患者介入治疗后, 并发相关性肺炎的主要病原菌的耐药性比较严重, 比如鲍氏不动杆菌主要对头孢曲松、头孢哌酮、头孢他啶以及哌拉西林等耐药, 耐药率均超过 65.00%, 而肺炎克雷伯菌主要对头孢哌酮、头孢他啶以及庆大霉素耐药, 耐药率均超过 75.00%, 铜绿假单胞菌主要对头孢曲松、头孢哌酮耐药, 耐药率分别为 96.55%、75.86%, 大肠埃希菌主要对头孢曲松、头孢哌酮以及庆大霉素耐药, 耐药率分别为 87.50%、68.75%以及 62.50%。金黄色葡萄球菌主要对四环素、青霉素、红霉素、氨苄西林以及庆大霉素耐药, 耐药率均大于 80.00%, 对利奈唑胺、万古霉素、替考拉宁敏感, 溶血性链球菌主要对青霉素、红霉素、苯唑西林、庆大霉素以及氨苄西林耐药, 对万古霉素、利奈唑胺、替考拉宁敏感。说明主要病原菌存在耐多药的现象, 可能是因为临床上对抗生素的大量、广泛应用有关, 同时也与医院相关职能科室对抗生素的正确使用缺乏相应的监管有关^[27,28]。临床应根据药物敏感性试验结果合理选择抗菌药物, 结合本研究结果, 缺血性脑卒中患者介入治疗后可优先选用美罗培南、万古霉素、利奈唑胺、替考拉宁等药物进行肺部感染的预防治疗。

综上所述, 缺血性脑卒中患者介入治疗后并发肺部感染的病原菌主要以革兰阴性杆菌为主, 其次为革兰阳性球菌, 并且主要病原菌的耐药性严重, 且存在多药耐药性现象。由于受各种条件、因素的影响, 各个医院缺血性脑卒中介入治疗后并发肺部感染的病原菌的细菌谱不一致, 但是总体而言介入治疗后的肺部感染需要引起临床医师的重点关注。以下措施可为控制缺血性脑卒中介入治疗后并发的相关性肺炎提供一定的参考^[29,30]: ①加强临床医师的无菌操作观念, 严格执行各项消毒灭菌的措施; ②制定抗菌药物的使用规则, 合理使用抗感染药物; ③如发生肺部感染, 尽快对病原菌进行培养和鉴定, 并按照药物敏感性试验结果调整抗菌药物的使用。

参考文献(References)

- [1] Zhao P, Liu S, Zhong Z, et al. Age- and sex-related difference of lipid profile in patients with ischemic stroke in China [J]. *Medicine* (Baltimore), 2018, 97(23): e10930
- [2] Cho SK, Sohn J, Cho J, et al. Effect of Socioeconomic Status and Underlying Disease on the Association between Ambient Temperature and Ischemic Stroke [J]. *Yonsei Med J*, 2018, 59(5): 686-692
- [3] 涂雪松. 缺血性脑卒中的流行病学研究[J]. *中国临床神经科学*, 2016, 24(5): 594-599
- [4] Auboire L, Sennoga CA, Hyvelin JM, et al. Microbubbles combined with ultrasound therapy in ischemic stroke: A systematic review of in-vivo preclinical studies[J]. *PLoS One*, 2018, 13(2): e0191788
- [5] Knecht T, Story J, Liu J, et al. Adjunctive Therapy Approaches for Ischemic Stroke: Innovations to Expand Time Window of Treatment [J]. *Int J Mol Sci*, 2017, 18(12): E2756
- [6] Helmy TA, Abd-Elhady MA, Abdou M. Prediction of Ischemic Stroke-Associated Pneumonia: A Comparison between 3 Scores [J]. *J Stroke Cerebrovasc Dis*, 2016, 25(11): 2756-2761
- [7] Ribeiro PW, Cola PC, Gatto AR, et al. Relationship between Dysphagia, National Institutes of Health Stroke Scale Score, and Predictors of Pneumonia after Ischemic Stroke [J]. *J Stroke Cerebrovasc Dis*, 2015, 24(9): 2088-2094
- [8] Hwong WY, Abdul Aziz Z, Sidek NN, et al. Prescription of secondary preventive drugs after ischemic stroke: results from the Malaysian National Stroke Registry[J]. *BMC Neurol*, 2017, 17(1): 203
- [9] Campbell BCV, Mitchell PJ, Churilov L, et al. Tenecteplase versus Alteplase before Thrombectomy for Ischemic Stroke [J]. *N Engl J Med*, 2018, 378(17): 1573-1582
- [10] 王姝梅, 李海英, 袁俊亮, 等. 卒中相关性肺炎与缺血性脑卒中严重程度及预后的关系研究[J]. *中国全科医学*, 2013, 16(11): 1203-1205
- [11] Parikh NS, Merkler AE, Kummer BR, et al. Ischemic Stroke After Emergency Department Discharge for Symptoms of Transient Neurological Attack[J]. *Neurohospitalist*, 2018, 8(3): 135-140
- [12] Pocovi N. Appraisal of Clinical Practice Guideline: 2018 Guidelines for the Early Management of Patients with Acute Ischemic Stroke[J]. *J Physiother*, 2018, 64(3): 199
- [13] 贾春燕, 池礼捷, 牛瑞芳, 等. 自拟活血化癥方对缺血性脑卒中患者生活质量的影响[J]. *现代生物医学进展*, 2016, 16(36): 7176-7178, 7193
- [14] Rajborirug K, Tumviriyakul H, Suwann J. Effects of Stroke Unit Care in Acute Ischemic Stroke Patient Ineligible for Thrombolytic Treatment[J]. *J Med Assoc Thai*, 2017, 100(4): 410-417
- [15] 周腾飞, 朱良付, 李天晓, 等. 补救性支架植入治疗急性缺血性脑卒中 13 例[J]. *介入放射学杂志*, 2017, 26(11): 1028-1033
- [16] Zhang R, Ji R, Pan Y, et al. External Validation of the Prestroke Independence, Sex, Age, National Institutes of Health Stroke Scale Score for Predicting Pneumonia After Stroke Using Data From the China National Stroke Registry [J]. *J Stroke Cerebrovasc Dis*, 2017, 26(5): 938-943
- [17] Nascimento Alves P, Silva C, Baptista J, et al. Laterality of Pneumonia in Acute Stroke[J]. *Eur Neurol*, 2017, 77(1-2): 75-79
- [18] 胡科, 任应国, 徐明超, 等. 急性脑卒中患者肺部感染的病原菌特点与耐药性分析[J]. *中华医院感染学杂志*, 2016, 26(1): 68-70
- [19] 姚绍鑫, 王健, 李藏安. 脑卒中患者介入治疗后多药耐药菌感染的病原学分析[J]. *中华医院感染学杂志*, 2015, 25(3): 540-542
- [20] Le Bouc R, Clarençon F, Meseguer E, et al. Efficacy of Endovascular Therapy in Acute Ischemic Stroke Depends on Age and Clinical Severity[J]. *Stroke*, 2018, 49(7): 1686-1694
- [21] 刘慧珍, 赵国伟, 高钧. 脑卒中合并肺部感染患者病原体分布及抗生素应用研究[J]. *中国预防医学杂志*, 2017, 18(10): 793-795

(下转第 535 页)

- Retrospective Study in 113 Patients [J]. *Med Arch*, 2015, 69 (6): 352-356
- [20] Li J, Xu XZ, You T, et al. Early results of the proximal femoral nail antirotation-Asia for intertrochanteric fractures in elderly Chinese patients[J]. *Saudi Med J*, 2014, 35(4): 385-390
- [21] Chen Y, Liu S, Lin P, et al. Comparative biomechanical study of reversed less invasive stabilization system and proximal femoral nail antirotation for unstable intertrochanteric fractures [J]. *Chin Med J (Engl)*, 2014, 127(23): 4124-4129
- [22] Zhang S, Zhang K, Jia Y, et al. InterTan nail versus Proximal Femoral Nail Antirotation-Asia in the treatment of unstable trochanteric fractures[J]. *Orthopedics*, 2013, 36(3): e288-e294
- [23] Oshima H, Tanaka S, Takatori Y, et al. Clinical and Radiographic Outcomes of Total Hip Arthroplasty With a Specific Liner in Small Asian Patients: Influence of Patient-Related, Implant-Related, and Surgical Factors on Femoral Head Penetration [J]. *J Arthroplasty*, 2017, 32(10): 3065-3070
- [24] 陈述祥,刘彦,陈丽君,等.老年股骨转子间骨折不同治疗方法的评价[J].暨南大学学报(自然科学与医学版), 2014, 35(2): 177-181
- [25] Ma KL, Wang X, Luan FJ, et al. Proximal femoral nails antirotation, Gamma nails, and dynamic hip screws for fixation of intertrochanteric fractures of femur: A meta-analysis [J]. *Orthop Traumatol Surg Res*, 2014, 100(8): 859-866
- [26] Nherera L, Trueman P, Horner A, et al. Comparison of a twin interlocking derotation and compression screw cephalomedullary nail (InterTAN) with a single screw derotation cephalomedullary nail (proximal femoral nail antirotation): a systematic review and meta-analysis for intertrochanteric fractures [J]. *J Orthop Surg Res*, 2018, 13(1): 46
- [27] Ma JX, Wang J, Xu WG, et al. Biomechanical outcome of proximal femoral nail antirotation is superior to proximal femoral locking compression plate for reverse oblique intertrochanteric fractures: a biomechanical study of intertrochanteric fractures [J]. *Acta Orthop Traumatol Turc*, 2015, 49(4): 426-432
- [28] Ma JX, Kuang MJ, Fan ZR, et al. Comparison of clinical outcomes with InterTan vs Gamma nail or PFNA in the treatment of intertrochanteric fractures: A meta-analysis [J]. *Sci Rep*, 2017, 7(1): 15962
- [29] Sehmisch S, Rieckenberg J, Dresing K, et al. Stabilization of unstable intertrochanteric fractures with the proximal femoral nail [J]. *Oper Orthop Traumatol*, 2013, 25(1): 63-83, quiz 83-84
- [30] 白志刚,宋强,程锁利,等.四种手术方式治疗高龄骨质疏松性股骨转子间骨折的回顾性分析 [J]. *中国骨质疏松杂志*, 2017, 23(6): 790-794

(上接第 489 页)

- [22] Li P, Wang X, Wang W, et al. Comparison of the efficacies of three empirically-selected antibiotics for treating *Acinetobacter baumannii* pulmonary infection: experience from a teaching hospital in China[J]. *Int J Clin Pharmacol Ther*, 2017, 55(7): 588-593
- [23] Douglas IS. Pulmonary infections in critical/intensive care - rapid diagnosis and optimizing antimicrobial usage [J]. *Curr Opin Pulm Med*, 2017, 23(3): 198-203
- [24] Ferro BE, Srivastava S, Deshpande D, et al. Failure of the Amikacin, Cefoxitin, and Clarithromycin Combination Regimen for Treating Pulmonary *Mycobacterium abscessus* Infection[J]. *Antimicrob Agents Chemother*, 2016, 60(10): 6374-6376
- [25] 韩小年,黄婧,贾晓涛,等.预防使用抗菌药物对脑卒中相关性肺炎有效性和安全性的 Meta 分析[J].*中华神经医学杂志*, 2018, 17(1): 78-83
- [26] Song JU, Park HK, Kang HK, et al. Proposed risk factors for infection with multidrug-resistant pathogens in hemodialysis patients hospitalized with pneumonia[J]. *BMC Infect Dis*, 2017, 17(1): 681
- [27] Chin W, Zhong G, Pu Q, et al. A macromolecular approach to eradicate multidrug resistant bacterial infections while mitigating drug resistance onset[J]. *Nat Commun*, 2018, 9(1): 917
- [28] Abdul-Aziz MH, Lipman J, Roberts JA. Antibiotic dosing for multidrug-resistant pathogen pneumonia [J]. *Curr Opin Infect Dis*, 2017, 30(2): 231-239
- [29] Moon SM, Park HY, Kim SY, et al. Clinical Characteristics, Treatment Outcomes, and Resistance Mutations Associated with Macrolide-Resistant *Mycobacterium avium* Complex Lung Disease [J]. *Antimicrob Agents Chemother*, 2016, 60(11): 6758-6765
- [30] 温德良,李智博,温艺超,等.重症监护病房脑卒中相关性肺炎多重耐药菌感染的危险因素及病原学分析[J].*实用医学杂志*, 2016, 32(13): 2178-2181