

## **Risk factors and preventive measures for postoperative infection in episiotomy of puerperal.**

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### **Abstract**

**Objective:** To investigate the characteristics of pathogenic bacteria and related risk factors for postoperative infection in episiotomy of puerpera and provide basis for the clinical prevention and treatment of postoperative infection in episiotomy.

**Methods:** The clinical data of 1200 cases of full-term parturient receiving vaginal delivery receiving lateral incision hospitalized in obstetrics from March 2012 to April 2015 were retrospectively analysed with the pathogen distribution statistics, and multivariate logistic regression analysis was used to analyse the related risk factors; spss20.0 software was adopted for statistical analysis.

**Results:** After the single factor analysis, it was found that age>30 y old, BMI>28 kg/m<sup>2</sup>, vaginal examination>3 times, emergency delivery, birth process>8 h, postoperative hospitalization time>5 d, premature rupture of membranes, delivery in summer, reproductive tract infections in puerpera, incision length>3 cm, operate time of suture personnel ≤ 10 y, complication with basic diseases were risk factors for maternal episiotomy infection after operation (P<0.05); Multi factor logistic regression analysis showed that BMI>28 kg/m<sup>2</sup> (OR: 2.136, 95% CI: 1.117~4.086), Vaginal examination>3 times (OR: 1.850, 95% CI: 1.162~2.945), postoperative hospitalization time>5 d (OR: 2.620, 95% CI: 1.363~5.032), premature rupture of membranes (OR: 1.627, 95% CI: 1.059~2.502), reproductive tract infections in puerperal (OR: 1.865, 95% CI: 1.053~3.300), complication with basic diseases (OR: 2.022, 95% CI: 1.220~3.350) were independent risk factors for postoperative infection in episiotomy of puerpera (P<0.05).

**Conclusion:** In this study, BMI, Vaginal examination, postoperative hospitalization time, premature rupture of membranes, reproductive tract infections in puerpera, complication with basic diseases were risk factors for postoperative infection in episiotomy of puerpera, thus it is desired to take corresponding intervention measures to reduce rate of postoperative infection in episiotomy and prevent incision infection.

**Keywords:** Episiotomy, Pathogens, Infection, Risk factors.

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### **Introduction**

Episiotomy is a common obstetric surgery and it is mainly applied to pregnant women whose perineum is too tight to deliver, avoiding severe laceration in pelvic tissue and perineum, accelerate delivery, and shorten the second birth process [1,2]. According to relevant studies, episiotomy rate has been as high as 90.0% in some parts of China, it will inevitably lead to incision infection [3,4]. Episiotomy is incision of class II, due to its special anatomy position, carelessness treatment can lead to incision infection, which is mainly related to its susceptibility to vaginal, intestinal and urethral microbial flora infection [5-7], not only affecting the operation effect, but also increasing the suffering of patients, as well as prolong hospitalization time [8,9]. In order to prevent and treat Incision infection after episiotomy, the clinical data of 1200 cases of full-term parturient receiving vaginal delivery receiving lateral incision hospitalized in obstetrics from March

2012 to April 2015 were retrospectively analysed in this study, and related risk factors and preventive measures for postoperative infection in episiotomy were also analysed, the report of which is as follows now.

### **Data and Methods**

#### **Clinical data**

The clinical data of 1200 cases of full-term parturient receiving vaginal delivery receiving lateral incision hospitalized in the hospital's obstetrics from March 2012 to April 2015 were collected with age ranging from 21 to 38 y old. The diagnosis of incision infection conforming to the corresponding standards of "The diagnostic criteria of nosocomial infection" formulated by the State Planning Commission.

**Inclusion criteria:** Subjects were aged  $\geq 18$  y; gestational weeks from 32 to 42 w.

**Exclusion criteria:** Women unable to give their informed consent and who did not have an accompanying person with them who could consent to their participation in the study on their behalf were excluded from the study [10].

Sterile tubes were used to collect incision secretion of puerpera submitted for censorship, and culture and separation were conducted in strict accordance with the requirements of "standard for National clinical laboratory procedures" formulated by National Planning Commission; a retrospective survey of 1200 cases of puerpera was conducted, including age, Body Mass Index (BMI), the number of vaginal examination, emergency delivery or not, birth process, the hospitalization time after operation, the premature rupture of membranes or not, delivery season, reproductive tract infection or not, length of incision, working time of suture personnel, having basic diseases or not; and single factor analysis and multiple regression analysis were adopted to determine whether the above factors were independent risk factors for postoperative infection in episiotomy of puerpera. Strict anaerobic bacteria of the identification and drug susceptibility testing were mainly used ATB Express instrument (France Biological Merière); identification and susceptibility of other bacteria were mainly used VITEK-2 compact automatic bacteria instrument (France Biological Meriere).

### Statistical analysis

SPSS20.0 software was used for statistical analysis, and  $\chi^2$  or Chi  $\chi^2$  test and Fisher's exact probability method were adopted for comparison of count data; the single factor analysis and multivariate logistic regression analysis were conducted to analyse the risk factors for postoperative infection in episiotomy of puerpera with  $P < 0.05$  believed as statistically significant difference.

## Results

### Infection rate and the main pathogenic bacteria distribution

Vaginal incision infection occurred in 30 cases of 1200 puerpera after operation with the infection rate of 2.50%; 92 strains of pathogens were detected in the samples, of which there were 58 strains of gram negative bacteria accounting for 63.04% with the main pathogens of *Pseudomonas aeruginosa* and *Escherichia coli*, and there were 30 strains of gram positive bacteria accounting for 32.61% with the main pathogens of *Staphylococcus aureus* and *Staphylococcus epidermidis*, and there were also 4 strains of fungi accounting for 4.35%, as seen in Tables 1 and 2.

**Table 1.** The clinical data of the full-term puerpera undergoing the episiotomy for vaginal delivery.

Clinical data	Numerical value
Age (y old)	26.94 $\pm$ 5.78
Gestational age (w)	39.87 $\pm$ 2.54
Natural childbirth (case)	1004
Vaginal delivery (cases)	196

**Table 2.** Distribution and constituent ratios of the main pathogens (%).

Pathogens	The number of strains	Constituent ratios
Gram-negative bacteria	58	63.04
<i>Pseudomonas aeruginosa</i>	23	25.00
<i>E. coli</i>	17	18.48
<i>Aerobacter cloacae</i>	8	8.69
<i>Acinetobacter baumannii</i>	6	6.52
Others	4	4.35
Gram-positive bacteria	30	32.61
<i>Staphylococcus aureus</i>	12	13.04
<i>Staphylococcus epidermidis</i>	9	9.78
Str.	5	5.44
Others	4	4.35
Fungus	4	4.35
<i>Saccharomyces albicans</i>	3	3.26
<i>Candida glabrata</i>	1	1.09
Total	92	100.00

### Single factor analysis and infection rate of postoperative infection in episiotomy of puerpera

Age  $> 30$  y old, BMI  $> 28$  kg/m<sup>2</sup>, vaginal examination  $> 3$  times, emergency delivery, birth process  $> 8$  h, postoperative hospitalization time  $> 5$  d, premature rupture of membranes, delivery in summer, reproductive tract infections in puerpera, incision length  $> 3$  cm, operate time of suture personnel  $\leq 10$  y, complication with basic diseases were risk factors for maternal episiotomy infection after operation ( $P < 0.05$ ), as shown in Table 3.

### Multivariate logistic of risk factors for postoperative infection in parturients

Regression analysis showed that BMI  $> 28$  kg/m<sup>2</sup> (OR: 2.136, 95% CI: 1.117~4.086), vaginal examination  $> 3$  times (OR: 1.850, 95% CI: 1.162~2.945), postoperative hospitalization time  $> 5$  d (OR: 2.620, 95% CI: 1.363~5.032), premature rupture of membranes (OR: 1.627, 95% CI: 1.059~2.502), reproductive tract infections in puerperal (OR: 1.865, 95% CI: 1.053~3.300), complication with basic diseases (OR: 2.022, 95% CI: 1.220~3.350) were risk factors for postoperative

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infection in episiotomy of puerpera ( $P < 0.05$ ), which is shown in Table 4.

**Table 3.** Univariate analysis of the related factors for the postoperative infections in the puerpera undergoing the episiotomy and the infection rates (%).

Related factors		Survey cases	Infection cases	Infection rate	$\chi^2$ value	P value
Age (years old)	>30	262	11	4.2	3.967	0.046
	$\leq 30$	938	19	2.03		
BMI (kg/m <sup>2</sup> )	>28	340	14	4.12	5.093	0.024
	$\leq 28$	860	16	1.86		
Vaginal examination (times)	>3	314	16	5.1	11.754	0.001
	$\leq 3$	886	14	1.58		
Emergency delivery	Yes	216	10	4.63	4.901	0.027
	No	984	20	2.03		
Birth process (h)	>8	375	15	4	5.035	0.025
	$\leq 8$	825	15	1.82		
Postoperative hospitalization time (d)	>5	224	12	5.36	9.224	0.002
	$\leq 5$	976	18	1.84		
Premature rupture of membranes	Yes	361	17	4.71	10.338	0.001
	No	839	13	1.55		
Delivery season	Summer	287	12	4.18	4.374	0.036
	Other seasons	913	18	1.97		
Reproductive tract infections	Yes	396	19	4.8		
	No	804	11	1.37		
Incision length (cm)	>3	125	7	5.6	5.501	0.019
	$\leq 3$	1075	23	2.14		
Operate time of suture personnel	>10	782	13	1.66	6.462	0.011
Time (y)	$\leq 10$	418	17	4.07		
Basic diseases	Yes	179	10	5.59	8.223	0.004
	No	1021	20	1.96		

**Table 4.** Multivariate logistic regression analysis of the risk factors for the postoperative infections in episiotomy of puerperal.

Related factors	$\beta$	$\bar{x} \pm S$	$\chi^2$	P value	OR value	95% CI
$\chi^2$ value						
BMI	0.759	0.331	5.261	0.029	2.136	1.117~4.086
Times of vaginal examination	0.615	0.237	6.712	0.016	1.85	1.162~2.945
Postoperative hospitalization time	0.963	0.333	8.358	0.002	2.62	1.363~5.032
Premature rupture of membranes	0.487	0.219	4.927	0.033	1.627	1.059~2.502
Reproductive tract infections	0.623	0.291	4.573	0.037	1.865	1.053~3.300
Complication with basic diseases	0.704	0.258	7.469	0.01	2.022	1.220~3.350

## Discussion

### *Risk factors for the postoperative infections in episiotomy of puerpera*

In this study, we found that BMI, Vaginal examination, postoperative hospitalization time, premature rupture of membranes, reproductive tract infections in puerpera, and complication with basic diseases were risk factors for postoperative infection in episiotomy of puerpera. Due to the particularity of perineal position, it's easier to generate infection [11,12], studies have shown that the infection rate of perineal incision was 0.49%~10.42% [13]. The results of this study showed that postoperative infection rate in episiotomy of puerpera was 2.50%, and the pathogen bacteria of infection were mainly gram negative bacteria. The puerpera's self-factors such as vaginitis, obesity, surgery operation and other iatrogenic factors could cause the postoperative infections in episiotomy of puerpera [14]. The results of the study showed that BMI>28 kg/m<sup>2</sup>, vaginal examination>3 times, postoperative hospitalization time>5 d, premature rupture of membranes, reproductive tract infections in puerpera, complication with basic diseases were independent risk factors for postoperative infection in episiotomy of puerpera, suggesting that there are many related risk factors for postoperative infection in episiotomy of puerpera. The higher BMI are, the higher body mass of puerpera, and fat excessive influences the immune of body and glucose metabolic disorder [15], which increased the risk of postoperative incision infection; Wang et al. reported that BMI was associated with postoperative incision infection, which is consistent with our results [7]. Other author showed that vaginal examination over four times is correlated with incision infection [16]. The study of Tang has revealed that long time of postoperative hospitalization can increased the risk of incision infection [17], which is in line with our research. Complication with basic diseases leads to increased risk of incision infection, of which diabetes accounted for the greater risk [16]. Because diabetic patients have metabolism disorders of protein, sugar and fat, decreased body resistance, as well as microvascular disease, causing blood circulation disorders and high glucose environment provides the conditions for the pathogenic bacteria breeding.

### *Preventive measures for the postoperative infections in episiotomy of puerpera*

Correcting body mass index, doing a good job in pregnancy education reasonable diet nutrition, controlling body quality of puerpera in a reasonable range should be conducted. Meanwhile, it is also important to strength basic diseases management of puerpera, especially puerpera with diabetes, timely treat basic diseases and improve immunity. The number of vaginal birth after birth should be minimized. Checking in indication after birth can be anus check instead of vaginal birth to avoid the destruction of genital tract defense function. Accurate treatment of premature rupture of membrane, strengthening nursing measures, and reducing the vaginal

examination of puerpera with premature rupture of membrane are also key points. Doing a good job of perineal health care, regular perineal incision povidone iodine disinfection, strengthening postpartum rehabilitation, shortening the length of stay in hospital as far as possible are also pivotal. It plays an important role to rationally use antimicrobial drugs and choose high sensitive antibiotic to prevent and treat the infection on the basis of drug susceptibility test results as well as avoid excessive use or abuse of antibacterial drugs. In conclusion, there are more pathogens and more risk factors associated with infection after episiotomy, and the corresponding measures should be taken to reduce the infection rate and prevent incision infection after episiotomy.

## Conclusion

In this study, we found that BMI, Vaginal examination, postoperative hospitalization time, premature rupture of membranes, reproductive tract infections in puerpera, and complication with basic diseases were risk factors for postoperative infection in episiotomy of puerpera. Therefore, it is urged to take corresponding intervention measures to reduce rate of postoperative infection in episiotomy and prevent incision infection.

## Ethical Considerations

The authors assert that the study is carried out in compliance with the Declaration of Helsinki of the World Medical Association, and according to a protocol approved by Medical Ethics Committee of Binzhou People's Hospital. All participants had been informed about the study gave their consent during the study period.

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