


# ***Antibiotics for the treatment of pelvic infections***

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## Surgery in OB/Gyn

<b>Mode of surgery</b>	<b>classification</b>
<b>abdominothoracic</b>  abdomen-surgery mamma-surgery	<b>clean</b>
<b>abdominovaginal</b>	<b>contaminated</b>
<b>vaginal</b>	<b>strongly contaminated</b>

## Microbiology of abdominothoracic infections (soft part infections)

**enterobacteriaceae**

**micrococcaceae**

**anaerobic germs**

## microbiology of abdominovaginal and vaginal infections

**Enterobacteriaceae**

**Micrococcaceae**

**anaerobic germs**

**Chlamydia**

**Ureaplasmas**

**others**

**polymicrobial infections**



**ascending infections**

## isolates from surgical site infections (%)

	Robert-Koch-Institute, 1997-2002, OP-KISS		Großhadern, 2000- 2003 (Grabein, 2005)
causative agent	general and abdominal surgery	OB	OB/GYN
<i>S. aureus</i> (%MRSA)	12,2 (15,1)	18,8 (4,7)	1,8 (0,4)
enterococci	12,6	6,9	13,9
<i>E. coli</i>	22,2	3,1	14,5
<i>P. aeruginosa</i>	4,2	0,7	1,1
<i>Klebsiella spp.</i>	3,5	0,7	3,0
staphylococci (K-)	4,4	10,0	13,8
<i>Enterobacter spp.</i>	3,1	0,7	0,8
streptococci (hematolytic)	4,8	6,4	10,6 (4,6)

## CDC-definitions for surgical site infections (SSI):

([www.rki.de](http://www.rki.de))

- within 30 days after surgery  
(implantations: 1 year)
- **A1: superficial incisional SSI**  
infection involves only skin or subcutaneous tissue of the incision
- **A2: deep incisional SSI**  
infection involves deep soft tissue (i.e. fascial and muscle layers) of the incision
- **A3: organ/space SSI**  
infection involves any part of the anatomy, other than the incision, which was opened or manipulated during an operation

## Surgical site infections (SSI) – definitions (CDC)

- **SSI rate:** number of infections/100 operations
- **indicator operations in OB/GYN:**
  - cesarean section
  - vaginal and abdominal hysterectomy
  - mastectomy

## Surgical site infections (SSI) - definitions

- **risk-index:** NNIS (National Nosocomial Infections Surveillance System of CDC)
  - patient's preoperative physical status:  
1 point if ASA - score is 3 or higher  
ASA-score: American Society of Anesthesiologists, 1: healthy patient, 2: patient with mild systemic disease, 3: patient with severe systemic disease, 4: patient with incapacitating systemic disease, 5: moribund patient
  - intrinsic microbial contamination of surgical site:  
1 point if contaminated or dirty/infected
  - duration of operation:  
1 point, if operation lasts longer than 75% of all operations of this indicator operation



**risk index category 0-3**

## Surgical site infection rates

		Robert-Koch-Institut, 2000-2005, OP-KISS		CDC, Atlanta, 1992- 2004, NNIS Report	
operation	risk index category	number of operations	infection rate	number of operations	infection rate
vaginal hysterectomy (duration cut point > 93 Min.)	0	1878	0,37	29.857	1,31
	1	769	0,39		
	2,3	112	0		
	all infections A3				
abdominal hysterectomy (duration cut point > 123 Min.)	0	4770	1,72	49.024	1,36
	1	2595	2,93	24.064	2,32
	2,3	587	4,43	5.053	5,17
1,74% A1; 0,41% A2; 0,16% A3					

## Surgical site infection rates

		Robert-Koch-Institut, 2000-2005, OP-KISS		CDC, Atlanta, 1992- 2004, NNIS Report	
operation	risk index category	number of operations	infection rate	number of operations	infection rate
sectio cesarea (duration cut point >45 Min.)	0	44.937	1,38	154.141	2,71
	1			46.081	4,14
	2,3			4.871	7,53
			1,13% A1; 0,18% A2; 0,06% A3		
mastectomy (duration cut point > 95 Min.)	0	10.426	0,91	16.287	1,74
	1	5.788	1,87	10.700	2,20
	2,3	830	3,13	1.112	3,42
			0,94% A1; 0,32% A2; 0,08% A3		

## Surgical site infection rates

		Robert-Koch-Institut, 2000-2005, OP-KISS		OB/GYN Großhadern, 2004	
operation	risk index category	number of operations	infection rate	number of operations	infection rate
vaginal hysterectomy (duration cut point > 93 Min.)	0	1878	0,37	51	1,96
	1	769	0,39		
	2,3	112	0		
	all infections A3				
abdominal hysterectomy (duration cut point > 123 Min.)	0	4770	1,72	202	3,47
	1	2595	2,93		
	2,3	587	4,43		
		1,74% A1; 0,41% A2; 0,16% A3			

## Surgical site infection rates

		Robert-Koch-Institut, 2000-2005, OP-KISS		Großhadern, Frauenklinik	
operation	risk index category	number of operations	infection rate	number of operations	infection rate
sectio cesarea (duration cut point >45 Min.)	0	44.937	1,38	495	0,2
	1				
	2,3				
	1,13% A1; 0,18% A2; 0,06% A3				
Mastectomy (duration cut point > 95 Min.)	0	10.426	0,91	458	3,3
	1	5.788	1,87		
	2,3	830	3,13		
	0,94% A1; 0,32% A2; 0,08% A3				

## Postoperative infections - frequencies

<b>infection</b>	<b>Frequency (%)</b>
<b>urinary tract infection</b>	<b>30%</b>
<b>soft tissue infection</b>	<b>20%</b>
<b>sepsis</b>	<b>&lt; 1%</b>

## Mortality related to pregnancy (Bavaria)

	1983-88	1989-94	1995-2000	2001-04
total (thereof during and after sectio)	96 (44)	63 (26)	72 (35)	23 (15)
pregnancy	21%	30%	21%	26%
birth	10%	3%	4%	-
childbed	69%	67%	75%	74%
live births	699.663	793.222	756.426	341.318
mortality/100.000 live births	13,7	7,9	9,5	6,7
direct mortality /100.000 live births	11,3	5,5	5,4	5,6

# Antibiotics for the treatment of pelvic infections

<b>complication</b>	<b>1983-88</b>	<b>1989-94</b>	<b>1995-2000</b>	<b>2001-04</b>
<b>thrombo-embolism</b>	<b>24</b>	<b>13</b>	<b>20</b>	<b>7</b>
<b>(embolism of amniotic fluid)</b>	<b>6</b>	<b>3</b>	<b>9</b>	<b>4</b>
<b>haemorrhage</b>	<b>16</b>	<b>10</b>	<b>8</b>	<b>3</b>
<b>sepsis</b>	<b>12</b>	<b>7</b>	<b>5</b>	
<b>hypertensive illness</b>	<b>10</b>	<b>8</b>	<b>4</b>	<b>7</b>
<b>anesthetic complication</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>1</b>
<b>abort</b>	<b>8</b>	<b>0</b>	<b>3</b>	<b>3*</b>
<b>extrauterine gravidity</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>others</b>	<b>1</b>	<b>1</b>	<b>0</b>	
<b>total</b>	<b>79</b>	<b>44</b>	<b>41</b>	<b>22</b>

\* one septic abort

- **1995-2004: 208.547 sectio cesarea**  
**no sectio letality, i.e. no death of preoperative healthy mother because of genital sepsis**  
**one septic death after sectio with preoperative amnion infection syndrome**
- **1995-2000:**  
**4 deaths because of a-streptococcal sepsis after spontaneous birth**
- **seit 2001**  
**no further deaths because of a-streptococci reported**

## Life threatening wound infections

- **TSS** (streptococci, staphylococci)

in 2200 hospitals in Germany 2004

**48 Fälle**

- **necrotising fasciitis**

type I: mixed infections (90%)

type II:  $\beta$ -hemolytic streptococci (10%)

## necrotizing fasciitis:

### clinic:

- erythema, redness → dusky/purplish skin discoloration
- compartment-syndrome
- formation of blisters
- systemic symptoms (fever, leucozytosis, CRP ↑, ESR ↑)
  
- type I (mixed infection): 30 % formation of gas
- type II (a- Streptococci): initially heavy pain  
(„pain out of proportion“) →  
painlessness  
  
rarely formation of gas

## necrotizing fasciitis:

### causes:

1. Direct bacterial invasion through local tissue injury
  - trauma, often bagatell-trauma
  - operation
2. ongoing infection (erysipelas, phlegmon)
3. No detectable reason (> 50%)

### complications:

- |                        |     |
|------------------------|-----|
| 1. toxic shock und DIC | 80% |
| 2. renal failure       | 80% |
| 3. ARDS                | 55% |

## necrotizing fasciitis:

### diagnostics:

1. preanalytics: punctate/tissue biopsy better than swab
2. lab: microbiology (gram stain, culture, detection of antigens)  
    clinic-chemical lab
3. Imaging studies: radiographs, CT, MR

### therapy:

1. surgery
2. antibiotic therapy
3. Intensive care
4. hyperbaric oxygen treatment (HBO)



**emergency!!! Don't miss time!!!**

# Antibiotics for the treatment of pelvic infections



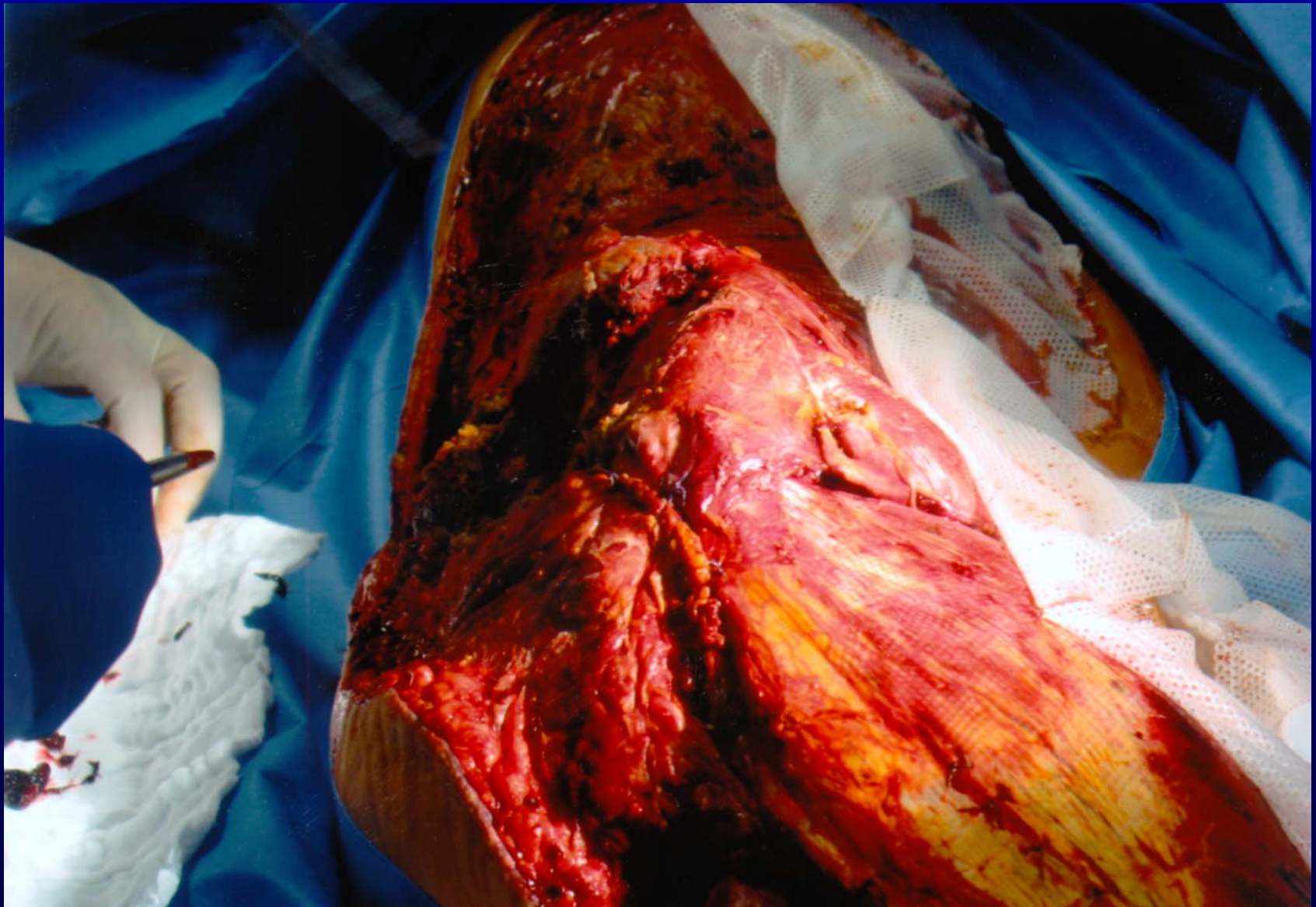
# Antibiotics for the treatment of pelvic infections



# Antibiotics for the treatment of pelvic infections



# Antibiotics for the treatment of pelvic infections



## Therapy

polymicrobial antibiotics



combinations of antibiotics



„power“-antibiotics

## i.v. antibiotics-regime for the treatment of surgical site infections

### 1. Localized infections with minimal systemic findings

<b>antibiotic</b>	<b>dose (g)</b>	<b>time interval (Std.)</b>
<b>Cefotaxime</b>	<b>1</b>	<b>8</b>
<b>Cefotetan</b>	<b>2</b>	<b>12</b>
<b>Cefoxitin</b>	<b>2</b>	<b>6</b>
<b>Ceftriaxone</b>	<b>1*2, dann 1</b>	<b>24</b>
<b>Piperacillin</b>	<b>4</b>	<b>6</b>
<b>Ampicillin/Sulbactam</b>	<b>3</b>	<b>6</b>
<b>Mezlocillin</b>	<b>4</b>	<b>6</b>
<b>Ticarcillin/Clavulanic acid</b>	<b>3.1</b>	<b>4-6</b>

## i.v. antibiotics-regime for the treatment of surgical site infections

### 2. extensive infections with moderate to severe systemic findings

<p><b>clindamycin</b>, 900 mg every 8 h. + <b>gentamicin</b>, 2.0 mg/kg, then 1.5 mg/kg every 8 h. (+ ampicillin, penicillin, vancomycin f. enterococci, possibly linezolid, quinupristin/dalfopristin for vancomycin-resistant enterococci)</p>	<p><b>ampicillin</b>, 2.0 g, then 1 g every 4 Std. + <b>gentamicin</b>, 2.0 mg/kg, then 1.5 mg/kg every 8 Std. + <b>metronidazole</b>, 500 mg every 8 Std.</p>	<p><b>Imipenem /cilastatin</b> 500 mg to 1000 mg, every 6 Std. ⊕ mero-penem 3*1g, i.m.</p>	<p><b>levo-floxacin</b>, 500 mg every 24 Std. + <b>metronidazole</b>, 500 mg every 8 Std.</p>
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## necrotising skin- and soft tissue infections: therapy

- penicillin i.v. 25-30 M IU/d
- clindamycin (inhibits toxin production,  
immunomodulatory effects)

For mixed infections additionally:

- meropenem
- vancomycin, linezolid
- **tigecyclin**

**obstetrics**

only:

**cephalosporins**

**penicillins**

**makrolids**

**carbapenems**

## prophylaxis

soft tissue infections

wound infections

urinary tract infections

## prophylaxis

- **gynecology:** long lasting operations  
vaginal operations
- **obstetrics:** secondary labor  
> 6 h after rupture of membranes

## strategy

**infections commissioner**

**expert for antibiotics**

**specialist for infectiology**

## strategy

sterility – hygiene

nosocomial management

application of antibiotics

method of operation

suture material

**gynecology + obstetrics**



**„contaminated area“**



**suture-Triclosan**

# Thank you!

