Perioperative Antibiotic Prophylaxis

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Nothing to Disclose
Principles of Prophylaxis

• Dose just prior to surgery
• Dose with agent effective for site
• Dose to meet MIC needs
• Deliver IV
• Stop within 24 hours
Timing

Antibiotic given >3 hours late – ineffective
Burke. 1973

Premature administration > infections
Delayed administration > infections
Classen. 1992

Lack of intra-operative redosing may contribute to SSI
Miliani et al. 2009
Does Dose Matter?

Cefazolin 500 mg — 33% infection

Cefazolin 1 gm — 18% infection

Cefazolin 2 gm — 9% infection

Johnson et al. 1980’s
Effect of Overuse (Misuse)

- Cost
- Toxicity
- Development of resistant organisms
Perioperative Antibiotics in Otolaryngology

- Tonsillectomy
- Septoplasty/rhinoplasty
- Otologic surgery
- Clean head and neck surgery
- Contaminated head and neck surgery
What is the possible impact of antibiotic administration after tonsillectomy?

1) reduce pain
2) speed recovery
3) reduce halitosis
4) reduce hemorrhage
5) speed return to activity
Tonsillectomy

Meta-analysis only RCT 5 trials

- Fever + antibiotic
- Halitosis + antibiotic
- Time to reduced pain - no diff
- Need for pain meds - no diff
- Time to normal diet - no diff

Dhiwakar et al. 2006
How Could Antibiotic Administration Impact Septorhinoplasty?

1) reduce edema
2) eliminate infection
3) avoid septal perforation
4) reduce epistaxis
5) increase cost and toxicity
Prophylaxis in Septorhinoplasty

RCT 200 patients

single shot antibiotic vs 7 days of Rx

outcome 0% vs 3%

side effects 2% vs 29%

Rajan et al. 2005
Prophylaxis in Septorhinoplasty

Prospective 35 patients

Placebo vs 1 day vs 7 days

No diff in pain, fever, purulent secretion

Caniello et al. 2005
In the Setting of Nasal Packing – How Does Antibiotic Administration Help?

1) reduce smell
2) prevent toxic shock
3) reduce fever
4) speed recovery
5) prevent bacteremia
Packing in Nasal Surgery

RCT 110 patients
Antibiotic impregnated pack vs plain pack
Antibiotic pack reduced flora
(no infections seen)

Bandhauer et al. 2002
Toxic Shock Syndrome

Fever, rash, hypotension, desquamation, multi-organ involvement

Staph aureus enterotoxin

30+% of normals are staph carriers
(Perhaps 10% produce toxin)
How to Prevent Toxic Shock?

Avoid nasal packing
Use pack material which does not support bacteria
Coat pack with antibiotic
Remove packing promptly
Otologic Surgery

Cochlear implant 292 patients
Single dose better than multi-day

Meta analysis 11 studies
No diff - graft failures, drainage

Basavaraj et al. 2004
Verschuur et al. Cochran data, 2004
Special Considerations with Cochlear Implants

PCV 13
23 valent pneumococcal conjugate vaccine
children age 6-71 weeks
licensed 2/2010
Patterns of Antibiotic Prophylaxis for Thyroidectomy and Parathyroidectomy
Thyroid/Parathyroid

275 surveyed
   62% almost never use
   26% almost always

Surgical site infection  5/4541 (0.11%)

Clark et al. 2010
Clean Neck Dissection

Retrospective  108 patients
    no antibiotic vs Augmentum

Outcome  2% vs 13%  (p=.02)

Seven et al. 2004
Clean Neck Dissection

200 patients - retrospectively evaluated
100 received antibiotics  3% infection
100 received no antibiotic  9% infection
p > .05

BUT 3% does not = 9%  B = 0.5

Carrau et al. 1991
Clean Neck Dissection

N = 273  (2006-2010)

<table>
<thead>
<tr>
<th>Group</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>No drug</td>
<td>0/41</td>
<td></td>
</tr>
<tr>
<td>Intraop</td>
<td>4/157</td>
<td>2.5%</td>
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<tr>
<td>More</td>
<td>5/75</td>
<td>7.1%</td>
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Overall (3.3%)
OR 1.35 with each additional hour of surgery

Man et al. 2011
What about major head and neck surgery?

Clean contaminated
Risk of Wound Infection

Clean

Clean-contaminated

Contaminated (gross spillage)
Clean Contaminated Head and Neck Surgery

Placebo controlled trials - up to 87%
RCT’s with antibiotic risk 3-17%

Thyroidectomy – parotidectomy
infection rates with no drug 1-5%
Issues to Discuss

Choice of drug
Timing of administration
Route of administration
Duration of administration
Randomized Clinical Trials

Stratified for risk
Prospective in design
Double blind
Objective outcome measures
Primary endpoint: wound infection
Risk Stratification Procedures

Prior radiation vs none
Advanced stage vs early stage
Neck dissection vs no neck dissection
Flap reconstruction vs primary closure
Post-Op Assessment

O no erythema
I < 1 cm erythema
II 1-3 cm erythema
III diffuse erythema
IV purulent drainage
V fistula
What We Learned Along the Way

• Prior radiation = no prior radiation (but the radiated patients had far worst problems)
  
  Johnson. 1989

• Neck dissection – no real impact
• Primary closure 5% - flap reconstruction 20%
• Stage probably reflects other issues (duration and complexity of surgery, immune/nutritional issues)
Variables Which Impact Outcome

Preoperative preparation
  nutrition, systemic disorders, dental infection

Intraoperative considerations
  hemostasis, gentle tissue handling, careful closure, drainage

Post operative care
  nutrition, wound & drain care, trach care
Timing of Administration

Nothing special in head and neck

Begin prior to incision (0-2 hours)
Choice of Antibiotic

NORMAL ORAL FLORA
1-10 million organisms/cc saliva
   90% anaerobic gram negative
   10% aerobic gram positive
most produce β-lactamase

No gram neg enterics (*E coli, Pseudomonas*) exception
“old trach”
Choice of Drug

Effective against oral flora (β-lactamase producers)
clindamycin
ampicillin-sulbactam (Unasyn)
cephalosporins (2nd choice)
Route of Administration

Intravenous
   effective blood and tissue levels in minutes

Topical (effective in colon – rarely employed alone)
Timeline – Bugs/CC Laryngectomy and Bilateral Neck Dissection

Grandis et al. 1994
Do Topicals Enhance Intravenous?

We couldn’t prove it

High risk patients

IV alone vs IV plus topical

Grandis et al. 1994
What about Duration?

Isn’t more always better??
Duration of Prophylaxis

1 day vs 5 days - no diff

Brand et al. 1982
Major Head and Neck

RCT  74 patients

1 day vs 5 days

Outcome  no diff

Carroll et al. 2003
Prophylaxis in High Risk Patients

109 flap patients
1 day vs 5 days
20% vs 25%

p > 0.05

Johnson et al. 1992
Bacteremia

- Heart valves
- Orthopedic appliances
  - American Heart Association
  - CDC recommendations
Pulmonary Complications: After Major Head-Neck with Trach

RCT 73 patients
No antibiotic vs 5 days Augmentum
Outcome 40% pulmonary infection
no diff
(p=0.57)

Ong et al. 2004
Antibiotic Prophylaxis for Pneumonia

- Introduction of antibiotic in susceptible population selects for resistant organisms

  Petersdorf 1950’s

- Elimination of Legionella = no change in rate of nosocomial pneumonia in susceptible patients

  Johnson et al. 1985
What’s New in Prophylaxis?

Not much!

- The principles remain the same
- New patterns of drug resistance
- New drugs
- New opportunities for pre-op prep
- Enhanced knowledge of nutrition
- New surgical techniques
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Heal with Steel
Timeline – Bugs/CC Laryngectomy and Bilateral Neck Dissection