Incident HIV Associated with Rectal Gonorrhea and Chlamydia Independent of Sexual Behavior in Men who have sex with Men

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BACKGROUND

• Rectal gonorrhea (GC) and chlamydia (CT) are associated with HIV acquisition1,2
• STI and HIV share the same causal pathway through sex
• It is unclear if this association is due to biology or behavior

1- Bernstein et al. JAIDS 2010
2- Pathela et al. CID 2013

AIM

• To determine whether the association between concurrent and prior rectal GC and CT infection and HIV diagnosis is independent of receptive anal sexual behavior

METHODS

• Retrospective case-control study
• Clinical data from Public Health— Seattle & King County STD Clinic, 2001 – 2014

METHODS

• Cases: Persons with new HIV diagnoses who tested HIV-negative ≤12 months
• Controls: Tested HIV-negative & matched 4:1 on year
• Exclusion criteria:
  – Concurrent syphilis infection
  – No rectal GC/CT test at visit
  – Incomplete sexual behavior data

METHODS

• Sexual behavioral data collected as part of clinical care
  – Clinician collected until 2010
  – 2010-14 – CASI collection ~75% persons
  – Questions ask about condom use in aggregate by partner HIV status and anal sex role

<table>
<thead>
<tr>
<th>Partner HIV Status</th>
<th>Any Receptive Anal Sex</th>
<th>Condom Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>HIV+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV-</td>
<td></td>
<td></td>
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<tr>
<td>HIV unknown</td>
<td></td>
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</tbody>
</table>
METHODS

• Covariate: Sexual Behavior Categories
  – No receptive anal intercourse in 12 months
  – Condoms with ALL receptive anal intercourse (RAI)
  – Condomless RAI ONLY with HIV-negative partners
  – Condomless RAI with HIV-positive/unknown partners

• Logistic regression with robust standard errors to estimate odds ratio (OR) for association between rectal GC/CT and HIV

• Step-wise addition of variables
  – Univariate models (3):
    • Current Rectal GC, Current Rectal CT, and History of rectal GC or CT <12 months
  – 1st Multivariable model: Confounders
    • age, race, number of sex partners <2 months, methamphetamine use in prior year, calendar year, other rectal infection (GC or CT respectively, and <12 month)
  – 2nd Multivariable model: Sexual behaviors/Mediating Variables
    • Sexual behavior categories: no RAI, condoms always for RAI, condomless RAI with HIV negative, condomless RAI with HIV-positive/unknown

RESULTS: Study Population

<table>
<thead>
<tr>
<th></th>
<th>Controls N=704</th>
<th>Cases N=176</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, SD)</td>
<td>33.0 (10.2)</td>
<td>31.4 (9.3)</td>
<td>0.061</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td>0.002</td>
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<tr>
<td>White (non-Hispanic)</td>
<td>488 (69.3)</td>
<td>111 (63.1)</td>
<td></td>
</tr>
<tr>
<td>Black (non-Hispanic)</td>
<td>30 (4.3)</td>
<td>15 (8.5)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>66 (9.4)</td>
<td>5 (2.8)</td>
<td></td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>43 (6.1)</td>
<td>14 (8.0)</td>
<td></td>
</tr>
<tr>
<td>Native American/Alaskan Native</td>
<td>5 (0.7)</td>
<td>2 (1.1)</td>
<td></td>
</tr>
<tr>
<td>Unknown/other*</td>
<td>72 (10.2)</td>
<td>29 (16.5)</td>
<td></td>
</tr>
<tr>
<td>Number of sexual partners in &lt;2 months (mean, SD)</td>
<td>3.4 (4.3)</td>
<td>4.7 (5.7)</td>
<td>0.004</td>
</tr>
<tr>
<td>Methamphetamine use</td>
<td>96 (13.6)</td>
<td>51 (29.0)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Association of HIV diagnosis and Rectal STI among MSM in Seattle STD Clinic: Univariate Analyses

Association of HIV diagnosis and Rectal STI among MSM in Seattle STD Clinic: Multivariate Analyses – Model 1
Association of HIV diagnosis and Rectal STI among MSM in Seattle STD Clinic: Multivariate Analyses – Model 2

SUMMARY
- Concurrent rectal GC and CT confer a 2-3 fold increase risk of new HIV diagnosis, even after controlling for behavioral risk factors and other covariates
- Prior rectal GC/CT infection in the past year increases the risk of HIV by 3-fold

LIMITATIONS
- Retrospective data
- Subject to recall and social desirability bias
- Residual confounding possible
- Generalizability unknown

CONCLUSIONS
- Rectal gonorrhea and chlamydia are independent risk factors for HIV.
  - This finding is consistent with GC and CT playing a causal role through a biological mechanism
- Findings support STI prevention and control as an HIV prevention intervention

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