The Forensic Evaluation of Sexually Transmitted Diseases

VFPMS seminar 2016

Jo Tully

Why should we worry?

- Incidence of many STD's increasing
- Risk = difficult to determine
  - Increased when genital injury present
  - Increased with other genital lesions (other STD)
- Increasing antibiotic resistance eg. gonorrhoea
- Forensic evaluation for CSA challenging – many uncertainties
- Children different epidemiology from adults??
  - Seattle 1990 SA adults = 43% +ve STD <72 hours
  - Infrequent…rare… in children?

Infidelity

Immorality

Serious criminal offending

STD's are unique infections because they may imply…..

Case-based discussion relating to opinion formulation – gonorrhea, chlamydia, HSV, HPV and Hepatitis B in adolescence

General points

- STD's in pre-pubertal children are RARE
- Children with STD's - often other features of CSA
- Genital STDs in pre-pubertal children are usually SYMPTOMATIC (Dx, pain, abnormal exam)
- Extra-genital sites (oropharynx and rectum) are usually ASYMPTOMATIC
- Presence of certain STDs beyond the incubation period of congenital/perinatal transmission = red flag
- **Mode of transmission** proves the contentious point.....

As forensic practitioners we need to ask ourselves……

"Does the identification of a sexually transmitted organism in a pre-pubertal child imply that this child has experienced sexual contact?"

Case 1

- 4 yr old girl presented to Sunshine ED - purulent vaginal Dx
- Weekend visit to grandparents and Mum
- Swabs taken, commenced amoxil, “reassured” (dad stated concern) and discharged
- No Hx STD’s in parents
- 24-48 hours later swabs – *neisseria gonorrhoea*
- Rang VFPMS – “what do we do?”
- What would you do now? Is this CSA? Level of concern?

VFPMS assessment 1

- Vaginal swab and slide – PCR and culture +ve *NG*, *mycoplasma hominis* and *ureaplasma,* negative for *CT*
- Urine NAAT – *NG* detected, *CT* not detected
- Anal swab and slide – negative
- Throat - ?
- Serology – Hep B **non-immune**, Hep C, HIV, syphilis negative

VFPMS assessment 2

- Dad - urine NAAT negative *NG*
- Brother – urine NAAT negative *NG*
- Mother – urine NAAT positive *NG*

- Treated IM cephalosporin
- (plus azithro/doxy as co-infection with chlamydia common and slows development of cephalosporin resistance)
- Hep B immunisation
- Referred ID F/U
- **Notified** to public health

VFPMS opinion

- GC in pre-pubertal children **almost always** sexually transmitted
- Vertical transmission excluded as cause
- Possibilities;
  - Mum infected by person A and then infected Chloe by close contact - Innocent
  - Mum infected by person A who also infected Chloe by sexual contact – Sexual Abuse
  - Chloe infected by person A who then infected Mum by close contact – Sexual Abuse
- Other STD's increase chance of CSA as mode of transmission

Gonorrhoea

- Gonorrhoea outside the neonatal period is strongly suggestive of CSA ("virtually" 100% *CDC guidelines 2014*)
- Period of latency of congenital eye infection..?
- **Always** notify as suspect CSA
- PID rare in pre-pubertal so no rush to Rx
- Pharyngeal and rectal infections common and often aSx so look for them
- Short incubation period – 2-3 days

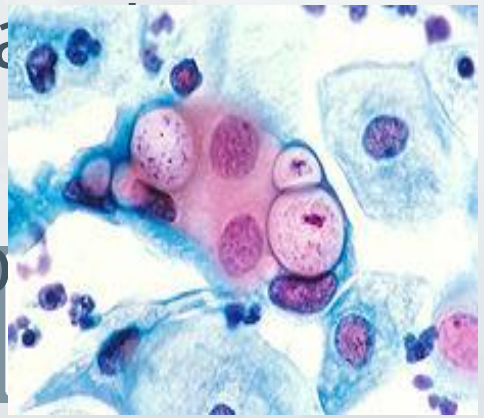
Gonorrhoea - Diagnosis

- Accurate diagnosis essential
- Urine NAAT (2 samples) for genital infections
- Culture for extra-genital sites
- Gram stains alone not sufficient
- Screen all body sites

Chlamydia

- Commonest reported STD in USA (> under 24yrs)
- PID, ectopic pregnancy, infertility
- Chlamydia infection outside neonatal period strongly suggestive of CSA BUT perinatally transmitted infection of nasopharynx, urogenital tract and rectum can persist for > 1 year (2-3 yrs?) a period of

  latency for congenital eye infectio
- **So what do we do….?**



Excellence in clinical care, research and education

Chlamydia – diagnosis

- NAAT's on urine for genital infections
- More sensitive than culture for chlamydia
- Urine NAAT is Ix of choice for genital chlamydia in girls (take a 2nd if 1st +ve)
- Culture and PCR from swabs equally sensitive
- Should take a 2nd if first +ve? False positive rate
- Culture for extra-genital sites and boys (use correct swabs)
- Full screen if identified from one site

Urine NAAT

- Not validated in children, ? PPV
- One study – only girls positive for STD's
- Only recommended for genital testing in girls
- Confirmatory testing
- Know limitations when using for CSA

Case 2

- 7 year old girl
- Disclosure to mother - 2 years of SA by father
- 1 year previously attended GP vesicular rash on inner thighs, several “flare-ups” since
- Swab demonstrated HSV-1
- Mum Hx cold sores, no Hx genital HSV, ? Dad
- Modes of transmission..? What is the probability of sexual transmission? How do we form an opinion?

HSV in childhood

- Rare (1 per million in under 11 years)
- Up to 20% of genital HSV is type 1, therefore type non-discriminatory
- Either type can cause either lesion
- Incubation period 2 days to 2 weeks, shedding period 3-4 days to 1 week
- Long latent periods, “dormancy” – can still transmit when aSx
- Should always raise the *suspicion* of CSA and prompt Ix
- Diagnosis by PCR from lesion (*not* serology)

Blistering ano-genital lesions

- VZV (chicken pox)
- Molluscum
- Staph aureus
- Bullous pemphigoid (rare)
- Aphthous ulcers (Lipschutz's ulcer)
- Syphilis (chancre)

Sexual transmission	Non-sexual transmission	Vertical transmission
Genital-genital (usually 2 but can be 1)	Auto-inoculation (typically 1)	Sx develop within first 4 weeks of life
Genital–anal (usually 2 but can be 1)	Hetero-inoculation (innocent touch by caregiver with oral or hand lesions)	Mother with genital HSV
Oral-genital (usually 1 but can be 2)		Vaginal delivery
Oral-anal (usually 1 but can be 2)		LSCS following PROM > 4-6 hrs
Digital-genital (rare)		

Modes of transmission HSV

- Which is it? CSA more likely when;
  - Older children > 5 years
  - + Genital lesions alone
  - + Type 2 HSV
- Type 1 in genital or anal area raises *possible* concern for CSA *(Adams 2001)*
- Type 2 in genital or anal area raises *probable* concern for CSA *(Adams 2001)*

But the lines are blurred….

- Seek advice

Case 3

- 3 year old girl
- Referred to VFPMS by GP with “bunches of grapes” around the anus
- Present for about a year
- Clinical appearance one of anal warts
- **What else do we need to know?**
- **Is this CSA?**
- **Would you notify police/CP?**

HPV

- Over 100 types
  - Genital warts 6 and 11 (also conjunctival, oral, nasal, laryngeal warts)
  - Cancer 16, 18 and also 31,33,35
- ASx infection common, most of us infected at some point, self-limiting in most
- 2 vaccines – quadrivalent (gardasil) – 6, 11, 16, 18 and bivalent (cervarix) – 16, 18
- Bx if atypical
- Rx ?decrease transmission
  - imiquimod, podofilox
  - Cryotherapy, surgical removal

Mode of transmission

- Congenital/perinatal
  - Periconceptually
  - Transplacentally
  - Via amniotic fluid
  - Direct exposure via birth canal
  - Ascending infection PROM
- Postnatal
  - Heteroinoculation
  - autoinoculation (nongenital HPV sources/fomite)

- **Sexual abuse**

Important points about HPV in children

- HPV DNA detected in 5-40% neonates of HPV +ve mothers *(Virology 2012,PLOS 2013, syst review 2005, Obs Gyn 1998)*
- Not all SVD's (HPV detected in sperm, amniotic fluid, placenta, cord & maternal blood)
- HPV still detected in 15% at 2 years of age (most clear in infancy but may persist well beyond)
- Unclear how often infantile infection progresses to clinical disease – long incubation periods

How can we form an opinion on mode of transmission?

- Still a dilemma
- Hx, physical examination (Hx maternal HPV)
- Age (AAP 1999 – older than 2-2 ½ more suggestive?, role of reactivation latent infection in older children? >4yrs 3 times >8yrs 12 times more likely to be abused – *Paediatrics 2005*)
- PPV HPV+ children (all ages) is about 30% for CSA (*Paeds 2005)*
- Role of screening for other STD's? *(Paeds 2005 abused kids no evidence other STI's)*

HPV - take-home messages

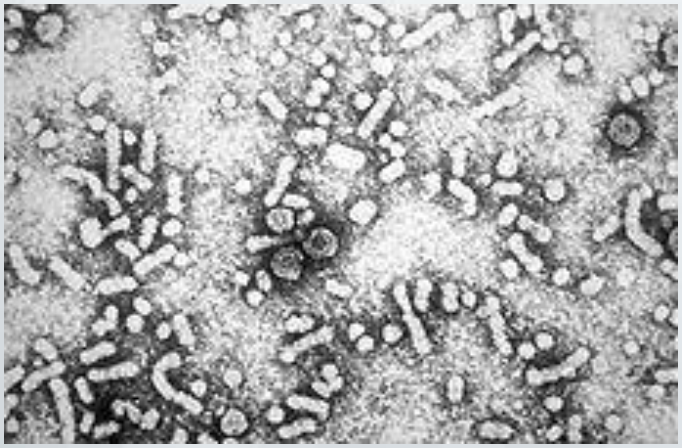
- Increasing age, increasing attribution to CSA but VT/reactivation and HI still possible/probable
- Pre-school with +ve maternal history, no disclosure/other signs/RFx reasonable to attribute to vertical transmission
- Pre-adolescent with above still could be VT/reactivation/HI (possible/probable)
- Can’t use age alone
- All need CSA evaluation? Just after school age?

Case 4

- 15 year old girl from Residential Unit, high risk
- Forensic evaluation for penetrative SA ? Ejaculation, no condom
- Alleged perpetrator older male, white Caucasian
- Attends with DHS worker, vaccination Hx unknown
- **What will you do about her Hep B risk?**

Hepatitis B

- Incubation period 6 weeks to 6 months
- Highly infectious, more stable than Hep C, HIV
- Children more likely to develop chronic infection (90% in babies, 30% <5yrs, 2-6% adults)
- HBIG protects for 3-6 months, effective, 0.06mls/kg
- Vaccine OK if already immune
- If levels <10, repeat all 3 doses
- If giving HBIG, should also vaccinate at separate site



A sensible approach…….

- Penetrative SA +/- ejaculation
  - Baseline serology in all cases THEN;
  - If known not to be vaccinated/immune or if assailant known Hep B +ve then VACCINE PLUS Ig (plus all further doses)
  - If status unknown VACCINE AND F/U re further doses (once serology known)
  - If fully vaccinated could either BOOSTER or await serology if compliant to F/U

CDC guidelines for evaluating adolescents for STD's - overview

- Urine NAAT plus serology Hep B, Hep C, Syphilis, HIV at initial visit
- Prophylaxis (azithro plus cef/metra?)
- Emergency contraception
- Hep B vaccination +/- Ig
- HPV vaccine for 9-26 year olds
- Consider HIV PEP – risk of transmission during SA…?
- NB Vaccine follow-up (Hep B needs 1 and 4-6 months, HPV 1 and 6 months)

CDC guidelines for evaluating children for STD's - overview

Which children need screening? *(CDC guidelines 2014)*

- Penetration or exam findings suggestive of recent/healed penetration injury to genitals, anus, oropharynx
- Abused by stranger
- Abused by perpetrator known to be infected or high risk (IV drugs, MSM, multiple sex partners)
- Sibling or household relative with STD
- High community rates of STD's
- Signs or Sx of STD
- Already diagnosed with one STD

How should we screen?

- *NG* – boys - **culture** from pharynx, anus, urethra.
- *NG* – girls – **culture** from pharynx, anus, vagina plus **urine NAAT** for genital infection
- *CT* – **culture** from anus and vagina (no pharyngeal specimens as yield low and perinatally acquired infection may persist) plus **urine NAAT in girls**
- *TV* – culture (NAAT being developed)
- Hep B, Hep C, syphilis, HIV - blood samples
  - Remember to follow-up

Take home messages 1

- Infections transmitted by sexual contact unless evidence of **perinatal** or ***clearly, reasonably and independently*** documented but ***rare*** non-sexual transmission
  - Genital, rectal or pharyngeal Neisseria gonorrhea
  - Syphilis
  - Genital or rectal Chlamydia Trachomatis
  - Trichomonas vaginalis
- **Strong/almost certain** likelihood of sexual transmission
- Most identified following ***symptomatic*** presentation

Take home messages 2

- Period of latency of congenital eye infection with chlamydia and gonorrhoea may be considerably longer than previously thought
- Perinatally acquired chlamydia may persist for 2-3 years
- The absence of an identified source of infection does not exclude CSA
- **The presence of an STD in pre-pubertal children outside the neonatal period should almost always prompt a CSA evaluation**

Infection type	Evidence for CSA	Suggested action
Gonorrhoea *	Diagnostic	Report
Syphilis *	Diagnostic	Report
HIV **	Diagnostic	Report
Chlamydia *	Diagnostic	Report
Trichomonas *	Highly suspicious	Report
Anogenital warts *	Suspicious	Consider report ^#
Genital HSV	Highly suspicious (type 2 especially)	Report ^
Bacterial vaginosis	Inconclusive	Medical follow-up

* if not likely to be prenatally acquired and RARE non-sexual vertical transmission excluded

**if not likely to be acquired perinatally or through transfusion

^ unless there is a clear Hx of auto-inoculation

report if there is additional evidence to suspect abuse including Hx, physical exam or other STI's

References

- CDC guidelines 2014
- Adams, J et al *Updated guidelines for the medical assessment and care of children who may have been sexually abused* J Paed & Adol Gynae 2015 accepted manuscript
- Reading et al *Gonorrhoea, chl;amydia, syphilis and trichomonasd in children under 13 years of age: national surveillance in the UK and Republic of Ireland* Arch Dis Child 2014; 99: 712-716
- Kelly, P *Does sexually transmitted infection always mean sexual abuse in ypung children?* Arch Dis Child 2014; 99 no 8 editorial
- Bechtel *Sexual abuse and sexually transmitted infections in children and adolescents* Current Opinion Paed 2010; 22
- Hammerschlag *Sexual assault and abuse of children* Cl Inf Dis 2011; 53
- Reading et al *Evidence for sexual transmission of genital herpes in children* Arch Dis Child 2007; 96
- Hornor *Anogenital Herpes in children* J paed HC Vol 20 No 2