

Non-gonococcal urethritis, *Helicobacter pylori* infection and fellatio: a new ménage à trois?

There have been a number of organisms that are associated with sexually transmitted urethritis (see Table 1); however, the majority of non-gonococcal urethritis cases (up to 50 %) are due to *Chlamydia trachomatis* (Shahmanesh, 2001). No other micro-organism has been shown to cause any larger proportion of the remaining non-gonococcal urethritis cases, although a large number of organisms have been isolated from the urethra of young males (Kumar *et al.*, 1995). In addition, oral sex is a very common sexual activity with nearly 80 % of single whites and almost 50 % of African Americans engaging in the activity, although variations in the prevalence of oral sex exist due to differences in gender, marital status, race and ethnicity (Billy *et al.*, 1993). *Helicobacter pylori*, a gastric organism discovered more than 20 years ago, is responsible for chronic gastritis and peptic ulcer disease and is associated with an increased risk of developing stomach cancer (Eslick *et al.*, 1999).

Table 1. Organisms that cause or are associated with sexually transmitted urethritis

Organism	No. of cases (%)
Gonococcal	
<i>Neisseria gonorrhoeae</i>	
Non-gonococcal	
<i>Chlamydia trachomatis</i>	15–50
<i>Ureaplasma urealyticum</i>	10–40
Other	20–40
<i>Mycoplasma genitalium</i>	15–25
<i>Trichomonas vaginalis</i>	Rare
Yeasts	Rare
Herpes simplex virus	Rare
Adenoviruses	Rare
<i>Haemophilus</i> sp.	Rare
Other bacteria? (<i>Helicobacter</i>)	Unknown

H. pylori infection has also been implicated in numerous enterohepatic and extragastric diseases (Eslick *et al.*, 2002; Solnick & Schauer, 2001; On *et al.*, 2002).

The aim of this article is two-fold: firstly, to postulate that *H. pylori* may be transmitted sexually through the act of fellatio and thus, secondly, to highlight the possibility that *H. pylori* may be another micro-organism responsible for urethritis among males.

The idea that *H. pylori* or another species of *Helicobacter* could cause urethritis has never before been proposed. There have been three conflicting studies conducted to determine if sexual contact plays any role in the transmission of *H. pylori* (Aceti *et al.*, 1987; Polish *et al.*, 1991; Perez-Perez *et al.*, 1991). These studies were inadequate in terms of sample size, study design and causal information regarding sexual practices by the participants.

Non-gonococcal urethritis is predominantly developed through sexual activities, although rare reports exist of non-sexual transmission (Kleist & Moi, 1993; David, 1997). The sexual routes for the transmission of urethritis among males include vaginal intercourse, anal intercourse and oral sex (Martinez-Garcia *et al.*, 1996; Jensen *et al.*, 1993; Burstein & Zenilman, 1999). Moreover, uropathogens including *Escherichia coli* have been shown to be sexually transmitted between sex partners (Foxman *et al.*, 1997). Oral sex (fellatio) is one of the main routes for the spread of common oral flora (Group A β -haemolytic streptococci, *Neisseria meningitidis*) causing pathology (Fisk & Riley, 1995; Edwards & Carne, 1998). Studies have reported that 0–90 % of *H. pylori*-infected individuals may permanently/transiently carry *H. pylori* in their mouth and saliva, from which further infections may arise (Dowsett & Kowolik, 2003; Thomas *et al.*, 1997). The bacterial load of *H. pylori* in saliva has not been estimated; however, if techniques like PCR can detect low numbers of the bacteria then this suggests that *H. pylori* may exist in sufficient quantity to have pathogenic consequences (Dowsett & Kowolik, 2003).

What about the urethral tissue – can

H. pylori live or colonize in this location? It must be remembered that *H. pylori* does not invade the tissues of the host to any great extent, it is a mucosal pathogen. The urethral epithelium varies depending on the location within the urethra. For example, the navicular fossa can have either stratified squamous or stratified columnar ciliated epithelium (Sternberg, 1997). *H. pylori* usually colonizes the gastric columnar epithelium, but can survive on the squamous epithelium of the mouth (tongue, cheek, palate) (Thomas *et al.*, 1997; Parsonnet *et al.*, 1999). Thus, *H. pylori* could inhabit the urethra and perhaps colonize the tissues leading to inflammation and/or pathology.

The natural infective dose of *H. pylori* is unknown. Based on the analogy of other enteric pathogens (*Shigella*, *Giardia lamblia*, *Entamoeba histolytica*) it has been suggested that the infectious dose of *H. pylori* is small (Feldman *et al.*, 1998). If the minimum infective dose of *H. pylori* is small, then the chance of a urethral infection is greater than if a high inoculum were needed. One would suspect that low doses of *H. pylori* should be sufficient to causes urethritis given the correct environmental conditions of temperature and pH.

If *H. pylori* can survive in the extreme acidic environment of the stomach, can it live in the urethra with acidic/neutral or even alkaline urine flowing through it? Based on previous studies of *H. pylori* and environmental pH it is possible for *H. pylori* to survive in pH ranges between 2.2 and 7.2 (Clyne *et al.*, 1995). Moreover, the optimal pH for *H. pylori* survival is between 4.5 and 7.0 which is also the pH range for human urine. The urinary tract may provide an ideal environment for *H. pylori* to thrive in once colonization has been established. Will the flow of urine affect the colonization of *H. pylori*? I suspect no more than any other sexually transmitted infection. In the stomach, *H. pylori* adheres to gastric epithelium using adhesins interacting with the host-cell receptor (Noach *et al.*, 1994). It does this to avoid being washed away into the intestines by peristalsis. The urethra should support *H. pylori* (microaerophilic) just as it does a number of other organisms (i.e. lactobacilli, enterococci, β -haemolytic streptococci) (Kumar *et al.*, 1995).

In conclusion, oral sex is one of the most common sexual practices in the world and it is possible that *H. pylori* could be transmitted via the act of fellatio to the urethra leading to infection. This organism may be the 'missing link' in explaining the large proportion of males with non-gonococcal urethritis where no other responsible organisms can be isolated. This is the first article to suggest a link between *H. pylori* infection and urethritis. Studies will be required to determine if *H. pylori* is transmitted via oral sex to the urethra; what, if any, interactions might occur with other uropathogens; if any pathologies arise from such an association [e.g. prostate (prostatitis), epididymitis, seminovesiculitis, testicles (orchitis, cancer) and urinary calculi]; and potential treatment modalities.

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DOI 10.1099/mic.0.26945-0