

Helicobacter pylori: a sexually transmitted bacterium?

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Introduction Oral sex (fellatio) is a very common sexual activity. *H. pylori* is mainly a gastric organism, but studies have reported that infected individuals may permanently or transiently carry *H. pylori* in their mouth and saliva.

Material and methods A Pubmed search was conducted using the words infection, oral sex and urethritis. **Results** The existing studies support the hypothesis that *H. pylori* could be a causative agent of non-gonococcal urethritis.

Conclusions It is possible that *H. pylori* may be transmitted via the act of fellatio in the urethra. Further research is required to explore the role of *H. pylori* in sexually transmitted urethritis.

Key Words: *H. pylori* ◊ oral sex ◊ urethritis

INTRODUCTION

There are a large number of microorganisms associated with sexually transmitted urethritis (Table 1). *Chamydia trachomatis* remains the most important cause of non-gonococcal urethritis (up to 50%) [1], although a large number of other microorganisms are considered to be causative agents of non-gonococcal urethritis [2].

Helicobacter pylori (*H. pylori*) is a microaerophilic Gram (–) bacterium. It was first discovered in 1982 in stomach specimens of patients with gastritis and peptic ulceration [3]. *H. pylori* is a gastric organism of humans and animals and constitutes the main cause of chronic disorders of the digestive system, such as active chronic gastritis, peptic ulcer, dyspepsia, cancer and MALT lymphoma. The exact mode of transmission remains essentially unknown while the most plausible route of transmission is considered to be the faecal – oral route [4]. *H. pylori* is usually acquired in childhood [5]. The bacterium is detected more frequently in the developing world. Many healthy people without a history of gastropathy have antibodies against *H. pylori* in their blood and the frequency increases with age. Very high percentages of positive antibodies, up to 90%, have been found in members of families with *H. pylori*-infected

Table 1. Organisms associated with sexually transmitted urethritis

Neisseria gonorrhoeae
Chlamydia trachomatis
Ureaplasma urealyticum
Mycoplasma genitalium
Trichomonas vaginalis
Yeasts
Herpes simplex virus
Gardnerella vaginalis
Helicobacter?

individuals, presumably from inter familial transmission [6].

Review of current studies

Sexual transmission of non-gonococcal urethritis in men includes vaginal intercourse, anal intercourse and oral sex [7]. Fellatio constitutes a significant route for the spread of common oral flora (Group A β -haemolytic streptococci, *Neisseria meningitidis*) causing pathology [8, 9]. Of the known urethritis

causing pathogens, syphilis, chlamydia, herpes and fungi can be transmitted via oral sex [8].

Studies have reported that 0–90% of *H. pylori*-infected individuals may permanently or transiently carry *H. pylori* in their mouth and saliva, thus creating a possible route of transmission from infected to non-infected people via oral sex [10, 11]. Recently, a hypothesis has emerged that *H. pylori* could be transmitted via oral–genital contact and may be associated with urological diseases, such as urethritis, MALT lymphoma of the urinary bladder, chronic prostatitis and prostate cancer. However, this hypothesis has many gaps and therefore needs to be investigated and proven [12, 13].

One important issue that must be taken into consideration is whether the epithelium of the urethra is appropriate to support *H. pylori* colonization in order to cause further infection. *H. pylori* usually colonizes the gastric columnar epithelium, but it also colonizes the squamous epithelium of the mouth (tongue, cheek, palate), as mentioned above [14, 15]. Thus, *H. pylori* could inhabit the urethra, which also consists (depending on the location) of squamous epithelium and perhaps this colonization of the tissues could lead to inflammation and/or pathology [4].

Another factor to be considered is the pH prevailing in the area of infection, i.e. whether it is suitable for installation and proliferation of the bacterium. *H. pylori* has the ability to survive in the very low pH of the stomach using the enzyme urease to break down urea into ammonia, thus creating an alkaline mist, which protects it from stomach acids. *H. pylori* is also capable of deploying in environments with a higher pH and ideally in an environment with pH 6.0, as is precisely the pH of human urine [16].

A potentially infective mechanism of *H. pylori* is the adhesins (lectins) that recognize corresponding receptors on the surface of epithelial cells [17]. Through this connection, the bacteria avoids being washed away into the intestines by peristalsis. It can therefore be assumed that the same mechanism is the one that protects the microorganism from the flow of urine.

The infective dose of microorganisms causing sexually transmitted diseases such as *chlamydia*, *ureaplasma* and *gonococcus* is unknown (www.publichealth.gc.ca). On the other hand, infective dose of the most frequently known intestinal pathogens, as studied in human volunteers, vary between different microorganisms. Concerning the various serotypes of *Salmonella* and *E. coli*, infectious dose is quite large ($>10^5$ organisms) while for some *Shigella spp.* is very low (less than 10 organisms). Toxigenic *Vibrio cholerae* (serotypes O1 and O139) are infective

at a dose of 10^4 organisms, whereas non-O1 strains are infective at a much higher dose (10^6 organisms). *Campylobacter jejuni*, *Cryptosporidium parvum* and *Entamoeba coli* appeared to have infectious doses as low as 500 organisms, 10 oocysts, and 1 cyst, respectively. The infectious dose of *H. pylori* is unknown in humans. The only knowledge we have to date is that infection in a Rhesus monkey has occurred with a minimum of 10^4 *H. pylori* bacteria intake by orogastrical inoculation [18]. Thus, our knowledge so far does not allow us to judge whether the natural infectious dose of *H. pylori* is large or small and whether it is sufficient to cause urethritis. An important question is why hasn't a *Helicobacter* species been recovered from the urethra so far? One of the reasons may be that *Helicobacter* species are difficult to grow in culture because of its fastidious nature. For the recovery of *H. pylori*, nonselective agar media, including chocolate agar and Brucella agar with 5% sheep blood, have been useful. Selective agar, such as Skirrow's and modified Thayer–Martin agars, also support growth. Recently, the combination of a selective agar (Columbia agar with an egg yolk emulsion, supplements and antibiotics) and a nonselective agar (modified chocolate agar with Columbia agar, 1% Vitox and 5% sheep blood) was reported as the optimal combination for recovering *H. pylori*. Incubation of up to 1 week in a humidified, microaerobic atmosphere at 35° to 37°C may be required before growth of this human pathogen is visible. Organisms are identified presumptively as *H. pylori* by the typical cellular morphology and positive results for oxidase, catalase and rapid urease tests. Definitive identification of *H. pylori* requires more tests, such as growth at 42°C, rapid hippurate hydrolysis test, production of hydrogen sulfide (H₂S) in triple sugar iron agar butts, nitrate reduction, hydrolysis of indoxyl acetate, resistance to nalidixic acid and susceptibility to cephalothin. Detection of *Helicobacter* antigens and bacterial DNA using enzyme-linked immunosorbent assays (Elisa) and molecular methods, respectively, are also used [6]. A second reason may be that in a routine laboratory, microbiologists look for certain organisms based on the clinical information provided and not for microorganisms which are more likely to be considered contaminants or not clinically significant.

CONCLUSIONS

In conclusion, we can say that oral sex is one of the most common sexual practices in the world and it is possible that *H. pylori* may be transmitted via the act of fellatio in the urethra leading to infection. This organism could be one piece of the puzzle with regard

to the large proportion of men with non-gonococcal urethritis, where no other responsible organisms can be isolated. More studies are required to clarify whether *H. pylori* can be transmitted via oral sex

to the urethra, how we would diagnose such cases, what the chances are of minor or major pathologies arising, if any interactions with other uropathogens exist and the potential treatment modalities.

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