Rapid control of a chancroid outbreak: implications for Canada

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From June to November 1987 an outbreak of chancroid occurred in Winnipeg, the first in more than 10 years; 14 people (9 men, 5 women) were involved. Nine of the cases were confirmed through culture. A control strategy was implemented in November 1987 that included presumptive treatment of genital ulcer disease with single-dose antimicrobial therapy, intensive tracing of contacts and treatment of asymptomatic sexual contacts. The origin of the outbreak was not determined, and an epidemiologic link between all the patients could not be demonstrated. The isolates were found to contain the same plasmid; this suggested that a single clone of *Haemophilus ducreyi* was responsible for the outbreak.

On observe à Winnipeg, de juin à novembre 1987, une épidémie de chancre mou, la précédente remontant à plus de 10 ans. Il s'agit de 14 sujets (9 hommes, 5 femmes). On obtient confirmation par culture dans neuf cas. En novembre 1987 on adopte un plan d'éradication comprenant le traitement de tout ulcère présumé être un chancre mou par une dose unique d'un antimicrobien, la recherche assidue des personnes ayant eu un contact avec un malade et le traitement des partenaires sexuels asymptomatiques. On ne peut déterminer ni la source de l'épidémie, ni de facteur épidémiologique reliant tous les malades. Comme toutes les souches isolées contiennent le même plasmide on croit avoir affaire à un seul clone d'*Haemophilus ducreyi*.

Chancroid is an infrequent but important form of genital ulcer disease in North America.[1] It is caused by *Haemophilus ducreyi*. Confirmation of the diagnosis requires isolation of the organism; unfortunately, this is seldom done since most clinical laboratories lack the necessary culture media.

The epidemic nature of chancroid suggests that control efforts can help to eliminate the disease. Three well-described outbreaks in North America have been reported over the last decade.[2-4] Several of the epidemiologic and demographic characteristics were similar: (a) a high male:female ratio, (b) the exclusive involvement of heterosexual people and (c) the importance of prostitutes in perpetuating the outbreak. Schmid and associates[1] noted a sustained increase in the incidence of chancroid in the United States, and Simonsen and collaborators[5] reported that chancroid may be an important cofactor in the transmission of human immunodeficiency virus (HIV) type 1 among heterosexuals in Africa.

In Canada chancroid appears to have been limited to sporadic cases except for a large outbreak in Winnipeg between 1975 and 1977. We report a second outbreak in Winnipeg that occurred more than 10 years after the first.

Methods

Patients

The first case was identified in June 1987, when an isolate of *H. ducreyi* was referred to the Health Sciences Centre, Winnipeg, for confirmation. The isolate was from a person with a genital ulcer who denied any travel or exposure to prostitutes. We

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requested that community physicians refer all subsequent cases of genital ulcer disease suspected to be chancroid to the centre. Chancroid was diagnosed if *H. ducreyi* was isolated from the ulcer or if laboratory testing excluded *Treponema pallidum* and herpes simplex infections in a patient with a nonvesicular ulcer negative for *H. ducreyi*.

Microbiologic study

Samples were obtained for culture and darkfield microscopy with cotton swabs from suspect ulcers that had been cleansed of overlying exudate with nonbacteriostatic sterile saline. Agar plates were inoculated with the swabs. Two media were used to increase culture sensitivity:[6] gonococcal agar base (Gibco, Paisley, Scotland) and Mueller–Hinton agar (Scott Laboratories, Carson, Calif.). The media were supplemented with 10% bovine hemoglobin, 5% lamb serum, 10% gonococcal supplement (Atlas Laboratories, Winnipeg) and vancomycin (3 mg/L). The inoculated plates were immediately taken to the microbiology laboratory for incubation at 33° to 35°C in candle-extinction jars. The plates were examined daily for 7 days before being discarded. Colonies were suspected of being *H. ducreyi* if they had a nonmucoid, yellow-grey appearance and could be pushed intact across the agar surface. Gram's staining typically revealed gram-negative coccobacilli in clumps or whorls (railroad track or fish-school pattern). Identification was confirmed with a negative result of the porphyrin test for hemin requirement and a positive result of the test for nitrate reductase activity.[7] Beta-lactamase production was determined with the chromogenic cephalosporin test.[8]

Serum samples were obtained for the following serologic tests for syphilis: the fluorescent treponemal antibody absorption test, the rapid plasma reagin test, the VDRL test and the microhemagglutination assay for *T. pallidum*. Urethral swabs from men and cervical swabs from women were cultured for *Neisseria gonorrhoeae* and used for enzyme immunoassay to detect *Chlamydia trachomatis* (Chlamydiazyme, Abbott Diagnostics, Chicago). Eight patients were counselled about the risk of HIV-1 infection and asked for informed consent before HIV-antibody testing.

Plasmid analysis and susceptibility testing

Isolates were screened for the presence of plasmids with the method described by Meyers and colleagues.[9] Minimal inhibitory concentrations (MICs) of erythromycin, ciprofloxacin, trimethoprim–sulfamethoxazole and ceftriaxone were determined for nine isolates by means of agar dilution.[10]

Control strategy

From June to October 1987 six cases of chancroid were diagnosed. In October 1987 a control strategy was devised by the Division of Infectious Diseases, University of Manitoba, and the Manitoba and Winnipeg health departments. The strategy included laboratory confirmation, presumptive treatment of genital ulcer disease (not obviously due to syphilis or genital herpes) with single-dose ceftriaxone therapy, active tracing of contacts and epidemiologic treatment of all sexual contacts (i.e., treatment of asymptomatic people exposed to culture-positive patients). Case subjects were interviewed by a public health nurse to identify contacts during the symptomatic period and the 4 weeks before the onset of symptoms. A public health nurse informed prostitutes in the core area that a different sexually transmitted disease was present and encouraged symptomatic women and their contacts to present for examination and treatment.

Results

Outbreak description

One case of chancroid was reported in Manitoba between 1982 and 1986, as compared with 14 in 1987. Elsewhere in Canada 4 to 21 cases were reported each year dui ng that period (Table 1), the largest number being from Quebec (A. Gordon Jessamine: personal communication, 1988). In November 1987 eight cases of chancroid were reported in Winnipeg; during the preceding 5 months one to three cases had occurred each month (Fig. 1).

Patient characteristics

The age varied from 20 to 71 years. Cases 1 through 6 were the original patients, among whom no complete epidemiologic link could be established. Cases 2 and 3 were sexual partners. Men accounted for nine subjects and women for five (male:female ratio 1.8:1); eight of the men reported prostitute exposure, and four of the women were prostitutes. Nine patients were Caucasian and five American Indians or Metis. Twelve patients resided or socialized in the core area of Winnipeg. All of the patients were heterosexual. Only seven were epidemiologically linked, and no consistent chain of infection was documented. Case 11 was a female prostitute whose source of infection could not be identified and who transmitted chancroid to two sexual partners. In six of the eight cases in November 1987 the people resided or socialized in the same hotel. None of the 14 patients or their contacts had had sexual contact with a person from an endemic area.

Table 1: Reported cases of chancroid in Canada from 1982 to 1987 by province

Year	BC	Alta.	Sask.	Man.	Ont.	PQ	Nfld.	Total
1982	1	–	1	1	–	5	–	8
1983	1	–	–	–	–	2	1	4
1984	1	1	–	–	2	4	1	9
1985	1	1	–	–	–	3	–	5
1986	1	1	–	–	1	4	–	7
1987	1	1	–	14	3	2	–	21
Total	6	4	1	15	6	20	2	54
Culture positive	5	4	0	9	0	4	0	22

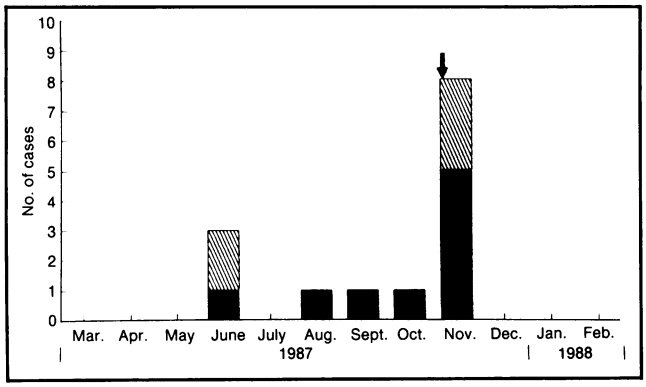

Fig. 1: Reported cases of chancroid in Winnipeg from March 1987 to February 1988 by month. Diagonally striped bars represent culture-negative specimens, and black bars represent specimens positive for *Haemophilus ducreyi*. Arrow represents introduction of formal control strategy.

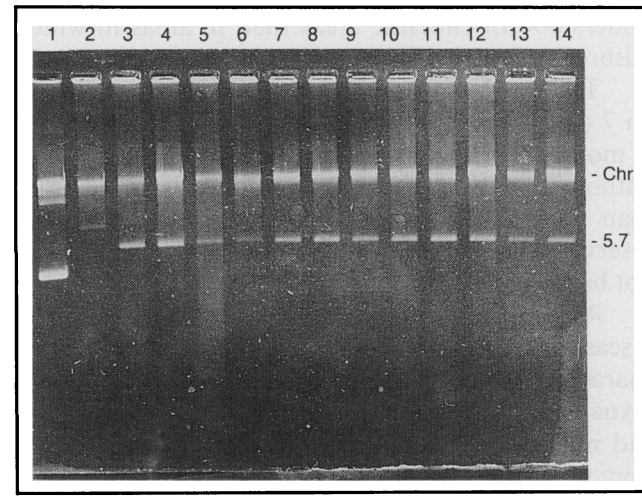

Fig. 2: Plasmid profile. Lanes 1 through 4 are previously characterized strains of *H. ducreyi*, lanes 5 through 13 are isolates from Winnipeg outbreak, and lane 14 is isolate from Vancouver. Chr represents chromosomal DNA band; 5.7 indicates β-lactamase plasmid with molecular weight of 5.7 megadaltons.

After the institution of the control strategy, in November 1987, seven new cases were identified and 11 sexual contacts interviewed and treated. Seven of the contacts were asymptomatic. *H. ducreyi* was isolated from three of the four contacts with chancroid but from none of the asymptomatic contacts.

Clinical features

Thirteen of the patients had genital ulcers and one an extragenital ulcer. Seven of the 13 patients had multiple ulcers. Four patients had inguinal adenopathy and one a bubo. Of the eight men with genital ulcers seven had not been circumcised.

Seven patients were treated with trimethoprim–sulfamethoxazole, 160 and 800 mg respectively orally twice daily for 7 days, and seven with a single dose of ceftriaxone, 250 mg intramuscularly. Of the eight patients seen at follow-up 2 to 3 weeks later all had responded successfully to the therapy. Those who did not return for follow-up were contacted by a public health nurse and reported resolution of symptoms and healing of the genital ulcers.

Microbiologic features

H. ducreyi was recovered from nine patients (64%). None of the 14 patients had microscopic or serologic evidence of syphilis. None of the 12 in whom viral culture was done had positive results. Two patients had concurrent gonorrhea. Of the eight who underwent HIV-1 antibody testing none had positive results. Convalescent HIV-1 antibody testing at least 6 weeks after infection in three of the eight and in another patient gave negative results.

All nine *H. ducreyi* isolates produced β-lactamase. The plasmid content was compared with known plasmids of *H. ducreyi* (Fig. 2). The Winnipeg isolates contained a plasmid with a molecular weight of 5.7 megadaltons known to encode for the TEM β-lactamase.[11] An isolate obtained in January 1988 from a patient in Vancouver had the same plasmid profile; however, the epidemiologic data did not link this patient to the Winnipeg outbreak.

The most active antimicrobial agent was ceftriaxone, which had an MIC of 0.002 mg/L. The MIC of erythromycin was 0.03 mg/L, ciprofloxacin 0.004 mg/L and trimethoprim-sulfamethoxazole 0.015-0.3 mg/L.

Discussion

In the early 1900s chancroid was endemic in Winnipeg.[12] Its disappearance from Winnipeg and most of the developed world and the persistence of other sexually transmitted pathogens has not been explained. In contrast, chancroid is the most frequent cause of genital ulcer disease in developing countries.[13] The epidemiologic features are better understood in endemic areas than in areas in which outbreaks occur.

The incubation period is relatively short (median 7 days), and if left untreated the disease lasts 1 to 3 months.[14] The organism is highly infectious and pathogenic. Women tend to be less symptomatic than men; those who are prostitutes act as the reservoir. The presence of asymptomatic carriers has not been confirmed.

As in the initial outbreak in Winnipeg the disease was centred in a core area of the city characterized by prostitution and involved highly sexually active men and women. Most of the men had not been circumcised, and most of the women were prostitutes. The epidemic appeared to be clonal in origin since the isolates possessed the same plasmid and were equally sensitive to the antimicrobials. We presume that the infection originated from a person visiting or returning from an endemic area, although we could not document this link among the initial cases.

The outbreak abruptly ended after implementation of the control strategy. Since November 1987 only one additional case of chancroid has been reported in Manitoba; the patient returned to Canada for treatment after symptoms developed in Africa from sexual exposure.

Why two outbreaks occurred in Winnipeg and not elsewhere in Canada is uncertain. Our experience with laboratory identification of *H. ducreyi* may have facilitated our recognition of the second outbreak. The lack of laboratory facilities elsewhere may impede recognition and delay control efforts. Laboratories that serve sexually transmitted disease clinics should be capable of identifying *H. ducreyi*. In addition, physicians who treat sexually transmitted diseases should be aware of the clinical features of chancroid and learn how to collect appropriate culture specimens.

Culture identification takes about 3 to 7 days and has a sensitivity of 60% to 80% in identifying *H. ducreyi* from typical chancroid ulcers. The organism is not recovered as commensal flora from genital ulcers due to other causes.[15] The main limitation of culture identification is the inability of the organism to survive transportation and the need for inoculation of the specimen in media within 2 hours after collection. Culture facilitates antimicrobial susceptibility testing; this is important since *H. ducreyi* has variable sensitivity to antimicrobials because of its ability to acquire antibiotic-resistant plasmids.

Aggressive and effective control efforts appear to have a major impact on *H. ducreyi* infection. The organism's high degree of infectivity, the high pathogenicity, the infrequency of an asymptomatic carrier state and the short incubation period permit identification of infected or at-risk people for treatment on an epidemiologic basis with highly effective antimicrobial therapy. The failure to implement control measures may result in the development of endemic areas, as demonstrated by Schmid and associates.[1]

Epidemiologic data from Africa suggest that genital ulcer disease facilitates HIV transmission. In Africa chancroid is the principal cause of ulcerative genital lesions; control of the disease may significantly help to control HIV infection there. We did not observe any cases of HIV infection in the Winnipeg outbreak but believe that rapid control of chancroid should be undertaken in the hopes of limiting heterosexual transmission of HIV.

Chancroid may be going unrecognized in Canada. With its resurgence in the United States further outbreaks may occur in Canada. The use of such control strategies as we have described may prevent outbreaks.

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Conferences

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Sept. 22-28, 1990: 23rd International Congress on Occupational Health: Sharing Solutions
Montreal Convention Centre
Secretariat, 23rd International Congress on Occupational Health, 2-58 de Brésoles St., Montreal, PQ H2Y 1V5; (514) 499-9835, FAX (514) 288-4627

Oct. 1-5, 1990: Canadian Society of Forensic Science Annual Conference
Skyline Hotel, Ottawa
Abstract deadline is June 1, 1990.
Canadian Society of Forensic Science, 215-2660 Southvale Cres., Ottawa, Ont. K1B 4W5; (613) 731-2096

Oct. 10-13, 1990: 5th National Conference on Perinatal Care and Prevention of Handicap: Promotion of Health — Prevention of Handicap
Ramada Renaissance Hotel, Saskatoon
Saskatchewan Institute on Prevention of Handicaps, Box 81, University Hospital, Saskatoon, Sask. S7N 0X0; (306) 966-2512

Oct. 11-12, 1990: Histopathologic Diagnosis of Inflammatory and Neoplastic Skin Diseases: Assessment of Patterns and Silhouettes
Halifax Sheraton
Dr. Noreen Walsh, Department of Pathology, Victoria General Hospital, Rm. 721, D.J. MacKenzie Building, 1278 Tower Rd., Halifax, NS B3H 2Y9; (902) 428-3897

Oct. 11-14, 1990: Canadian Pain Society (IASP Chapter) Annual Meeting
London, Ont.
Ms. Inese Kramins, Local Arrangements Committee, Department of Psychology, University of Western Ontario, London, Ont. N6A 5C2

Oct. 16-20, 1990: Canadian Cardiovascular Society 43rd Annual Meeting
World Trade and Conference Centre, Halifax
Secretariat, 401-360 Victoria Ave., Westmount, PQ H3Z 2N4; (514) 482-3407

Oct. 17-20, 1990: Canadian Group Psychotherapy Association 11th Annual Conference
Minto Place Suite Hotel, Ottawa
Dr. Allen A. Surkis, 675-1650 Cedar Avenue, Montreal, PQ H3G 1A4; (514) 934-8010

Le 18-20 octobre 1990: 11e congrès annuel de la Société québécoise de biochimie clinique
Hôtel Château Mont Sainte-Anne, Beaupré, PQ
Pierre Douville, président du Comité organisateur, Service de biochimie, Hôtel-Dieu de Québec, 11 Côte du Palais, Québec, PQ G1R 2J6; (418) 691-5135

Oct. 22-24, 1990: Institute for the Prevention of Child Abuse 5th National Conference — Focus on Child Abuse: Stop the Hurt
Delta Chelsea Inn, Toronto
Note: originally scheduled for Sept. 24-26, 1990
Consultation and Conferences Services, Institute for the Prevention of Child Abuse, 25 Spadina Rd., Toronto, Ont. M5R 2S9; (416) 921-3151, FAX (416) 921-4997

Oct. 26-28, 1990: Canadian Sex Research Forum 17th Annual Meeting
Whistler Conference Centre, Whistler, BC
Shirley A. Halliday, executive director, Canadian Sex Research Forum, Sexual Medicine Unit, University Hospital- Shaughnessy Site, 4500 Oak St., Vancouver, BC V6N 3N1; (604) 875-2027

Nov. 23-24, 1990: Canadian Bioethics Society 2nd Annual Meeting — Autonomy, Donation and Sharing as Issues in Bioethics
Château Frontenac, Quebec City
Dr. Harry Grantham, Hôtel-Dieu de Québec, 11, côte du Palais, Quebec, PQ G1R 2J6; (418) 691-5075, FAX (418)691-5331