JOURNAL OF CLINICAL MICROBIOLOGY, Feb. 1985, p. 273–275
0095-1137/85/020273-03$02.00/0
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Vol. 21, No. 2

Actinomyces naeslundii as an Agent of Pelvic Actinomycosis in the Presence of an Intrauterine Device

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Received 11 July 1984/Accepted 3 November 1984

***Actinomyces naeslundii* is a saprophyte, sometimes a pathogen, of the human oral cavity. Very few extra-oral infections related to this agent have been described. We report the first instance of *A. naeslundii* as an etiological agent of pelvic actinomycosis in a user of an intrauterine device, an infection so far exclusively attributed to *Actinomyces israelii*.**

Pelvic disease used to be a rare manifestation of human actinomycosis (2). Over the past decade, the presence of an intrauterine device (IUD) has been recognized to be a risk factor for the development of pelvic actinomycosis (1, 4, 7, 8, 11, 12, 15–17, 19, 27). Whenever the genus *Actinomyces* has been identified in such infections, *Actinomyces israelii* has been the only species involved (1, 4, 8, 11, 15, 17, 19, 27).

Actinomyces naeslundii can be isolated from various sites of the normal human oral cavity (10, 21). It has been identified in numerous oral infections in humans, such as infected dental root canals (3), dental calculus (3), gingivitis (22), periodontitis (24), and sinus tract infection after tooth extraction (3). *A. naeslundii* has also been recovered in non-oral infections in humans, such as bacteremia, wound infections, cutaneous lesions, empyema of the gallbladder (3), and suppurative thyroiditis (13).

We report the first instance to our knowledge of *A. naeslundii* isolation in pelvic actinomycosis in the presence of an IUD.

The patient was a 39-year-old, gravida 3, para 3, menstruating, sexually active female who had an IUD (Dalkon Shield model) inserted in 1972. Except for a year of increasing intermenstrual vaginal discharge, she was well until 2 weeks before her admission. She then developed a low-grade fever and a sharp and progressive abdominal pain which was localized in the pelvis at the time of her admission on 14 June 1982. She had a rectal temperature of 39.2°C. The abdomen was supple but tender, with rebound in the lower quadrants, where a fullness was perceived on palpation. On pelvic examination, the cul-de-sac, adnexa, and rectovaginal wall were indurated. The mobility of the pelvic structures was diminished, and a large, poorly delineated mass that was tender to palpation was felt posterior to the uterus. The cervix was normal, with the tail of the IUD present. The rest of the exam was otherwise unremarkable.

Her initial leukocyte count was 19,200/mm^3, with 69% polymorphonuclear cells and 20% band forms. Serum lactic dehydrogenase was 273 IU/liter (normal, 100 to 225 IU/liter), and serum alkaline phosphatase was 160 IU/liter (normal, 30 to 115 IU/liter); Aspartate aminotransferase was normal. Initial bacteriological studies included a urine culture, which proved to be negative 2 days later, and two sets of aerobic and anaerobic blood cultures. One bottle grew a *Staphylococcus epidermidis*, which was thought to be a contaminant.

A barium enema and an intravenous pyelogram showed an extrinsic compression of the sigmoid colon and both ureters. A pelvic ultrasound and an abdominal computed-axial-tomography scan revealed a midline, posterior, extrauterine, large, complex mass.

On day 4, the IUD was removed, and the material adherent to it was stained and cultured. The Gram stain demonstrated gram-positive, filamentous rods consistent with an actinomycete (Fig. 1). This pathogen was recovered by culture in a GasPak envelope (BBL Microbiology Systems, Cockeysville, Md.). Further identification by the Connecticut Department of Health Services, Hartford (specimen no. 21944), was performed in accordance with the recommendations of the Anaerobe Laboratory of the Virginia Polytechnic Institute (9). This examination revealed an anaerobic, nonmotile, nonhemolytic, gram-positive rod. The organism is biochemically characterized in Table 1. Direct immunofluorescence with fluorecein isothiocyanate conjugates of species-specific globulins (Biological Products Division, Centers for Disease Control, Atlanta, Ga.) (18) was positive (4+) for *A. naeslundii* and negative for *A. israelii*. The anaerobic culture also recovered a mixed anaerobic flora, which was not further identified. The aerobic culture of the material grew *Bacteroides fragilis*, alpha-*Streptococcus*, and gamma-*Streptococcus*.

From admission the patient was treated with ampicillin. On day 2, clindamycin and gentamicin were added to her regimen because of a suspected pelvic abscess. Her fever started to abate on hospitalization day 4. On day 10, her antibiotic regimen was changed to per os amoxicillin and clindamycin. She was discharged on day 14 on per os penicillin and probenecid. At that time, both pelvic examination and repeat abdominal computed-axial-tomography scan showed a dramatic reduction in the size of the mass.

Subsequently, the patient had rare intermittent abdominal pain and a worsening stress urinary incontinence, for which she was readmitted on 19 October 1982 to undergo a Marshall-Marchetti-Krantz operation as well as a total abdominal hysterectomy and bilateral salpingo-oophorectomy. The latter procedure was done to prevent a relapse of pelvic actinomycosis and consequently achieve contraception. The macroscopic examination of the surgical specimen revealed

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a slight focal chronic myometritis, a bilateral but predominantly left chronic endosalpingitis, and left tubo-ovarian adhesions. The histopathology showed no evidence of residual actinomycosis.

The *Actinomyces* strain recovered from this patient, although most consistent with *A. naeslundii*, presents several unusual biochemical characteristics. The fermentation of rhamnose by *A. naeslundii* varies from 2% (20) to 17% (21), and raffinose is not fermented by only 6% of the strains (20, 21). Schoffield and Schaal, who have used numerical taxonomy to define *A. naeslundii* (subcluster 3a) (20), have found that the fermentation of xylose and not of inositol is respectively 35 and 6%. Because the *Actinomyces* strain was discarded, it has not been possible to repeat the biochemical tests for control. We nevertheless believe that the direct immunofluorescence clearly identifies the organism as *A. naeslundii*. Pine et al. have demonstrated the high specificity of the antiserum used (18), especially the absence of cross-reactivity with *A. viscosus*, a species closely related to *A. naeslundii* (20).

The clinicopathological presentation of this case is no different than that of *A. israelii*-related pelvic actinomycosis. Several studies have now shown the presence of *Actinomyces* or actinomycetes-like structures in the vaginal and cervical secretions of women wearing IUDs (1, 5, 7, 11, 18, 23, 26). The species so far involved has been *A. israelii* (1, 8, 18, 23). Although found in non-IUD users (6, 18), *A. naeslundii*, when looked for, has not been detected in IUD users (1, 6, 8, 18, 23). These data suggest that *A. naeslundii* is an occasional saprophyte of the lower genital tract and that its presence is not related to IUDs. The mechanism by which actinomycetes gain access to the genital tract has not been clearly defined, but the best evidence supports the role of orogenital sexual practices (7).

Our patient had risk factors for developing pelvic actinomycosis. For one, she had a Dalkon Shield IUD, the model which has been associated with the highest incidence of actinomycosis (12, 25). Moreover, her IUD was in place for 10 years, and duration of IUD use has been identified as another risk factor (16).

The distinction between *A. naeslundii* and *A. israelii* may have clinical significance. Lerner has reported that some strains of *A. naeslundii* are less susceptible in vitro to antibiotics that are effective against *A. israelii*, such as penicillin, but that erythromycin appears to be uniformly efficacious against both species (14).

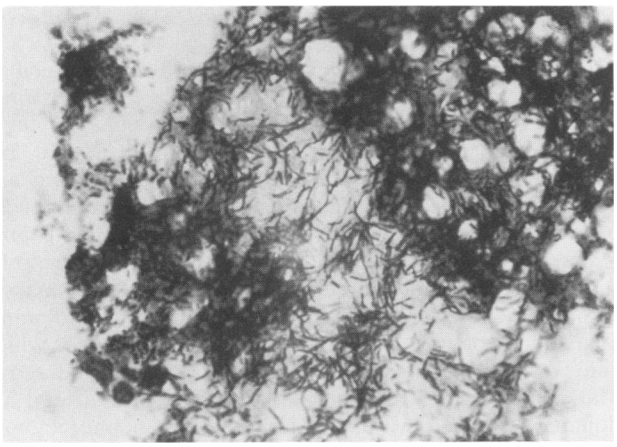

FIG. 1. Gram stain micrograph of the material attached to IUD. Aggregates of diphtheroid, gram-positive rods connected by a web of slender, branching filaments are shown.

TABLE 1. Biological characteristics of the isolated *A. naeslundii* strain

Test	Result[a]
Arabinose	−
Dulcitol	−
Fructose	A
Galactose	A
Glucose	A
Glycerol	−
Inositol	−
Lactose	A
Maltose	A
Mannitol	−
Mannose	A
Melibiose	−
Raffinose	−
Rhamnose	A
Salicin	A
Sorbitol	−
Sucrose	A
Trehalose	A
Xylose	A
Starch hydrolysis	+
Indole formation	−
Purple milk reaction	−
Gelatin liquefaction	−
Nitrate reduction	+
Urease	+
Esculin hydrolysis	+
Catalase	−
H_2S production	+
Egg yolk plate reaction	
Lecithinase	−
Lipae	−
Gas chromatography products in PYG[b] broth	
Acetic acid	+
Butyric acid	−
Lactic acid	+
Propionic acid	−
Succinic acid	+

[a] Acid fermentation; +, present; −, absent.
[b] PYG, Peptone-yeast extract-glucose.

We express our appreciation to Ronald Maenza, Soo Hwan Pai, and Arthur Gandleman.

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