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# Microbiology of infected pilonidal sinuses

I BROOK

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SUMMARY Aspirates of pus from infected pilonidal sinuses in 75 patients showed bacterial growth. Anaerobic bacteria only were recovered in 58 (77%) specimens, aerobic bacteria only in three (4%), and mixed aerobic and anaerobic bacteria in 14 (19%). Two hundred and nine isolates were recovered: 147 anaerobes (2·0 isolates a specimen) and 62 aerobes (0·8 a specimen). The predominant anaerobes were *Bacteroides* sp (81 isolates, including 29 *Bacteroides fragilis* group) and 51 anaerobic cocci. The predominant aerobes were *Escherichia coli* (n=15), *Proteus* sp (n=9), group D steptococcus (n=7), and *Pseudomonas* sp (n=7).

This study highlights the polymicrobial nature and predominance of anaerobic bacteria in infected pilonidal sinuses.

Infection in pilonidal sinuses may be protracted, cause local irritation, and in rare cases lead to serious complications such as bacteraemia or meningitis. Most reports have described small groups of patients.[1] This report describes the microbiology of pilonidal sinuses in a group of 75 patients, which is the largest study to date, and therefore permits more precise assessment of the different organisms contributing to the infection.

## Patients and methods

Between June 1975 and June 1985, 82 aspirates taken from pilonidal sinuses were processed for aerobic and anaerobic bacteria by the clinical microbiology laboratories at Walter Reed Army Medical Center in Washington, DC, and the Naval Medical Center in Bethesda, Maryland. Bacterial growth was observed in 75 (91%) cases. Mean age of the 75 patients was 27 years (range 3 to 47 years), and 61 were men. Twenty three of the patients received antibiotics before their samples were collected. Cultures were obtained either by direct needle aspiration of the purulent contents into a syringe that was immediately sealed and transported to the laboratory within 30 minutes, or by a swab that was dipped into the pus and introduced into an anaerobic transport system (Port-A-Cul, BBL, Cockeysville, Maryland) and sent to the laboratory within two hours. The specimen material was plated on to pre-reduced vitamin $K_1$-enriched brucella blood agar, an anaerobic blood agar plate containing kanamycin and vancomycin, an anaerobic blood plate containing colistin and nalidixic acid, and an enriched thioglycolate broth (containing haemin, sodium bicarbonate, and vitamin $K_1$).[2] The material was then incubated in GasPak jars (BBL, Cockeysville, Maryland) and examined at 48 and 96 hours. Plates that showed growth were held until the organisms were processed and identified. All cultures that showed no growth were held for at least five days. Anaerobes were identified using the API anaerobic system (Analytab Product, Inc, Plainview, New York) at the Walter Reed Hospital and the Minitek system (Baltimore Biological Products, Cockeysville, Maryland) at the Naval Hospital. Other carbohydrate tests (Scott Laboratories, Fiskeville, Rhode Island) and gas liquid chromatography[3] were performed as needed to identify the organisms. Sheep blood (5%), chocolate agar, and MacConkey agar plates were inoculated for the isolation of aerobic organisms. The plates were incubated at 37°C aerobically (MacConkey) and under 5% carbon dioxide (blood and chocolate), and examined at 24 and 48 hours. Aerobic bacteria were identified using conventional methods.[3]

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## Results

Anaerobic bacteria only were recovered in 58 (77%) specimens, aerobic bacteria only in three (4%), and mixed aerobic and anaerobic bacteria in 14 (19%). A total of 209 bacterial isolates were recovered, accounting for 2·8 isolates per specimen (2·0 anaerobes and 0·8 aerobes per specimen) (table).

Table *Bacterial isolates for 75 pilonidal sinuses*

| *Aerobic and facultative bacteria* | | *Anaerobic bacteria* | |
|---|---|---|---|
| *Gram positive cocci:* | | *Anaerobic cocci:* | |
| Alpha-haem streptococci | 6 | *Peptostreptococcus* sp | 15 |
| Group D streptococci | 7 | *P asaccharolyticus* | 5 |
| Non-haem streptococci | 3 | *P prevotii* | 7 |
| *Streptococcus pyogenes* | 4 | *P anaerobius* | 20 |
| *Staphylococcus aureus* | 3 | *P magnus* | 2 |
| *Staphylococcus epidermidis* | 2 | *S constelatus* | 1 |
| | | Microaerophilic streptococcus | 1 |
| | | *Veillonella alcalescens* | 2 |
| | | *Veillonella parvula* | 1 |
| *Gram negative bacilli:* | | *Gram positive bacilli:* | |
| *Proteus morgani* | 4 | *Eubacterium lentum* | 1 |
| *Proteus mirabilis* | 2 | *Prop ionibacterium* sp | 1 |
| *Proteus vulgaris* | 2 | *P acnes* | 2 |
| *Proteus* sp | 1 | *Lactobacillus* sp | 3 |
| *Escherichia coli* | 15 | *Clostridium* sp | 2 |
| *Klebsiella pneumoniae* | 3 | | |
| *Klebsiella oxytoca* | 1 | *Gram negative bacilli:* | |
| *Pseudomonas aeruginosa* | 5 | *F nucleatum* | 2 |
| *Pseudomonas* sp | 2 | *F mortiferum* | 1 |
| *Enterobacter* sp | 2 | *Bacteroides* sp | 19 |
| | | *B fragilis* | 15 |
| Total | 62 | *B distasonis* | 2 |
| | | *B ovatus* | 4 |
| | | *B vulgatus* | 2 |
| | | *B thetaiotaomicron* | 6 |
| | | *B melaninogenicus* | 13 |
| | | *B intermedius* | 3 |
| | | *B asaccharolyticus* | 4 |
| | | *B ureolyticus* | 9 |
| | | *B bivius* | 2 |
| | | *B oris-buccae* | 2 |
| | | Total | 147 |

A total of 147 anaerobic bacteria were recovered. The predominant anaerobes recovered were *Bacteroides* sp (81 isolates, including 29 *Bacteroides fragilis* group) and 51 anaerobic cocci. A total of 62 aerobic isolates were recovered. The predominant ones were *Escherichia coli* (n = 15), *Proteus* sp (n = 9), group D streptococcus (n = 7), and *Pseudomonas* sp (n = 7). There was no consistent pattern of combinations, although *Bacteroides* sp were recovered in 38 instances with anaerobic cocci.

## Discussion

This study confirms previous reports in adults[1 4 5] and children[6] by showing the polymicrobial nature and predominance of anaerobic bacteria in infected pilonidal sinuses, where anaerobes outnumbered aerobes in a ratio of 2·4:1. In contrast to other investigators,[1 4 5] Gram negative aerobic and facultative bacilli, especially *E coli*, *Proteus* sp, and *Pseudomonas* sp, were isolated in many instances, and like other reports, *Staphylococcus* sp were only occasionally recovered. The recovery of Gram negative bacilli is not surprising as these organisms are part of the normal gastrointestinal flora.

We have already described the microbiology of 25 infected pilonidal sinuses in children.[6] A total of 63 anaerobes (2·5 per patient) and 13 aerobes (0·5 per patient) were recovered. The predominant anaerobic isolates were *Bacteroides* sp, anaerobic cocci, Clostridium, and Fusobacterium. The predominant aerobes were *E coli* and group D streptococcus.

Finegold reviewed 13 publications dealing with the bacteriological characteristics of infected pilonidal sinuses in adults.[1] The most common isolates reported in those studies were various *Bacteroides* sp, including *B fragilis*, anaerobic Gram positive cocci, and *Clostridium* sp. The most recent report presenting the bacteriological features of pilonidal sinuses in adults reported 11 cases.[4] Anaerobic organisms such as *Bacteroides* sp and Gram positive anaerobic cocci were the predominant isolates. Gram negative enteric bacteria and *S aureus* were not present.

Infections with *Bacteroides* sp are generally polymicrobial where these organisms are recovered mixed with other anaerobic, facultative anaerobic, and aerobic bacteria.[1] Previous studies reported that the association between *Bacteroides* sp and its counterparts is generally synergistic.[7-9] In studies using an intra-abdominal abscess model, Weinstein *et al* proved the need to use antibiotics that are effective against both *Enterobacteriacae* and *Bacteroides fragilis*.[10] The synergy among the different bacterial strains in mixed polymicrobial aerobic and anaerobic infections may be due to protection from phagocytosis and intracellular killing,[11] production of essential growth factors,[12] and lowering of oxidation reduction potential in infected host tissues.[13]

The isolation of anaerobic bacteria mixed with aerobic and facultative organisms at that site is not surprising as anaerobes are the predominant organisms in the gastrointestinal tract, where they outnumber aerobes by 1000:1.[14] Because anaerobic bacteria are often associated with pilonidal sinuses, physicians should consider their presence if antimicrobial treatment is used. Gram staining of aspirated pus and appropriate aerobic and anaerobic microbiological techniques can help in the selection of proper treatment. As some of the anaerobes are resistant to penicillin, treatment should also include appropriate coverage of those organisms. Surgical drainage is still the treatment of choice. The presence of penicillin resistant anaerobic bacteria, however, such as *B fragilis*[15] and some strains of the *B melaninogenicus* group,[15 16] may warrant the administration of appropriate antimicrobial agents such as clindamycin, cefoxitin, metronidazole, imipenem, or the combination of a $\beta$ lactamase inhibitor and a penicillin.

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