ranked differential diagnosis generated by GIDEON was recorded for each admission before and after removing clinically irrelevant data (determined prior to computer entry). For comparison of clinicians to GIDEON, only the primary admitting diagnosis of the admitting junior resident was accepted. Differential diagnoses were also compared. The clinicians’ and GIDEON’s diagnoses were compared with the discharge diagnoses. Diagnostic accuracy was compared by use of McNemar’s test for paired binary data.

The admitting house officers listed the correct diagnosis first in 75 (87%) of 86 cases (table 1). The GIDEON diagnostic module, when provided with all positive findings regardless of relevance, listed the correct diagnosis before the house officers did in 28 (33%) of 86 cases (P < .001 for the comparison with). GIDEON listed the correct diagnoses in its top five possible diagnoses in 31 (36%) of 86 cases (P < .001).

The diagnostic accuracy of GIDEON improved when irrelevant findings were excluded. GIDEON then generated a correct diagnosis as the first choice in 52 (60%) of 86 cases, and the correct diagnosis was in its top five diagnoses in 59 (69%) of 86 cases. The diagnostic superiority of the house officers remained (P < .001).

Of 38 evaluable admissions of immunosuppressed patients, the clinical team made the correct diagnosis in 30 cases (79%). GIDEON, when provided with all data, made the correct initial diagnosis in 6 (16%) of 38 cases (P < .001). With irrelevant findings omitted, performance of the “guided” GIDEON module improved, listing the correct diagnosis first in 16 (42%) of 38 cases (P < .01). In five cases, the GIDEON diagnostic module correctly supplied a leading diagnosis not considered by the admitting team. Two patients were critically ill with legionellosis, another with staphylococcal toxic shock syndrome.

When GIDEON was supplied with only the most relevant information, as its manufacturer recommends [5], it remained inferior to physicians. In part, this inferiority results from assumptions of the Bayesian matrix that all findings are manifestations of a unitary infectious process. Another limitation of GIDEON is that its extensive database remains incomplete. Productive use of the GIDEON diagnostic module requires an adequate degree of user sophistication in order to select relevant inputs.

The GIDEON diagnostic module is not yet useful in the evaluation of febrile patients with straightforward diagnoses. However, in five cases or 45% of erroneous house officers’ diagnoses, the guided GIDEON module ranked the correct diagnosis. This finding suggests that GIDEON may be useful in complex cases.

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References

Possible Transmission of Human Immunodeficiency Virus Type 1 from Body Piercing

Body piercing refers to the cosmetic piercing of body parts for implantation of objects such as rings, studs, or pins. A solid needle is used to create a tract through which the object is inserted. Body sites commonly pierced include the ears, eyebrows, tongue, nose, nasal septum, umbilicus, nipples, and genitalia. We report a case of HIV infection possibly transmitted through body piercing.

A 35-year-old homosexual male tested seronegative for antibodies to HIV-1 seven times between March 1990 and July 1994. Subsequent seroconversion was documented by an indeterminate HIV-1 serology in November 1994 and a positive HIV-1 serology in December 1994. The patient reported an extensive history of body piercing during the documented period of seroconversion. These piercings included single episodes in Amsterdam and New York City as well as three subsequent episodes in Boston. Multiple body sites were pierced including the penis, scrotum, nipples, umbilicus, tongue, chin, eyebrows, and nasal septum. The patient provided a history of three male sexual partners during the year before his positive HIV result was obtained, a period that fully overlapped with the period of seroconversion to HIV. He denied that he had had anal intercourse or recipient oral sex (with ejaculation) with any of the three partners over this period. The patient’s only history of injection drug use was a single episode of cocaine injection 7 years before seroconversion. He never received blood transfusions or other blood products. Twenty-two months after seroconversion to HIV, the patient was asymptomatic and had a CD4 lymphocyte count of 354/mm³.

To our knowledge, this is the first case of HIV infection possibly transmitted through body piercing. Although the patient reported three homosexual relationships during the period of seroconversion, he denied engaging in high-risk behaviors with these partners. He reported that during the period of seroconversion he underwent
at least five separate body piercings in which needles contaminated with HIV may have been used.

Body piercing is an emerging practice among adolescents and young adults in the United States, but there are limited data as to its prevalence [1, 2]. As an unregulated practice occurring in such diverse settings as tattoo studios, unlicensed parlors, nightclubs, house parties, college campuses, and prisons, body piercing may carry with it a risk of transmission of blood-borne pathogens including HIV, hepatitis B virus, and hepatitis C virus. In this regard, the risk of HIV transmission associated with body piercing may be similar to that associated with tattooing [3, 4]. Clinicians should be aware that body piercing is a potential route of transmission for HIV and other blood-borne pathogens. Further studies are needed to determine the prevalence of body piercing and the associated incidence of infectious diseases.

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Infective Endocarditis Associated with Fiberoptic Bronchoscopy in a Patient with Mitral-Valve Prolapse

A 24-year-old HIV-positive male (CD4 cell count, 190/mm³) was admitted electively to the hospital for evaluation of multiple asymptomatic pulmonary nodules. Findings on physical examination were normal; no murmurs were detected. A transthoracic echocardiogram showed mild mitral-valve prolapse with mild mitral regurgitation and no vegetations. Because the patient was afebrile, no blood cultures were performed at that time. On 17 November 1993 the patient underwent fiberoptic bronchoscopy (FOB) with bronchoalveolar lavage, the results of which were nondiagnostic. Four weeks later the patient was readmitted electively for CT-guided lung biopsy. On the day of admission, 14 November 1993, he developed a fever (temperature, 103°F). Four of four blood cultures yielded viridans streptococcus. A 3/6 systolic murmur was detected 2 days later. A repeated transthoracic echocardiogram revealed two, and possibly more, distinct mitral-valve vegetations (the largest one measuring >15 mm) involving both the anterior and posterior leaflets. There was moderate mitral regurgitation. The patient was treated successfully with a 4-week course of iv penicillin G and gentamicin. After 2 weeks of antibiotic therapy, he underwent fine-needle aspiration of one of the lung nodules, which revealed Pneumocystis carinii pneumonia (PCP), granulomatous type.

We believe this patient developed endocarditis due to viridans streptococcus secondary to bacteremia, which was precipitated by flexible bronchoscopy; this association has not been reported previously. We base this assumption on the following: before undergoing FOB, the patient was afebrile, no mitral regurgitation murmur was detected, and an echocardiogram showed mitral-valve prolapse with mild mitral regurgitation and no vegetations. Approximately 4 weeks after the procedure, he developed classic bacterial endocarditis (fever, a new murmur, and vegetations that had not been demonstrated on the echocardiogram obtained 1 month earlier) due to viridans streptococcus, the most common pathogen in dental and oral procedures–related infective endocarditis.

The incidence of bacteremia following FOB has been evaluated prospectively in several studies and has been found to be extremely low, ranging from zero to 2% [1–3]. Nonetheless, pneumococcal bacteremia with meningitis has been reported following FOB [4]. On the basis of the experience with several hundred cases of infective endocarditis attributed to dental procedures, the “incubation period” for procedure-related endocarditis has been estimated to be on the order of 2 weeks [5]. More recently, van der Meer et al. [6] found that the median interval between a dental procedure and the onset of symptoms was 28 days (range, 0–175 days). Our patient underwent an unspecified dental procedure ~6 months earlier, but he was essentially asymptomatic at the time of his first admission. Four weeks after fiberoptic bronchoscopy was performed, he started experiencing symptoms that were eventually proven to be due to infective endocarditis. In a recent position paper on infective endocarditis prophylaxis, antibiotic prophylaxis for bronchoscopy with a flexible bronchoscope, with or without biopsy, is not recommended [7].

Our patient had no risk factors for infective endocarditis other than his mitral-valve prolapse. Mitral-valve prolapse increases a patient’s risk for endocarditis five- to eight-fold [8]. Nonetheless, because mitral-valve prolapse is common in the general population [9], whereas endocarditis is rather uncommon, mitral-valve prolapse cannot be considered a high-risk lesion, even when a murmur is present. Recognized high-risk factors for infective endocarditis in patients with mitral-valve prolapse are male gender; age older than 45 years; the presence of mitral regurgitation (either clinically or evidenced on an echo cardiogram); and thickened, redundant leaflets. We are not proposing that fiberoptic bronchoscopy be added to the list of invasive diagnostic or therapeutic procedures for which infective endocarditis prophylaxis is recommended. We believe, however, that it is important for physicians to recognize that fiberoptic bronchoscopy, albeit a low-risk procedure with respect to infective endocarditis, may on rare occasions cause it.

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