

Infectious Complications of Body Piercing

S. Samantha M. Tweeten and Leland S. Rickman

From the University of California, San Diego (UCSD)/San Diego State University Joint Doctoral Program in Public Health (Epidemiology) and the Division of Infectious Disease, Department of Medicine, UCSD School of Medicine, San Diego, California

Body piercing appears to be gaining in popularity and social acceptance. With the increase in the number of piercings, it is likely that health care providers may see an increase in the complications resulting from these piercings. These may include the transmission of hepatitis viruses and bacteria at the time of the piercing or in the course of wound care. We review the infectious complications that have resulted from body piercing and have been documented in the medical literature.

Body piercing, the use of needles, rings, steel posts, or other adornments that penetrate the skin and other structures of the human body, predates history. Piercing appears to be increasing in popularity and, as discussed in a prior review of the infectious complications of tattooing [1], may increase the risk of various complications. The medical literature on postpiercing infections occurring in areas other than the ear is limited, and there are few reliable data on incidence or prevalence. Most publications are case reports. It is probable, however, that practitioners will see an increase in infections in a variety of pierced body sites. We review the infectious complications of body piercing that have been documented in the medical literature, in an effort to increase clinicians' awareness of potential problems.

See article on related topic on pages 767–8.

Background and Demographics of Body Piercing

Until recently in this century, body piercing at sites other than the earlobe has been relatively rare in western culture. However, there is a long history of body decoration by piercing the skin. Such piercings have been done as a rite of passage or to indicate marriageability or social standing [2]. Roman centurions were said to have pierced their nipples to hold their capes and as a sign of loyalty to the Emperor [3]. Mayans pierced their tongues for spiritual purposes [3]. The Pharaohs of Egypt ceremoniously had their navels pierced [4].

Genital piercings were, and still are, seen in areas around the Indian Ocean and among peoples of the South Pacific [3, 4]. Prince Albert, consort to Queen Victoria, was said to have

a penile piercing, subsequently named for him (and purported to be a common practice among the well-dressed men of London at the time). Its purpose was said to be to hold the penis tightly against the thigh so that the stylish tight trousers would fit better [5]. In Europe and North America, body piercing has been seen by those in "punk" and antiestablishment subcultures as symbolic of deviance and rebellion, particularly when tattooing was discarded as being too mainstream [6].

Apparently gaining in popularity, body piercing also appears to be gaining limited social acceptance. The ear is still the most common body piercing site. However, other facial sites, including the eyebrow, lip, nose, and tongue, as well as the hidden sites of nipples, navel, and genital areas of both sexes, are being pierced with increasing frequency [7]. Owing in part to the more intimate nature of some piercings, there are no reliable statistics or demographic data available about the people being pierced. One survey indicates that $\leq 80\%$ of American women have pierced ears [8]. Infections seen in ear sites may thus reflect potential infectious complications associated with other piercing sites.

People pierce their bodies for a variety of reasons. The counterculture youth are thought to be more inclined toward facial piercings that may provide increased shock value as they are seen by others [5]. Although genital piercings have anecdotally been seen primarily in homosexual men, heterosexuals (both male and female) are getting pierced in increasing numbers for both sexual and aesthetic reasons [9]. Sado-masochism has also been implicated in the recent increase in interest in body piercing [10], but many more people are being pierced for other reasons [11]. It may be done to increase self-esteem. Young women in particular may be pierced at times when they feel they have lost control of their lives [11].

Body piercing is perceived by some as a form of deviant behavior that may lead to other risks. Fiumara and Eisen [12] stated that those with "exotic" piercings, primarily genital, were at high risk for sexually transmitted diseases. Their patients with these genital piercings appeared to be primarily homosexual men. Analysis of a sample of 20 high-school stu-

Received 9 June 1997; revised 5 November 1997.

Reprints or correspondence: Dr. Leland S. Rickman, UCSD Medical Center—8951, 200 West Arbor Drive, San Diego, California 92103-8951.

Clinical Infectious Diseases 1998;26:735–40
 © 1998 by The University of Chicago. All rights reserved.
 1058-4838/98/2603-0028\$03.00

dents who had been pierced at a variety of sites including the tongue and navel, however, found that the students were generally academically solid and had good attendance [13]. People of all ages and professions are appearing in piercing studios, requesting jewelry placement at all sites.

Body Piercing Methods

Regardless of the site of a piercing, aseptic techniques should always be used to reduce the risk of infection. Aftercare, the care of the piercing site after introduction of jewelry, is also of importance in preventing infection and must be meticulously performed. Antibiotic prophylaxis, however, is not generally required for the prevention of bacterial endocarditis [14].

The most common piercing site is the earlobe. This is often pierced with a spring-loaded "gun," which punctures the lobe with a sharp metal stud. This effectively tears a hole through the tissue. A backing is placed on the earring stud to hold it in place. Recently, the piercing guns themselves have been recognized as a possible vehicle for the transmission of viral hepatitis. The guns are not easily cleaned and are infrequently sterilized. The transmission of hepatitis B virus (HBV) has also been associated with spring-loaded finger-stick devices, which have a similar mechanism of action to the piercing gun and may be inappropriately cleaned [13, 15].

The gun method is used frequently by physicians as well as at department and jewelry stores. Ear piercing is also often done by friends or relatives with various household needles, sometimes with thread in the hole, or with jewelry. The piercing gun is designed for piercing earlobes only, as it is not adjustable to deal with varying thicknesses of other tissues, and embedment of the earring backs is more likely to occur if the gun is used at other body sites [16].

Body piercing is not always performed with an aseptic technique. Some people choose to pierce themselves. This is rarely functional, as the piercing must be done at sufficient depth to keep the jewelry in place. Too-shallow insertion may lead to rejection of the jewelry or an increased chance of injury. The choice of jewelry is also important. Surgical steel (300-grade), niobium, or gold is usually used, although contact dermatitis may occur with surgical steel or gold [4]. Use of jewelry containing other metals may lead to dermatitis or metal sensitization [17].

The jewelry most commonly inserted at piercing sites other than the ear consists of a barbell-shaped ornament, bent or straight; a ring with a bead; a stud with a metal ball at one end and a flat disk on the other for the labret (a piercing through the area below the lower lip); or in the case of some septum piercings, a tusk [4]. Inert plastics may also be placed after healing.

A reputable piercer should follow a protocol for all piercings and adhere to safety guidelines [18]. The protocol follows aseptic surgical technique [19]. It begins with thorough instruction of the client about the procedure, risk, consent, and aftercare.

The jewelry is selected with the type of piercing in mind. The type of piercing, location on the body, and client needs determine the gauge of the jewelry and the diameter of the rings or length of the "barbell" to be placed. Once the jewelry is chosen, a single-use, nonreusable setup should be used to perform the piercing. Any items that are not disposable must be autoclaved between clients, as should the jewelry to be placed. Single-use items such as needles and corks must be packaged in individual sterile packaging. A piercer should wear examination gloves, changing them between clients or anytime contamination may have occurred [20].

Once the client is ready and has been placed on a flat surface, the piercer should cleanse the area to be pierced with a topical antiseptic. The site is marked to provide a guide for the needle and is grasped with a Pennington forceps. A large-gauge (12–16-gauge) hollow needle is inserted quickly, and a cork is placed on the sharp end. The jewelry is brought through the hole, following the needle in a needle-and-thread fashion, and is sealed with a bead, metal ball, or disk [4].

The client is instructed not to touch the piercing until it is healed, is taught how to cleanse daily, and is made aware of the signs of infection and the chances of injury. Variations on these procedures may occur. In piercing of the tongue, a longer "barbell" is usually initially placed to allow for edema of the tongue [4]. It is then replaced, if desired, with a shorter rod. The client is instructed to use an antiseptic mouthwash several times a day [4].

Generally, local anesthesia is not used for body piercing. In the Prince Albert penile piercing, the needle goes through the urethra. A topical anesthetic may be applied and a needle-receiving tube used to guide the needle and to minimize tissue damage because of the increased potential for pain during the piercing [11].

Piercings done with an ear-piercing gun also require site preparation. Generally, a topical antiseptic is applied to the earlobe and the position of the piercing is marked on the lobe. A metal piercing stud with a sharpened end is placed in the gun and applied to the lobe, and the spring trigger is released to drive the stud through the lobe, tearing through the tissue rather than creating a hollow tube through which the ring is placed. The earring must be sterile and the piercing gun appropriately cleaned and sterilized to avoid infection. Aftercare is as important in ear piercing as it is in other piercings.

Healing times for piercing vary according to placement. Those areas that are exposed—ears, lips, eyebrows, and tongue—tend to heal quickly; the tongue heals in 3–6 weeks and the others in 6–8 weeks. Nipple piercing is more variable and is said to be dependent on the type of clothing worn. Such healing can take 8–16 weeks [4]. The wearing of tighter clothing is generally reported to inhibit healing. Navel piercings may take up to 9 months to heal, reportedly in part because they are frequently covered by tight clothing such as jeans and pantyhose [4]. Genital piercings are reported to take less time to heal [4].

Complications of Piercing

Noninfectious Complications

Many noninfectious complications of piercing have been reported. In ear piercing, metal-allergic dermatitis may result [21–25]. Use of the ear-piercing gun can result in earrings being deeply embedded in the lobe [16, 26, 27], which may be mistaken for keloids [28, 29]. Inflammation may become so extreme as to envelop the piercing jewelry [30]. Keloid formation may occur as a late complication of body piercing [31–36]. Pseudolymphoma or lymphadenopathy may also occur with any piercing [37, 38], and sarcoidal tissue reaction has been reported [39].

Torn ear lobes and other trauma are not uncommon among those with pierced ears [32, 40, 41], but injuries to other areas do occur. Rings in nipples may be torn out. Higgins et al. [42] reported a patient with urethral rupture following avulsion of a Prince Albert ring. Wilcox [43] expresses concern that penile piercings may increase the chance of tissue destruction in the sexual partners of those with piercings.

Body jewelry may become an issue in radiology, as it may appear as a peculiar artifact if the patient is unwilling or unable to remove it [44]. Reichle and Dailey [45] point to the potential for airway obstruction due to the edema associated with tongue piercing. Price and Lewis also express concern about problems with piercings in oral sites, including airway obstruction, chipped or cracked teeth, and interference with mastication [46].

Infectious Complications

Infections following piercing have been reported infrequently in the medical literature. Cortese and Dickey [21] found that 11% in a survey of student nurses with pierced ears had infection with purulent discharge. Biggar and Haughie [8] found that 24% had infection with purulent discharge. An organism may be introduced to the piercing site at two points in time. The first is when the piercing is done with poor technique and unsterile instruments. The second is during the aftercare of the piercing site, when the wound is not kept clean or is handled by the client [47].

Some bacterial infections, like those reported by Scully and Chen [48] of pierced tongues requiring the expression of purulent material, will spontaneously heal. A nipple piercing that resulted in an abscess of the left breast was reported by Fiumara and Capek [49]. The abscess responded to ampicillin therapy. Some infections have required surgical irrigation and debridement. With treatment, most bacterial infections will heal, but because of the intimate nature of some piercings, or because of fear, some patients will not seek timely medical advice.

Staphylococcus aureus is the organism most often reported with regard to infected piercings. It was the predominant organism recovered from a group of girls who had held a “piercing party” in a children’s home [50]. Lovejoy and Smith [51] described three patients whose blood cultures were positive for

S. aureus after their ear piercings became red and inflamed. The first, a 15-year-old girl, and the second, a 14-year-old girl, experienced redness and swelling of the earlobe, and eventually the diagnosis of hematogenous osteomyelitis of the iliac crest was established. The third patient was a 2-week-old girl whose ears were pierced 2 days prior to admission to the hospital for fever. Her blood and CSF cultures subsequently yielded *S. aureus*.

S. aureus was also isolated from the external ear discharge of a 5½-week-old girl shortly after her ears were pierced [52]. She was admitted to the hospital because of abdominal distention and loose stools. McCarthy and Peoples [53] described a 6-year-old child with chronic neutropenia who developed toxic shock syndrome shortly after having her ears pierced. The discharge from the inflamed earlobe was found to contain toxin-producing *S. aureus*. Piercings traversing the auricular cartilage may also produce infection, particularly if a piercing gun is used. This was the case for a 14-year-old girl whose ear required incision and drainage (I&D) [54]. Cultures of the drained material yielded *Staphylococcus* species and *Pseudomonas aeruginosa*.

P. aeruginosa has also been reported to occur in others when ear piercings involve the auricular cartilage. Turkeltaub and Habal [55] reported a case of acute chondritis following ear piercing. A 16-year-old girl required I&D for an abscess that had failed to respond to cefadroxil after her ear piercing. She had initially sought treatment for erythema, swelling, and tenderness at the site of the piercing. A 45-year-old Italian woman found that her ear became swollen and tender following placement of an acupuncture staple, similar to an earring, in the pinna for weight loss [56]. Green discharge was seen and *P. aeruginosa* was isolated in culture. The patient required surgical I&D and was left with some deformity. A 13-year-old also required I&D after developing infection of the high external ear [57].

P. aeruginosa infections of the ear have been reported to require substantial resection of necrotic tissue. This was the case in a 20-year-old woman presenting to an emergency department 2 weeks after undergoing a piercing through the auricle [58]. She had pain and discharge, which were treated empirically with oral dicloxacillin. When she returned several days later with no change in her symptoms, I&D was performed with removal of necrotic tissue, which resulted in cosmetic deformity. Irrigation and debridement, with administration of intravenous ceftazidime and ciprofloxacin, cleared the infection. Cumberworth and Hogarth [59] reported *P. aeruginosa* infection in a woman who presented with pain and a large abscess after her upper ear was pierced with an ear-piercing gun. She required resection of a large portion of the upper ear.

Also reported with some frequency and sometimes leading to life-threatening outcomes after body piercing are infections due to group A β -hemolytic streptococci (GABHS). Jay [26] reported infection with GABHS in a series of children seen in a clinic. A 17-year-old boy was seen following an ear piercing

that resulted in a cutaneous infection at the piercing site. This led to septic arthritis and acute glomerulonephritis [60]. Culture of a joint aspirate and discharge from the ear yielded GABHS. George and White [61] reported a woman who attempted to repierce an infected ear lobe. She became toxic and presented in shock. Blood cultures were positive for GABHS, and the patient developed bronchopneumonia and acute renal failure. After a protracted hospital course and a long convalescence, the patient recovered.

Erysipelas has been reported after ear piercing [62]. Also reported with infection due to GABHS is endocarditis; a nose piercing resulted in endocarditis in one young woman [9], and a 15-year-old boy developed a ventricular septal defect from endocarditis that followed an ear piercing [63].

Other bacteria have the potential to be inoculated at piercing sites. Primary tuberculosis was inoculated into the earlobe of an 18-month-old child by a mother with active pulmonary tuberculosis [64]. The child's tuberculosis was localized to the area around the ear and neck. Ear piercing has been reported as a method of inoculation of *Clostridium tetani* in India and Senegal [65]. Thorner cites cases of death due to tetanus following piercing [62].

Viruses may also be inoculated in the course of piercing. Transmission of HBV has been well documented in cases in which needles and other equipment have been shared in body piercing as well as tattooing [1, 66] and in association with finger-stick devices and acupuncture [13, 15, 67]. In a large retrospective Italian study [68], ear piercing was significantly associated with hepatitis, even when intravenous drug use and multiple sex partners were controlled for (OR = 2.20; 95% CI, 1.51–3.22). A case-control study in the state of Washington found that those having HBV were significantly more likely ($P < .001$) to have had their ears pierced than controls [69]. Karim et al. [70] found that HBV seropositivity in females was significantly associated with ear piercing ($P < .001$) among black urban children in South Africa.

Van Sciver [71] reported a patient with hepatitis in whom the only identifiable risk factor was having had her ears pierced 3 months prior to development of symptoms. A patient with acute HBV seen at Massachusetts General Hospital (Boston) was thought to have been exposed to the virus through ear piercing [72]. This case resulted in severe hepatic necrosis and death after a long hospital course. Another case of HBV infection, reported by Parry [73], followed ear piercing; no other risk factors were identified, and the infection resulted in hepatic necrosis and death.

Body piercing [74] and tattooing [75] have been demonstrated to be risk factors for the acquisition of hepatitis C virus, as have acupuncture [76] and injection with nondisposable needles [77]. Hepatitis D virus was also found to be significantly associated with ear piercing and tattooing [78].

Discussion

The practice of body piercing appears to be increasing in popularity. Although few cases of postpiercing infection are

reported in the medical literature beyond a few case reports about non-ear sites, it is probable that health care providers will be called on to treat complications resulting from the practice. Piercings may also be of concern for emergency services personnel, as the jewelry may cause obstruction or be involved with serious injury.

Patients may be reluctant to seek medical care because of the potential for embarrassment about a piercing. The health care provider should obtain a history of piercing, particularly when presented with unexplained hepatitis, endocarditis, or other syndromes for which piercing may be a risk. To be most effective, this must be done in a nonjudgmental fashion. No patient wants to be made to feel a deviate or unacceptable for having a nonmainstream body piercing, particularly when frightened and ill.

Several cases in this review required second hospital admissions because of failure of antibiotic therapy. These complications may be minimized by culturing specimens from the infected site for organism identification and determination of appropriate antibiotic therapy. Removal of the jewelry, acting as a foreign body, may be required to cure local infection.

Body piercing will continue, so prevention of infection must be of concern. Many bacterial infections have been shown to occur following piercing, and the risk of hepatitis B and C has been associated with piercing. Although no cases have been reported in the medical literature, it is possible that HIV may also be transmitted through unsterile, shared piercing tools [79–81]. Transmission of HIV has been shown to occur with acupuncture treatments [82]. Of concern is the lack of regulation of those who perform body piercings and the facilities they may use.

Several states have enacted legislation to regulate both tattooing and body piercing. A bill (AB186) is pending in California that would require practitioners of tattooing and body piercing and those applying permanent cosmetics to be registered with the county in which they practice.

Those in these businesses would have to comply with minimum health and safety guidelines, pay licensing fees, and submit to inspections and fines by county health departments. It is hoped that regulation will reduce the potential for infectious complications of body piercing and tattooing. The Association of Professional Piercers [20] supports the standardization in safety and piercing practices. Piercings done with a maximum of care will reduce the number of infectious complications that may occur.

References

1. Long GE, Rickman LS. Infectious complications of tattoos. *Clin Infect Dis* 1994;18:610–9.
2. Brain R. The decorated body. London: Hutchinson & Co., 1979.
3. Armstrong ML, Ekmark E, Brooks B. Body piercing: promoting informed decision making. *Journal of School Nursing* 1995;11:20–5.
4. Brown DE, Edwards JW, Moore RP. The penis inserts of Southeast Asia. Berkeley, California: University of California, Berkeley, 1988.

5. Armstrong ML. You pierced what? *Pediatric Nursing* **1996**;22:236–8.
6. Wojcik D. Punk and neo-tribal body art. Jackson, Mississippi: University Press of Mississippi, **1995**.
7. Armstrong ML. Body piercing: what practicing RNs should know. *Texas Nursing* **1996**;70:8–10.
8. Biggar RF, Haughie GE. Medical problems of ear piercing. *NY State J Med* **1975**;75:1460–2.
9. Wright J. Modifying the body: piercing and tattoos. *Nursing Standard* **1995**;10:27–30.
10. Rosen MA. Sexual portraits. San Francisco: Shanew Press, **1990**.
11. Meyers J. Nonmainstream body modification. *Journal of Contemporary Ethnography* **1992**;21:267–306.
12. Fiumara MJ, Eisen R. The titivating penile ring. *Sex Transm Dis* **1982**;10:43–4.
13. Bauer FW, Klotz PM, Ginier P, et al. Nosocomial transmission of hepatitis B virus associated with a spring-loaded fingerstick device—California. *MMWR Morb Mortal Wkly Rep* **1990**;39:610–11.
14. Dajani AS, Taubert KA, Wilson W, et al. Prevention of bacterial endocarditis. *JAMA* **1997**;277:1794–801.
15. Marcus DL, Lordi PF. Transmission of hepatitis B virus associated with a finger-stick device [letter]. *N Engl J Med* **1993**;328:969–70.
16. Muntz HR, Cui DJ, Finkelhor Asher B. Embedded earrings, a complication of the ear-piercing gun. *Int J Pediatr Otorhinolaryngol* **1990**;19:73–6.
17. Fisher T, Fregert S, Gruvberger B, Rystedt I. Nickel release from ear piercing kits and earrings. *Contact Dermatitis* **1984**;10:39–41.
18. Grey M. Checklist for choosing a piercer. *Piercing Fans International Quarterly* **1996**;48:50.
19. Osler T. Antiseptics in surgery. In: Fry DE, ed. *Surgical infections*. Boston: Little, Brown and Company, **1995**:119–26.
20. Association of Professional Piercers. The APP basic ten health & safety guidelines. *Piercing Fans International Quarterly* **1996**;48:54.
21. Cortese TA, Dickey RA. Complications of ear piercing. *Am Fam Physician* **1971**;4:66–72.
22. Fisher AA. Ear piercing hazard of nickel-gold sensitization [letter]. *JAMA* **1974**;228:1226.
23. Boss A, Menné T. Nickel sensitization from ear piercing. *Contact Dermatitis* **1982**;8:211–3.
24. McDonagh AJG, Wright AL, Cork MJ, Gawkrödger DJ. Nickel sensitivity: the influence of ear piercing and atopy. *Br J Dermatol* **1992**;126:16–8.
25. Inoue T, Kurihara T, Harashina T. Ear-piercing technique by using an eyelet-type Teflon piercer (eyelet-piercer). *Ann Plast Surg* **1993**;31:159–61.
26. Jay AL. Ear-piercing problems [letter]. *BMJ* **1977**;2:574–5.
27. Cockin J, Finan P, Powell M. A problem with ear piercing [letter]. *BMJ* **1977**;2:1631.
28. Saleeby ER, Rubin MG, Youshock E, Kleinsmith DM. Embedded foreign bodies presenting as earlobe keloids. *J Dermatol Surg Oncol* **1984**;10:902–4.
29. Hendricks WM. Complications of ear piercing: treatment and prevention. *Cutis* **1991**;48:386–94.
30. De San Lazaro C, Jackson RH. Vanishing earrings. *Arch Dis Child* **1986**;61:606–7.
31. Ellis DAF. Complications and correction of the pierced ear. *J Otolaryngol* **1976**;5:247–50.
32. Kelly PA. Surgical treatment of keloids secondary to ear piercing. *J Natl Med Assoc* **1978**;70:349.
33. Caruso BG, Meyerhoff WL. Trauma and infections of the external ear. In: Paraparella MM, Shumrick DA, eds. *Otolaryngology*. 2nd ed. Philadelphia: WB Saunders, **1980**:1345–53.
34. Buchwald C, Holme Nierlsen L, Rosborg J. Keloids of the ear. *Journal of Oto-Rhino-laryngology and Its Related Specialties* **1992**;54:108–12.
35. Zuber TJ, DeWitt DE. Earlobe keloids. *Am Fam Phys* **1994**;49:1835–41.
36. Gaughf CN, Pritzker AS, Davis L. Survey of informed consent for ear piercing: risk of keloids. *Pediatr Dermatol* **1996**;13:430.
37. Ashkenazi S, Mimouni M, Varsano I, Feingold M. Superficial cervical lymphadenopathy after insertion of earrings. *Am J Dis Child* **1984**;138:1147–8.
38. Zilinsky I, Tsur H, Trau H, Orenstein A. Pseudolymphoma of the earlobes due to ear piercing. *J Dermatol Surg Oncol* **1989**;15:666–8.
39. Mann RJ, Peachey RD. Sarcoidal tissue reaction—another complication of ear piercing. *Clin Exp Dermatol* **1983**;8:199–200.
40. Arevalo R, Rosen L. Ear piercing [letter]. *N Engl J Med* **1974**:634.
41. Reiter D, Alford EL. Torn earlobe: a new approach to management with a review of 68 cases. *Ann Otol Rhinol Laryngol* **1994**;103:879–84.
42. Higgins SP, Estcourt CS, Bhattacharyya MN. Urethral rupture in a homosexual male following avulsion of a ‘Prince Albert’ penile ring. *Int J STD AIDS* **1995**;6:54–5.
43. Wilcox RR. Sexual behaviour and sexually transmitted disease patterns in male homosexuals. *British Journal of Venereal Disease* **1981**;57:167–9.
44. Healy T. Nipple-piercings: unusual artifacts. *Radiography* **1979**;45:164–5.
45. Reichle RB, Dailey JC. Intraoral body-piercing. *General Dentistry* **1996**;44:346–7.
46. Price SS, Lewis MW. Body piercing involving oral sites. *J Am Dent Assoc* **1997**;128:1017–20.
47. Threlkeld MG, Cobbs CG. Infectious disorders of prosthetic valves and intravascular devices. In: Mandell GL, Bennett JE, Dolin R, eds. *Principles and practice of infectious diseases*. New York: Churchill Livingstone, **1995**:783–93.
48. Scully C, Chen M. Tongue piercing (oral body art). *Br J Oral Maxillofac Surg* **1994**;32:37–8.
49. Fiumara MJ, Capek M. The Brustwarze, or nipple ring. *Sexually Transmitted Diseases* **1982**;9:138–9.
50. Sanders DY. Complications of ear piercing. *Woman Physician* **1971**;26:459.
51. Lovejoy FH Jr, Smith DH. Life-threatening staphylococcal disease following ear piercing. *Pediatrics* **1970**;46:301–3.
52. Shulman BH. Ear piercing and sepsis. *Clin Pediatr* **1973**;12:27A.
53. McCarthy BP, Peoples WM. Toxic shock syndrome after ear piercing. *Pediatr Infect Dis J* **1988**;7:741–2.
54. Stately R, Fitzgibbon JJ, Anderson C. Auricular infections caused by high ear piercing in adolescents. *Pediatrics* **1997**;99:610–11.
55. Turkeltaub SH, Habal MB. Acute pseudomonas chondritis as a sequel to ear piercing. *Ann Plast Surg* **1990**;24:279–81.
56. Warwick-Brown NP, Richards AES. Perichondritis of the ear following acupuncture. *J Laryngol Otol* **1986**;100:1177–9.
57. Cossette JE. High ear-piercing [letter]. *Otolaryngol Head Neck Surg* **1993**;109:967–8.
58. Widick MH, Coleman J. Perichondrial abscess resulting from a high ear-piercing. *Otolaryngol Head Neck Surg* **1992**;107:803–4.
59. Cumberworth VL, Hogarth TB. Hazards of ear-piercing procedures which transverse the cartilage: a report of pseudomonas perichondritis and review of other complications. *British Journal of Clinical Pathology* **1990**;44:512–3.
60. Ahmed-Jushuf IH, Selby PL, Brownjohn AM. Acute post-streptococcal glomerulonephritis following ear piercing. *Postgrad Med J* **1984**;60:73–4.
61. George J, White M. Infection as a consequence of ear piercing. *Practitioner* **1989**;233:405–6.
62. Thorner M. Pathological conditions following piercing of the lobules of the ear. *JAMA* **1894**;22:110–2.
63. Battin M, Fong LV, Munro JL. Gerbode ventricular septal defect following endocarditis. *Eur J Cardiothorac Surg* **1991**;5:613–4.
64. Morgan LG. Primary tuberculosis inoculation of an ear lobe. *J Pediatr* **1952**;40:482–5.
65. Mamtani R, Mahotra P, Gupta PS, Jain BK. A comparative study of urban and rural tetanus in adults. *Int J Epidemiol* **1978**;7:185–8.

66. Steigman F, Dourdourekas D, Canlas N. The asymptomatic HBs-Ag carrier: auto- and heterologous perils. *Am J Gastroenterol* **1976**;65:512–21.
67. Shier N, Warren J, Torabi M, Hongen R. Contamination of a finger-stick device [letter]. *N Engl J Med* **1993**;328:969–70.
68. Mele A, Corona R, Tosti ME, et al. Beauty treatments and risk of parenterally transmitted hepatitis: results from the hepatitis surveillance system in Italy. *Scand J Infect Dis* **1995**;27:441–4.
69. Johnson CJ, Anderson H, Spearman J, Madsen J. Ear piercing and hepatitis. *JAMA* **1974**;227:1165.
70. Karim SSA, Coovadia HM, Winsor IM, Thejpal R, Van den Ende J, Fouche A. The prevalence and transmission of hepatitis B infection in urban, rural, and institutionalized black children in Natal/KwaZulu, South Africa. *Int J Epidemiol* **1988**;17:168–73.
71. Van Sciver AE. Hepatitis from ear piercing [letter]. *JAMA* **1969**;2047–2285.
72. Castleman B, McNelly BU. Case records of the Massachusetts General Hospital. *N Engl J Med* **1966**;274:1317–25.
73. Parry SW. Ear piercing [letter]. *N Engl J Med* **1974**;291:1143.
74. MacLennan S, Moore MC, Hewitt PE, Nicholas S, Barbara JAJ. A study of anti-hepatitis C positive blood donors: the first year of screening. *Transfusion Medicine* **1994**;4:125–33.
75. Ko Y-C, Ho M-S, Chiang T-A, Chang S-J, Chang P-Y. Tattooing as a risk of hepatitis C virus infection. *J Med Virol* **1992**;38:288–91.
76. Kiyosawa K, Tanake E, Sodeyama T, et al. Transmission of hepatitis C in an isolated area in Japan: community-acquired infection. *Gastroenterology* **1994**;160:1596–602.
77. Chen T-Z, Wu J-C, Yen F-S, et al. Injection with nondisposable needles as an important route for transmission of acute community-acquired hepatitis C virus infection in Taiwan. *J Med Virol* **1995**;46:247–51.
78. Wu J-C, Wang Y-J, Hwang S-J, et al. Hepatitis D virus infection among prostitutes in Taiwan. *J Gastroenterol Hepatol* **1993**;8:334–7.
79. Hrdy DB. Cultural practices contributing to transmission of human immunodeficiency virus in Africa. *Rev Infect Dis* **1987**;9:1109–19.
80. Wagner RF Jr. Risk of infection to dermatologists, cosmetic workers and the public. *Int J Dermatol* **1990**;29:253–7.
81. Neequaye AR, Neequaye JE, Biggar RJ. Factors that could influence the spread of AIDS in Ghana, West Africa: knowledge of AIDS, sexual behavior, prostitution, and traditional medical practices. *J Acquir Immune Defic Syndr* **1991**;4:914–9.
82. Vittecoz D, Mettetal JF, Rouzioux C, Bach JF, Bouchon JP. Acute HIV infection after acupuncture treatments. *N Engl J Med* **1989**;320:250–1.