

Body Piercing

Complications and Prevention of Health Risks

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Abstract

Body and earlobe piercing are common practices in the USA today. Minor complications including infection and bleeding occur frequently and, although rare, major complications have been reported. Healthcare professionals should be cognizant of the medical consequences of body piercing.

Complications vary depending on the body-piercing site, materials used, experience of the practitioner, hygiene regimens, and aftercare by the recipient. Localized infections are common. Systemic infections such as viral hepatitis and toxic shock syndrome and distant infections such as endocarditis and brain abscesses have been reported. Other general complications include allergic contact dermatitis (e.g. from nickel or latex), bleeding, scarring and keloid formation, nerve damage, and interference with medical procedures such as intubation and blood/organ donation.

Site-specific complications have been reported. Oral piercings may lead to difficulty speaking and eating, excessive salivation, and dental problems. Oral and nasal piercings may be aspirated or become embedded, requiring surgical removal. Piercing tracts in the ear, nipple, and navel are prone to tearing. Galactorrhea may be caused by stimulation from a nipple piercing. Genital piercings may lead to infertility secondary to infection, and obstruction of the urethra secondary to scar formation. In men, priapism and fistula formation may occur. Women who are pregnant or breastfeeding and have a piercing or are considering obtaining one need to be aware of the rare complications that may affect them or their child. Though not a

‘complication’ *per se*, many studies have reported body piercing as a marker for high-risk behavior, psychopathologic symptoms, and anti-social personality traits.

When it comes to piercing complications, prevention is the key. Body piercers should take a complete medical and social history to identify conditions that may predispose an individual to complications, and candidates should choose a qualified practitioner to perform their piercing.

As body piercing continues to be popular, understanding the risks of the procedures as well as the medical and psychosocial implications of wearing piercing jewelry is important for the medical practitioner.

Body piercing is defined as the cosmetic piercing of any part of the body for the insertion of objects such as rings, studs, or pins. It dates back to early civilizations,^[1] and there are centuries-old writings discussing the prevention of problems related to these practices.^[2] The introduction of piercing into the USA and other parts of the developed world has occurred relatively recently. Piercing of soft earlobes for the secure attachment of jewelry became common practice among women during the mid-1950s^[3] and the modern fashion of body piercing only started to become popular in the late 1980s.^[4] In 2004, a USA cross-sectional study of 18- to 50-year-olds found that 19% of men and 49% of women had soft earlobe piercings, and 8% of men and 21% of women had piercings in other parts of the body.^[5] These facts suggest both an increased prevalence and a changing social meaning.

The majority of piercings are performed in tattoo and piercing parlors, but soft earlobe piercings are often done in jewelry or department stores. Piercing by itinerant artists, street vendors, or other untrained individuals also occurs. Minor health complications are common. Studies performed in 2001^[6] and 2006^[7] of undergraduates at a single US university both reported a prevalence of body piercing (excluding the soft earlobe in women) of 51%, with a persisting self-reported medical complication rate of 17–19%. This included excessive bleeding, skin tearing, tooth injury, cyst formation, and bacterial infection.^[7] A 2005 representative, population-based, cross-sectional survey in England found that 10% of adults aged 16 years and over had ever had a body piercing (excluding soft earlobes), with a self-reported complication rate of 28%.^[8] In this study, piercings were most common in the younger age groups (27% in 16- to 24-year-olds; 46% in women and 13% in men) but the complication rate (31%) in the 16- to 24-year-olds was very similar to that of the whole group. This is important, as it is likely that the younger individuals had obtained their piercings closer to the time of the survey and so their memories of the events were probably more reliable. Among the 16- to 24-year-olds with complications, approximately half sought professional help and 1% needed hospital admission.^[8] Complications vary depending on the body-piercing site, materials used, experience

of the practitioner, hygiene regimens, and aftercare by the recipient.^[9] Several European countries have adopted legislation for body art establishments. There is no universal regulation of piercing practices in the USA. Where regulation is present, it is either state based or under local ordinance. Healthcare professionals should be cognizant of the medical consequences of body piercing. This article discusses the complications of body piercing, suggests appropriate preventive practices, and makes some recommendations for treatment.

1. General Complications

1.1 Infection

Infection is the most common complication and it occurs in up to 20% of all body piercings.^[10,11] The most commonly isolated bacteria are *Staphylococcus aureus*, group A streptococci, and *Pseudomonas* spp.^[12] Rare cases are caused by coagulase-negative staphylococci, anaerobic bacteria, or atypical mycobacteria.^[13-17] Infections are usually localized (figure 1), although there are a number of reports of life-threatening and distant infections (table I).^[40,41,52,54-57,62,66,67] Lymphadenopathy or pseudolymphoma with or without infection may also occur.^[68,69] Treatment of localized infection includes irrigation, compresses, and topical and, if necessary, oral antibiotics. For empiric oral antibiotic therapy, the bacterial pathogens common to the piercing site should be considered (table I). A bacterial culture may be helpful. Removal of the jewelry is not always prudent, as a patent piercing tract may allow for drainage, thus avoiding the development of a sac and its potential for abscess formation. However, in the event of persistent infection, removal of the jewelry may become necessary.

There is a risk of transmission of communicable disease through the piercing procedure. Transmission of hepatitis B, C, D, and G is clearly possible.^[9,18] A 2001 review of 12 studies completed between 1974 and 1997 looking at risk factors for viral hepatitis found an association with ear piercing in six of the studies, and an association with percutaneous needle exposure including body piercing in two of the studies.^[19] In 2008,



Fig. 1. Ear piercing of hard cartilage with infection.

there was a case reported of fatal fulminant herpes simplex hepatitis associated with a recent tongue piercing in an immunocompetent woman.^[57] However, it is not clear that body piercing is a general risk factor for hepatitis. It may be a surrogate marker for other risk-taking behaviors.^[70-72] Transmission of HIV during the piercing procedure, although theoretically possible, has not been proven to occur.^[73,74] Both the piercers and the recipients are at risk for contracting a blood-borne infection. It is recommended that piercers be vaccinated against hepatitis.^[75] In the event of direct blood contact, serologic studies should be undertaken.

Infective endocarditis is a rare but serious complication of body piercing, especially in those with an underlying cardiac problem (table I).^[20-40] A 2008 review identified 21 cases of endocarditis associated with piercings of the tongue (seven), earlobe (six), navel (five), lip (one), nose (one), and nipple (one) during the previous 10 years.^[67] The most common organisms have been *Staphylococcus* and/or *Streptococcus* spp. and about half the reported cases have required surgical intervention in-

cluding valve replacement. There is a lack of awareness of the risk of endocarditis associated with body art among patients with congenital heart disease, reflecting a lack of patient education as well as a lack of consensus among cardiologists as to the appropriate advice for those at risk.^[76,77] The 2007 American Heart Association guidelines,^[78] while recognizing that there are minimal published data regarding the risk of bacteremia or endocarditis associated with body piercing, advise against body piercing of individuals with any of the conditions listed in table II, because of the possibility of bacteremia. If an individual with congenital heart disease does decide, against medical advice, to get a body piercing, prophylactic antibiotics should be given about an hour prior to the procedure, depending on the piercing site, and must be given for all piercings involving perforation of the oral mucosa in those with the underlying conditions in table II.^[78] In addition, it is imperative that local piercing-site infections are treated promptly.^[79] If an individual with a recent piercing (within the previous 4 months) presents with unexplained fever, night chills, weakness, myalgia, arthralgia, lethargy, or malaise, infective endocarditis should be considered even if there is no history of congenital heart disease.^[21-23,27,28,32,35,39,40,80]

1.2 Allergies

Noninfectious complications of body piercing are listed in table III.

Allergic contact dermatitis (type IV reaction) is an inflammation of the skin that results from direct contact with an allergen. There is a red, scaly, itchy eruption in the area of contact. Wearing jewelry close to the skin and within piercing tracts is an important cause of allergic contact dermatitis. Nickel, which may be in metal jewelry, is the most commonly involved allergen (figure 2).^[81,82] Wearing metal touching the skin is the most common cause of sensitization to nickel. A study of 118 men revealed a metal sensitization rate of 11.1% among those who had piercings, 4% among those who had never had a piercing, and 14.6% among those with more than one piercing.^[83] This study is relevant as it was not confounded by the inclusion of women, who are more likely to have worn metal jewelry for years prior to any piercing. It was concluded that the number of piercings was a statistically significant predictor of metal allergy.^[83]

In response to a high and increasing prevalence of nickel allergy, both Denmark and the European Union passed legislation (the European Nickel Directive) restricting the amount of nickel released from metal designed to be worn next to the skin. The 1992 institution of this rule in Denmark has lowered

Table I. Rare reported infectious complications of body piercing

Piercing site	Documented complication	Reported organism(s)	Reference (site of piercing)
General	Hepatitis	Hepatitis B, C, D, G ^a	De Man et al. ^[18]
			Hayes and Harkness ^[19]
	Endocarditis	<i>Staphylococcus aureus</i>	Giuliana et al. ^b (nasal) ^[20]
			Kovarik et al. ^b (earlobe) ^[21]
			Lee et al. ^b (earlobe) ^[22]
			Dupont et al. ^b (navel) ^[23]
			Raja et al. ^b (navel) ^[24]
			Hoyer and Silberbach ^c (earlobe) ^[25]
			Weinberg and Blackwood ^c (navel) ^[26]
			Ramage et al. ^b (nasal) ^[27]
			Harding et al. ^b (tongue) ^[28]
			Ochsenfahrt et al. ^c (nipple) ^[29]
			Papapanagiotou et al. ^b (earlobe) ^[30]
			Kloppenburg and Maessen ^b (tongue) ^[31]
			Lick et al. ^b (tongue) ^[32]
			Battin et al. ^b (ear) ^[33]
			Barkan et al. ^c (navel) ^[34]
			Batiste et al. ^b (tongue) ^[35]
			Tronel et al. ^b (tongue) ^[36]
			Akhondi and Rahimi ^c (tongue) ^[37] [also published by Goldrick ^[38]]
Friedel et al. ^b (tongue) ^[39]			
Carano et al. ^b (lower lip) ^[40]			
Ear	Acute post-streptococcal glomerulonephritis	<i>Streptococcus</i> spp.	Ahmed-Jushuf et al. ^[41]
	Abscess	<i>Mycobacterium fortuitum</i>	Hori and Jackson ^[42]
	Auricular chondritis and perichondritis	<i>Lactobacillus</i> spp.	Razavi and Schilling ^[43]
		<i>Pseudomonas aeruginosa</i>	Keene et al. ^d ^[44]
			Lee and Gold ^[45]
		Sandhu et al. ^[46]	
		Fisher et al. ^d ^[47]	
		More et al. ^[48]	
		Turkeltaub and Habal ^[49]	
		Stewart et al. ^[50]	
	Nonmenstrual toxic shock syndrome	Endotoxin of <i>Staphylococcus aureus</i>	McCarthy and Peoples ^[51]
	Pyogenic spondylitis	<i>Staphylococcus aureus</i>	Sewnath et al. ^[52]
Eyebrow	Local infection	<i>Mycobacterium flavescens</i>	Ferringer et al. ^[17]
Nose	Lupus vulgaris	<i>Mycobacterium tuberculosis</i>	Kaur et al. ^[53]

Continued next page

Table I. Contd

Piercing site	Documented complication	Reported organism(s)	Reference (site of piercing)
Mouth	Ludwig angina	Group A streptococci ^e	Perkins et al. ^[54]
	Brain abscess	<i>Streptococcus intermedius</i>	Herskovitz et al. ^{f [55]}
		<i>Streptococcus viridans</i> , <i>Peptostreptococcus micros</i> , <i>Actinomyces</i> spp., <i>Eikenella corrodens</i>	Martinello and Cooney ^[56]
	Fatal fulminant herpes simplex hepatitis	Herpes simplex virus	Lakhan and Harle ^[57]
	Chorioamnionitis	<i>Eikenella corrodens</i>	Jadhav et al. ^[58]
	Cephalic tetanus	<i>Clostridium tetani</i> ^e	Dyce et al. ^[16]
Nipple	Mastitis/abscess	<i>Staphylococcus epidermidis</i>	Ochsenfahrt et al. ^[29]
		<i>Mycobacterium abscessus</i>	Trupiano et al. ^[15]
		<i>Prevotella intermedia</i> ,	Brook ^[14]
		<i>Peptostreptococcus anaerobius</i>	
		<i>Mycobacterium fortuitum</i>	Bengualid et al. ^[59]
		<i>Mycobacterium fortuitum</i>	Lewis et al. ^[60]
		Atypical mycobacteria, coagulase-negative staphylococci	Jacobs et al. ^[61]
		Coagulase-negative staphylococci, group B streptococci	Jacobs et al. ^[61]
		Microaerophilic staphylococci	Jacobs et al. ^[61]
		<i>Staphylococcus aureus</i>	Bader et al. ^[62]
	Toxic shock syndrome	Unspecified	Javaid and Shibu ^[63]
	Infection of an implant	Group A β -hemolytic streptococci	De Kleer et al. ^[12]
Navel	Septic arthritis	<i>Staphylococcus aureus</i>	Dupont et al. ^[23]
	Local infection	<i>Mycobacterium chelonae</i>	Ferringer et al. ^[17]
Male genital	Prostatitis, testicular infection	Unspecified	Kaatz ^[64]
	Recurrent condyloma acuminatum	Human papillomavirus	Altman and Manglani ^[65]
	Fournier gangrene	Group A streptococci, mixed Gram-negative bacilli, anaerobic organisms	Ekelius et al. ^[66]

a Direct transmission not proven.

b No history of congenital heart disease.

c History of congenital heart disease.

d Outbreak/multiple cases from one source.

e Presumed, but not proven.

f Resulted in death.

the incidence of new sensitization.^[84] Early compliance with this requirement was also demonstrated in Sweden by the finding of a decrease in the percentage of items on the market intended for direct and prolonged contact with the skin that tested positive for nickel release using the dimethylglyoxime test (from 25% in 1999 to 8% in 2002/2003). Additionally, there was a decrease in the number of piercing posts that contained nickel concentrations above the threshold of 0.05%, from 60% in 1999 to 17% in 2002/2003,^[85,86] with maintenance of this change confirmed in 2010.^[87]

Costume jewelry, even if made of so-called sterling silver, may contain nickel, as well as cobalt, chromium, and molybdenum, at higher than acceptable levels.^[88] Sensitization to cobalt may occur alone or it may occur as a cross-reaction to nickel.^[89,90] White gold may also contain nickel, but allergy to gold itself is quite rare.^[91]

The highest risk of sensitization to metals via piercing occurs during the healing period. Healing periods vary based on the piercing site (table IV).^[88] Only inert materials such as 316 low carbon, vacuum melted (LVM) implant-grade stainless steel, titanium, and niobium should be worn during healing.^[96]

Table II. Cardiac conditions associated with the highest risk of adverse outcome from endocarditis^a (reprinted with permission from Wilson et al.,^[78] *Circulation* 2007; 116: 1736-54, © 2007 American Heart Association, Inc.)

Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
Previous infective endocarditis
Congenital heart disease
unrepaired cyanotic congenital heart disease, including palliative shunts and conduits
completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure
repaired congenital heart disease with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)
Cardiac transplantation recipients who develop cardiac valvulopathy
a 2007 Guidelines from the American Heart Association Rheumatic Fever, Endocarditis and Kawasaki Disease Committee, Council on Cardiovascular disease in the Young and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia and the Quality of Care and Outcomes Research Interdisciplinary Working Group. The committee advised against body piercing of individuals with any of the above conditions because of the possibility of bacteremia.

Other less common causes of allergic contact dermatitis related to body piercing include local anesthetic and antiseptic creams and ointments. In particular, topical applications containing diphenhydramine, and antibiotic ointments containing neomycin or bacitracin are common sensitizers and should be avoided. Interestingly, polymyxin B sulfate, often also in combination antibiotic ointments, is only a very rare sensitizer and not usually a culprit.^[97]

Treatment of allergic contact dermatitis involves removal and ongoing avoidance of the offending agent. Topical and,

rarely, systemic corticosteroids may be necessary to control symptoms.

Allergy to latex in the protective gloves worn by body piercers may cause a similar type IV response, resulting in an itchy dermatitis on the hands. It may also precipitate a type I response, including contact urticaria and wheezing, with positive skin prick tests and the presence of specific IgE antibodies. The use of single-use, reduced-protein content, powder-free latex gloves (low latex release) may reduce the risk of sensitization.^[75] Additionally, there are suitable and easily available protective gloves made of other non-sensitizing materials such as nitriles or vinyl.^[98]

1.3 Loss of Blood

A small amount of bleeding is expected with every piercing; however, severe hemorrhage has been reported. Tongue and penile piercing (in particular, glans piercing) are the most risky in this regard because of the vascularity of these organs.^[99] Hypovolemic shock after tongue piercing has been reported.^[100] Following a piercing, damage to the spongy body of the penis may lead to hemorrhage and erection difficulties.^[9] Individuals taking anticoagulants or antiplatelet medications or those who have an underlying bleeding diathesis are at increased risk for bleeding and should abstain from body piercing. Antiplatelet agents include aspirin (acetylsalicylic acid) and most other nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen and naproxen. As a general rule, it is important to avoid aspirin for 7 days and all other NSAIDs for at least 1 day before any piercing procedure.^[101] The effect of aspirin is irreversible for the life of a platelet (5–9 days), whereas the antiplatelet effect of the other NSAIDs lasts from 5 to

Table III. Noninfectious complications of body piercing

Piercing site	Documented complications
General	Allergic reaction; bleeding; scar formation (hypertrophic, keloid); hypergranulation tissue; traumatic tear; embedding, migration, or rejection of jewelry; poor healing; discoloration of tissue around the piercing site; hematoma; large vessel or nerve injury; interference with medical procedures (airway access, electrosurgical burns, difficulty with catheterization)
Ear	Severe ear deformity ('cauliflower ear'), pseudolymphoma
Nose	Basal cell carcinoma, granulomatous reaction, aspiration or swallowing of jewelry, strong smell of keratinous material
Mouth	Swelling, hypovolemic shock, increased saliva production, pain, speech impediment, interference with mastication, permanent numbness, loss of taste, aspiration or swallowing of jewelry, tooth chipping/cracking, mucosal damage/oral ulcers, gingival recession, atypical trigeminal neuralgia, calculus build-up on jewelry
Nipple	Difficulty breastfeeding, galactorrhea due to hyperprolactinemia resulting from nipple stimulation, ejection of milk from piercing tract
Navel	Migration and rejection during third trimester of pregnancy
Male genitals	Compromise of barrier contraceptives, urethral strictures, priapism due to entrapment of penis in scrotal piercing hole, paraphimosis due to inability to replace the prepuce over the jewelry of the glans, engorgement, urethral rupture, orchitis, glanular hypospadias
Female genitals	Compromise of barrier contraceptives, frictional irritation, potential for complications during childbirth, pelvic inflammatory disease leading to sterility

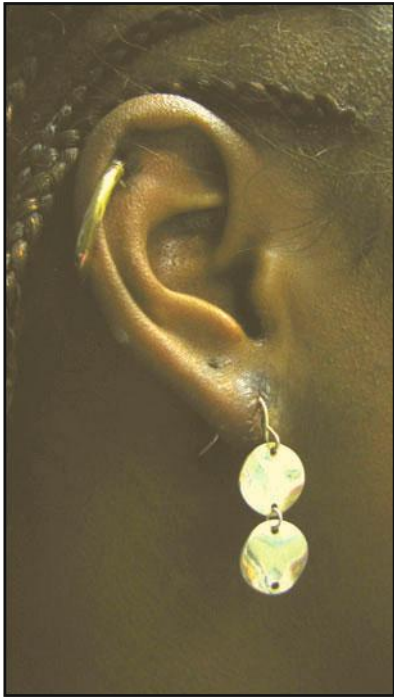


Fig. 2. Contact dermatitis due to nickel in the jewelry.

7 hours. As it is important to be sure that the piercing wound tract is fully coagulated prior to exposing it to an antiplatelet agent even for a few hours at a time, the recommendation is to avoid aspirin and NSAIDs for 7 days after the procedure as well. This is particularly important for vascular and mobile areas of the body such as the tongue and penis.

1.4 Scarring

Any procedure that disrupts the skin deeper than the epidermis leads to a scar. Piercing holes may be visible for years after the wearing of jewelry has been abandoned (figure 3). Piercing sites are at risk for hypertrophic and keloid scarring. Hypertrophic scars are raised scars and are a common way for a wound to heal (figure 4). Keloids result from scars with autonomous growth patterns that spread outside the area of injury. They can become large and unsightly and, at times, they become infected. Enlargement or precipitation of a keloid may be aggravated by the necessary removal and reinsertion of jewelry causing repetitive trauma, or ongoing inflammation (figure 5). In general, people who know that they form keloids are wise to avoid any unnecessary skin trauma, including body piercing. Getting rid of a keloid is difficult.

On the other hand, it is often fairly straightforward to repair surgically a split earlobe or even a torn piercing tract in the eyebrow or on some other part of the body. Tears are not un-

common injuries, as it is easy for jewelry to get snagged or to be pulled and the tissue to get ripped (figure 6).

Overgrown and unsightly scars may occur in individuals taking isotretinoin and in those with a compromised immune system or diabetes, in whom healing may be delayed.^[9] Long healing times increase the risk of secondary infection. It is said that piercing guns, frequently used for earlobe piercing, may cause crush injuries and thus lead to excessive scarring; however, there is little evidence to support this statement.^[102]

1.5 Interference with Medical Procedures

Body jewelry may interfere with diagnostic and therapeutic procedures. Images from modalities such as x-ray, ultrasound, computed tomography, and magnetic resonance imaging (MRI) may be distorted by overlying jewelry. Ferromagnetic jewelry may move and cause injury if it is worn during MRI. Electrical burns may occur if metal jewelry is present during defibrillation or the use of electrocautery devices. Orofacial piercings can be problematic for anesthesia.^[103] Risks include swallowing or aspiration, bleeding, trauma, and edema. There are reports of hypoxia, laryngospasm, and tongue bleeding after endotracheal intubation when tongue-piercing jewelry had not been removed,^[104,105] as well as ingestion of nasal jewelry following nasogastric tube placement.^[106] These cases highlight the importance of the removal of jewelry prior to medical procedures.

Table IV. Prolonged piercing-tract healing times, as reported in medical and trade literature

Piercing site	Time to heal	
	medical literature ^[92-94]	trade literature ^[95]
Tongue	3–6 wk	6–8 wk
Lip	6–8 wk	6–8 wk
Earlobe	6–8 wk	4–8 wk
Ear cartilage	6–8 wk	3–9 mo
Eyebrow	6–8 wk	6–8 wk
Nostril	6 wk–4 mo	3–4 mo
Nipple	6 wk–6 mo	Male 3–4 mo Female 6–9 mo
Navel	4 wk–12 mo	6–9 mo
Urethral meatus (Prince Albert)	2–4 wk	6–8 wk
Scrotum (hafada)	2–3 mo	3–4 mo
Labia majora	4 wk–4 mo	3–4 mo
Labia minora	2–6 wk	4–8 wk
Clitoris	2–10 wk	4–8 wk
Coronal ridge (dydoe)	4–8 wk	3–4 mo



Fig. 3. Piercing tract orifice visible 5 years after jewelry was last worn.

In the event of an emergency a patient may not be able to assist with jewelry removal; therefore, emergency medical personnel should be familiar with the various types of body jewelry, their opening mechanisms, and the appropriate techniques for removing them (figure 7). In a survey of 28 emergency room doctors in the United Kingdom, only six were able to describe accurately the opening mechanisms of three common types of body jewelry. There are several recent publications that provide appropriate guidance.^[107-109] A plastic piercing retainer can be inserted in place of jewelry to hold a piercing tract open.

1.6 Blood, Blood Product, and Organ Donation

Body piercing may result in deferrals related to blood, blood product, and organ donation. In August 2005, the Canadian Blood Services decreased the deferral period for tattooing and ear or body piercing from 12 to 6 months. A 2009 study showed no measurable adverse effect on safety after shortening this deferral period.^[110] Currently, the American Red Cross does not require a deferral for blood donation if the body piercing was performed using sterile instruments or single-use equipment. However, donors must wait 12 months if there is any question about the instruments used.^[111] As for organ donation, a recent study on the impact of high-risk social behaviors on recipient survival following heart transplantation showed that, as long as the donors were serologically negative for viruses, there was no impact on recipient survival.^[112]

2. Site-Specific Complications

2.1 Mouth

Although previously uncommon in the Western world, piercing of the tongue and perioral areas is currently a popular form of body art.^[113-115] Healing times are typically estimated at 4–8 weeks (table IV); however, in a 2004 study of tongue piercing in beagles, histopathology performed 3 months after piercing demonstrated that re-epithelialization of the piercing tract was not total and that the central portion of the canal was still covered with fibronecrotic material.^[116]

Commonly reported early complications of tongue piercing include swelling, difficulty eating, excessive salivation, and pain. These symptoms are usually temporary, peaking during the first 3 days and, in most cases, improving significantly by the end of a week. Difficulty speaking or talking with a ‘lisp’ is common. A study in Belgium showed that although participants reported having difficulty talking immediately after their



Fig. 4. Hypertrophic scar following ethnically appropriate nasal piercing. Removed in order to get a job in finance.



Fig. 5. Keloid following ear piercing.

piercings, this usually only lasted from a few days to 6 weeks. A listener experiment performed 1–5 years post-piercing revealed no ongoing articulation problems.^[117] Bleeding can occur both during and in the days immediately following the procedure. It is typically mild and can be controlled by applying pressure; however, as previously noted, there have been cases of excessive bleeding, leading to hypotensive shock.^[100] Hypergranulation tissue and/or a pink/white membrane around the opening of the tongue tract is often observed. If it develops during healing, it is usually temporary (unpublished observations).^[95]

Tongue and lip jewelry tends to ‘nest’ 1–2 mm into the soft oral tissue; however, more significant embedding of the jewelry has been reported and may occur as early as 24 hours post-procedure (figure 8). This is usually due to a combination of swelling, improperly sized jewelry, and the high susceptibility of the mucous membranes to mechanical pressure. Embedding of more than 50% of the ball of the barbell needs addressing promptly, as further swelling may result in the tongue ‘swallowing’ the jewelry and the formation of the aforementioned membrane across the end of the jewelry, potentially necessitating surgical removal.^[118] Proper sizing of jewelry is crucial and initial jewelry should be long enough to allow for swelling. Relevant aftercare aimed at reducing tongue swelling includes sucking ice chips, drinking cold liquids only, and limiting tongue movement for the first 24 hours. In addition, cessation of smoking is important, as smoking may delay healing time.

Dental complications from oral jewelry are manifest. These include chipping and fracture of teeth, and gum damage. In a split-mouth study of lower lip piercings, tooth fractures and cracks were more prominent on the piercing side (20% vs 4%).^[119] Switching to a shorter barbell once the tract is healed

may help,^[92] but it is almost impossible to place the piercing tract far enough from the teeth and gums to avoid damage from the inserted jewelry, despite careful chewing. Strong associations have been shown between gingival recession and piercings of the tongue or lower lip.^[120] Gingival recession can lead to esthetic impairment, increased susceptibility to root caries, and dentin hypersensitivity. Oral jewelry has a tendency to accumulate calculus (figure 9).^[113] Interestingly, a recent study showed that having a tongue-piercing tract is a risk for oral colonization with *Candida albicans*, regardless of the presence of jewelry.^[121] Immediately prior to piercing, the use of a chlorhexidine mouthwash helps remove oral bacteria and its use is recommended for 7 days after the piercing. After this, the regular brushing of teeth and jewelry with a soft-bristled toothbrush and the use of an alcohol-free, antiplaque formula mouthwash after each meal is wise.

Other complications specific to oral piercings include mouth ulcers, leakage of intraoral liquids through the piercing tract, nerve damage leading to loss of taste, numbness, and atypical trigeminal neuralgia.^[122] People with oral and nasal jewelry are at risk for its aspiration or ingestion. If inhalation occurs, visualization of the item with a laryngoscope and/or a chest x-ray may be necessary to clear the airway and remove the jewelry.^[123]

2.2 Nose

A well known complication of nasal piercing is inflammation, sometimes leading to the embedding of the stud in the nasal mucosa. This inflammation may occasionally be granulomatous, related to destruction of the cartilage, and there is a report of a granulomatous tumor of the nasal ala



Fig. 6. Torn earlobe.



Fig. 7. Captive bead rings are a common style of body jewelry. Removal requires dislodging the bead, which is held in place by tension. This can be done manually or with the use of specialized pliers.

occurring 1 year after nasal piercing leading to obstruction of nasal breathing and necessitating surgical removal.^[102] Because of colonization of the nose with staphylococcal organisms, nasal piercings become infected easily. There is a report of a young woman with no known previous cardiac abnormalities who developed *S. aureus* endocarditis complicated by multiple cerebral, kidney, and spleen septic emboli 6 months after a nasal septum piercing.^[20] The repeated trauma of removing the jewelry (to hide it from parents) probably played a significant role. Cartilage piercings can cause septal hematomas,^[92] and piercing of the nasal bridge has resulted in nerve damage^[93] as well as bone necrosis related to obstruction of the blood supply.^[80] Trade literature mentions ‘septum stench,’ meaning a strong smell of inspissated keratin formed from the surface of the epidermal lining of the tract. This is similar to the unpleasant smell emitted on opening an epidermal cyst.^[95] Also, nasal studs may be aspirated or swallowed.

2.3 Eyebrow

The most common complications of eyebrow piercing are local inflammation and infection.^[17] These can lead to erythema, pain, and swelling of the face and cheek. There is a report of a solid, movable, tender, cherry-sized swelling of the lateral third of the right eyebrow with an erythematous eyelid and a large swelling of the cheek 4 months after an eyebrow piercing, requiring a systemic antibiotic and surgical excision.^[124] It is recommended that the application of cosmetic products is avoided until the piercing canal has healed. Eyebrow-piercing tracts often split because of the weight of the inserted jewelry or unintentional

manipulation of the area. Surgical repair is usually straightforward. Choosing jewelry of the appropriate style and weight for its intended position may help to prevent this problem.

2.4 Ear

Ear piercings go beyond the soft earlobe. In a 2003 review, Stirn^[93] describes 12 different types of ear piercings. Cosmetic complications of soft earlobe piercings include tearing (from catching on clothing or during contact sports), stretching due to heavy jewelry that may eventually lead to a bifid deformity, and keloid formation. Simple tears can be sutured under local anesthesia; however, larger defects may require reconstructive surgery.^[92] Infections of the soft earlobe usually remain localized, with limited superficial crusting; however, there are multiple reports of post-earlobe-piercing endocarditis (table I)^[25,30,33] as well as a report of acute post-streptococcal glomerulonephritis 1 month after such a piercing with an unsterilized safety pin.^[41]

Transcartilaginous piercings may be complicated by hematoma formation, which may result in cartilage ischemia or a severe deformity commonly referred to as ‘cauliflower ear.’^[80] Because of their avascular nature, piercings of the upper ear cartilage are often associated with poor healing and serious infection.^[45,46] Both chondritis and perichondritis have been reported.^[43,50] In addition to individual case reports,^[49] there have been reports of outbreaks of *Pseudomonas* infections caused by commercial piercing of the ear cartilage. In one report, 7 confirmed and 18 suspected cases were linked to a specific mall kiosk.^[44] Four people were hospitalized and several cases resulted in significant disfigurement. *Pseudomonas* was cultured from two of the four workers, the atomizer solution,



Fig. 8. Tongue stud ball nested in the tongue, with membrane around.



Fig. 9. Calculus on the lower ball of tongue barbell after only 5 weeks of use.

and wastewater in traps beneath the sinks. Multiple health infraction were documented including the use of open piercing guns to drive relatively blunt needles through the cartilage, reuse of a 'single-use' disinfectant bottle, and 'cleaning' of already sterilized studs with spray disinfectant.^[44] There were similar findings during another outbreak when 9 of 15 recipients were hospitalized. The aftercare solution was found to be an aqueous solution of benzalkonium chloride, which is ineffective in suppressing the growth of *Pseudomonas*.^[47,48]

In general, perichondral auricular abscesses occur within the first month after high ear piercing. Surgical incision, drainage, and culture may be necessary. *Pseudomonas aeruginosa* and *S. aureus* are common culprits and respond well to fluoroquinolones. Atypical mycobacterial infections have also been seen.^[42] Cosmetic preservation or reconstruction of the auricular cartilage can be difficult.

2.5 Nipple

Nipple-piercing tracts heal slowly (table IV). This may account for the estimated infection rate of up to 20%,^[94] at times associated with the development of a subareolar abscess.^[15,125] Spreading of infection around breast and chest wall implants is a significant problem in men and women,^[12,63] so nipple piercing is not recommended for anyone with anterior chest implants. At times, piercing-associated breast abscesses grow unexpected pathogens (coagulase-negative staphylococci, mycobacteria, *Streptococcus* spp., anaerobes, and *Gordonia* spp.), therefore, again, culture is important so that the correct antibacterial may be administered.^[59] A nonhealing abscess may simulate or be associated with a breast carcinoma.^[126] As with other piercing sites, distant infection, such as endocarditis, may occur.^[29]

Noninfectious complications of nipple piercing include migration, rejection, and tearing during contact sports. Galactorrhea may occur because of nipple stimulation leading to hyperprolactinemia. The prolactin level will return to normal after removal of the piercing jewelry.^[127] Pierced nipples have been reported to swell prior to and during menstruation, even after complete healing. The impact of nipple piercings on breastfeeding is addressed in section 3.

2.6 Navel

Navel piercings may take up to a year to heal (table IV). This can be frustrating, as there may be a continuous serous ooze, which easily becomes superinfected with skin organisms (figure 10). As with other piercings, anatomy is important. A navel with a distinct ridge is easiest to pierce. Since the navel is a remnant of the umbilical cord, an infection could easily spread to the abdomen and internal organs, but, in fact, this is a rare event.^[93,128]

Cosmetic complications include the visible formation of excess granulation tissue and discoloration of the skin around the piercing, as well as persistent discharge. Additionally, scarring can occur because of migration and rejection of jewelry (figure 11). As with other piercings, this risk is increased with the use of jewelry of inappropriate design and weight (e.g. too narrow a gauge or too heavy), especially if it is superficially placed or if the recipient is overweight. An enlarged abdomen accounts for the migration and extrusion that often occurs during the third trimester of pregnancy.^[92]

Navel jewelry can get caught on clothing and rapid movement may irritate the surrounds. During the healing process, it is wise to avoid full sit-ups, to wear loose garments, and to cover the area during exercise and intimate activities to prevent exposure to sweat and bodily fluids.^[95] Wearing a curved barbell instead of a ring until the tract has healed may reduce irritation and scarring. Post-inflammatory hyperpigmentation or darkening of the adjacent skin is common and may be minimized by avoiding sun on the area for up to a year.

2.7 Genitals

Multiple variations on genital piercings exist. In men, common piercings involve the glans, urethra, prepuce, and scrotum;

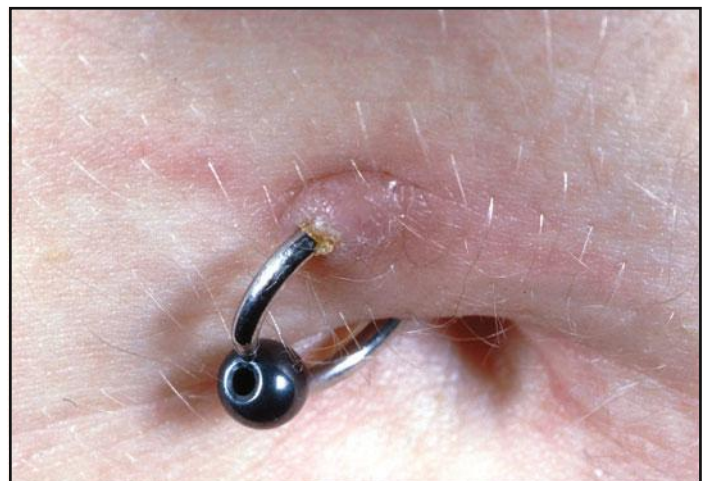


Fig. 10. Navel crust with captive bead ring.



Fig. 11. Keloid from umbilical jewelry.

in women, the labia, clitoral hood, and clitoral body. All of these are used to increase sexual pleasure. Serious complications include damage to nerves and vessels, infertility secondary to infection, and obstruction of the urethra secondary to scar formation.

Complications relating to intercourse include an increased risk for infection prior to complete healing and interference with the use of barrier contraceptive methods by tearing condoms or dislodging diaphragms. Prevention includes avoidance of jewelry with sharp edges, double condoms, and/or a second form of contraception/protection.

Numerous complications specific to men have been reported. These include priapism related to entrapment of the penis in a penile ring, and a fistula of the glans resembling acquired glanular hypospadias.^[129,130] Priapism requires emergency treatment to preserve erectile function. Paraphimosis relates to the inability to replace the prepuce over the jewelry in the glans of an uncircumcised penis.^[131] The prepuce is typically reduced manually after a nerve block, but sometimes injection of the prepuce with hyaluronidase is required. Piercings such as the 'Prince Albert,' or other variations in which the piercing tract perforates the urethral meatus, can result in strictures due to scarring or a split urinary stream (figure 12). Additionally, piercings that perforate the urethra may cause additional tracts through which semen and urine leak.^[93]

For infectious complications related to male genital piercings see table I.^[65,66] Interestingly, there is a suggestion that the glans- and urethral-piercing jewelry and tract in men may be protective against the acquisition of chlamydia.^[132] This is counterintuitive and has not been confirmed.

Recently, there were two case reports of squamous cell carcinoma (SCC) associated with genital piercings. Both men had

HIV and hepatitis C infections as well as Prince Albert piercings. The association between trauma/chronic inflammation, underlying immunosuppression, and SCC is well known. These cases are another reminder that inserted jewelry can lead to chronic trauma.^[133]

In women, piercing does not go through the urethra and complications are fewer. Complications include site sensitivity, skin irritation, and numbness. Despite this, piercing of the genital tract has been reported to cause sterility secondary to pelvic inflammatory disease.^[9]

3. Complications during Pregnancy, Labor, and Breastfeeding

Many women with inserted jewelry undergo uneventful pregnancies and deliveries; however, it is important that these women are aware of possible pregnancy-specific complications. Women who are pregnant or who expect to become pregnant within a year should not get pierced, as unhealed piercing tracts may expose an unborn child to infection, blood-borne disease, and medications used to treat complications.

The rapid growth of a gravid stomach may pose a problem for navel rings and abdominal microdermal implants. Pregnant women are at increased risk for migration and rejection of jewelry as well as localized scarring,^[134] and surgical excision of abdominal microdermal implants has been necessary during the latter months of pregnancy to allow stretched and/or infected sites to heal.^[135]



Fig. 12. Prince Albert piercing with captive bead ring.

Adding to the infectious complications already mentioned, there is a report of preterm labor caused by *Eikenella corrodens* chorioamnionitis at 26 weeks' gestation. The patient and her partner had tongue piercings and engaged in daily oral sex. The authors speculated the contamination route was related to the tongue piercings and cunnilingus.^[58]

Literature is lacking on complications during childbirth, but systematic removal of all piercings is recommended.^[134] This is the same recommendation as for other surgical or emergency procedures. In particular, while some women with genital jewelry have delivered without complications, swelling and engorgement may pose a problem, related to tearing of the labia or trauma to the infant during birth.

The effects of nipple piercing on lactation are not clear. While nipple piercings are not generally believed to be detrimental to milk supply, there are known lactation difficulties. These include maternal discomfort, poor latch, babies frequently coming on and off the breast, slurping, gagging, and milk leaking from the infant's mouth, all probably associated with obstruction of breast ducts and scar formation.^[136] Wearing of the jewelry puts the infant at risk for aspiration/ingestion and the infant's gums, tongue, and soft palate at risk for injury. Colostrum or breast milk may seep or flow through the piercing tract during feeding.^[137,138] The recommendation is to remove jewelry before breastfeeding.

4. Prevention

When it comes to piercing complications, prevention is the key. A good piercing candidate is a healthy one. Piercers should take a complete medical history including a history of allergies and systemic diseases, in particular enquiring about cardiac disease, unregulated diabetes, or other conditions that may predispose to infection.^[139] There should be no intercurrent infection. Specific medical issues such as a history of asthma, urticaria, or angioedema in the case of an oral piercing need consideration. Medications should be reviewed, including over-the-counter products. As already discussed in section 1.3, it is important to avoid aspirin for 7 days and all other NSAIDs for at least 1 day before a piercing procedure. In addition, the recommendation is to avoid aspirin and NSAIDs for 7 days after the procedure. Healing issues such as a predisposition to hypertrophic or keloid scarring need discussion. The candidate should not have open wounds or be anticipating surgical, medical, or dental procedures. Women who are pregnant or are planning to become pregnant within the year should not be pierced.

Anatomy of the candidate must also be considered. Not all candidates have the correct anatomy for the piercing that they

desire. For example, a distal lingual frenulum (or 'tongue-tie') may not be conducive to tongue piercing, as it requires very distal placement of the tongue barbell, which increases the risk of tooth and gum damage (figure 13).

Lifestyle is important. Participation in contact sports increases the risk of avulsion injuries. Candidates who plan to remove their piercings regularly (to hide them from employers or family members) should be warned that the trauma of repeated insertion and removal, especially during healing, may increase the odds of infection and lengthen healing time.^[20]

In many countries piercers do not require a license and the people performing piercings are not typically in the medical field. While the majority of candidates go to piercing parlors, earlobe piercing is often done in mall kiosks and a small subset opts for piercings performed at home. Candidates should understand the importance of being pierced by a qualified practitioner. Qualified practitioners have a good understanding of the physiology and anatomy of the body part to be pierced. They follow hygiene precautions using aseptic techniques and sterilized tools, and they are aware of both the associated problems and the appropriate therapies. Poorly trained piercers in unsterile environments increase the risk of local infection, transmission of blood-borne disease, and damage to nerves and vessels. A piercer who is unfamiliar with complications and their treatments may not counsel the candidate adequately prior to piercing and may not be aware of the early symptoms



Fig. 13. Distal lingual frenulum is not conducive to tongue piercing as it requires very distal placement of the tongue barbell.

Table V. Association between body piercing and high-risk behavior^[141]

Associated high-risk behavior	Odds ratio (95% CI)
Alcohol use	5.5 (1.1, 11.2)
Smoking	3.1 (1.6, 5.9)
Drug use	
men	2.2 (1.3, 4.0)
women	4.1 (2.7, 6.2)
Antisocial behavior in adolescents (truancy)	2.6 (1.3, 5.3)

and signs of serious complications. An untrained piercer may also fail to relay the importance of using appropriate, site-specific materials to minimize the risks of allergy, infection, migration, and rejection.

Clear oral and written aftercare instructions are crucial. A piercing site may require judicious care for more than a year.^[80] Important issues to be addressed in the aftercare instructions include estimated healing time, wound care, common adverse effects, and means to minimize these adverse effects (i.e. acetaminophen [paracetamol] for pain control, ice for swelling). Worrisome symptoms should be discussed and emergency contact numbers provided. The Association of Professional Piercers is an international nonprofit organization based in California, USA, dedicated to the dissemination of vital health and safety information related to body piercing. Basic aftercare instructions can be found on the association's website.^[140]

Though not a 'complication' *per se*, medical practitioners should also be aware of the correlation between body piercing and psychopathology. Many studies have reported body piercing as a marker for high-risk behavior such as substance abuse and high-risk sexual activity, psychopathologic symptoms such as depression, suicide ideation, and eating disorders, and antisocial personality traits such as poor self-esteem, sensation seeking, anger, violence, and gang affiliation (table V).^[141]

However, body piercing is becoming mainstream and it may simply be a sign of free artistic expression. Medical practitioners must walk the delicate line between having increased vigilance for problems in this population and avoiding discrimination or making generalizations.

5. Conclusion

There are many complications related to body piercing. As this form of body modification continues to be popular among the young, understanding the risks of the procedures as well as the medical and psychosocial implications of wearing piercing jewelry is important for the medical practitioner. In addition, healthcare providers need to play an active role in the devel-

opment of hygiene regulations aiming to improve the safety of body piercing.

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