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A case of *Staphylococcus aureus* endocarditis after ear piercing in a patient with normal cardiac valve and a questionnaire survey on adverse events of body piercing in college students of Korea

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Abstract

Body piercing in young adults is on the rise in western countries and also in Korea. It is usually practised by non-medical persons, and therefore frequently entails local adverse events. Serious complications, such as septic arthritis or infective endocarditis, are occasionally reported, but infective endocarditis in patients with normal cardiac valve is rare. We experienced a case of acute *S. aureus* endocarditis after ear piercing. Thereafter we studied the status and complications of body piercing in college students of Korea based on a questionnaire survey, and revealed that the rate of ear piercing is high (96.5%) and 61.3% of the pierced persons experience local complications.

Introduction

Body piercing is increasing in popularity among young adults in western culture. In Korea, body piercing was taboo for the traditional reasons, but, as the society becomes westernized, now body piercing is a common practice in teenage girls and young women. As the number of persons receiving body piercing increases, various complications are reported [1]. Among adverse events, infectious complication is the most frequent unwanted event, which, though not entirely, is preventable if aseptic procedures are followed throughout the piercing procedure and aftercare. However, because neither regulations nor medical guidelines on body piercing are present in Korea, most piercing is practised by non-medical personnel probably under suboptimal hygiene conditions.

Localized infections around pierced body sites are relatively common and usually managed with topical care resulting in few serious sequelae in most healthy persons. These minor complications sometimes are accompanied by bacteremia, and if bacteremia occurs in the person with structural cardiac diseases, infective endocarditis (IE) is an anticipated compli-

cation. IE after body piercing is usually reported in the patient with underlying heart disease or it occurs after piercing of mucosal sites [2]. We encountered a case of *Staphylococcus aureus* endocarditis after ear piercing in a patient without underlying valvular heart disease. In addition, this case might be the tip of the iceberg implying unrecognized frequent adverse effects of body piercing, so we investigated the general status of body piercing and the type of adverse reactions of ear piercing in young women of Korea by a questionnaire survey.

Case report

An 18-y-old high school student was admitted to our hospital because of 5 d of fever. She had no significant past medical history. She was pierced in both ear lobes at a beauty salon 7 d earlier. Erythema and discharge developed after the piercing, which improved without any treatment.

On admission, the patient had a temperature of 38.5°C, blood pressure 140/80 mmHg, heart rate 118/min, and respiration rate 24/min. Non-itching maculopapular rashes on the face and tender puncture sites on both ear lobes were noted. Heart sound

was regular without cardiac murmur. Laboratory tests showed that erythrocyte sedimentation rate was 11 mm/h, C-reactive protein 8.74 mg/dl, WBC count $6.1 \times 10^9/l$, and neutrophil count 93.8%. Transthoracic echocardiography demonstrated neither valvular abnormalities nor vegetation. Three sets of blood cultures grew methicillin-susceptible *Staphylococcus aureus* that was managed with intravenous cefazolin (6 g/d) and gentamicin (5 mg/kg/d for 3 d). On the fourth hospital d, papular rashes spread to extremities and also an Osler's node on the right big toe, subungal splinter's hemorrhage on the left third finger nail bed, and pustules on fingers of both hands developed. With therapy of cefazolin, fever and cutaneous manifestations were abated. On the 22nd hospital d, systolic murmur began to be audible in the mitral area and transthoracic echocardiography revealed vegetation and mitral valve regurgitation due to prolapse of the posterior leaflet of the mitral valve. The patient was discharged in an asymptomatic state on the 34th hospital d after completion of a 4-week course of therapy with cefazolin.

A questionnaire survey

115 college students responded to this questionnaire survey. They were first-y grade female students of 2 (children's welfare and nursing) colleges in Seoul and 1 nursing college in Incheon, Korea. Their mean age (with standard deviation) was 19.3 ± 1.57 y, and 111 (96.5%) of them were pierced at least once at the mean age of 17.14 ± 2.77 y (range 1–24 y). The piercing rates were not statistically different between Seoul (94.6%) and Incheon (100%) (p value >0.05 by Student t -test). Distribution of age with those undergoing ear piercing showed 2 peaks: a small one at 15 y of age and a large one at 18 y. The small peak coincides with the age of graduation from a junior high school and the large peak the age of graduation from a senior high school. The mean number of piercing was 2.54 ± 0.94 . 107 (91.6%) students were pierced at jewelry stores, and others pierced at beauty salons (4.7%), piercing shops (1.9%), home (0.9%), and clinics (0.9%). Regarding the locations of the ear, ear lobe only (86.5%) was predominant and piercing in the cartilaginous portion of the ear (13.5%) or piercing at sites other than ear (2.7%) was uncommon. Other body sites pierced concomitantly with ear were nostril (1 person), navel (1) and genitalia (1).

Adverse events occurred in 68 of 111 persons (61.3%). Discharge (63.8%) from the pierced sites was the most frequent adverse reaction and there were several other complications, such as, in decreasing frequency, localized redness (44.9%),

itching (26.1%), fever (4.3%), bleeding (7.2%), metal allergy (1.5%), and headache (1.5%). Six (8.8%) persons sought assistance from health professionals, but there was no serious case requiring hospitalization.

Discussion

Body piercing poses several problems to medical practitioners, and the types of these complications vary according to the pierced sites. With regard to IE, 8 cases in the review literature [2] and an additional 4 cases have been reported up to 2004 [3–6]. *S. aureus* is the most frequent etiologic agent and *S. epidermidis*, *N. mucosa*, *H. aphrophilus*, *H. parainfluenzae* and streptococci cause infective endocarditis. *Staphylococcus* or group A beta-hemolytic *Streptococcus* is associated with skin piercing, whereas other normal oral flora (*Neisseria*, *Haemophilus* or *viridans Streptococcus*) is associated with piercing of mucosal sites. Most of the patients developing infective endocarditis after body piercing seem to have some underlying cardiac abnormalities, but it is uncertain whether valvular abnormalities are already present before the development of endocarditis or they are caused by destruction of previously normal valve by endocarditis. Also it does not mean that every one of the patients described as 'previously healthy' had normal cardiac valve before the development of infective endocarditis. Our case study definitely documented the cardiac valve initially normal, which was to be destroyed by endocarditis. Two cases of endocarditis in the valves previously normal were reported: the first case is *Staphylococcus aureus* after nasal piercing [7], and the other is *Staphylococcus epidermidis* in persons with piercing of the ear lobe [8]. In this context, this is the first case of *S. aureus* endocarditis after ear piercing in a person with normal cardiac valve. Our case seems to be rare, but if endocarditis occurs in a patient without structural cardiac abnormalities after piercing of the skin, the etiologic agent is more likely to be *S. aureus* rather than coagulase-negative *Staphylococcus* because *S. aureus* is a normal flora of the skin and virulent enough to infect normal cardiac valve. In a study on *S. aureus* endocarditis, roughly 50% of patients initially had normal cardiac valve whereas CNS usually causes IE in patients with prosthetic heart valve [9].

In staphylococcal bacteremia or endocarditis, several kinds of rashes occur, including petechia, Osler's node, Janeway lesion, subungal hemorrhage, conjunctival hemorrhage, Roth spots, septic emboli, and metastatic pustules. These lesions are usually located in extremities or trunk. Facial maculopapular rash in this case is an unusual finding, and it can

be a clue to the early diagnosis of staphylococcal bacteremia or endocarditis.

Exact statistics on body piercing in Korea are not available in the medical literature. Our data, however, show the very high rate of ear piercing, and a preliminary survey on ear piercing in 55 nurses of our hospital shows that the rate is 89.1%. These rates are higher than the 60% piercing rate in American college students [10] and even higher than 70% in Australian younger women [11]. In contrast to the high piercing rates, the piercing site is mostly ear lobe. In a report from the USA, the navel is the most popular candidate for piercing in undergraduate female students. In an Australian nationwide survey, 44% of respondents pierced ears and 7% pierced other body sites. The discrepancy between the high rate of body piercing and the low rate of piercing of non-mainstream sites in Korean college students defies any simple explanation, but we guess that body piercing is still at the stage of introduction when piercing is usually practised on the most socially acceptable site, i.e. ear lobes. The cause of the high piercing rate seems to be that ear piercing can be carried out very easily in various shops, including jewelry stores or beauty salons, in Korea.

Our questionnaire survey also revealed that most people were ear pierced in non-medical facilities or by non-professional practitioners. Because regulation or accreditation is not enacted, a proper hygiene procedure is not guaranteed at least in some piercing shops. Our data showed frequent local complications as those of other studies [12,13], although it is premature to generalize this result because there is a possibility of bias due to inaccurate recall which may underestimate the rate of local complications. Also some complaints of complication may be only a normal tissue reaction to tissue injury. In addition to the frequency of infectious complications secondary to suboptimal aseptic procedure, it is possible that, prior to the procedure, no proper information is offered about any potential serious risk from it, and these practices give a false sense of security that piercing is a safe procedure. In this situation, if local complications occur, their significant prognostic symptoms may be overlooked, which later might result in serious complications.

In summary, in the circumstances of the high rate of ear lobe piercing and the frequent occurrence of local complications associated with ear piercing in Korean young women, we experienced a rare but rather typical case of acute *S. aureus* endocarditis in a high school student who presented an unusual form of rash in staphylococcal bacteremia, i.e. maculopapular facial rash. To reduce the occurrence of serious complications after body piercing, it is necessary to establish mandatory regulations or accreditation.

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