SIGNIFICANCE IN FORENSIC IDENTIFICATION — CHARACTERIZED HARD TISSUE FINDINGS IN 3 SKULLS —

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Abstract: In the field of forensic odontology, judgement and identification of unknown bleached bone skulls is an important function. However, as it is possible for teeth to drop out after death, in such cases characterized hard tissue findings may be important. In this report we note relatively rare hard tissue findings in 3 cases. Case 1 was a frontal suture (metopism) in a 36-year-old male, Case 2 was a so-called Os Incae, and Case 3 was an exostosis. The frequency of metopism in Japanese adults is about 6.9 %, Os Incae in males is 3.1 % and 2.2 % in females, while exostosis is 7–15.6 %. It is considered that metopism, Os Incae and exostosis may play important roles in identification, especially if an X-ray photograph of the skull has been taken during that person's lifetime.

Key words: forensic odontology, hard tissue findings, frontal suture (metopism), Os Incae, exostosis

INTRODUCTION

Judgement and identification of unknown skeltonized bodies is an important field in Legal Medicine. In personal identification, from a forensic odontological point of view, dental treatment marks are effective. However, in stale corpses, teeth have frequently dropped out from the skull after death, there not being a firm ligament between tooth and alveolar bone as the periodontal membrane has gradually atrophied. Moreover, when the deceased body is mutilated and damaged by birds or beasts, or there has been a natural disaster, the probability that the teeth remain in the skull is extremely low. Such cases are often difficult to identify. In such cases, other hard tissue findings are effective for personal identification. Here we report 3 cases of specific rarely seen findings as we think that these may be a useful record for forensic identification.

CASE REPORTS AND CHIEF AUTOPSY FINDINGS

Case 1

In July 1999, a rock-climber in a Nara Prefecture valley near Totsukawa Village discovered a bleached bone skull between rocks. The development of the processus mastoideus was good, the frontal eminence bad and the adhesive region of each muscle protruded markedly. It was judged to be male from the morphological characteristics of the skull. The incisive suture had disappeared completely, the transverse palatine suture outside one-third was disappearing and from the condition of alveolar bone absorption it was estimated that age was around 35 years. In the frontal teeth region only teeth sockets were observed. It was conceivable that the teeth had dropped out after death. A fracture line was observed from the left supraorbital margin toward the toprea, and in a characteristic finding the frontal

suture had not disappeared. It crossed the frontonasal suture and then to the internasal suture (Fig. 1). From the police investigation and the dental treatment marks, the skull was identified as being from a 36-year-old male resident of Gojou City, Nara Prefecture, who had been missing for one year. The cause of death could not be determined from the bleached bones, although a brain contusion from a fall was suspected.

Case 2

In December 2000, in Yamato-Takada City, Nara Prefecture, a mechanical excavator operator doing building foundation work discovered a skeltonized skull. The development of the processus mastoideus was good, that of the frontal eminence bad, the adhesive region of each muscle protruded markedly and there were no traumatic findings. It was judged to be a male from the morphological characteristics of the skull. Also, from the resorption condition of the alveolar bone and the condition of the incisive and the transverse palatine suture, age was estimated as 40 years. As characteristic findings, the vertical sagittal suture in a form that connects the lower ends of the right and left lambdoidal suture was observed, as was the triangle bone, the so-called Os Incae (Fig. 2). Details were too indistinct for the identity and cause of death to be determined from the bleached bones.

Case 3

In December 2000, a man discovered a skeltonized body a little off the main path while walking his dog on Mt. Miminashi, Kashihara-City, Nara Prefecture. A packing cord thought to have been he used to cause death hung down from the tree above. The development of the processus mastoideus was good, that of the frontal eminence bad, the adhesive region of each muscle protruded markedly and there were no traumatic findings. It was judged to be male from the morphological characteristics of the skull. Also, from the resorption condition of the alveolar bone and the condition of the incisive and the transverse palatine suture, estimated age was around 50 years. As a characteristic finding, bony tissue was observed at the buccal side of the right molar region (Figs. 3-6). Cause of death was judged as suffocation related to hanging. A will and driver's license were discovered in a rucksack near the deceased body. He was identified as a 46-year-old male from Tokyo.

DISCUSSION

When we judge a bleached bone corpse, there are important items regarding personal identification such as sex determination, estimation of age, length of time after death, cause of death and findings of dental treatment marks. Hard tissue findings such as those on bones are important too for personal identification, as these do not usually disappear even after the passage of time following death.

Case 1 was distinguished by a frontal suture (metopism), which generally close and disappear by the age of 5 or 6 years. It is reported[1] that the frequency of occurrence of the frontal suture is about 6.9 % in Japanese adults, with no significant difference between males and females. This skull was 36-year-old, but frontal suture has been reported in a skull of a 91-year-old male[2]. There are few reports that the sutures subsist, although there are comparatively many reports that frontal sutures agglutinate early in infancy.

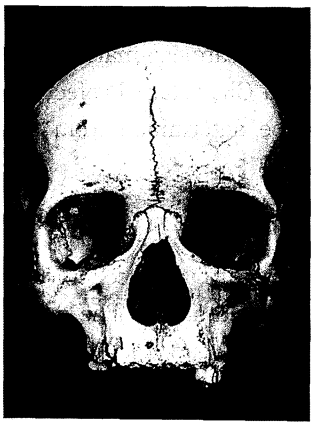

Fig. 1. Metopism observed in the skull of a 36-year-old male.

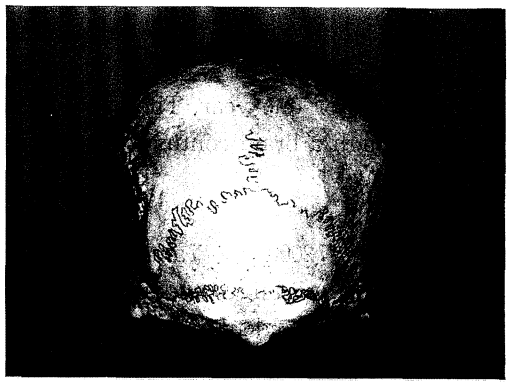

Fig. 2. Os Incae is observed in the skull.

Fig. 3. Bony tissue seen at the buccal side of the right molar region.

Fig. 4. The palatal face of the bony tissue.

Fig. 5. The right side face of the bony tissue.

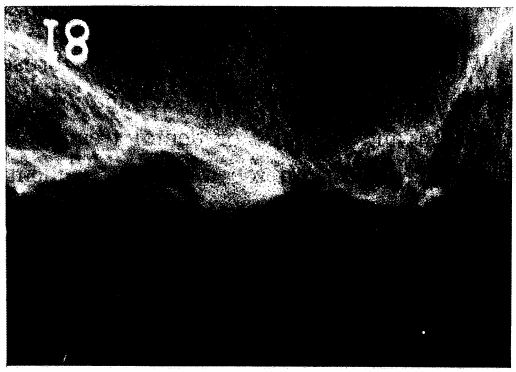

Fig. 6. The dental X-ray finding of the bony tissue.

Next the suture that was observed in Case 2 was named the Os Incae and reported first in 1851, as it was frequently observed in craniums of ancient Peruvian Inca tribespeople[3]. It is presently a condition not recognized much in the field of forensic medicine, although it is comparatively well-known to anthropologists and anatomists[4]. The lambdoidal suture of the right and left that branches from the saggital suture continues to the lower part, and as it becomes independent the bones seen are said to be the epactae bones. Otherwise, it is said to be the Ossa suturalia, in cases that the bone is in the sutures between other skulls. The Os Incae is representative, the bone in the part of occipital face of the upper region of the squama occipitalis, and it is an independent, separated bone without being fused into the Os interparietale. The frequency of Os Incae in Japanese adults according to Dodo[5] is very low, male 3.1 % and female 2.2 % Takahashi, et al.[6] reported it in 4.6 % of Indian adult craniums, and Kodama[7] observed it in about 5 % of adult Hokkaido Ainu craniums. It is known that there are a variety of morphological characteristics in Os Incae (Fig. 7), with even lower frequencies[8]. It is also possible to determine the identify of a bleached bone corpse from the existence of this suture, to some degree.

Furthermore in Case 3, the outward expansion from the alveolar bone at the buccal side of the right molar region was judged by the bony tissue. That lesion can be suspected as osteoma, exostosis or similar lesions. Jaw bones are often observed to have abnormal developments, inflammatory or reacted bone increases, but real osteoma rarely consists of mature bone. There are peripheral osteoma which expanded outside from the alveolar bones, or outside bone tumor, central osteoma which appears within bones and inside bone tumor. In histological findings there are compact osteoma, osteoma spongiosum, or a combination of these types. In the dental X-ray photograph (Fig. 6), the bone of the lesion is assimilating with the surrounding bone and it is conceivable that the bone tumor, with excessive reaction

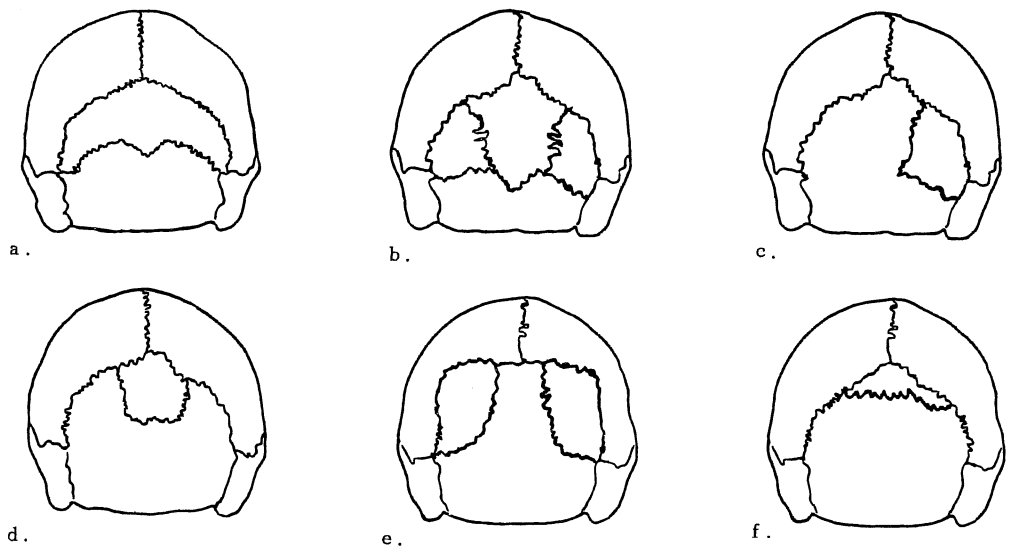

Fig. 7. The various morphological findings of Os Incae (a.~ f.).

to the bone formation, expanded outside from the alveolar bone, rather than the osteoma with a high possibility of being exostosis. According to Yokofuji[9,10] the frequency of exostosis is 15.6 % with no difference between males and females, with 7 % appearing only in the upper jaw. There are many examples appearing from the premolar to the second molar region in the upper jaw. The frequency of exostosis in an advanced periodontitis patient is lower at 7 %. By increasing the bone by compensating against excessive bite pressure, it controls the destruction of the alveolar bone and defends the loss of a tooth from periodontal disease, as it was considered in this case.

From these findings, in 3 cases of hard tissue findings whose frequencies are low, we note that such findings may play important roles for personal identification, if an X-ray photograph of the skull has been taken during the person's lifetime.

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