The presence of sharp-edged weapon related cut mark in Joseon skull discovered at the 16th century market district of Old Seoul City ruins in South Korea

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Abstract: A human skull was discovered at the 16th-century drainage channel of market district ruins, one of the busiest streets in the capital of Joseon kingdom. By anthropological examination, we noticed the cut mark at the right occipital part of the cranium. Judging from the wound property, it might have been caused by a strong strike using a sharp-edged weapon. As no periosteal reaction or healing signs were observed at the cut mark, he might have died shortly after the skull wound was made. We speculated that this might have been of a civilian or soldier victim who died in a battle or the decapitated head of prisoner. This is the first report about the discovery of the skull damaged by sharp-edged weapon at the archaeological sites in the capital city of Joseon Kingdom.

Key words: Skull, Cut mark, Sharp-edged weapon, Joseon kingdom, Old Seoul City, Korea, 16th century

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Introduction

There have been a number of anthropological reports about traumas remained on the ancient skeletons [1, 2]. Although many fractures were resulted from the accidents, they might have been caused by intentional violence as well, especially with various weapons [3]. The presence of cut marks on the crania was indicative of the attacks with sharp-edged

weapons such as axe or sword [1-3]. We also admit that the weapon-related traumas also occurred in pre-20th century Korean skulls by armed conflicts at that time. For instances, in 18th century Joseon skeletons, we found possible projectile wounds (e.g., by a musket bullet) on the skull [4]. The skull traumas caused by sharp-edged weapon were also reported from the excavation site of Seven-Year War between Korea and Japan (*Imjinwaeran*) [5].

However, similar reports about the weapon-related injuries has been rare to date in South Korea. As there is still a lack of information about the ancient cranial wounds made under various circumstances, we have difficulty in interpreting the cases discovered at the excavation sites. It thus becomes definite obstacle to our understanding of the actual situations of traumatic injuries among pre-20th century Korean people.

Recently, in the downtown area of Old Seoul City ruins, we

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occasionally discovered 16th century human skull where the weapon related cut mark was identified. Whatever the cause was, in this case, we took a rare opportunity to examine the weapon-induced damage still remained on the skull. As the obtained data made us re-consider the significance of similar cases in anthropological studies of South Korea, we will report herewith.

Case Report

Archaeological context of the sample

In 2014, Hanul Research Institute of Cultural Heritage (Suwon, South Korea) excavated a human skull from the market district ruins of Old Seoul City [6] (Fig. 1A). The skull was found in the geological layer including drainage channel, situated to the south of the store ruins (Fig. 1B, C). The evidence of fire was identified above the stratum where the skull was found. The traces of fire were extensively discovered in the strata even at the nearby sites as well. The date of the fire was estimated to be in 16th to 17th century based on the typology of cultural remains [6]. The geological layer of fire traces was not disturbed at all by subsequent human activities or natural

phenomena. This means that human skull was buried in that place at the latest in the 16th century [6].

Anthropological examination

The skull was moved to Laboratory of Bioanthropology, Paleopathology and History of Diseases, Seoul National University College of Medicine. Various parts of the cranium (frontal, parietal, temporal, occipital, and sphenoid parts) were intact while most portions of facial bone were missing except for the orbital portion. Mandible was also missing. The damage of facial part was so serious that we did very limited measurement of the skull: 176 mm, 143 mm, and 91.9 mm for maximum length, maximum breadth, and minimum frontal breadth, respectively. Sex estimation was based on the cranium morphology (i.e., glabella, supraorbital margin, mastoid process, and nuchal crest) [7]. Age estimation was done by the fusion degree of the ectocranial suture [8]. Our examination revealed that the skull was of a middle-aged (30–40 years) adult male.

We found the ossicles at lambdoidal suture (nonmetric trait) and porotic hyperostosis at both sides of parietal bone. Skull damage sign was searched by the criteria defined in lit-

Fig. 1. (A) Cranium discovered at the archaeological site of the market area ruins in Old Seoul City district. Yellow asterisk indicates the place at the drainage channel where cranium was discovered. (B) Magnified image of skull (indicated by arrow) at drainage channel. (C) The elliptical hole (indicated by arrow) is observed in the cranium.

Fig. 2. Lateral (A) and posterior (B) view of cranium. Cut mark and elliptical hole is identified in the right side of occipital bone (arrow). (C) Magnified image of the cut mark (solid arrow). The dotted arrow means the possible path through which the sharp-edged weapon cut the cranium.

eratures [9, 10]. We found few traumatic changes except for cut mark (length, 3.6 cm and width, 5.8 cm) in the right occipital bone (Fig. 2A). The elliptical hole (length, 2.9 cm and width, 2.15 cm) was also observed at the cut mark (Fig. 2B). Considering the appearance of cut mark, the impact to the skull was likely to be made by a weapon swung in medial to lateral direction or vice versa (Fig. 2C). Comparing the previous reports on the weapon leaving distinct patterns on the bone [9-11], the cut mark of this cranium might have been made by a sharp-edged weapon (sword or axe) with a substantial force and speed. As we could not find any evidence for periosteal reaction of healing in the hole and cutting surface margin [12], the Joseon male appears to have died shortly after the skull wound was made (Fig. 2C).

Discussion

Was this cut mark made during battle? We could not completely deny that the cranium might have been of a soldier or a civilian victim who was killed during a battle. Throughout 16th to 17th century, there were combats that took place in the midst of the Joseon kingdom's capital streets. Thus it is not a serious problem even if we think of this skull wound case as caused by a sharp-edged weapon in battle. Of course, besides this, we could not rule out that the cut mark might have been made by the crimes such as robbers' attacks.

How did the weapon make a blow to the victim's head? To get an answer to this query, we referred to Wenham's report [13]. According to him, the trauma to the occipital part might have happened during less-formal fighting such as an attack

while retreating or falling on the ground [13]. However, another explanation is also possible for this case. In East Asia, the convicted felons' heads were occasionally decapitated and hung on the streets. Likewise, a death row convict of Joseon society was beheaded as a form of capital punishment [6]. After the executioner beheaded the prisoners using a sharp-edged weapon, their heads were displayed to the public at the city streets [6]. Actually, the cranium of this study was found at Jongro Street (*Unjongga*) of the Old Seoul City. To the south, there was a *Euigumbu*, the judiciary office at that time. On the other side of the street was the *Jeonokseo*, the office to take charge of the prisoners in the jail. The area was a kind of judicial district of the kingdom. In *Joseon wangjo sil-rok*, we found multiple records that the prisoners' heads were displayed around this area where the skull was discovered [6]. If we accept this assumption, he might have been the decapitated prisoner.

By currently available information, however, we are not sure whether the cut mark of this case was actually caused by wartime injury or by the capital punishments for a convict. Above all, especially as for the latter, we could not get anthropological evidence (e.g., cut marks remained in the cervical vertebrae) [14, 15]. Considering that the skull trauma caused by sharp-edged weapon is rarely studied in ancient human skeletons of South Korea, the current study on the sharp-edged weapon damaged skull in the Joseon kingdom's capital area is meaningful anyway to the related anthropologists of the country.

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References

1. Nagaoka T, Uzawa K, Hirata K. Weapon-related traumas of human skeletons from Yuigahama Chusei Shudan Bochi, Japan. *Anat Sci Int* 2009;84:170-81.
2. Nagaoka T, Uzawa K, Hirata K. Evidence for weapon-related traumas in medieval Japan: observations of the human crania from Seiyokan. *Anthropol Sci* 2010;118:129-40.
3. Ortner DJ. Trauma. In: Ortner DJ, editor. *Identification of Pathological Conditions in Human Skeletal Remains*. 2nd ed. Cambridge: Academic Press; 2003. p.119-77.
4. Kim YS, Kim MJ, Yu TY, Lee IS, Yi YS, Oh CS, Shin DH. Bioarchaeological investigation of possible gunshot wounds in 18th century human skeletons from Korea. *Int J Osteoarchaeol* 2013; 23:716-22.
5. Kim JH. Analysis of the human remains recovered from Dongrae fortress pond. Dongrae fortress pond II (appendix IV). Busan: Gyeongnam Institute of Cultural Properties; 2010. p.401-35.
6. Hanul Research Institute of Cultural Heritage. *Archaeological excavation report of the ruins of Jong-gak station improvement project site*. Suwon: Hanul Research Institute of Cultural Heritage; 2017.
7. Buikstra JE, Ubelaker DH. *Standards for data collection from human skeletal remains*. Arkansas Archaeological Survey Research Series No. 44. Fayetteville, AK: Arkansas Archaeological Survey; 1994.
8. Acsadi G, Nemeskeri J. *History of human life span and mortality*. Budapest: Akademiai Kiado; 1970.
9. Novak SA. Battle-related trauma. In: Fiorato V, Boylston A, Knusel CJ, editors. *Blood Red Roses: The Archaeology of a Mass Grave from the Battle of Towton AD 1461*. Oxford: Oxbow Books; 2000. p.90-102.
10. Weber J, Czarnetzki A. Brief communication: neurotraumatological aspects of head injuries resulting from sharp and blunt force in the early medieval period of southwestern Germany. *Am J Phys Anthropol* 2001;114:352-6.
11. Kimmerle EH, Baraybar JP. *Skeletal trauma: identification of injuries resulting from human rights abuse and armed conflict*. Boca Raton, FL: CRC Press; 2008.
12. Sauer NJ. The timing of injuries and manner of death: distinguishing among antemortem, perimortem and postmortem trauma. In: Reichs KJ, editor. *Forensic Osteology: Advances in the Identification of Human Remains*. 2nd ed. Springfield, IL: Charles C. Thomas; 1998. p.321-32.
13. Wenham SJ. Anatomical interpretations of Anglo-Saxon weapon injuries. In: Chadwick Hawkes S, editor. *Weapons and Warfare in Anglo-Saxon England*. Oxford University Committee for Archaeology Monograph No. 21. Oxford: Oxford University Committee for Archaeology; 1989. p.123-39.
14. Morimoto I. Note on the technique of decapitation in medieval Japan. *J Anthropol Soc Nippon* 1987;95:477-86.
15. Morimoto I, Hirata K. A decapitated human skull from medieval Kamakura. *Anthropol Soc Nippon* 1992;100:349-58.