E91 Case Study of Postmortem Dismemberment Using a Coping Saw and a Related Analysis of the Cutting Plane Curvature

Eunah Joo, MS, National Forensic Service, Ipchunro 10 National Forensic Service, Forensic Safety Division, Wonju-si, Gangwon-do, SOUTH KOREA; Youngil Seo, MS, National Forensic Service, Ipchunro10, Wonju 220-170, SOUTH KOREA; Sangyoon Lee, MS, National Forensic Service, Ipchunro10, National Forensic Service, Wonju 220-170, SOUTH KOREA; Donghwan Kim, PhD, National Forensic Service, Ipchunro10, National Forensic Service, Wonju 220-170, SOUTH KOREA; Jin-Pyo Kim, PhD, 1524 Yusungdaero Yusung-gu, Daejeon, SOUTH KOREA; and Nam-Kyu Park, PhD, National Forensic Service, 10 Ipchoonro, Wonju, SOUTH KOREA*

After attending this presentation, attendees will better understand the correlations of the morphological characteristics of saw blades and the curvature of the cutting plane. Moreover, by analyzing a postmortem dismemberment case in which it was presumed that a coping saw was used, attendees will gain an understanding of the characteristics of saw marks from a coping saw.

This presentation will impact the forensic science community by suggesting new criteria for saw mark analyses. While few studies on the cutting plane shape can be found in the literature, the information from the curvature of the kerf wall can play a crucial role in identifying the tool that was used. Forensic scientists, especially those in charge of tool mark examinations, will have a reference for the size of the saw that was used derived from the degree of curvature of the kerf wall.

Saw marks remaining on bone indicate the features of the saw used for cutting. Because of the importance of identifying criminal tools, there have been steady advances in the analysis methods of saw marks; however, in contrast to well-established knowledge on saw types from the morphological characteristics of kerf wall striations and false starts, there have been few previous detailed studies on the overall shape of the cutting plane.[1-3] As is widely known, when the blade width of a saw is narrow, the cutting section of the bone forms a curved plane. Recently, more than 20 curved complete cuts were found in a postmortem dismemberment case, and it was presumed that the width of the saw blade used in the crime was unusually narrow. As a result of the examination, a coping saw was assumed to be used in the crime. This case motivated these efforts to study the correlation between the morphological features of saw blades and the curvature of the cutting plane. Generally, there are correlations between blade width, blade thickness, and kerf width with the curvature of the kerf wall. Therefore, measuring the curvature of the kerf wall can provide guidelines for presuming the size of a saw used in a crime scene.

The saw marks were cut into pig femurs, which have a hardness comparable to the hardness of human cortical bone.[4] Before cutting, the bones were cleaned by soaking in warm detergent solution and using an ultrasonic cleaner to minimize possible damage to the bone.[5] Saw marks were created with two types of hacksaws and two types of coping saws. Three tool mark experts cut the bones with a maximum tilt of the saw blade and selected the most curved cutting sections. An Alicona Infinite Focus 3D microscope was then used to measure the curvature of these cutting planes. The measured value of curvature of the cutting plane from the scene was compared to that produced in the laboratory. The curvature of the witness kerf wall was found to be much larger than the hacksaw-made plane. The upper limit of the criminal blade width could be set and excluded a considerable number of saw types from the list of suspect tools.

In this presentation, evidence will be presented indicating a coping saw was used as the cutting tool in this postmortem dismemberment case. The reliability of this new analysis method on the basis of the results of this experiment will be discussed. The results of the present study can be used to verify the type of saw used for cutting, in particular, in terms of the blade width and blade thickness.

Reference(s):

1. Andahl R.O. The examination of saw marks. *J Forensic Sci Soc* 1978:18:31-46.
2. Symes S.A. *Morphology of saw marks in human bone: identification of class characteristic* (dissertation). Knoxville (TN): Univ. of Tennessee, 1992.
3. Bailey J.A., Wang Y., Goot F.R.W., Gerretsen R.R.R. Statistical analysis of kerf mark measurements in bone, *Forensic Sci Med Pathol* 2011:7:53-62.
4. Saville P.A., Hainsworth S.V., Rutty G.N. Cutting Crime: the analysis of the "uniqueness" of saw marks on bone. *Int J Legal Med* 2007:121:349-57.
5. Mairs S., Swift B., Rutty G.N. Detergent: an alternative approach to traditional bone cleaning methods for forensic practice. *Am J Forensic Med Pathol* 2004:25:276-84.

Dismemberment, Saw Mark, Bone Trauma, Curvature of the Kerf Wall

*Presenting Author