



A48 A Study of Modern Commingled Human Remains From a Korean War Recovery Site — Gum Riverside, Junla Province

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After attending this presentation, attendees will better understand two of the most commonly used methods in pair-matching and segregation of commingled remains and their effectiveness when applied to Korean samples.

This presentation will impact the forensic science community by providing results that compare and validate two methods — visual pair-matching and osteometric sorting — as well as demonstrating that the osteometric sorting method can be reliably used as a basic guideline in segregating commingled remains in situations such as mass disasters or archeological sites.

In a situation in which commingled remains are recovered from mass disasters or mass burial, segregating the remains is one of the most fundamental and crucial processes.¹

The purpose of this study is to analyze the effectiveness of the two widely used methods in pair-matching and segregation of individual remains — visual analysis and osteometric sorting. In this study, samples were collected from the commingled remains recovered from a Korean War recovery site.

Of the 1,969 samples recovered from Gum Riverside in Junla Province, four skeletal elements (femur, tibia, innominate, and humerus) were chosen and the two pair-matching methods were separately applied. Using the visual analysis method, the samples were evaluated by looking at the similarities in bone morphology and taphonomy, and the osteometric sorting, a quantitative method, was used to find possible matches through a statistical evaluation of size similarities between homologs.²⁻⁴ The matched homologs were then compared to DNA analysis of the samples in order to confirm the validity of the methods.

As a result, the concordance rate of the samples pair-matched using the visual pair-matching method to the DNA analysis ranged between 58% and 94%. Specifically, 94% (29/30) of the pair-matched samples were in concordance with the DNA testing result for femurs, 88% for tibias (14/16), 100% for innominates (5/5), and 58% for humeri (7/12).

Using the osteometric sorting method, the pair-matching concordance rate ranged from 83% to 97%; 97% for femurs (29/30), 94% for tibias (16/17), 100% for innominates (5/5), and 83% for humeri (10/12).

The result showed a relatively high concordance rate (94%~100%) for both methods when applied to the femur and tibia; however, the rate was comparatively low (58%~83%) when applied to the humerus. The result indicates that both pair-matching methods are reliable when applied to the femur, tibia and innominate, but not for the humerus; however, the low rate of successful pair-matching of the humerus could be due to the small sample size as well as the samples being highly fragmented, which limited the analysis using the visual and osteometric methods.

Although it is difficult to be conclusive due to the small sample size, the result for the innominate was noteworthy as it exhibited a 100% concordance rate despite its highly fragmented condition. It is hypothesized that distinctive features of the samples, such as sciatic notch and auricular surface, contributed to the result.

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Despite a recent study suggesting that the osteometric pair-matching method is unreliable, the conclusion reached through the results from this study is that the quantitative method is adequately utilizable in segregating commingled remains in situations such as mass burial or archeological sites.⁵ Also, this study demonstrated that one can expect a positive result even for highly fragmented samples, especially if the samples have distinct features that can be visually evaluated and distinguished. Thus, in sum, the osteometric sorting method has its value in pair-matching commingled remains and would be even more so through some adjustments and when used in combination with the visual pair-matching method.⁶

In this study, the equation of regression using the size of bones and the *t*-score for the comparison of adjoining bones at joints could not be calculated because the sample size of the Korean remains collected from Gum Riverside was not significant enough to apply the statistical method. Through further studies, the calculation of the equation of regression that is suitable for the Korean data by accumulating Korean samples is expected, along with the establishment of a pair-matching method that can be used in combination with the visual analysis method to effectively analyze and segregate commingled remains in various situations.

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Pair-Matching, Comminged Remains, Osteometric Sorting