

**Commentary on:** Cox M, Malcolm M. Fairgrieve SI. A new digital method for the objective comparison of frontal sinuses for identification. *J Forensic Sci* 2009;54(4):761–72.

Sir,

We have gone through the article entitled “A New Digital Method for the Objective Comparison of Frontal Sinuses for Identification,” *J Forensic Sci* 2009;54(4):761–72, by Cox et al.

The authors have proposed the use of frontal sinus for identification purposes. The authors have proposed the use of digital photo editing software Adobe Photoshop CS2 for this purpose. For background, the authors have cited seven references (1–5, 11, and 24) that have relied on the shape of frontal sinus for the identification of suspects. The cited articles generally talk about qualitative assessment, most of the time as an additional approach rather than the only approach, and limit the scope to known suspects, whereas the authors propose a quantitative assessment that can subsequently be applied to population. The methodology described by the authors has the following discrepancies:

- Use of Radiograph for two assessments: Although the authors have mentioned clearly about using two radiographs for contemporary group, no such mention has been made for clinical and archeological samples. It seems the authors have used same radiograph for two assessments; however, in order to simulate the experiment properly, two radiographs with a proper time gap should have been used.
- Repeat Tracing: Instead of using two different radiographs, the authors have made simulation by using same radiograph with two different tracings and have assessed inter- and intra-observer reliability using Pearson’s correlation coefficient and have shown a strong correlation between the two. However, we do not agree with this statistical methodology, because despite having significant differences between two pairs, there can be a strong correlation between two observations. Use of Pearson’s correlation coefficient for inter-/intra-observer agreement must be exercised with caution as it is unable to rule out the systematic bias/error (1).
- Method of Measurement: Using the same method as described by the author, we conducted an experimental study wherein two different examiners were asked to trace the sinus on some published radiographs using the same method. Although the shape of the tracings was same, the size of the tracings did not match, thus showing that systematic bias/error can give misleading results. Location of reference point to start the measurements needs a good objective criterion.
- Methodology to calculate total differences (SS and DS): As we could get from the article, in order to calculate the total differences for 61 measurements between two sets of measurements (SS and DS), the authors have proposed a summation of differences between two sets of measurements for all the 61 measurements. They have done it by using absolute values. Theoretically, two differences in opposite directions might produce a net difference of 0. This possibility has not been taken into account. Similarly, differences in large measurements and small measurements have been considered similar. In our view, the differences should have taken as proportional differences, thus giving proper weight to the magnitude of

difference which might have been affected by using the absolute difference method as proposed by the authors.

- Practicality/Complexity of Proposition: The method proposed by the authors uses a technique that involves finding the difference for 61 measurements in an individual. Considering the application of the proposed method to a mass tragedy involving a bus with 50 travelers, in order to identify a person using the prescribed technique, these 61 measurements need to be first carried out in 50 travelers and then for random assessment differences in  $61 \times 50$ , that is, 3050, should be calculated. It is difficult to understand why the authors have not tried to reduce these 61 measurements to a reasonable level. To complex the situation further, log values have been used. Several authors have explored the possibility of fewer measurements for the purpose of characterization and identification (2–4). In our view, after creating a normative data set, the authors should have marked the areas with maximum differences and similarities. Fewer measurements for the purpose of characterization and identification could have been possible with the help of principal component analysis (PCA) (5,6). We feel that had the proportional differences taken into account instead of absolute/log differences, the PCA would have been more promising.

In view of the above evidence, we find the technique, despite been shown to be having promising results by authors, is impractical and difficult to learn with too many complexities. We are of the view that after reduction in points of measurements determined by advanced statistical tools such as PCA, the use of proportional differences instead of log differences and using a more objective approach to draw reference point to start the measurement coupled with a validation with repeat measurements using two different radiographs might provide a better and more practical technique.

## References

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