



Physical Anthropology Section – 2004

H16 Aging the Elderly: A New Look at an Old Method

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After attending this presentation, attendees will learn to present an alternate strategy for aging elderly female pubic symphyses.

This presentation will impact the forensic community and/or humanity by providing the forensic community a better tool to produce age estimates for elderly individuals, which is not currently available.

Physical anthropologists have long been confronted with the problem of estimating skeletal age of elderly individuals. Some believe that it is impossible to determine advanced age with any level of precision. Experts have also questioned the accuracy of ageing skeletal remains from pubic bone morphology. As a result, large age categories such as 40+, 50+, and 60+ years have been used to minimize the impact of these problems. Refinements to the current definitions in the SucheyBrooks unisex ageing method may alleviate some of the problem. Specifically, if the late phases are refined and an additional stage added (a 7 phase instead of a 6 phase system), the method may be improved. Further, since the determination of age ranges should reflect the demographic profile of a population they are drawn from, then a different statistical approach, transition analysis, should be considered.

This study consisted of 148 female individuals from the University of Tennessee William Bass Donated Collection (Donated, n=63) and a known age Balkan forensic sample (Balkan, n=85). Each pubic symphysis was scored with the aid of a standard desk magnifying glass. The new definitions and decision-making rules for females were as follows:

Suchey-Brooks Phases 1-4: No modifications were made.

Phase 5: The rim is complete at this stage, but the symphyseal face may show a slight depression as it begins to erode. The pubic tubercle is separated from the face. The quality of bone on the articular surface is

still good and very compact. In a few cases, a slight amount of porosity may be present, but it usually affects less than 15% of the symphyseal face. Only extremely mild signs of osteoporosity/osteopenia are present (if any) and the ventral aspect of the symphysis is typically not porous.

Decision making traits are: 1) if the articular surface still has majority of compact bone with less than 15% porosity anywhere on surface, and 2) osteoporosity/osteopenia is absent or extremely mild, score as a Phase 5. If either of these two traits is observed greater than specified, then score as greater than a Phase 5.

Phase 6: The symphyseal face is usually depressed and the rim begins to erode, beginning with the superior ventral aspect. The quality of bone on the articular surface is breaking down, no longer retaining the smooth, compact surface. The symphyseal face is eroded, in the form of either porosities or small channel-like structures – coalescences of smaller porosities into oblong pores/channels. Osteoporosis is mild to moderate in this phase. Lipping of the articular surfaces can be present.

Decision making traits are: 1) if less than 50% of the symphyseal surface is porous, and 2) lipping is mild to moderate then it is scored as a Phase 6. If the symphyseal face appears to be borderline (40-60% of face is porous but still a fair amount of compact bone), then osteoporosity/osteopenia should be used as the deciding feature. If this trait is moderate to severe, then it is scored as a Phase 7. The weight of bone should be the primary indicator, though other indications of osteoporosis can be found on the ventral aspect of the pubis where porosity may be present and the bone may have a striated quality.

Phase 7: The symphyseal face is extremely porous and eroded (>50% of its surface). Osteoporosity/osteopenia is present and is typically moderate to severe in nature (the bone is very light in weight). The symphyseal face appears to be relatively flat, since the rim is highly eroded and is losing definition. The ventral surface of the symphysis is typically scarred or has striated bone with ligamentous outgrowths, occurring typically near the obturator foramen. Lipping of the articular surfaces is often moderate, but may be mild or severe. This character is highly variable.

Interand intra-observer error was tested among four observers and was not statistically significant, indicating that each observer was scoring in a similar fashion. In order to compare results with the published data from the Suchey-Brooks method (males), regression analyses were conducted on these populations. For the Donated collection, age regressed on phase produced a highly significant model ($r=0.8361$, $R^2=0.6992$, $F=144.06$, $p<0.0001$). Likewise, the Balkan model was also highly significant ($r=0.5164$, $R^2=0.2667$, $F=30.19$, $p<0.0001$). Statistically, the Donated collection compared favorably with previously published male data, even though females are considered more variable than males. The Balkan model explained less of the data variation, presumably due to a small sample size in younger phase categories.

Transition analysis is better suited for categorical data and is therefore used to determine if the proposed 7-phase system is a valuable tool for age estimation. A transition analysis estimates when an individual moves from one phase to the next, given the parameters of a unique population. In this case, the transition analysis also allowed us to determine whether or not certain phases should be collapsed together. If the



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transitional ages overlap, it would indicate that the phases should be collapsed. The calculated transitional ages for the Donated and the Balkan collection clearly documented the applicability and segregation of the Phase 7 morphology from the previous phases.

The suggested modifications to the Suchey-Brooks method are believed to be beneficial for ageing elderly female pubic symphyses. Given the age structure of today's population, more forensic cases dealing with older age individuals are likely to occur. These refinements will enable physical and forensic anthropologists to better estimate age at death.

Aging, Pubic Symphyses, Elderly