A54 Recognizing Transplanted Allograft Bone in Forensic Anthropological Cases

Angi M. Christensen, PhD, FBI Laboratory, Quantico, VA 22135; Louis Jares, BS, MTF Biologics, New Braunfels, TX 78130*

Learning Overview: After attending this presentation, attendees will understand how to recognize transplanted bone if it presents in a forensic anthropological context.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by informing forensic anthropologists regarding the likely appearance of transplanted bone in a forensic context, so it is not mistaken for commingling.

Given that structural allograft bone transplants are now routinely used to treat skeletal traumas and cancers, it is possible that bone grafts may be observed in forensic anthropological cases. Because these transplants involve large portions of donated cadaveric (non-native) bone, such cases could potentially complicate forensic anthropological investigations by mimicking the presence of a second individual in terms of bone morphology and size. However, they may also provide significant leads for personal identification. Here, an overview of structural allograft bone transplantation is provided to make forensic anthropologists aware of how these cases may look in forensic anthropological contexts.

Bone transplants have been in use for more than 130 years and are routinely used in association with treatment of severe bone loss due to trauma, orthopedic implant procedures, and oncology. Bone transplantation most often uses human donor grafts. These grafts are sometimes non-structural and small-scale such as bone chips, powders, or pastes which are typically used to enhance or improve fusion or healing. They may also be large-scale structural transplants that take the form of bone portions or even entire bones that are typically used for limb salvage or to restore weight-bearing function. Autografts use skeletal material procured from the individual receiving the graft, while allograft bone is procured from one or more deceased individuals, depending on the complexity and scope of the surgical procedure

Once implanted, the graft recipient effectively possesses both native and non-native skeletal material. Although efforts are typically made to use size-appropriate grafts, the transplanted bone may still be somewhat morphologically and metrically different from the native antimere of the recipient. This means that in the event a recipient of a structural bone allograft becomes the subject of a forensic anthropological examination, skeletal analysis could be affected if the transplant is not recognized and is instead mistaken for commingling based on these dissimilarities in antimeres.

One advantage of a bone transplant in a forensic anthropological case is that the surgery will likely be apparent due to either bone remodeling or the association of a surgically implanted device. The healing/remodeling of bone should be apparent as an antemortem process that may be linked to an injury and/or surgery. Evidence of surgery may be helpful in narrowing the pool of possible missing persons to whom the remains may belong. Surgically implanted devices can similarly help search for possible missing persons or can sometimes be used to corroborate identity. Knowledge of the appearance of bone transplants may help forensic anthropologists in recognizing alterations and hardware associated with this procedure and help provide significant leads in identifying the remains.

It is unknown how often (if ever) bone transplants have been observed in forensic anthropological cases. Due to the presence of native and non-native bone in the same skeleton, it is possible that transplanted bone could result in metrically and morphologically dissimilar antimeres and mimic commingling, thereby misleading the analysis. However, awareness of this process and its appearance should help in recognizing when a bone transplant may be involved and mitigate such complications. This awareness may be enhanced through increased and continued communication and collaboration between medicolegal experts and those in the tissue transplant community.

Forensic Anthropology, Bone Transplant, Commingling