

Forensic Anthropology in Latin America: Examining Methods of Human Identification

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Abstract

The purpose of this research to examine what forensic techniques have been used through time for positive human identification within the context of mass graves in the region of Latin America. Latin American countries struggle with human rights issues, political violence, and mass natural disasters, which often means there are mass graves in certain regions of these countries. Forensic anthropology teams in Latin America are often responsible for identifying human skeletal remains in these instances. The application of forensic anthropology techniques and methods is analyzed throughout time, and little change is observed within these methods. The techniques that have been most useful in identifying victims in these countries are discussed, such as DNA analysis and dental records.

Keywords: Latin America, Forensic Anthropology, Human Identification, Human Rights, Political Violence

Introduction

Latin American countries are more likely to suffer from political violence, natural disaster, and mass disasters which often result in mass graves. These mass graves are filled with un-named victims and at times are not discovered until years later. Police and government officials do nothing when it comes to trying to identifying these victims because of political corruption. It is usually forensic anthropology teams that help with the identification of victims in these specific countries. The most well-known forensic anthropology teams are the Argentina Forensic Anthropology Team (EAAF) and the Guatemalan Forensic Anthropology Team (FAFG). These teams, rather than government or police, perform most of the work for identifying individuals in mass graves. When these skeletonized remains are discovered, it is not a local crime that can be dealt with by the government (Bielous, 2019).

The methods and techniques for human identification in these countries were similar, most of them consisting of DNA analysis, osteological analysis, and the biological profile. Many of these countries have been using the same techniques for years and it seems that they do not get the chance to advance with the techniques used for human identification. Forensic anthropology teams are continuing to use the same techniques that were first used when forensic anthropology was introduced to Latin America (EAAF Guide).

Countries in Latin America have a lack of regional standards in forensic anthropology (Íscan & Olivera, 2000). It is a growing discipline, but it still needs to continue to improve on setting forensic anthropology standards. Each country in Latin America may have different standards to follow in context of forensic science as a whole. An example of this is how some countries use universities and private laboratories to perform human identification techniques, while other countries only allow government laboratories to

employ human identification techniques such as DNA-based genetic identification (Lorente, 1999).

Forensic Science in Latin America

Countries in regions like North/Central America, South America, and the Caribbean are considered to be a part of Latin America. The countries that suffer the most with human rights violations and political violence are Guatemala, Argentina, El Salvador, Peru, Chili, Colombia, and Brazil. These countries have now grown enough to have their own forensic anthropologists but it was not always that way since Western anthropologists who intentionally involved in the training and the awareness of biological anthropology.

When forensic anthropology in the United States first coalesced into its own discipline in the 1970's, it was expected that U.S. forensic anthropologists would travel to other regions like Latin America to aid in the investigations of finding and identifying the victims of human rights abuses. Now, since forensic anthropology has grown there are more forensic anthropologists who have been trained and are natives to these Latin American countries. While it may be expected for a foreign forensic anthropologist to assist in certain circumstances, there are now more professionals in the forensic science field in their own countries. Various important anthropologists like Clyde Snow and Ellis R. Kerly helped establish physical anthropology and forensic anthropology sections in their own country and in Latin American countries, like Argentina (Ubelaker, 2018).

The History of the Discipline

Forensic anthropology was created by European anatomists but it was developed in America because there were many high-profile court cases, focused research, and a large donated skeletal collection critical to the establishment

of forensic methodologies (Ubelaker, 2018). In 1972, the American Academy of Forensic Science (AAFS) established physical anthropology as its own section (Ubelaker, 2018). This was, in part, due to Ellis R. Kerley and Clyde Snow. In 2015, the physical anthropology section changed its name to anthropology to broaden the scope and accommodate practitioners of archaeology. In 1977 and 1978, Ellis R. Kerley led the creation of the American Board of Forensic Anthropology (ABFA). This organization set up a certification process that was examination-based and initially certified diplomates (Ubelaker, 2018).

While early forensic anthropology was primarily based on analyzing skeletal remains, it soon diversified into a broader field that included decomposed remains, skeletal trauma analysis, war deaths, and diverse techniques of human identification (Ubelaker, 2018). Forensic anthropology now includes search and recovery, age estimation, new computer techniques, isotopic analysis, biomechanics of trauma interpretation, human rights investigations and many other aspects of human identification (Ubelaker, 2018). It continues to grow as a discipline as we are introduced to and continue to advance more in technology that can be used in the forensic science context.

When Clyde Snow arrived in Argentina in 1984, he was able to establish the use of forensic anthropology in political violence cases (Fondebrider, 2012). Clyde Snow was interested in aiding Latin America because of the large amount of people who would be kidnapped, killed, and buried throughout the "Dirty War" in Latin America. After this war, he continued to consult and train colleagues in order to help found the Argentina Forensic Anthropology team (EAAF), this team was able to aid in investigations of political violence (Ubelaker, 2018). In 2003, the Latin American Association of Forensic Anthropology was formed. This organization is able to provide training, education, and experience to those individuals who want to be certified as a forensic anthropologist.

Human Right Violations/Political Violence

Many countries in Latin America suffer human rights abuses as a result of politically driven conflicts and violence. This could mean that people in power are killing and hurting the citizens they are supposed to serve. Many people lose their family members and have no idea what happened to them. Historical changes have caused many problems for citizens in these countries. The political system is turned against the people due to a military dictatorship, which is being attacked since people want to facilitate a democratic elected government (Friedenberg, 2001). Political violence can include concepts like humanitarian issues, human rights violations, war crimes, and genocide (Fondebrifer, 2012).

The dictatorship era in Latin America left a large number of people dead and also left many people missing. When these human rights violations happened, it caught the attention of the International Committee of Red Cross (ICRC) and independent forensic teams (Calmon, 2019).

Missing people are not accounted for, such as the people who are already declared dead. A lot of Latin American countries began improving on the discipline of forensic science when the investigation of political crimes was on the rise in the 1960's and 1980's (Calmon, 2019). Not every country developed forensic anthropology in the same way. Brazil stands out because the development of forensic anthropology was connected to legal medicine. Most forensic anthropologists in Brazil only need a Bachelor's degree plus training in health disciplines in order to be considered a forensic anthropology expert (Calmon, 2019).

Forensic anthropology is becoming a bigger discipline in Latin American countries, due to the fact that they need to identify large amounts of people. While other countries like the United States and the United Kingdom began using forensic anthropology as an aid to the medico-legal community (law enforcement), Latin American countries had to use it in order to meet the demands of all the deaths that were connected to political crimes (Fondebrider, 2012). Anthropologists who work in Latin America usually do not have one occupation, they work with various organizations. They could have multiple jobs such as teaching in a university, government positions, private sectors, working in international organizations, and working with human right organizations. They get paid low wages no matter if they are working directly or indirectly in academia (Friedenberg, 2001).

Forensic Anthropology in Latin America

Forensic anthropologists in Latin America usually are approached by family members in order to find victims or the "disappeared". This is why many forensic anthropologists must have a connection with the families of victims. Not only will they be collecting DNA from the victim's families, but they need to be able to share the good and bad news of the investigation. At times, a victim may not be from a political crime but they may be from a mass disaster, which may still require a mass amount of people to be identified and investigated.

Different phases comprise the investigation, recovery, and the analysis of human remains. There is a preliminary investigation, archaeological phase, laboratory phase, identification process, and lastly release the results to family or the community (EAAF Guide). These phases must all be interconnected with one another in order to make it a clear and manageable investigation. The preliminary investigation may require the most work since one needs to look at written sources, work with oral sources and collect the antemortem data that includes getting biological samples for genetic testing from the victim's biological family. The family usually reaches out to these forensic anthropology organizations to get answers for their missing relatives and some may comply with what information the anthropologists request while others may be afraid to share this type of information.

Some challenges persist with forensic anthropology in Latin America that include having no local bone or dental standards, no accurate reporting of the actual

amount of people who are missing in an investigation, and a lack of information in the expert reports that professionals must fill out (Ubelaker, Colantono, & Smithsonian, 2019). There are issues with funding as well when it comes to studying and recovering mass graves. In Argentina and Chile, different State agencies may be able to fund these projects but other counties are not as fortunate (Ubelaker, Colantono, & Smithsonian, 2019). Universities in Latin America may not be able to participate in these projects because of the funding and risks involved. Also, since political violence is an issue, it may be risky for people to work at burial sites that are monitored by State police and victim's families (Ubelaker, Colantono, & Smithsonian, 2019). It could be dangerous for people to work at burial sites since there are police officers and family members surrounding the work area. Also, the victimizers who could have been responsible for these human rights violations are still free and still hold a share of power.

Search & Recovery Methods

The first step towards search and recovery usually includes a preliminary investigation that requires using oral and written sources to lead investigators toward the location of the graves (Bielous, 2019). While doing the preliminary investigation they will also try to retrieve information of the characteristics of the victims and as well try to reconstruct the event in a historical context. Maps and sketches from witnesses can help recognize the spot. Also taking aerial photographs, using satellite photographs, and using archaeological prospection can help locate the site (EAAF Guide).

After forensic anthropologists receive this information, they can conduct surveys in order to find mass graves. They can use a ground-penetrating radar (GPR) and a proton magnetometer to look for mass graves. GPR is able to send radar waves through ground to sense the presence of bodies and a proton magnetometer is able to detect small changes in the Earth's magnetic field and this can help find gravel pits since digging through soil disturbs the electromagnetic properties (Sachse & Guzman, 2012). This means that any soil in which human remains were buried will come up on the GPR monitor screen since this detects any physical and chemical changes in the ground. GPR also ensures that no site is destroyed since it is a non-invasive survey method for searching for mass graves. GPR is able to create a map of how the site looked like before it was disturbed. So, for these mass grave cases, it would be before any human remains were buried. Flotation can keep track of small artifacts found in these mass graves and using a geographical information system (GIS) is a way to store coordinates and data of excavation sites as materials are recovered. While at these excavation sites, tools such as shovels, trowels, anthropometers used for anthropometric measurements, boley gauges to measure dental materials, spreading calipers to measure the thickness and internal/external diameters of skeletonized remains, and heat-sensitive infrared cameras will be used to locate new graves, excavate the found graves, and to measure skeletal

remains (Sachse & Guzman, 2012).

Excavation

There are different types of localities where bodies may be found such as: clandestine cemeteries, surface sites, discrete excavated graves, or in rivers, lakes, or oceans (EAAF Guide). After a potential mass grave is discovered, a team gets ready to conduct an archeological excavation. The goal is to search and recover the bodies. Mass graves, synchronic graves, diachronic graves, disturbed graves, and altered graves may all be a classified type of grave in which mass amounts of victims are found. Mass graves are often hastily dug pits where a large amount of human remains are dumped. Synchronic graves are also considered mass graves but all the bodies were deposited during the same burial event. A diachronic grave are mass graves where the bodies were buried during different burial events. A burial site may be disturbed as a result of natural processes or altered intentionally by human action (EAAF Guide). Even within the same burial context, bodies can be found in different states of preservation, and their conditions can vary.

Once the grave is found, steps such as determining if the area is on private property, preserving and isolating the area, and making sure there are no threats of danger are important to remember. Also, documentation of the site is critical, so archaeologists must track the location with a GPS, photo-document the area, check if the site will be modified by humans or by natural processes, employ safety and security procedures, and find a way to communicate with community members where the remains are located (EAAF Guide).

The recovery of remains during the excavation process will go through receiving a site code, documentation, packaging, chain of custody, and transportation. Families are allowed to watch the exhumation under the site protocol and they can perform any needed cultural or religious rituals as long as they do not disturb the site (EAAF Guide). Families also have the right to know how bodies will be exhumed and the preliminary findings. Many Latin American countries do have a focus on supporting the victim's family. This is unique to Latin America because families are usually the people who reach out to forensic anthropology teams in order to help find their loved ones.

After the remains are recovered, they are sent to the laboratory to be assessed. The remains will go through receiving a basic biological profile which will consist of estimating sex, age, ancestry, and stature. They will then be given a dental analysis, analysis of pathologies, anomalies, trauma analysis, and distinction between taphonomic processes and perimortem wounds (EAAF Guide). This is critical information that informs not only the identification of an individual, but also the potential cause and manner of death. Sampling for genetic testing may be conducted after all analyses have been performed, and if genetic testing was not conducted it was due to rare circumstances (EAAF Guide). The Argentina Forensic Anthropology team lead an example for many other countries in Latin America and their

guide is similar to many forensic anthropology teams because the Argentina Team was one of the first and most advanced teams since forensic anthropology was introduced in Latin America.

In some circumstances, remains will be analyzed with gas chromatography/mass spectrometry (GC/MS), forensic radiology, computerized tomography (CT), or magnetic resonance imaging (MRI). In a mass fatality incident, GC/MS is used by extracting osseous materials from the skeletal remains and once this material is in the GC/MS instrument it can generate traces that are distinctive to a individual (Edson & McMahon, 2019). Forensic radiology can be used to compare the antemortem and postmortem radiographic records of an individual to confirm an identification (Kahana & Hiss, 1997). Radiographic markers are used in order to compare and identify victims. Using CT scans for human identification is similar to forensic radiology. With a CT scan, lateral scout views and skull X-rays are utilized for identifying victims (Haglund & Fligner, 1993). A lateral scout view would be a digital radiograph of the lateral view of the skeletal remains. MRI scans can be used as well, this method gives detailed images of the soft tissues in the body. If enough tissue is on the individual facial recognition can be conducted on victims with cranial MRI scans (Schwarz et al., 2019).

Techniques

A greater proportion of forensic anthropology work in Latin American countries is done in the field instead of a laboratory. However, there are some things that can only be performed at a lab, and this has to do more with positively identifying the individual. At times, gas chromatography will have to be used in order to find the amount of poison that was in a body. Forensic radiology is a useful tool for severely destroyed remains. Using techniques such as x-rays, computer tomography, and MRIs can also help determine the cause of death (Sachse & Guzman, 2012). In Uruguay, the field of forensic anthropology is still developing along with the rapid advances in analytical technologies. Human remains used to be analyzed by coroners with little training but now there is a lab that is dedicated to forensic anthropology. Techniques such as facial image analysis, comparing DNA fingerprints, and examining dental records are the most popular techniques that are used (İscan & Oliver, 2000). Forensic anthropology research is rare to Central and South America which may explain why newer human identification techniques have not been introduced. Countries such as the United States and the United Kingdom are able to focus primarily on conducting forensic anthropology research, but anthropologists in Latin American countries may not have the time and resources in order to continue to grow and continue to advance the technology of forensic anthropology. While these techniques are reliable, Latin America needs to be introduced to newer techniques in order to solve cases quicker and to lessen the workload.

A basic biological profile is always the first step for the forensic anthropologist. This is helpful in order to get

the basic and useful information of the victim they are trying to identify. Forensic anthropologists in Latin American countries rely heavily on the biological profile in order to get the age, sex, stature, ancestry, and any unique traits. This can be useful to families as well because it could be easy to compare and contrast the medical documents they have of their missing loved one.

In Ecuador, human identification for victims of political violence is based on the established anthropological techniques. The identification process that takes place after human remains are found include getting fingerprints, if possible, estimating the biological profile, estimating their social status and ethnicity, the types of bones, and the cause of death (Ubelaker, Coantonio, & Smithsonian, 2019). In Chile, comparing the antemortem and postmortem information was essential to connect with the victim's family relatives. Families called for action to identify individuals after they had discovered missing detainees skeletal remains, which were not being identified by the government. Chilean forensic anthropologist used skull photo superimposition, dental x-rays, and the biological profile to identify unknown skeletal remains (Bielous, 2019).

In Uruguay, they also use simple techniques of identifying victims. In the case of *Operación Zanahoria*, which was an operation in which the military killed citizens and hid the fact that they committed this crime, they only left skeletal fragments of citizens. DNA tests were conducted, but professionals could not extract DNA from the human radius and the DNA they took from the fibula remains they found had no matches in the DNA banks (Bielous, 2019). Forensic anthropologists were able to provide evidence of what actual happened with archaeological evidence that is backed up with expert and legal evidence. The bodies were identified by their location because the dictatorship refused to grant relatives the body (Bielous, 2019), There are international standards when it comes to recovering skeletal remains during excavations and Uruguay broke those protocols by not protecting the skeletal remains that were recovered (Bielous, 2019). Uruguay also relied on techniques such as facial reconstruction when forensic treatments were being used in 2005. This technique is not reliable due to the low correlation between the human skull and the features of the face (Ubelaker, 2007).

Peru follows a similar pattern with these countries. In Peru, the law only permits fingerprint, odontograms, and DNA as accurate forms of identification (Bielous, 2019). Peru identifies victims through a traditional forensic anthropology method called positive presumptive identification. This requires that the victims' family share the individual personal characteristics and forensic anthropologists compare that to the postmortem information of the skeletal remains (Bielous, 2019). Victims who have already been lost for longer than ten years will not have much of a success rate in positive identification.

Brazil uses some of the same methods as other Latin American countries. They use comparative

antemortem and postmortem methods, forensic sculptures, digital facial reconstruction, dental evidence, and the biological profile (Ubelaker, Colantonio, & Smithsonian, 2019). Research continues to be conducted in Brazil in order to advance forensic fields. There is still a long way to advancing the methods in Brazil and all other Latin

much more detailed planning. With the amount of human skeletal remains that are commingled, it may be difficult to apply identities to all remains, especially when remains are in fragmentary condition. It is advised that only bones that have been genetically marked or bones that have been identified with the use of odontology, pathology, or

Table 1. Most Commonly Used Human Identification Techniques/ Methods by Country in Latin America

Country	Techniques/Methods
Argentina	DNA Analysis, Biological Profile, Dental Records
Guatemala	DNA Analysis, Biological Profile, Dental Records
Uruguay	Fingerprints, Biological Profile, DNA Tests, Facial Reconstruction, Skull Superimposition
Ecuador	Fingerprints, Biological Profile
Chile	Antemortem and Postmortem Information, Skull Superimposition, Photographs, Dental X-Rays, Biological Profile
Peru	Fingerprints, Dental Records, DNA Tests
Brazil	Antemortem and Postmortem Information, Forensic Sculptures, Digital Facial Reconstruction, Dental Records, Biological Profile

*Chart Information comes from (Ubelaker, Colantonio, & Smithsonian, 2019)

American Countries.

Forensic anthropology and the application of archaeological methods are important components that will aid these countries in their fight to identify people from mass graves.

Research such as analyzing the palatal rugae has begun in Latin America as a means of identifying people. The palatal rugae, which may also be called the transverse palatine, are the ridges on the anterior of the palatal mucosa. These ridges are formed with the front of the tongue and it forms a unique structure in the hard palate that can be analyzed for forensic identification – like a fingerprint. It is a new analytical-description method that can help identify victims if their unique features have been altered or if their body has decomposed and has been transformed (Blanco, Bollini, & Atencio, 2019). This method is less costly and the information can be collected rapidly. It is more helpful in the cases where the individuals were victims of a violent crime or catastrophe. With the use of this method, it will provide a standardized framework for providing rugoscopic information (Blanco, Bollini, & Atencio, 2019). This method can enrich the techniques that forensic science is already using for human identification.

Commingled Remains

In examination of mass graves, multiple skeletal remains are bound to be recovered. Commingled human skeletal remains means that there is a mixing of the bones of two or more people. One of the responsibilities of the forensic anthropologist carries within the context of human rights violations is proving that multiple individuals residing in a common grave was purposeful and could have not been a coincidence (Fleischman, 2016).

A mass grave with commingled remains always requires

radiographs can be repatriated or positively identified. (Varas & Leiva, 2011).

When a mass grave is first determined to have commingled remains, it is standard procedure to count the number of bones found and to estimate the minimum number of individuals (MNI) (Egana, Doretti, Bernardi, & Ginarte, 2008). After this, the bones might be sorted, analyzed and an attempt to determine biological profile or profiles might proceed. The analysis that takes place after the remains are recovered is done in order to reunite the largest number of individuals from all the mixed remains. When investigating a case with commingled remains, a positive identification can only be given with osteo-anthropological data and DNA testing results (Egana, Doretti, Bernardi, & Ginarte, 2008).

Results & Conclusion

Forensic anthropology in Latin America has made some advancements, but it has not kept pace with other countries around the world. Throughout analysis of other research articles, it can be seen that methods or techniques that are most likely to be used in Latin America in context of mass identification are those of DNA analysis, comparative dental records, and analyzing a biological profile of the skeletal remains. It is important to note that all skeletal remains will have a biological profile, but often the profiles are very similar so they cannot be used to confirm positive identification until another method is used. These techniques have been implemented ever since forensic anthropology was introduced into these countries. It seems that there has been little change in methods and their application when it comes to identifying skeletal remains in

mass graves.

Along with the biological profile, forensic anthropology teams in Latin America use DNA analysis most frequently because it is reliable and accessible. However, DNA analysis may be expensive and only a few labs can work in extracting DNA from bone remains (Egana, Doretti, Bernardi, & Ginarte, 2018). The families of victims are usually involved when forensic anthropology teams are conducting an investigation, recovery, and analysis of skeletal remains in mass graves. If the forensic anthropologists who work for these teams are able to obtain DNA from family members to compare to the remains, a positive identification is possible. Dental records can also provide a positive identification, but this technique can only be used if the missing individual has available dental records.

While there is research proceeding in Latin America countries exploring new techniques for human identification, there has been very little change in applications of these techniques for positive human identification. Forensic anthropology teams are usually the ones conducting the actual analysis for human identification on recovered skeletal remains in mass graves, and they are continuing to use well known techniques that they depend on to lead them to a positive identification. In the future, this may change but at the time being, these techniques will continue to be used in Latin America. There are limitations to forensic anthropology in these countries because there is little collaboration between the forensic anthropology teams and the universities that have funding to conduct research on human identification.

Forensic anthropology as an academic discipline, continues to grow in Latin America. With the creation of more courses at all levels in forensic anthropology, forensic archeology, and the creation of standards related to forensic science, the field of forensic science can develop at a quicker rate. If more funding becomes available for forensic science in countries of this region, it can be used towards supporting research for more recent techniques of human identification and the training of professionals in the discipline. One critical limitation is that forensic anthropology teams are not connected to the research that is being conducted in universities. There is an urgent need for greater collaboration between universities and forensic anthropology teams to continue to advance the discipline.

It is not only forensic anthropologists that aid in these human identification cases. A legal team, people with knowledge in international affairs, and people who can work with the victim's families are necessary when conducting these investigations. The use of advancing techniques and methods is still under development. There already is a demand to improve DNA testing by making it more efficient. Also, there is a need for the implementation of a quality management system for all the forensic work. However, since these countries often face economic difficulties, it may be hard to make these advancements very quickly (Bingham, 2020). While Latin American countries struggle to advance their forensic methods, there is still

growth in the educational opportunities in the field. The desire to implement standards is especially valuable to the training of new professionals in the discipline.

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