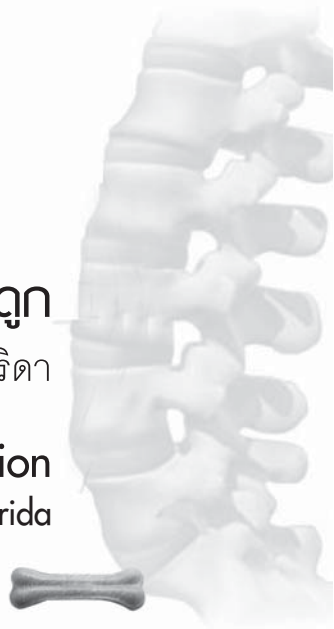

การเปรียบเทียบเกณฑ์วิธีในการเก็บรวบรวมกระดูก
ระหว่างรูปแบบของมหาวิทยาลัยเชียงใหม่ และมหาวิทยาลัยแห่งฟลอริดา

Comparison of the two techniques of bones collection
between Chiang Mai University and University of Florida

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ABSTRACT

Many researches of Anthropology had to gather data from all of the human bones. For gathering the best data that not misses anything, thus a complete set of the bones collection is the most important that leads to make more researches henceforth. Thereby, the best technique of bones collection was studied in this project by comparing bone collection protocol between Chiang Mai University and University of Florida. The result showed that protocol of University of Florida provided the advantage of good protection of the delicate bones and should be suitable for keeping the bones in good condition. Chiang Mai University is ready to choose the protocol of University of Florida for collecting bones which help to avoid damages of the bones and lead to serve much more the further research in the field of anthropology than for the past.

***Keywords**: bone collection protocol, protection of delicate bones, preserve the bone*

บทคัดย่อ

งานวิจัยที่เกี่ยวข้องกับสาขามานุษยวิทยามีความจำเป็นต้องเก็บข้อมูลจากกระดูกของมนุษย์ทุก ๆ ชิ้น การเก็บรวบรวมกระดูกให้ครบถ้วนบริบูรณ์จึงมีความสำคัญอย่างมากเพื่อทำให้เกิดงานวิจัยอย่างมากมายขึ้น การศึกษาครั้งนี้เป็นการเปรียบเทียบเทคนิคในการเก็บรวบรวมกระดูกของมหาวิทยาลัยเชียงใหม่และมหาวิทยาลัยแห่งฟลอริดา ผลจากการศึกษาแสดงให้เห็นว่ารูปแบบของมหาวิทยาลัยแห่งฟลอริดามีจุดเด่นดีกว่าในการเก็บรักษากระดูกที่มีความบอบบางและมีความเหมาะสมอย่างมากในการรักษากระดูกให้อยู่ในสภาพดีอีกด้วย

คำหัส: เกณฑ์วิธีการเก็บรวบรวมกระดูก การปกป้องกระดูกที่บอบบาง การเก็บรักษากระดูก

Introduction

Anatomical anthropology is the field of study that deals with the analysis of human skeletal resulting from the cadaver donor which donated their body after death. The studied aspects of anatomical anthropology are the determination of such as sex,[1-3] age[4] and race[5-8] that are used in the field of forensic science[9] and medical application.[10,11] Like all other sciences, the methods used by anatomical anthropology can be divided into two types, those used to gather data and analyze data. Data gathering methods involve technique used to collect information from human skeleton. These vary from simple visual examination of traits by osteometry that is the measurement of human bone on an objective scale using calipers or an osteometric board to complex methods, such as determining age from microscopic examination of thin section of bones. By contrast, data analysis methods involve technique used to analyze the gathered data for the purpose of answering the question posed by the anatomical anthropology protocol compared with the forensic anthropology protocol. Metric methods, as they often are called attempt to quantify many of anthroposcopic characteristics used in the identification of aspects of the skeleton. Thus, anatomical and forensic anthropologists often will take measurements to determine ancestry, sex, age and other characteristics of a living person from their skeleton that shall be complete and not break down or nicked. From the past to present, a bones collection room in the department of anatomy has been used by many researchers in the field of anatomical and forensic anthropology for gathering data and making many researches.[1-3,10,11] For gathering the best data in the future research, the department of anatomy realizes the importance of a complete set of bones collection. Thus we compared and chose the better technique between our technique and the technique from department of Anthropology, college of Liberal Arts and Sciences, University of Florida.[12]

Materials and methods

There are two protocols use to collect the skeleton. The detail of each protocol as follow:

Chiang Mai protocol

1. Place the small bones of hands and feet into one corner of the floor of the box without a plastic bag.

2. Opposite the same side corner of the hands and feet, place the cranium on and place the mandible near it.

3. Place long bones along another long side of box.

4. Stack form around the vertebrae in anatomical sequence by putting a rope in the vertebral foramens. Place the vertebrae on top of hand and foot bones.

5. Gather the ribs in a bundle and place it on top of the vertebrae.

6. Place hip bones, scapulas and sacrum in box.

Florida protocol

1. Place the long bones lengthwise along one long side of the box. Place the larger bones like the femurs and tibias on the bottom and smaller bones like the radii, ulnas, clavicles and fibulas on top of them.

2. Place cranium on the other side of the box, at the front. Position the cranium so that the face is pointing

into the corner of the box, as this will help protect the delicate bones of the face. To safely pick up a cranium, grip it with one hand on the frontal bone (the forehead) just above the eye orbits, along the temporal lines, and place your other hand under the occipital bone at the back of the cranium. Always hold the cranium with two hands as you are examining it. When handling the cranium, do not place your fingers in the eye orbits or the nasal passages, as this will damage the thin bones in these areas.

3. Place mandible near the cranium with the teeth facing up.

4. Place small bones of hands and feet in a plastic bag. Place this bag in the back corner of box, behind the cranium.

5. Stack vertebrae in anatomical sequence. Place short stacks of vertebrae (C1-7, T1-6, T7-12, L1-5) on top of the bag of hand and foot bones. Place the larger vertebrae (lumbar and lower thoracic vertebrae) on the bottom and the smaller vertebrae (cervical and upper thoracic vertebrae) on top.

6. Gather the ribs in a bundle with all of them oriented the same way—all vertebral ends together, all sternal ends together. Place ribs in a plastic bag. Place this bag gently on top of the vertebrae.

Place hip bones, scapulas and sacrum in the box. Because of the irregular shape of these bones, they might not always fit in the box the same way. In general, the scapulas should be oriented with the ventral surface facing up—this protected the coracoids and acromial processes. The hip bones should be oriented so that posterior and lateral surface of bones are facing up and pubis is projecting down into the box.

7. Before putting the lid on the box, make sure that none of the bones are sticking up above the top of box. If any bones are sticking up, gently rearrange the bones to fit below the top of the box. DO NOT push down bones to make them fit, or force the lid to flatten them down, as this will cause serious damage to the bones.

Results

The results of step 1 to 6 of Chiang Mai protocol (Figure 1 and Figure 2) by placing the small bones of hands and feet on the first step had higher risk of damage from being compressed or struck by heavy long bones placed on the third step. The second step by placing the cranium in the box with the face pointing in the direction of other bones caused damage to facial bone. The third step by placing the long bones along another long side of the box without lengthwise, was disorderly and might be compressed or struck the small bones. The fourth step by stacking form around the vertebrae in anatomical sequence by putting a rope in the vertebral foramens caused the vertebrae packed themselves too fit and sequently harmful damaged and disordered. The fifth step by gathering the ribs in a bundle and placed it on top of vertebrae without oriented them the same way—all vertebral ends together, all sternal ends together, harmful damaged, disordered, scattered and not handy to use. The sixth step by placing hip bones, scapulars and sacrum in box without oriented them caused harmful damage and disorder.

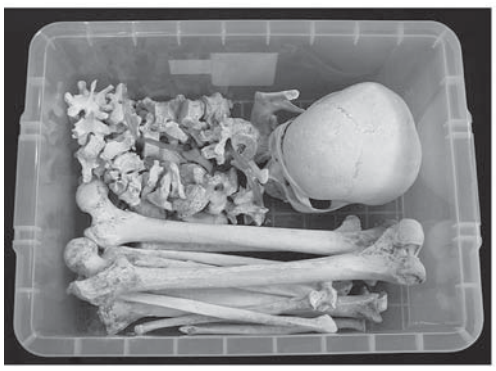

Figure 1 *Pattern of step 1 to 4 of Chiang Mai Protocol*

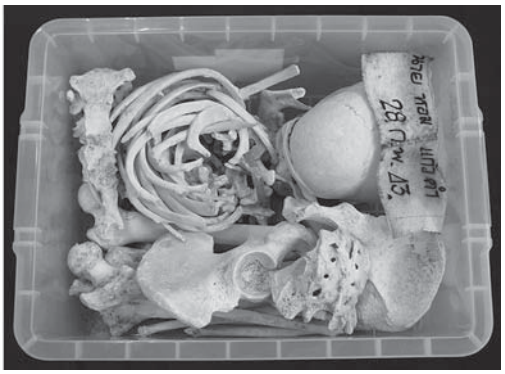

Figure 2 *Pattern of step 5 to 6 of Chiang Mai Protocol*

The results of step 1 to 7 of Florida Protocol (Figure 3 and Figure 4) by placing the long bones lengthwise along one long side of the box on the first step were well regulated and damage avoided in small bones. The second step by placing the cranium on the other side of the box, at the front that the face was pointed into the corner of the box, as this could help to protect the delicate bones of the face. The third step by placing the mandible near the cranium with the teeth faced up could help to avoid the teeth fell down. By placing the small bones of the hands and feet in a plastic bag and placed this bag in the back corner of the box, behind the cranium on the fourth step could help to pack them were regulated and damage avoided. The fifth step by stacking the vertebrae in anatomical sequence and placed short stacks of the vertebrae (C1-7, T1-6, T7-12, L1-5) on top of the bag of hands and feet bones could help to pack them were regulated and damage avoided. The sixth step by gathering the ribs in a bundle with all of them oriented the same way—all vertebral ends together, all sternal ends together after that placed the ribs in a plastic bag were regulated, damage avoided in them and easy to use. The seventh step by orienting the hip bones, scapulars and sacrum before placed them in the box could help to pack them were regulated and damage avoided.

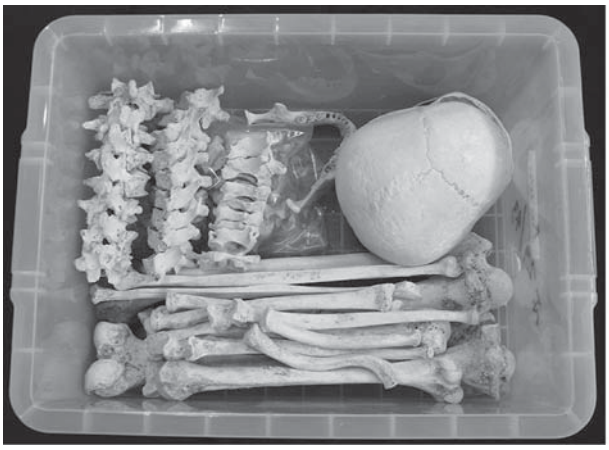

Figure 3 *Pattern of step 1 to 5 of Florida Protocol*

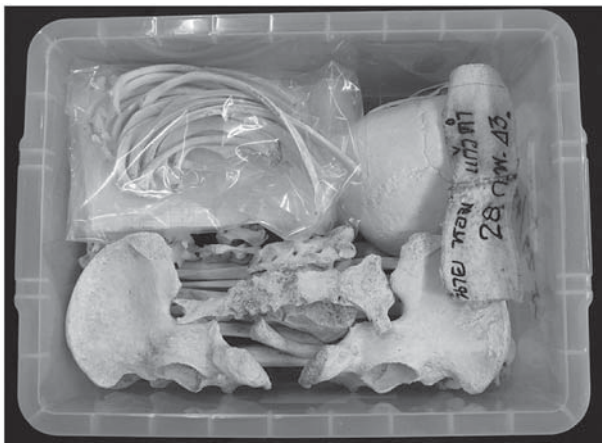

Figure 4 *Pattern of step 6 to 7 of Florida Protocol*

Discussion

The study of packing the skeleton by the rule of protocol of Chiang Mai University showed higher risks of bones damage according to the following explanation: 1) Placing the small bones of the hands and feet on the floor of bone box by scattering without placed it in a plastic bag or small box had higher risk to damage by being compressed or struck by the heavy long bones. 2) Placing the cranium must be careful because if we place the cranium by pointing the face out to other bones, a higher risk of damage the delicate bones of the face can occur. 3) Placing the mandible without facing up the teeth may affect the teeth to fall down. 4) Placing the long bones was not lengthwise; the small bones might be compressed or struck to damage. 5) Stacking form around the vertebrae in anatomical sequence by roping into the vertebral foramens which affected small processes or spines to crack or damage because it could not move to avoid damage. 6) Placing the ribs by gathering in a bundle without oriented all of them in the same way, and them in a plastic bag or small box on top of the vertebrae had higher risk to damage the delicate rim at their sternocostal end. 7) Placing the scapulars in the box without oriented its ventral surface facing up had higher risk to damage the coracoids and acromial processes. 8) Placing the hip bones in the box without oriented so that facing up the posterior and lateral surface and projecting down the pubis of the bones into the box had higher risk to damage them. Dissimilar from the protocol of Chiang Mai University that showed higher risk of bones damage, the protocol of University of Florida had the advantage of good protection of the delicate bones and be suitable for keeping the bones in good condition for gathering the best data in the future of anatomical and forensic anthropologic researches.

Conclusion

The protocol of University of Florida was well-organized for protection of the delicate bones and it kept the bones in good condition better than the protocol of Chiang Mai University. Thus, it was greatly convenient for application.

We hope that the protocol of University of Florida would benefit to make orderliness and convenience. Thus, the department of Anatomy, aculty of Medicine, Chiang Mai University was ready to choose the protocol of University of Florida for collecting the bones which avoid damaging of bones and leading to make muchhelpful in the future in the field of anatomical and forensic anthropology than the past.

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