The roles of forensic anthropology in fetal death investigation

Etty Indradi
Department of Bioanthropology and Paleanthropology, Faculty of Medicine
Gadjah Mada University

ABSTRACT

Etty Indradi - The Roles of Forensic Anthropology in Fetal Death Investigation

Physical anthropologist who has a training in forensic anthropology may be requested to give an expertise opinion. In case of discovery of fetal remains, forensic scientist should understand what main principles of medicolegal examination the evidences are based. In relation with fetal skeletal remains several investigations should be emphasized, i.e. the origin of the skeleton, the matriality compared with gestational age, the prematurity, whether the fetus is viable at birth, is the case an abortion one, the fetal death indicating the possible cause of death, and the time elapse between the dismemberment and the discovery.

The aim of this paper is to discuss the role of forensic anthropology in fetal death investigation and to present case studies of fetal death. The methods used in this study are those by various experts, to determine the age of fetuses. The material for the case study is an unknown fetal remain from Java, Indonesia sent by the local enforcement agency. The study was carried out in the Laboratory of Bioanthropology and Paleanthropology Faculty of Medicine in July 1992. The result shows the Ong's method proved to be the most appropriate in this case, probably due to the similarity in body size between the Japanese and Indonesian. The result also shows that fetal age identification is extremely sensitive to measurement error. An error of 2 mm. Can lead to 3 months difference in fetal age. Therefore, a caliper with 0.005 mm accuracy is suggested. The conclusion drawn from this study is that physical anthropological is a necessary part of forensic investigation.

Key Words: fetal remains investigation - Java origin - fetal age - identification method - forensic anthropology

ABSTRAK

Etty Indradi - Peranan antropologi forensik dalam pemeriksaan kematian fetus

Pakar antropologi fagai yang telah mengalami latihan dalam antropologi forensik dapat diminta untuk memberikan bantuan ke dalam kasus kematian fetus. Jika kasus yang diduga adalah kasus kehamilan, atau kasus lain, pakar forensik harus menguasai prinsip-prinsip pemelajaran medisilagal yang dipadukan dengan ilmu hukum dan ilmu disiplin lain secara lembaga. Dalam kaitan dengan kasus kerangka kehamilan harus mendapat perhatian khusus, yaitu dari masa asal kerangka (maminus atau hijau), matrialitas terhadap umur kematian, keadaan prematur, apalagi kematian bayi. Jika kasus tersebut, data-data yang membantu penelitian selalu penting dan waktunya harus segera dipelajari.

Tujuan artikel ini adalah, mengurutkan peranan antropologi forensik dalam pemelajaran kematian fetus dalam kasus kematian fetus. Metode yang dipelajari dalam penelitian ini adalah metode penelitian umum yang biasa digunakan dalam kasus kematian fetus. Hasil penelitian ini menunjukkan bahwa metode Ong adalah yang paling tepat dalam kasus ini.

Etty Indradi, Department of Bioanthropology and Paleanthropology, Faculty of Medicine, Gadjah Mada University, Yogyakarta, Indonesia

INTRODUCTION

Physical anthroplogy has been a necessary part of forensic investigation. There are several cases of discoveries of decomposed fenses and bones of fetuses which have ended up in the hands of physical, anthropologists, having been sent for identification by law enforcement agen-
cists. "Not all cases of forensic anthropology deal
with adults or children: some deal with unborn fe-
tal remains.\textsuperscript{3} Fetal bones look completely different from adult bones. Due to immaturity, the cranial bones have no sutures and serratation, are immediately coming apart during decomposition. For instance, the maxilla is apart from the cra-
nium. The frontal, occipital, parietal, all separate from each other. The hip bones are present in three pieces. Metacarpal and metatarsal are formed lately. Therefore the number of fetal bones present can be one of the keys to estimate the fetal age.

The roles of forensic anthropologists in crimes
involving fetuses.

Physical anthropologist who has a training in forensic anthropology may be requested to give expert testimony. An expert witness usually does one or more of the followings: \textsuperscript{3}a) draws upon fact and express professional opinion, b) reaches a conclusion, c) responds to hypothetical questions, d) expounds professional procedures to the court or jury, and e) requires professional judgment of a particular question when a simple yes or no an-
swer would not suffice.

In the case of discovery of fetal remains, fo-
renic scientists should understand on what the
main principles of medicolegal examination are
based. What do we, physical anthropologists, have to answer on the report on terms of the medi-
colegal context? If with adult skeletons remains the determination of the sex, stature, race, and age is important, so it is with fetal skeletons, with sev-
eral\textsuperscript{4} aspects.

1. Are the bones of human or of animal origin?
2. Are they fetal bones, or are they the skeletal parts of some birds or smaller mammals?
3. Could the fetus have been viable at birth, or was it born prematurely, in a non-viable state?
4. Could the fetus have originated from the sus-
pected woman whose pregnancy terminated in the extremised way and time?
5. Did the investigation furnish data indicating the circumstances or the possible cause of death?
6. How much time may have elapsed between the intervened of the fetus and its discovery?

In terms of fetal origin, if the cranial bones are present, the proportion of cranial size is large relative to the bones of the extremities. In addi-
tion, the secondary ossification centers have not fused yet in fetal humans, and the foramen mag-
num is anteriorly located, whereas in animals it is usually more posterior. Some animal remains that could be incorrectly interpreted as fetal humans are: chicken, cat, dog, weasel, rabbit and f..

The time that may have elapsed between the intervened of the fetus and its discovery can be es-
timated by the degree of decomposition, which is
dependent upon the environment. Wet soil has a
more preserving effect than dry soil\textsuperscript{5}. Therefore, in the case of a suicidal or murder pregnant woman, the fetal remains will perhaps last longer since the fetus is still in the womb. The decompo-
sition of teguments and cartilages takes about 5 years or more, and boied bones are much lighter than fresh bones\textsuperscript{6}.

If the fetus is burnt, it decreases in the three dimensions. There are several degrees of shrink-
...\textsuperscript{6}...
was sufficient for complete destruction to burn up the bones.

Stage of development is also important to strengthen fetal age estimation. Three criteria for the developmental stage of the tympanic plate is suggested: 1) the petro-mastoid portion of the temporal bone is present, but the tympanic ring has not yet developed, 2) the tympanic ring is incomplete (U-shaped) and partially adheres to the petro-mastoid portion, and 3) the tympanic ring adheres well to the temporal bone inferiorly, and the previously open ends of the 'U' are closing toward each other, although closure is incomplete. Two researchers used criteria offered to examine 95 blacks and 71 whites from the fifth fetal month to the third postpartum month. The result showed no significant difference between the two races, and they concluded that during the fifth to eighth fetal month, stage one has already been reached. If stage three is complete it is mostly postnatal.

With a knowledge of various methods of fetal bone development, fetal age and sex estimation, physical anthropologists should be able to be consulted by law enforcement agency if fetal remains are discovered.

Case studies

1. Case One:

"A woman reported to her gynecologist that she had found gristy material during her recent menstrual periods. She brought samples of this to the gynecologist, who recognized what he thought was fetal bone. The patient had been pregnant 5 years previously. The doctor who treated her at that time did a curettage, but he encountered so much bleeding that he stopped before evacuating the entire uterine contents."

On case one, the researcher identified the fetal age as 13 to 14 weeks, and concluded that the fetus might be the result of partial curettage 5 years ago that left behind bits of fetus, or alternatively, an unrecognized pregnancy that led to spontaneous miscarriage. But because he found only the cranial, sternal and clavicular bone fragments, Kerley assumed that the rest of the bones may have been curetted away, therefore the earlier conclusion is probably right. In addition, the radiograph showed that the woman had a bicomma-

2. Case Two:

The following bones were discovered:

1. One broken and defective braincase. The maxillae and the cheek bones were totally lacking. Moreover, the bones were injured to various degrees due to putrefaction of the soft parts and decay of the bones.

2. One bone very similar to the humerus of a newborn infant.

3. One bone very similar to the ulna of a newborn infant.

4. Two very fine bones resembling nasal bones.

5. Two femoral bones.

The researchers concluded that it was not fetal bone because: 1) the skull was too small for the skull of a mature fetus, 2) all sutures of the cranial bones were united by bony fusion, 3) the foramen magnum was found in the back part of the basiocciput, while in the human fetus it is localized in the middle part.

3. Case Three (this study):

On July 11, 1990 the Laboratory of Bioanthropology & Paleoanthropology, Gajah Mada University Faculty of Medicine, Yogyakarta, received a bottle contained 200 cc of 10% formaldehyde with decomposed fetal remains in it, from the Police Department of Kedu, Central Java. There was no other information about the surrounding environment of the fetal discovery. The Police Department only searched for the answer of the fetal age.

RESULTS

From the observation of case three, I determine that there are a total of 72 pieces of bones from one human individual. There are 17 vertebrae, 10 left ribs, 10 right ribs, a left temporal, right and left sphenoids, right and left zygomatics, an occipital, a left frontal, right and left parietals, right and left maxillae, a right mandible, right and left clavicles, right and left scapulae, right and left humeri, right and left ulnae, right and left radius, a left femur, 5 metatarsals, and 6

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The measurement of the bones in case three is shown on TABLE 1.

<table>
<thead>
<tr>
<th>Bones</th>
<th>Left (mm)</th>
<th>Right (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femur length</td>
<td>47.02</td>
<td>44.33</td>
</tr>
<tr>
<td>Humerus length</td>
<td>40.57</td>
<td>40.75</td>
</tr>
<tr>
<td>Ulna length</td>
<td>41.76</td>
<td>41.75</td>
</tr>
<tr>
<td>Radius length</td>
<td>34.98</td>
<td>34.26</td>
</tr>
<tr>
<td>Clavicle length</td>
<td>30.62</td>
<td>30.62</td>
</tr>
<tr>
<td>Scapula length</td>
<td>30.40</td>
<td>30.67</td>
</tr>
<tr>
<td>breadth</td>
<td>19.00</td>
<td>19.20</td>
</tr>
<tr>
<td>length</td>
<td>24.49</td>
<td>24.52</td>
</tr>
<tr>
<td>Mandible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>corpus height</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td>ramus breadth</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>Maxilla horizon length</td>
<td>15.70</td>
<td>15.46</td>
</tr>
<tr>
<td>diagonal</td>
<td>20.26</td>
<td>20.00</td>
</tr>
<tr>
<td>Frontal</td>
<td>46.56</td>
<td>47.10</td>
</tr>
<tr>
<td>malar</td>
<td>46.25</td>
<td>45.75</td>
</tr>
<tr>
<td>lateral</td>
<td>27.74</td>
<td>27.53</td>
</tr>
<tr>
<td>temporal</td>
<td>27.60</td>
<td>27.00</td>
</tr>
<tr>
<td>Temporal anterior</td>
<td>14.25</td>
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</tr>
<tr>
<td>posterior</td>
<td>13.30</td>
<td></td>
</tr>
<tr>
<td>superior</td>
<td>17.74</td>
<td></td>
</tr>
<tr>
<td>inferior</td>
<td>17.31</td>
<td></td>
</tr>
<tr>
<td>Occipital</td>
<td>47.00</td>
<td></td>
</tr>
<tr>
<td>transverse length</td>
<td>37.00</td>
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</tr>
<tr>
<td>sagittal length</td>
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</tr>
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<td>Parasagittal</td>
<td>54.35</td>
<td>35.61</td>
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<tr>
<td>horizontal/length</td>
<td>40.20</td>
<td>50.70</td>
</tr>
<tr>
<td>Rib I</td>
<td>15.85</td>
<td>16.90</td>
</tr>
<tr>
<td>II</td>
<td>29.40</td>
<td>32.35</td>
</tr>
<tr>
<td>III</td>
<td>42.47</td>
<td>43.25</td>
</tr>
<tr>
<td>IV</td>
<td>41.10</td>
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<td>V</td>
<td>45.91</td>
<td>46.15</td>
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<td>VI</td>
<td>48.33</td>
<td>49.57</td>
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<td>VII</td>
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<td>43.35</td>
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<td>IX</td>
<td>36.40</td>
<td>45.15</td>
</tr>
<tr>
<td>X</td>
<td>37.27</td>
<td>41.55</td>
</tr>
</tbody>
</table>

The fetal age: 6-6.5 months.

2. Determination of the fetal age using arch length measurement and "table of fetal age in months".

Using Obstukhi method, TABLE 2 indicates that the fetal age of case three ranges between 6-8 months with high frequency of the occurrence at the age of 7 months.

<table>
<thead>
<tr>
<th>Age</th>
<th>Case 3 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-5 m</td>
<td>46.36</td>
</tr>
<tr>
<td>6 m</td>
<td>22.50</td>
</tr>
<tr>
<td>7 m</td>
<td>34.38</td>
</tr>
<tr>
<td>8 m</td>
<td>43.90</td>
</tr>
<tr>
<td>50.70</td>
<td>70.36</td>
</tr>
</tbody>
</table>

3. The determination of the fetal age using "Rapid determination of fetal age".

As it shown in Table 3 using Fazekas and Kosa (1978) method, the result of measurement spread in the range of 6 to 8 months but the high frequency of occurrence is at the age of 7 months. This is matched with the method of Obstukhi and only 5-1 months older from the Mehta & Singh's method combined with Moore's table. Note that Fazekas and Kosa used a European sample, Obstukhi used a Japanese fetus sample and Mehta and Singh used an Indian sample. This fetal discovery case is Indonesian, which is in general assumed to be smaller than European, and in the range between Japanese and Indian, in size.

Note that at certain times, the measurement decreases (-) even though the fetus is getting older (TABLE 3). The normal of the ratio place in cranial bones. This is because the fetal growth needs to reach a normal proportion. At two and a half month old, the fetal upper head is still as wide as the shoulders and has a long face. Then it gradually reaches a normal proportion having a shorter face and the shoulders wider than the head.
<table>
<thead>
<tr>
<th>Age (in millimeters)</th>
<th>6 m.</th>
<th>6.5 m.</th>
<th>7 m.</th>
<th>7.5 m.</th>
<th>8 m.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occipital</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>horiz.</td>
<td>35.82</td>
<td>20.00</td>
<td><strong>35.95</strong></td>
<td>47.00</td>
<td>48.00</td>
</tr>
<tr>
<td>vert.</td>
<td>45.71</td>
<td>28.00</td>
<td>34.50</td>
<td>35.00</td>
<td>48.00</td>
</tr>
<tr>
<td><strong>Parietal</strong></td>
<td></td>
<td></td>
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<tr>
<td>horiz.</td>
<td>58.35</td>
<td>42.00</td>
<td>47.70</td>
<td>51.00</td>
<td><strong>63.00</strong></td>
</tr>
<tr>
<td>R</td>
<td>55.61</td>
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</tr>
<tr>
<td>vert.</td>
<td>40.70</td>
<td>19.90</td>
<td>46.50</td>
<td>53.50</td>
<td><strong>50.00</strong></td>
</tr>
<tr>
<td>L</td>
<td>50.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maxilla</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>15.70</td>
<td>12.50</td>
<td><strong>16.70</strong></td>
<td>17.00</td>
<td>19.00</td>
</tr>
<tr>
<td>L</td>
<td>13.40</td>
<td></td>
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<tr>
<td>L</td>
<td>20.20</td>
<td>13.00</td>
<td>23.70</td>
<td>25.00</td>
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</tr>
<tr>
<td>R</td>
<td>20.00</td>
<td></td>
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</tr>
<tr>
<td><strong>Mandible</strong></td>
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</tr>
<tr>
<td>length, L</td>
<td>34.00</td>
<td>30.00</td>
<td>32.20</td>
<td>34.00</td>
<td>37.00</td>
</tr>
<tr>
<td>R</td>
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<td>30.10</td>
<td>31.00</td>
<td>33.00</td>
</tr>
<tr>
<td><strong>Foramen</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>L</td>
<td>20.6</td>
<td>19.00</td>
<td>19.00</td>
<td>21.00</td>
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</tr>
<tr>
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<td>18.00</td>
<td>18.00</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td><strong>Nasion</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>19.00</td>
<td>18.00</td>
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</tr>
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<td>L</td>
<td>19.00</td>
<td>18.00</td>
<td>18.00</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>R</td>
<td>18.50</td>
<td>17.50</td>
<td>17.50</td>
<td>19.50</td>
<td>19.50</td>
</tr>
<tr>
<td><strong>Clavicle</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>30.6</td>
<td>30.6</td>
<td>26.00</td>
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<td>31.00</td>
</tr>
<tr>
<td>R</td>
<td>30.6</td>
<td>30.6</td>
<td>26.00</td>
<td>30.10</td>
<td>31.00</td>
</tr>
</tbody>
</table>

4. Determination of the fetal age

Fetal stature = 7.92 Humerus -0.32 + 1.8 cm

- 13.8 Radius +2.85 + 1.62 cm
- 8.73 Ulna -1.07 + 1.59 cm

a) Left humerus (7.92 X 43.97) +0.32 + 1.8

b) Right humerus (7.92 X 44.03) -0.32 + 1.8

= 359.22 mm = 35.92 cm (6.7-6.9 months)
c) Left radius (13.8 X 34.98) -2.85 + 1.62

= 481.49 mm = 48.15 cm (9.25 months)
d) Right radius (13.8 X 34.26) +2.85 + 1.62

= 468.32 mm = 46.83 cm (9 months)
e) Left ulna (6.37 X 41.76) -1.07 + 1.59

= 350.05 mm = 35.00 cm (6.75 months)
f) Right ulna (8.37 X 41.73) -1.07 + 1.59

= 349.80 mm = 34.98 cm (6.5-6.75 months)

Results of the examination for case three:

1. The bone is human, apparent from the proportion of the cranial bones to the bones of the extremities, and the unfused secondary ossification centers.

2. The lunar age is 7 months (6.5-7 months).

3. The fetus could be viable at birth since at this stage the fetus should be capable of breathing air (relatively mature respiratory system). The fetus could survive with medical care, if born prematurely.

4. The possible cause of death was induced abortion, since it is uncommon to have a spontaneous abortion during late pregnancy. The possible induced abortion very likely was by mechanical irritation, not by chemical agent, due to the relatively intact/undeveloped fetal bones. If it was aborted by chemical agent, like hypertonic saline injection (due to the decapsulated fetus), it was very possible to lead to the death of the mother. Even though the fetus in this case was preserved by 10% formaldehyde, one study shows that formaldehyde preservation for z period over six months leads to no great change in the external dimensions of the fetal body. The chemical agent hypothetic hormone (progesterone or antiprogestin) is impossible to use in the abortion of late pregnancy, since its effect is merely to contract the uterus muscle and to deactivate the hormonal body, which is too slow for a 7 month fetal age that already has movement reflex to sustain her life.

5. The time elapsed between the interment of the fetus and its discovery might have been very short, since ligamentous attachment is present, fetal flesh is partially attached to the bone, the hair that was attached to the head flesh had also appeared, and there was no erosion on the surface of the bone. The elapsed time between
the time of death and the discovery might have been less than one month.

6. To answer whether the fetus might have origi-
nated from the suspected woman, it should be
matched with the manner of disposal, and the
suspected woman's condition and history.

Therefore it is very important for the forensic
anthropologist to be informed of the circum-
cstances of the environment of the fetal discov-
ery to support the final conclusion.

7. After the report was done, I was told that the
fetus was removed from the abdomen of a de-
composed pregnant woman in the autopsy
room. The suspected boyfriend confessed that
"they" went together to an unskilled abortion-
ist.

DISCUSSION

The fetal age ranges of case there was from 6
to 6.5 lunar months except for the formula using
radius length, which gave 9.925 lunar months
age. Does it mean that in this case the radius
length is 'longer in proportion to the body
height/stature'? The fact that the table 3 of
Fazekas & Kaua4 shows the radius length of
34.26 - 34.98 mm in the range of the age of 6.5 to
7 months suggests that the radius formula by
Olivier & Pineau1 should be reconsidered, since
all other measurements available result in range
of 6 to 7 months. In addition, the distal femoral
epiphysis has not yet appeared, which suggests
that the age is less than 9 months.

Of the various methods of fetal age determina-
tion using measurements of the bones, the best
method is the rapid determination of fetal age2
combined with method using arch length measure-
ment of the cranial bones3. In addition, the
presence of the bones and ossification centers
should be observed to strengthen the conclusion.

It should be noted that the fetal measurements are
very sensitive in age determination. The differ-
ences of 2 mm can lead to 3 months age differ-
ences. Caliper with 0.005 mm. accuracy is
suggested.

Dealing with the medicolegal context, the fo-
rensic scientist should also be able to differentiate
a neonate from newborn infant; in case of his-
cide, a newborn which usually dies from strangu-
lation or the mother lets the newborn baby die by
throwing her/him away in an isolated area. There
are six epiphyseal centers which appear at birth:
the head of the humerus, condyle of the femur,
condyle of the tibia, talar, calcaneus, and coccyx5.
The crown-rump length is often over 35 cm12,13.

In the physical development at term, the petrous
part of the temporal bone is ossified with the
squamous part and mastoid process, and the tym-
npanic part is fused with its base part1.

CONCLUSION

As a field of science that studies human bones,
physical and forensic anthropology has long been
contributing to medicolegal issues in regard to the
discovery of skeletal human remains. Forensic fe-
tal osteology is an important part of that study but
is very distinct in many ways. It is a branch of
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REFERENCES

1. Olivier G, Pineau H. Comparaison entre les mesura-
sions sur le squelette et sur le vivant. Rev Anthropol. 1957;
3:1-16.
2. Matta L, Singh HM. Determination of crown-rump
length from fetal long bones: Humerus and Femur, Am J
3. Oboniski F. Developmental changes of the cranial bone
thickness in the human fetal period, Am J Phys Anthro-
4. Paavola IG, Knor F. Forensic fetal osteology, Budapest:
5. Keiley GR. Forensic anthropology and crimes involving