

CASE REPORT

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Personal Identification on the Basis of Antemortem and Postmortem Radiographs

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ABSTRACT: This report documents three recent cases in Hungary in which personal identification was achieved by comparison of antemortem and postmortem radiographs. These cases demonstrate three examples of radiological identification. In Hungary, comparison methods play an important role in personal identification because of the lack of adequate dental records for most of the population. The authors emphasize that in cases where antemortem radiographs and photographs are available, radiographic comparison is deemed preferable to photographic superimposition, because it is more technically exacting and permits the matching of a potentially larger number of anatomical, pathological or traumatic features.

KEYWORDS: forensic science, forensic radiology, personal identification, X-ray comparison, frontal sinuses, bony pelvis, humerus, lumbar spine

Many hundreds of thousands of radiographs have been taken of Hungary's over 10 million residents. These radiographs are often used to verify personal identity after death. The verification of identification based on the comparison of the ante- and postmortem radiographs is a long and commonly used practice. Kenyeres' book, *The Medical Court of Law (Törvényszéki Orvostan, in Hungarian)*, has been used to identify individuals and their ages since the turn of the century (1). There are many parts of the human skeleton which, because of their anatomical variability, are very applicable to the identification process. The first authority to point this out was Schuller, who found that X-rays of the frontal sinuses are a very good tool for identification (2). Since Schuller, many others have also noted that the frontal sinuses, mastoid air cells, jaws and teeth, trabecular pattern and pelvis are also valuable structures in the process of identification (3–8).

Authorities have consistently stated that the most reliable parts of the skeleton for identification are those which are anatomically variable or which exhibit change due to pathological development, trauma, or alterations from surgery (9–12). In addition, they emphasize that an antemortem radiograph should be no more than a few years old when used as a frame of reference at the time of death. However, depending on the anatomical feature that is being

used for comparison, it may not matter that antemortem radiographs are old.

Case Reports

The following examples are taken from the files of the Department of Forensic Medicine, University Medical School of Pécs, Hungary. They demonstrate three examples of radiological identification.

Case 1

In the summer of 1996, the decaying corpse of an unidentified man was found. An autopsy determined that the cause of death was not foul play, but rather natural causes. Positive identification was impossible without distinguishing marks or scars. Medical records for the suspected individual were obtained. This documentation indicated that the man had had radiographs taken of his skull and nose in July 1995, in conjunction with a traumatic condition. The radiograph of the skull showed no sign of any traumatic alteration, but the nose did have a break in it. During the autopsy, the appropriate parts of the skull were removed. A break was found in the nose of the corpse. New radiographs were taken of the skull after death. When compared with the radiographs before death, they showed substantial evidence to link the person in the original radiographs to the corpse. The outlines and hedges of the frontal sinuses, the cells, the contours of the eye sockets, and the hedges of the nose bone positively linked the two (Fig. 1). The direction, location, and magnitude of the break in the nose were also similar enough in the ante- and postmortem images to assure positive identification. The superimposition of the images taken both before and after death proved a positive match.

Case 2

In the beginning of November 1996, the body of an unidentified man was found in the ruins of a burned weekend house. The fire rendered the body unidentifiable. All forms of documentary personal identification were also burned. The medical records of the suspected man were obtained. These records included an exploratory X-ray from 1991 which showed a deformed pelvis. This X-ray later served as a valuable tool in identifying the man. During the autopsy, the pelvis of the corpse was removed, cleaned, and examined with an X-ray similar to the exploratory radiograph taken earlier. The mark of the previous protrusion in the pelvis was found and determined to be substantially identical to the one in the original X-ray. The victim of the fire was therefore positively identified as the suspected individual (see Fig. 2).

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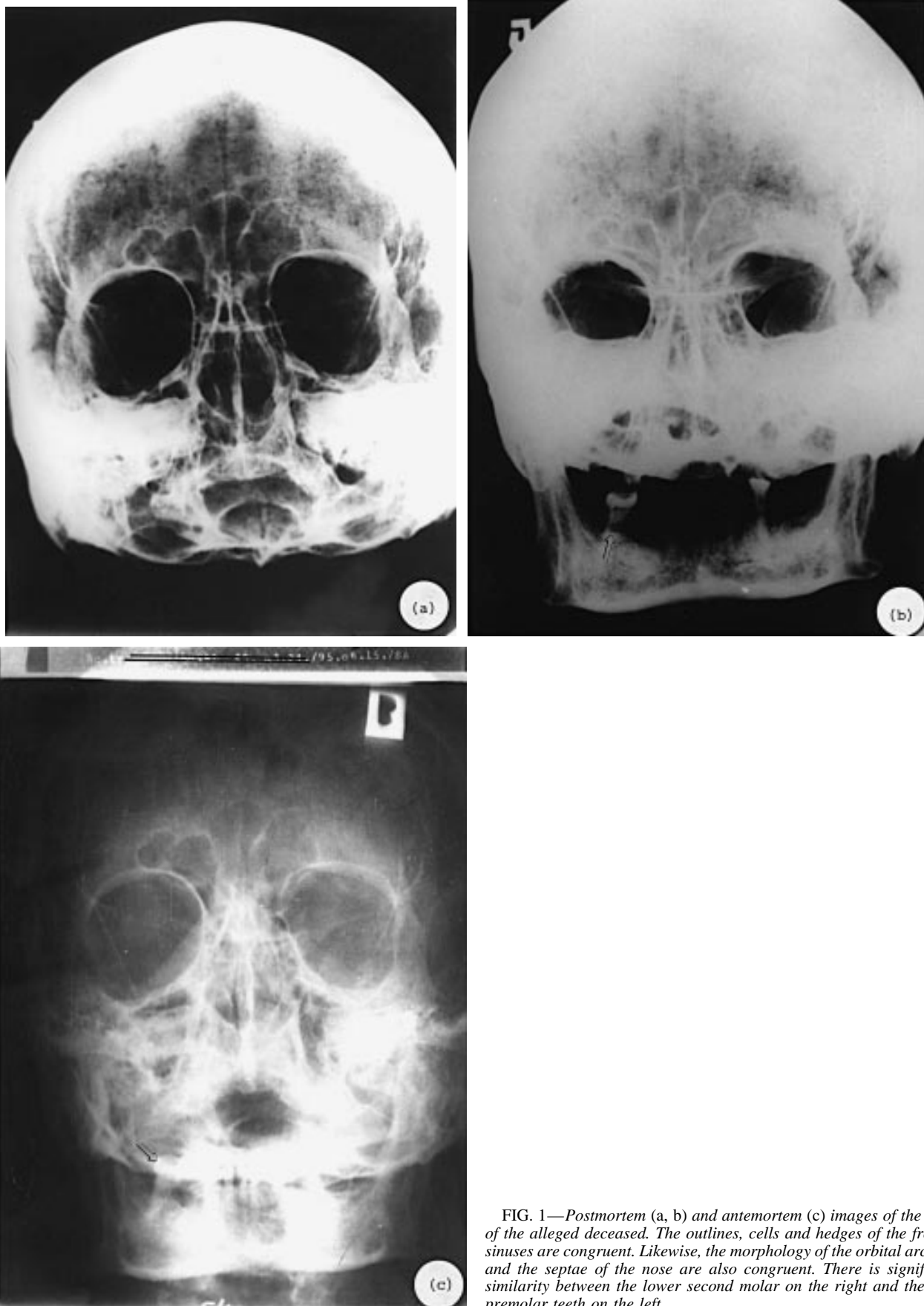


FIG. 1—Postmortem (a, b) and antemortem (c) images of the skull of the alleged deceased. The outlines, cells and hedges of the frontal sinuses are congruent. Likewise, the morphology of the orbital arcades and the septae of the nose are also congruent. There is significant similarity between the lower second molar on the right and the first premolar teeth on the left.



FIG. 2—Pelvis images taken after (a) and before death (b). On both images, the ramus ossis pubis on the left clearly reach over the ramus on the right. The protrusion of the bases of the acetabulae on both the right sides is conspicuous. Note the similarity of the asymmetry of the pelvic entrances.

Case 3

In September 1996, the body of a man in the middle stages of decomposition was found. The initial suspected identity of the corpse was discovered to be incorrect because the presumed victim was found to be still alive. Since visual identification of the body was not possible, a medicolegal autopsy was performed. Skeletal samples were taken, as is required in Hungarian procedure. The bones were soaked and cleaned *lege artis*. Police investigative procedures later revealed new information about the presumed identity of the corpse. The medical records of the presumed individual showed that radiographs had been taken of his abdomen and right shoulder joint in December 1995. According to the diagnosis, these areas showed no changes from trauma. However, upon careful examination of the radiographs, anatomical differences were found in the humerus and in the third and fourth vertebrae in the abdominal area. Postmortem radiographs were taken and compared with the antemortem radiographs. The images were found to be significantly similar, and the man's presumed identity was positively confirmed (Figs. 3 and 4).

Discussion

Because of the political and economical changes in Eastern Europe, the Hungarian health and social insurance system is currently undergoing considerable change. A great many citizens have



FIG. 3—An antemortem image of the abdomen. The processus transversus on the right of the third vertebra is shown to have been widened by 1 cm to about 1.5 cm. On the fourth, it has also widened but not as much.

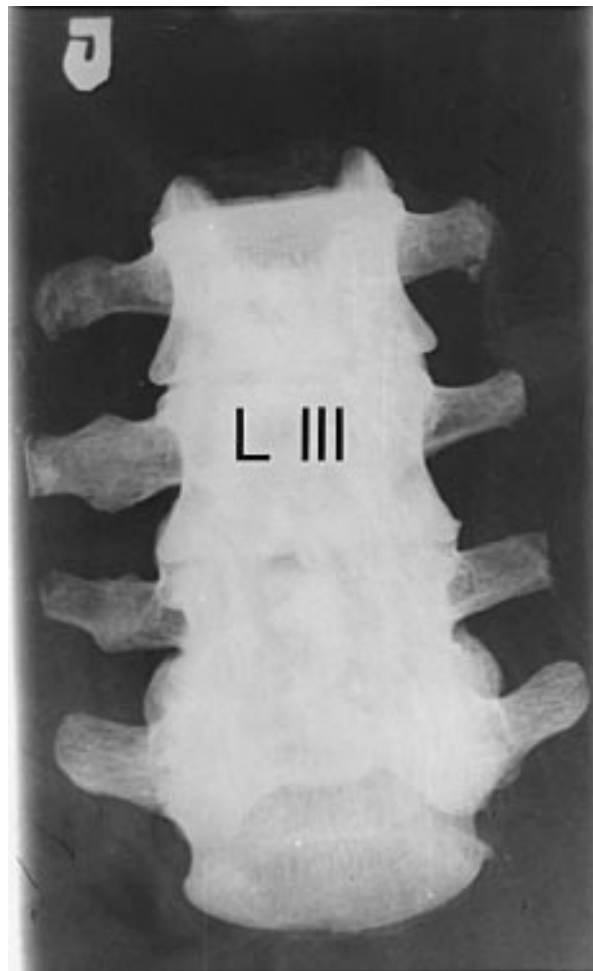


FIG. 4—Postmortem image of the second through fifth lumbar vertebrae of an unidentified person. The alteration on the third and the fourth vertebrae is significantly similar to those in the antemortem image.

become excluded from the health and social insurance system. Tens of thousands are homeless. These conditions make the process of postmortem identification of these persons more difficult.

Currently, there are three main comparison methods of personal identification used in Hungarian forensic practice: (a) examination of dental records, (b) superimposition of photographs, and (c) comparison of radiographs. These methods are described below.

(a) Unfortunately, the changing Hungarian health insurance system no longer pays for dental care. Consequently, a large portion of the population is unable to seek appropriate dental care, and the national state of dental health continues to decline. Furthermore, dentists do not always provide reliable records to forensic practitioners. Although dentists are required by law to keep accurate odontological records, they frequently do not follow through with the extra time and work required to produce the proper documentation. As a result, most people do not have dental records which are correct, up to date, and applicable to the forensic identification process. The decline in dental care is best demonstrated by the sharp decrease in odontological radiographs at the Medical University of Pécs Dental Clinic in 1995. During the first six months of 1995, 1791 patients had a total of 2895 radiographs. On July 1, national insurance stopped covering dental care. As a result, in the following six months, only 725 patients had a total of 1088 radiographs (according to the statistics of the Dental Clinic).

(b) The use of the photographs in the process of identification is fairly common, but it is not the most accurate method of personal identification. The use of the video superimposition, with its limited hardware and software capabilities, has exhibited a low rate of success in Hungary (13–15).

(c) Hungarian radiologists typically keep radiographs on file for approximately five years. Still covered by national insurance, medical radiographs are common. The process of identification through radiographs is appropriate in many cases, such as those described above, in which antemortem radiographs of the alleged deceased are available for comparison. This process depends on the accuracy and availability of the archives of hospitals and family doctors. The process specifically relies on images of various parts of the skeleton that may change as the result of traumatic, pathological, or surgical occurrences. In cases where antemortem radiographs and photographs are both available, establishment of personal identity by comparison of radiographs is deemed preferable to photographic superimposition, because the former is technically exacting and permits the matching of a potentially larger number of anatomical, pathological or traumatic features.

The three case studies presented herein are meant to demonstrate three examples of identification using antemortem and postmortem radiographs. The first case uses the shape of the frontal sinuses to positively identify the victim. The second case uses the pelvis to identify the deceased with all certain likelihood. The third case uses the humerus and the lumbar vertebrae to identify the victim.

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