

## CASE REPORT

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### Confirmation of Human Identification Using Computerized Tomography (CT)

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**ABSTRACT:** Computerized tomography (CT) was used to assist in confirming a human identification. The potential utility of comparing lateral scout views and lateral skull X-rays for identification purposes is proposed. Antemortem CT scans with scout views of the human skull are useful for comparison with postmortem radiographs and should be considered as a potential modality for establishing definitive identification when antemortem radiographs are not available.

**KEYWORDS:** physical anthropology, human identification, computerized tomography, CT scan analysis, radiography, frontal sinus

Although the human skeleton has an abundance of potentially individualizing features sufficient to definitively establish or exclude identification, the most common obstacle to accomplishing this is the absence of antemortem documentation with which to make adequate comparisons. Radiographic features of comparison for the human skull are well known and have been extensively reported in the literature [1-4]. The use of computerized axial tomography (CAT) scans has been investigated in the comparison of frontal sinus configurations [5]. A computerized tomography (CT) scan assisted in this case to confirm identification. The potential utility of comparing lateral scout views and lateral skull X-rays for identification purposes is discussed.

#### **Brief Case History**

A tentatively identified 77-year-old male recluse was discovered in his residence following an approximate four month postmortem interval. Initial tentative identification was based on consistency of sex, age, race, body habitus, and the fact that the owner of the residence had not been seen for four months and the remains were found in the residence. The body was mummified and had been extensively scavenged by rats, making

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visual identification impossible and necessitating a more definitive identification method. Autopsy determined the cause of death to be arteriosclerotic cardiovascular disease with three vessel coronary artery disease consistent with documented antemortem medical history, but did not reveal any unique physical characteristics useful for establishing identification. Destruction of fingerpad soft tissue had eliminated fingerprint ridge detail. No dental records were available. Among miscellaneous papers in the residence was a bill from a local hospital. Review of hospital records revealed that a CT scan had been performed the year prior to death during an evaluation for possible brain metastases.

The antemortem CT scan was compared to postmortem A-P skull films. A single air space, interpreted as a right frontal sinus, was visible in the axial CT scan taken at the level of the sella turcica and anterior cranial fossa (Fig. 1a). Axial CT scans of the head taken at higher and lower levels did not reveal the presence of a left frontal sinus. The postmortem A-P skull radiograph disclosed a corresponding unilateral right, single-celled, frontal sinus (Fig. 1b).

Retrospectively, following release of the body, the lateral scout view taken in the course of the CT scan (Fig. 2b) was compared with the postmortem lateral skull radiograph depicted in Fig. 2a. Although there was not exact alignment of orientation between the postmortem lateral X-ray and the antemortem lateral scout film, if properly oriented lateral skull X-rays had been taken, features of potential correspondence would have included the general morphology of the skull, the appearance of the floor of the anterior

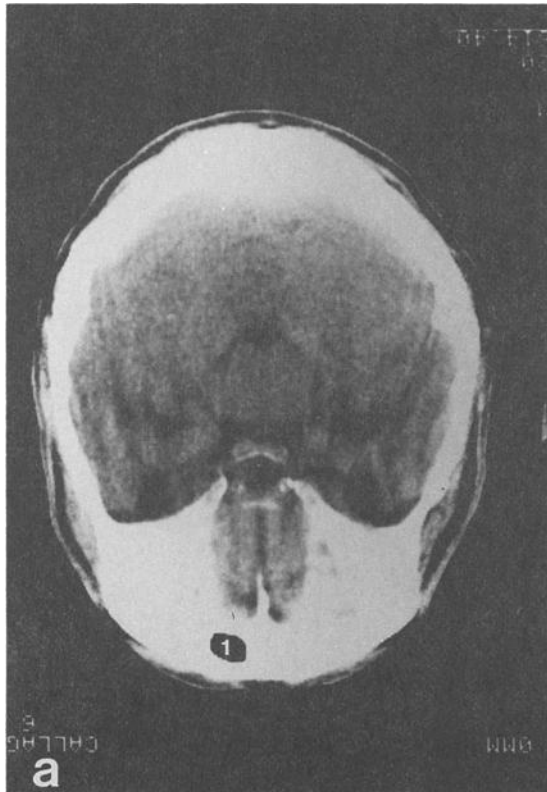


FIG. 1a—Antemortem axial CT scan demonstrating unilateral, right frontal sinus (1). Taken at the level of the sella turcica and anterior cranial fossa.



FIG. 1b—Postmortem A-P radiograph of the skull showing right, single-celled frontal sinus (1) corresponding to Fig. 1a.

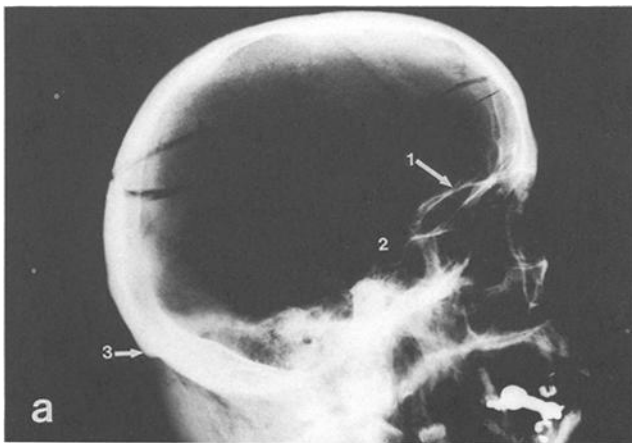


FIG. 2a—Postmortem lateral radiograph of the skull. Providing comparable orientations were available, features of potential correspondence with Fig. 2b would be: (1) floor of anterior cranial fossa; (2) sella turcica and associated anterior and posterior clinoid processes; (3) external occipital protuberance; (4) general morphology of the skull.

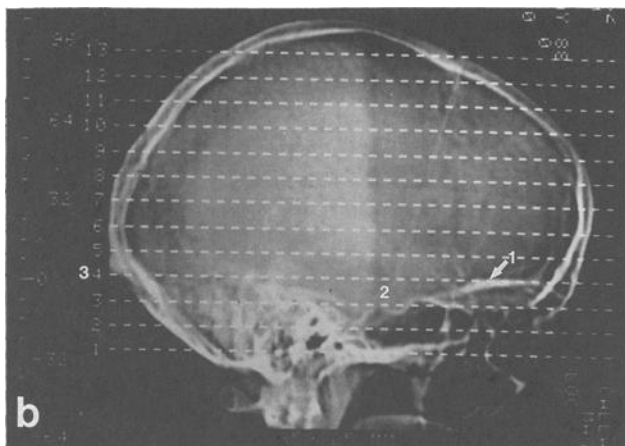


FIG. 2b—Antemortem scout view, taken at time of CT scan.

cranial fossa, sella turcica, anterior and posterior clinoid processes, and external occipital protuberance, as well as a large pneumatized sphenoid sinus.

### Discussion

Computerized tomography has been hailed as a significant advance in radiologic sciences. The frequent use of computerized tomography makes it increasingly available as an antemortem record and indeed, this imaging method is replacing to large degree the use of skull radiographs.

In our case, a unilateral frontal sinus provided unique anatomic correspondence between an antemortem CT scan and a postmortem X-ray. Although mere presence of unilateral frontal sinus development alone does not confirm identification, in the context of this case, it was considered sufficient to confirm an already strong tentative identification. Unilateral absence of the frontal sinus has an incidence reported by Schüller [6] as 1% and by Leicher [7] as 10.7% for males and 4.5% for females. These differences are likely related to the sample size and the population surveyed.

Because there is not direct correspondence between skull radiographs and CT scans, definitive identification will be more likely the more unusual the findings are, as in this case. However, investigators should keep in mind that a scout view always accompanies the CT scan in order to demonstrate the orientation and levels at which the tomographic "cuts" were made so that the CT series may provide a comparison view for a postmortem skull radiograph, albeit in reduced size.

Antemortem CT scans and scout views of the human skull capture many features which may be compared with postmortem radiographs and should be considered as a resource to allow positive identification when suitable antemortem radiographs are not available. If computerized tomography can be used during postmortem examination, direct comparison of antemortem and postmortem CT studies is possible [5]. As with standard skull radiographs, frontal, sphenoid, and mastoid sinuses are likely locations of unique morphology.

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