

CASE REPORT

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The Identification of Fragmented Vietnam War Remains Utilizing a Healing Extraction Site

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ABSTRACT: A difficult dental identification of fragmented Vietnam War remains was made without the benefit of roentgenogram comparisons. The identification was strengthened by the highly unusual finding of a healing extraction site.

KEYWORDS: odontology, human identification

In August 1985, the Socialist Republic of Vietnam released to the United States Government 26 sets of remains purported to be those of U.S. servicemen killed during the Vietnam War. The U.S. Government was also advised that 21 of these sets of remains had been assigned a tentative name association, based on personal effects or other information known to the Vietnamese. Historically, however, these tentative name associations have often proven to be inaccurate.

After the repatriation ceremony in Hanoi, Vietnam, the remains were flown to Hawaii where they were received with all appropriate military honors at Hickam Air Force Base. Upon completion of the return ceremony, the remains were taken to the U.S. Army Central Identification Laboratory in Hawaii (CILHI) for examination and analysis.

All remains received at CILHI are considered commingled, since there is no reliable chain of evidence for them. Therefore, carefully coordinated analysis must be carried out on all remains simultaneously by both the forensic odontologist and the physical anthropologists. Only after this processing is completed and any segregation is finalized can each set of remains be considered the unique skeletal remains of a single individual. It is important to note that tentative name associations are never released to the CILHI scientific staff until analysis is completed. The results of these analyses for the 26 sets of remains repatriated are shown in Table 1.

The views expressed herein are those of the author and do not necessarily reflect the views of the U.S. Army or the Department of Defense. Received for publication 7 March 1990; accepted for publication 4 April 1990.

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TABLE 1.—Final identification for the 26 sets of remains repatriated in August 1985 (all names are fictitious).^a

Case No.	Tentative Identification (per Vietnam)	Information Provided By Vietnamese ^b	Final Identification Name
1	Bland, H. H.	N, R, DD, PD	same
2	unknown	DD, PD	Bates, D. F.
3	Hanes, T. H.	N, R, DD, PD	same
4	Simms, J. L.	N, R, DD, PD	same
5	Banes, H. G.	N, R, DD, PD, GCC	same
6	Mitchel, F. H.	N, R, DD, PD, GCC	same
7	unknown	DD, PD	Vickers, D. J.
8	Donalds, M. N.	N, R, DD, PD	same
9	unknown	DD,* PD*	James, C. A.
10	Powell, F. L.	N, R, DD, PD	same
11	Williams, D. K.	N, R, DD, PD	same
12	James, S. L.	N, R, DD, PD	same
13	Roberts, B. C.	N, R, DD, PD	same
14	unknown	YO, PD*	Goodson, H. L.
15	Keys, A. J.	N, R, DD, PD	same
16	Thome, F. D.	N, R, DD, PD	same
17	Johnson, H. J.	N, R, DD, PD	same
18	Edwards, B. V.	N, R, DD, PD	same
19	Donner, D. G.	N,* R,* DC,* PC,* DD*	Asian Mongoloid
20	Samson, G. H.	N, R, DC, PC, DD**	same
21	Farlet, F. M.	N, R, DC, PC, DD**	same
22	Noll, F. X.	N, R, DC, PC, DD**	same
23	Ames, S. R.	N, R, DC, DD**	same
24	Mervin, D. S.	N, DC, PC, DD**	same
25	Craig, J. T.	N,* DC,* PC,* DD,** PD**	Edwards, K. N.
26	unknown	DC, PC, DD (correct for →)	Craig, J. T. (see Case No. 25)

^aTotal sets of remains returned (per Vietnam) = 26; accuracy = 88.4% (95 items of verifiable information/11 errors).

^bKey to abbreviations used:

N = name.

R = rank.

DD = presumed date of death (day/month/year).

PD = presumed place of death.

GCC = Geneva Convention card.

YO = year only (date of death).

DC = presumed date of capture (day/month/year).

PC = presumed place of capture.

* = incorrect information from Vietnamese.

** = information for which the accuracy cannot be verified.

Case No. 10

The degree of positiveness of an identification in any forensic science case can occasionally be open to discussion [1]. The amount of evidence available for analysis, the quality of the evidence, and the experience of the forensic scientist are a few of the factors to be weighed. Leaving the more intangible element of forensic science experience aside, a sufficient quantity and quality of evidence will usually allow an identification case to reach a successful conclusion, regardless of the expertise of the forensic scientist (that is, the evidence will speak for itself). Occasionally, however, a dearth of evidence or inferior quality of the evidence will tax even the most experienced investigator. Such was the situation with Case No. 10 from the August 1985 Vietnam turnover. The remains

returned for this case are depicted diagrammatically and described in Fig. 1 and shown photographically in Fig. 2. Although the quantity of the remains returned was small, a great deal of information was obtained during the forensic dental analysis performed at CILHI.

After completion of the postmortem analysis, the next step was to retrieve the dental record for F. L. Powell, the named individual associated with these remains by the Vietnamese. Medical, dental, and biographical information that will aid in identification of the Vietnam service personnel missing in action (MIAs) is maintained in-house at

RECORD OF IDENTIFICATION PROCESSING DENTAL CHART																	
LAST NAME - FIRST NAME - MIDDLE INITIAL (or unknown number)											GRADE		SERVICE NO./SOCIAL SECURITY ACCT NO.				
CASE #10																	
NAME OF CEMETERY, EVACUATION NUMBER, OR SEARCH AND RECOVERY NUMBER											PLOT		ROW	GRAVE			
MARKING ABBREVIATIONS:																	
F-Facial		O-Occlusal		D-Distal		A ⁿ -Amalgam		-Fill-Filling		Porc-Porcelain		Back-Backing					
L-Lingual		M-Mesial		I-Incisal		CR-Crown		Plas-Plastic		Sil-Silicate		Fac-Facing					
CARIES															CARIES		
RESTORATIONS							MAXILLAE AND TEETH NOT RECOVERED								RESTORATIONS		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
UPPER RIGHT																	
UPPER LEFT																	
LOWER RIGHT																	
LOWER LEFT																	
RESTORATIONS		MODFL-AM	MOD-AM	MOD-AM										SEGMENT OF MANDIBLE AND TEETH NOT RECOVERED			RESTORATIONS
CARIES		RPD	RPD														
CARIES		REST	REST														CARIES
CARIES		PREP	PREP														CARIES
THE FOLLOWING CONDITIONS WILL BE INDICATED IF PRESENT (Describe in detail in Remarks section)																	
MOTTLED ENAMEL		ROTATION		FRACTURED ENAMEL		IRREGULARITY OF ALIGNMENT											
ENAMEL HYPOPLASIA		UNERUPTED TEETH		FRACTURES OF TEETH		X UNUSUAL RESTORATIONS											
EROSION		MALOCCLUSION		RETAINED DECIDUOUS TEETH		UNUSUAL APPLIANCES											
ABRASION		SUPERNUMERARY TEETH		ABNORMAL INTERDENTAL SPACES		MALPOSED TEETH											
PREPARED BY (Typed Name and Signature) Jon Curtis Dailey, CPT, DC Forensic Odontologist											VERIFIED BY (Typed Name and Signature) N/A						

FIG. 1—Diagrammatic representation of the dental remains from Case No. 10.

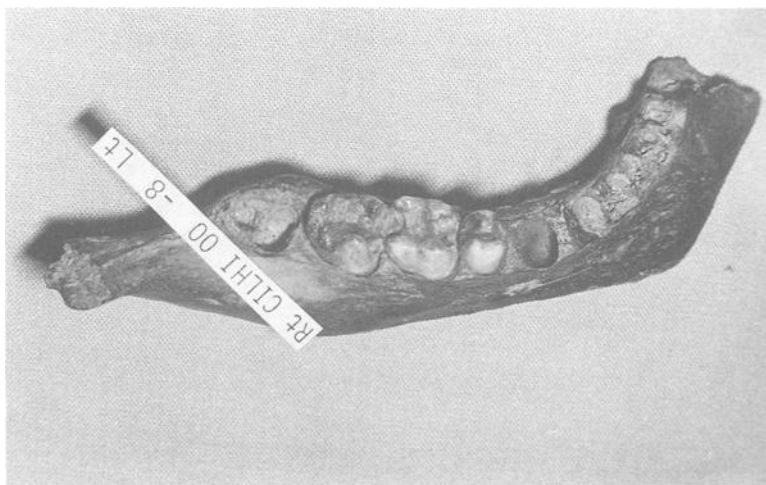


FIG. 2—The dental remains of Case No. 10.

CILHI. CILHI maintains such information for over 2000 individuals still listed as missing from the Vietnam War, as well as all information used to identify previously resolved cases.

What was hoped would be a routine identification was complicated by the lack of any antemortem roentgenograms for Powell and by the minimal written dental records, available only in poor-quality photocopies. A comparison of antemortem and postmortem information for the mandible is shown in Fig. 3. There are forensic scientists who have stated that, without roentgenogram-to-roentgenogram comparison, an identification such as this should not be attempted, especially from an population of over 2400, which was the number of MIAs in 1987. However, while an identification based on a comparison of the remains with the paper record might appear quite weak upon superficial inspection, an in-depth item-by-item analysis will validate the strength of this identification.

Points of Comparison

Teeth No. 22 Through 28

While none of these teeth were recovered and returned to CILHI for analysis, the fact that sockets for these teeth can be observed in the segment of mandible recovered indicates they had been present at or near the time of death. Therefore, for these seven teeth, there is no inconsistency with the antemortem dental record in question.

Tooth No. 29

Tooth No. 29 has a mesial-occlusal-distal (MOD)/amalgam restoration, which is consistent with the antemortem dental record.

Tooth No. 30

Antemortem, this tooth is stated to have had mesial-occlusal (MO)/amalgam and distal-occlusal (DO)/amalgam restorations. Postmortem, the remains show that this tooth has a MOD-amalgam restoration. This information concerning two distinct restorations was obtained from a diagrammatic depiction of the restored tooth, as shown on the individual's

PHYSICAL AND DENTAL COMPARISON CHART	
For use of this form, see AR 600-8-1, the proponent agency is MILPERCEN	
REMAINS OF	NAME
CASE #10	POWELL, FRANK L.
1	2
2	2 MOD-AM
3	3 MO-AM, DO-AM, L-AM
4	4 RPD
5	5 O-AM, F-AM, F-AM
6	6 M-SIL, F-SIL
7	7 M-SIL, D-SIL
8	8 M-SIL, D-SIL
9	9 M-SIL, D-SIL
10	10 RPD
11	11 MF-RESTN
12	12 DO-AM, O-AM
13	13 O-AM
14	14 MO-AM, DO-AM, F-AM, L-AM
15	15 O-AM, O-AM, F-AM
16	16 O-AM
17	17 O-AM
18	18 RPD
19	19 RPD
20	20 DO-AM
21	21 RPD
22 PX (MISSING POSTMORTEM)	22
23 PX	23
24 PX	24
25 PX	25
26 PX	26
27 PX	27
28 PX	28 MOD-AM
29 MOD-AM	29 MOD-AM
30 MOD-AM, RPD REST PREP(DISTAL)	30 MO-AM, DO-AM
31 MODFL-AM, RPD REST PREP(MESIAL)	31 MODFL-AM (PIN RETENTION)
32 RECENT EXTRACTION	32 EXTRACTED 27 NOV XXYZ
ESTIMATED HEIGHT	HEIGHT
ESTIMATED WEIGHT	WEIGHT
ESTIMATED AGE	AGE date of incident: XXyrs, XXmo, XXdys 02 DEC XXYZ
HAIR	HAIR
REMARKS	If POWELL died on 02 Dec XXYZ, then the socket would be six days old as observed on his remains.

DA FORM 5520-R, APR 86

REPLACES DD FORM 897, 1 FEB 56, WHICH IS OBSOLETE

FIG. 3—Comparison of antemortem dental information for F. L. Powell with postmortem dental data from Case No. 10.

initial military dental exam (Fig. 4). As can be seen, there is some latitude for interpretation. What is important, however, is that the surfaces filled in the postmortem findings are consistent with the antemortem records.

Tooth No. 31

This tooth contained a mesial-occlusal-distal-facial-lingual (MODFL)/amalgam restoration with pin retention antemortem and a MODFL-amalgam restoration postmortem.

Standard Form 003
 Rev. November 1954
 Promulgated
 By Bureau of the Budget
 Circular A-32 (Rev.)

HEALTH RECORD			DENTAL											
SECTION I. DENTAL EXAMINATION														
1. PURPOSE OF EXAMINATION						2. TYPE OF EXAM.		3. DENTAL CLASSIFICATION						
<input checked="" type="checkbox"/> INITIAL	<input type="checkbox"/> SEPARATION	<input type="checkbox"/> OTHER (Specify) 2x6				<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. MISSING TEETH AND EXISTING RESTORATIONS														
											REMARKS			
PLACE OF EXAMINATION										DATE				
NLS LITTLE CROWN 1A										20 FEB 64				
SIGNATURE OF DENTIST COMPLETING THIS SECTION														
W. C. Brubaker														

FIG. 4—Photocopy of Powell's initial military dental exam.

While no pin could be found after numerous roentgenograms, this does not require the conclusion that no pin is present. The radiopacity of the very large amalgam restoration could easily hide more than one small retention pin. What is important is the consistency between all five tooth surfaces being restored.

Removable Partial Denture Rest Seat Preparations

Under all accepted conventions for removable partial prosthodontics, replacement of the missing left posterior teeth utilizing a removable partial denture, as recorded for F. L. Powell in his dental record, would require contralateral (that is, cross-arch) retention and stabilization to be provided somewhere within the right-side mandibular posterior teeth recovered. That is exactly what is observed, with a distal rest seat preparation on Tooth No. 30 and a mesial rest seat preparation on Tooth No. 31.

Extraction of Tooth No. 32

Tooth No. 32 was not returned with the remains of Case No. 10. Close inspection of the socket for this tooth resulted in the conclusion that this tooth was not lost postmortem, like Teeth No. 22 through 28, but rather that it had been extracted very close to the time of death. This was based upon the following findings:

1. The sockets for Teeth No. 22 through 28 were all very clean, devoid of any residue along the socket walls or in the area of the root apex. This finding differed with that for the socket of Tooth No. 32. The most interesting finding concerning this socket was what appeared to be dried tissue firmly affixed to the socket walls, as is shown in Fig. 5. This material was most prominent in the distal root socket.

2. Analysis of the socket using roentgenography (Fig. 6) was inconclusive. However, in observation, the lamina dura of the socket of Tooth No. 32 did not have the same appearance as that observed around Teeth No. 31 or 30. The lamina dura appeared to be "fuzzy" or somewhat indistinct.



FIG. 5—Healing extraction site (socket of Tooth No. 32 in Case No. 10). Note the removable partial denture rest preparations on the first and second molars.

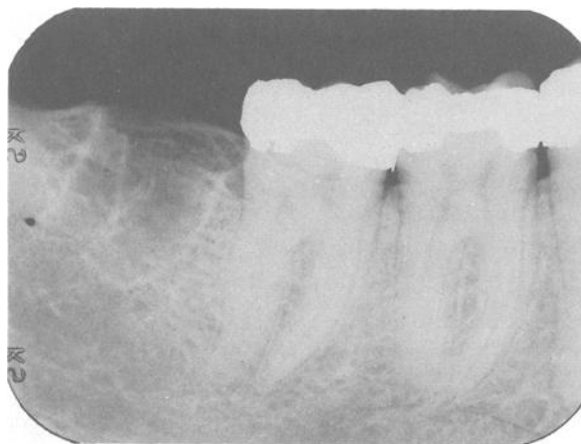


FIG. 6—Roentgenogram showing the "fuzzy" appearance of the lamina dura of the socket for Tooth No. 32.

3. The gross microscopic appearance of the crestal bone of the socket of Tooth No. 32 differed slightly from that of the other tooth sockets. Histologic sectioning and examination was not performed because of a prohibition on the destruction of remains in effect at CILHI during the time the analysis of these remains was conducted.

Based upon this information, it was concluded that Tooth No. 32 had probably been extracted within two weeks prior to death.

A review of several scientific articles dealing with human tooth extraction wound healing produced no contradictions to this age estimation [2,3,4]. From these articles it was learned that, by the second week postextraction, the blood clot in a tooth socket is becoming organized by fibroblasts that are proliferating from connective tissue cells in what is left of the periodontal membrane. These proliferations of fibroblasts are growing inward toward the center of the socket. The periodontal membrane is degenerating and not really recognizable as such. The wall of the bony socket appears frayed (which may

produce the “fuzzy,” indistinct appearance on a roentgenogram). Finally, the margin of the socket shows a large amount of osteoclastic activity (which may produce the difference in appearance of the crestal bone).

The age estimation of approximately two weeks for the socket of Tooth No. 32 is not markedly inconsistent with what was estimated to be the approximate age of the extraction for F. L. Powell at the time of his death, at least six days. This estimate was arrived at by comparing the date of the extraction for Tooth No. 32 from Powell's composite antemortem dental record in Fig. 3 (27 Nov. XXYZ) with the date of his incident, or death, as is mentioned in the remarks section at the bottom of Fig. 3 (02 Dec. XXYZ). On the date of the incident, Powell's aircraft disappeared and was presumed to have been hit by a surface-to-air missile.

Again, it is important to remember that all postmortem findings were recorded prior to comparison with the record of Powell, the name associated with these remains by the Vietnamese.

After completion of this step-by-step analysis of the available dental information, it was concluded that even without roentgenograms, and from a population of over 2400 MIA individuals, an identification was possible.

References

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