

## CASE REPORTS AND BACKGROUND: DIFFICULTIES WITH IDENTIFICATION - SWEDEN

I. Dawidson

*The National Board of Forensic Medicine, Forensic Odontology Division, Retzius v. 5, 171 65 Solna, Sweden.*

### ABSTRACT

Despite the best conditions such as professional management, all possible aid and means of assistance, along with good legislation, sometimes unexpected factors occur to prevent or at the very least delay identification of the unknown deceased. The specific difficulties in identification cases that involve several countries, as well as problems arising from inconsistencies created in the *Antemortem* (AM) and *Postmortem* (PM) files, can obstruct the identification of the recovered human remains. There may be long delays with police procedures whenever a missing person or a dead body has crossed a national border. Also, lack of professional dental investigation can make comparisons difficult or sometimes impossible. Three cases from Swedish files have been used to illustrate such difficulties - there were some parts of the investigations that worked better than others as well as specific problems that arose from the mistakes and delays that occurred. Improving standards and learning from such difficulties may help to minimise future problems.

(J Forensic Odontostomatol 2011;29:1:1 - 6)

**Keywords:** Forensic odontology, identification, dental record, DVI System International

**Running title:** Difficulties with identification cases

### INTRODUCTION

The aim of this paper is to give a general background to dental identification in Sweden and describe three cases to illustrate some of the difficulties encountered with identification.

The Swedish National Board of Forensic Medicine is a government agency that comprises forensic medicine and forensic odontology, forensic psychiatry, forensic toxicology and forensic genetics. The National Board of Forensic Medicine is separated from the police forces in order to be able to keep its neutrality and objectivity while handling the forensic parts of any police investigation.

Around 250 single case identifications are made by forensic odontologists in Sweden every year. The majority of these cases (about 70 %) are carried out at the forensic medicine department in Stockholm which is responsible for the most densely populated area of the

country: around two million people. Sweden has a population of nine million mostly living in urban areas of the southern part of the country. There is one full time forensic odontologist position in Sweden, placed at the forensic medicine department in Stockholm.

The forensic odontologist is responsible for the identification of single cases at the forensic medicine departments in Stockholm and Uppsala, keeping the repository of missing persons and unidentified bodies of the entire country, as well as taking care of other forensic odontology issues, for example: age estimations, bite mark and dental trauma analyses in criminal investigations (not insurance or malpractice cases). All education and research in forensic odontology, as well as keeping up to date on the legislation that governs the dental care and its documentation in Sweden, is also a part of the everyday work of the forensic odontologist. The forensic odontologist is also a natural member of the Swedish Identification Commission, which is activated whenever there is a fatal disaster abroad involving Swedish citizens. Apart from the employed forensic odontologist there are a few dentists contracted by the National Board of Forensic Medicine to carry out identifications at four other forensic medicine departments in Sweden; two of these dentists are specialists in oral radiology and the other two are forensic pathologists as well as dentists.

Most of the identification cases in Sweden are relatively straightforward, often requiring only confirmation of the identity of a deceased individual, because the police can provide a tentative identity. These cases mostly involve people who have died at home and have not been found for extended periods of time, fire victims and transport fatalities. The police will provide the dental records from the victim's dentist for comparison with the dental PM findings and radiographs. However, every now and then a totally unknown body is found.

Sweden is a big, sparsely populated country with thousands of square miles of forests and thousands of lakes and a very long coastline. On top of that Sweden shares the Baltic Sea with nine other countries. The water is cold

most of the year and the ice can be treacherous, especially in the spring. Whenever human remains are found outdoors, or in the water, the repository of missing persons becomes of importance. Sweden, together with other Nordic countries, has a very good record of identifying totally unknown bodies; only one or two persons are buried as unknown each year. This is partly due to good cooperation between the police force and the forensic odontologist, as well as the good collaboration between the countries around the Baltic Sea. Despite everything that facilitates the work of the forensic odontologist there are some cases that have proved to be more challenging, demanding long periods of research before achieving the desired result - an identification.

### THE REPOSITORY OF MISSING PERSONS AND UNIDENTIFIED BODIES

More than 7000 persons are reported missing each year in Sweden. Fortunately, only about 1% of these cases are actual disappearances. The number of reported missing persons has risen dramatically during the last decade, possibly due to technical progress: such as not responding to emails or cellular phones for several days. The police investigation of a disappearance involves finding out the circumstances of the disappearance and gathering all possible information about the missing person, including the medical and dental records. If the missing person has not been found within 60 days the case becomes national and the files are sent to the police headquarters in Stockholm, where the information is put into the National Police Repository of Missing Persons and Unidentified Bodies, which is kept by the Division of the International Police Cooperation. Copies of the files with original dental records containing any/all radiographs and photographs are forwarded to the forensic odontologist for registration in the Dental Repository of Missing Persons and Unidentified Bodies.

The Disaster Victim Identification (DVI) System International, developed by Plass Data Software A/S and adopted by Interpol,<sup>1</sup> is used for this purpose if the cases contain any dental information. In this database the only pages that are filled out are A0, A1 and A2 as well as F1 and F2 and any photographs and radiographs are imported if they are digital or scanned and imported into the database if they are analogue. As the dental information is searchable in the DVI System with quite

advanced sophistication it is extremely useful whenever a totally unknown body is found. In 2010 the latest DVI System International version (DVI3) was implemented and is being put into use by the Swedish police. In the future updates with further versions of the DVI System will be implemented continuously.

Until now almost 500 cases have been put into the new DVI System International in Sweden. Of these 64 are PM cases. Many of the PM cases have been found by other Nordic countries, most often in the waters of the Baltic Sea or Kattegat/Skagerrak (Fig.1). Also, some of the unknown deceased are apparently of foreign origin, mainly from Eastern Europe as indicated by the dental treatment.



*Fig: 1. The map of Scandinavia and the Baltic Sea.*

### THE INTERPOL BLACK AND YELLOW NOTICES

When a deceased individual defies all identification effort it is time to request international assistance from Interpol. A Black Notice is then issued to the Interpol liaison offices of all member countries. The Interpol's Black Notices are routinely sent out to all 188 member countries. A Black Notice has a description of the deceased (and circumstances of the discovery) that has not been identified in the country where the remains have been found. Its purpose is to alert the police in other countries to make searches in the repositories of missing people in the hope of finding a matching identity and return the deceased to the family for appropriate disposal. The Black Notice should

also contain all necessary information that could be used for comparison with the missing persons in the national repositories of missing persons. It should include information on the dental status, with photographs and/or radiographs – if available. Unfortunately, the quality of the information varies immensely, especially concerning the dental status of the victim. At best there is a DVI F2 page written in English but photographs and/or radiographs of the dentition are a rarity. Very often it is apparent that the dental entries have not been made by a forensic dentist but a pathologist or a police officer and frequently include comments such as “full set of teeth” or “teeth in poor condition.”

The Yellow Notices are issued through Interpol for missing persons and facilitate comparisons with unknown bodies in other countries than the one of the missing person’s origin. Usually, the description of the missing person’s dentition (if present) is of acceptable quality. However, the radiographs are seldom attached; this might change in the future as digital radiographs are becoming more frequently used. Sometimes the Interpol office of the issuing country will issue a notification (sent locally to neighbouring countries only) instead of contacting the Interpol headquarters (in Lyon, France) when it seems unnecessary to bother all member countries. This is often the case (when someone has gone missing or a body has been found) in the closed off waters of the Baltic Sea.

### **THE DENTAL RECORD LEGISLATION**

Since Dr. Oscar Amoëdo wrote the first scientific dissertation on the use of dental comparison for human identification in 1898,<sup>2</sup> forensic odontology has become an accepted tool in the science of identifying unknown human remains. The method has been refined continuously and with an almost universal spread of the use of dental radiography, dental identification has become extremely reliable if carried out according to appropriate scientific protocols and standards. However, the ability of the forensic odontologist to reach a conclusion is totally dependent on the availability and quality of the AM comparison material (the dental records), which in their turn are dependent on the national legislation.

Sweden is one of the most privileged countries in this respect: the medical and dental record legislation states clearly and in great detail how records should be written, kept and preserved,<sup>3</sup> what should be included and how

to guard the integrity of computer generated records. Some of that legislation applies especially to the needs of forensic odontology. The most important laws state that records must be preserved for at least ten years after the patient’s last visit and that records must be released to the forensic pathologist or odontologist if deemed necessary to the forensic investigation. The dental profession seems to be particularly conscious of these requirements, which became apparent when 543 Swedish citizens were among the victims of the Asian Tsunami on 24<sup>th</sup> December, 2004. Of the 430 Swedish victims who were old enough to have dental records, only two records were no longer in storage. They had been destroyed because these two victims had not visited their dentists for the past 18 and 20 years respectively.

The following cases present different problems and mistakes that delayed the establishment of identity. However, these individuals were identified eventually and could be buried with their own names. Solving these cases increased knowledge and experience of all those involved in the investigation.

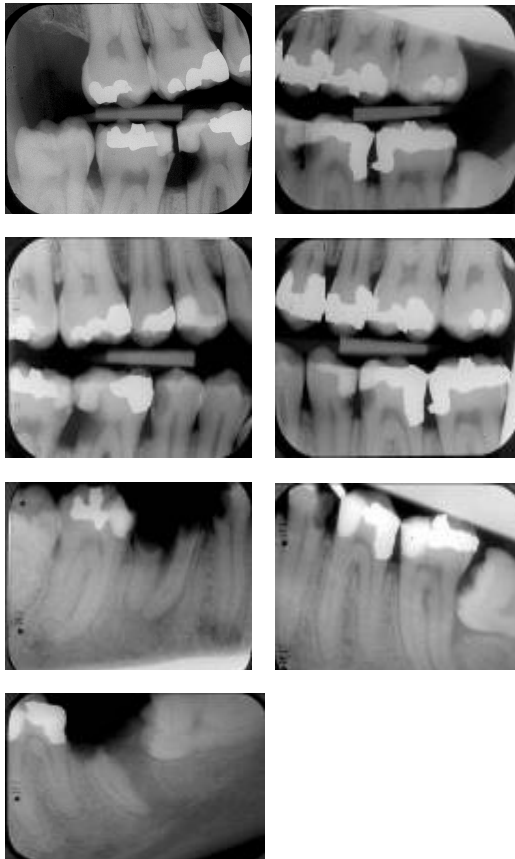
### **CASE 1**

#### **The man who lost three teeth.**

On May 12, 2007, several pieces of a skeleton to include a cranium and mandible were found scattered in the woods outside the city of Örebro, 200 kilometres west of Stockholm. The remains with several items of clothing were brought to the forensic medicine department in Linköping, where the forensic pathologist (also a dentist) carried out an autopsy as well as the dental investigation that included photographs of the jaws and radiographs of the teeth. As the police had no idea of the identity, the results of the dental investigation were forwarded to Stockholm to be compared to the missing persons by the forensic odontologist.

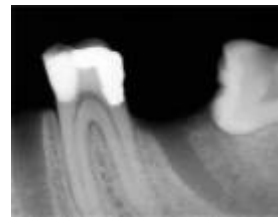
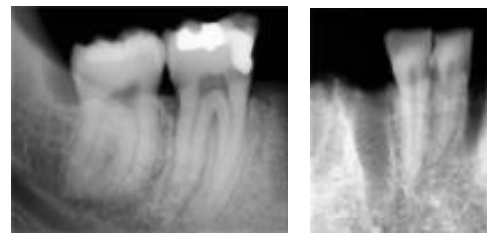
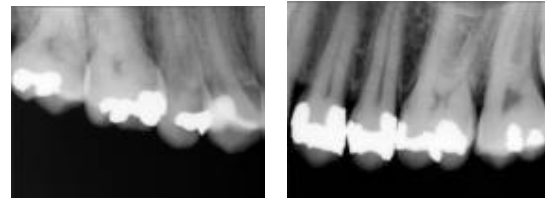
However, despite several attempts, searching of the DVI System failed to yield any possible matches. To make sure that an identity would not be missed due to some mistake in the registration of the AM status in the past, a manual comparison routine was started, meaning that the unknown individual would be compared to almost every case in the repository of the missing persons. This is time consuming, undertaken only if everything else has failed. Fortunately, within a few days the police technicians investigating the artefacts (that had been found together with the skeleton) concluded that the man’s shoes were

manufactured in 2000. This information helped restrict the search range. Starting with the missing persons from 2000, the manual comparisons ended with one of the last cases from 2003. Despite several discrepancies there were enough similarities to prompt closer scrutiny. As these cases were filed in the DV11 version there were no radiographs linked to the system. However, when the actual files were pulled from the archive and the AM and PM radiographs were compared the identity could be established with certainty.



86 DENTAL INFORMATION in permanent teeth (Notify temporary teeth specifically)		
11	intact tooth	intact tooth
12	intact tooth	intact tooth
13	intact tooth	intact tooth
14	composite filling DO	amalgam filling MOD
15	amalgam filling MO	amalgam filling MOD
16	amalgam filling MO amalgam filling O	amalgam filling MO
17	amalgam filling O	amalgam filling O amalgam filling LO
18	missing ante molar	impacted tooth
18	17 16 15 14 13 12 11	21 22 23 24 25 26 27 28
48	47 46 45 44 43 42 41	31 32 33 34 35 36 37 38
48	acute caries O	impacted tooth (visible)
47	amalgam filling O composite filling MO	restored root
46	missing ante molar	amalgam filling DO composite filling MO col DV
45	missing ante molar	temporary filling DO
44	intact tooth	intact tooth
43	intact tooth	intact tooth
42	intact tooth	intact tooth
41	intact tooth	intact tooth

Fig. 2: CASE 1. The radiographs and AM F2 form.



86 DENTAL FINDINGS in permanent teeth (Notify temporary teeth specifically)		
11	missing post molar	missing post molar
12	intact tooth	intact tooth
13	intact tooth	intact tooth
14	composite filling DO	amalgam filling MOD
15	amalgam filling MO	amalgam filling MOD
16	amalgam filling MO	amalgam filling MO
17	amalgam filling O	amalgam filling O amalgam filling LO
18	missing ante molar	impacted tooth
18	17 16 15 14 13 12 11	21 22 23 24 25 26 27 28
48	47 46 45 44 43 42 41	31 32 33 34 35 36 37 38
48	acute caries O	impacted tooth (visible)
47	amalgam filling O composite filling MO	missing post molar
46	missing post molar	amalgam filling DO composite filling MO
45	missing post molar	missing post molar
44	missing post molar	intact tooth
43	missing post molar	intact tooth
42	intact tooth	intact tooth
41	intact tooth	missing post molar

Fig. 3: CASE 1. The radiographs and photographs and the PM F2 form of the unknown remains.

One of the main reasons for the failure to match the cases by search or data mining was because two of the victim's teeth (45 and 46) had been extracted 16 days before he had gone missing. These teeth had been designated as missing in the AM file (Fig 2).

Further confusion was caused because tooth 37 had been resected and the distal root had been extracted three months prior to the disappearance. However, as the skeletonized remains presented empty sockets it was concluded that teeth 45 and 46 were missing PM. Additionally, the mesial root of 37 was missing PM, whereas the socket left by the distal root had healed, leading to the mistaken conclusion that the whole 37 had been lost PM (Fig. 3). The coding of the recently extracted teeth as missing AM although it might be expected that the remains, if found, would present empty sockets that were recorded as corresponding teeth missing PM was an important lesson for the author. The search engine of the DVI program had naturally excluded the correct missing individual since teeth missing AM are absolute exclusion criteria against teeth that have apparently been present at the time of death and gone missing PM. It would be more prudent to register these teeth as extracted, or write “recently extracted” as free text in the lines of the corresponding teeth.

**CASE 2**

**What happened to the woman on the other side of the Baltic Sea?**

A notification instead of a Yellow Notice was issued by the Interpol Wiesbaden on August 1, 2005. The evidence indicated that an elderly German woman had committed suicide on January 16, 2005, by jumping into the Baltic Sea off the German coast near Heringsdorf, which lies next to the German-Polish border (Fig. 1). She had left a suicide note explaining that she suffered from a disfiguring tumour disease and had decided to end her life. The notification contained an incompletely filled F2 form as well as a description of other characteristics. It was specifically pointed out that she was missing five front teeth in the lower jaw, which were replaced by a partial denture (Fig. 4).

On January 23, 2005, a female body was found on the beach of the city of Mrzeżyno, Poland, almost 100 km from the German border (Fig. 1). It was concluded that she had been in the water only a few days. The PM investigation showed that she had drowned. However, the Polish authorities were unable to match her to any of the missing women in Poland and the body remained unidentified. In the end a notification instead of a Black Notice was issued by Interpol Warsaw, directed to the countries at the southern end of the Baltic Sea. Among physical characteristics described, one

was particularly important: a scar and evidence of tumour on the left side of her face. There was also a mention of a denture in the upper jaw (which turned out to be incorrect). An addition to that notification was created a few weeks later as demanded by the Nordic countries, including a rudimentarily filled out F2 form. The most significant information contained in the F2 form showed that six teeth in the front of the lower jaw were missing (Fig. 5). Despite several discrepancies between the German and the Polish F2 forms, the missing lower teeth as well as the evidence of facial tumour, triggered the notion that the missing German woman and the unidentified body in Poland could be the same person. A response suggesting that probability was issued through Interpol Stockholm to the German and Polish counterparts. Interpol Wiesbaden responded a few weeks later corroborating the results.

11	filling (synthetic material)	filling (synthetic material)	21
12			22
13	filling (synthetic material)		23
14			24
15	missing ante mortem		25
16	amalgam filling		26
17	missing ante mortem	missing ante mortem	27
18			28

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
RIGHT								LINGUALLY							LEFT
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

48															38
47	missing ante mortem							filling (synthetic material)							37
46	amalgam filling							amalgam filling, filling (synthetic material)							36
45	amalgam filling														35
44	filling (synthetic material)							amalgam filling							34
43	missing ante mortem, partial denture							filling (synthetic material)							33
42	missing ante mortem, partial denture							missing ante mortem, partial denture							32
41	missing ante mortem, partial denture							missing ante mortem, partial denture							31

**Fig. 4: CASE 2.** AM F2 form issued by Interpol Wiesbaden, Germany.

11															28
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
RIGHT								LINGUALLY							LEFT
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
48								P P P	P P P						38
47															37

**Fig. 5: CASE 2.** PM F2 issued by the Interpol Warsaw, Poland.

As the timeline (Table 1) shows it took more than a year to establish the identity in this case despite only a few days having passed between the disappearance of the German

woman and the discovery of the deceased female on the other side of the German/Polish border. The notifications were issued many months after the actual events had taken place and the contents of the F2 forms were of poor quality (and inaccurate) in all likelihood because they had not been handled by a dentist. The comparison and conclusion of probable identity was made on the other side of the Baltic Sea almost by pure chance.

**Table 1: CASE 2. Timeline of the ID process.**

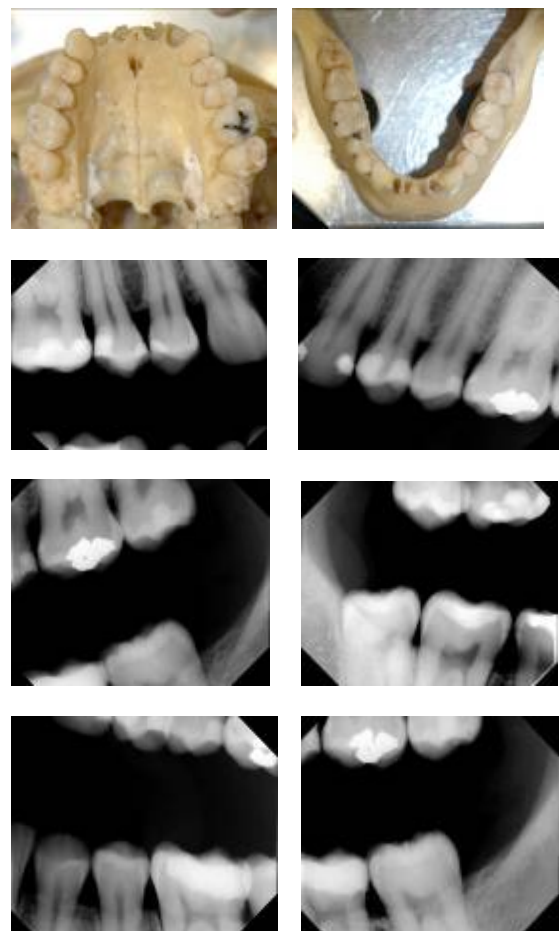
January 16, 2005	Reported missing in Germany
August 1, 2005	Notification issued (instead of Yellow Notice)
January 23, 2005	Body found in Poland
December 5, 2005	Initial notification issued (instead of Black Notice)
February 8, 2006	Additional notification with F2 issued
February 13, 2006	Comparison report issued, Stockholm: probable identity
March the 1, 2006	Confirmation of identification

### CASE 3

#### Which way from Finland?

On the 13<sup>th</sup> of June, 2009, a badly decomposed body was found in the water near the northern Swedish city of Härnösand. It had apparently been floating in the cold waters of the northern Baltic Sea for several months: possibly it had spent the winter frozen in the ice of the Gulf of Bothnia. The body was transported to the forensic medicine department in Umeå for autopsy and identification. A full dental investigation was conducted, including radiographs and photographs of the jaws (Fig. 6). None of the proposed local cases of missing persons from the recent years matched the remains. The whole PM file of this unsolved case was forwarded to Stockholm for comparison to the entire content of the repository of the missing persons. Despite several thorough searches no match was found. Based on the detailed investigation it was concluded that the deceased person was male, somewhat taller than 180 cm and aged between 20 and 40. The details and quality of the dental treatment indicated that he was of Nordic origin, excluding the possibility that the victim was from the Baltic States or Eastern Europe. The logical next step was to contact the authorities in Finland.

Whenever there is a need of cooperation among the police forces of the five Nordic countries Interpol is usually bypassed. Information about the unresolved case was relayed to Finland from Sweden. As a result of this contact, one of the numerous odontograms that arrived showed very good concordance with the dental status of the victim. A request for radiographs yielded four bitewings in the returning mail that secured the establishment of identity (Fig. 7). The deceased man was a 37-year-old Finnish citizen who had gone missing in the tiny city of Björneborg, on the opposite side of the Bothnia Bay from Härnösand (Fig. 1). He had disappeared on November 28, 2008, and his body had travelled more than 200 km during the winter, probably moved across the sea by the ice breaking up in the spring (May in this part of the world). However, it took almost four months to solve the case, possibly because neither a Yellow Notice nor notification of disappearance was issued to the countries in the vicinity of the northern part of the Baltic Sea.



**Fig. 6: CASE 3. The PM photographs and radiographs of the unknown remains.**

86 DENTAL FINDINGS in permanent teeth (Notify temporary teeth specifically)			
11	missing post marker	missing post marker	21
12	missing post marker	missing post marker	22
13	intact tooth	composite filling W composite filling O	23
14	composite filling DO	composite filling WO composite filling DO	24
15	composite filling DO composite filling MO	composite filling DO	25
16	composite filling MO	enamel filling O amalgam filling LO	26
17	intact tooth	composite filling O	27
18	no information	no information	28
48	impacted tooth (visible) intact tooth	missing ante mortem	38
47	composite filling O	intact tooth	37
46	composite filling MO amalgam filling V	composite filling DO	36
45	enamel filling DO composite filling MO	intact tooth	35
44	composite filling DO	intact tooth	34
43	intact tooth	intact tooth	33
42	missing post marker	missing post marker	32
41	missing post marker	missing post marker	31

Fig. 7: CASE 3. PM F2 form of the unknown remains.

### CONSIDERATIONS:

1. Interpretation and entry of dental information (*antemortem* and *postmortem*) to Interpol forms should always be undertaken by dental personnel.

2. Issuing the Yellow and Black Notices or notifications sooner if there is the slightest possibility that the case might have crossed any national borders.

3. Better and stricter routines for issuing the Yellow and Black Notices or notifications; compulsory use of the full sets of DVI forms including all photographs and radiographs available.

4. Additional information for any ambiguous dental situations: for example, in order to avoid exclusion by the search program describe newly extracted teeth using free text e.g. "recently extracted" instead of encoding them as MAM if the teeth that have been lost within

a short period before the person had gone missing.

### CONCLUSIONS

Many factors can influence the outcome of an identification investigation. Each case has its own positive and negative details that might speed up or delay identification and the return of the deceased to their families. But, as the cases described in this paper show, there are some more obvious reasons that might unnecessarily prolong the whole process. In order to avoid such delays it would be advisable to introduce and emphasise basic routines when dealing with remains without a tentative identity and missing persons. A few simple rules could save a lot of time for the professionals working on these cases and also a lot of anguish for the families of the missing individuals.

### REFERENCES:

1. [http://www.plass.dk/images/pdf/dvi\\_brochure\\_2010.pdf](http://www.plass.dk/images/pdf/dvi_brochure_2010.pdf)
2. Amoëdo O. *L'Art Dentaire en Médecine Légale*. Paris: Masson et Cie, Editeurs, Libraires de L'Academie de Médecine, 1898.
3. The National Board of Health and Welfare: *Patientsäkerhetslag (SFS nr 2010:659) and Patientdatalag (SFS nr 2008:355)*

### Address for correspondence:

I. Dawidson  
 Forensic odontologist,  
 The National Board of Forensic Medicine,  
 Forensic Odontology Division,  
 Retzius v. 5, 171 65 Solna, Sweden.  
 Phone: +46854542113  
 Email: [irena.dawidson@rmv.se](mailto:irena.dawidson@rmv.se)