Čestoća dentalnih identifikacija trupla iz masovnih grobnica u Hrvatskoj

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Sažetak

U ovome radu prikazani su rezultati i postupci dentalnih identifikacija na 523 trupla ekshumiranih do lipnja godine 1996. Postupak identifikacije bio je proveden u Zavodu za sudsku medicinu i kriminalistiku Medicinskog fakulteta u Zagrebu. Forenzički stomatolog sudjelovao je u postupku identificiranja na temelju raščlambe zubala. Sva orodentalna obilježja pomno su se obilježila u Interpolove obrasce za unos poslijesmrtnih dentalnih obilježja te u računalni program CAPMI 4. Forenzička raščlamba genomske i mitohondrijske DNA, koja se temelji na postupku lančane reakcije polimeraze (PCR), provedena je na uzorcima iz stanica zubnih tkiva u onim slučajevima kada su ostali tradicionalni forenzički postupci bili nedostatni i neuspješni. Do mjeseca lipnja godine 1996. u Republici je Hrvatskoj ekshumirano 523 trupla ubijenih ljudi : 412 muškaraca (78,77%) i 111 žena (21,23%). Ukupno je bilo identificirano 381 truplo (72,84%), a 142 trupla (27,16%) ostala su neidentificirana. Zubna identifikacija temeljena na poznatim prijesmrtnim dentalnim obilježjima postignuta je u 23,88% slučajeva. Najviše je identifikacija postignuto na temelju usporedbe sa zubnim kartama (35%), rendgenske snimke pomogle su i indentifikaciji 15% trupla, fotografije u 22% slučajeva, razgovori s članovima obitelji pomogli su u identificiranju 18% slučajeva, a samo se je 10% slučajeva riješilo s pomoću zaživotnih stomatologa koji su prepoznali svoje stomatološke zahvate. Zubi u kombinaciji s antropološkim parametrima - dob, spol, visina uz neke druge specifične parametre kao što su tetovaža, osobni dokumenti, nakit i DNA raščlamba - pripomogli su u još 60,64% slučajeva, ali nisu bili dominantni zbog nepostojanja prijesmrtnih podataka. Samo u 15,48%% slučajeva zubi nisu poslužili u postupku identifikacije, već je ona postignuta na temelu drugih vjerodostojnih podataka. Danas na kraju XX. stoljeća susreli smo se s do sada najvećim zahvatom u forenzičkoj stomatologiji u kojem se gotovo danomice educiramo na novim slučajevima. Identifikacijski se postupak nastavlja kako bi se pronašlo i identificiralo još 2.197 ljudi koji se vode nestalim od trenutka napada na Republiku Hrvatsku.

Ključne riječi: sudska stomatologija, zubi, rat, masovne grobnice, DNA

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Uvod

Ratovi, uz prirodne katastrofe i prometne nesreće na zemlji, vodi, i zraku, nameću potrebu da se provedu identifikacijski postupci kako bi se ustanovio identitet svih stradalnika (1-5).

Nakon rata na reintegriranim je područjima Republike Hrvatske trebalo pronaći i identificirati zarobljene i nestale ljude te identificirati veliku množinu pronađenih ljudskih ostataka. Mnoge su žrtve rata pokopane u masovne grobnice. Neke od tih grobnica su pronađane, a tijela ekshumirana. Za mjesto većine grobnica znali su preživjeli svjedoci, ekshumacija trupla iz nekih grobnica je u tijeku, no još uvijek postoje neistražena područja i razložita sumnja da tamo ima masovnih grobnica jer se do danas nisu pronašli svi nestali. Do sredine 1997. godine u Republici Hrvatskoj, to jest na njezinim oslobođenim područjima, pronađene su mnoge masovne grobnice s tijelima miješanoga civilnog stanovništva koje je trabalo identificirati (6,7). Iz najveće od pronađenih grobnica, Ovčare pokraj Vukovara, ekshumirano je 200 trupla. Ostale su grobnice bile znatno manje.

Ovim radom želimo prikazati rezultate dentalne identifikacije i najčešće načine utvrđivanja identiteta s kojima smo se prvi put susreli u praksi, te prikazati poteškoće tijekom njihove provedbe.

Ispitanici i postupci

Do mjeseca lipnja 1997. u Hrvatskoj je ukupno ekshumirano 1360 trupla, a ovim radom prikazujemo načine zubne identifikacije na 523 trupla koliko ih je ekshumirano do sredine 1996. godine.

Identifikacijski postupak većim je dijelom provodio Identifikacijski tim i Vladino povjerenstvo za zatočene i nestale, a tek manjim dijelom kompetentni stručnjaci sudske medicine na samom terenu ekshumacije. Identifikacija je provedena u Zavodu za sudsku medicinu i kriminalistiku Medicinskog fakulteta u Zagrebu (Slika 1). Forenzički stomatolog sudjelovao je u postupku identificiranja na temelju raščlambe zubala. Sva orodentalna obilježja, kao što su: okluzija, abrazija, raspored i vrsta aloplastičnih ispuna na zubima, izvađeni zubi, razvojne anomalije, diskoloracije, proteski nadomjesci, endodontska liiječenja i nikotinske naslage, pomno su bilježena

Slika 1. *Novootvorena obdukcijska dvorana Zavoda za sudsku medicinu i kriminalistiku*

Figure 1. *New Morgue in Department of Forensic Medicine and Criminology*

u Interpolove obrasce za unos poslijesmrtnih dentalnih obilježja te u računalni program CAPMI 4, Slika 2 (8). Neposredno prije očitavanja poslijesmrtnih dentalnih obilježja počesto je zube i dijelove čejusti bilo potrebno složiti i prilijepiti u logične anatomske cjeline. Za lijepljenje je rabljeno cianoakrilatno ljepilo (Locite 420*), poznato kao super ljepilo.

Forenzička raščlamba genomske i mitohondrijske DNA, koja se temeelji na postupku lančane reakcije polimeraze (PCR), provedena je na uzorcima iz stanica zubnih tkiva u onim slučajevima kada su ostali klasični forenzički postupci bili nedostatni i neuspješni (9-11).

Rezultati

Do mjeseca lipnja 1996. u Republici Hrvatskoj ekshumirano je 523 trupla ubijenih ljudi: 412 muškaraca (78,77%) i 111 žena (21,23%). Identificirano je ukupno 381 truplo (72,84%), a 142 trupla (27,16%) ostalo su neidentificirana (Tablica 1).

Zubna identifikacija temeljena na poznatim prijesmrtnim dentalnim obilježjima postignuta je u 23,88% slučajeva (Slika 3). Najviše je identifikacija postignuto na temelju usporedbe sa zubnim kar-

Post Mortalni   OBRAZAC ZA IDENTIFIKACIJU ŽRTVE   F1

MRTVO TIJELO   Broj:

Mjesto smrti :   Spol nepoznat ☐
Datum smrti :   ☐☐ Dan   ☐☐ Mjesec   ☐☐ Godina   Muško ☐   Žensko ☐

ZUBNI NALAZ

83   U pojedinačnim slučajevima

Mjesto pronalaska
Broj
Datum

Policijska postaja
Adresa
Telefon

PREGLED ZUBALA

Zatražen od (datum)
Načinjen u (datum)

84   MATERIJAL

Čeljusti Gornja Donja
Komadi/Dijelovi
Pojedinačni zubi

Ostalo

Lokacija uzorka

85   DODATNI DETALJI
Stanje tijela
Stanje čeljusti
Oštećenja
- mekih tkiva
- čeljusti
- zubi

mogući uzrok oštećenja

ostalo

Stomatolog
    Ime:
    Adresa:
    Telefon: POTPIS

Post Mortalni   OBRAZAC ZA IDENTIFIKACIJU ŽRTVE   F2

MRTVO TIJELO   Broj:

Mjesto smrti :   Spol nepoznat ☐
Datum smrti :   ☐☐ Dan   ☐☐ Mjesec   ☐☐ Godina   Muško ☐   Žensko ☐

86	PODACI O ZUBIMA	
11		21
12		22
13		23
14		24
15		25
16		26
17		27
18		28

18 17 16 15 14 13 12 11   21 22 23 24 25 26 27 28

DESNO   JEZIČNO   LIJEVO

48 47 46 45 44 43 42 41   31 32 33 34 35 36 37 38

48		38
47		37
46		36
45		35
44		34
43		33
42		32
41		31

87	Opis krunica, mostova, proteza	
88	Okluzija, atricija, anomalije, pušenje, parodontni status, ostalo	
89	Rdg	
90	Ostali materijal	
91	Dob	

Slika 2. *Ružičasti obrazac za unos poslijesmrtnih dentalnih obilježja prema Interpolu*

Figure 2. *Interpl Disaster Identification From (postmorten - pink)*

tama (35%), rendgenske snimke pomogle su u identifikaciji 15% mrtvih tijela, fotografije u 22% slučajeva, razgovori s članovima obitelji pomogli su u identifikaciji 18% slučajeva, a samo se je 10% slučajeva riješilo uz pomoć zaživotnih stomatologa koji su prepoznali svoje stomatološke zahvate (Slika 3).

Tablica 1. *Raspodjela prema spolu identificiranih i neidentificiranih žrtava*

Table 1. *Sex distribution od identified and unidentified victims*

| No.E.	Male	Female	No.I.	No.U.
523	412	111	381	142
100%	78.77%	21.23%	72.84%	27.16%

(No.E. - Number of exhumed victims, No.I. - Number of identified victims, No.U. - Number of unidentified victims)

(No.E. - broj ekshumiranih žrtava, No.I. - broj identificiranih žrtava, No.U. - broj neidentificiranih žrtava)

Zubi u kombinaciji s antropološkim parametrima - dob, spol, visina te neki drugi specifični parametri kao što su tetovaža, osobni dokumenti, nakit
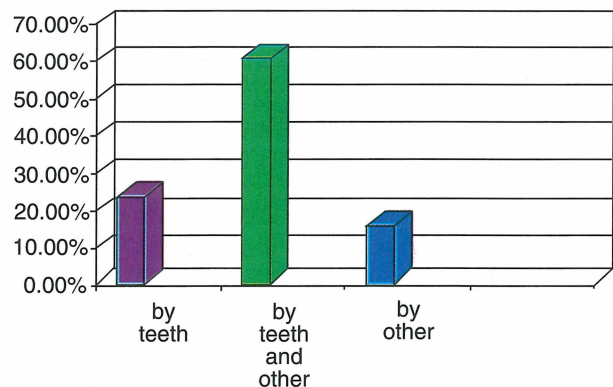
Slika 3. *Razvrstanost prema načinu provedene identifikacije*

Figure 3. *The Distribution by Means of Identification*
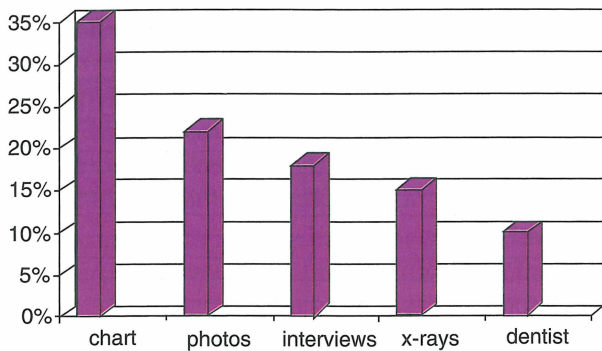
Slika 4.   *Dentalna identifikacija*
Figure 4. *Dental Identification*

i DNA raščlamba - pripomogli su u još 60,64% slučajeva, ali nisu bili dominantni zbog nedostatka prijesmrtnih podataka (Slika 3).

Samo u 15,48% slučajeva zubi nisu poslužili u postupku identifikacije, već je ona postignuta na temelju drugih vjerodostojnih podataka (Slika 3).

Rasprava

Dentalna je identifikacija, u pravilu kada posjedujemo dobre prijesmrtne podatke (12-14), jedan od najvjerodostojnijih načina identificiranja ljudskih ostataka. Međutim, ratovi kao nenormalna stanja u kojima stradavaju velike skupine ljudi stvaraju forenzičarima velik problem i zbog činjenica što u takvim okolnostima prijesmrtni podatci počesto budu uništeni i namjerno uklonjeni. Dosadašnja iskustva na identifikacijskim postupcima žrtava rata potvrđuju upravo te probleme (6,15).

Osobitost rata u Hrvatskoj je u tome što su se pretežito uništavali civilni ciljevi i civilno stanovništvo, jer vojnih u početku nije ni bilo. Jedan od osnovnih načina identificianjra ekshumiranih trupla temeljio se je na zubima, ali na žalost nije bilo dovoljno vjerodostojnih prijesmrtnih podataka, samo 23,88%. Kao što je prikazano, najviše dentalnih identifikacija postignuto je na temelju zubnih kartona i usporedbe s fotografijama. Tek manji dio dentalnih identifikcaija postignuto je na temelju usporedbe s rendgenskim snimaka, razgovorima s užim članovima obitelji i stomatologa koji su sudjelovali u radu pojedinih zahvata na zubima žrtava. Samo u jednom slučaju identifikacije poslužili su nam sadre-
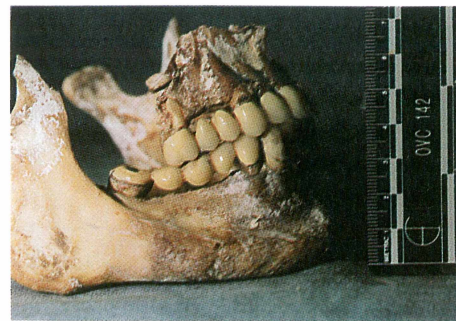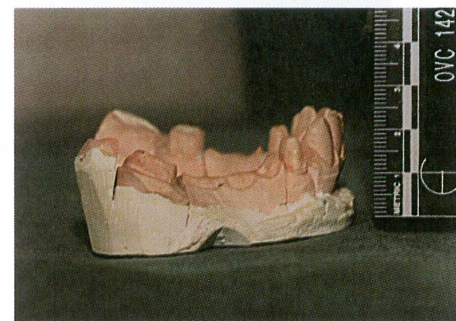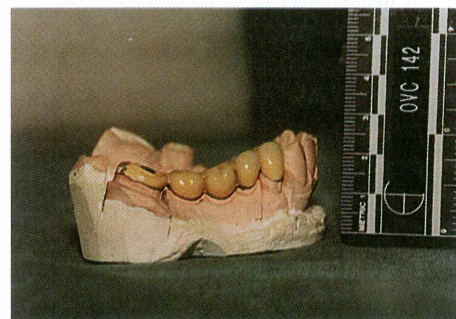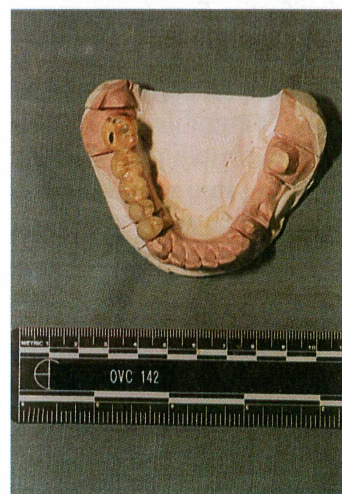

Slike 5a, 5b, 5c, 5d.   *Slučaj identificiran usporedbom sadrenoga modela i keramičkih mostova na donjoj čeljusti*

Figures 51, 5b, 5c, 5d. *Case identified by plaster technical model and porclain bridges on the lower jaw*

ni modeli na kojim su se izrađivali keramički mostovi, a uz pomoć osobe koja ih je sačuvala, (Slike 5a, 5b, 5c i 5d).

Osim što su medicinski i stomatološki prijesmrtni podatci bili uništeni, mnogi od ubijenih bili su starije životne dobi. Ako su proteze i pronađene u ustima žrtava, mogućnost da se utvrdi identitet s pomoću njih bila je otežana jer se u našoj domovini ne prakticira obilježavati proteze određenim identifikacijskim elementima, a to se je pokazalo lošim (16,17). Zato su nam za određivanje identiteta služili nepčani retencijski priljepci, ugrađeni zlatni zubi, te ponekad i istrošenost pojedinih dijelova proteze od trajnih zuba suprotne čeljusti ili nekoga drugog abrazijskog sredstva kao što je lula. Međutim, zubi su i dalje poslužili u identificiranju interdisciplinarno uz antropologa i patologa. U tim slučajevima, a bilo ih je najviše, 60,64%, određivala se je dentalna starost tijela, spol, postojanje nikotinskih naslaga na zubima, profesionalni stomatološki zahvati na zubima, te boja, veličina i oblik zubala. Ti su se podatci međusobno uspoređivali i nadopunjavali s rezultatima antropologa i patologa poput slaganja slike od puzli. Uz pomoć intervjuiranja članova rodbine i prijatelja, te podataka koje smo dobili od preživjelih svjedoka, identifikacijski postupak napredovao je iz dana u dan.

Identifikacija se je uvijek zaključivala na nekoliko parametara, čak i kad se je mogla postići na samo jednome ključnom parametru. U slučajevima kada nam je nedostajala bitna pojedinost, ili su se interdisciplinarni rezultati malo razilazili, obavljala se je izolacija DNA iz zuba i kosti. Naime, tijela su pod zemljom prije ekshumacije bila do 6 godina pa je počesto zbog vlage i nečistoće izolacija DNA iz kosti bila nemoguća, zbog čega je kao izvod da bi se odredio identitet ponovno služio zub, odnosno odontoblasti i mitohondriji (18-22).

Početak forenzičke stomatologije u Hrvatskoj datira od tridesetih godina XX. stoljeća (23). Danas, na kraju stoljeća, susreli smo se s dosada najvećim zahvatom u forenzičkoj stomatologiji u kojem se gotovo danomice educiramo na novim slučajevima. Identifikacijski se postupak nastavlja kako bi se pronašlo i identificiralo još 2.197 ljudi koji se vode kao nestali od trenutka napada na Republiku Hrvatsku.

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The Incidence of Dental Identifications from Mass Graves in Croatia

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Summary

The paper presents the results and procedure of identification of 523 bodies exhumed up until June 1996. The identification procedure was carried out in the Department of Forensic Medicine and Criminology School of Medicine in Zagreb. A forensic dentist participated in the identification procedure, based on a breakdown of sets of teeth. All orodental characteristics were carefully registered in the Interpol forms for entry of post-mortem dental characteristics, and in the CAPMI 4 computer programme. Forensic classification of genomic and mitochondrial DNA, based on the method of polymerase chain reaction (PCR), was carried out on the samples from dental tissue cells in cases when other traditional forensic methods were inadequate of unsuccessful. Up until June 1996, 523 bodies had been exhumed in the Republic of Croatia: 412 men (78.77%) and 111 women (21.23%). A total of 381 bodies (72.84%) were identified and 142 bodies (27.16%) remained unidentified. In 23.88% of cases dental identification was achieved on the basis of known dental features. The majority of bodies were identified by comparison with dental records (35%), X-rays helped in the identification of 15%, photographs in 22%, talks with members of the family helped in the identification of 18% and 10% of cases were solved with the help of dentists, who recognised their own dental work. In combination with anthropological parameters - age, sex, height, together with other specific parameters, such as tattoos personal documents, jewellery and DNA classification, helped in another 60.64% of cases, although they were not dominant due to the lack of data prior to their death. Teeth were of no help no help in only 15.48% of cases. In such cases identification was made on the basis of other reliable data. Today, at the end of the 20th century, we are confronted with the greatest task ever in forensic dentistry, during which almost every day we come across new cases on which to learn. The identification procedure continues in order to find and identify a further 2.197 people, reported missing during the attack on the Republic of Croatia.

Key words: *forensic, odontology, teeth, mass graves, DNA*

Introduction

Wars, as well as natural disasters and accidents on land, water and air require identification processes in order to determine the identity of victims (1--5).

The need to find and identify imprisoned and missing citizens, as well as identification of hundreds of human remains, is one of the characteristics of the post-war period in the Republic of Croatia. Most of the war victims were buried in numerous mass graves, some of which have been found and bodies already exhumed. Locations of the majority of the mass graves are known through information obtained from live witnesses, and exhumations are in process. Given the fact that not all persons missing in the war have been found it is suspected that many mass graves still exist, while their locations remain unknown. Up to the mid 1997's numerous mass graves containing the remains of a mixed civilian population were found on the liberated territories of Croatia (6,7). The largest mass grave found to date was "Ovčara", near Vukovar, from which 200 bodies were exhumed. Numerous other mass graves were significantly smaller.

This paper will present methods and results and results of dental identifications and the most frequent methods for determination of identity. Given the fact that we were confronted with such a huge number of identifications to accomplish in such a short period for the first time, the paper also points to the difficulties encountered during the identification processes.

Material and Methods

Up until June 1997 a total of 1360 bodies were exhumed in Croatia. This paper will present methods of dental identification of 523 bodies exhumed up until July 1996.

The identification procedure was performed in the field, by the "Government identification Team and Committee for Imprisoned and Missing Persons" in the majority of cases, and occasionally by competent forensic experts.

Personal identification of victims was performed at the Department of Forensic medicine and Criminology at the School of Medicine in Zagreb (Figure 1). A forensic odontologist participated in the identification process by carrying out dental identification. All oro-dental characteristics such as: occlusion, abrasion, aloplastic fillings, root canal fillings, missing teeth, developmental anomalies, color changes, prosthetic appliances and evidence of smoking were carefully recorded in the postmorten Interpol Disaster Victim identification forms and in the computer program CAPMI 4, Figure 2, (8). In many cases the remains showed fracturing of the maxilla and mandible. Before recording dental data the bones were glued together by the use of cyanoacrylic ester glue (Locite 420*) commonly known as superglue.

Forensic genomic and mitochondrial DNA testing based on "polymerize chain reaction" (PCR) procedure on DNA extracted from dental tissues cells was applied in several cases where dental comparison and other traditional forensic methods were insufficient and unsuccessful (9-11).

Results

Up until July 1966 the bodies of 523 civilians were exhumed in the Republic of Croatia: 412 males (78.77%) and 111 females (21.23%). A total of 381 victims (72.84%) were positively identified, while 142 (27.16%) victims remain unidentified (Table 1).

Dental identification, based on available dental antemortem data, was achieved in 23.88% cases (Figure 3). Dental identification was achieved by the use of dental charts in 35%, X-ray in 15%, photographs in 22%, interviews in 18%, and dental supports in 10% of the cases (Figure 4).

Teeth, combined with anthropological parameters - age, sex and height, as well as other specific characteristics, such as tattoos, personal identification cards, jewelry and DNA were helpful for identification of 60.64% of victims (Figure 3).

In 15.48% of cases positive identification was achieved by other relevant identification elements, and teeth were not used at all (Figure 3).

Discussion

Dental identification is one of the most competent methods of personal identification in cases when

good antemorten data are available (12-14). However, wars, like situations with accidents involving large groups of people, cause problems for forensic experts. In wars, antemortem data are often destroyed of deliberately removed. The experience gained from identification processes of war victims in Croatia point indicate precisely problems of that nature (6,15).

Characteristic of the war in Croatia is in the fact that mainly the civil population and civilian targets were de destroyed, since military ones did not exist at that time. One of the basic methods of identification of exhumed bodies was dental identification. Unfortunately, insufficient antemortem data was available - only 23.88%. Most dental identifications were based on dental charts and comparisons with photographs. Only a few dental identifications were based on X-rays, interviews and statements of odontologists regarding their work on the teeth of victims. In on case dental identification was based on plaster models for porcelain bridges provided by the surviving person (Figures 5a,5b,5c and 5d).

Apart from destruction of medical and odontological antemortem data, a further obstacle was the age of the killed civilians. The majority were elderly, with or without prosthetic appliances. In cases where prosthetic appliances were found in the mouths of victims, the possibility of achieving positive personal identification was slight because marking prosthetic appliances with identification elements is not practised in Croatia. This proved to be a limiting factor for identification processes (16,17). In such situations the following elements were used in the identification process: palatal retention devices from the prosthetic appliances; gold teeth; parts of the prosthetic appliances attrited by the permanent teeth from the opposite jaw or some other abrasive factor such as, for example, a pipe. Teeth, however, were further used in the interdisciplinary

identification processes conducted in cooperation with anthropologists and pathologists. In such cases (60.64%) the following factors were determined: dental age of the body, sex, tobacco plaque on teeth, eventual professional odontological treatment on teeth, color, size and shape of the dentition. These data were compared and supplemented with the results received from the anthropologist and pathologist, similar to putting together a puzzle. Interviews with relatives and friends of the victims, and information received from the surviving witnesses further helped the identification processes to improve from day to day. Identification was always confirmed by several parameters, even in the cases when it could only be confirmed by one key parameter. In cases when a significant detail was overlooked or when the interdisciplinary results were not in complete accordance, isolation of DNA from teeth and bones was applied. Given the fact that in the majority of cases the bodies had remained in the ground for 6 years before exhumation DNA isolation from bones was not possible because of the effect of humidity and contamination. For this reason, the source of identification was again the teeth i.e. odontoblasts (18-22).

Forensic dental expertise in Croatia started in the early thirties of this century (23). Today, at the end of the 20th century we are confronted with the most extensive operation in forensic odontology which is providing the opportunity for daily on-the-spot training on new cases. Identification processes in Croatia continue in order to find identify another 2.197 people missing or imprisoned in detention camps during the aggression on Croatia 1991-1995.