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Misuse of Red Cross Emblem among Health Care Professionals

Basanta Kumar Behera*
Saubhagya Kumar Jena**
Manoj Kumar Mohanty***
Kusa Kumar Shaha****

ABSTRACT

Background: Knowingly or unknowingly the Red Cross emblem is being misused among health care professionals. In the present study, attempt has been made to find out misuse of the emblem amongst health care professionals like by Pharmaceutical shops, Doctor's clinics/ Hospitals, Medical laboratories, Doctor's vehicles and Ambulances. **Material & Methods:** A cross sectional descriptive study (single blind) was conducted on randomly selected pharmaceutical shops, doctor's clinics/hospitals, medical laboratories, doctor's vehicles and ambulances in and around Puducherry from Jan-Feb 2011. All the data were collected randomly by using a self designed questionnaire on use of Red Cross emblem by above mentioned health care professionals. On each category 100 samples were selected. **Results:** Out of 100 samples in each category, it has been found that misuse of Red Cross emblem in Pharmaceutical shops was 12%, Doctor's clinics/Hospitals was 37%, Medical laboratories was 48% , Doctor's vehicle was 21% and in Ambulances it was 66%. **Conclusion:** In spite of existing law against the misuse of Red Cross emblem, its inadvertent use is rampant. It still needs awareness programme among health care professionals from time to time. It is recommended that implementation of existing law should be strictly followed.

Key words: Red Cross emblem, Pharmaceutical shops, Hospitals, Medical laboratories, Ambulances.

INTRODUCTION

Red Cross is an International humanitarian organization which gives the service to the people in war and peace by keeping the spirit of compassion & universal brotherhood which was proposed by Henry Dunant[1]. He urged that various voluntary National societies would render aid to the wounded one during war without comparing the nationality. He also proposed that these societies must have a protective emblem and trained workers to serve the wounded people and protected by the International treaty. In the Geneva Convention 1864 International Red Cross movement was initiated to aid for the wounded soldiers. The league of Red Cross Society was created in 1919 at Geneva as head quarter to coordinate the work of national societies [2].

As per the act at Geneva Convention 1960, Red Cross emblem can only be used by the Red Cross Society and the armed forces medical services. Misuse of the emblem is prohibited under Chapter 4 Geneva Convention Act [3]. In India, if any one misuse the red cross emblem shall be put in fine of rupees 500/- and forfeiture of the vehicles or goods will be done with out authorization [3,4].

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Unauthorized use of the Red Cross emblem is a punishable offence, even Medical practitioners and allied health workers can not use the emblems [2-5]. In India the rampant misuse of Red Cross emblem is being seen by medical practitioners, Government and private hospitals, and also by the chemists [6]. One study from RIMS, Imphal shows that 34% of doctors use Red Cross emblem in their vehicles [7]. This article attempts to review the misuse of Red Cross emblem in various places by the health care professionals in and around Puducherry.

MATERIAL AND METHODS

General settings

The Red Cross emblem gives more identity and status to health care professionals in society. Many health care professionals use this Red Cross emblem very frequently in different places. Any kind of imitation and usurpation of Red Cross emblem is counted as misuse.

Research design

The study was a cross-sectional descriptive study.

Study area

This cross sectional study was conducted in and around Puducherry. We considered all directions (East, West, North and South) of Puducherry to collect the data.

Data collection

All the data collected randomly in a pre designed questionnaire on Red Cross emblem used in Pharmaceutical shops, Doctor's clinics, Medical Laboratories, doctors vehicles & Ambulances. In each category 100 samples were randomly selected for this study between Jan and Feb 2011. Single blind method was adopted for the collection of data. Data was collected from all streets of Puducherry in all directions from the pharmaceutical shops, medical laboratories, doctors clinics (includes all forms of medical practice), and known doctors vehicles. Data on ambulance was collected from both government and private sectors. Ambulances coming with patients from surrounding areas to different hospitals in Puducherry were also included in this study. Ambulances like '108 services' and discarded ambulances dumped in the campus of Hospital were excluded from the study.

RESULTS

The Red Cross is the official symbol of Red Cross Society and does not signify any medical facility. Out of 100 pharmaceutical shops studied for misuse of Red Cross emblem, 12 of them used the symbol and 74 used green cross. The common symbol to denote health and medical services is the caduceus, a figure that comprises a short staff rod with two serpents curled around it, sometimes surmounted by wings, which was found only in one doctor's clinic out of 100 random clinics seen. Thirty seven used Red Cross emblem on their signboard. Forty eight out of 100 medical laboratories misused Red Cross emblem on their signboard. Twenty one doctors misused symbol on their own vehicle which include both four and two wheelers. Two-third of the ambulance shows Red Cross emblem on the vehicle.

DISCUSSION

The emblem of Red Cross society is the most misused symbol in the world [7] .The symbol can only be used by members of the Red Cross Society or the armed forces medical service for identification and protection of personnel during any International Committee of the Red Cross (ICRC) operation at any place. Doctor and people of other medical fraternity cannot use this symbol. The Indian Parliament had passed an ordinance in 1960 against misuse of Red Cross as per the Geneva Convention. Doctor's are supposed to use "Caduceus" and Pharmacist can use 'green cross'. For Hospitals the symbol is a bold white "H" with

blue background and ambulance should use a specific symbol i.e. a blue colored serpentine [2].

In the present study 12% of pharmaceutical shops used Red Cross symbols on the signboard. Percentage of misuse is small but significant. Till date no study has been conducted to show percentage of misuse of Red Cross by pharmaceutical shops. More than seventy percent used the symbol which is assigned/meant for them i.e. green cross. Out of 100 doctor's clinic or nursing homes or non-allopathic clinic, 37 misused Red Cross symbol. Study by Menon A and Kuruvilla shows 53% doctor used Red Cross symbols in their clinic [6]. This may be due to close alliance of Red Cross society with medical profession[8]. Sometimes it may be due to the mistaken belief on the part of medical professionals, that they are entitled to use Red Cross emblem. Twenty seven percent used other symbols like picture of teeth in dental clinic or heart picture in case of cardiologist etc. Only one clinic used caduceus symbol in its signboard. Nearly half of the medical laboratories misused Red Cross symbol. This may be due to non-allotment of any symbols and popularity and close proximity of Red Cross emblem to any medical service. A specific symbol can be assigned to medical laboratory service, so that its misuse can be reduced. In the present study more than 20% of doctors used Red Cross symbol on their front or rear glass or on the number plates. Similar findings were observed in the study at Imphal, India. Misuse of the symbol in our study is less as compared to the findings of Menon A and Kuruvilaa A [6]. It was also found that 66% ambulances used Red Cross emblem. Ambulances are supposed to use specific logo earmarked for them. This may be due to thinking of ambulance service providers that they are associated with humanitarian services or were not aware of the fact that they were not supposed to use Red Cross symbols [9].

CONCLUSION

According to International humanitarian law the emblem is a symbol of protection. With this view of misuse of the Red Cross emblem among health care professionals, it still needs awareness campaign and training programme for the doctors, pharmacists, laboratory technicians, and ambulance service providers regarding proper use and not to misuse the Red Cross emblem. It is also important to aware regarding proper use of Red Cross emblem among the budding health care professionals. With the involvement of press media and the Director of Health Services towards proper use of Red Cross emblem, few health care professionals do not misuse the Red Cross emblem in Puducherry. Health care professionals should use independent signs assigned to them and popularize them. To bring out protective value of Red Cross, mobile advertisement regarding importance of symbol can be done. We strongly recommend that the implementation of existing law to avoid the misuse of the patent of Red Cross emblem among health care professionals.

Table No. 1 Symbols used in Pharmaceutical shop

Symbols	Number of Pharmaceutical shop (n =100)
Red Cross	12
Green Cross	74
Blue Cross	04
White Cross	03
No Symbol	07

Table No. 2 Symbols used in Doctor's Clinic

Symbols	Number of Clinics (n =100)
Red Cross	37
Green Cross	06
Caduceus	01
White Cross	02
Other Symbol	27
No Symbol	27

Table No. 3 Symbols used in Medical Laboratory

Symbols	Number of Lab. (n =100)
Red Cross	48
White cross	3
Green cross	5
Other symbol	9
No Symbol	35

Table No. 4 Symbols used in Doctors vehicle

Symbols	Number of vehicle (n =100)
Red Cross	21
Caduceus	26
'Dr' Symbol	13
No Symbol	40

Table No. 5 Symbols used in Ambulance

Symbols	Number of vehicle (n =100)
Red Cross	66
Caduceus(Ambulance symbol)	18
Others	08
No Symbol	8

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Estimation of Stature from the Percutaneous Length of the Tibia, Ulna and Radius in South Indian Population

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Astrid Lovita Miranda**

ABSTRACT

Background: Stature estimation is one of the important parameter in establishment of the identity of a person. It is important to establish studies in different populations as stature varies in different races and populations.

Material and methods: In the present study, an attempt has been made to estimate stature from the lengths of tibia, radius and ulna in 100 medical students belonging to South Indian population. Linear and multiple regression equations were calculated for estimating stature from the lengths of tibia, radius and ulna.

Results: In males, correlation coefficients of the linear regression equations ranged from 0.714 to 0.630 with standard error 4.93 to 5.47 cm. Whereas, in females it ranged from 0.661 to 0.560 with standard error 4.12 to 4.55 cm. Multiple regression equations involving all the three parameters showed higher correlation coefficients (0.829 in males and 0.747 in females) with standard error 4.02 cm in males and 3.73 cm in females. **Conclusion:** The regression equations of the present study are helpful in estimating stature from the lengths of tibia, radius and ulna in South Indian population.

Keywords: Forensic anthropology, identification, stature, dismembered body, limb length.

INTRODUCTION

Identification of a victim or an accused involved in a criminal act is an important task in the field of forensic investigation. Estimation of stature of an individual from the skeletal materials or from the mutilated or amputated limbs or parts of the limbs has obvious significance in the personal identification in the events of the murders, accidents or natural disasters that mainly concerns with the forensic identification analysis.

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Many studies have been conducted in different ethnic groups to estimate stature from the length of long limb bones, because the long limb bones have got a definite correlation to the height of an individual.[1-8] Few studies have been proved that the percutaneous measurement of long limb bones are useful in the estimation of living stature.[9-12] However, stature varies with the race and is determined by genetics of a person, geographical location, environment and climatic conditions. Since no studies have been documented in the South Indian population, an attempt has been made to estimate stature of an individual from percutaneous lengths of the radius, ulna and tibia in South Indian population.

MATERIAL AND METHODS

The study sample includes 100 MBBS students (both males and females) belonging to South India studying in Father Muller Medical College,

Mangalore in the age group of 18-24 years. The informed consent was taken from the subjects before taking the measurements. The subjects with any congenital deformities, trauma and pathological conditions affecting the height of a person and of the right upper and lower limbs were excluded from the study.

Height of the subject was measured in standing position using stadiometer. The subjects were asked to stand barefooted on the board of a standard stadiometer with both feet in close contact with each other, trunk braced along the vertical board, and the head adjusted in Frankfurt plane. The measurement was taken in centimeters, by bringing the horizontal sliding bar to the vertex. Then, the length of tibia, ulna and radius was taken using Vernier caliper. To maintain uniformity, only the bones of right side were considered for the study.

Length of tibia

Ask the subject to sit straight with thigh in a straight line, knee flexed at 90° position and the foot rotated laterally, which makes the bony projections prominent. Then, length of the tibia was measured as a straight distance between the superior-most margin of the medial condyle to the inferior-most margin of the medial malleous.

Length of ulna

Ask the subject to sit in straight position and flex the elbow at 90° with arm parallel to ground. Rotate the wrist completely (in complete pronation) which makes the styloid process of the ulna prominent. Then, the length of ulna was measured as a straight distance from the most proximal point of the olecranon process to the most distal point of the styloid proces.

Length of radius

Ask the subject to sit straight with the elbow semi-flexed, and the forearm and hand in straight position. Then, length of the radius was measured as a straight distance between the superior-most point on the outer surface of radial head to the most distal point of the styloid process.

Statistical analysis

The data was analysed using Statistical Programme for Social Sciences (SPSS) version 11. The linear and multiple regression equations were derived for estimating stature from individual bones and for the combination of bones, respectively. For assessing the correlation between the stature and the length of the bones, the Pearson's correlation coefficient was calculated and its significance was tested by Students-t test. "P" value less than 0.05 was considered as significant.

RESULTS

The study sample consists of 50 males and 50 females. Age of the study population ranged from 18 to 22 years in both sexes with the mean age of 19.80±1.21 years in males and 19.34±0.87 years in females. Stature of the study population ranged from 153.20–192.00 cm (173.61±6.97 cm) in males and 152.40–178.40 cm (163.04±5.43 cm) in females. Descriptive statistics of the study sample were shown in Table 1. Length of tibia, ulna and radius were larger in males compared to females. The linear regression equations for the estimation of stature from the lengths of tibia, ulna and radius were shown in Tables 2 and 3. The highest correlation coefficient was observed with tibial length in both sexes (0.714 in males and 0.661 in females). Among the forearm bones, higher correlation coefficient was found with radial length in males and ulnar length in females. Multiple regression equations (Table 4) were calculated using all the parameters, which improved the correlation coefficients in both sexes (0.829 in males and 0.747 in females).

DISCUSSION

Estimation of stature from bones plays an important role in identifying unknown bodies, parts of bodies or skeletal remains. In the present study, an attempt has been made to estimate the stature from the lengths of tibia, radius and ulna in South Indian population.

In the present study, the mean stature of male sample is 173.61±6.97 cm in males and 163.04±5.43 cm in females. This differs from other studies conducted in Eastern and Northern parts of India,[9,10] Mauritius,[11] Germany,[5] Turkey[4,12] and Korea[13] where the stature was lower compare to the South Indians. Similarly the length of tibia, radius and ulna was also varies in different populations (Tables 5 and 6). The above observations are in concurrence with the fact that stature varies in different races and populations. However, on should not forget that these differences could be due to variation in techniques adopted while measuring these parameters.

Linear regression equations were calculated for each measurement. The correlation coefficients of the linear regression equations ranged from 0.714 to 0.630 in males and 0.661 to 0.560 in females. The standard error of estimate ranged from 4.93 to 5.47 cm in males and 4.12 to 4.55 cm in females. Multiple regression equations were calculated by including all the three measurements, which showed improvised correlation coefficients (0.829 in males and 0.747 in females) with standard error of estimate 4.02 cm in males and 3.73 cm in females. This is comparable to other studies conducted in Eastern and Northern India,[9,10] Mauritius,[11] Turkey[4,12] and Korea[13] (Tables 5 and 6). However, the study on German population showed high standard errors for stature estimation from the lengths of radius and ulna.[5] The highest correlations were observed between the stature and tibial length, which explains that the weight bearing bones are better indicators of the stature.

We conclude that there is a linear relationship between the length of bones and body height. The lengths of tibia, radius and ulna could be helpful to estimate stature. The regression equations of the present study could be used to estimate stature in South Indian population.

Table 1: Descriptive statistics of the study sample

Parameter	Male			Female		
	Min	Max	Mean	Min	Max	Mean
Age (years)	18.00	22.00	19.80±1.21	18.00	22.00	19.34±0.87
Stature (cm)*	153.20	192.00	173.61±6.97	152.40	178.40	163.04±5.43
Tibial length (cm)*	37.90	51.00	42.24±3.04	35.60	44.60	39.43±0.30
Ulnar length (cm)*	25.00	34.40	29.02±1.69	24.40	30.90	27.64±0.19
Radial length (cm)*	22.50	31.10	26.73±2.07	21.90	26.80	24.33±0.17

* Difference between male and female is significant ($p<0.05$)

Table 2: Linear regression equation for estimating stature in males

Parameter	Equation	SE (cm)	R	R^2
Tibial length	H = 1.636y + 104.484	4.931	0.714	0.510
Ulnar length	H = 2.575y + 98.876	5.500	0.625	0.390
Radial length	H = 2.124y + 116.836	5.471	0.630	0.397

H- Height (cm); y- Length of the bone (cm); SE- Standard error of the estimate (cm); R- Correlation coefficient.

Table 3: Linear regression equation for estimating stature in females

Parameter	Equation	SE	R	R^2
Tibial length	H = 1.670y + 97.19	4.118	0.661	0.437
Ulnar length	H = 2.427y + 95.555	4.371	0.605	0.366
Radial length	H = 2.528y + 101.515	4.550	0.560	0.313

H- Height (cm); y- Length of the bone (cm); SE- Standard error of the estimate (cm); R- Correlation coefficient.

Table 4: Multiple regression equations for estimating stature

Sex	Equation	SE	R	R^2
Male	H = 1.148a + 0.635b + 1.250c + 73.288	4.024	0.829	0.687
Female	H = 1.151a + 1.260b + 0.534c + 69.840	3.730	0.747	0.557

H- Height (cm); a- Tibial length (cm); b- Ulnar length (cm); c- Radial length (cm); SE- Standard error of the estimate (cm); R- Correlation coefficient.

Table 5: Comparison of different studies in males

Study	Tibia			Radius			Ulna		
	Length (cm)	R	SE (cm)	Length (cm)	R	SE (cm)	Length (cm)	R	SE (cm)
Present study	42.24±3.04	0.714	4.93	26.73±2.07	0.630	5.47	29.02±1.69	0.625	5.50
Celbis [4]	-	-	-	24.5±1.15	0.638	4.70	26.4±1.23	0.619	4.80
Mall [5]	-	-	-	24.6±1.25	-	7.73	26.5±1.54	-	7.50
Mohanty [9]	37.08±2.34	0.952	2.87	-	-	-	-	-	-
Bhavna [10]	36.48±1.91	0.765	3.67	-	-	-	-	-	-
Ozaslan [12]	38.37±2.40	0.740	4.46	-	-	-	-	-	-
Choi [13]	35.20±2.10	0.781	4.23	23.0±1.3	0.735	4.62	24.7±1.3	0.714	4.97

R- Correlation coefficient; SE- Standard error of the estimate (cm).

Table 6: Comparison of different studies in females

Study	Tibia			Radius			Ulna		
	Length (cm)	R	SE (cm)	Length (cm)	R	SE (cm)	Length (cm)	R	SE (cm)
Present study	39.43±0.30	0.661	4.12	24.33±0.17	0.560	4.55	27.64±0.19	0.605	4.37
Celbis [4]	-	-	-	21.7±1.19	0.852	3.50	23.6±1.20	0.764	4.30
Mall [5]	-	-	-	22.0±1.03	-	7.73	23.8±1.07	-	7.55
Mohanty [9]	35.03±2.60	0.939	3.44	-	-	-	-	-	-
Bhavna [10]	33.66±1.50	0.717	3.42	-	-	-	-	-	-
Ozaslan [12]	35.13±2.22	0.790	3.93	-	-	-	-	-	-

R- Correlation coefficient; SE- Standard error of the estimate (cm).

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Determination of Sex from Sacrum: Its Forensic Utility

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ABSRTACT

Background: Aim of the study is to determine sex of sacrum using different parameters like curved length, vertical length, anteroposterior diameter and transverse diameter of first sacral vertebra, width of sacrum, length of ala and extent of sacral hiatus. **Materials & Methods:** The intact sacra of 110 adult human of known sex obtained from government medical college Aurangabad. The various parameters like length, width, curved length, anteroposterior and transverse diameter of first sacral vertebra were measured by using thread, sliding caliper and ruler. Several indices like sacral index, curvature index corporobasal index and alar index were calculated. **Results:** Demarking points were evolved and none of the parameters appeared to be promising in identifying sex, except transverse diameter of first sacral vertebra and length of sacrum which is useful in study of medico-legal cases. Various indices were calculated using standard formula for each, the mean and standard deviation for each index was calculated along with demarcating points which determine sex with about 100 percent accuracy.

Key Words: Sex Determination, Sacrum

INTRODUCTION

The sacrum is an important bone so far as sex determination is concerned and a very little metrical data is available on Indian population. Anatomists, anthropologists and forensic experts have always been challenged to determine the sex of skeletal remains to establish the identity of a person. Once sex is determined, the half of the suspected population is excluded from further investigation. Over the years different researchers have carried out various types of measurements on human sacra of different races and regions. One of the well known methods for sex determination using sacra is by sacral index method. As the available literature clearly showed that the sacrum has not been widely studied in India, therefore few researchers have undertaken the study of sacrum. According to, the metrical study of sacrum has been carried out earlier by Wilder (1920)[1], Faweet (1938)[2], Davivongs (1963)[3] and Jit & Singh (1966)[4] advocated the demarcating point (DP) which identifies sex with 100 percent accuracy. Singh and Gangrade (1968)[5] have said that within the same population the mean value can be significantly different in bones from different zones. Singh and Singh (1972)[6] have shown that demarcating points (DP) should be calculated separately for different regions of the population, the available literature shows that the Indian sacra has not been studied widely except by Singh and Raju (1977)[7] and Jana et al (1988)[8]. Hence the present study was undertaken with a view to study the sex-differences in the sacra among the Maharashtrian population. The purpose of this study was to develop discriminant functions which can be used for sex determination on measurements of the pelvis of modern Greeks.

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MATERIAL & METHODS

The present study was carried out on intact sacra of 110 adults which include 70 male and 40 female. The following measurements were recorded using thread, sliding caliper and ruler.

1]	CL	Curved Length
2]	VL	Vertical Length
3]	AP- S1	Anteroposterior diameter of S-1 vertebra
4]	T- S1	Transverse diameter of S-1 vertebra
5]	W- S1	Total width of sacrum
6]	LA	Length of ala
7]	E	Extent of sacral hiatus

The transverse and anteropostrior diameter of first sacral vertebra and length of ala was measured using sliding caliper. The transverse diameter [T-S1] of first sacral vertebra was measured by taking one point on each side of the lateral most point on superior surface of the vertebra. The anteroposterior diameter [AP-S1] was measured by taking one point on anterosuperior border and another on posterosuperior border of the 1st sacral vertebra by means of the sliding caliper. The curved length [CL] was measured from upper border of body of first sacral vertebra to lower border of body of fifth sacral vertebra using thread and the length was taken using a ruler in centimeters. The vertical length [VL] was measured using vernier caliper between upper surface of body of 1st sacral vertebra and lower end of fifth sacral vertebra in centimeters. Anteroposterior diameter [AP-S1] and transverse diameter [T-S1] across the body of 1st sacral vertebra of first sacral vertebra was measured using vernier caliper in centimeters. The width of sacrum [W] across the entire upper surface including ala and body of 1st sacral vertebra was measured using vernier caliper in centimeters, and length of ala [LA] between lateral aspect of body of 1st sacral vertebra and the right or left border of sacrum on the upper surface of sacrum was measured using vernier caliper in centimeters. The extent of upper end of sacral hiatus [E] was noted to the level of dorsal sacral intervertebral foramina.

From the above parameters values of mean and standard deviation were calculated from each parameter.

The range for each parameter was calculated using statistical analysis along with mean and standard deviation, the P value was determined to find out whether the sexual difference between the two means was significant or not.

$$1)\ \text{Sacral index} = \frac{\text{Width of sacrum}}{\text{Vertical length of sacrum}} \times 100$$

$$2)\ \text{Alar index} = \frac{\text{Vertical length}}{\text{Midventral vertical length}} \times 100$$

$$3)\ \text{Index of body of 1st sacral vertebra} = \frac{\text{Anteroposterior diameter of 1st sacral vertebra}}{\text{Transverse diameter of 1st sacral vertebra}} \times 100$$

$$4)\ \text{Corporobasal index} = \frac{\text{Transverse diameter of 1st sacral vertebra}}{\text{Width sacrum}} \times 100$$

$$5)\ \text{Curvature index} = \frac{\text{Vertical length}}{\text{Curved length}} \times 100$$

RESULTS

The mean, calculated range and demarking points of various parameters and percentage of bones in which sex could be determined by them is given in table 1. None of the parameters showed any promising result except transverse diameter of first sacral vertebra and vertical length of sacrum.

Table 1: Demarking points for various parameters of sacrum for determination of sex in Maharashtrian population

Diameter	M/F	Mean ± S.D	Calculated range	Demarcating Point (D.P.)	No. Beyond D.P.	Percentage Beyond D.P.
Vertical Length	M	9.93 ±1.93	3.24 - 20.1	>9.8	(48)	(68.57)
	F	9.29± 1.30	5.12 - 9.87	<3.2	(0)	(0)
Transverse Diameter 1st Sacral Vertebra	M	3.92 ± 4.07	8.3 -16.1	>4.2	(13)	(18.57)
	F	3.31±3.66	7.67 - 4.28	<2.3	(0)	(0)
Width of Sacrum	M	11.52±1.55	1.39 - 22.7	>11	(12)	(17.14)
	F	11.57 ±1.59	0.63 - 11.0	<1.3	(0)	(0)
Alar Index	M	68.76±3.81	12.31-114.8	>73.22	(8)	(11.42)
	F	121.86±3.12	28.21-73.22	<12.31	(0)	(0)

The findings of the study showed that the female sacra are shorter and wider while male sacra are longer and narrower. We have determined sex of 48 male sacra using vertical length, 13 male sacra from transverse diameter of first sacral vertebra, 12 male sacra from width of sacrum, and 8 male sacra from alar index.

Fig. 1: Female Sacrum short and wider

Fig. 2: Male sacrum long and narrow

DISCUSSION

Most of the investigators have concluded that sacrum depicts definite sex and ethnic character, it is seen from table -2 that sacral index is higher in females than in males irrespective of the type of population. In findings of our study the sacral index for Maharashtrian female is 119.6 which are greater than that for Maharashtrian males 101.3, this indicates that female sacra are shorter and wider while male sacra are longer and narrower.

COMPARISON OF SACRAL INDICES

The sacral index in case of males in Agra region is 98.21 similar observation was reported by Jana etal (1988) [9] in their study of sacra of Budhwan region. (the mean sacral index of the male being 95.7(cited by Mishra S.R et al in 2003)[10]

The present study in the Indian Maharashtrian population the mean sacral index is 101.3 which belong to subplatyhieric group.

On the basis of sacral index the sacrum has classified into three groups

1. Dolicohieric - S1 below 100,
2. Subplatyhieric - S1 between 100-106
3. Platyhieric - S1 above 100

According to Wilders classification Maharashtrian female sacra belong to platyhieric group while Maharashtrian male sacra belong to subplatyhieric group. A comparison of the mean, range and standard deviation of the sacral width in present study [11.51 in male and 11.72 females] while the findings of other workers [99.92 in males

Fig. 3: Male and Female Sacrum showing Transverse diameter of body and ala of 1st sacral vertebra

and 101.24 in females] indicates that the sacral width is more in females than males [10-11],.

Similarly a comparison of mean vertical length of sacrum of present study [9.93 males and 9.29 females] with findings of other workers like Raju et al (1981)[12] [10.49 males and 9.27 females] indicates that the mean vertical length is lower in females than males. From above findings we can conclude that maharashtrian female sacra have more width and less vertical length thus we can say that female sacra are shorter and wider while male sacra are longer and narrower.

The limiting points of an actual range of every measurable parameter in males and females are taken as identification points [I.P.s] to ascertain sex to an unknown bone but the fallacy of such I.P. has been discussed by Singh & Raju [1977][7] to be certain calculated range is found from standard deviation and mean of any parameter, limiting points of such calculated range have been called as demarking points (D.P.). by Jit and Singh (1966)[4] which identify sex with 100 percent accuracy from any given region.

From the study of sacrum carried out by Raju et al [12] in Varanasi region only length of sacra, transverse diameter of s1 vertebra, width of sacrum and alar index were useful in identification of sex of sacrum while other parameters were not useful.

It is observed from Table-1 that the sex of 48 male sacra were determined using a single parameter of vertical length whose demarking point is beyond 9.8 cm with 100 percent accuracy, similarly 13 male sacra (18.57) were determined by using transverse diameter of S1 vertebra whose demarcating point is beyond 4.28 cm, 12 male sacra (17.14 %) determined from width whose demarcating point is 11cm and 8 male sacra determined whose demarcating point is beyond 73.22 was possible.

CONCLUSION

1)Sacral index is higher in females (119.6) than males (101.3) thus female sacra belong to platyhieric group while male sacra belong to subplatyhieric group.

2)Sacral width is more in females (11.7) than in males (11.5).

3)Vertical length is less in females (9.29 cm) than males (9.93)

4)48 male sacra sex determined from single parameter of vertical length whose DP is beyond 9.8 cm with 100 percent accuracy.

5)13 male sacra were determined from transverse diameter of 1st sacral vertebra and 8 male sacra demarcating point is beyond 73.22 from alar index 12 male sacra whose demarcating point is beyond 11cm from width of sacrum could be identified with 100 percent accuracy.

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Original Article

Incidental Histopathological Findings in Medicolegal Autopsies: A Two Year Retrospective Case Study with brief review of literature

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Kumari Vinaya**

ABSTRACT

A handful of histopathological findings unrelated to the cause of death are noticed in routine histopathological examination of medicolegal autopsies. These findings which are of practically no significance to the autopsy report however have an immense academic value. A two year retrospective study was undertaken to enlist the various incidental microscopic findings in autopsy specimens. The interesting findings that were noted are Macronodular cirrhosis, Miliary tuberculosis, Aspergillosis of lung, focal von Meyenberg complex, Solitary cyst of liver, Intra tubular germ cell neoplasia (ITGCN), Ectocervical cavernous hemangioma and vegetations over the aortic valves. This article highlights these incidental findings along with a brief review of literature.

Key words: Incidental, Histopathological, Medicolegal autopsies.

INTRODUCTION

A detailed examination of the deceased is essential in framing the final report of a medicolegal autopsy. The final autopsy report contains the pathology of the organs which caused the death. Less frequently the histopathological findings unrelated to the cause of the death go unnoticed. In most of the academic institutions, due to the dearth of time, the forensic experts and pathologists are content with the final autopsy report and the other incidental findings are given little value. This study highlights the various incidental microscopic findings in medicolegal autopsies, which gain a prime importance in academic and research purposes.

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MATERIALS AND METHODS

A two year (2008-2009) retrospective study of medicolegal autopsies was conducted at the Department of Pathology, Shimoga Institute of Medical Sciences, Shimoga, Karnataka, India. The organs relevant to the case concerned were sent for histopathological examination. Representative bits from the concerned organs were processed in a routine manner. The gross and microscopic findings, unrelated to the cause of death were taken into consideration and a brief discussion of the salient features has been made.

RESULTS

A total of 600 autopsies were conducted during the year 2008 and 2009. The organs relevant to the case concerned were sent for histopathological examination. Out of 600 autopsies conducted, various organs from 68 autopsies were sent for histopathological examination. Out of the various organs sent for histopathological examination, only ten organs showed incidental findings as depicted below (Table-1).

Table 1: Showing the various incidental histopathological findings

S. No	Cause/manner of death	Age/Sex	Organs received	Incidental histopathological finding
1	Road Traffic Accident	35/M	Liver	Macronodular cirrhosis.
2	Post surgical	26/F	Brain, lungs, heart, liver, spleen, kidneys, uterus	Miliary tuberculosis.
3	Head injury	50/M	Lung and liver	Lung – Aspergillosis. Liver – Focal von Meyenberg complex.(Fig:1)
4	Consumption of poison	35/m	Kidney, Liver, both lungs	Lung – Fibrocaseous tuberculosis.
5	Unknown	60 yrs male	Liver	Solitary Cyst – Liver (Fig:2)
6	Post surgical	26/F	Brain, Lungs, heart, liver, spleen, kidneys, uterus with adnexae	Cervix – ecto cervical cavernous hemangioma.(Fig:3)
7	Road Traffic Accident	35/M	Liver	Fatty liver
8	Road Traffic Accident	45/M	Lungs	Tuberculosis
9	Assault	37/m	Lungs, liver, kidney, spleen, heart, brain, kidneys and testis	Testis- ITGCN. (Fig:4&5)
10	Snake bite	40/f	Kidney, heart lungs	Vegetations over aortic valves.(Fig:6)

Fig. 1: Photomicrograph of liver showing von Meyenburg complex.(10X)

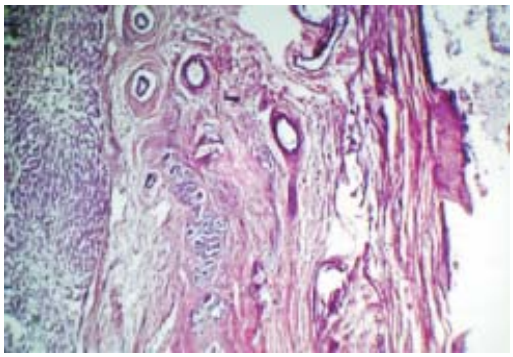

Fig. 2: Photomicrograph of liver showing solitary cyst.(10X)

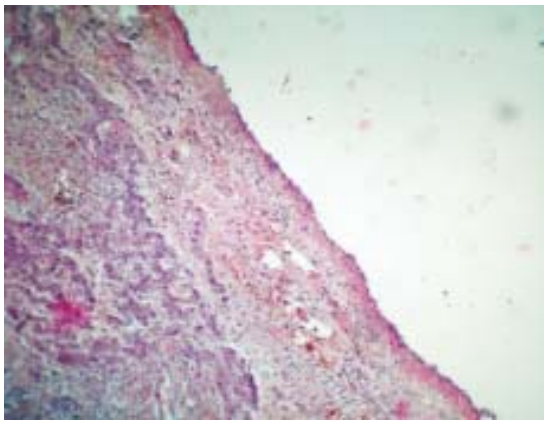

Fig. 3: Photomicrograph of the cervix showing Cavernous hemangioma.(5X)

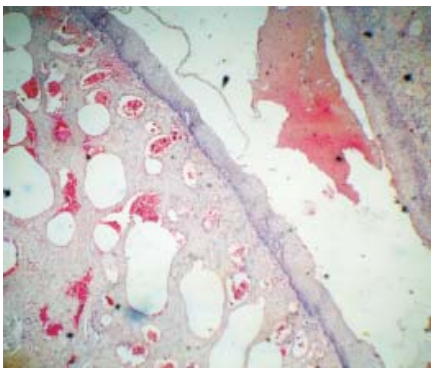

Fig. 4: Photomicrograph of Intra Tubular germ cell Neoplasia (ITGCN).(10X)

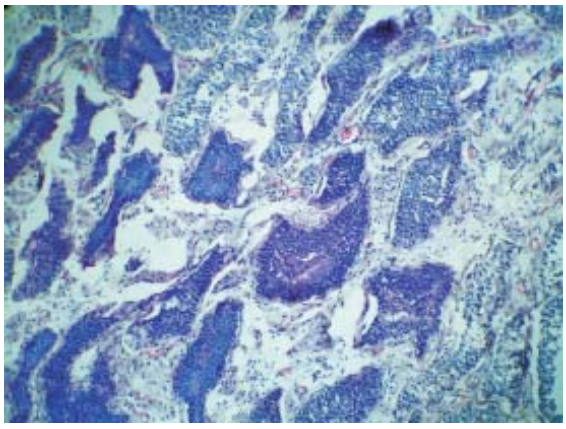

Fig. 5: Photomicrograph of Intra Tubular germ cell Neoplasia (ITGCN).(40X)

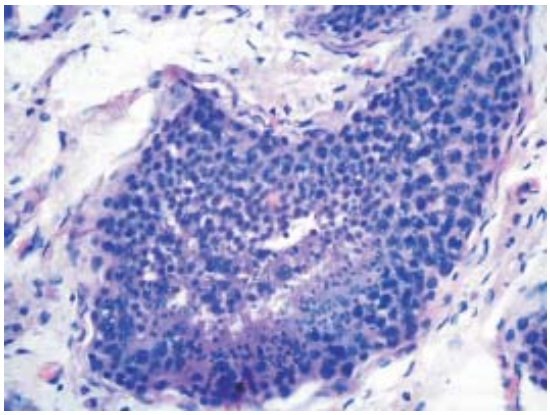

Fig. 6: Gross – Vegetations over aortic valve

DISCUSSION

Incidental autopsy findings though not contributory to the cause of death, yet are very important from academic point of view. Among the cases which we came across, was a 35 years old male, who died in a road traffic accident, whose liver showed classical features of Macronodular cirrhosis. The deceased had a history of chronic alcoholism.

In a case of 26 year female, who underwent lower segment C-section and expired during the immediate post operative period, there were features of miliary tuberculosis in all the organs that were sent for histopathological examination. It was not clear whether the deceased had a previous history of tuberculosis or the deceased acquired tuberculosis during pregnancy. However wide spread caseating granulomas were seen in multiple organs.

A 50 year old male with head injury, underwent autopsy. Lungs showed classical Aspergillous colonies and liver showed focal von Meyenberg complexes. Von Meyenberg complexes, also called as bile duct hamartomas are small clusters of modestly dilated bile ducts embedded in a fibrous or a hyalinised stroma. They presumably arise from residual embryonic bile duct remnants and are typically seen in late childhood or adolescence or during adult years. Lesions are usually found incidentally during radiographic studies or at autopsy. They are common and do not have any clinical significance, but caution has to be exercised during radiography as these lesions can be mistaken for metastatic malignancy. [1,2,3]

A 35 year old male who expired due to consumption of an unknown poison showed extensive fibrocaseous tuberculosis in the lungs. The cause for the suicide is unknown but the informants ascertained that there was no history of the patient suffering from tuberculosis. Similarly in a case of road traffic accident of a 45 year male, the lungs showed presence of fibrocaseous tuberculosis. Another victim of road traffic accident, a 35 year old male showed an incidental finding in the form of extensive fatty liver. Fatty change is a common finding in the general adult population and it is observed in 5-10% of the

adults. In the present study, among the various organs of 68 autopsy cases which were sent for histopathological examination, 30 were liver, out of which a total of 6 cases showed fatty change. An elderly male who died due to an unknown reason showed a solitary cyst in the liver measuring 4x4 cms. Cysts in the liver are usually multiple, lined by cuboidal to flattened epithelium, but occasionally solitary cysts are seen and these are of biliary origin and are commonly seen in women than men. The solitary cyst may be unilocular or multilocular. It is presumed to be of developmental origin. The lining consists of a single layer of flat, cuboidal or columnar

epithelium which rarely may be ciliated or squamous. [2,4]

The cause of death of a 25 year female following laproscopic tubectomy was ascertained through post mortem examination. Histopathology revealed an incidental finding in the form of Cavernous hemangioma of the ectocervix. Cavernous hemangiomas of the cervix are extremely rare, benign lesions. To date, fewer than 50 cases have been reported. Most of these lesions are asymptomatic incidental findings, but sometimes, they may cause abnormal vaginal bleeding in the form of menometrorrhagia and postcoital spotting. They should be included in the differential diagnosis of patients with vaginal bleeding. [5,6] Ozver S et al has reported a case of cavernous hemangioma of the cervix in a 53-year-old patient with the complaint of postcoital spotting.[6]

A post mortem examination was conducted on a 37 year old male who had been assault. The viscera that were sent for histopathological examination included lungs, liver, heart, spleen, brain, kidneys and testis. The testis showed features of Intra Tubular Germ Cell Neoplasia (ITGCN). ITGCN is encountered with a high frequency in cryptorchidism, prior to germ cell tumours, strong family history of germ cell tumors, androgen insensitivity syndrome and gonadal dysgenesis syndrome. Untreated ITGCN progresses to invasive germ cell tumor in approximately 50% of cases over 5 years follow up. Thus, its significance is similar to carcinoma in situ in other organs. [1,2]

Testes with ITGCN are usually normal in size but can be smaller than normal. Histologically, ITGCN is characterized by large primitive atypical cells that are usually twice the size of normal germ cells. These cells lie along the thickened basement membrane of atrophic seminiferous tubules or may replace the entire tubules. The malignant germ cells have large nuclei with prominent nucleoli and abundant clear cytoplasm that is rich in glycogen, demonstrable by a periodic acid–Schiff (PAS) stain. Because normal germ cells are not stained with PAS, this stain may help to distinguish ITGCN cells from normal cells.[7,8]

ITGCN is usually found in testes which harbour invasive germ cell malignancy, but sometimes, ITGCN is found incidentally in the absence of an obvious tumour, occasionally in children or adolescent with various intersex states, but most often in the study of testicular biopsies performed for study of infertility.

A 40 year old female, who had succumbed to snake bite immediately following the incident, showed vegetations over the aortic valves. Microscopically the vegetations were sterile. Although disseminated intravascular coagulation (DIC) is well documented following viperine bite and the underlying mechanism of NBTE is thought to be DIC, there is no report of NBTE in humans following snake bite. Singh S et al reported a case of a young male who following viperine bite developed local swelling, superficial gangrene of tissues at the site of bite, and oliguria and died following multiple cerebral infarcts and acute renal failure. The post-mortem examination showed NBTE of the aortic valve, multiple embolic infarcts of brain, spleen and kidneys, acute tubular necrosis and features of DIC in the brain in the form of fibrin thrombi in the capillaries, perivascular hemorrhages and necrosis.[9] In the concerned case, the middle aged female succumbed to the snake bite within 24 hrs. With the available literature, it couldn't be concluded whether the vegetations were following snake bite or due to some other cause.

CONCLUSION

Incidental findings in medicolegal autopsies, though do not influence the cause of death, yet gain a prime importance in the histopathological report which contributes to the academic and research development. Cases such as solitary cyst in liver, Von Meyenburg complexes, and cavernous hemangioma of cervix produce little or no clinical symptoms and most of these are detected only as an incidental finding in autopsy specimens. Hence the importance of incidental

findings in medicolegal autopsies cannot be under emphasized.

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Determination of Sex by Foramen Magnum Morphometry in South Indian Population

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ABSTRACT

Background: Sex determination in mutilated and fragmentary remains is an important exercise in forensic practice. Present study was conducted to establish sex using foramen magnum morphometry on skulls from autopsied bodies. **Materials & Methods:** A total of 230 skulls (146 males and 84 females) were studied to measure antero-posterior diameter (length) and transverse diameter (breadth) of foramen magnum. Area of foramen magnum was calculated and Sectioning point analysis was performed. **Results:** Mean length, breadth and area of foramen magnum in male were 36.40 mm, 32.93 mm and 939.50 mm2 respectively, whereas the mean length, breadth and area in females were 31.62 mm, 28.32 mm and 700.5 mm respectively. Thus, measurements in males were significantly higher as compared to females. Sectioning points for length, breadth and area were 34.01 mm, 30.62 mm and 820 mm2 respectively. Sectioning Point analysis showed the accuracy of sex determination is more with area of foramen magnum followed by length and breadth of foramen magnum. **Conclusion:** The foramen magnum morphometry can be an important tool in sex differentiation.

Key words: Skull; foramen magnum; sex determination; south Indian.

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INTRODUCTION

In the field of forensic anthropology, determining gender from skeletal remains has been an age-old problem. Determination of sex forms an irreplaceable component of identification in unknown, decomposed, mutilated and skeletonized bodies. There are numerous morphological and morphometric methods to determine the sex form a skeleton. The process becomes even more complicated when fragmentary skeletal remains are the only available source as in explosions, warfare and other mass disasters like aircraft accidents[1]. In the forensic context, the anthropological analysis for sexing skeletal material provides relatively fast and reliable data as this could help to narrow down the police investigator's field of search to

approximately half the population which would otherwise be exhausting the available resources[2]. This stresses need to determine new techniques that are less economical, less time consuming and probably more accurate in the determining sex of an unknown body[3].

In determining gender from skeletal remains, the skull plays an important role, as it is probably the second best region of the skeleton, next only to pelvis for this purpose[4,5].

In the present study we chose foramen magnum, which is the central, deepest, & anatomically important part of the posterior cranial fossa of the skull to determine the gender of a person from its diameters and the area.

Studies on morphometric analysis of foramen magnum have been published previously by various researchers, but these have been on dried skulls or Computer tomography (CT) enabled studies[1,6,7,8,9,10,11,12,13]. The current study is based on skulls from cadavers brought for medicolegal autopsy as this gives an easy access to foramen magnum and can be studied with minimal requirements.

Further, as there are significant metric and morphologic biological differences among the skulls of Caucasoid, Mongoloid, and Negroid races[3], so values of the studies done on one population cannot be applied to another population in the determination of gender. Keeping these points in mind the authors have conducted present study to generate the values for the same purposes.

MATERIAL AND METHODS

This study was conducted in Department of Forensic Medicine, Kasturba Medical College, Manipal, India. Materials for the present study consisted of skulls of dead bodies of both sexes of known age, autopsied at the mortuaries attached to the Department of Forensic Medicine, Kasturba Medical College, Manipal; District Wenlock Hospital, Mangalore and Victoria Hospital, Bangalore. A total number of 230 cases, 146 male and 84 female adult skulls (above 18 years) belonging to South Indian population were studied. Skulls with fractures were excluded from the study.

Length of foramen magnum (antero-posterior diameter), breadth of foramen magnum (transverse diameter) and area of the foramen magnum were measured using an inside caliper and a vernier caliper (Fig 1). Anteroposterior diameter is the direct distance from Basion to Opisthion and the transverse diameter is the distance between the lateral margins of the foramen magnum at the point of greatest lateral curvature[14]. Inside Caliper there is an instrument used to measure the inside diameter of any hollow object. It has two prongs, which can be fixed at the desired position with the help of a fixing screw (Fig 2). These dimensions were measured after extracting the brain, and stripping of the dura adherent to the base of the skull.

Calculation of the Area of the foramen magnum

The area of the foramen magnum was calculated using the Radinsky's formula[15]. A = 1/ 4 x w x h x 22/7; where A – Area, w – Length, h – breadth

Fig. 1: Foramen magnum measurements

A-Basion, B- opisthion, C & D – transverse diameter.

The data was analyzed using SPSS (Statistical Package for Social Sciences, version 11.0) computer software and results were drawn. The significance of results was tested using student's

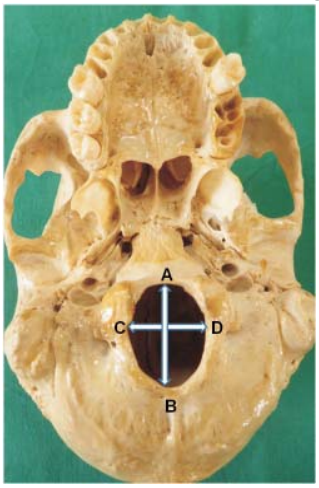

Fig. 2: Inside caliper

t-test. The p- value of less than 0.001 was considered as significant. Sectioning point analysis was performed to differentiate the sex from antero posterior, transverse diameter and area of foramen magnum. For the dimensions and area of foramen magnum, average of mean values in males and females was taken as cut off value for sex determination and termed as the 'sectioning point'. To find the accuracy of Sectioning points (SP) in sex determination, sensitivity and specificity was derived for each parameter by cross tabulation.

RESULTS

The data collected was analyzed and sectioning point (SP) and descriptive analysis was employed for determining the sensitivity and specificity of SP's for each parameter. The mean length, breadth and area of foramen magnum among the males were 36.40 mm, 32.93 mm and 939.50 mm^2 respectively. The mean length, breadth and area among the females were 31.62 mm, 28.32 mm and 700.5 mm respectively [Table 1]. The length ($p<0.001$), breadth ($p<0.001$) and area of foramen magnum ($p<0.001$) in males were significantly higher compared to females [Table 1].

Table 1: Descriptive Statistics: Measurements of the foramen magnum

	Male (n=146)				Female (n=84)			
	Min	Max	Mean	S.D	Min	Max	Mean	S.D
AP	32	49	36.40	3.27	26	36	31.62	2.05
TD	29	46	32.93	2.35	24	33	28.32	2.12
A	741.04	1769.39	939.50	146.15	418.4	904.3	700.50	86.02

AP – Anteroposterior diameter (mm), TD – Transverse diameter (mm), A – Area (mm2), Min – Minimum, Max – Maximum, S.D. – Standard Deviation, * – $p<0.001$

The SP's for length, breadth and area were 34.01 mm, 30.62 mm and 820 mm^2 respectively. The result of this analysis indicates that the SP for length has an accuracy of 82.1% in female and 95.9% in males. The SP for breadth has an accuracy of 89.3% in females and 88.4% in males. The SP for area has an accuracy of 90.5% in females and 93.8% in males [Table 2]. Based on these findings the accuracy of sex determination is more with the area of foramen magnum followed by length and breadth of foramen magnum in decreasing order.

Table 2: Accuracy of sectioning points by crosstabs analysis

	SP	Male	Female
AP	34.01 mm	95.9%	82.1%
TD	30.62 mm	88.4%	89.3%
A	820 mm^2	93.8%	90.0%

AP – Anteroposterior diameter, TD – Transverse diameter, A – Area, SP – Sectioning Point

DISCUSSION

The data from earlier studies were done on dry skull or were CT based, employing different techniques and statistical methods cannot be compared per se, as the measurements are recorded from the interior of the skull as against from the exterior of the skull in previous studies. The length of the foramen magnum in males is higher as compared to earlier studies, whereas the breadth of foramen magnum is lower compared to Gapert et al[8] and Manoel et al[9]. The breadth and area of foramen magnum are higher in the present study compared to earlier studies. The sectioning point for length of foramen magnum calculated for western population[8,9] is higher compared to the present study and other studies conducted on Indian population, whereas the sectioning point for area of foramen magnum is higher in the present study compared to other studies[6,7] [Table 3 &4].

Table 3: Comparison of foramen magnum measurements with earlier studies

	Routal et al[6]		Sayee et al[7]		Gapert et al[8]		Manoel et al[9]		Present study	
	M	F	M	F	M	F	M	F	M	F
AP	35.5	32.0	34.2	33.5	35.91	34.71	35.7	35.1	36.4	31.62
TD	29.6	27.1	28.5	28.0	30.51	29.36	30.3	29.4	32.93	28.32
A	819.0	771.0	---		783.82	730.28	---		939.50	

M – Male, F – Female, AP – Anteroposterior diameter (mm), TD – Transverse diameter (mm), A – Area (mm2)

Table 4: Comparison of Sectioning point measurements with earlier studies

SP	Routal et al[6]	Sayee et al[7]	Gapert et al[8]	Manoel et al[9]	Present study
AP	33.75	33.85	35.31	35.4	34.01
TD	28.35	28.25	29.94	29.85	30.62
A	795.0	---	757.05	---	

AP – Anteroposterior diameter (mm), TD – Transverse diameter (mm), A – Area (mm2), SP – Sectioning Point

The difference in findings of our study from the previous studies could be attributed to methodology of recording the measurements. We employed different technique of measuring foramen magnum, as the availability of sophisticated CT is a premium in our country.

Extensive search of literature did not reveal any similar studies done on cadavers and this is the first of its kind to our knowledge. The observations made in our study justifies that data compiled for a certain population cannot be employed for determining sex in another population.

We would suggest that foramen magnum is a valuable tool for sex determination and can be employed with reasonable accuracy in the South Indian population especially in circumstances where only skull fragments are available as evidentiary material. However similar studies are recommended for different and larger populations to define more accurate and reliable sectioning points for sexing foramen magnum.

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Latest Advances in Antimortem Dental Records: A Contribution to Forensic Medicine

Vishwas Bhatia
Garima Bhatia
Nitul Jain

ABSTRACT

What better can be the thought to reviving an individual's identity even after death.identification of individuals not known is of utmost importance in this world.moreover personal identification is important in investigating criminal cases,attaining legal documents of death and also settling of insurance policies .every individual is unique, so is his identity and similarly his dentition as well., Forensic odontology plays an important role in retriving evidence and identifying an individual and that too with a conclusion that is genuine and can be relied upon., People might feel what role could a dentist play in reviving a person's identity after death.but it is for us to bring it to their notice that the tooth is the hardest structure of body and its unique composition makes it resistant to various mechanical, thermal and chemical insults.,Keeping in view the above thoughts in mind,one can understand what role can a dentist play in investigations regarding death.dental records can be a boon in the progress of investigations that sometimes need a clue for identification of an individual along with other proofs,thus helping in confirmation of any doubt which arises., The aim of this paper is to present not only the various kind of dental records but also some of latest dental advancements that can greatly help in recognizing an individual.this would be a step forward from us dentist in making all practitioners aware about these records.such an effort would collectively make all practioners,dental and medicine in making people understand the value and importance of keeping an individual dental record.

Key words: forensic odontology, dental records, dental identification

INTRODUCTION

Forensic odontology is the study of dental applications in legal proceedings. The subject covers a wide variety of topics including individual identification, mass identification, and bite mark analysis. The study of odontology in a legal case can be a piece of incriminating evidence or an aspect of wide controversy.

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"unique is an individual,unique is his/her dentition!!" Yes the saying really means what it says.it can be understood by the fact that each tooth has five surfaces making it a total of 160 surfaces,each surface having different shapes,size and they too may have fillings, crowns, extractions, bridges,orthodontic brackets,metal dentures and the latest ,intraoral implants and dental jewels used nowadays as a dental accessory. Criminal investigations, insurance settlements, military proceedings and legal certification of death are some of the areas of interest in person identification [(1)].

Though fingerprints, dental comparisons and biologic methods such as dna profiling are the most reliable means of identification, but unfortunately many times conventional forensic techniques don't provide any conclusive means of identification.

In such scenarios, forensic odontology may play an important role in the retrieval of evidence and identification, having a high degree of reliability and simplicity. Tooth, the hardest organ, because of their composition and anatomic location are resistant to various mechanical, thermal and chemical insults [1, 2, 3].

A question may arise- why would forensic odontology be so important? An answer to this possibly is the fact that teeth are the least destructible part of the body and may remain more or less intact for many years beyond death. They contain information about the physiological and pathological events in the life of the individual which remain as markers within the hard tissues of the teeth "somewhat similar to osteobiography of an individual".therapeutic activity by a dentist in the form of restorations and prostheses may modify an individual's dentition in a more or less unique manner. Various restorations may survive incinerations of more than 1600^0c [2, 3].

The alfred p. Murrah federal building bomb blast [2], which happened at oklahoma city on april 19, 1995, is an interesting example to prove so. It has been considered as the "gold standard of disaster response". The forensic teams worked for 16 days for 12 hours shifts daily. Their hard work led to recovery of 168 victims, and simultaneously 168 positive identifications were made out. Out of these cases, 45 cases were identified on the basis of dental identifications, 77 cases by a combined dental id & fingerprints identification techniques and remainders by footprints, palm prints, visual, radiological, and dna means.

In an another exceptional case, where forensic odontology proved to be of immense value is the asian tsunami which struck off the shores on 26th of december 2004

In this unfortunate event, there were more than 2,00,000 casualties involving more than 58 nationalities victims. More than 20 countries were involved in identification process. Among all means of identifications, dentistry proved to be the most valuable id's mean in up to 85% of cases [4].

Also, talking statistically, fellingham and coworkers have calculated that there are 1.8×10^{19} possible combinations of 32 teeth being intact, decayed, missing or filled. Rawson and associate mathematically calculated that the biting edge of 12 anterior teeth can be arranged in 1.3×10^{26} different ways [2].

Among individual cases, most notable ones are those of adolf hitler and eva brown, who were identified because of a telephonic bridge worn by hitler in his lower arch [5].

All of the above said examples are just a few among thousands. This highlights how important a dentist can be as a good source for much needed information arising out of death investigations. Besides identification, forensic odontology has also important contribution towards age estimation, sex and race determination, bite mark analysis, collection of dna from pulp or entrapped cementocytes in cementum, during mass disasters etc to name a few [2, 6].

Dental records- past to present day

Latest treatments

1. Dental implants- nowadays many patients are turning up for dental implants as a replacement for missing natural tooth. These implants are osseointegrated in the dental arch and thus can serve as a permanent marker to identify the human body, as it is impossible to remove them from one's body unless removed by a dental surgeon. Also, as these implants are mostly made up of titanium like materials, they may survive virtually any sort of insults.

2. Dental jewellery- dental jewels, commonly used nowadays like diamond studs can be permanently fixed on the facial surface of the tooth, thus adding on to a sparkling twinkle in the smile adding to the beauty of an individual. These jewels are permanently fixed on the tooth and cannot be removed without a prosthodontist. This can significantly contribute to the identification of an individual.

3. 2d poly line method-it uses adobe photoshop. Use of the 2d polyline method entails drawing straight lines between two fixed points in the dental arch and between incisal edges to indicate the tooth width. Identification for this method is

based on canine-to-canine distance, incisor width, and rotational angles of the incisors. This method relies heavily on accurate measurements.

4. Painting method- it too uses adobe photoshop. Use of the painting method entails coating the incisal edges of a dental model with red glossy paint and then photographing the model. Adobe photoshop is then used to make measurements on the image. Identification for this method too is based on canine-to-canine distance, incisor width, and rotational angles of the incisors. The painting method depends on precise overlaying of the images.

There can be numerous types of dental records for patients who are attending dental clinics. These can simply range from an intra oral photograph to cast and full mouth radiographs. Some of the potential dental records, which can be very useful in case the need arises, are as follows.

5. Case history documents containing all pertaining information about charting of dentition, the inter-occlusal relationship (class i, ii and iii) and any specific type of information about the oro-facial structures.

6. Photographs: particularly intra-oral ones, which can show individual traits specific to a person like, mesiodens, rotated tooth, stained or discolored tooth etc for example.

7. Radiographs: these can be in the form of iopa's, occlusal views, opg's or cephalograms in case of an ortho or surgical dental patient.

8. Study casts or casts fabricated for the purpose of fixed or removable partial dentures or ortho appliances. These are the simplest possible record of the patient containing all necessary details about their individual dentition

9. Denture: as it has been found in various studies, the palatal rugae pattern of every individual patients are different, as it will be correspondingly in the maxillary denture of these patients. Denture of these patients can be a useful indicator of their identity in case of mishaps. Recently there has been stress on engraving the denture with patient's and clinic identity who fabricated it as well. In fact, the brazilian aeronautic minister demands palatal rugoscopy of all its pilots, in order to ensure their identification in case of accident [7].

10. Any kind of appliance in the form of a removable or fixed restoration which has been preserved for the patient can also serve as dental record in cases where the need arises.

11. Lastly even bill books used to charge the patients after the treatment can also be a valuable source of information, which may contain the kind of treatment and when it was done like.

THE INDIAN SCENARIO

India is 7th most populated country in the world with enormous men power. Unfortunately our country also happens to be mostly affected by disasters, terrorism, accidents and air or train crashes, resulting in loss of thousands of lives every year, some of these innocent people are never identified either because of their bodies are mutilated beyond recognition or there are no or fewer ante-mortem information if any, available.

India has around 260 dental colleges of a total of 960 in entire world, making country as containing 26% of world's dental colleges, graduating around more than 20000 thousands of students every year [8]. This means we have enormous men power of dentists working in government/ private or corporate sector. Therefore, simultaneously much potential regarding forensics, but still we are lagging behind.

THE LACUNAE

These lacunas regarding this aspect are of two folds, dependent upon both the treating dentist and the general public as well. Some of these potential lacunae are.

Not many people in india visit dentist even once in their life. Even if they do so, that will be in dire situation of pain, for which they would like the offending tooth to be pulled out of their oral cavities. So such patients treated on emergency basis may have few records to none at all.

A large number of patients are treated by road side quacks, which has to be legally stopped. Also, as of now there is no law making it mandatory to store and keep the dental records

The patients which are treated for routine dental treatments like, fillings/ root canals, crown and bridges also may not have any sort of dental records. And in case records are kept, they may not be kept for a longer time. In cases where, patients had been to a dentist and might had some sort of dental records, many a times it is almost impossible to locate & obtain am records

POOR QUALITY AM RECORDS/ NON AVAILABILITY

Also, as of now there is no separate specialization at graduate or post graduate levels in the forensic odontology in india. And general public is also largely unaware of this potential arena.

Lastly the most important aspect is funds and economy. To be able to maintain all these data, it takes lots of stresses, pain and funds, which we are already struggling for. But still that can not be an excuse in dire situations of life and death.

Thus, when nothing remains out of a body, except for a fragment of tooth, identifying the person to whom it does belongs to, may at least make something at last to be returned to the grieved families. With above considerations, it is clear that a dentist can be an important source for providing valuable data to answer questions that arise during a death investigation.

CONCLUSION

As a tooth can withstand insults where all other tissues may not survive to be recognized, the importance of such tooth can be of interest in identification of persons, provided good ante mortem records are available "there are fewer am records available particularly in our set-ups, we need to keep an accurate & ordered dental records of all the patients which may be of immense value in unfortunate events, thus making us to serve people even better with more responsibility and care"

Henceforth, this review paper primarily aims at making general practitioners aware about "the importance of keeping the various types of dental records & urging the concerned authorities to enforce a law making it mandatory to maintain dental records"

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Sudden Death Due to Mitral Valve Prolapse

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ABSTRACT

Sudden unexpected deaths arouse many questions in the minds of the deceased's relatives, investigating officer and also the general public. This is a fact more so when a person dies and in the process sustains some accidental injuries giving a false picture of foul play. So the onus lies on the forensic expert to explore all the findings at autopsy and come to a conclusion as to the cause of death, to aid the investigative process. We came across one such case where an apparently healthy middle aged individual was found dead in his room. Few fresh injuries were present thus creating an air of suspicion. Detailed post mortem and histopathological examination proved it to be a case of death due to Mitral Valve Prolapse.

Key Words: Sudden Death; Natural Death; Cardiac anomaly; Mitral Valve Prolapse.

INTRODUCTION

Mitral valve prolapse syndrome (MVPS) is a common disorder in the general population.[1] Mitral valve prolapse is a condition that is being recognized with increased frequency. It is not known whether its incidence is increasing, or whether we are better able to diagnose it today.[2] It is said to have good prognosis but is also reported as an uncommon cause of sudden death which is a cause of concern[3,4]. The incidence of MVPS in autopsy series has been reported to be about 4-5%, while clinical data hint at an incidence of about 2.5%.[5]

It appears to occur more frequently in females and occasionally it is familial. In most instances, the syndrome is idiopathic, although it occurs in association with many other conditions, particularly Marfan's syndrome, rheumatic heart disease, coronary heart disease, congestive cardiomyopathy, ostium secundum atrial septal defect, Ehlers-Danlos syndrome or abnormalities of the thoracic cage. [6] The majority of patients with the syndrome have minimal, if any, symptoms and follow a benign course. We are presenting a case of sudden unexpected death as a result of myxoid degeneration of mitral valve without any previous or family history of heart ailments.

CASE REPORT

An elderly male, aged 55 years, moderately built and nourished was found dead in his apartment. According to the history the deceased was staying

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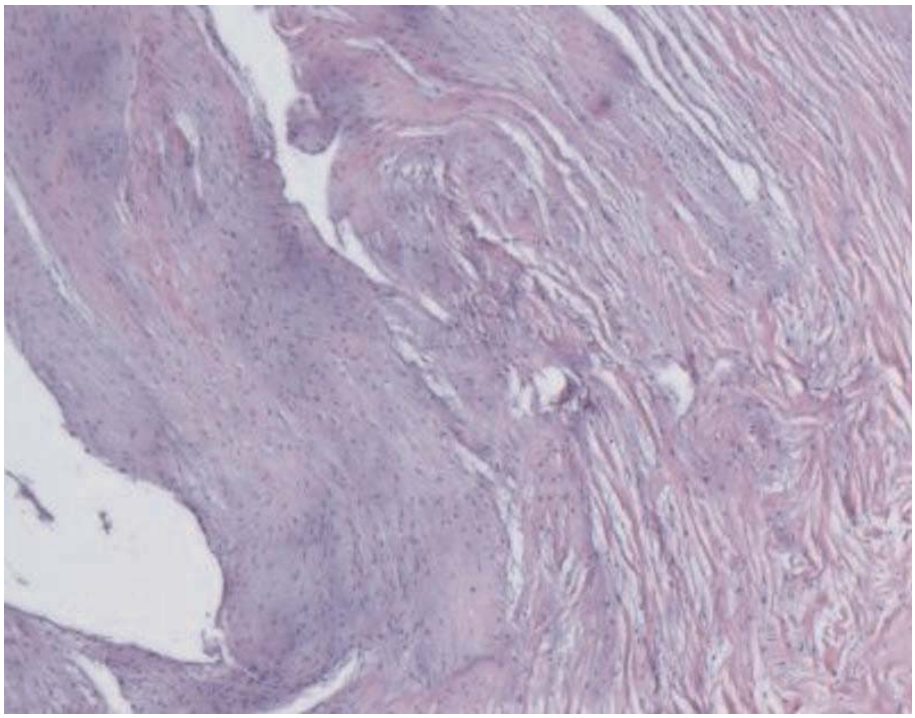
in an apartment with his friend. On the fateful night both had dinner together after which the friend left the apartment for a walk and returned after around one hour only to find the deceased lying on the floor next to his cot. He was unconscious and was immediately rushed to the hospital, where he was declared brought dead. The scene of crime did not show any sign of probable use of assault on the deceased. At autopsy, there was a split laceration on the left eyebrow (1.5 x 0.3 cm x muscle deep) and a pressure abrasion on the left cheek (3 x 1.5 cms). The undersurface of the scalp was contused over the right temporal region. No other external injuries were present on the body. The dead body measured 163 cm in length and 46 kg in weight. Examination of the heart revealed a pale area on the anterior surface of right ventricle and the left atrioventricular valves were enlarged and thickened. The heart weighed 285 gm; a white patch was present on the posterior wall of the left ventricle. The right and left ventricular thickness was 0.7cm and 1.3 cm respectively and the coronaries were patent. All other internal organs were unremarkable. The heart was subjected for histopathological examination, which revealed scar tissue in the ventricular valves with myxoid degeneration of the left atrioventricular valve (mitral valve) (Fig 1). Chemical analysis report of viscera was negative for the presence of any

Fig. 1: Mitral Valve Showing Myxoid Degeneration. (H&E X 200)



poison. The cause of death was opined as mitral valve myxoid degeneration.

DISCUSSION

Mitral valve prolapse syndrome (MVPS) is a relatively common disorder of the mitral valve and most often take a benign clinical course. Only a subset of patients develops severe clinical symptoms such as arrhythmia, insufficiency of the mitral valve or infective endocarditis. As a consequence, sudden death might occur in these patients, thought to be caused by an arrhythmogenic event. [5] As the cause of death seems to be cardiac arrhythmia, so postmortem diagnosis is difficult and depends on severe changes of the mitral leaflets. [7]

The gross criteria for diagnosing prolapsing mitral valve are: (1). interchordal hooding of the

involved leaflets, (2). hooding or doming of leaflets towards the left atrium, (3). elongation of the involved leaflets resulting in an increase in valve area, (4). dilatation of the valve annulus in patients with severe mitral regurgitation. The posterior leaflet is most frequently affected. The involved leaflets, in general, are thickened, soft, greyish white and have a smooth atrial surface. Chordae tendinae are described as elongated, tortuous and attenuated or thinned. Microscopic findings include significant thickening of the spongiosa and the fibrosa, changes in dense collagen fibers in the atrialis layer, occasionally, with fibrin platelet deposits. [8] Complications related to abnormal mitral valve include infective endocarditis, thromboembolic events, cardiac arrhythmias, progressive mitral regurgitation, rupture of chordae tendineae and congestive heart failure. Individuals with thick mitral leaflets and mitral systolic murmur are at higher risk of developing complications. [9]

In our case the deceased was found dead lying on the floor with a head injury in the form of a split laceration which aroused suspicion of foul play. But the examination of scene of incidence, gross findings (mitral valve leaflets were thickened, pale and were softened) and histopathological findings of the heart, which satisfied the criteria for diagnosing that the deceased, was suffering from mitral valve myxoid degeneration. In view of the above findings along with the chemical analysis report which was negative for any toxic material we came to the diagnosis of the deceased dying as a result of Mitral valve prolapsed syndrome.

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