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Estimation of stature from per-cutaneous tibial length measurement amongst students of S.M.S.R, Sharda University

Original Article

Estimation of Stature from Per-Cutaneous Tibial Length Measurement Amongst Students of S M S R, Sharda University

Anshul Saxena¹, Pooja Rastogi², Rohit Bharti³, Ankita Kakkar⁴

ABSTRACT

Stature is one of the major parameters for ascertaining the identity of an individual. Mathematical correlation of length of long bones to the overall stature has been an established method of estimation of height for unidentified individuals. In the present study 100 individuals of either sex, in the age group of 20 – 25 years were studied and their percutaneous tibial lengths were correlated with overall stature. Differences were noted in the tibial lengths of right and left sides in the same individual and also among tibial length in individuals with similar height. Regression analysis was carried out and formulae were developed for stature estimation. Comparisons were made with different regional studies and it was concluded that with varying statures in different populations, region specific studies need to be carried out for every population group.

KEYWORDS | Identification; Stature; Tibia; Regression analysis.

INTRODUCTION

The necessity of identification of an individual is utmost important from birth to death as mistaken identity can result in various medico legal problems.¹ Identification can be complete, when an absolute identity is established or partial when only certain facts of identity are determined like race, age, sex, stature, so called "Big Four" factors of identity.

The height/stature of a person is an inherent character and it is considered to be one of the important parameters of personal identification.² Stature is defined as "height of body in upright position". Estimation of stature is an important tool in forensic examination for identification especially in unknown, highly decomposed, fragmented and mutilated human remains.

A lot of investigative work has been done in this field, but only a few works have been done using the percutaneous length of long bones for

Author's Credentials:

^{1,3}Assistant Professor, ²Professor, ⁴Associate Professor, Department of Forensic Medicine & Toxicology, School of Medical Sciences & Research, Sharda University, Gautam Budh Nagar, Uttar Pradesh 201310 **Corresponding Credentials:** Ankita Kakkar: Associate Professor, Department of Forensic Medicine & Toxicology, School of Medical Sciences & Research, Sharda University, Gautam Budh Nagar, Uttar Pradesh 201310 e-mail: ankita.kakkar@sharda. ac.in



How to cite this article Anshul Saxena, Pooja Rastogi, Rohit Bharti, Ankita Kakkar/ Estimation of stature from per-cutaneous tibial length measurement amongst students of S.M.S.R, Sharda University/Indian Journal of Forensic Medicine and Pathology/2021;14(3):327-331 estimation of stature. Keeping this view in mind, the present study aims to calculate the stature from the surface length of tibia measured from the surface anatomical landmarks in living individuals. The study may prove to be a useful tool for estimation of stature in mass disasters or in cases of skeletal remains found in remote places where only tibia is present as a long bone.

MATERIALS AND METHODS

The present study was conducted for a period of one year from December 2019 to November 2020 in the Department of Forensic Medicine in School of Medical Sciences & Research, Sharda University. Ethical clearance for the study was sought from Institutional Ethical Committee. The study group comprised of 200 individuals, of either sex, from amongst students of S.M.S.R, Sharda University in the age group of 20 – 25 years after obtaining a written informed consent.

The standing height was measured using a stadiometer with a movable headboard. The subject was be made to stand bare foot on the horizontal platform with the heels of both feet together. The head of the subject was aligned in the Frankfort horizontal plane. The subject was looking straight ahead, with the shoulders relaxed, arms at the sides, legs straight and knees together and foot flat with the heels almost together and feet pointing outwards. The heels, buttocks and the back of the head were in contact with the vertical backboard. The headboard was firmly positioned on top of the head with sufficient pressure to compress the hair. The height was documented in centimeters.

The percutaneous tibial length was measured for both limbs using a Vernier calipers from the most prominent palpable portion of the medial condyle of tibia to the tip of medial malleolus. This was accomplished by fixing the knee and inverting the foot partly so as to relax the soft tissue and render the bony landmark more prominent. Further, the measurement was confirmed using a metric tape.

Inclusion Criteria

Individuals between the age 20 - 25 years.

Exclusion Criteria

- Those with physical deformities and/ or/ with fracture of head, fracture of spine, fracture of lower limbs and pelvis.
- Individuals below 20 years of age.

RESULTS

A total of 200 subjects were studied and observations were noted. The gender based descriptive analysis of the data obtained, is mentioned in Table 1 through Table 5.

The data was analysed using SPSS software (version 27) and regression analysis was carried out. Gender specific formulae were derived for each side, as follows

Males

Height (cm) = 87.198 + 2.307 * Right tibial length (cm)

Height (cm) = 90.430 + 2.200 * Left tibial

	Male			Female			
-	Height (cm)	Right Tibial Length	Left Tibial Length	Height (cm)	Right Tibial Length	Left Tibial Length	
Age range		years 25 - 20			years 25 – 20		
Samples	100	100	100	100	100	100	
Mean	172.95	37.181	37.532	159.826	33.066	33.279	
Standard Deviation	6.038	2.109	2.122	5.640	1.681	1.747	

Table 1: Descriptive analysis of data

Anshul Saxena, Pooja Rastogi, Rohit Bharti, Ankita Kakkar/Estimation of stature from per-cutaneous tibial length measurement amongst students of S.M.S.R, Sharda University







Fig. 2: Correlation of height with left tibial length in males.

Fig. 3: Correlation of height with right tibial length in females.



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length (cm)

Females

Height (cm) = 82.723 + 2.329 * Right tibial length (cm)

Height (cm) = 82.714 + 2.317 * Left tibial length (cm)

For males, the Pearson co-efficient derived was 0.821 and 0.816 for the right and left sides respectively, while for females it was 0.703 and 0.738 respectively. Correlation was found to be significant at the 0.01 level (2-tailed) for both the sexes.

DISCUSSION

Stature is an inherent parameter for identity to be established. When the complete skeleton is available, it can be estimated using the anatomical method but this is seldom the case. In most cases, a part of the skeletal remains are available and at times even the individual bones are fragmented. Hence the mathematical method of correlating stature with the length of long bones is very useful. Estimating stature using measurements from long bones especially lower limb bones femur, tibia etc. has got higher correlation when compared to upper limbs.3 Between femur and tibia, tibia has been widely used for stature estimation as its surface anatomy can be marked more accurately and hence percutaneous measurements are more feasible.

Indians stop growing in height on

completion of union of epiphysis and diaphysis by the age 20 which has been confirmed by several research workers.⁴ In the present study stature was correlated with tibia from both right and left sides. The mean values of right and left tibia were respectively 37.18 and 37.53 in males and 33.06 and 33.28 in females. Length of the left tibia was found to be mostly greater than that of the right side for both the sexes.

For similar height, different tibial lengths were found amongst certain individuals. This has been observed by previous researchers also. The mean stature measurements were observed to be 172.95 cm and 159.82 cm respectively for males and females.

India has a diverse population with coexistence of varied ethnicities. Stature differs in these population subgroups as has been exemplified by multiple anthropometric studies. Sreya Moitra found the mean stature for Bengali population to be 167.62 cm and 157.44 cm respectively for males and females.⁵

In comparison Gaurang N et al found the mean statures in Gujarati population to be 169.94 cm and 159.64 cm for males and females respectively, while in South Indian population Anitha MR et al found it to be 161.93 cm.⁶⁻⁷ This diversity necessitates region specific formulae to be used for different groups of population. Anshul Saxena, Pooja Rastogi, Rohit Bharti, Ankita Kakkar/Estimation of stature from per-cutaneous tibial length measurement amongst students of S.M.S.R, Sharda University

CONCLUSION

The present study proves that there is a positive correlation between tibial length and the overall stature of an individual. Numerous studies have been carried out at varied places for stature estimation using long bones of the lower limb but there are wide variations in the formulae obtained. This shows that different body parameters have developed at different regions and this too keeps changing as the population keeps getting taller with time. It is important that specific data, relevant to that region, be used when estimating stature for a particular ethnic group.

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A Report on Illegal Abortions in Transkei Region of South Africa

Banwari Meel

ABSTRACT

Background: The Choice on Termination of Pregnancy Act of 1996 (Act 92 of 1996) has so far had very little impact on criminal abortions in the Transkei region of South Africa. This raises the serious question why the women opt for an illegal abortion rather than go to designated legal abortion clinics which carry out safe abortions in South Africa.

Objective: To study the underlying reasonswomen,prefer to go for an illegal abortion in Transkei region of South Africa.

Method: Two medical students voluntarily found out the facts regarding illegal abortions in Transkei region of South Africa. These students went to an illegal abortionist and then described in a student research assignment what they saw there.

Results: In 2015 two medical students consulted both a legal and an illegal abortionist facility in rural pretendingtowant an abortion. Their conversationswere recorded. The legal clinic was not user-friendly, misbehaved with the girls, cast doubt on their confidentiality and took a long time to do the abortions, while the illegal abortionist charged money for their service, but they were quick and kept confidentiality.

Conclusion: Illegal facilities are more user-friendly and ensured confidentiality which leads to women going to anillegal abortionist instead.

Keywords | Abortion, Confidentiality, Illegal abortion, Abortion clinic.

INTRODUCTION

The Choice on Termination of Pregnancy Act of 1996 (Act 92 of 1996) has had no impact on criminal abortions in the Transkei region of South Africa.¹The Act permits abortion to be done legally but there is no significant difference in criminal abortion before and after the Abortion Act of 1996.⁴

When women with unwanted pregnancies do not have access to safe abortions, they often resort to unsafe abortions.² An abortion is unsafe when it is carried out either by a person lacking the necessary skills or in

Author's Credentials:

Professor, HIV/AIDS Management (Stellenbosch), Research Associate, Faculty of Health Sciences, Nelson Mandela University, Port Elizabeth 6017 South Africa.

Corresponding Credentials:

Banwari Meel: Professor, HIV/AIDS Management (Stellenbosch), Research Associate, Faculty of Health Sciences, Nelson Mandela University, Port Elizabeth 6017 South Africa.

e-mail: banwarimeel1953@ gmail.com

How to cite this article Banwari Meel/ A Report on Illegal Abortions in Transkei Region of South Africa/Indian Journal of Forensic Medicine and Pathology/2021;14(3):333-338 an environment that does not conform to minimal medical standards, or both.² An unsafe abortion can lead to immediate health risks, including death as well as long term complications, affecting women's physical and mental health and wellbeing.² A gap remains between the legally enshrined rights of women and their actual access to legal and safe abortions. The supply of and the demand for unsafe, illegal abortions thrive on this divide, mostly in the region where people are illiterate.³

There is no shortage of literature on fetal death or dumping in dustbins. The medicolegal investigation requires in this care but generally end up without any conclusion.⁵ The purpose of this report is to highlight the problem of illegal abortion through a faceto-face deal with illegal abortionist in their facility.

METHOD

Two students voluntarily chose to find out about legal and illegal abortions by visiting two sites. The legal abortion site was in a hospital where it was not difficult to get access as they were medical students, but the illegal abortion place was difficult to access and gain information from it. They planned a strategy. Within two days they managed to find first-hand information about illegal abortion site. One student became a client (using an informer) of abortionist and the other became her friend to accompany her. The conversation with the illegal abortionist was recorded, and the site was visited. The description of how they carry out an abortion was recorded. The students also interviewed a15-year-old girl who was a client of the illegal abortionist. This was carried out by medical students voluntarily keeping full confidentiality and ethical values in their mind.

RESULTS

Verbal communication recorded at the illegal abortion clinic with informer and illegal abortionist is as follows: They went as students into town to look for different advertisements. One student pretended to be pregnant, while the other pretended to be her friend. A large number of posters are displayed on the town's streets in the Transkei region of South Africa (Photograph 2). The students' conversation started by referring to the poster advertising abortions:



Fig. 1: Map of Transkei sub-region of South Africa population catered for by Forensic Pathology Laboratory indicated by a square.

Student: Hello, I saw your advert and I am interested in your services, but I want to know how the procedure is done and how much it is.

Guy: Okay, where are you so that we can talk?

"We then told the guy where we were, and he asked us to go and stand by the entrance of the Bank on [enter name of street here lol]. He asked us what we were wearing, and we then went to where he had instructed us to go. He called us back using a different number. We located him and he led us into a dirty old building on the same street. We went up about two flights of stairs and we were led to a room on the corner. The door of the room was covered with a curtain and the door was locked. We went inside into a very dim room with a TV and some old sofas for sitting. The room was very small, perhaps about two metres across. Inside were sitting a man and a woman. The guy asked us to enter another very small room behind a curtain. This room had a blanket which was laid on the floor and next to it there were numerous small glass containers containing some powders and some candles. When entering this room, one had to take off their shoes. However, we refused to enter this room with the excuse that we wanted to know more about the procedures. After some small amount of convincing the guy finally allowed us to remain in the room with the sofas."

We then asked about the procedure.

Student: Please tell me how the procedure is done and how long it will take.

Guy: We will give you one tablet to drink and we will insert another one vaginally.

Student: How will I know that the abortion has happened?

Guy: Trust me, you will know.

Student: But how?

Guy: Ey, I am telling you, you will just know

Student: Will there be any pain?

Guy: No, not really.

Student: Then what will happen that will show me that it has happened?

Guy: Okay, there will be a bit of pain but not too much.

Student: Are there any complications?

Guy: No, not really as long as you insert the pill correctly. That's why we prefer to do it ourselves.

Student: So, can I take the pills home and do it myself?

Guy: Yes, but you have to do it correctly.

Student: How much will it be?

Guy: How much do you have?

Student: I need to know the exact amount so that I can tell my boyfriend. He will be paying. Guy: Well, I will talk to him. We can discuss the price.

Student: But I want to know the price.

Guy: Okay, I will be right back.

The guy then left us alone for several minutes and then he returned.

Guy: How many months?

Student: Three months along now.

Guy: Okay, that will be R600 including free womb cleaning.

Student: Okay then does the price charge according to the months?

Guy: Yes.

DISCUSSION

This is probably the first report of its kind that gives the real picture of illegal abortion. It is known to almost everyone, including the police, but there is no action. In Mthatha streets, nearly every street lamp, tree and on most walls, you will find adverts for "Safe and pain free abortion" by so-called doctors with the asking price of anything between R150 and R300.

These two students then called doctor M. According to the pamphlet that was handed to them by someone at Owen Street, the abortion could be done on the same day and would be painless. They then went to call on Dr M and spoke to someone who claimed to be Dr M's secretary. The abortion would cost R200. The person would not go into detail as to what the procedure would entail but did say the student would get some pills to make her numb. The next day when they tried to call Dr M, the number was not available.

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They then managed to get hold of a girl who had had an abortion with Dr M. The girl was only 15 years old when she started having unprotected sex with her boyfriend. She was too scared to go to the clinic to get contraceptives because she thought that the nurses would shout at her. Her boyfriend did not want to use condoms because they were in a committed relationship. After about three months she found out that she was pregnant. Scared to tell her parents, she decided to have an abortion. One of her friends recommended that she try Dr M who could help her for only R200. She contacted him and he gave her two tablets, one to take immediately and the other to take after two hours. She says that after an hour she began to have severe period pain like cramps. She could barely walk but decided to also take the second pill. A day after while at school she again had cramps, but they were not as severe as the ones before. While in the bathroom she noticed that she was bleeding when suddenly she expelled what looked like a baby's head. After that she could not walk, and her friends called her mother who took her to the doctor.

In May 2015, the two students made a call to one of the abortion clinics, a so-called women's clinic. It also renders other services apart from abortion such as job promotion to get babies to be loved more. The informers could not find where the clinic was located, and met with two men only at a Shell garage. These men were the ones performing these abortions.

The information received from these two men indicated that they use a pill to do the abortion. A pill is given to pregnant woman, and the number of pills given depends on the number of weeks of pregnancy or the number of months the woman says she has not had a period. There is nothing they use to at least confirm the number of weeks of pregnancy. They rely on the information given by the pregnant lady. Because there were two informers who managed to speak to these men, the first informer had to pretend to be pregnant and the other informer acted as a friend who was accompanying the pregnant one. The informer who pretended to be pregnant said she had missed her periods for two months, and then the men said that, because it was two months, she hadn't had her periods, then in her case she would get three pills to use. The route of administration would be one orally and two vaginally. It was indicated that they recommended giving the pills also vaginally because its mechanism of action would be faster compared to the one given orally.

The students could not get enough information concerning the pills, for example, the dosage and the name of the pills. The men indicated that they could still administer a pill to a woman who said she was about three, four, or five months pregnant. How these tablets would work is that they would cause vaginal bleeding, and the woman would feel as if she were having her period. The woman would bleed for a period of about three to four days. On the first day, the bleeding would be heavy and there would be blood clots also. From the second to the third day the bleeding would be lighter.



Fig. 2: One of the advertisement in the city of Mthatha.

The men indicated that when performing this procedure, a woman can do it either at their clinic or they can take the tablets to drink at home, as at home it is more convenient as they can take the tablets in their own time, and they wouldn't have to walk to home from the clinic. Seemingly most patients prefer that, and they themselves recommend that also to their patients.

From what these men said, most of their patients don't experience any complications, because they believe they treat their patients well. It was indicated that after the bleeding has stopped a woman must come back to the clinic to receive another pill that is used to clean the womb. They said that some women do come back for cleaning of the womb, and some don't come back. The risk is that if you don't come back to clean the womb, you might get an infections and one of the advantages indicated for cleaning the womb is that it delays another pregnancy. The total costs of the pills amounted to R480.00 - R580.00 for the first three pills to perform the abortion and R100.00 for the cleaning pill.

There is always a danger with an illegal abortion as there is lack of immediate intervention if severe bleeding or another emergency develops during or after the procedure, and post abortion check-ups and care are also not provided. The data suggests that expanding access to safe abortions has reduced deaths from unsafe abortions by about 91% between 1994 and 2001, according to a 2008 letter to the South African Medical Journal.⁶

Illegal abortionists use unsterile instruments that might introduce foreign organisms leading to infection. Most people performing these abortions are not trained but they do them anyhow and this could lead to serious complications such as shock, air embolism, amniotic fluid embolism, deep venous thrombo embolism, disseminated intravascular coagulation and infection.

Illegal abortionists are in the hundreds and are scattered in almost all towns in the former Transkei region where they run their illegal practices. It is not difficult to catch them as they advertise openly. Their advertisements are on main roads where many important officials and politicians are passing through, but they keep their eyes closed to them. Who should put a stop to this illegal and dangerous threat to women health? There are lot of discussion on gender issues, and a month declared every year for the health of women in South Africa, but no one is prepared to talk about the issue of illegal clinics. Are the legal medical clinics not reporting illegal abortionists? What about law enforcement agencies? It is difficult to estimate how many women or young girls are dying of postabortion complications. It always remains a secret as they will never disclose to anyone. How easy is it to catch an illegal abortionist and whose responsibility is it?

The police? The Health Professionals Council of South Africa (HPCSA)? What is being done by law enforcement and legitimate medical providers to expose these networks? From another perspective, are we training enough real health workers to fill the gaps in services that allow illegal abortionists to thrive?³

CONCLUSION

Illegal abortions are a public health issue and must be addressed as soon as possible in the Transkei region of South Africa. It is difficult to know how many illegal abortions are carried out each year and how many deaths occur because of them.

Government must take note of this situation, so that the noble purpose of the Abortion Act of 1996, which was promulgated by the honourable President Nelson Mandela to save the lives of mothers, could be fulfilled. Moreover, the legal abortion clinics must become more user-friendly to contribute more positively to addressing the problem.

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ORIGINAL ARTICLE

Human Biometric Authentication using Dental Features

K Ramasamy¹, M Jayasheela², E Gomathi³, E Udayakumar⁴

ABSTRACT

Now a days, Human identification has become a major issue. Many biometric authentications like fingerprint, Iris, hand veins, etc., were introduced to identify individuals and they have more complex features in it. Under numerous occasions like disasters, traditional biometric attributes like fingerprints and so on, may not work in light of their contrariness in such cases. They may lead once in a while towards high blunder rate and furthermore the investigation is more perplexing. Biometric using dental features are becoming a leading technique for human identification. Research says that dental features of persons are unique by nature. By research, it was found that the maxillary and mandible jaws of every individual are found to be unique. Here, the majority of the likenesses are coordinated with the goal that person can be actually recognized by its novel element. Along these lines dental biometrics gets need over rather in considering highlights and examination perspective. In this sense, it has been a savvy way to deal with investigate the new fields of exploration. In this paper, a human dental biometric image processing system has been implemented using MATLAB software for easy identification and this system is rotation invariant with greater accuracy.

Keywords | Human identification, Biometrics, Dental radiographs, Segmentation and Matching.

INTRODUCTION

The territory of biometrics has such a lot of importance for as far back as couple of years in view of an energizing and an alternate way to recognize people than that of customary validation frameworks recently advanced like passwords. Under various events for example Fiascos customary biometric attributes like fingerprints and so forth, may not work in light of their contradiction.¹ For this situation, dental highlights are considered as a helpful apparatus for human identification. The verification utilizing actual attributes is called biometrics and there are numerous kinds of it. For instance, these can be fingerprints, retina examines, iris filters, Author's Credentials: ¹Dean-Academics & Research, ²Professor, ³Associate Professor, ⁴Assistant Professor, Department of ECE, KIT-Kalaignarkarunanidhi Institute of Technology, Coimbatore 641402, Tamil Nadu, India.

Corresponding Credentials:

K Ramasamy: Dean-Academics & Research, Department of ECE, KIT-Kalaignarkarunanidhi Institute of Technology, Coimbatore 641402, Tamil Nadu, India. e-mail: ramasamy10366@ gmail.com

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facial outputs, palm checks, hand calculation, voice acknowledgment, hand composing or console elements. Precision is the main quality of biometric framework. We need to have the most precise arrangement executed. When all is said in done, the palm examines are the most exact biometric strategy, while the console elements is the most un-precise technique.³ At the point when somebody who parts in to the biometrics framework, they need to characterize an underlying reference profile that will be utilized as format. This is the first occasion when that an advanced portrayal of their biometric factors is recorded. While considering biometric frameworks, we need to consider the adequacy issues. We need to consider how much biometric framework influences the protection, and how much actual inconvenience does it cause. As a rule an iris check is the most worthy type of biometric, since it just outputs the outside of the eye, and there is no actual contact included.⁵ The retina filter is the most unworthy since it requires actual contact, can be awkward, and can disregard protection (can uncover ailments).

As innovation grew huge number cases are examined by scientific trained professional. Risk mortem ID for the most part happens preceding demise and furthermore known as legal distinguishing proof. Posthumous (PM) distinguishing proof is completed in the afterlife. An after death biometric identifier needs to endure serious.¹³ In 2015, F Rehman et. all carried out an analysis and the feature properties have been calculated. But the identity rates for Radiograph and Coloured image are 85.7% and 88.8%, respectively. In 2016, Pranoti V et. all presented a method which involves three processing stages such as Image Acquisition, Pre-processing and Feature Extraction & Dental code formation. The Identity rates for Radiograph and Dental photograph are 92% and 94%, respectively. In 2016, Kritika P et. all presented a method which involves preprocessing, segmentation and a matching technique. But the identity rates for Radiograph and Coloured image are 94.73% and 89.46%, respectively. All the above systems lead to more compound analysis and central to high error rate. In this paper, we present a very simple system with good matching.⁸

Proposed System

The flow diagram of the proposed system is shown in Figure 1. It includes the basic techniques which are involved in the image processing. They are: Image Acquisition, Pre-processing, Noise Removal, Feature Extraction, Segmentation and Matching.²²



Fig.1: Flow diagram of Proposed System.

Image Acquisition

In Image acquisition process, we retrieve dental images of various humans by using certain sources. The dental radiographs of patients are likewise gathered for dental recognizable proof framework.⁸

Pre-Processing

The dental pictures were gathered from the x-beam indicative focus. The introduced work is principally centered around the component removal from the dental radio charts and not

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on how the x-beams are achieved on dental piece of the body. The dental picture might be in jpeg configuration and it is changed over to dim scale design.¹¹ For dim scale pictures, every pixel esteem is deducted from the most extreme worth that can be spoken to by the information type and afterward yields the distinction. As result, the dim regions become lighter and light regions become hazier. These radiographs are pre-prepared to sift through undesirable foundation commotion current with radiographs and resizing is accomplished for legitimate data removal of maxillary bone.24 Commotion is physically added for the exploratory reason. The commotion is taken out by utilizing Median Filter. Here, Median Filter works by traveling over the image pixel by pixel, displacing each an motivation with central advantage of adjoining pixels. At that point the locale of interest is chosen.13

Feature Extraction

After pre-preparing, highlight extraction is performed. The highlights we have extricated for teeth shading pictures²⁶ are force highlights. Individual normally contains these highlights. Here, we removed certain dental highlights, for example, Statistical highlights, Shape and Texture. In factual highlights, we consider, Mean, Standard deviation, fluctuation and skewness.¹⁵ For the reason, we utilized morphological picture preparing methods on dark scale picture Morphology is a broad course of action of picture planning exercises that cycle pictures reliant on shapes.



Fig. 2: Input Image.



Fig. 2.1: Resized Image



Fig. 2.2: Gray Image



Fig. 2.3: Noisy Image



Fig. 2.4: Noise removed image.



Fig. 2.5: Segmented image



Fig. 2.6: Area part

Results of authenticated output

Morphological exercises apply a getting sorted out part to a data picture, making a yield image of a comparative size. In a morphological movement, the assessment of each pixel in the yield picture relies upon an assessment of the contrasting pixel in the data picture and its neighbors. GLCM features are used here for getting better yield.¹²

Segmentation and Classification

In division, Expectation Maximization figuring is used. It works by picking sporadic characteristics for the missing data centers and using those notions to measure a second game plan of data.²⁰ The new characteristics are used to make a prevalent gauge for the initially set and the cycle continues until the figuring meets on a fixed point. Various strategies, for instance, pixel-based segment, surface examination, etc may be considered. Here surface examination is used.¹⁷

Matching

Finally, Matching Technique is executed using Euclidean Distance. In image examination,

the distance converts procedures the distance of each object idea from adjacent boundary.



Fig.2.7: Input image



Fig. 2.8: Resized image



Fig. 2.9: Gray image



Fig.2.10: Noisy image

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Fig. 2.11: Noise removed image



Fig. 2.12: Segmented image



Fig. 2.13: Area part

Results of Unauthenticated Output

In this work, some of the basic techniques such as Image acquisition, Pre-processing, Segmentation, Matching technique and Feature Extraction were implemented using MATLAB Software.²⁵ Human Biometric features is extracted initially and then preprocessed, Segmented, along with that, noise in the image can be removed by adding salt and pepper noise into the image. After the removal of noises in the image, identification and matching techniques were used in order to authenticate the individuals by considering their dental features. The whole process is implemented using MATLAB Software.⁴



Fig. 3: Features of Proposed System

Database	No. of Persons	Total Images	No. of correctly identified persons	Accuracy Rate
Radio- graphs	100	200	99	99%
Color Images	100	100	94	94%

Table1: Outcome of Proposed System.

RESULT ANALYSIS

The dental radiograph of individuals which has been collected and stored in a database undergoes various processes simultaneously. In Image Acquisition process, the collected images are retrieved and moved on to preprocessing phase.

Here, image resizing, conversion of image into grey scale and removal of noise by using median filter is implemented. After that, Image segmentation is done by using the Expectation maximization algorithm. Then, statistical features are extracted and the images are compared by using Matching Technique by Euclidean distance feature.

A database is being created with a set of dental images and the details are fed into it. After implementing all these processes successfully, the dental radiographs are compared for the identification process. The image which is selected or obtained image is then compared with the features of images in the database. If the image is coordinated with the any radiographs in the folder, then it is displayed as "Authenticated" and if not, it is displayed as "Unauthenticated", likewise, the results are obtained. In Figure 2a& 2b, the input, resized, grey, noisy, noise removed, segmented, area part, authenticated and unauthenticated images are shown.

The dental features such as Statistical features, Shape and Texture extracted in this system are shown in Figure 3. Table1 shows the accuracy rates of the proposed system using radiographs and color images are 99% and 94%, respectively and is greater compared to the other systems.

Rotation Invariant

The process of identifying the image even

if it is rotated was also implemented using Rotation invariant algorithm into the source code. Figure 4 shows that the proposed system is rotation invariant as the same features can be extracted even though the dental image is rotated in a different angle of 35 degree. Hence it is angle independent. This makes it compatible over the dental biometric as it won't serve under such circumstances; this will be of better use. The features removed from the rotated image also provide the same as that of the original image.¹⁸



Fig. 4: Image rotated over an angle of 35 degree

App Development

The MATLAB App Designer is a cooperating growth situation for scheming an app layout and programming its performance. For the purpose of dental authentication, the preview has been generated using MATLAB 2019a. As shown in Figure 5, two levels of matching (one to one and many to one) have been done. In the case of one to one, two dental images are provided with the desired algorithm the features are extracted and the matching is done if the images are from the same person then validity is given else the invalid status is provided.

In case of the of the many to one matching the database is shaped with all the images of the users and for matching only the testing image is given as input to the scheme if the user is present in the database the authentication is provided or else invalid is displayed.¹³



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(a) One to One matching



(b) Many to One matching

Fig. 5: App development

CONCLUSION

Dental biometrics should not best be the lower part of ID of an individual. Rather it ought to be dealt with as a corroborative gadget. For instance, if an individual's face is totally harmed and its recognizable proof is absurd by utilizing face, at that point dental biometrics can likewise be utilized as corroborative instrument alongside other like unique mark, vein sway and so on. Dental biometrics is used in measurable science for human ID, dental radiographs are struggled to be treated as one of the biometric realities of person. The framework introduced in this paper is basic, less mind boggling, revolution invariant with more prominent exactness. The system presented in this paper is simple, less complex, rotation invariant with greater accuracy.

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Original Article

Frequency of Urinary Anomalies in Perinatal Autopsies

Pratima Manohar Pattar¹, Sainath K Andola², Asha Patil³, Suraj B⁴

ABSTRACT

Background: Congenital anomalies of urinary system are common and are found in 3-4% of population, and 10% of terminations of pregnancies are attributable to lethal urinary anomalies. Although timely detection of nonlethal anomalies depends on many aspects, for instance equipment quality, sonologist experience and timing of the ultrasound examination. However, to confirm the findings and to attain definite diagnosis, a fetal autopsy after the termination of a pregnancy is of utmost important and is also crucial for genetic counseling. In view of this, the present study aimed to determine the frequency and to identify the types of the urinary anomalies in perinatal autopsies.

Methods: This study includes 391 perinatal autopsies conducted prospectively from July 2016 to June 2018 at M. R. Medical College, Basaveshwar Teaching and General Hospital, Kalaburagi. After obtaining the consent from either parent, each fetus was examined as per the predetermined protocol which included ultrasound diagnosis, photographs, external and internal examination.

Results: The gestational age ranged from 16weeks to 44weeks and the mean weight was 1123.96gm. Out of 391 cases urinary anomalies encountered in 19 cases (4.9%). Out of 19 cases, anomalies of renal parenchyma were seen in 15 cases (78.9%) and anomalies of pelvi-ureters and bladder was seen in 4 cases (21.1%). Three cases of urinary anomalies were associated with syndromes and 8 cases were associated with other system anomalies.

Conclusion: The perinatal autopsy after termination of pregnancy is essential to confirm the ultrasound findings and to make a definitive diagnosis.

Keywords | Autopsy; Congenital anomalies; Ultrasonography; Urinary anomalies.

Author's Credentials:

^{1,3}Assistant Professor,
⁴Associate Professor,
Department of Pathology,
ESIC Medical College
& Hospital, Kalaburagi
Karnataka 585105.
²Professor, Department of
Pathology, M.R Medical
College, Indian College of
Pathologists, Kalaburagi,
Karnataka 585105,
India.

Corresponding Credentials:

gmail.com

Suraj B: Associate Professor, Department of Pharmacology, ESIC Medical College & Hospital, Kalaburagi, Karnataka 585105, India. e-mail: drsurajpanchal@

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INTRODUCTION

n India 8-15% of perinatal deaths and 13-16% of neonatal deaths are due to congenital anomalies. However, multiple congenital anomalies in patients present a reasonably uncommon but extremely difficult task to the pediatrician.¹

In an around 3-4% of population, congenital anomalies of urinary system are found.² Intermediate mesoderm along the posterior wall of the abdominal cavity helps in the development of the urinary system.³ Although the development begins around the 4th week of post conception; it is completed by the 12th week.⁴

Tenpercentofterminationsareattributable to lethal urinary anomalies. However, timely detection of nonlethal anomalies depends on many aspects, for instance equipment quality, sonologist experience and timing of the ultrasound examination. In the second half of the pregnancy, normal amniotic fluid volume suggests that at least one kidney is functioning and an intact urinary channel to amniotic cavity. However, oligoamnios if present, suggest strong suspicion of urinary tract anomalies.⁵

Nevertheless ultrasonography (USG) is a valuable examination tool; to confirm the findings and to attain definite diagnosis, a fetal autopsy after the termination of a pregnancy is important. Therefore, a fetal autopsy not only helpful in identifying the cause of the fetal loss but also gives substantial surplus evidence which in practice is essential for genetic counselling.⁶

In view of the above and with limited data on autopsy studies related to urinary system, this study was undertaken to determine the frequency and to identify the types of the urinary anomalies in perinatal autopsies.

MATERIALS AND METHODS

This study includes 391 perinatal autopsies conducted prospectively from July 2016 to June 2018 at M. R. Medical College, Basaveshwar Teaching and General Hospital, Kalaburagi. After obtaining permission from Institutional Ethics Committee (Approval HKES/MRMCK/IEC/181021) No: and the consent from either parent, all fetuses with gestational age greater than 16 weeks and less than 44 weeks, birth weight greater than 350 g were included; while autolysed fetus, fetus with gestational age less than 16 weeks and greater than 44weeks and birth weight less than 350g were excluded. Each fetus was examined as per the predetermined protocol included which ultrasound diagnosis, photographs, external and internal examination.

The autopsy protocol included the removal of cervical, thoracic, abdominal and pelvic organs en block and subsequently dissected into organ blocks. The placenta, fetal membranes and umbilical cord were studied in all the cases. Histological sections were taken from lung, liver, kidney, thymus, brain, placenta and umbilical cord. In cases where the antenatal ultrasonography diagnosis was available, were compared with the postnatal autopsy findings.

RESULTS

A total of 391 perinatal autopsies were conducted with a gestational age ranging from 16weeks to 44 weeks. Majority (30.5%) of the cases were of gestational age 16-20weeks (Table 1). There was male predominance seen with male to female ratio being 1.2 : 1. Birth weight ranged from 350g to 3800g with mean weight of 1123.96±781.46gm (Table 2).

Intra uterine death (47.4%), congenital anomalies (21.0%), placental insufficiency (16.8%) and aspiration pneumonia (14.8%) were the cause of death identified in perinatal autopsies. The congenital anomalies were present in 82 cases accounting for the incidence of 21% in perinatal autopsies (Table 3). Among these, majority of the cases showed anomalies of central nervous system (8.7%).

The urinary system anomalies were found in 19 cases (4.9%), of which 15 cases were of renal parenchymal anomalies and found

Gestational Age	Male		Female			A1	Total	
	Number of Cases	%	Number of Cases	%	Genitalia	Genitalia	Number of Cases	%
16-20wks	66	32.3	44	25.8	07	01	118	30.4
20-24wks	52	25.4	48	27.2	01	03	104	26.3
25-29wks	44	21.5	35	20.5	-	-	79	20.3
30-34wks	24	11.9	28	15.9	-	01	53	13.6
35-39wks	17	07.9	13	07.7	-	-	30	07.5
40wks<	02	01.0	05	02.9	-	-	07	01.9
Total	205		173		08	05	391	

Table 1: Age and	Sex distribution	in perinatal	autopsies.
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Table 2:	Birth w	Jeight (distrib	11f10n	1n	perinatal	autopsies.
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Birth Weight in Grams	No of Cases	Percentage (%)
350-500	85	21.6
500-1000	119	30.5
1000-1500	77	19.5
1500-2000	44	11.4
2000-2500	40	10.3
2500-3000	20	05.2
3000<	06	01.5
Total	391	100

Table 3: Distribution of congenital anomalies inperinatal autopsies.

Type of Anomalies	No. of Cases	Percentage
Nervous system anomalies	34	8.7%
Urinary anomalies	19	4.8%
Cardiovascular anomalies	07	1.9%
Lung anomalies	09	2.4%
Gastrointestinal anomalies	08	2.0%
Musculoskeletal anomalies	05	1.2%
Total	82	21.0%

to be more common than pelvi-ureteral and bladder anomalies which attributed to 4 cases. Urinary anomalies showed male predominance with M:F ratio being 2.3: 1 along with 3 cases of absent genitalia and 2 cases of ambiguous genitalia (Table 4). The gestational age ranged from 16weeks to 34 weeks with maximum cases (47.3%)in 20-24weeks and was found to be statistically significant (p-value=0.032). Table 4: Age distribution in cases of urinary anomalies.

Gestational	Gestational Renal Pelvi-		Total	
Age	Anomalies	Anomalies	No	%
<20wks	02	03	05	26.4
20-24wks	09	-	09	47.3
25-29wks	01	01	02	10.5
30-34wks	03	-	03	15.8
Total	15	04	19	100

Table 5: Urinary anomalies in perinatal autopsies.

Congenital Anomalies of Urinary System	No of Cases
Unilateral renal agenesis	04
Bilateral renal agenesis	03
Bilateral Polycystic renal disease	02
Unilateral Multicystic dysplastic kidney	02
Bilateral Multicystic dysplastic kidney	04
Renal hypoplasia	01
Horse shoe kidney	01
Extrophy of bladder	01
Absent bladder & ureters	03
Distended bladder	03
Total	24

A total of 24 different urinary anomalies were found in the 19 cases. Five had more than one anomaly, while 14 had a single anomaly (Table 5). Five cases with more than one anomaly were Mermaid syndrome with left multicystic dysplastic kidney and right renal agenesis, right multicystic renal dysplasia with left renal agenesis and three cases of bilateral renal agenesis associated with absent bladder and ureters. Three cases were associated with syndromes, one case of

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Mermaid syndrome with Potters syndrome and two cases of Mermaid syndrome (Fig 1 & 2). The 8 cases which were associated with other system anomalies are as follows:



Fig. 1: Mermaid syndrome A) Radiography shows single femur bone, B) Fetus with fused lower limbs with absent feet and absent genitalia.



Fig. 2: Mermaid syndrome A) Radiography shows two femur bones, B) Fetus shows fused lower limbs with fused feet and absent genitalia.



Fig. 3: Bilateral multicystic renal dysplasia. A) USG shows enlarged cystic kidneys, B) Enblock shows bilateral enlarged kidneys, C) Cut section shows multiple cystic spaces, D) H&E 10x Section shows varying sized cysts lined by flat epithelium surrounding fibrous stroma.



Fig. 4: (a) Fetus with distended abdomen, (b) Megacystis



Fig. 5: Bilateral kidneys with distended bladder (megacystis).

- Bilateral multicystic renal dysplasia with CCAM type-2 (Fig 3).
- Megacystis with imperforate anus & single umbilical artery (Fig 4).
- Megacystis with situsin versus & dextrocardia (Fig 5).
- Renal-hepatic-pancreatic dysplasia (RHPD) with asplenia.
- Left renal agenesis with diaphragmatic hernia & CCAM type-2 with single umbilical artery.
- Mermaid syndrome with single umbilical artery.
- Left renal hypoplasia with ventriculomegaly& single umbilical artery.
- Megacystis with pentology of Cantrell, diaphragmatic hernia, omphalocele & imperforate anus.

Out of 19 cases, USG findings were available in 12 cases. In 5 cases the USG findings were confirmed by autopsy and there were no changes in the diagnosis and in 7 cases additional findings were found in the autopsy (Table 6).

 Table 7: Congenital anomalies compared with other studies.

Table 6: Comparison of prenatal USG findings withautopsy diagnosis.

USG Findings	No of Cases
A) USG findings were confirmed in autopsy	5
B) Change in autopsy diagnosis	7
USG findings	Autopsy diagnosis
Oligohydromnios	Bilateral renal agenesis
Oligohydromnios	Mermaid syndrome with bilateral renal agenesis
Diaphragmatic hernia	Left renal agenesis, CCAM type 2 with diaphragmatic hernia
Single live intrauterine fetus of gestational age 17weeks	Left renal hypoplasia
Oligohydromnios	Mermaid syndrome with right renal agenesis and left renal dysplasia
Oligohydromnios with bilateral renal agenesis	Mermaid syndrome with bilateral renal agenesis and potters syndrome
Single live intrauterine fetus of gestational age 23weeks	Left renal agenesis

DISCUSSION

Congenital malformations are an important cause of perinatal mortality and morbidity of great deal in childhood. Due to use of advanced diagnostic technology in particularly USG; the detection of birth defects is increasing antenatally and during the neonatal period.⁷

Multifaceted interaction of racial and ethnic factors, socio-cultural and known and unknown genetic and environmental factors, may have an impact on the prevalence pattern and the array of congenital anomalies.⁸

In the present study the incidence of congenital malformation is 21.0% which correlated with Naik et al¹¹(17.4%) (Table 7).

Total Congenital -Percen no of anomalies tage autopsies (Ahuja et al⁹(2013 140 58 41.4% (Potekar et al¹⁰(2014 54 35 54.3% (Naik et al11(2015 46 8 17.4% (Kupati et al¹²(2016 200 54 27% (Present study(2018 391 82 21%

The detection of the foetal urinary anomalies incidence was also influenced by the time of examination. In the present study, thorough examination of foetuses showed incidence of 4.43% in 16-18 weeks of gestational age and this increased to 12.83% by 28-30 gestational weeks. Therefore, a single scan at 16-18 weeks of gestation could have unnoticed many of these anomalies. However, only 9% of renal abnormalities were detected by 17 weeks of gestation during a screening program held in Sweden for detecting renal foetal malformation; while 91% could be detected by 33 weeks of gestation.⁶ Therefore, the present study shows the importance of timing of antenatal scan for the detection of urinary anomalies.

Table 8: Incidence of urinary anomalies compared with other studies.

Study	Incidence of Urinary System Anomalies
Gupta et al ⁶ (2012) n= 226	4.43%
Ahuja et al ⁹ (2013) n= 140	7.85%
Naik et al11(2015) n=46	2.1%
Kupati et al ¹² (2016) n=200	8.5%
Present study (2018) n= 391	4.85%

The incidence of urinary system anomalies in the present study is 4.94%, which corroborated with the earlier study conducted by Gupta et al⁶ which showed 4.43% (Table 8). Urinary anomalies in the male foetuses were twice reported as that in the female foetuses indicated by Cortes et al.¹³ Although the incidence of the sexual dimorphism varies in different series, a similar male preponderance was reported by Sanghvi et al.¹⁴ and Menasinkai et al² which relates with the present study (M:F as 2.3:1).

As early as, in 16-18 weeks of gestation, the abnormalities in the development of the urinary system could be detected. However, foetuses in the present study showed the maximum incidence in between 20-24 weeks of gestation, which correlated with the studies conducted by Gupta et al^6 , Ahuja et al^9 and Kupati et al^{12} (20-24wks of gestation).

The pelvi-ureteral and the bladder anomalies were more frequent in the 16-24 weeks of gestation, while the renal anomalies were found to be more in the 24-32 weeks of gestation. The renal anomalies were more common than the pelvi-ureteral and combined renal pelvi-ureteral anomalies, which is closely correlated with Gupta et al⁶ and Kupati et al.¹²

The incidence of renal agenesis is between 1/200-1/4000 births and is one of the most frequent renal abnormalities.¹⁵ In our study, most frequent abnormality seen was renal agenesis attributing to 7 cases (41.2%) which is comparable with Gupta et al.⁶ However, unilateral renal agenesis (4 cases) was found to be slightly common than bilateral renal agenesis (3 cases). Isolated unilateral kidney lesions such as agenesis, hypoplasia or dysplasia escape detection more often than bilateral lesions, probably because they will not cause amniotic fluid alterations and thus will not trigger the awareness for a renal anomaly.¹⁶ The renal agenesis was most frequent in between 20-24weeks of gestational age and males affected more than females. The second most common anomaly was multicystic renal dysplasia. Other renal anomalies found were polycystic renal



Fig. 6: Bilateral polycystic kidney disease A) USG image showing enlarged kidney, B) Enblock showing bilateral enlarged cystic kidneys, C) Cut section shows multiple cystic spaces, D) H&E 10x Section shows varying sized cysts lined by flat epithelium.

disease (Fig. 6), horse shoe kidney (Fig. 7) and hypoplastic kidney. In pelvi-ureteral bladder anomalies more common were megacystis, extrophy of bladder (Fig. 8) and absent bladder and ureters.



Fig. 7: A) Enblock shows fused kidneys, B) Horse shoe shaped kidney.



Fig. 8: Fetus with extrophy of bladder.

This study has prospectively evaluated the frequency and patterns of urinary anomalies in perinatal autopsies along with the comparison of prenatal ultrasound findings with postmortem diagnosis.

The limitation of this study is unavailability of karyotyping in our study setup to demonstrate the chromosomal aberrations which is most commonly associated with congenital anomalies and it is important not only for epidemiologic studies but also for the genetic guidance of the parents.

CONCLUSIONS

Early antenatal detection of urinary anomalies has significance, as this may help in postnatal management and will also have a bearing on the decision of the termination of the pregnancy. Although oligohydramnios usually trigger the attention towards a thorough examination of the urinary system but the presence of oligohydramnios makes the interpretation of the ultrasound findings more difficult and can therefore be responsible for inaccuracies. Thus the fetal autopsy after termination of pregnancy is essential to confirm the findings for a definitive diagnosis.

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AGE DETERMINATION FROM CORACOID PROCESS OF SHOULDER JOINT IN MALES OF CENTRAL INDIA

ORIGINAL ARTICLE

Age Determination from Coracoid Process of Shoulder Joint in Males of Central India

Vishal Babulal Surwade¹, Sachin Kumar Meena², B H Tirpude³, P N Murkey⁴

ABSTRACT

There is no statistical data to establish variation in coracoids process fusion of Author's Credentials: shoulder joint in males in central India population. This significant oversight can lead to exclusion of persons of interest in a forensic investigation. Coracoid process fusions in males were analyzed on radiological basis to assess the range of variation of coracoids process fusion at each age. In this study the X ray films of the subjects were divided into three groups on the basis of degree of fusion. Firstly, those which were showing No Fusion (N), secondly those showing Partial Union (PC), and thirdly those showing Complete Fusion (C). Observations made were compared with the previous studies.

Keywords | Coracoid Process; Shoulder Joint; Radiological basis.

INTRODUCTION

piphysis of the bones unites at the particular ages which are remarkably constant for a particular epiphysis and this is helpful in age determination. In law the crime and punishment is entirely based on criminal responsibility and this in turn depend on the age of a person. Age is helpful in identification of an individual which in turn is helpful in both civil and criminal cases. It has been also stated that the study of epiphyseal union of bones is considered a reasonably accurate and accepted method for age determination by the

law courts all over the world. As per Modi's textbook, owing to variation in climatic, dietetic, hereditary and other factors affecting the people of the different states of India, it cannot be reasonably expected to formulate a uniform standard for the determination of the age of the union of epiphyses for the whole of India.1 Union of epiphysis in cartilaginous bones takes place earlier in the females by about 2 years than in males except in case of skull sutures where obliteration sets in little later and proceeds more slowly in females than in males

¹Associate Professor, Department of Forensic Medicine, Sri Aurobindo Institute of Medical Sciences, Indore, Madhya Pradesh 453555, ²Senior Demonstrator, Department of Forensic Medicine, Govt Medical College, Kota 324005, Rajasthan, ^{3,4}Professor, Department of Forensic Medicine, Mahatma Gandhi Institute of Medical Sciences, Sewagram, Wardha, Maharashtra 442102, India. Corresponding **Credentials:** Sachin Kumar Meena: Senior Demonstrator,

Department of Forensic Medicine, Govt Medical College, Kota 324005, Rajasthan India. E-mail: drsachinmeena @gmail.com

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and under tropical conditions ossification is observed earlier than in temperate areas. Reddy KSN (2009) stated that the bones of human skeleton develop from a number of ossification centers.² At eleventh to tweelth week of intrauterine life, there are 806 centers of ossification, at birth there are about 450. The adult human skeleton carries only 206 bones. Mehta Homi S (1963) observed that it has been approved by research in our country that the epiphysio- diaphysial union in Indian occurs about a year or two in advance of the age at which that occurs in Europeans.³ Jit and Kulkarni revealed that Precocity of epiphyseal union has been attributed to racial and climatic factors.⁴ This difference could possibly be due to inadequate material or recording of incorrect ages of the subjects. By taking into consideration the radiological assessment in central India the study will be of help in further understanding the details of precise assessment of age in central Indian population.

AIMS AND OBJECTIVES

- To estimate age from coracoids fusions at shoulder joint in male subjects.
- To asses age specific difference in coracoids fusion at shoulder Joint in all subjects.
- To assess and evaluate the difference in the coracoid fusion at shoulder Joint in Central part of the India with other parts of India on the basis of previous studies.

MATERIAL AND METHODS

The study was carried out with the objective to assess the general skeletal maturity of subjects in Central India. Total eighty (80) females were taken in this study from age ranging from thirteen to twenty one years (13-21).

The individuals were selected from the following sources:

- Individuals admitted in Hospital for treatment purpose.
- Patients coming to the hospital for routine check-ups.

• Student coming to the hospital for medical check-ups.

The individual chosen for the study were evaluated and confirmed for the following:

- They were born to parent native of Central India and lived here since birth.
- They have authentic documentation of their date of birth. (Birth certificate, School leaving certificate, Hospital records, School records).
- Individuals involved in study were predominately right-handed.

Exclusion Criteria

- The subjects should not have any bony deformity or pathology, congenital malformation, nutritional deficiency, endocrinal disorders, history of chronic drug intake (e.g.) anti-epileptic drugs, steroids and chronic illness thus affecting the skeletal growth and development of the individual.
- Those who have no valid Date of Birth certificates.

Procedure of Radiography

After taking the written consent the thorough physical examination and radiological evaluation was done. X-Rays were taken with the help of X-Ray machine in the Department. Minimum shots were taken to expose the joints involved in study and minimum and appropriate voltage settings of X-Ray machine were applied so as to avoid unnecessary radiation exposure of the subjects to get the desired qualities of X-Rays. All the radiological procedure was undertaken according to the prescribed standards. Skeletal maturity was evaluated according to the Jits and Kulkarni's classification of four stages, Appearance, Non fusion, Partial fusion, and complete fusion ("NF", "PF", "CF" respectively).4

X-Rays showing clear gap between the epiphyseal and diaphysial, showing saw tooth like appearance end were designated as "Non-fusion" (NF) X-rays. The X-rays

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showing a line replacing the hiatus between the epiphyseal and diaphysial ends and not showing saw tooth like appearance were designated as "Partial Fusion" (PF) X-rays. X-Rays showing the same bony architecture in the diaphysis and epiphysis and showing scar of the previous stage were designated as "Complete Fusion" (CF).

The master chart was prepared and tabulated as per code number given above. It was classified, analyzed and compared with known standards. Data analysis was done EPI Info software. At the end conclusions were drawn.

OBSERVATION AND RESULTS

Total 170 individuals were included in this study. The numbers of males were 90 and numbers of females were 80. In this study radiological examination of right side shoulder joint was studied.

A	Males		F	emales
(in years)	No	Percentage (%)	No	Percentage (%)
13-14	8	8.89	12	15.00
14-15	12	13.33	8	10.00
15-16	10	11.11	12	15.00
16-17	16	17.78	10	12.50
17-18	14	15.55	14	17.50
18-19	10	11.11	8	10.00
19-20	12	13.33	10	12.50
20-21	8	8.89	6	7.50
Total	90	100.00	80	100.00

Table 1: Age and Gender Wise Distribution of Subjects.

Table 2: Coracoid P	rocess in Males.
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Age in years	NF	PF	CF	Total
13-14	8(8.88%)	0(0%)	0(0%)	8(8.88%)
14-15	8(8.88%)	2(2.22%)	2(2.22%)	12(13.33%)
15-16	6(6.66%)	1(1.11%)	3(3.33%)	10(11.11%)
16-17	4(4.44%)	4(4.44%)	8(8.88%)	16(17.77%)
17-18	1(1.11%)	2(2.22%)	11(12.22%)	14(15.55%)
18-19	0(0%)	0(0%)	10(11.11%)	10(11.11%)
19-20	0(0%)	0(0%)	12(13.33%)	12(13.33%)
20-21	0(0%)	0(0%)	8(8.88%)	8(8.88%)
Total	27(30%)	9(10%)	54(60%)	90(100%)



Graph 1: Age and gender wise distribution of subjects.





x2-	60.3333
value	
p-	0.000, S,p<0.05

value

Note: Figures in parenthesis indicates percentage.

Coracoid Process in males shows partial fusion in 12 (14.63%) cases in 14-15 year of age group. 2 (2.22%) cases in 14-15 years of age group. 1 (1.11%) case, 4 (4.44 %) cases and 2 (2.22%) cases in 15-16 years, 16-17 years and 17-18 years of age groups respectively.

Similarly it Show complete fusion in 2 (2.22%), 3 (3.33%) and 8 (8.88%) cases in age group of 14-15 years,15-16 years and 16-17 years respectively. Whereas it is in 11 (12.22%) cases in 17-18 years of Age group. As the person grows and matures it shows complete fusion in all 30 (33.33%) cases between 18-21 years of age group.

Researcher	Region	Male
Galstaun (1937)	Bengal	17-18
Krogman (1960)	USA	18-19
Reddy KSN (1973)	Andhra Pradesh	15-16
Sahana S.N (1986)	Bengal	17
Saini et al (2005)	Rajasthan	18-19
Agrawal Anil (2006)	Delhi	16
Cardoso Hugo (2008)	Spain	17
Schaefer M.C.(2008)	Bosnia	15-18
Pimple et al (2013)	Mumbai	18-19
Present Study	Central India	18-19

DISCUSSION

Out of 170 subjects 90 males and 80 females from age group 13-21 years, were studied radiologically for epiphyseal fusion of coracoid process of scapula.

In the age group of 13-14 years males shows non fusion in 8 (8.88%) cases. In 14-15

years of age group partial fusion was seen in 2 (2.22%) cases and complete fusion was seen in 2 (2.22%) case. Similarly 15-16 years and 16-17 years age group shows complete fusion in 3 (3.33%) and 8 (8.88%) cases respectively. The coracoid process shows complete fusion in all 41 (45.55%) cases between 17-21 years of age group of males.

Average age of complete fusion of coracoid process with scapula in male subjects was 18-19 years in present study.

The observation of present study exactly matched with the work of Pimple et al (2013)⁵, Saini et al (2005)⁶ and Krogman (1960)⁷ in the population of Western Maharashtra, Rajasthan and the United States of America respectively.

Disparity was observed with the work of Galstaun (1937)⁸ and Hugo Cardoso (2008).⁹ They observed fusion of coracoid process in males 1 year earlier than present study i.e. 17-18 years. A Delhi based study done by Agarwal A (2006)¹⁰ observed early fusion of coracoid process at 16 years which was 2 years earlier than present study.

This means, the observations of present study done in Central India, is slightly different than the observations done in North and Eastern India and so also with some Western countries. The reason may be change in climate, dietary and hereditary factors.

The coracoid process showed complete fusion in 8 (10%) cases in 18-19 years age group, in 10 (12.5%) cases in 19-20 years age group and in 6 (7.5%) cases in 20-21 years of age group.

This means, the observations of present study done in Central India, is slightly different than the observations done in North and Eastern India and so also with some Western countries. The reason may be change in climate, dietary and hereditary factors. The present study confirms that, the worldwide trend of early fusion of epiphysis in females as compared to their male counterparts is uniform throughout the world. The present study also observed that, female epiphyseal fusion is early than male subjects.

Limitations of Study

- Population in Central India is mixed type comprising of various religions and castes so this study is not applicable to specific caste or religion.
- Dietary, religious, economic, environme -ntal factors are not studied in the present context.
- As the number of subjects were less, for confirmation of various variations, more studies are required.
- This study was conducted exclusively on the young indigenous population of Central India keeping in mind that very less literature about the age estimation from ossification of shoulder joint is available involving this particular region of India.
- By comparing the available literature about ossification of long bones, fusion was delayed one to three years in this study with population of Central India than those parts of Eastern India in the population of Bengal.
- By comparing the available literature the age of skeletal maturity in males in this region are nearly similar to those in population of Western Maharashtra and Rajasthan were compared with available results of various previous studies.
- As this study is done in Central India region the application of standards of this study may be considered ideal for application in the region of Central India.
- Population in Central India is mixed type

comprising of various religions and castes, so this study is not applicable to specific caste or religion for estimation of age.

• Due to changing life style pattern, dietary, climatic, behavioral factors; age of ossification is changing as mentioned in the available literature. So as to evaluate these changes, studies are recommended in every region of India at regular time period for academic and judicial interest.

• Due to very narrow borderline range of differentiation between various stages of fusion, it is difficult to consider stage of fusion as age indicator.

- The opinion about age should always be given in the range. From this study, range of 1-2 years of margin of error can be concluded.
- With similar findings we have observed, there is enhancement of belief in the theory that the similarities in geographic-climatic condition, ethnicity, socioeconomic status, dietary habits have the common influence on the fusion of epiphysis with the age.

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Physical Indicators of a Grave: A Review

REVIEW ARTICLEPhysical Indicators of a Grave: A Review

Manashree Mane¹, Saptarshi Suresh Rao², Urvita Sharma³, Sandip Kumar Chhasia⁴

ABSTRACT

The observable characteristics or the geographical indicators of a burial site can help locate the buried remains. The investigator has to use every available technique in the search and hence needs training in search techniques. Several factors can influence the appearance of a grave. Deliberate burials tend to leave surface evidence and are commonly revealed as a depression. Unidentified graves can also be detected by plant growth, animal signs and other surface objects or indicators. Soil anomalies (depressions and cracking) are more pronounced at larger grave sites versus the smaller grave. The objective of our article is to review these processes and provide guidance as to which search, or instrument technique will be an effective strategy for locating graves.

Keywords | Buried remains; Clandestine grave; Indicators; Grave; Ground Penetrating Radar.

INTRODUCTION

When a murder has been committed and the remains of this individual are buried, the law enforcement agency in charge of the investigation has to use every available technique or method in the search for the remains. The law enforcement agency needs training in search techniques, but these techniques may not be effective enough when searching for buried human remains.¹ Indicators for murder victim in clandestine graves have gathered interest of both investigators and researchers.² Forensic Taphonomy plays an important role in the location of clandestine graves from the effect that decomposition has on the burial site, and it can be used to locate these sites. The Soil might be mixed up at the location of grave and vegetation on the grave will differ from the surrounding.

Animal scavenging also plays an important role in the location of clandestine graves. The Presence of disturbed soil or burrows and holes makes it a potential site of possible human remains. Along with the above

Author's Credentials:

^{1,4}Assistant Professor, ^{2,3}B. Sc Student, Department of Forensic Science, Jain (Deemed-to-be University), Bangalore 560027.

Corresponding Credentials:

Manashree Mane,

Assistant Professor, Department of Forensic Science, Jain (Deemed-tobe University), Bangalore 560027. e-mail:manashree4n6@ gmail.com

How to cite this article Manashree Mane, Saptarshi Suresh Rao, Urvita Sharma, Sandip Kumar Chhasia/ Physical Indicators of a Grave: A Review/Indian Journal of Forensic Medicine and Pathology/2021;14(3):361-366 indicators, presence of clothing or bones on the soil surface can help investigators in detecting a possible grave. Indications of clandestine graves can also vary between climate, season, and soil type. Surface deposits that are which are either completely or partially exposed can be classified as primary or secondary burial sites.

Several factors can influence the appearance of a grave. Wind, water, ploughing of a field, soil conditions and depth of the burial will all play a role. Apart from these physical indicators, the processes associated with the decomposition need to be understood. Moreover, the preservation of organic materials plays a significant role in archaeology as well as forensic science.³

Soil Surface

Soil may be levelled to the surface after burying, but it will always form a depression in the area where the remains are buried. This kind of a depression called primary depression is largely due to the subsequent downfall of the buried body and partly due to decomposition. The largest volume to collapse during the decomposition process is the thorax abdominal area which may give rise to a secondary depression. Usually there is no vegetation seen on a newly formed grave. The decomposition of the body may leave certain nutrients in the soil to give favourable conditions for plants to grow and these plants may actually grow faster than the surrounding vegetation. Normally weeds and grasses are the first plants to appear on a new grave as they are fast growers and are easily differentiated from surrounding vegetation.⁴

Disturbing the ground creates alterations in the vegetation which may alter the local flowering regime.⁵ In the case of filling the grave, the mounding phenomenon is tried to be omitted by flattening the surface over the grave. However gradually the soil will consolidate and sink causing a hollow over the grave. Differences can be measured using geophysical survey techniques and processed later using appropriate software such as catographic analysis, aerial photography, field observation etc. A shallow grave may have characteristics of both contexts since some bones may be scattered on the surface due to erosion or disturbance, while other remain beneath the soil.⁶

Animal Scavenging

Animal scavenging is another important sign in cases where the grave is shallow. In certain cases, these animal activities help in detection and recovery of human remains. Any fresh digging caused by racoons or opossums and dogs should be investigated. Birds and rodents tend to carry off hairs and bits of clothing to use as their material for burrow or nests. Scavenger birds also tend to congregate near a body. Coyotes and dogs may carry body parts or bones from their concealed or buried location out in the open where they can be easily detected.⁷ There is also the possibility that some personal belongings or bones are brought to the surface due to the digging of the animals. Various environmental, individual, and cultural factors may have an impact on these physical indicators.8

Surface Deposits

Surface deposits, the types of burials also are primarily important.8 Location of remains also determines a forensic context to a large extent. In a primary burial site, the body remains in its original location and is undisturbed. A secondary burial site indicates that the remains have been moved from their original site and deposited.9,10 Excess soil is usually scattered around the edges of the grave or left with no attempt to level the surface with the surrounding area, resulting in a small ridge or rise next to the grave. Usually, environmental factors and taphonomic processes will destroy the tissues within a period of time, but if found then it might be a possible indicator of a grave. Associated artifacts and evidence like weapons, digging tools, concrete blocks, clothing, wrapping materials are generally used to cover the surface deposits. It may indicate a possible grave of a forensic context.In cases where a body is buried at a shallow depth or buried in a natural depression, extra holes may be dug around the burial site to gather enough soil to completely conceal the body. This might be another possible indicator to suspect a grave.

Geophysical Characteristics

A study in which the importance of training in archaeology and archaeological methods was discussed, has led to a significant which has improvement in the recovery of burials considering certain surface evidences.¹¹ The geophysical characteristics include stratification evidence, tool marks on the burial pit edge, bioturbation of the deposits, sedimentation factors, surface compression and depression of the burial pit deposits, and internal compaction of the burial pit deposits.¹²

Non-invasive search and detection techniques

Non-invasive search and detection techniques also play a major role to locate and identify graves. The recognizable signs of a scene are natural/disturbed vegetation, soil features and topography of soil and corresponding artifacts. If a buried feature is suspected, a trowel can be used to identify differences in soil texture, coloration, and composition with surrounding soil. Visual signs include discoloured areas of substrate marked by odour or discoloration from body fluid leakage, presence of insect puparium, and yellowish discoloration of low, overhanging deciduous foliage.¹³

Vegetative Markers and Ornamental Vegetation

The importance of vegetative markers and ornamental vegetation play an important role in preliminary identification. The Presence of a cemetery can be indicated by the presence of flowering and/or fruiting trees, camellias, roses, daffodils, lilacs. Periwinkle is commonly found as an ornamental plant at cemeteries in the south-eastern U.S¹⁴

The vegetation dynamics of a burial site using five swine carcasses was carried out in Italy by burial of the carcasses to detect the effects of mechanical disturbance and carcass decomposition on vegetation structure and specific composition. After the burial, B. sterilis, C. caryophyllea, Euphorbia cyparissias, Tecurium chamaedrys, V. myuros, and the moss Schistidium apocarpum were significantly more abundant in the undisturbed control plot than on the graves.¹⁵

Clandestine Grave Detection Techniques

Various techniques of clandestine grave detection are used like changes in vegetation, chemical analysis of volatile organic compounds (VOCs), human remains detection (HRD) dogs and ground penetrating radar. The release of purge fluids into the soil kills the surrounding vegetation. As decomposition of the purge fluids progresses, releasing carbon, nitrogen and phosphorus to the grave soil, vegetation may be more abundant at the grave site than other vegetation in the area.¹⁶

After the weed invasion these are replaced by a species of plant which is very different from the vegetation present in the surrounding area. Chemical alterations includes enrichment of the soil due to decomposition of the body and also aeration of the soil during the inhumation process which typically manifests in form of darkened or stained soil. The cadaver dogs are trained to detect the odour of decomposing human remains and alert their handlers regarding the location of these decomposing human remains.¹⁷

Soil Changes

At the time of decomposition, materials from a cadaver enter grave soil providing a localised infiltration of nutrients which results in the formation of cadaver decomposition island. One of the major characteristic features of this island is increased soil microbial biomass and microbial activity.

The changes associated with these include an increase in nitrogen concentrations in soil as well as plants. Calcium concentrations and pH are found to be higher directly underneath the carcass with a gradient decrease towards the periphery of the decomposition site. This effect is detectable for up to seven years after the death of the animal.¹⁸⁻¹⁹

NON-INTRUSIVE WAY OF SEARCHING FOR A BURIAL

Probe

The probe is a relatively non-intrusive way of searching for a burial. Probes are an easy to use, inexpensive and accurate way of narrowing down a search area for a burial. The regular metal probe is the least expensive, but other probes are just as good to use. The gas probe has a sensor that can detect gases that are released from a decaying body. Certain gases are released from these decomposing bodies and a gas probe, when inserted into the ground, may be able to pick them up. Another type of probe is the soil temperature probe. Decomposing bodies have been shown to raise the temperature of the surrounding soil by a few degrees. This can be detected by using subsurface soil temperature probes. The last type of probe that could be used is a soil pH probe. Besides increasing the temperature of soil around a burial, decomposing bodies have also been known to increase the alkalinity of the soil around a burial.Soil pH probes can be used to measure this increased alkalinity and possibly detect a burial.²⁰⁻²¹ The main disadvantage of the probe is that the searchers using the probe need to be trained in how to handle and use it properly.

Shovel Test

By digging down this far archaeologists can determine if the stratigraphy of the soil is natural or reversed. If there is a possible burial a properly trained and cautious archaeologist may dig in 10 cm intervals only, causing little or no damage to anything that may be buried.²²

Metal Detector

When using a metal detector to locate a buried body the assumption is that there will be metal objects on or with the body. Compared with some other methods used, metal detectors are relatively cheap. The commonly used metal detectors contain a transmitter, powered by a battery that radiates a low frequency signal

into the ground by means of a coil that is placed at the bottom of the metal detector. When the low frequency current signal reaches any metal or mineral that is in the soil, the metal or mineral re-radiates a signal back to the surface. This signal is what the metal detector's receiving coil picks up.Metal detectors have a few disadvantages too. First, they can detect only metal material (ferrous, nonferrous), and only to a few feet in depth. The depth at which the detector can react to metal depends on the coil size and the size of the metal object.²² Large metal objects can be detected at a deeper level than small ones, which can be detected only if they are close to the surface.23

Ground Penetrating Radar (GPR)

Ground Penetrating Radar (GPR) is a technique that is becoming more widely available to archaeologists in the field. GPR sends electromagnetic waves into the earth then records the energy that is reflected back from materials located below ground. A short pulse is used to allow accurate measurements of depth to the target. The echoes that are reflected are displayed on an oscilloscope.24 One disadvantage is that the GPR works well only in smooth areas with a constant elevation.²⁰ The Smooth level ground cannot be guaranteed when an archaeologist is working in the field. Another disadvantage to using GPR is that the equipment that is needed is very hard to obtain and relatively expensive.24

GPR is capable of measuring both physical and chemical changes in the ground in three dimensions; therefore, depth as well as the spatial distribution of graves can be determined.²⁵ Depth in the ground can also be determined. Energy is reflected from any discontinuity in the ground, including mineralogical differences, sediment size distinctions, void spaces, concentration of associated artifacts. Amplitudes of the reflected waves can also be measured, indicating differences in material properties within the ground, that is significant in locating subtle buried features.²⁵⁻²⁶ The greater the contrast in electrical properties between any two buried materials at an interface, the greater will be the amplitude of recorded signals.²⁷ The advantages such as depth of burial, grave size, type of caskets and their orientation, numbers of graves in certain locations, and the spatial distribution of graves within certain areas of cemetery may provide crucial help to the forensic investigators.²⁸

CONCLUSION

The observable characteristics the or geographical indicators of the burial site can help locate the areas of interest. Several factors can, of course, influence the appearance of a grave. The processes associated with the decomposition is of great importance to forensic science and archaeology as it can be used to establish cause and manner of death, provide the location of human remains and can also provide

means to determine post-mortem interval. There are various techniques are used for the detection of clandestine graves, like physical characteristics of graves, chemical analysis of volatile organic compounds, cadaverdetection dogs, etc. The most common are magnetic radiometry, electrical resistivity, GPR, and electromagnetic conductivity of which GPR is the best method.

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Doctrine of 'resipsa loquitur' in surgical management of head injury in Transkei region of South Africa: Case reports

CASE REPORT

Doctrine of 'resipsa loquitur' in surgical management of head injury in Transkei region, South Africa: Case Report

Banwarilal Meel

ABSTRACT

Background: Poor people accept death as 'God's wish', sing a ritual song and Author's Credentials: bury their loved ones without pointing a finger at anyone or asking how their loved ones died. Medical errors cause several deaths, but most of the time this goes unnoticed, because many affected by it are poor and illiterate.

Objective: To highlight the problem of fatal surgical errors in the management of head injury of patients in the Transkei region of South Africa.

Case Histories: The case reports of the autopsies that discussed are intended to highlight the gross surgical negligence of medical professionals. In the first case, burr-holes were made to release intracranial pressure, but a piece of glass, which was the primary cause of increased intracranial pressure, was left in the cranium. In the second case, an inexperienced operating surgeon pushed the drill deep into the cortex of the brain while making burr-holes. The third case report describes a head injury suffered by an alcohol-intoxicated patient. The head injury was inflicted at a police station. This article presents histories, post-mortem findings, causes and mechanisms of death, as well as discusses acts of commission and omission.

Conclusion: A high level of fatalities is caused by 'acts of commission and omission' in respect of head injury of patients in the Transkei region of South Africa. This matter needs regular auditing through forensic pathology services.

Professor, Research Associate, Nelson Mandela University, Port Elizabeth 6031, South Africa.

Corresponding Credentials:

B Meel, Professor, Research Associate, Nelson Mandela University, Port Elizabeth 6031 South Africa. Email: meelbanwari@ yahoo.com

Keywords | Surgical Negligence; Medical Ethics; Res Ipsa Loquitor.

INTRODUCTION

urgery has become an integral part of global health care, with an estimated 234 million operations performed annually. Surgical complications are common

and often preventable.¹ Preventable medical errors lead to the death of up to 98,000 Americans annually and cost the US economy over \$17 billion per year.2 The most expensive of



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these errors are related to surgery, accounting for over 6 billion annually, roughly one-third of the total financial burden of medical error.²

South Africa may be on the verge of a medical malpractice litigation 'storm', as the number and size of claims appear to be increasing rapidly. In the last four years the Department of Health (DotH) has incurred R1.2 billion in legal costs relating to medical malpractice.³ The worst provincial culprits were KwaZulu-Natal (R209.1 million), the Eastern Cape (R91.9 million) and Limpopo (R30.9 million).³ According to the Medical Protection Society, the cost of reported claims more than doubled over a recent twoyear period. Claims exceeding R1 million have increased by nearly 550% compared to 10 years ago, while claims valued at over R5 million have increased by 900% in the past five years.4

The Health Professions Council of South Africa (HPCSA) received 2,403 complaints between April 2011 and March 2012. Many of these related to claims for misdiagnosis, practising outside the scope of practice and refusal to treat patients.⁴ Medical professionals fail in their responsibility to their patients by not giving them proper care and attention, acting maliciously, or providing substandard care, thus causing far-reaching complications such as personal injury and even death. A study conducted by the author showed that at least 12% of hospital deaths in the Transkei region are preventable.⁵

Medication errors are an important problem in health care, causing harm to patients. In 1993 such errors were estimated to account for 7000 deaths in the USA.⁶ According to the HPCSA, between April 2008 and March 2009 about 90 doctors in South Africa were found guilty of unprofessional conduct.⁷ Forty-four doctors have been struck from the roll since 2005 owing to unethical and unprofessional conduct.⁷ Xhosa society is not litigious in nature. They leave everything to god. This is because the people are poor and illiterate. Seventy-three percent of the rural people in the Eastern Cape were living on less than R300 per month in 2005/2006 and more than half of them on less than R220 per month.⁸ The purpose of these case reports is to highlight the problem of surgical malpractice through 'acts of omission' and 'acts of commission' in the Transkei region of South Africa.

Case History 1

Mr XM was a 25-year-old male who was drinking beer in a sheebeen (local liquor selling place) with his girlfriend one evening. Some other young boys were also drinking in the same place. One of them harassed Mr XM's girl friend, which led to a fight. He was hit on the head with a broken beer bottle and started bleeding profusely. He was brought to hospital, where he was admitted and initially stabilised, but he became unconscious. The next day he was taken to theatre to decrease intracranial pressure. Two burr-holes were made in the anterior and posterior part of the parietal bone, but a piece of glass lodged in the cranium was not removed. The patient died after two days.



Fig. 1: Two burr-holes and piece of glass in center on outer table of left side of parietal bone.

On autopsy, the scalp was found to be stitched, and two burr-holes were seen in the parietal bone. One burr-hole was completed, but the other was just drilled into the outer table of bone. A piece of glass was recovered. A depressed fracture of the parietal bone was seen, with a cut in the meninges and the brain tissue. Subdural and subarachnoid hemorrhage was observed on the surface of the brain. The brain was oedematous with shifting and tentorial herniation on one side. The other organs were congested.

Case History 2

Mr BM was a 40-year-old male who was assaulted, being hit on the head with a stone. He was brought to hospital by the police and admitted in a state of unconsciousness. He was diagnosed as having a head injury with subdural haemorrhage. He was operated on and later died in hospital.

On autopsy, stitches were found on the head. Underneath the stitched wounds, burrholes were seen on the anterior and posterior part of the parietal bone. The durameter and cortex of the brain were found to be cut corresponding to the both burr-hole. The brain was oedematous, and tonsillar herniation was observed. The lungs were oedematous and the other organs congested.

Case History 3

Mr TT was a middle-aged man with a history of alcoholic intoxication whom the police brought to the hospital's casualty department in a semi-comatose state one night. He had been in police custody. The patient was diagnosed as alcohol-intoxicated, as his breath was smelling of alcohol. He was treated with intravenous fluid and insulin. The patient died after two days in hospital. He was sent to the forensic pathology laboratory for an autopsy.

On autopsy, some bruises were found on his head. When the skull cavity was opened, a massive extradural haematoma was visible underneath a depression of the cerebral cortex. Tentorial as well as tonsillar herniation with shifting of the brain to the opposite side was observed. The brain was oedematous and the other organs were congested.

DISCUSSION

This autopsy case report is the first of its kind in the Transkei region of South Africa. It reveals the tip of an iceberg and provides important information to justify further study to develop a protocol for the care of patients in hospitals in this region. Iatrogenic hospital deaths are generally under-estimated and therefore under-reported. The reporting system used by hospital management is inadequate and most of these deaths are ignored or remain unnoticed. A few cases of iatrogenic injury deaths come to the notice of forensic pathology services because they are referred for medico-legal autopsies. However, even when an autopsy reveals apparent negligence causing the death, no action is taken. When people are poor, they are regarded as lesser human beings. They do not have a voice, and if they have, there are not enough people to listen to them.

According to the Health Professions Amendment Act (Act 29/2007), death during or after a surgical procedure may be considered medico-legal and subjected to medico-legal autopsy and inquest. All deaths due to surgical mishaps, including anaesthetic and/or procedure related deaths, are dealt with under section 48.⁹ In the past the practice was to refer such cases for medicolegal autopsy, but this culture no longer exists in hospital in Transkei region. Deaths are taken very lightly and hardly any enquiry is instituted by the management.

Case 1 was operated on and two burrholes were observed, but the piece of broken glass bottle, which was the primary cause of increased intracranial pressure, was not removed by the operating surgeon.



Fig. 2: Depressed fracture of inner table of left parietal

bone of skull in centre with two burr-holes on both side.



Fig. 3: Burr-holes on right parietal bone penetrated into duramater and lacerated cortex of right parietal lobe of brain.

The first burr-hole was very superficial, incomplete and did not serve any purpose. The second was in the occipital bone (Photograph 1). The piece of glass had led to a depressed fracture (Photograph 2). Young doctors are not trained sufficiently to carry out craniotomy procedures. Moreover, they are doing these operations on their own without any supervision.¹⁰ It is difficult to estimate how many patients have died because of the negligence of these doctors, but it could be presumed that the number is very high.

Case 2 suffered from an uncommon complication of extensive damage to the cerebral cortex underneath burr-hole surgery, indicating that the operating surgeon was not aware of this complication (Photograph 3). The damage to the cerebral cortex was caused exclusively by the surgeon who operated on the patient. It was absolute carelessness and could not be accepted at any standard of patient care. If it happened in any other developed country or even in this country in some metropolitan cities, it would have been headline news in the media. Sadly, it will remain unnoticed and secret forever, and the doctor will not change his/her way of practice. Most young doctors in public hospitals are working without any supervision.¹⁰ Subdural haematoma is commonly treatable by burrhole craniotomy with drainage, which is most effective, provided the procedure is performed by an experienced doctor who takes specific precautions to reduce complications.¹¹ The lack of experienced doctors in this region is a matter of concern. They learn, but only after killing several patients, which could be called the 'cut, kill and learn syndrome'. This is totally unacceptable in any society.



Fig. 4: Fracture of left side parietal and temporal bone.



Fig. 5: Extradural hematoma underneath fractured temporo-parietal bone on left side of head.

Case 3 was arrested by police when drunk on a road. He was beaten in police custody and died in the hospital's casualty department. No intervention was carried out, since it was simply presumed that he was drunk. The treating medical officer did not seem to be aware that two conditions can exist in the same patient. It is very important to look for signs of trauma associated with alcohol abuse, especially head injuries, as such patients are more prone to these. This was an act of omission. This death could have been avoided, as an extradural haematoma is a treatable condition (Photograph). Traumatic extradural haematoma is a neurosurgical emergency and timely surgical intervention is the gold standard.¹²

All three cases in this report fall in the category of the doctrine of Res Ipsa Loquitur, 'the facts speak for themselves.' If a doctor involved in such a case is charged, the incident, which was under the exclusive control of the defendant (cases 1 and 2) happened, but it would not have happened in the absence of negligence, and the plaintiff did not contribute to the harm by his own negligence. The burden of proof then falls on the defendant to refute this prima facie inference of negligence that has been created.¹³ This doctrine is not currently applied in South African courts.¹⁴ This maxim would shift the advantage to the plaintiff in cases of negligence, thus supporting the patient's constitutional right in terms of section 27 (a).15

There is very limited literature on medical malpractice in South Africa. Surgical malpractice is much easier to pick up in autopsy, but medical errors are difficult and need a well-equipped toxicology laboratory to estimate the drug level. It is the duty of a doctor to do what is best for the patient, and to avoid the death of patients by iatrogenic injury.¹⁶ Medical professionals who work in hospitals must act transparently and be accountable to the public, but that has not happened in these cases. Forensic pathology services provide reliable data that can be used to ensure the quality of care of patients in hospital. Strengthening forensic pathology services will help in quality control in the management of patients in hospitals. Deservedly large pay-outs have been made to patients, related to the harm suffered because of negligence of doctors.¹⁷

In public sector hospitals, there is a mix of many problems such as too many ill patients, non-functioning equipment, and recurring shortage of supplies, exacerbated by lack of experience of interns and community service medical officers, who all too often function unassisted and are not advised by senior personnel.¹⁰ Deaths due to these conditions remain unnoticed by the next of kin forever.

People in this region are not aware of any kind of litigation process. Even if some know about it, it is difficult to pay the legal fee. This occurs because of a low level of literacy and poverty among people in this region. The Department of Health (DOH) is more concerned about the money paid because of litigation every year, they do not look the lives lost unnecessarily.

People are 'God-fearing' and do not blame their doctors when something goes wrong, yet in many cases litigation would be justified. Too many medical personnel and other stakeholders do not care about the pain and suffering of the people in this region because of negligent service delivery. Patients are invariably the losers, particularly in smaller towns and rural areas as they lost their loved one, and not get compensated in any form.⁴

The high level of iatrogenic injuries or negligence in the care of patients in hospitals could be prevented. The hospital management must be sensitive to these deaths and must carry out periodic mortality meetings and auditing of patient care.

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Accidental Decapitation in Road Traffic Accident: A Rare Occurence

CASE REPORT

Accidental Decapitation in Road Traffic Accident: A Rare Occurence

Abhishek Yadav¹, Aravindan V², Jay Narayan Pandit³, Karthi Vignesh⁴

ABSTRACT

Accidental decapitation is very rarely seen in Road Traffic Accidents. The common site of decapitation is at the level of the mid-neck in C2-C3 vertebrae or C3-C4 vertebrae due to its weak nature. Here we present a rare presentation of decapitation in a case of Road Traffic Accident, where a person riding a cycle was decapitated at the atlanto-occipital joint. The mode of decapitation and the rarity of its site make this case unique. Autopsy surgeons do not encounter decapitation cases regularly and hence on first encounter many queries regarding manner of death arises in one's mind. The autopsy surgeons should be clear that although decapitations are commonly encountered in suicide and railway track settings, there is a possibility of its occurrence in regular road traffic accident settings also especially in persons travelling in two-wheeled (open) vehicles.

Keywords | Decapitation; Road Traffic Accident; Atlanto-occipital joint; Avulsed Laceration.

INTRODUCTION

Decapitation is the separation of head from the trunk. It can be of two types: complete and incomplete decapitation. It always causes sudden death because all the vital structures passing through the neck are severed in decapitation.¹ Decapitation may be antemortem or occur due to postmortem mutilation.² In antemortem decapitations, suicides are more common than the other manners of death. Accidental and homicidal manners occur almost equally but quite less than suicides.³ Accidental decapitation is commonly encountered in army conflicts where people are commonly exposed to explosive materials. It is relatively rare in civilian settings⁴ like in industrial accidents or railway accidents.⁵ The frequency of accidental decapitation in Road Traffic Accidents is more in pedestrians⁶, motorcyclists⁷, and cases were also reported in car drivers⁸ and

Author's Credentials:

¹Additional Professor, ²Junior Resident, ^{3,4}Senior Resident, Department of Forensic Medicine and Toxicology, All India Institute of Medical sciences, New Delhi 110029, India.

Corresponding Credentials: Abhishek Yadav, Additional Professor, Department of Forensic Medicine and Toxicology, All India Institute of Medical sciences, New Delhi 110029, India.

e-mail: drayad_in@yahoo. com

How to cite this article Abhishek Yadav, Aravindan V, Jay Narayan Pandit, Karthi Vignesh/Accidental Decapitation in Road Traffic Accident: A Rare Occurence/Indian Journal of Forensic Medicine and Pathology/2021;14(3):373-377 passengers⁹ of cars or buses. The common site of decapitation is at the level of the midneck in C2-C3 vertebrae or C3-C4 vertebrae due to its weak nature.¹⁰ Here we present a rare presentation of decapitation in a case of Road Traffic Accident, where a person riding a cycle was decapitated at the atlantooccipital joint. The mode of decapitation and the rarity of its site make this case unique.

CASE DETAILS

A 48-year-old male was riding a bicycle on a busy road in Delhi. Allegedly, a mini truck hit his bicycle from the back and he was thrown out of his cycle over a street light pole. He was brought to trauma emergency of AIIMS, New Delhi, where he was declared brought dead. Before autopsy, X-ray examination (Figure-1) was done, which showed decapitation at the atlanto-occipital joint. He was well-built and moderately nourished.



Fig. 1: Digital X-ray of head and neck.

Rigor mortis was present all over the body. An avulsed lacerated wound leading to a neartotal decapitation of the head (Figure 2) was present. The head was severed at the level of the atlanto-occipital joint and attached with the trunk only by a piece of skin and soft tissue (Figure 3). All structures including the trachea, esophagus, blood vessels, nerves, and bone were cut. Graze abrasions were present over the anterior aspect of the chest. Lacerated wounds were present over the bilateral occipital region and right frontal region of the scalp. Multiple abraded contusions were present over the face, both arms, and elbows. On opening the scalp, diffuse subdural and subarachnoid hemorrhage were present.



Fig. 2: Near-total Decapitation at atlanto-occipital joint.



Fig. 3: Near-total decapitation.

Hemothorax was present and all the organs were pale. The cause of death was given as Traumatic decapitation due to blunt force/ surface impact.



Fig. 4: Crime scene photograph.



Fig. 5: Damaged back of bicycle. Crime scene photographs were analyzed and crime scene examination was done which

were consistent with the given history and the postmortem findings. The victim was recovered from the base of a street light pole (Figure 4). The back portion of the bicycle was badly damaged (Figure 5) and the front wheel of the mini-truck was seen dismantled from the main truck and the front part of the truck was damaged (Figure-6).



Fig. 6: Damaged front of mini truck.

DISCUSSION

In India, National Crime Records Bureau 2019 reports documented a total of 4,67,171 cases of Road Traffic Accidents of which 1,81,113 cases were fatal.¹⁰ However, decapitation cases were reported in less than 0.01% of all traffic accidents in the past.⁴ Decapitations are rare outcomes of Road Traffic Accident. Due to its rarity, decapitation cases are less studied and only case reports, case series and some review articles are present in the literature.

Historically, decapitation was carried out as capital punishment since 3000 BC in Rome and Greece.¹¹ They used devices like guillotine for carrying out decapitation. Even in 2013, allegedly judicial executions by decapitation was reported in Saudi Arabia.¹² The 19th and 20th century literature shows more decapitations in army conflicts only. The civilian settings have seen more number of decapitations in suicides involving railway track.⁴ The homicidal and accidental decapitations are relatively less. Decapitations in form of postmortem mutilation are also reported in the literature.

Accidental decapitations are rarely encountered in civilian settings but contribute to high degree of mortality. especially among young individuals.9 Decapitation in road accidents occur due to sudden stoppage of an individual travelling in high velocity¹³ by a stationary object. Zivot and Dimaio in their study found out that minimum 98km/ hr speed is required to cause decapitation.¹⁴ Cases are also reported in low velocity impact.¹⁵ The reported stationary objects in the literature are barrier stanchion¹³, iron cross bar¹⁶, tailgate of truck and roadblock chain.¹⁷ Both speed and impact with the stationary object are important mechanisms in decapitations due to road traffic accidents. In our case, a mini truck had hit the back of a cycle.

The deformations in the back of the cycle and the front of the mini truck noticed during crime scene examination were suggestive of a high-speed impact. The stationary object involved in our case was a street light pole on the side of the road. The possible mechanism in our case could be the sudden stoppage of the victim's face causing violent facial impact by the street light pole resulting in profound hyperextension at the atlanto occipital joint thereby leading to decapitation when he was thrown out of his cycle by a high-velocity impact. There were multiple lacerations in front of face and head confirming our possibility of a violent facial impact.

Road accidents related decapitations have been reported in pedestrians⁶ and motorcyclists.⁷ The mechanism behind this could be the exposure of the entire body to high-velocity impact accidents. The usage of helmets were also not immune for decapitations because of exposure of the neck.¹⁸ It is a known fact that occupants of closed vehicles are relatively safe compared to that of two-wheeled (open) vehicles. The mechanism of exposure of whole body may not be completely acceptable because car drivers and passengers of cars and buses⁹ were also reported to be victims of decapitation in road traffic accidents. In our case, the victim was riding a bicycle and was not wearing helmet. The mechanism of full body exposure could be a possible mechanism of decapitation here.

The site of the decapitation is commonly the mid-neck (C3-C5) in almost all the cases of accidental decapitations in road traffic accidents reported in the literature.¹⁸ The possible mechanism may be due to its anatomical weakness or a direct impact over the cervical region.¹⁹ The cases where the mechanism of violent facial impact followed by hyperextension of neck also reported the site of impact to be in mid-neck (C3-C5). In our case, the site of decapitation was at atlantooccipital joint. The possible explanation for the site of decapitation being different from that of other reported cases could be the exact site of facial impact. The site of facial impact in our case was in and above the area of forehead, which could explain the higher level of site of decapitation.

CONCLUSION

Autopsy surgeons do not encounter decapitation cases regularly and hence on first encounter many queries regarding manner of death arises in one's mind. The autopsy surgeons should be aware that although decapitations are commonly encountered in suicide and railway track settings, there is a possibility of its occurrence in regular road traffic accident settings also especially in persons travelling in two-wheeled (open) vehicles.

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A case of megacolon with a giant fecaloma on medico-legal autopsy

CASE REPORT

A Case Of Megacolon with a Giant Fecaloma On Medico-Legal Autopsy

Robert Ngude¹, B Meel²

ABSTRACT

Chronic constipation is one of the causes of megacolon. It is generally a natural death, provided not died during procedure under anesthesia. This case (NM) is of a 15-year girl (NM) who died on the operation table and referred for a medico-legal autopsy. There has been a history of repeated episodes of constipation since the age of six, and frequently hospitalized but no definite diagnosis was made by primary health care physician. On autopsy, large bowel was distended with a hard giant fecaloma. On histopathological examination, hirschsprung's disease is ruled, and idiopathic megacolon was considered as a cause of death. History, clinical examination, autopsy findings, and histopathological picture along with medical negligence are discussed in this report.

Keywords | Hirschsprung disease; Idiopathic megacolon; Fecal impaction.

INTRODUCTION

diopathic rectosigmoid megacol -on is an uncommon and poorly understood condition characterized by massive dilatation and aperistalsis of the sigmoid colon.¹ It is unknown what causes dilatation and dysmotality in this condition, and it usually presents in late childhood or early adulthood.² Chronic constipation is very common and often difficult to remedy than an acute onset of constipation.³ Faecaloma is an extreme variety of impaction in a chronic constipation.⁴ The fecoloma is characterized by a hardened large mass of faeces frequently localized in sigmoid colon and rectum, and is difficult to discharge.⁵ Primary cause of chronic constipation is related with intrinsic motility of colon and generally considered after secondary causes are ruled out.³ Chronic constipation if not managed promptly lead to faecal impaction, and rarely to fecaloma.⁵ The condition can be

Author's Credentials:

¹Chief Specialist, Department of Forensic Medicine, Witwatersrand University, Johannesburg, South Africa. ²Research Associate, Faculty of Health Sciences, Nelson Mandela University, Port Elizabeth 6017, South Africa.

Corresponding Credentials:

B Meel, Research Associate, Faculty of Health Sciences, Nelson Mandela University, Port Elizabeth 6017, South Africa.

e-mail: Banwarimeel1953@ gmail.com

How to cite this article Robert Ngude, B Meel/A Case of Megacolon with a Giant Fecaloma on Medico-Legal Autopsy/Indian Journal of Forensic Medicine and Pathology/2021;14(3):379-382 due to congenital abnormalities such as Hirschsprung disease, idiopathic megacolon or known risk factors hence due to acquired conditions.⁶ Hirschsprung disease is a congenital abnormality, which is commonly neonatal with the neonate being unable to pass stool in the first 24 to 48 hours.⁶ Surgical techniques are available to remove the aganglionic bowel and reconstruct the intestinal tract.⁶ Pediatricians and primary care physicians have an important role to play in diagnosing and managing children with megacolon or hirschprung disease.⁶

There are cases reported that lead to sudden death due to catastrophic spontaneous rupture of urinary bladder associated with megacolon due to faecal impaction (Faecaloma).⁷ According to the amended Health Professions Act 2007 section 56, all procedure related deaths are deemed to be unnatural deaths.⁸ In cases of unnatural deaths, the inquest Act (Act 58 of 1959) provides for a medico-legal investigation to be held, including medicolegal post mortem examination.⁸ The purpose of this case report is to highlight the problem of idiopathic megacolon in cases of chronic faecal impacted children.

CASE REPORT

A 15-year-old girl (NM) presented with repeated episodes of constipation since the age of 6 years. On admission she had difficulty in breathing and weaknesses of the lower limbs with inability to pass urine and distended bowel. On examination, the blood pressure was 135/52mm.Hg, pulse 150/min, respiratory rate 37 while no bowel sounds were elicited. Per rectal examination showed rock hard stools impacted within anus. Abdominal X-ray disclosed impacted stools and a severely distended large bowel. Earlier she was tested for pregnancy and found negative.

A laparatomy was arranged in a hospital. The patient went into cardiac arrest after induction of anaesthesia. Full cardiopulmonary resuscitation was done, and the patient recovered. On commencement of surgery the patient went into cardiac arrest. Resuscitation was done again, but there was no return of spontaneous circulation. On autopsy, the body of 15-year-old girl weighed 5 kg. Left foot was hyperemic, brain weighed 1200g. The proximal colon was markedly distended with gas. The transverse colon, sigmoid colon and the rectum were distended and had rock hard impacted faeces, 5kg of this solid material being found. The liver was enlarged and congested. All other organs appeared intact and unremarkable. On histological examination, Hematoxylin and Eosin stains were used and demonstrated the ganglionic cells in the myenteric plexus with adjacent nerve twigs (Figure 4). This case was diagnosed as idiopathic megacolon by exclusion.

DISCUSSION

This is probably first case report which has come to attention of forensic pathologist for the first time in South Africa. It could be emphasized that sometimes unusual nature of cases which the forensic pathologist is confronted rather than his/her "daily bread" of traumatic deaths. When encountered at autopsy, its contribution to death requires assessment and a thorough investigation of its origin by the forensic pathologist.¹ A correct history of the case, along with anatomical sampling of tissue on autopsy are important to confirm the diagnosis.

NM was admitted on several occasions in different hospitals with history of constipation, but none of the doctor had any clue of diagnosis to her condition. They tested her for pregnancy, because of her distended abdomen and a high prevalence of teenage pregnancies. One could think of it that how many patients in hospital either poorly diagnosed or wrongly diagnosed in hospitals. NM is only one such example. The most common errors reported in the studies reviewed were evaluation and treatment errors.⁹

It is expected that Hirschsprung's disease should be suspected in any case of chronic constipation with history of repeated

admission in hospital. The deceased had a chronic illness that was not diagnosed for 9- years. If she were diagnosed early, there was good chance that the patient could have survived. It was a preventable death.¹⁰ Generally, Hirschsprung's Disease is a congenital condition that usually affects neonates who cannot pass stool in the first 24-48 hours.¹¹ This is due to the failure of ganglion cells to descend during embryogenesis around the 12th to 14th week.¹¹ Sometimes, when Hirschprung's disease is limited, and involved to a small segment of bowel, then it can delay in manifestation such as teen years and early adulthood.¹¹ The preferred first diagnostic procedure is a contrast enema which could be performed at a primary health care setting. This will define the transition zone between normal (dilated) bowel and narrow segment of gut. This transition zone is seen in 70-90% of cases.12 The gold standard of diagnosis is rectal biopsy. It is possible to obtain a sub mucosal rectal suction biopsy even without any anesthesia.13



Fig. 1: A view of the exposed abdomen highlighting the abdominal distension (Pic courtesy of operating surgeon).



Fig. 2: A view of the distended bowel seen following the

abdominal laparatomy midline incision.



Fig. 3: Distended large bowel seen at laparotomy (Provided by the courtesy of operating surgeon).

The stool collected during autopsy weighed about 5 kg, rock hard and impact the distal gastrointestinal tract (Photograph 1, 2 & 3). Abnormal dilation of the distal part of gut can develop from a range of disease processes. NM was not died in operation theatre, it may not be fault in category of deaths because of procedure, and therefore, it was not mandatory to carry out a forensic autopsy. Certain deaths that might have been considered natural in the past must now be classified as unnatural.8 Very few doctors know or understand the acts and regulations governing their professions, having had minimum exposure to them during undergraduate training.8



Fig. 4: A section of a full thickness of small bowel (4x).

The etiology of idiopathic megacolon, is due to atrophy of the tendinous fibrous net in the colon. Three elements are essential prerequisites to normal bowel movement are smooth muscle, TFN rooted to the tendinous tissue membrane of the myenteric plexus and an intact enteric nervous plexus system.¹⁴ The ganglionic cells were visible on histopathological examination in the case of NM, therefore, cannot fit in the diagnosis of Hirschsprung's disease (Photograph 4). It could be an idiopathic megacolon, causing bowel distention with aperistaltic syndromes.¹⁴

Symptoms of inability to pass urine could be due to obstruction of the urinary bladder caused by chronic constipation and fecal impaction which leads to megacolon leading to urinary system mechanical obstruction in NM.⁷ The idiopathic megacolon is an uncommon entity and must be investigated thoroughly to find the gaps in clinical diagnosis. Primary health care physician must be aware of Hirschprung and megacolon condition in their practice whenever they come across a case of chronic constipation.

The Forensic pathologist must be prepared for unnatural deaths as it falls under the Procedure-related Deaths Act of 2007. In summary, a good history is always emphasized to all medical officers in their primary health care training program so that they will not miss a case like that of NM. The cause of chronic constipation must be investigated thoroughly so that one can prevent a preventable death.

CONCLUSION

Forensic pathologist come across a variety of cases where medical practitioners commit errors in their judgment. Pathologist must report back to these medical doctors so that they will not carry out the same mistakes in their practice.

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Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

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Reference from electronic media

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