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Alok Atreya,[1*] Nuwadatta Subedi [2]

It is a great pleasure to welcome you to this first issue of the Journal of the Medicolegal Society of Nepal (JMeLeSoN), which is being published by the Medicolegal Society of Nepal (MeLeSoN). The peer-reviewed, open-access annual journal encourages shared learning and interdisciplinary collaboration in medicine, law, and ethics.

Our vision and mission

JMeLeSoN sees forensic medicine as a tool for justice, education, and development for the people of Nepal. We aim to be a major source of evidence-based research that meets medicolegal needs through cutting-edge scholarship, influencing both local practice and global knowledge.

Unique medicolegal challenges faced in Nepal

Against the backdrop of the overcrowding of repositories with journals of forensic medicine, one may ask whether JMeLeSoN was truly necessary, given its academic journal's title. The main reason is a peculiar medicolegal context in Nepal, which is an area not much discussed by international journals. The unique challenges found in Nepal merit scholarly attention, but these are seldom dealt with in international outlets, either because they are specific to this region, or because the methodological quality is not perceived to be high. Multidisciplinary journals in Nepal do publish forensic literature; however, they offer limited space to accommodate the increasing number of submissions in this field. As a result, forensic publications remain scattered across various journals and often fail to effectively reach the targeted audience of forensic medicine professionals.

The rural health care system of Nepal does not have a well-developed forensic setup, with a lack of trained personnel and standardized protocol for postmortem or evidence collection, as well as clinical forensic medicine services, resulting in suboptimal medicolegal work. The severe lack of experts in forensic medicine (and this is a national phenomenon, mainly in remote areas) has a serious impact on the quality of the medico-legal services offered by non-qualified people. Research is urgently needed to train general medical officers in basic medico-legal services and develop efficient forensic techniques suitable for resource-limited settings.

The religious and cultural diversity in Nepal complicates forensic practice, and in some parts of Nepal, the relatives of the deceased may oppose postmortem examinations associated with traditional beliefs. This would entail culturally sensitive methods whilst not compromising forensic accuracy by embracing local traditions. Such nuanced, community-based approaches are rarely addressed by global journals; they demand scientific rigor as well as cultural sensitivity.

The true prevalence of cases of violence and abuse, including domestic violence, human trafficking, and child abuse, is largely underreported due to social stigma and a lack of focus on quality forensic documentation. Medical negligence in developing countries, poor access to forensic training, and new trends in telemedicine malpractice and disaster forensics are also poorly reported in the global literature.

The 'publish or perish' culture has driven the proliferation of predatory journals, which seek to capitalize on academics' pressure to publish quickly [1]. Doing for the sake of publishing has left Nepalese researchers, especially those who have limited access to reputable journals, exploiting them by publishing quick, low-quality work. These journals also often lack serious peer review and are not transparent, undermining the integrity of scholarly work.

JMeLeSoN attempts to fill these gaps by offering a tailored platform for the medicolegal community of Nepal, and authors can rely on the journal for a responsible and ethical avenue for rigorous evidence-based scientific reference, advancing both local and international forensic medicine, science, law, and ethics. Intending to promote interdisciplinary research and mentor future researchers (including undergraduate and postgraduate scholars), JMeLeSoN makes sure that peculiar issues of Nepal, often ignored by high-impact journals, are properly documented and addressed, so that they can contribute to the national and international medicolegal literacy.

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Our mission and comprehensive scope

JMeLeSoN aims to be a leading platform for innovative, evidence-based studies addressing medicolegal issues from a transformative perspective. Our scope includes:

Core forensic medicine areas:

- Forensic medicine and toxicology
- Medical ethics and bioethics
- Legal frameworks in public health
- Autopsy investigations and forensic pathology
- Violence and abuse documentation
- Medical negligence and malpractice
- Forensic sciences, including anthropology, odontology, and digital forensics

Educational and transformative research:

- Innovative teaching method in forensic medicine
- Case-based inquiry methodologies in forensic education
- Technology integration in forensic education and practice
- Learner-focused learning approaches in medical education
- Continuing education and professional development in forensic sciences

Social justice and community engagement:

- Social factors affecting forensic practice and justice access
- Community-based participatory research in medico-legal contexts
- Cultural sensitivity in forensic practice
- Justice-driven forensic methodologies
- Research addressing inequities in forensic service delivery

Interdisciplinary approaches to complex forensic challenges:

- Collaborative research integrating psychology, law, sociology, and public health
- Multi-disciplinary approaches to complex forensic challenges
- Policy research and systematic reforms in medico-legal systems
- Resource optimization strategies for forensic practice

We welcome various article types, including original research, systematic reviews, case reports, editorials, viewpoints, letters, and educational innovations, to foster interdisciplinary scholarly dialogue.

Our commitment to goals and objectives

Guided by a comprehensive vision, JMeLeSoN is committed to:

- Promoting high-quality research: Supporting original studies to advance medicolegal knowledge and practice with particular emphasis on innovative methods.
- Fostering interdisciplinary and transdisciplinary collaboration: Bridging medical professionals, legal experts, forensic scientists, educators, and policymakers to tackle complex medicolegal issues through our interdisciplinary approach, bridging academic fields.
- Advancing forensic education: Serving as a platform for sharing innovative pedagogical approaches, innovative teaching methods, and educational research that transform forensic medicine education and practice in Nepal and beyond.
- Enhancing knowledge dissemination: Providing immediate open access to all content, published annually in August, to promote global knowledge exchange, ensuring accessibility for researchers from all economic backgrounds.
- Upholding ethical standards: Following Committee on Publication Ethics (COPE) and the International Committee of Medical Journal Editors (ICMJE) guidelines, while maintaining transparency and integrity in all publishing practices.
- Addressing local and global issues: Highlighting Nepal-specific challenges, such as underreporting of violence due to social stigma, inadequate forensic training, and rural forensic limitations, while contributing to global forensic scholarship through creative solutions and methodologies.
- Building capacity for rural and underserved areas: Promoting research on training general medical officers for basic medico-legal services, developing resource-optimized forensic practices, and improving rural forensic services.
- Promoting social transformation: Encouraging research that examines how forensic medicine can serve as a tool for social justice, community empowerment, and structural reform, particularly for marginalized and vulnerable populations.
- Educating and advocating: Raising awareness among stakeholders about medicolegal principles and their social implications, while fostering awareness of the importance of forensic experts in society. Mentoring young researchers and raising awareness of medicolegal principles.

Our Commitment to Ethical Publishing

In response to combat predatory journals, JMeLeSoN adopts a transparent and rigorous approach. It ensures ethical publishing through our online submission system, transparent editorial policies, a respected editorial board, and quality of review. There is no publication charge, so it would support authors from low-income backgrounds, and

all the expenses for the publication will be borne by the MeLeSoN.

A call to action: join our transformative community

We invite forensic experts, clinicians, jurists, public health experts, educators, and researchers to contribute to JMeLeSoN and join a community that is engaged in transformative work. We particularly encourage submissions that address critical research priorities.

For young researchers, educators, practitioners, and policymakers

We welcome our young scholars who will be given the opportunity to submit their work and receive mentoring that encourages critical thinking and ethical scholarship. Educators are encouraged to share their teaching approaches; professionals may submit practical knowledge, and policymakers should submit evidence-based innovations on how to reform the Nepalese forensic facilities.

Contributing to JMeLeSoN, you are now a part of the community of researchers who share your commitment to ethical, high-quality research that matters for justice and knowledge. Together, we can make forensic medicine contribute to something more than just a technical discipline, a true player in social development.

Acknowledgments and Looking Forward

We express our deepest gratitude to the MeLeSoN and its enthusiastic members, the editorial board members, and the authors for their unwavering support in launching this journal. We also acknowledge the countless professionals, educators, and researchers who have contributed to the vision of transformative forensic medicine in Nepal.

As we embark on this journey, we recognize that JMeLeSoN beyond a journal; it is a push for a fairer, equitable, and scientifically rigorous approach to forensic medicine. We invite you to join us in creating a lasting impact of rigorous, accessible, and influential medicolegal scholarship that resonates both nationally and internationally.

Together, we will evolve forensic medicine beyond a purely technical discipline into a promoter for social change, educational reform, and universal fairness. The future of forensic medicine in Nepal and its addition to global research starts with this first issue of JMeLeSoN.

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Pattern of suicide – victim profile with special reference to hanging and associated neck injuries in cases autopsied at Kathmandu University Hospital

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Anish Karki,[1*] Pankaj Kumar Singh,[2] Abdul Sami Khan,[2] Raj Kumar Karki[2]

Abstract

Background: Suicide is the act of taking one's own life voluntarily using various methods. Suicide having various causes and is a topic of interest for various disciplines like sociology, anthropology, psychology and psychiatry. Suicide accounts for the fourth leading cause of death in 15-29 years age group globally. The study aims to assess the pattern of suicide, incidence of hanging and associated neck injuries in cases brought for medico-legal autopsy at Kathmandu University Hospital, Kavrepalanchok, Nepal.
Methods: A cross-sectional observational study was conducted in the Department of Forensic Medicine, Kathmandu University Hospital from 2022 November 01 to 2023 October 31. Study participants were the deceased with clear history of suicide, brought for medico-legal autopsy. A total of 95 cases of suicide were studied.
Results: Of the 95 cases of suicide under study, majority were males accounting for 67.4% and the 32.6% were female. The most preferred method of suicide was found to be hanging in 74.7% of the cases which was followed by poisoning. Internally, no injury was found in 98.6% of hanging cases. Hyoid bone fracture in relation to age was statistically significant (p=0.05).
Conclusion: Internal neck injuries are rare in cases of suicidal hangings. Suicide being more common in adult age group and does not discriminate based on sex and religion author feels the need for psychological screening and extension of suicide prevention program in the community to prevent the premature deaths.

Keywords: autopsy, hyoid bone, neck injury, Nepal, suicide

INTRODUCTION

Suicide is a devastating event that impacts family, society and the country with long-lasting effects on the living members of the family. Every year 727,000 people commit suicide making it the third leading cause of death among 15-29 years-old globally in 2021. Globally, nearly 20% of suicidal poisoning is due to pesticides, most of which occur in rural agricultural areas of low and middle-income countries [1]. Pre-existing mental disorders such as severe depression, mania, bipolar disorder, schizophrenia, substance abuse disorders and previous attempts of suicide, are at high risk. Majority of people commit suicide as a reaction to impulse brought about by stress, relationship problems, harassment, bullying or diminished coping abilities in difficult situations [2]. After the COVID-19 pandemic, mental health and economic status of Nepalese has been devastated, resulting in increased suicide rate annually [3].

The study aims to assess the pattern of suicide, incidence of hanging and frequency of neck injuries in suicidal hanging.

METHODS

A cross-sectional observational autopsy-based study with the aim to investigate the pattern of suicide and victim profile with special reference to hanging and associated neck injuries was conducted in the Department of Forensic Medicine, Kathmandu University School of Medical Sciences, Kathmandu University Hospital, Kavrepalanchok. All the suicide cases brought for medicolegal autopsy during the period of 12 months starting from November 2022 to October 2023 were included in this study. Purposive sampling technique was used. In a study conducted by Jha S in 2017, the prevalence of suicide was 34.2% [4]. So based on this data we calculated sample size using Cochran's formula, considering 95% confidence interval and 10% margin of error, lead sample size to 95 cases.

Selection criteria of study participants were as follows:

Inclusion criteria:

- All cases with a definite history of suicide based on circumstantial evidence by police and history with next of kin.

Exclusion criteria:

- Cases with no clear history of suicide.
- Decomposed corpses.
- Unknown factors leading to death.

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Procedure:

Information about the case was collected from the relevant paper (Muchulka) produced by the police before conducting postmortem examination. External and internal autopsy findings were observed and documented meticulously. In hanging deaths, bloodless dissection of neck was undertaken after evisceration of the other body organs below the sternal notch, following the protocol proposed by Prinsloo and Gordon where in layer-by-layer dissection of the neck was done.

The I incision below the sternal notch was proceeded to modified Y incision in pursuit of bloodless dissection of neck. The skin with platysma was dissected and inspected following which the bilateral sternocleidomastoid muscles were inspected and then dissected out, a longitudinal incision was given to evaluate the muscle for any injuries. Sternothyroid, sternohyoid and omohyoid muscles were inspected and dissected out and a longitudinal incision was given similarly to evaluate the injuries present. Post muscles dissection the thyroid gland was exposed; thus, the thyroid gland was inspected for any injuries, simultaneously thyroid cartilage and hyoid bones were examined anteriorly. The attachments of the floor of mouth and tongue were severed and tongue with hypoglossal region, hyoid bone, thyroid cartilage and trachea up to the sternal notch were eviscerated for further examination. Esophagus was opened using enterotome and examined following which the esophagus was removed from its attachment to the hypoglossal region and trachea. The hypoglossal region was meticulously examined, and the hyoid bone was dissected from the attachments and examined for any contusions or fractures. The next step in bloodless dissection was to open the trachea and the thyroid cartilage posteriorly, the lumen of trachea and the vocal cords were examined for any injuries if and when present, the injuries were documented in and out of process [5].

A structured, self-designed proforma was developed based on the study objectives and was used to collect socio-demographic, circumstantial and autopsy-related data. The form included variables such as age, gender, occupation, method of suicide, type of ligature material, type of suspension, ligature mark characteristics, and both external and internal neck findings in hanging cases. It was entered into Microsoft EXCEL and statistical package for social science version 27 was used for descriptive and inferential statistics. The data was categorized, tabulated and summarized in terms of mean, median, percentage and range. Furthermore, it was analyzed using various statistical methods like Mann-Whitney U test, Chi-square test, independent t-test, one way ANOVA and Kruskal Walis (H) test.

RESULTS

Out of 95 cases of suicide, majority of the subjects were male (67.4%) and the remaining 32.6% were female. Three-fourths of the subjects committing suicide were married (74.7%) and the rest were unmarried (25.3%). Majority of the individuals were of age 21-30 years as shown in table 1. Mean age for suicide was found to be 31 ± 12.97 years for females and 45.59 ± 18.73 years for males.

Table 1. Age-wise distribution of the subjects (n=95).

Age	Frequency	Percent (%)
Below 10 years	1	1.1
11-20 years	10	10.5
21-30 years	22	23.2
31-40 years	14	14.7
41-50 years	18	18.9
51-60 years	18	18.9
> 60 years	12	12.6

Majority of the subjects (49.4%) were self-employed, which included occupations such as farmer, painter, cobbler, laborer, driver and business, 43.1% were unemployed and 7.3% were employees of some private or government organization including law enforcing agency.

Hanging was found to be method of choice which was seen in 74.7% (N=95) of the suicides and remaining 25.3% cases were of poisoning. Among the hanging cases, 70.4% (n=71) of the incident occurred inside the house and the remaining 29.6% occurred outside the house such as trees in the backyard, jungle, office, cowshed, etc.

Farmers were highest in number in terms of committing suicide by both means i.e., hanging and poisoning. Students were second to commit suicide by hanging as shown in figure 1.

Over two-thirds (70.5%) of the subjects

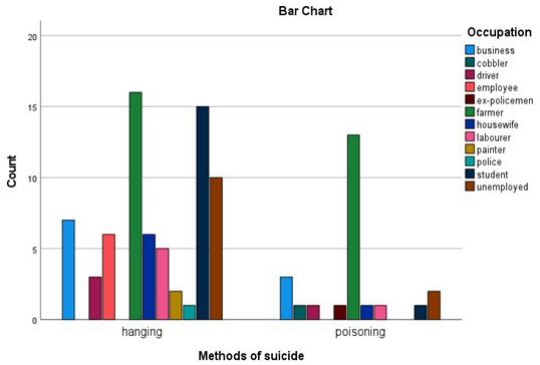

Figure 1. Distribution of method of suicide occupation-wise.

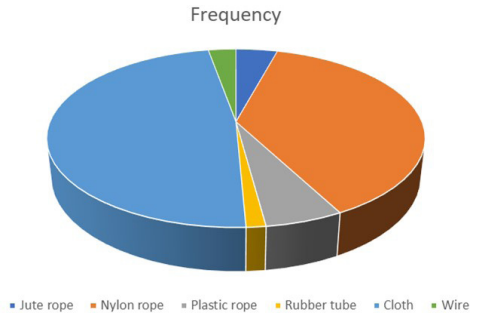

Figure 2. Type of ligature materials used in hanging.

committed suicide were Hindu, one-fourth were Buddhist (27.4%) and few (2.1%) were Christian and Kirat.

Nearly half i.e., 47.9% of the cases with hanging used clothes like saree (traditional cloth worn by Hindu females), bedsheet, shawl as a ligature material which was followed nylon rope (38.1%), plastic rope (5.6%), jute rope (4.2%), wire (2.8%) and rubber tube (1.4%) as shown in figure 2.

Nearly two third (64.8%) cases were partial suspension and 35.2% were of complete suspension among hanging cases. Atypical knot was found in the majority (77.5%) of the cases and typical knot in 22.5%. Distribution pattern of external findings related to hanging are shown in table 2 and 3.

Table 2. Variables Related to Hanging Cases (n=71).

Variables	Frequency N(%)
Characteristics of ligature marks	
Incomplete	36 (50.7%)
Complete	35 (49.3%)
Position of Ligature marks	
Above the thyroid	58 (81.7%)
Over the thyroid	12 (16.9%)
Below the thyroid	1 (1.4%)
Direction of the ligature marks	
Oblique	68 (95.8%)
Transverse	3 (4.2%)
Position of knot	
Left of Neck	23 (32.4%)
Right of neck	31 (43.7%)
Occipital region	16 (22.5%)
Chin	1 (1.4%)
Injury around ligature marks	
Abrasion	69 (97.2%)
Rope burn	2 (2.8%)

Table 3. External findings of autopsy in the hanging cases (n=71).

Variables	Frequency N(%)
Dribbling of saliva	
Absent	30 (42.3%)
Present	41 (57.7%)
Facial congestion	
Present	33 (46.5%)
Absent	38 (53.5%)
Cyanosis	
Absent	9 (12.7%)
Present	62 (87.3%)
Blood discharge from mouth	
Absent	70 (98.6%)
Present	1 (1.4%)
Blood discharge from nostril	
Absent	68 (95.8%)
Present	3 (4.2%)

Table 4 depicts that nearly three-fifth (57.7%) of the hanging cases had dribbling of saliva, near to half (46.5%) of the cases had facial congestion, cyanosis of nail beds was present in more than two-third (87.3%) and bloody discharge from mouth and nose were rarely seen.

Table 4: Internal findings of autopsy in hanging cases (n=71).

Variables	Frequency N(%)
Incidence of neck skeleton fracture	
Intact	68 (95.8%)
Fracture of hyoid bone	3 (4.2%)
Appearance of subcutaneous tissue	
Infiltration of blood	1 (1.4%)
White and glistening	70 (98.6%)
Neck Muscle Injury	
Absent	69 (97.2%)
Present	2 (2.8%)

White and glistening subcutaneous tissue, no neck muscle injury and intact hyoid bone was predominantly found in hanging cases as shown in table 5. Statistical significance was observed between fracture of neck skeleton and age with p value of 0.05 where fracture of hyoid bone was found in subjects more than 40 years of age as shown in table 5.

Table 5. Association of age with internal neck findings in hanging cases (n=71).

Variables		Age (years)		P-value
		<40	>40	
Incidence of Neck Skeleton Fracture	Intact	39	29	**0.05**
	Fracture of Hyoid bone	0	3	
Appearance of Subcutaneous Tissue	Infiltration of blood	0	1	0.27
	White and glistening	39	31	
Neck Muscle Injury	Absent	24	45	0.89
	Present	1	1	

DISCUSSION

Suicide is a harmful event committed with the motive of ending one's life [6]. In the present study, subjects of 21-30 years age group were highest in number to commit suicide which was followed by subjects of 41-50 and 51-60 years of age which is close to data from World Health organization [1] and various studies [7-11]. Suicide exists at a higher rate among young adults in low-income countries for which unequal distribution, low quality and difficult accessibility of health services could be the reasons [11]. We found that a child of age 9 years committed suicide by hanging whereas a 92 year old man committed suicide by poisoning. Similar case of a boy and a girl aged 11 years committing suicide by hanging was noted by Jayprakash S [12] and by a 10-year-old boy was noted by Polson CJ [13]. This shows that age has no bar for suicide however method of choice may vary depending on the physical ability

or emotional immaturity.

In our study the number of males committing suicide were double than that of females which is similar to the findings from other studies[2,14] and data from World Health Organization in different population, however highest number of suicides among women has been reported from China, Angola, Japan, Belgium, Sri Lanka, India and both North and South Koreas in the year 2019[17].

Suicide among married individuals was found to be more common in our study which is similar to other studies [9,19,20]. This contrasts with a study where 58% of individuals were single, 30% were married, 2 widows and 2 divorcees [14]. Marital and family conflicts appear to be one of the important predisposing factors for young married people committing suicide. Our study identified that most of the deceased with suicide were employed, among the employed it was seen more frequently among the farmers which is similar to a study [21] but contrasts with a study by Khan MM which highlights economic hardship as a major factor for suicide due to which many unemployed people committed suicide [14]. However, the present study stresses employment does not serve as a buffer against suicide. Further this difference could be due to prevailing psychiatric illness among the study population which were either diagnosed or undiagnosed, social stressors or impulsive act due to emotional immaturity about which the study lacks the information.

Nepal being a Hindu dominated country, majority of the suicide occurred among Hindus, finding of which is similar to other studies [9,10,23]. No cases of suicide from Islam community were brought at the study center during the study period. Attitude, values and beliefs play a major role in a person's decision to end one's life, such as Islam forbids suicide and therefore suicide rate is low in population practicing Islam [10,22].

In this study, we found that the most common method of suicide was hanging and then poisoning which is consistent with other studies [2,23,24,32,33]. This is different from studies conducted at Eastern region of Nepal and Pakistan where poisoning was found to be the most common method of suicide [4,14]. The difference in suicide pattern varies significantly with age and sex of the victim, time and place [33], further strict legislation regarding buy and sale of harmful chemical compounds in the recent days make them least accessible and could be a reason for poisoning being least common method in the present study. Moreover, advancement in medical field regarding the treatment protocols of poisoning cases has drastically reduced the number of mortality and morbidity. In Asian region, hanging has been chosen as a preferred method unlike the countries such as the US suicide by firearms is more common [7].

Among the suicides by hanging, we found that the most common ligature material used in hanging was cloth like saree, bedsheet, shawl which resembles finding from two other studies [9,20] and contrasts with finding by Pradhan A where most of the victim used rope [25]. The easy access and availability of the ligature materials around the victim's vicinity could be the reason.

In this study, most hanging cases involved partial suspension with the feet touching the ground, consistent with several other reports [9,25]. However, this contrasts with findings from some studies where complete suspension without ground contact was more common [16,26,27]. Additionally, hanging was atypical in over half of the cases, aligning with certain research [9] but differing from others that reported a higher prevalence of typical hanging [16].

In more than half of the hanging cases, the ligature mark was incompletely encircling the neck and appeared obliquely above the thyroid cartilage, consistent with findings from multiple studies [8,9,15,20,26]. The knot was located on the right side of the neck in nearly half of the cases, a pattern that aligns with a study [27] but differs from another that reported more frequent placement on the left side [8]. This variation might be influenced by hand dominance in the population, though no such information was obtained from the relatives. Abrasion was the most common injury around the ligature mark, matching observations in earlier research [26]. Most of the hangings occurred inside the house likely due to privacy which is consistent with various studies [9,26-29].

Externally, dribbling of saliva was observed in over half of the cases, facial congestion in nearly half, and cyanosis in more than two-thirds. Blood discharge from the mouth and nostrils was mostly absent, which aligns with findings from previous research [15,34]. The presence of saliva dribbling indicates the individual was alive at the time of hanging [18]. Facial congestion is typically caused by reduced venous return from the head, while its absence may result from compression of deeper arteries or vasovagal shock [35]. Cyanosis is commonly associated with asphyxiation [36].

During internal examination, bloodless dissection of the neck was performed in all hanging cases. In nearly all instances, the subcutaneous tissues beneath the ligature mark appeared white and glistening, with neck muscle injuries observed in a few cases—findings consistent with earlier research [12] but contrasts with another study conducted by Sivasuthan S which revealed rupture of lower attachment of sternocleidomastoid muscle in 62% cases [31]. Contusions of the sternocleidomastoid muscle were noted occasionally, while tears at its lower attachment were reported more frequently in a study, likely due to stretching forces. Such injuries may indicate ante-mortem hanging and could also result from rough handling of the body during the process of cutting down and lowering it while the heart was still beating [12].

Fracture of the hyoid bone was observed exclusively in subjects older than 40 years. A

statistically significant association was established between age and the occurrence of hyoid bone fractures ($p = 0.05$). This finding is consistent with previous studies [12,15,26,30], which suggest that age-related calcification and ossification of neck structures — including the fusion of the greater horn with the body of the hyoid and ossification of the thyroid cartilage — contribute to increased susceptibility to fracture in middle-aged and older individuals.

CONCLUSIONS

This study highlights the complex interplay of age, sex, occupation, marital status, religion, and method in suicide cases, with hanging emerging as the most common method, followed by poisoning. The highest incidence of suicide was observed among young adults aged 21–30 years, with a concerning presence even among children and the elderly, underscoring that suicide spans all age groups. Males were twice as likely to commit suicide as females, and cases were more common among married and employed individuals, particularly farmers. Hanging was predominantly partial and atypical, with cloth commonly used as ligatures. External findings like dribbling of saliva and internal features such as glistening subcutaneous tissue under the ligature mark were consistent with ante-mortem hanging. Fracture of the hyoid bone showed a significant age-related association, reflecting increased skeletal brittleness in older individuals. These findings emphasize the need for targeted mental health interventions, better regulation of toxic substances, and increased awareness to address the multifactorial causes of suicide.

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Ethics Statement: This study utilized anonymized court case records from the public domain of the Supreme Court of Nepal (2015–2020), ensuring no direct involvement of human participants. All data were thoroughly anonymized to prevent the identification of survivors, perpetrators, or other individuals associated with the cases. The research adhered to ethical guidelines by avoiding any violation of the Declaration of Helsinki on human research, as it did not involve primary data collection, interviews, or interventions. The study was conducted in compliance with ethical standards for secondary data analysis, focusing solely on publicly available legal documents. Confidentiality and privacy were rigorously maintained, and no sensitive personal information was disclosed. The research protocol prioritized minimizing harm while contributing to the understanding of medico-legal processes in child sexual abuse cases.

Author Contribution Statement: AK: Methodology, Formal analysis, Investigation, Data curation, methodology, Writing: Original draft; PKS: Formal analysis, Supervision, Writing: Review and editing; ASK: Data Curation, Writing: review and editing; RKK: Conceptualization, Supervision, Writing: Review and editing. All authors reviewed and approved the final manuscript to be published.

Guarantor: Dr. Anish Karki.

Declaration of generative AI: None.

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Pivotal Impact of Medicolegal Reports in Court: Examining Rape in Young Children

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Abstract

Background: The reporting of rape is increasing. Rape survivors suffer significant immediate, short-term, long-term consequences of physical, emotional, and psychosocial trauma. Medico-legal reports in rape involve reports from expert medical teams, including gynecologists. The evidence collected from the crime scene and evaluated by forensic scientists, pathologists, cytologists, and geneticists constitute an important document in court. The medico-legal report thus produced in a scientific way helps the verdict address the impact. This study focuses on medico-legal reports, victim-perpetrator dynamics, and the verdict in the case of rape in children less than 10 years of age.
Methods: The cases that "rape in less than 10 years of age" were extracted randomly from the Supreme Court webpage of Nepal from 2015 and 2020 for the focused study. The selected primary case law study was imported into Excel and analyzed.
Results: There were 43 cases of rape in the pediatric population of children less than 10 years of age. The youngest victim was 2 years of age. Among the perpetrators, the youngest was an 8-year-old boy, whereas the oldest was a 65-year-old man. All the perpetrators were known to the survivors. Positive medicolegal reports of sexual violence were present in 56% of the cases studied. The mean time taken from the reporting of the case to the final decision was 14 months. More than 80% of the accused were guilty.
Conclusion: Medico-legal reports in rape cases provide important scientific evidence in the court for verdict. Medical doctors with training in legal education help in developing contextual and precise medicolegal reports.

Keywords: child sexual abuse, medico-legal, rape, sexual offence.

Introduction

Medical reports are among the most important types of evidence in rape crime [1-5]. More than one-third of the reported sexual abuses were less than 10 years of age [6]. The dynamics of the process of rape crime in a child are different from those of adult rape crime [7]. Owing to their limited mental capacity [8], small children can be easily manipulated [9] and taken undue advantage of for a longer period of time [10]. The perpetrator plans his prey in an organized manner: target the prey, gain trust from the victim, fill a need for the prey, isolate the prey as needed, and then sexually abuse begins, making the victim believe that it is a game followed by penetrative sex, which continues for a long time, months to years. The perpetrator ensures control of the situation, keeping the activities secret by coercion or threat, thus saving himself from a crime that he has committed. The child rape survivors, on the other hand, were unable to reveal abuse sooner or express abuse in installment [10]. This is either because of threat, fear, coercion, embarrassment or the lack of vocabulary to express. It is likely that family, society, and the prosecutor may not believe the incident if it is revealed [11-14].

Unlike teenage girls and older women of reproductive age, children do not produce enough estrogen hormones [15]. Thus, the rigid, inelastic vagina suffers injuries due to penetration during sexual abuse [16]. There is also a likelihood of infection, and if it is untreated, it may suffer long-term consequences [18-21]. Rapeseed survivors suffer significant immediate [17], short-term, and long-term consequences of physical, emotional, and psychosocial trauma. Children who are victims of sexual violence are prone to psychological problems, which may be revealed in various forms: multiple forms of somatic pain, emotional outbursts, psychosocial problems, eating disorders, and distorted body image, which may also occur in adulthood [22-24]. The implicit, deep-rooted memory of sexual trauma may unknowingly surface out in practice with certain stimuli, which may be individually specific [25,26].

Medico-legal reports are among the most important scientific documents in the Court of Law [27]. With a better understanding of the complexity of rape crime in small children, medico-legal reports are prepared by teams of experts in medical fields, such as gynecologists, pediatricians, forensic physicians, psychiatrists, forensic pathologists, forensic cytologists, forensic psychologists, and forensic geneticists [28-36]. Concrete scientific evidentiary medical legal reports can have an important impact on the Court of Law in reaching a verdict.

It is, however, pertinent that judicial stakeholders, including lawyers, understand the importance of the medical examination sequence, terminologies used, samples sent, and opinions provided. Similarly, the examining physician should understand the basic legal issues associated with a particular case and provide a detailed description of the important clinical findings, even though they appear basic in the medical community. The gap is prominent [37]: lawyers are unable to understand

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medical jargon, and doctors fail to appreciate the importance of detailed medico-legal reports.

This study focuses on medico-legal reports, rape victim-perpetrator dynamics, and court verdict in rape crimes of children less than 10 years of age.

Objective of the study

The objective of the study was to analyze rape in children less than 10 years old from the reporting, investigation, and final decision of the Apex Court.

Methods

The cases "Rape in less than 10 years of age" were extracted randomly from the public domain Supreme Court webpage of Nepal (www.supremecourt.gov.nepal) from 2015 and 2020 for the focused study). The name of the survivor or the accused and the court case number are anonymized to ensure confidentiality. The selected primary case law study was imported into Excel and analyzed. The area of interest included the age of the rape survivor and the age of the perpetrator. The relationships between the perpetrator and the victim, type of abuse, and medical reports were recorded. In addition, the time taken from the reporting of the case to the final verdict was noted. The decision of the court to punish or acquittal was also noted.

Results

There were 43 court cases in which rape was registered at less than 10 years of age that were randomly selected from the public domain of the Supreme Court webpage of Nepal from 2015–2020. In those 43 court cases, there were 50 survivors. In one court case, there were 2 male child rape survivors, and in another court case, there were 7 girl child rape survivors. In the remaining 41 court cases, there was one rape survivor in each court case. Thus, in 43 court case law studies, there were 50 rape survivors. Similarly, out of 43 Court cases registered for the study, in 42 court cases, there was only one accused of rape, whereas in one Court case registered, there was 3 accused of gang rape. Therefore, there were 45 rape perpetrators in the study group; all were male (Table 1).

The youngest child was 2 years of age. The youngest sex perpetrator was an 8-year-old boy, and the oldest sex perpetrator was a 65-year-old man (Figure 1).

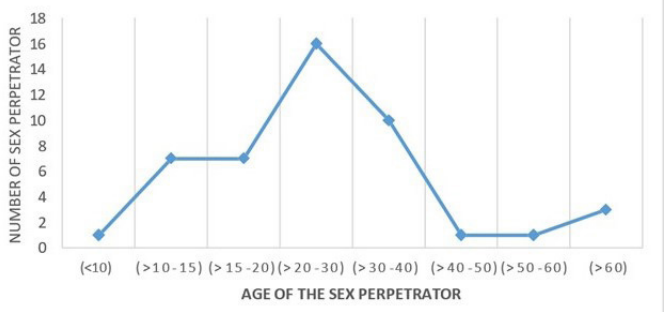

Figure 1. Age of sex perpetrators in survivors less than 10 years old.

The entire perpetrator was known to the survivor. The relationships of the perpetrator with the victim were as follows: father, uncle, relatives, neighbor, acquaintances, temple priest, and hostel warden. There were 7 children with rape a child (CRC) in the study group.

The methods used for rape is depicted in Figure 2:

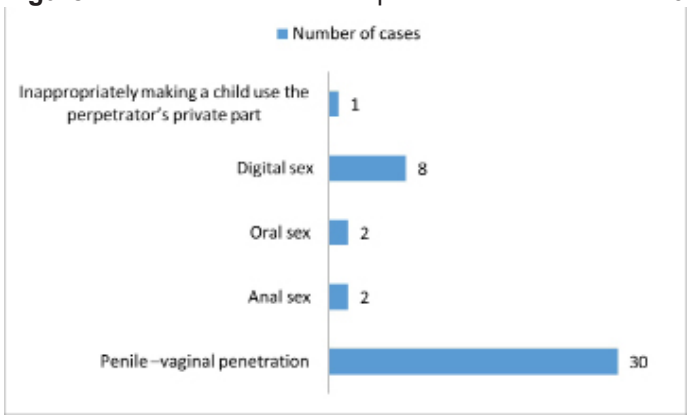

Figure 2. Methods used for rape survivors less than 10 years of age.

There were 2 cases of sodomy and 2 cases of forceful penetration of male private organs inside the child's oral cavity.

Medical Report

The absence of medical evidence does not rule out rape. Fifty-six percent of the patients had positive medical evidence of sexual violence. Two cases were invalid: one had no medical records, and the next report was produced by an incompetent clinician and was thus considered invalid (Figure 3).

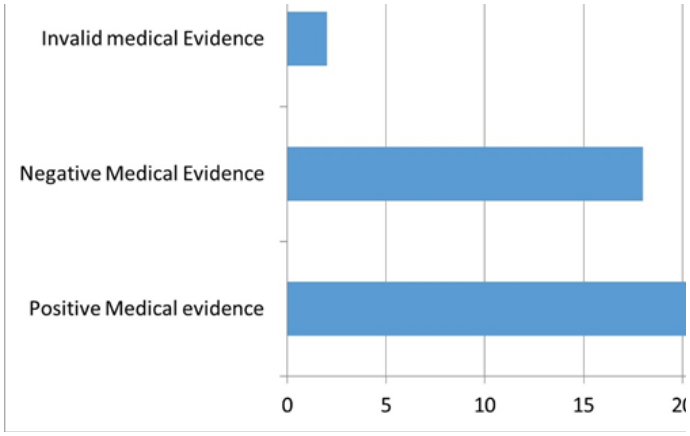

Figure 3. Medico-legal reporting of rape crime in survivors less than 10 years old.

The Verdict

A. The time taken from the FIR to the verdict ranged from the earliest of seven months to the maximum of 24 months. The fast tract of the Court process in rape cases and the sensitivity of all the stakeholders, including the Court, play vital roles in the entire system.

Table 1. Rape Survivors of Children Less Than 10 Years of Age.

No	Age of the survivor	Age of the Perpetrator	Relationship	Method used	Medical evidence	Time taken for Verdict (months)	Decision awarded
1	4 years	11 years	School friend	Digital	Present	12	Juvenile
2	4 years	16 years	Acquaintance	Penetrative	Negative	16	Punished
3	4 years	56 years	Neighbor	Oral	Negative	7	Punished
4	4 years	30 years	Neighbor	Penetrative	No record	10	Punished
5	4 years	25 years	Neighbor	Digital	Present	10	Punished
6	4years	35 years	Neighbor	Digital	Negative	20	Acquitted
7	4 years	30 years	Neighbor	Digital	Negative	7	Acquitted
8	4 years	25 years	Cousin	Penetrative	Negative	20	Punished
9	5 years	35 years	Temple priest	Penetrative	Present	30	Punished
10	5 years	30 years	Neighbor	Penetrative	CMA	16	Punished
11	5 years	35 years	Acquaintance	Penetrative	Negative	22	Punished
12	6 years	25 years	Neighbor	Digital	Present	15	Punished
13	6 years	25 years	Neighbor	Penetrative	None	11	Hostile
14	6 years	30 years	Uncle	Penetrative	Positive	15	Punished
15	6 years	17 years	Neighbor	Penetrative	Present	16	Punished
16	6 years	35 years	Neighbor	Penetrative	Present	10	Punished
17	6 years	19 years	Neighbor	Penetrative	Present	11	Punished
18	6 years	37 years	Neighbor	Penetrative	Present	12	Punished
19	6 years	15 years	Acquaintance	making a child touch perpetrator's private part	Negative	22	Acquitted
20	6 years	21 years	Acquaintance	Penetrative	Negative	22	Punished
21	7 years	40 years	Neighbor	Penetrative	Present	20	Punished
22	7 years	18years	Neighbor	Penetrative	Present	18	Punished
23	7 years	13 years	Neighbor	penetrative	present	11	Juvenile
24	7 years	14 years	Acquaintance	Penetrative	Present	14	Juvenile
25	7 years	19 (14 by medical test)	Neighbor	Penetrative	Present	Hostile	Acquitted
26	8 years	30 years	Neighbor	Oral	Negative	13	Punished
27	8 years	30 years	Acquaintance	Anal	Present	13	Punished
28	8 years	60 years	Acquaintance	Penetrative	none	18	punished
29	8 years	31 years	Acquaintance	penetrative	Negative	20	Punished
30	8 years	16 years	Neighbor	penetrative	positive	21	punished
31	8 years	30 years	neighbor	penetrative	positive	15	punished
32	9 years	35 years	Neighbor	Penetrative	Positive	15	Punished
33	9 years	30 years	Acquaintance	Penetrative	Present	20	Punished
34	9 years	60 years	Acquaintance	Penetrative	None	18	Punished
35	9 years	8,11,13	Acquaintance	Penetrative	Present	Gang rape	Juvenile
36	10 years (2 Boys)	21 years	Neighbor	Anal	Positive	7	Punished
37	10 years	65 years	Acquaintance	Penetrative	Present	22	Punished
38	10 years	25 years	Acquaintance	Digital	Negative		Acquitted
39	10 years	30 years	Neighbor	Digital	Negative	20	Punished
40	10 years	30 years	Acquaintance	Digital	Negative	11	Acquitted
41	10 years	43 years	Father	Penetrative	Negative	24	Acquitted
42	7 Children	35 years	Hostel warden	Penetrative	Negative	14	Punished

B. The Verdict: The final decision of the Court was awarded with a punishment to more than 80% of the cases in accordance with the law of land. Seven underage boys were involved in rape crime, including a gang rape by 3 miners aged 8 and 13 years. There were 8 acquittal cases, among which 2 cases had gone hostile in court; one case where the accused person used inappropriate sexual behavior with the Minor was acquitted with warning.

Age-specific results

One rape survivor was a 2-year-old child who was raped by a minor boy of 14 years of age. The method used for rape was penile–vaginal sex. There was positive evidence in the medico-legal report. The perpetrator was a neighbor known to the survivor and her family. The legal process took 24 months for the verdict. The perpetrator was awarded punishment according to the law of land.

There were eight 4-year-old rape survivors in the study group. Two patients had a history of child raping a child (CRC) (raped by 11- and 16-year-old boys). An 11-year-old school child abused a 4-year-old child by inserting her fingers into her vagina, causing her bleeding. In another CRC patient, a 16-year-old acquaintance had penile vaginal sex with a 4-year-old child. However, no positive medico-legal evidence was noted. Nevertheless, the court awarded punishment in view of the circumstantial evidence.

Discussion

Medical jurisprudence integrates the study of medicine with law. More than half of the rape survivors studied suffered from vaginal injuries. The level of estrogen, an important female hormone that increases significantly in the reproductive age group (15 years to 49 years), is lower in small children. The physical structures of the skin of small children are thin, friable, rigid, and more vascular than those of adults. The inflicted injuries may include contusion, erosion, abrasion, hematoma, or incised wounds. Foul-smelling discharge from the vagina indicates infection in the genital tract, burning urine, and difficulty passing through urine, indicating that urinary tract infection is common. Difficulty in passing stool is not uncommon in the early stages of rape trauma.

The study revealed that penile-vaginal penetration was the most favored method of rape, followed by digital rape, where the perpetrator's fingers were inserted into the vagina or anus, a common pattern observed in published literature [38]. A medico-legal report in a rape crime is not just a clinical note after a routine physical examination. A good Medico-legal report should include an expert professional clinical conclusion with recommendations for immediate and long-term management plans, which should be aligned with the law of the land. The report produced should help the court not only understand the medical condition and consequences but also expedite the Court procedure.

CRC is recognized in Nepalese society [39]. Childhood curiosity, a lack of sex education in school, a lack of parental guidance, upbringing, and misuse of social media play vital roles [40].

Importantly, the clinical, physiological, and psychosocial evaluation of child perpetrator is important for his or her intention at rape crime. This may not only help to determine the cause but also help in the treatment of any pathological findings, psychosocial counseling, and further rehabilitation as needed.

There was one 56-year-old man who had forced oral sex with a 4-year-old girl. The medico-legal report was negative. The court punished the accused with other relevant evidence within 7 months of the FIR. Negative medical reports do not rule out rape crimes [41, 42].

Most of the perpetrators were adult men aged 25 and 35 years. The methods used for rape include inserting fingers vaginally or via penile-vaginal penetration. Most of the medico-legal reports did not reveal any evidence of injury. All the accused were known to the survivors. More than half of the accused men were punished by the Court.

Digital rape is common and accused of the use of fingers to penetrate the vagina for sexual satisfaction**.** The Nepalese Penal Code, 2017, Section 219 recognizes that the action of any object inserting into the vagina (including fingers/digits) is noted as rape.

There were 3 rape survivors aged 5 years in the study group. All of them were raped by adult men. They were not strangers to the children who suffered the heinous crime. One of the perpetrators was a temple priest, whose communities trusted themselves as guardians with deep spiritual values.

One of the medico-legal reports presented in the court was prepared by a paramedic; thus, the question was raised for its validity.

In the Nepalese National Procedural Penal Code, 2017, the medical-legal report should be written by a forensic expert, or any doctor trained in forensic reporting [43]. OCMC (One Stop Crisis Management Center) has played a significant role in Nepal in addressing cases of rape and violence. There are OCMC services available in all 77 districts of Nepal. However, the challenge remains due to the lack of skilled manpower, geographical obstacles to transporting specimens for forensic investigations, and equipment.

Importantly, the examination of small children in private demands special training pertaining to anatomy and physiological and psychological issues, which, if not taken due to care, may inflict unintentional trauma. There are gaps and challenges noted in this area to be addressed by the authorities. All the perpetrators were awarded punishment. The time from FIR to the final summary ranged from 16 months to 30 months.

There were 9 rape survivors who were 6 years of age in the study group; none were strangers to the survivors. There were 2 cases of CRC.

There were 5 rape survivors aged 7 years. Almost all the accused were teenagers. One of the accused males was found to be 14 years of age by a forensic expert instead of 19 years in initial note. Moreover, the survivor became hostile in the court; thus, the accused was acquitted.

There were 6 rape survivors in the 8-year-old group. All the perpetrators were known to the survivors. The methods used for abuse are mostly penile–vaginal sex, one oral sex, and one anal sex. The physical injury to an 8-year-old girl by a 16-year-old perpetrator was extensive compared with that to older men abusing children. All the perpetrators were awarded punishment by the court. The time taken from the reporting to the verdict ranged from 13 months to 21 months.

There was a gang rape CRC in a 9-year-old girl and 3 male children aged 8, 11, and 13 years. The survivor sustained several injuries, including in the vaginal and perineal areas, as noted in the medical report. In Nepalese law, the age for criminal responsibility is 10 years [44]. The Supreme Court recognized the Gang rape crime and the children's sex perpetrators and sent them for juvenile rehabilitation in accordance with law. There were 6 cases with 14 rape survivors in 9-10 years group. The perpetrators were men aged 21 to 65 years.

Male rape is recognized in society as well as in studies [45]. However, there is reluctance in filing a complaint and seeking justice [46]. This may be due to embarrassment, an attitude of masculinity, and a society where there is an understanding that "men do not cry" [47].

In Nepalese society, any person, depending on his/her age, is called an uncle, aunt, brother sister, or grandfather grandmother. Nepalese people are generally naïve, friendly and kind, and they easily trust others. Neighbors are valued as their family members and share ups and downs. Children need protection as defined in Marlow theory. Parents are unaware of evil, trust their neighbors and surroundings, leave their children alone, and later witness sexual abuse to their children. Most of the time, the child rape survivor does not retaliate either because of fear, embarrassment, lack of vocabulary or even threat of violence to the victim or family.

Statistics show that more than 30% of the registered rape cases are less than 10 years of age, gesturing toward moral values, attitudes, beliefs and acceptance in society. The expression of masculinity is one of the most accepted reasons for indulging in rape crime. Sometimes men wrongly think that they are doing the right thing controlling women. The concerned authorities need a policy implementation to ensure that all the boys and men understand rape law and the importance of consent for intercourse.

Notably, the clinical examination of the child offender is not given much importance in the Medico-legal examination. Psychological tests of offenders are needed to trace their mental status as well as the intention element of the offender to commit such crime. Physiological tests of an offender are needed because if a sexual activity per se crime is committed without the intention or by the influence of disturbed mental conditions, the physiological reports shall show the condition/status of hormones and fluids in a way different from the sexual activity committed with the intention to commit such crime.

In this study, the medico-legal emphasis was only on physical evidence; the report did not explore the important aspects of emotional and psychological issues in rape survivors. There was no psychiatrist or psychosocial counsellor involved in the process. The need for follow-up to address the long-term effects on childhood rape seems to be a challenge. Rape survivors suffer significant immediate, short-term, and long-term consequences of physical, emotional, and psychosocial trauma. The child victim of sexual violence is prone to psychological problems, which may be revealed in various forms: multiple forms of somatic pain, emotional outbursts, psychosocial problems, eating disorders, and distorted body image, which may also occur in adulthood. The implicit deep-rooted memory of sexual trauma may surface out unknowingly with certain stimuli, which may be individually specific. These survivors need expert, specialized psychosocial/medical care for a long period of time. In addition, confidential screening in adolescent or adult clinics may help identify and address dormant trauma effectively.

Thus, in this study, the important aspect of psychological/emotional trauma to rape survivors was not raised by the experts examining the survivor and producing medico-legal reports or by the Court awarding the verdict. This important issue must be addressed.

In the study, 80 percent of the accused were guilty by the court of law and were punished. The punishment noted was jail and/or compensation to the perpetrator. The juveniles were sent for rehabilitation. However, none of the verdicts expressed the treatment of psychological trauma, which a survivor may suffer for the rest of her/his life.

Fast-track investigations and court proceedings with verdict gestures on the sensitivity of the justice system to gender-based violence, especially in small children, are needed. Three of the cases went hostile in court; all three were acquitted. Interestingly, a hostile case was a 10-year-old daughter accusing her father of repeatedly raping her for the past 3 years. The case compelled the picture of society's structure, beliefs, and controversy on social justice.

Even though the Nepalese Children Act emphasizes the responsibility of parents to take care of their children, parents still entrust their small child/children with neighbors, acquaintances easily either owing to societal upbringing or compulsion to leave children alone to fulfill basic household

necessity. On the other hand, men took advantage of the vulnerability of the situation and showed their masculinity and dominance.

The sexual abuse of males is recognized by Nepalese law. The law is gender neutral and recognize sexual abuse in both males and females.

The feasibility of the clinician examining the survivor was raised by the defense lawyer in one case. The existing law requires a medico-legal report to be produced by a forensic expert or a doctor with accredited training in the specified field. However, in practice, there certainly remains a void that needs serious input from the government. Equally, judicial stakeholders must demand the appropriate implementation of scientific technology by experts in the medico-legal area.

Conclusion

Rape in children less than 10 years old is not uncommon. A medicolegal report is not just a clinical note on the physical findings of a client visiting a health institution. A good medico-legal report is a comprehensive expert professional clinical conclusion with recommendations for immediate and long-term management plans, which should be aligned with the law of land. The report produced should help the court not only understand the medical condition and consequences but also expedite the Court procedure. The policy makers need to address training for the multidisciplinary medico-legal team with legal expertise.

The training for prosecutors, defense lawyers, and judges on medico-legal issues related to rape will add value to justice delivery to survivors and perpetrators of rape crime.

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Ethics Statement: This study utilized anonymized court case records from the public domain of the Supreme Court of Nepal (2015–2020), ensuring no direct involvement of human participants. All data were thoroughly anonymized to prevent the identification of survivors, perpetrators, or other individuals associated with the cases. The research adhered to ethical guidelines by avoiding any violation of the Declaration of Helsinki on human research, as it did not involve primary data collection, interviews, or interventions. The study was conducted in compliance with ethical standards for secondary data analysis, focusing solely on publicly available legal documents. Confidentiality and privacy were rigorously maintained, and no sensitive personal information was disclosed. The research protocol prioritized minimizing harm while contributing to the understanding of medico-legal processes in child sexual abuse cases.

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Forensic Science and Transitional Justice: Supporting the Office of the Missing Person's (OMP) Mandate on Enforced Disappearances in Sri Lanka

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Abstract

Background: Enforced disappearances represent one of the gravest human rights violations in Sri Lanka, high number of missing person cases spanning several decades of armed conflict. This study explores the role of forensic science in supporting the mandate of Office of the Missing Person (OMP) and argues for its critical integration in the pursuit of truth, justice, and reparation.
Methods: A qualitative institutional analysis was conducted, reviewing Sri Lanka's national laws, OMP's statutory powers, and obligations under the International Convention for the Protection of All Persons from Enforced Disappearance (ICPPED). Relevant international protocols, case studies from mass grave investigation in Sri Lanka referring to global best practices.
Results: Sri Lanka has a statutory and moral obligation to investigate disappearances using forensic science, practical implementation faces significant challenges: limited forensic labs, inadequate training, and lack of coordination between institutions. The study highlights that existing mass grave investigations and individual cases illustrate the evidentiary power of forensics but also reveal systemic gaps in infrastructure and accountability.
Conclusion: Forensic science, when applied within a human rights and victim-centered framework, is indispensable to the success of the OMP and broader transitional justice efforts. Strengthening forensic infrastructure, establishing standard operating procedures, and ensuring victims' participation are essential to restoring public trust and advancing reconciliation. The integration of scientific methods can transform enforced disappearance inquiries as credible, rights-based investigations.

Keywords: Forensic Anthropology, Forensic Pathology, Forensic Genetics, Human Rights, DNA Fingerprinting

1. Introduction

Enforced disappearance is a grave violation of human rights and international humanitarian law. In Sri Lanka, over 20,000 of missing files have been documented, including during the 1971 JVP insurrection, the 1987–1989 southern conflict, and the protracted civil war with the Liberation Tigers of Tamil Eelam (LTTE). Despite the establishment of the Office of the Missing Person (OMP), progress in locating and identifying the missing remains slow [1]. Given the low success rate in locating missing persons alive, the OMP must adopt alternative methods in its search efforts [2]. In particular, this article examines the critical contribution that forensic science can make to the OMP's work and to the broader transitional justice process alongside global best practices from Argentina and Bosnia were analyzed to identify practical forensic applications in anthropology, archaeology, pathology, and DNA analysis [3].

The article adopts an institutional analysis, reviewing national laws, OMP's statutory powers, and obligations under the International Convention for the Protection of All Persons from Enforced Disappearance (ICPPED) [4].

2. Legal and Institutional Framework

The OMP is mandated to search for and trace missing persons, clarify the circumstances of disappearances, and protect the rights of affected families. The Act recognizes the importance of forensic expertise which empowers the OMP to recommend legal and institutional reforms including the application of modern forensic techniques [5,6].

The Minnesota Protocol on the Investigation of Potentially Unlawful Death (UN Manual on the Effective Prevention and Investigation of Extra-legal, Arbitrary and Summary Executions) provides comprehensive guidance on investigating suspicious deaths [7]. It emphasizes the necessity of financial independence and adequate human resources, including qualified investigators and subject-matter experts.

Similarly, the Bournemouth Protocol on Mass Grave Protection and Investigation outlines

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the roles and responsibilities of personnel involved in the excavation of mass graves. Both manuals are critically important and should be adopted, as they establish minimum standards to ensure that evidence is generated in a manner that supports effective inquests and judicial investigations.

Sri Lanka is a party to the International Convention for the Protection of All Persons from Enforced Disappearance (ICPPED), which obliges the state to undertake effective investigations and ensure the right of families to know the truth. It should be noted that Sri Lanka has ratified the ICPPED but does not accept the individual complaints procedure under Article 31. Maldives ratified the Convention recently (2023), indicating a positive step toward international human rights commitments. Bangladesh acceded to the Convention in 2024. No data is provided on the ratification or acceptance of Article 31 by Afghanistan, Bhutan, India, or Pakistan. None of the countries have officially accepted Article 31 procedures except Sri Lanka, which explicitly rejected it as the independent domestic mechanism is established for the same purposes.

3. Forensic Science and Its Applications in Enforced Disappearance Cases

3.1. Forensic Anthropology and Archaeology

Forensic anthropology assists in the recovery and analysis of skeletal remains in Sri Lanka in the past. Human skeletal remains were discovered at the Shangri-La Hotel construction site in Colombo, during excavation work. These findings, particularly in 2017, sparked discussion about potential mass killings and mass graves, especially given the context of Sri Lanka's civil war and the Easter Sunday bombings. While the initial discovery was linked to an old cemetery, the site has also been associated with broader issues of disappearances and forensic investigations related to the civil war and subsequent events. Mass grave exhumations, such as at Chemmani (2025), Sooriyakanda(1990), Kokkkuthoduvai(2024), and Mannar(2028), highlight the role of forensic anthropologists in identifying signs of trauma, execution-style killings, and concealment.

3.2. Forensic DNA Analysis

DNA profiling is vital in confirming identities, especially when other identifiers (clothing, dental records) are unavailable. DNA evidence was used in the Krishanthi Kumaraswamy case of missing in 1996 to help prove the involvement of some of the accused in the crimes. DNA evidence, specifically from samples found at the crime scene, matched the DNA of several suspects, and two others. This requires the development of a centralized DNA database and consent-based collection of biological reference samples from relatives.

3.3. Forensic Pathology

Forensic pathologists determine cause and manner of death. In cases of suspected torture or extrajudicial killings, forensic pathology can provide crucial evidence supporting claims of human rights violations.

4. International Best Practices and Lessons

Countries such as Argentina (through the Argentine Forensic Anthropology Team) and Bosnia and Herzegovina have established successful forensic-based programs to address mass disappearances. These models demonstrate the importance of independent forensic institutions involvement, victim-centered approaches to be adopted, transparent protocols, and International cooperation. The UN Working Group on Enforced or Involuntary Disappearances, FAFG and the International Committee of the Red Cross (ICRC) offer supports that Sri Lanka could adapt to its context.

5. Current Challenges

Despite the potential, several obstacles undermine the effective use of forensics in line with the missing files or the context related to enforced disappearance [8], mainly related to:

- Inadequate forensic infrastructure and training,
- Political interference and mistrust,
- Lack of coordination between the independent institutions [9], and other state – nonstate actors; and
- Inaccessibility of records and poor preservation of exhumation evidence.

These challenges have led to delays and the undermining of families' trust in the state's commitment to truth and justice.

6. Recommendations

To strengthen the role of forensic science, state party should Establish a National Forensic Coordination Body, Invest in training and certifying forensic experts, Collaborate with international forensic agencies and NGOs, Develop policy frameworks and standard operating procedures, Ensure that exhumations follow Protocols, Create a Victims' DNA Reference Bank under OMP's supervision in Sri Lanka, and Enshrine victims' rights to participation and information in forensic processes [10].

7. Conclusions

Forensic science is not merely a technical tool but a pathway to justice, accountability, and healing. Its integration into the work of the OMP can transform the search for the disappearance from a politicized narrative into a credible, evidence-based process grounded in human rights. Sri Lanka's future in reconciliation and rule of law depends on how effectively it employs such scientific and legal tools.

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A Ruptured Heart: Post-Infarction Ventricular Wall Rupture Leading to Cardiac Tamponade

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Abstract

Background: Myocardial infarction and its complications contribute to most cardiac conditions, causing deaths. The infarcts may not be visible during gross examination at an autopsy, particularly if the death occurs soon after the onset of the disease. Cardiac tamponade is one of the complications after rupture of the infarcted myocardium.
Case report: A 58-year-old male was found dead inside of a toilet during early morning hours on a fateful day. A meticulous autopsy combined with histopathological examination of the heart specimen diagnosed myocardial infarction in a case with cardiac tamponade.
Conclusion: Incorporation of histopathology in forensic autopsy, particularly in sudden death cases can be beneficial to make a conclusive diagnosis of the cause of death and facilitate in proper administration of justice.

Keywords: Autopsy, cardiac tamponade, myocardial infarction, sudden death

Introduction

Autopsy is regarded as the gold standard tool to determine the cause of death [1]. In Nepal, an autopsy is conducted only in cases of legal indications, and clinical autopsies are rarely performed. Forensic autopsies are conducted in cases of unnatural deaths of all kinds, including sudden and suspicious deaths. The certainty of the cause of death as determined by autopsy depends upon the quality of examination and the availability of resources. In Nepal, there is a generalized lack of resources in the available mortuaries, leading to various constraints in meticulous autopsies and the determination of specific causes of death. Forensic autopsies are generally accomplished by gross external and internal examinations, and ancillary tests are not regularly performed [2].

In Nepal, the protocol of histopathological examination is not well established, and the mortuary facilities also lack such laboratories. This constraint is particularly detrimental in establishing the causes of death in disease conditions, which are the causes of sudden deaths, leading to appreciable number of unknown causes [3]. However, the available facilities of gross examination can be useful to rule out conditions like trauma and other violent deaths. Cardiac diseases are the most common causes of sudden death. Myocardial infarction and its complications contribute to most cardiac conditions, causing deaths [4]. The infarcts may not be visible during gross examination at an autopsy, particularly if the death occurs soon after the onset of the disease. To diagnose myocardial infarction at an autopsy, we need to perform meticulous gross external examination of the heart, and it should be supported by histopathological examination [5].

Case Presentation

A 58-year-old male, previously not known to be suffering from any serious disease or conditions, was allegedly found unconscious and dead inside the toilet room in the morning. The incident was reported at the district police office as it was preliminarily a case of an unnatural death, and a necessary inquest was performed and referred to the mortuary of our hospital to perform a post-mortem examination.

The body was recovered from the toilet. The body was clad in dark bluish colored underwear with fecal material stain in situ at the posterior part of the underwear. He was well-built, nourished, and with a length of 5 feet 4 inches.

The autopsy was performed after about 12 hours of death. On external examination, both the eyes were closed with the pupils fixed and dilated. Rigor mortis was fully developed in all the body parts. The postmortem hypostasis was present on the back, except for the areas of contact pallor on the shoulder blades and buttocks. There were no fresh appreciable external injuries as evaluated by the systematic external examination of the body. No injuries or lesions were appreciated during the gross examination of the scalp, skull, and brain. An "I" incision was given to examine the thorax and abdomen. The panniculus adiposus

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at the epigastric region was one centimeter thick. There was no internal injury evident in the thorax and abdomen. However, the pericardial sac seemed to be distended and dissecting the pericardium, a well-organized blood clot (250 gm) and some fluid blood was evident inside (Figure 1), suggestive of cardiac tamponade. Grossly, an area of rupture of 3 cm X 2 mm was evident on the anterior surface of the left ventricle, just below the left atrioventricular junction (Figure 2). On sectioning the coronary arteries, the left coronary artery was completely occluded by a thrombus. In contrast, the right coronary artery was occluded in approximately four-fifths of its lumen by an atheromatous plaque (Figure 3). An area of transmural necrosis was seen on the anterolateral wall (Figure 4).

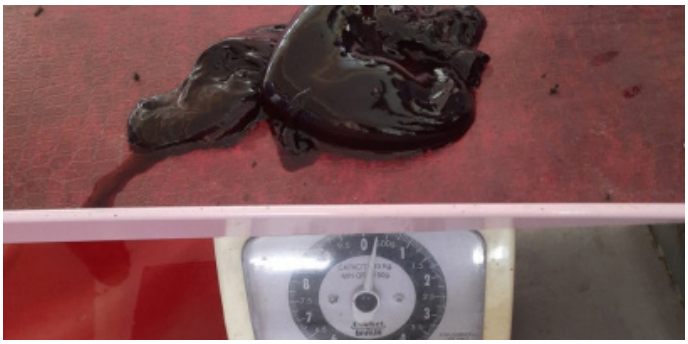

Figure 1. Blood clot in the pericardium.

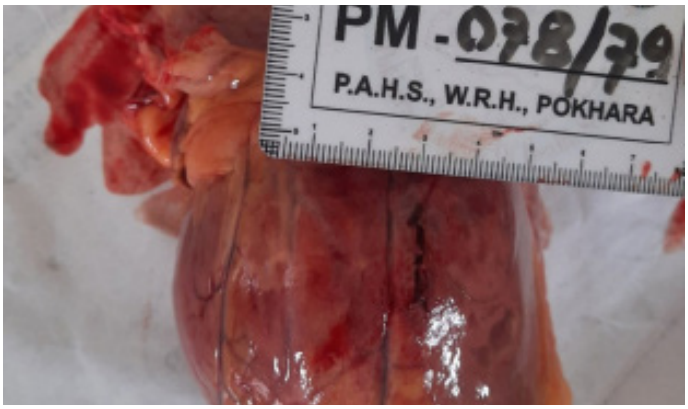

Figure 2. Rupture on the anterior surface of the left ventricle.

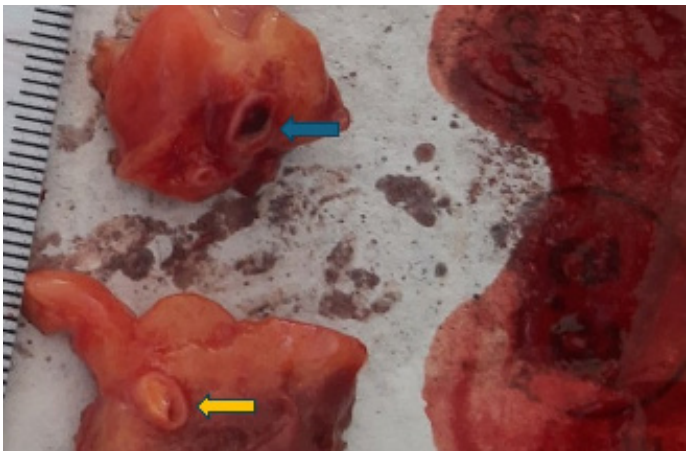

Figure 3. The left coronary artery was completely occluded by a thrombus (blue arrow) and the right coronary was occluded in approximately four-fifths of its lumen by an atheromatous plaque (yellow arrow).

Sections of myocardium, including the necrotic tissues and marginal healthy tissues and the portion of the myocardium with the occluded coronary arteries, were preserved in 10% formalin and submitted for histopathological examination. The histopathological examination of the cardiac specimen revealed areas of necrotic myocardium with dense neutrophilic infiltration. The coronary artery specimens, in addition to the occluding thrombi, showed features of atherosclerosis, including thickening of the intimal layer and areas of cholesterol clefts (Figure 5). The histopathological diagnosis of myocardial infarction was made. No other significant additional findings were present in other organs. Based on the gross and microscopic findings, the cause of death was established as: ruptured myocardial infarction leading to cardiac tamponade.

Figure 4. Areas of necrosis on sectioned specimen.

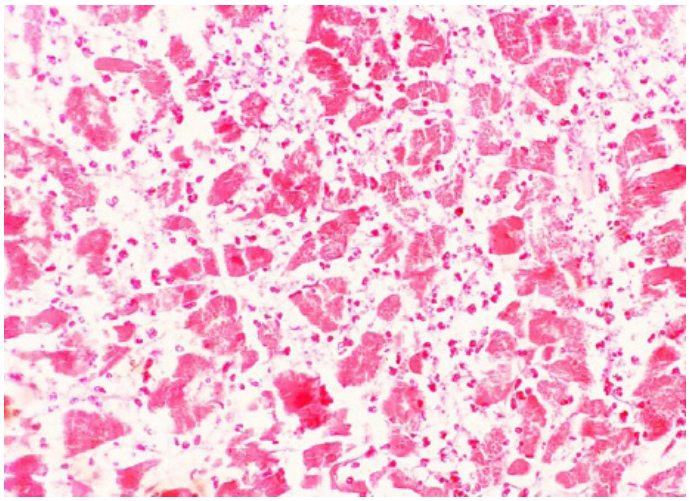

Figure 5. Dense neutrophilic infiltration along with necrotic myocardium suggestive of acute myocardial infarction.

Discussion

Ventricular free wall rupture is a rare but fatal mechanical complication of acute myocardial infarction. It commonly affects the left heart, usually within the first week [6]. In most cases, acute rupture results in sudden death, as observed in our case. The full-thickness rupture causes bleeding into the pericardial sac (hemopericardium), ultimately leading to cardiac tamponade and severe circulatory failure. Management involves urgent pericardiocentesis and efforts to stabilize the patient hemodynamically, followed by prompt surgical intervention. However, the prognosis remains extremely poor, and survival is

unlikely even with aggressive treatment [7].

The determination of the accurate cause of death is important to aid in the administration of proper justice. This can only be possible by meticulous autopsy. In cases of sudden death, the ancillary investigations of the internal organs are essential in addition to meticulous gross examination. Sudden death cases are often mistaken as unnatural deaths, as it raises suspicion of foul play. When an apparently healthy person dies unexpectedly, it is an obvious reaction of the family members or relatives to suspect unnatural events and seek investigations. Therefore, such deaths are subject to medico medico-legal autopsy.

The most common causes of sudden death are cardiac diseases. While the occlusion of the coronary arteries can be demonstrated morphologically, acute myocardial infarction cannot be appreciated on gross examination as well as histopathological examination until several hours after onset. Therefore, myocardial infarction often goes undiagnosed [8].

In this case, there was cardiac tamponade caused by the blood effused out of the rupture of a myocardial infarction. This condition can be mistaken for a traumatic rupture of the heart wall. If there is no evidence of other trauma, and based on the circumstances, the rupture can be attributed to myocardial infarction. In this case, however, the myocardial wall was necrotic even by the gross examination. This was proven histologically, thus increasing the evidence level.

Histopathological analysis is not frequently carried out in Nepal; instead, forensic autopsies mostly depend on gross examination. However, to make conclusive diagnoses, tissue samples must be examined histologically. Lack of such investigations frequently leads to cases going undetected for the cause of death, which could impede the administration of justice. The development of successful preventive measures by pertinent stakeholders is also impacted by this disparity. We urge policymakers to improve autopsy services by implementing infrastructure that supports histopathological examinations and clear guidelines. Forensic pathologists should be properly trained to collect pertinent specimens during an autopsy and carry out histopathological analyses.

Conclusion

Myocardial infarction can sequentially lead to cardiac tamponade, which is a fatal complication if timely intervention is not done. Meticulous autopsy is crucial to identify the accurate cause of death. The use of histopathological examination is essential to establish the underlying pathology, thereby increasing the level of evidence of the diagnosis. Histopathology can accurately establish myocardial infarction, which can at times go undiagnosed during gross examinations at an autopsy. Therefore, incorporating routine histopathological analysis in such cases can significantly enhance the accuracy and reliability of forensic investigations as well as to generate evidence for preventive strategies.

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Declaration of generative AI: The authors used ChatGPT (OpenAI) for the improvement of the English language. However, the authors reviewed and revised the content as per the requirements and are fully responsible for the content of the manuscript.

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Blinded by Love: A Case Report of Fatal Intimate Partner Violence Involving Penetrating Orbital Injury, Blunt Head Trauma, and Smothering

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Abstract

Background: Domestic violence continues to be a global public health crisis, with many cases escalating to fatal outcomes. While penetrating injuries involving the orbit are uncommon, their presence in domestic assaults highlights the severity and brutality of interpersonal violence.
Case report: We report the case of a woman who was fatally assaulted by her husband using a combination of blunt and sharp force injuries to the head, accompanied by smothering. Among multiple injuries, a penetrating trauma to the left eye inflicted with a broken beer bottle was especially striking. However, forensic analysis revealed that death was due to a combination of blunt force head trauma and asphyxia caused by smothering.
Conclusion: This case demonstrates the complex interplay of multiple fatal mechanisms in domestic homicides and emphasizes the importance of thorough forensic evaluation. Penetrating eye trauma, though not fatal in this case, reflects the violent nature of the assault and the use of improvised weapons in domestic settings.

Keywords: Domestic violence, homicide, blunt force trauma, penetrating trauma, forensic pathology

Introduction

Intimate partner violence (IPV) is a widespread and often fatal problem impacting individuals from all walks of life. Intimate partners are the reason 1 in 3 women across the world experience physical or sexual violence, as per the World Health Organization [1]. Despite ongoing efforts in awareness and prevention, IPV remains a leading cause of death among women [1]. The fatality in case of IPV can result from blunt force injuries, sharp force trauma, asphyxial mechanisms, or a cumulative effect of all.

Penetrating injuries to the orbit are relatively uncommon and are usually linked to high-velocity trauma or intentional assault with sharp objects. The orbit's close proximity to the brain and vital neurovascular structures means that even minor trauma can have life-threatening repercussions. In the context of IPV, the finding of such injuries shows the use of improvised weapons, showing the assailant's intent to disfigure or kill [2]. This highlights how ordinary objects can turn deadly, and how a simple disagreement can escalate into fatality.

This report details a tragic domestic assault where a woman sustained multiple head injuries, including a penetrating injury to her left eye from a broken beer bottle. While the eye injury was severe, the autopsy revealed that the cause of death was due to blunt and sharp force trauma to the head along with smothering.

Case Presentation

A deceased adult female was presented for a medico-legal autopsy following an alleged assault by her husband during a domestic dispute. As per the inquest report, the incident took place at hotel/lodge, where a beer bottle was used as the weapon.

Crime scene report: According to the police crime scene report on 26th August 2024, a deceased female was found dead in a lodge near a bus park of a Sub-Metropolitan City. The hotel management had informed the police after the door remained closed until late morning. The doors were locked from the inside, and the body of a deceased female was lying on the bed. The scene contained shards of broken glasses from a beer bottle (Figure 1).

Figure 1: Crime scene picture obtained from the police, showing shards of broken glass.

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External examination revealed multiple injuries predominantly involving the left orbital region, mouth, and chest. The left orbital area showed peri-orbital contusion and multiple abrasions over a 7 × 5 cm area. A 1 × 0.5 cm abrasion was noted on the medial aspect of the left eyebrow, approximately 2 cm lateral to the glabella. A full-thickness laceration measuring 2 × 0.3 cm was present on the lateral aspect of the left upper eyelid, 8 cm lateral to the midline. Subconjunctival hemorrhage of the left eye was also evident. The pattern of injuries around the left eye appeared to correspond with the impact of an irregular circular object (Figure 2). The dimensions and characteristics of the injury were consistent with the broken beer bottle, which typically has a circular shape but may have jagged or uneven edges. This variation likely resulted in a combination of injury types—abrasions in areas where the surface was blunt or grazed the skin, and penetrating trauma where sharp edges made deeper contact.

Figure 2: External eye injury.

Injuries around the mouth included a 1 × 0.3 cm and a 0.7 × 0.1 cm laceration on the inner aspect of the right upper lip, both with surrounding reddish contusions. These were situated 3 cm lateral to the midline and formed an irregular circular pattern, suggesting forceful pressure application to the mouth region. There were feature of asphyxia death, such as facial congestion and cyanosis of fingertips were also observed. These findings were interpreted as indicative of smothering. Over the right breast, four abrasions ranging from 0.5 × 0.5 cm to 1 × 1 cm were arranged in a circular manner, located approximately 5 cm lateral to the midline and 8 cm inferior to the clavicle.

Internal examination of the head and neck revealed a contusion over the left frontal region of the scalp and fracture of the facial bones. A subarachnoid hemorrhage was present over the left parietal lobe of the brain.

Based on the autopsy findings, the cause of death was determined to be due to blunt force and sharp force injuries to the head in association with smothering.

Discussion

The presented case involves a fatal domestic assault marked by a combination of blunt force trauma, sharp force injuries, penetrating ocular trauma, and smothering. While these types of injuries are not unusual in forensic pathology, it's rare for them to occur together, providing valuable insight into the nature of violence, use of makeshift weapons, and the mechanisms of death in intimate partner homicides

1. Penetrating Ocular Injuries in Homicide

Though ocular injuries aren't uncommon in facial assaults, penetrating injuries to the orbit from non-traditional weapons like a broken beer bottle are quite rare. The delicate bony structures of the orbit, especially the medial and superior walls, are susceptible to perforation. In this case, while the eye was penetrated, the damage did not extend into the cranial cavity. This highlights a failed but violent attempt at inflicting a potentially fatal brain injury.

Comparative cases:

- Thali et al. (2003) reported a fatal stabbing using a broken beer bottle, where spiral CT imaging postmortem revealed zygomatic bone fracture injury to the eye. The case emphasized the lethal potential of broken bottles even when not used to inflict deep or wide wounds [1].
- Rautji et al. (2003) documented a rare case of homicidal penetration of the eye using a screwdriver, resulting in fatal brain injury. The case was notable for its resemblance to this one in terms of entry point and victim-perpetrator relationship [3].
- Gönül et al. (2013) described a suicidal penetration through the orbit with a kitchen knife, underlining the orbit as a route to the brain even in self-inflicted injuries [4].

These reports affirm the forensic significance of orbital injuries both as a pathway to the brain and a marker of violent intent, whether or not they are directly fatal.

2. Blunt and Sharp Force Trauma in Intimate Partner Homicide

Blunt force injuries to the head are among the leading causes of death in domestic homicides, particularly those involving female victims. In this case, evidence of blunt trauma includes facial bone fractures, scalp contusions, and subarachnoid hemorrhage, pointing to multiple impacts with considerable force.

Campbell et al. (2007) indicates that intimate partner homicides often showcase overkill, with injuries exceeding those necessary to cause death. Blunt and sharp force injuries to the face and head are particularly revealing, as they often target areas tied to identity, reflecting rage and personal motives [5].

According to a review by Lund and Ormhaug (2020), over 60% of female homicide victims in Norway had blunt head and face trauma, often paired with other means like strangulation or stabbing [6].

3. Smothering:

The presence of inner lip lacerations, circular abrasions around the mouth, and contusions in this

case suggests manual or object-based smothering — a form of asphyxia by airway occlusion. Smothering is often overlooked during forensic examinations unless subtle injuries to the face, lips, and oral cavity are carefully sought. Smothering often leaves minimal external findings, and diagnosis is frequently made on circumstantial evidence and internal oral trauma [7]. This highlights the importance of thorough internal examination in suspected domestic violence cases. Lumb and Taylor (2004) reported a case of homicidal smothering in an elderly woman where petechial hemorrhages and mouth abrasions were the key indicators, emphasizing that smothering often accompanies other injury mechanisms in homicide [8].

4. **Use of Improvised Weapons in Domestic Settings**

The use of a broken beer bottle as a weapon in this case reflects a common pattern in domestic violence: the use of readily available objects. Unlike premeditated assaults involving firearms or knives, many domestic homicides are crimes of impulse and proximity, making everyday items potential weapons.

Logan and Blackburn (2009) found that in over 30% of domestic homicides, blunt household objects or broken glass were used as weapons, particularly in alcohol-related disputes [9]. This aligns with the forensic principle that any object can become a lethal weapon, depending on the force and intent.

Conclusion

This case demonstrates the lethal consequences of intimate partner violence and the forensic complexity involved in determining the cause of death when multiple mechanisms coexist. Although the penetrating eye injury was not fatal in itself, its presence underscores the brutality of the assault and highlights the use of improvised weapons in domestic settings. Careful external and internal examination, including assessment for smothering, was essential to establish the true cause of death: a combination of blunt and sharp force head injuries with asphyxia. Multidisciplinary collaboration remains vital in identifying, investigating, and preventing such tragic outcomes.

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From Autopsy to Arrest: Forensic Determination of Postmortem Interval Aiding Identification of a Double Murderer

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Abstract

Background: Infidelity sometimes triggers premediated killing using multiple methods. Brutal physical assault with blunt forces at multiple sites and compression of neck by a partner as a revenge for infidelity leads to fatal internal injuries causing death.
Case report: Two unidentified bodies were discovered, packed inside sacks. After Proper Police and Forensic investigation, it was found that, Husband killed his wife and another man suspecting, something lascivious between them. Wife was severely beaten up by her man, sustaining multiple bodily injuries. Multiple injuries included, pressure abrasion around neck, wrists and leg, fracture of right humerus, ribs, hyoid bone, laceration of left lung and liver.
Conclusion: Criminal activity may also result from an unhealthy relationship. Even though decomposition made identification extremely difficult in this instance, the degree of decomposition served as a tool to estimate the time since death, which gave the investigator a valuable lead for reviewing CCTV footage from the relevant time period.

Keywords: Murder, infedility, blunt force trauma, forensic pathology

Introduction

Intimate relationship homicide is a very unsettling but common occurrence that is frequently motivated by feelings of betrayal, rage, and jealousy [1]. Infidelity is one especially flammable trigger that can lead to severe acts of violence [2]. Spousal killings by husbands in domestic settings continue to be a major global public health and criminal concern, frequently leading to murder of multiple people when a third party is seen to have been betrayed [3].

Double homicide cases are complicated and emotionally intense, particularly when they involve close family members [4]. To reconstruct the events, determine the cause and manner of death, and help identify the offender, they require thorough forensic investigation [5]. In these situations, postmortem alterations like decomposition, lividity, and insect activity may make an accurate assessment difficult [6]. They do, however, also offer important hints about the time since death, which can be very helpful in identifying potential suspects and comparing results with outside data like CCTV footage or witness statements [7].

In homicide cases, autopsies continue to be the mainstay of forensic investigation [8]. Even when decomposition has advanced, it not only verifies the cause of death but also shows evidence of physical abuse, constraint, suffocation, or strangulation [9]. In the present case, a man, driven by suspicion of an illicit relationship between his wife and nephew, murdered both victims. He used blunt force trauma, smothering, and hog-tying before packing the bodies in sacks and discarding them beneath a culvert. Through careful postmortem examination, including assessment of injury patterns and decomposition changes, the forensic team was able to estimate the time since death. This estimation guided the reviewing of surveillance footage, ultimately leading to the identification and apprehension of the perpetrator.

This report highlights the indispensable role of forensic pathology in unravelling complex criminal cases and ensuring justice for the victims of domestic violence-fuelled homicide.

Crime Scene Findings

Forensic team was alerted after a passerby noticed what appeared to be a human hand protruding from a torn sack beneath a culvert bridge. The location, often frequented by locals for recreational activities such as smoking or drinking, had not previously raised suspicion, likely due to the meticulous packing of the bodies, which prevented any noticeable odour or disturbance.

Upon arrival at the scene, the forensic medicine expert, accompanied by law enforcement officials, inspected the area. The sack in question resembled an ordinary rice or potato sack, common in domestic and commercial use. Due to internal pressure—possibly from decomposition gases—the sack had torn, allowing a human hand to become visible, prompting discovery.

The sack was carefully cut open, revealing the body of a female, tightly and methodically bound. Her wrists and ankles were secured with ligature material, and her body was folded and packed in a constrained

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position, indicative of an intentional and organized attempt to conceal the crime.

A short distance away, a second similar sack was discovered. Upon opening, it was found to contain a male body, also tied in a similar fashion. The positioning, packing, and concealment of both bodies suggested premeditation and deliberate efforts to delay discovery.

These observations triggered an extensive investigation, beginning with detailed crime scene documentation and eventual transportation of the bodies for postmortem examination.

Case Presentation

External Examination of the Female Deceased

The female body was in a moderately decomposed state, with limbs tightly bound using ligature material. Both wrists were tied and positioned above the head, with shoulders fully abducted and elbows flexed. The legs were also tightly bound together in a crossed position, with the ligature material running anteriorly and looping around the neck. The knees were flexed, and the entire body appeared hog-tied in a compact position. A ligature was tightly wrapped around the neck, and a double loop of blue adhesive tape was present across the face, covering both the mouth and the eyes (Figure 1A-E).

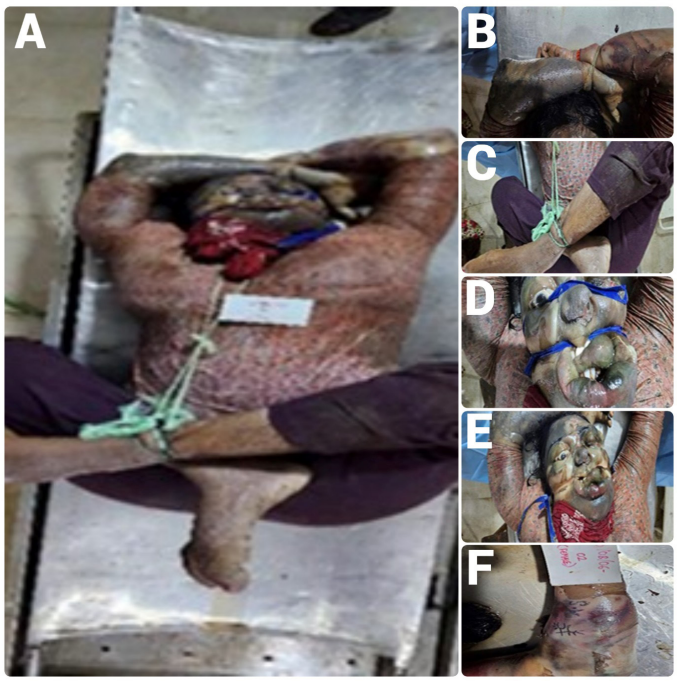

Figure 1: Female victim. A: Position of the body. B: Hands tied with ligature. C: Legs tied with ligature. D: Adhesive tape around mouth. E: Ligature around the neck. F: Tattoo on left forearm.

Visible injuries included:

- Pressure abrasions around the neck, both wrists, and lower thirds of both legs, consistent with ligature binding.
- A fracture of the right humerus at its middle third.
- A distinctive black tattoo on the anterior aspect of the left forearm, bearing the initials 'A.S' and a symbolic design—an important feature used for preliminary identification (Figure 1F).

Internal Examination

- There was an inward compression-type fracture of the bilateral greater cornu of the hyoid bone, suggestive of manual strangulation.
- The peritoneal cavity contained approximately 150 ml of blood, with a laceration on the posterior surface of the right lobe of the liver (Figure 2A).
- The left pleural cavity contained approximately 300 ml of blood, and a laceration was observed on the posterior surface of the upper lobe of the left lung (Figure 2B).
- Rib fractures were noted: right 2nd to 5th ribs and left 2nd rib (Figure 2C).

Postmortem Changes

Significant decomposition changes were noted, including:

- Greenish discoloration of the face and upper chest.
- Bloating of the face and abdomen.
- Blistering and skin peeling on the limbs.
- Protrusion of the eyeballs, and loosening of hair and nails.
- Minimal maggot activity was observed in the mouth and nostrils.
- Internally, the brain had liquefied into a greyish semi-fluid mass, and visceral organs exhibited brownish discoloration.

Based on the degree of decomposition and prevailing climatic conditions, the estimated time since death was placed at approximately 2–4 days. This estimate provided a crucial lead for investigators. Vitreous humour was also collected for estimating the time since death, through biochemical test. But was not used.

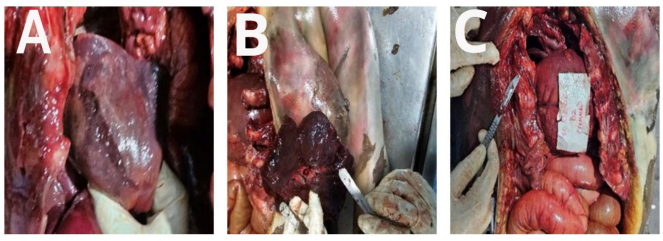

Figure 2. Internal examination. A: Laceration of the liver B: Laceration of the lungs C: Fractured ribs.

Linking Autopsy Findings to Investigation

Acting on the postmortem interval, police reviewed CCTV footage from the surrounding area covering the corresponding time frame. This led to the identification of both the victims and the perpetrator.

The subsequent investigation revealed that the perpetrator was an Indian national who had brought his wife and another man in false pretences of employment in Nepal. Motivated by suspicion of an illicit relationship between the two, he meticulously

planned and executed the murders. He killed the victims—one after the other—by blunt force trauma and smothering, hog-tied their bodies, packed them into sacks, and dumped them under the bridge. Disturbingly, during the initial investigation at the crime scene, he was found present among the onlookers, watching the recovery of the very bodies he had concealed.

Discussion

In 2009, Nepal Health Research Council reported that violence accounted for a larger percentage of intentional injuries, which accounted for 23% of all injuries [10]. In 2014, Kamaluddin et al. discovered that "premeditated" killings were more likely to employ multiple methods of killing than "crimes of passion," with retaliation serving as a common motivation [11]. Our case is an example of premediated homicide using multiple methods of killing. Instances of this methods in our case includes, Strangulation and blunt force trauma to arm, chest, abdomen.

A blunt trauma is a physical trauma caused by a violent impact that does not penetrate the surface of the body. Numerous injuries, such as abrasions, contusions, lacerations, internal or external haemorrhages, and bone fractures, can result from blunt trauma [12]. Multiple injuries were present on the body of the lady as a result of violence by his man. Pressure abrasion, around the neck, wrists and legs were caused due to ligature material, that was used to bind the body. Long-term compression of the epidermis results in pressure abrasion [13]. Dissection of neck revealed inward compression fracture of hyoid bone, which is usually present in strangulation [14]. Strangulation is a type of violent asphyxia death brought on by a ligature or other mechanical device that constricts the neck [15]. Tattoo, a crucial identification tool, was visible on the forearm [16]. Fracture of humerus was present. A break in a bone's continuity is called a fracture [17]. A tear in tissue brought on by a shearing or crushing force is called a laceration [18]. Laceration of lung can happen due to piercing of fractured segment of ribs leading t0o traumatic haemothorax. Blood in the pleural cavity is known as haemothorax [19]. Laceration of liver is a possible cause of hemoperitoneum which is caused due to blunt force trauma to abdomen. The presence of blood in the peritoneal cavity is known as the hemoperitoneum [20].

Conclusion

The husband was convicted of a felony, with sufficient evidence proving the commission of crime. The discovery of dead body, autopsy report, CCTV footage, and the confession of the accused served essentials of crime which established Corpus delicti.

Injuries on the body reveals brutal violence by perpetrator and the intention to conceal the crime can be inferred by the method used to constrain, pack and discard the body. Estimation of time since death from the state of decomposition of body, played a valuable role in unveiling the crime.

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Transforming Forensic Medicine Education in Nepal: Bridging the Gap Between Theory and Practice

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Forensic medicine is a vital field in the medical and legal arena which combines medical knowledge with the legal system to deliver justice based on scientific evidence. In Nepal, forensic medicine is often considered to be a very difficult subject by medical students, mostly because of limited hands-on experience and not wanting to handle medicolegal responsibilities. This perspective piece the reasons behind this perception and proposes measurable ways for transforming forensic medicine from a subject of apprehension to one of engagement and professional confidence.

The Challenge of Fear in Forensic Medicine Education

Forensic medicine involves some serious medical investigation and detective work that enables physicians to uncover truths behind unexplained deaths, injuries, and criminal activities. Forensic medicine is a trendy, hot field, but many medical students in Nepal struggle with anxiety regarding this. This anxiety stems from many areas: being potentially uncomfortable with autopsy observations, concerns about errors in medicolegal documentation (e.g., injury reports, death certificates, and postmortem reports), and being remorseful of any legal repercussions for mistakes. The many feelings of concern and apprehensions often overshadow the subject's intrinsic appeal. Foremost, it leads the students to a place of experiencing forensic medicine and criminal practice as a theoretical hurdle to get over; than a practical skill to master.

The current medical curriculum in Nepal provides robust theoretical training in forensic medicine, supported by dedicated faculty. Nonetheless, there is a considerable gap in the aspect of practical training. Very little exposure to hands-on experience during clinical posting lessens to provide students' confidence while handling real-life medicolegal cases. Moreover, the large amounts of legal codes, procedures, and documentation requirements that are important to memorize can create a daunting experience when we are not concentrated on where we need to use them practically. This disconnect contributes to a failure to prepare future doctors after graduation, particularly in rural areas with medicolegal case responsibilities often assumed by the doctor independently. Failure to prepare adequately can postpone justice and expose future doctors and patients to legal risks.

The Role of Forensic Medicine in Justice Delivery

Forensic medicine plays a crucial role in the justice system, providing impartial and objective scientific evidence that will better ensure the resolution of cases through justice. Qualified forensic professionals help reinforce the integrity of investigations and maintain acceptable standards of evidence to support societal tranquility. For medical students to fulfill these obligations and responsibilities, they must have the theoretical knowledge and practical experience necessary to approach medicolegal cases competently and comfortably.

Recommendations for Enhancing Forensic Medicine Education

To reduce the gap between theoretical grasp and practical realization, medical colleges of Nepal should adopt the following changes:

1. **Enhanced Practical Exposure:** Incorporate hospital-based discussions on real medicolegal cases, focusing on injury pattern analysis, medicolegal report preparation, postmortem examination findings, and poisoning case management. The feasibility of supervised hands-on opportunities, such as conducting postmortem examinations under supervision of expert, would assist to build practical competence.
2. **Engagement with Legal Processes:** Scheduling visits to police stations and courts should be arranged by the medical college to familiarize students with legal procedures and courtroom dynamics. Since students have previously gone through the legal process in the context of injury, it would allow students to see the practical involvement and legal processes when a doctor is called upon for a medicolegal investigation in the court to witness how evidence is presented and cross-examined. This process can demystify the legal system and boost confidence.

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3. **Interactive Teaching Methods:** Implement case-based learning that includes real police cases, rather than hypothetical medico-legal cases, as this will enhance student engagement during the learning of forensic medicine. Case based learning reverts the focus from memorization to actual problem-solving and builds a foundation of critical thinking and engagement to study the subject.
4. **Context-Specific Resources:** Develop forensic medicine textbooks in Nepal, written in Nepali authorship to suit the local context. Forensic medicine texts should introduce the legal framework within Nepal context, the documentation format, and the challenges of the work, making the subject more relevant and accessible to students.

Conclusion

Forensic medicine education in Nepal faces a critical moment. With the implementation of practical training and relevant resources, medical colleges can pivot forensic medicine from obscurity and fear to one of intrigue and professional viability. By doing this, future doctors will have the full educational foundation to grow the competencies and confidence needed to meet their medicolegal duties, enabling the justice system and support of public confidence in health care. Now is the time to make this shift - moving beyond the theoretical learning can build the future of forensic medicine in Nepal, creating a more capable workforce of forensic medicine practitioners.

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