



Case Reports: An Important Source of Data for Forensic Medicine and Forensic Pathology

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Abstract

Case Reports are detailed descriptions of the circumstances, physical presentations, medical features, treatments, and presents unique features of an individual that advances medical and forensic sciences and has educational value. Starting in the 20th century the editor board of major medical journals began to limit the publication of these types of reports. Reasons include they only represent a novel or curiosity, the application of the academically created hierarchy of research, and the limited number of pages. In the fields of forensic medicine and forensic pathology case reports play a critical function in defining new syndromes, such as SIDS, estimating fatal concentrations of drugs, and the collection of data that due to ethical and human experimentation regulations could not be obtainable by other methods. The editorial board of forensic and criminal journals should continue to support and encourage the publication of case reports. The recent growth of on-line and open access journals has allowed a new format for the publication of case reports. This mini reports provides define, history, structure of case reports, examples how case reports are used in the forensic field, and the future of case reports.

Key words: Forensic; Case reports; History; Medical; Publications

Abbreviation: RCT: Randomized Controlled Trial; SIDS: Sudden Infant Death Syndrome; SUDI: Sudden Unexplained Death in Infancy.

Introduction

A sometimes underutilized and over looked source of valuable information to those investigating a forensic case or certain types of crimes is the Case Report and Case Series. A forensic case report is a detailed description of the death scene, the findings of the autopsy and toxicological analysis, and the key features of an atypical or unique death. The information within these individual case presentations can aid the forensic pathologist during

his investigation in a unique death by providing the key features reported in similar types of cases. Forensic case reports, like all case reports, also serve as the foundation of generating new hypotheses, reporting novel observations, describing new, rare diseases, conditions, or syndrome, allow for in-depth narratives, and for their educational value. Starting in the 20th century with the application of evidence-based medicine the editors of a number of medical journals began to severely limit the publication of case reports. Fortunately the editor board members of the majority of forensic journals understanding the importance of presenting case reports all devoted a section of the journal to case reports. In addition, the recent growth of on line Open Access

journals allow for the rapid publication of case reports and allow for the easy accessible to forensic pathologist and criminal investigators. This is a mini review of the history, definition, structure, feature/role, and limitations of a case report. This review will also present several examples how case reports are used in a forensic investigation. And finally present the current state of cases reports within forensic journals.

History of Case Reports

The documentation of a specific medical case has a long history dating back to ancient times. The use of these individual medical case histories has been an important tool throughout medical history in the advancement of clinical knowledge. The first description of a case report is attributed to the ancient Egyptians (1600 BC). Papyrus have been discovered that contained recording detailed information about patients with head and chest trauma and the novel interventions offered for treatment. During the years of Hippocrates (460 B.C. - 370 B.C.), case reports contained detailed descriptions of the clinical findings with a chronological sequence of the disease and its evolution, including a proposal for the etiology of the patient's condition [1]. Starting in the late 20th century saw a decline in case reports within medical journals. The emergence of evidence-based medicine and the academically created hierarchy of research methods signaled the reduction of case reports within medical journals. Most professional journals editorial board applied this hierarchy in their decision making process in their allocation of the limited number of pages within their journals. In this hierarch case reports are located on the bottom, followed by case series, animal studies, observational research methodology that includes cohort study, case-control study, and cross-sectional study, clinical studies, and at the top is the experimental clinical research design the Randomized Controlled Trial (RCT), as the "Gold standard".

This resulted in editors devoting more space to these types of articles and dramatically reducing the space allocated to Case Reports. Some journal editors felt that Case Reports represented nothing more than the reporting of a mere curiosity [2]. While, others felt that Case Report represent an indispensable source of information furthering medical knowledge. These case reports play an especially critical role within the fields of forensic medicine and forensic pathology.

Definition of a Case Report

A key question, "What constitutes a Case Report?" The frequent cited definition: "A formal summary of a unique

patient and their illness, including the presentation signs and symptoms, diagnostic studies, treatment course and outcome" [3]. A broader definition are cases that provide new insight into the pathogenesis or biology of a disease, reports that expands the clinical or morphological expression of a known or new disease or disorder, or the presentation of a new syndrome or a totally unique case. A case report has the importance to description the features of the case not just its uniqueness. A Case Series typically consists 3 to 10 similar type cases [4].

Structure of a Case Report

The structure of a case report consists of a short introduction, clinical history, discussion, and references. The Introduction should be short and highlight the importance or implication of the case. The Clinical History should be detailed presenting the sequence of events, anatomical, morphological and laboratory findings, differential diagnosis, clinical course, and the outcome. The Discussion should put the findings into context within the field of medicine, forensic, or criminal investigations. Forensic Case Reports should include details of the scene presentation, the autopsy and toxicology results, and why that case is unique and not typically encountered during the normal case load of a Medical Examiner's or Coroner's Office.

Roles of a Case Report

Case reports have a significant role to play in research, medicine, forensic and even criminal investigation. Case reports/Series represent a large database of intriguing, unexplained, and interesting observations offers opportunity not offered by other means of investigations. The roles of Case Reports/Series include:

- a. Generate new observations,
- b. Describe a new medical disease/condition, diagnosis or new treatment,
- c. Generate hypotheses,
- d. Research rare disorders/events,
- e. Overcome ethical constraints,
- f. Allow for in-depth narrative,
- g. Educational value,
- h. Low cost,
- i. Fast publication,
- j. Change clinical practice [2].

Case reports are able to generate hypothesis from their novel observations. These reports of novel findings can improve therapeutic strategies [5]. Case reports are useful in cases of rare disorders/diseases that could not be investigated by controlled clinical trials due to their low incidence [6]. Running controlled trials with standardized

testing procedures on rare ailments is very difficult, as often there are not enough patients to achieve statistical power [5]. The narrative feature of case reports allow for a wide spectrum of information to be presented on cases of rare diseases, unexpected complications from standard therapy, novel diagnostic or therapeutic techniques, and results from new technology. The presentation and review of case reports in the clinical literature allows medical students and clinicians to be cognizant of new or mixed patterns of presentation [2]. Case reports are “natural experiments” that could not be intentionally performed due to ethical limitations. Case reports also have educational value, especially to teach young doctors the principles of medical publications [7]. In particular, in drug safety surveillance case reports are the best method to know the adverse effects of new drugs in order to take measures without delay [8]. The flexible structure, the fact that they represent lower cost compared with formal studies, and the short time between the observation and publication the case report serve as “primers” leading to discoveries of new diseases/disease pathophysiology as well as development of new preventive and therapeutic measures.

Limits of Case Reports

Case reports due to their intrinsic characteristics have some limitations. They include:

- a. Lack of appropriate controls;
- b. Limited sample size (one individual or a group of similar cases);
- c. Lack of blinding. All these characteristics bring about significant bias and random errors. Because of the above limitations, interpretation of the results of case reports and studies and discussion of their implications must be done with great caution [9].

In addition, no causal inferences cannot be drawn, the results cannot be generalized, case reports may over-interpret or tend to generalize from a particular case, all the reports are retrospective, no experience cannot be repeated, and no experimentation can be conducted [7].

The Use of Case Reports in Forensic Investigations

Whereas most areas of medical and scientific research are free to employ a wide range of methodology to conduct their investigation such as the RCT the field of Forensic Medicine and Forensic Pathology research is severely limited due to the nature of the subject matter. These limits are primarily due to ethical considerations and the rules regulating experimentation on human subject. Limited experimentations on human cadavers do exist in

the forms of body farms where bodies are used to study postmortem changes and develop methods to estimate post-mortem internals. The sciences of forensic medicine and forensic pathologists are based on the disciplines such as biology, chemistry, and physics but they also rely on information and data contained within Case Reports and Case Series. These case reports contain a detail description of the circumstances surrounding the death, the features and results of the autopsy and toxicological investigation, and other key features of the death. These individual case reports form an importance backbone of the forensic death investigation. Below are several examples how case reports play a critical role in the forensic investigation.

SIDS

The enigma of Sudden Infant Death Syndrome (SIDS) or Sudden Unexplained Death in Infancy (SUDI) has been reported for centuries. In short, SIDS is the discovery of a previously healthy infant discovered death in their crib during the morning hours. Characteristics of these cases include: Black, male, between the ages of 4-6 months old, with the mother being poor, young, undereducated, and single. The main forensic and pathological feature of SIDS is that even after a thorough death scene investigation by law enforcement and the Medical Examiner's office, a complete postmortem examination, and toxicology testing a clear and definite cause of death could not be identified. To date, there are over a hundred theories proposed for these deaths. This type of death has been cited in case reports dating back to the Bible. It was not until the early 1970's when the individual and scattered cases reports were examined as a group by epidemiologist did the classic features of SIDS emerged. The case reports provided investigators and forensic pathologists with some basic feature of the death and started the development of what defines a case of SIDS. Today SIDS is defined as a syndrome with well-defined characteristics. And the forensic pathologist used these features in differentiation between cases of SIDS and child abuse.

Toxicity levels

In the investigation of possible case of a drug overdose deaths it is the role of the forensic toxicologist to determine if a drug or drugs were responsible for the death and if they did the concentrations of each drug. Evidence-based medicine, clinical trials, and animal testing are all designed to determine the Therapeutic Levels for a drug. However, the calculation of the Lethal Levels is more difficult to determine and all possible interactions are impossible to test. It is unethical to expose human subjects to high concentrations of a drug to ascertain toxic or lethal levels. Therefore, a forensic

toxicologist uses data based on past case reports of drug overdose death to determine the fatal level of specific drugs. Over time as more and more cases are examined involving the same drug a more accurate determination of the lower limits of lethality can be determined. In addition, the case reports play an important role in the discovery previously unknown fatal synergistic interactions between two or more drugs.

Falls and level of injury

A frequent medico legal question faced by a forensic pathologist is "Can a fall from a specific height onto a specific surface cause a certain type of trauma?" This is common question in cases where a young mother is charged with child abuse but she is claiming that the infant accidentally rolled off the couch. While, the forensic pathologist has the specifics of the event it would unethical to conduct experiments exposing healthy live infants to recreate the event and assess the level of trauma. In addition, from the epidemiological perspective the experiment would require a large number of infants to overcome individual variability. Therefore, the forensic pathologist must rely on the description, location, and level of trauma reported in similar type case reports. Overtime a database of information containing a large number of infant falls that contain a detailed documentation of the height of the fall, type of the impacting surface, and the location and type of resulting trauma. The forensic pathologist will use information from past case reports to either support their opinion that the trauma to the infant is consistent with the story provided by the mother or an opinion concluding that the trauma was the result of child abuse.

Huffing

Case reports also serve an important function when a pathologist encounters a unique presentation. Take for example a possible death due to the behavior of huffing caused by the inhalation of products such as furnisher polish or Glad air freshener. The pathologist can review case reports and compare their case to previously cited cases and determine the level of similarity with regard to pathological features and toxicological markers indicating a death by huffing.

The Current State of Cases Reports in Forensic Journals

A great number of medical journals no longer publish case reports. The journal's editorial board justified this position for the following reasons: One is simplify due to the physical limits of the number of pages in each issue. Two, case reports do not have significant validity in

evidence based medical practice. Three, case reports are cited less often than other kinds of medical research articles (Mason 2001). Published case reports are not often cited in subsequent literature causing an overall drop in a given journal's impact factor [10]. Finally, case reports have a negative impact on the calculation of a journals impact factor expressed by the Citation Index [7,11]. As a consequence today a large number of journals are severely limiting the publication of Case Reports. However, a review of a number of leading forensic journals such as The American Journal of Forensic Medicine and Pathology; Journal of Forensic Science; and Forensic Science, Medicine, and Pathology Forensic Science International all devote a portion of the journal to Case Reports. In 2007, the first international PubMed-listed medical journal the Journal of Medical Case Reports began publishing only case reports were created. And in the years following there has been a growth of On-line and Open-Access journals with less space restriction allowing for the publication a greater number of Case Reports [12]. With the advances in electric search systems it is now possible to rapidly locate and review cases with a specific constellation of observations.

Discussion

In general the main advantage of a case report is its ability to report new observations, generate hypotheses, collect data about rare disorders or presentations, allow for an in-depth narrative, and serve as major tool of education. In the context of forensics medicine and pathology case reports serve a vital role. In many situation's they represent the only source of detailed information about the circumstances that caused a specific type of death, provide empirical data, and can provide support for the mechanism of a rare or atypical type of death.

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