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Forensic genetics in sexual assault: A retrospective study on the collection of evidence at the emergency department

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ABSTRACT

The objective of this retrospective study was to examine the accordance between information derived from the written medical report and the results of DNA forensic analyses regarding 122 cases of alleged sexual assault seen at the Emergency Department of Padua Hospital over a period of 5 years. The examination of discrepant results has proved useful to support a broader application of sexual assault management, particularly during the taking of case history. A story of sexual assault with vaginal penetration and ejaculation coincided with the discovery of male DNA using laboratory methods in more than one in every two cases (55%). Medical reports and laboratory findings were also consistent in the four cases in which the patient reported no penetration; no male DNA was found (3% of the whole sample). This led to a total of 71 cases (58% of the whole sample) in which there was a correlation between the victim's description of the event and the forensic genetics laboratory findings. This study shows a considerable discrepancy between laboratory findings and details recorded in medical reports written at the emergency department in the case of victims of sexual assault and our findings suggest that hospital services which deal with victims of sexual assault should pay more attention to the methods used to obtain and record the material collected during the victim's medical examination, and to interview patients about the episode. In order to understand the dynamics of the episode in rape cases, and to avoid discrepancies between medical reports and legal reconstructions of sexual crimes, it is crucial to provide victims with support, and to maximize their confidence in the healthcare providers who first attend to them.

1. Introduction

Sexual assault is a crime frequently encountered by health care professionals and forensic scientists as underlined by the World Health Organization [1].

Official statistic data from the second ISTAT survey of 2014 on violence against women show that in Italy 31.5% of women, between 16 and 70 years of age, are estimated as victims of physical or sexual violence during their lifetime: 20.2% have suffered physical violence acts, 21% were victims of sexual violence, 5.4% more severe forms of sexual violence as rapes or attempted rapes [2].

Despite the indications published in the FIGO guidelines in 2010 [3], nowadays there still remain a lack of consistency in their application in some Hospital settings [4]. The case-histories collected from the victim in the emergency department still remains sometimes inadequate or incomplete for the approach to the case's reconstruction. The examination of results could prove useful to provide support for a broader application of sexual assault case management, particularly in the collection of patient history, especially in light of the recent provisions of the Italian National guidelines on the management of violence against women by healthcare facilities provided by the Decree of the Italian President of the Council of Ministers on 24th November 2017 [5].

2. Material studied, methods, techniques

The objective of this retrospective study was to examine the discrepancy between information derived from the written medical report and the results of DNA forensic analyses on swabs collected from the victims in 122 cases of alleged sexual assault seen at the Emergency Department of Padua Hospital and to provide descriptive data on medico-legal findings. The examination of discrepant results could be useful to provide support for a broader application of sexual assault management, particularly in the history collection.

Data were obtained from a retrospective review of the case records and forensic laboratory results obtained on biological evidence collected from the victims at the Laboratory of Forensic Genetics of the Department of Molecular Medicine, University of Padua. All samples

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from 122 sexual assault cases processed by the laboratory between 1st January 2010 and 31st December 2014 were considered. In all these cases, the victims were females; they all underwent medical examination, and biological evidence was collected by means of vaginal, vulvar and rectal swabs.

In particular we examined 71 cases were related to judicial investigations and 51 cases from the hospital archives.

The study was divided into two main phases. The first was completed at the Forensic Genetics Laboratory and involved searching for a male genetic profile on the samples collected from patients who reported having been the victim of a sexual assault. DNA was extracted from swabs using the QIAampDNAMicro kit (QIAGEN Hilden, Germany) and DNA amplification was performed for each sample using the AmpFLSTRYfilerAmplification kit. The amplified alleles were analyzed with the ABI-PRISM 3130 Genetic Analyzer (Applied Biosystems). In our study the analyses were performed using the Christmas tree assay and the Y haplotype typing for the sole purpose of detecting the presence of any male DNA on biological samples (vaginal, rectal and vulvar swabs), since male DNA can be expected to be found if penile penetration and ejaculation have been reported. No autosomal short tandem repeat (STR) polymorphism analyses were performed to avoid any differential lysis, given that identifying the perpetrator's genetic profile was not a goal of this study.

The laboratory findings were compared with the patients' stories and the outcome of their physical examination, as recorded on standard evidence collection documents.

3. Results

A story of sexual assault with vaginal penetration and ejaculation coincided with the discovery of male DNA using laboratory methods in more than one in every two cases (55%). Medical reports and laboratory findings were also consistent in the four cases in which the patient reported no penetration; no male DNA was found (3% of the whole sample). This led to a total of 71 cases (58% of the whole sample) in which there was a correlation between the victim's description of the event and the forensic genetics laboratory findings. On the other hand, no correlation between re- ported penetration and male DNA in the samples collected from the victim was found in 36 cases (29% of the total). There was also a discrepancy in five cases (4% of the total) in which, vice versa, the medical report was negative, but male DNA was detected in the biological samples. This led to a total of 41 cases of inconsistency between the medical reports and the laboratory data (33% of the whole sample). Male DNA was only detected in cases in which the presence of spermatic material had first been identified using the Christmas tree method. It is important to highlight that the time elapsing between the reported sexual assault and the collection of biological evidence often wasn't stated on the written medical reports, and only in 12 cases - in the sample as a whole - this interval was reportedly less than 24 h.

4. Discussion

Among 103 cases in which the victims reported sexual contact with ejaculation, we found male biological material in 67 of their biological samples. In 6 of these cases, moreover, the Y haplotype differed from that of the person named by the victim as the aggressor; in 3 cases, the male DNA found in the swabs collected from the victim belonged instead to the victim's partner, with whom she had evidently had sexual intercourse prior to the assault, but had failed to mention this in her report.

The retrospective nature of this investigation prevented any accurate assessment of other details omitted in the medical reports that might have influenced the discrepancy, such as whether victims had bathed or changed their underwear or clothes before biological evidence was collected at the ED. In Italy, only police and judicial authorities may request analyses of biological trace evidence at the laboratories of forensic genetics. Consequently, in assault cases not reported to the police, no such analyses could be performed.

In some cases, the detection of male DNA on samples obtained from the victim was unexpected. Possible reasons for this situation would include, for example, a condom tearing during intercourse, or the presence of biological material belonging to a male other than the aggressor. We did not verify this hypothesis by means of further analyses because we had no male genetic profiles available for comparison since legal action had not been taken by the victims. In such cases, obtaining a more thorough medical report might facilitate the interpretation of the laboratory data; for example, it would be useful to ask patients if they had been involved in any consensual sexual activity not long before or after the reported sexual assault.

5. Conclusion

This study shows a considerable discrepancy between laboratory findings and details recorded in medical reports written at the ED in the case of victims of sexual assault. This discrepancy could be because the victim's story is inaccurate, because the medical report is superficial or lacks detail, incompletely describing the information and evidence collected.

Our findings suggest that hospital services for dealing with victims of sexual assault should pay more attention to the methods used to obtain and record the material collected during the victim's medical examination and questioning about the episode. Indirect confirmation of this shortcoming also comes from the paucity of publications on studies aiming to improve the way in which medical reports are drawn up on victims of sexual violence.

Declaration of Competing Interest

The Authors declare they have no conflicts of interest.

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