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## **Comparison of Small Group Discussions and Didactic Lectures in Forensic Medicine**

#### Lalchand Verma<sup>1</sup>, Chetan Kumar R<sup>2</sup>, Anupam Bansal<sup>3</sup>, VR Patil<sup>4</sup>, Shaswat S Nagar<sup>5</sup>

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#### Abstract

The subject of Forensic Medicine is a clinical subject as per the new curriculum based medical education which requires a variety of teaching and learning modalities, similar to other subjects. There is a need for innovative teaching which involves student interaction and participation. A small group discussion (SGD's) is one such method proven beneficial. A randomized crossover comparative study was conducted on II phase MBBS students in Forensic medicine who were exposed to both small group teaching and didactic lectures by dividing into 2 equal groups and then doing a crossover in two sessions. Evaluation was done by pre-test, post-test and feedback questionnaire of students with likert scale. Though there was no statistically significant difference between the marks obtained after Small Group discussion or didactic lectures, the perception analysis showed that majority of the students found SGD's better than didactic lectures in terms of learning, involvement, clearing doubts, increasing self confidence etc. SGD's can be used as an additional form of teaching in Forensic Medicine which help in increasing students' involvement, encourage self directed learning and help in making the teaching learning process more focused. However we need to have more faculties to fulfill this and sensitization of students is also required for this.

**Key words:** Small group teaching; Didactic lecture; CBME.

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#### Introduction

Forensic medicine is a branch dealing with interactions amongst law, judiciary and police officials. This branch of science of Forensic Medicine is an effective scientific method, which plays a vital role in assisting the Justice Delivery System to render justice to the society, in the administration of Criminal Justice.<sup>1</sup> Due to poor reporting by untrained doctors many a times law and justice suffers. In view of the judicial system requirements of our country, it is extremely important that the curriculum of Forensic Medicine be given a major overhaul and particular changes be brought to the teaching and learning methods used to impart knowledge of this subject at the undergraduate student level.<sup>2</sup>

Current medical education system provides knowledge to the students in an unbalanced and disproportionate manner. Students do not develop sufficient skills to investigate, diagnose, and treat the patient as a whole.<sup>3</sup> The age old and time tested traditional didactic lecture has its own limitations. Students absorb information passively rather than actively. Students do not develop critical thinking, problem solving, and decision making skills. However, active participation and cooperation of students often leads to better, more effective and permanent learning.<sup>4</sup>

The new curriculum designed by MCI focuses on these issues<sup>2</sup>. With interactive teaching and learning methods the knowledge and skills in forensic medicine and medico-legal report writing

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can to be improved. Like other subjects Forensic Medicine too requires multidisciplinary and innovative modern teaching learning methods along with direct observation of students in simulated environment to improve the quality of output of students. Small group discussion (SGD) is one such method which has been frequently compared with didactic lectures.<sup>5</sup> This study aims to compare these two teaching learning methods and access the perception regarding the two in Forensic Medicine.

## Aims and Objectives

- 1. To introduce and evaluate the effectiveness of small group discussions over didactic lectures in teaching Forensic medicine to undergraduate medical students.
- 2. To evaluate the perception of students regarding small group discussions and conventional didactic lectures.

## Materials and Methods

This study was carried out in the Department of Forensic Medicine, Government RVRS medical college, Bhilwara in the 3rd week of October 2019. The department lecture hall and demonstration room were used for the purpose. Approval for carrying out this study was taken from the Institutional Research and Ethics committee. After sensitization of the faculty about the entire project and its process, their suggestions were taken before finalizing the topics, time slots, and topics to be covered in the sessions. The topics to be taken for this study were unanimously decided as 'Mechanical injuries classification and Blunt injuries and from Toxicology part 'Agricultural poisons with Organo-phosphorous poisoning', taking into consideration the nearly equal level of difficulty and both were done in a single lecture/session. The topics were chosen by consulting with other subject experts from various institutes who also helped to prepare and validate the pre and post test questionnaires in both topics. The entire division of lecture schedules and SGD's was pre decided to enable smooth implementation of the entire project.

Second MBBS students coming to department of Forensic Medicine were sensitized about small group teaching procedure and ethical aspects of the study. Totally 64 students were present and all consented to participate freely and fairly. Attendance was taken and considered as usually taken for classes. Informed written consent was taken from all students. They were randomly divided into two equal groups.

Session 1, was conducted as small group discussion for group B and as conventional didactic lectures for group A. Small groups were randomly formed by chit and paper method of 5–6 students in each group. Pre test was conducted prior to both sessions. The time frame was about 1.5–2 hours. At the end of both teaching sessions a pre validated post test session (of 20 MCQ, True/false and fill the blanks) was conducted and answers and results were analyzed.

For the small group discussions sessions, the main topic was divided in to sub topics and each of the sub groups were given a sub-topic in a chronological order and were asked to discuss and learn the same followed by presenting it to the whole small group in their own methods. All the students would be participating along with inputs by the teacher in between as and when required.

In the next session taken after 2 days there was a crossover of the two groups with topic 2 taken in a similar way. Pre test and post test were conducted in each session as before. At the end of both sessions, a feedback questionnaire (of 10 parameters) session of Students was taken to assess their perception towards the two different methods of teaching. The data was analyzed utilizing the Likert scale (5 point -Strongly agree, Agree, Undecided, Disagree, Strongly disagree).

The mean and SD results were analyzed with the help of Statistician. Both groups pre and post test results mean (SD) was analyzed using Paired 'T' test and then for intergroup analysis unpaired 'T' test was done. The feedback about the opinions for SGDs and didactic lectures were analysed by calculating percentages.

### Results

A total of 64 students participated in the study. The mean (SD) of the pre-test and post-scores of didactic lectures and SGDs are as shown in the Tables 1-3.

Table 1: Pre and Post test scores comparing SGD's with Didactic lectures for Session 1

Table 2: Pre and Post test scores comparing SGD's with Didactic lectures for Session 2  $\,$ 

Group	Didactic lectures Mean(S.D)	Small Group Discussion Mean (S.D)		Group	Didactic lectures Mean(S.D)	Small Group Discussion Mean (S.D)	
Pre test	5.64 (± 3.008)	6.06 (± 2.82)	N A	Pre test	6.75 (2.22)	7.19 (3.059)	N A
Post test	9.67 (± 3.58)	10.68 (± 3.17)	p value-1.000 Unpaired 't' test Not significant	Post test	12.35 (2.96)	14.28 (3.148)	p value-1.000 Unpaired 't' test Not significant
p value	< 0.0001 (Highly significant)	< 0.0001 (Highly significant)		<i>p</i> value	< 0.0001 (Highly significant)	< 0.0001 (Highly significant)	

Table 3: Perception of students towards SGD's and didactic lectures.

Statement	Stro	ngly ree	Ag	gree	Unde	ecided	Disa	igree	Stro disa	ngly	Total
	N	%	N	%	N	%	N	%	N	%	- responses
SGD was an interesting form of learning for me	23	36	30	47	2	3	8	12	1	2	64
SGD helped me in self learning	27	42	20	31	7	11	10	16	0		64
SGD motivated me to read and prepare before the session	17	27	16	25	8	13	12	19	10	16	63
I was involved throughout the SGD sessions	17	27	23	36	10	16	13	20	1	1	64
I feel confident about the topic after the SGD sessions.	18	30	18	30	12	19	11	18	02	3	61
SGD sessions helped me in learning.	18	30	26	43	11	18	5	9	0	0	60
The facilitator was helpful.	28	47	26	43	4	7	2	3	0	0	60
I feel the facilitator should interact more in such sessions.	11	19	21	36	10	17	15	25	2	3	59
I was disturbed by the facilitator.	1	1	3	5	6	10	28	44	25	40	63
I was unable to express my views in SGD sessions.	1	2	3	5	15	24	28	45	15	24	62
I felt some students dominated the SGD sessions	3	5	16	25	6	9	19	30	20	31	64
I was not confident about the knowledge of my colleagues in the SGD sessions.	9	14	19	30	14	22	16	25	6	9	64
I felt time was wasted in the SGD sessions	3	5	5	8	8	12	29	45	19	30	64
I would like to have more such SGD sessions in the future	11	18	21	34	12	20	13	21	5	7	62
I feel fearful of SGD sessions.	1	1	8	13	11	18	23	38	18	30	61
I felt lectures were monotonous.	15	24	14	22	11	17	13	21	10	16	63
I felt more comfortable in lectures than in SGD's.	15	24	16	26	10	16	8	13	13	21	62
I felt teaching was not focused in SGD's.	5	8	9	14	12	19	16	26	21	33	63
SGD's helped me to clear my doubts better than lectures.	16	26	18	29	14	23	10	16	4	6	62
I was able to understand the topic better in lectures.	7	11	7	11	17	27	23	37	9	14	63







Strongly Agree Agree Undecided Disagree Strongly Disagree

#### Graph 2: Feedback from Students

Graph 1: Feedback from Students

On comparison of the charts of both sessions, it is observed that there is a significant difference between the scores of pre and post test of session 1 & 2 for both small group teaching and didactic lectures. A highly significant increase in the scores was found using paired 't' test (p < 0.0001). When the post test scores of didactic and small group were compared in both sessions, significant difference in the knowledge levels was not found using unpaired 't' test. The difference was not statistically significant (p = 1.0000).

On analyzing both the test sessions and test results, overall there is no statistically significant difference between the test results indicating that there may not be a significant difference in actual learning with the two methods of teaching. The preferences of the students among the didactic lectures and SGDs for 20 parameters are shown in numbers and percentages in Table 3.

On analyzing Table 3/Graph 1/2: The results show that 36% of students strongly agree and 47% agree that SGD is an interesting form of learning for them. 42% & 31% strongly agree and agree respectively that SGD helped them in self learning & 27% & 25% respectively strongly agrees and agreed that SGD sessions motivated them towards reading and preparing before a session. 27% & 36% expressed their agreement of feeling involved throughout the sessions. Similarly large number of students agreed that they were able to clear doubts better in SGD's, and that they felt more confident about a topic after SGD's. 8% & 14% students strongly agreed and agreed respectively that teaching was not focused in SGD's while 26% & 33% disagreed and strongly disagreed with this.

In comparison 24% & 22% of students felt didactic lectures were monotonous and only 22% (11% each strongly agree and agree) felt that they were able to understand the topic better in lectures.

Although the test scores of SGD's vs. Didactic lectures do not show statistical significance, the perception analysis clearly shows that students find SGD's a better, more interactive form of learning. It encourages self learning, motivates students to come prepared before the sessions and is definitely more interesting than didactic lectures.

### Discussion

#### Outcome

The results of this research have shown that there was no significant difference in the post test scores of small group discussion group or didactic lecture group. A comparison of pre-test and post-test scores of both the groups showed marginal elevation in scores, but the differences in the average scores were not statistically significant. The outcome of our study confirmed the published study of Fischer and colleagues in 2004. In that study, the methods of lecture and small group discussion were compared, and it was reported that although the students significantly preferred the group discussion to the lecture, there was no significant difference in the post-test scores of the two groups.<sup>6</sup>

Though this study though does not show any significant effective difference in results between small group teaching and didactic teaching still students were enthusiastic about small group teaching. This study adds a new dimension to the teaching learning methodology in Forensic medicine subject. The positive perception of the students and their wish for more such sessions ensures that we will have more such sessions in future.<sup>4,5</sup>

The enhancement of knowledge by SGDs could be due to many reasons as explained in many other research studies such as, they help in more active learning, increase the interest in the subject, motivate the students, foster reasoning and problem solving skills, and better retention.<sup>6,7</sup> Students develop confidence in themselves to ask questions, raise doubts and express their views. These group discussions also help to improve the communication skills, teamwork ability, organization and self-directed learning. SGD's facilitate adult style of learning, acceptance of personal responsibility for own progress. Moreover, it enhances student-faculty and peer-peer interaction, improves communication skills and provides opportunity to share the responsibility and clarify the points of bafflement.<sup>8,9</sup>

#### Limitations

There was definite shortage of faculty at my institute, being an upcoming new medical college there are only 2 faculties in my department. For this study purpose, a guest faculty from another college had to be invited.

Another limitation was the student attendance. Only 64 students attended both sessions. Though there are 100 students the attendance in classes is only about 60–65% anytime.

Though the available students were extremely enthusiastic, but the test results show that since this study marks were not to be counted in formative assessment they did not take this test seriously which may have given such results. And since feedback was voluntary and anonymous many students did not fill all the rows and columns of the questionnaire.

*Strengths:* This was a first of its kind study in Forensic subject and shall pave the way for innovative and interactive teaching learning in Forensic medicine and also in other subjects in our institute at Bhilwara and elsewhere.

### Conclusion

Results of this study suggest that innovative small group teaching was found more effective and acceptable to students than traditional teaching. Small group teaching should be introduced in undergraduate medical curriculum. Didactic lectures need to be made more interactive and interesting to prevent monotony and boredom.

*Implications:* A good balance of different methods of teaching is required to benefit the students and ensure good learning, enhanced confidence, healthy interactions between students and faculty and students themselves too.

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## Forensic Odontology: Knowledge and Awareness Among 2<sup>nd</sup> Year Medical Students

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#### Abstract

*Introduction:* Forensic odontology is the branch of forensic medicine which deals with the proper handling, examination and presentation of dental evidence in the best interest of justice. The present study was conducted to determine the awareness in medical students regarding the field of forensic odontology.

*Material and Methods:* A preformulated standardized questionnaire was circulated among 121 2<sup>nd</sup> year medical students.

*Results:* 96.69% students knew that Forensic Odontology is branch of forensic that deals with teeth while 95.04% students correctly said that Forensic Dentistry is a branch of Forensic Medicine. Only 3.3% students knew that Forensic Dentistry is useful for identification of person. 42.14% students were aware of the most reliable method of identification. 81.81% students were aware that DNA can be obtained from teeth. However only 28.92% students knew that gender could be identified from teeth. Students were aware that age can be estimated from teeth and that Bite marks are useful for identification. Majority of the students correctly answered that the evidence of forensic dentistry is legally acceptable in court.

*Conclusion:* Medical students were aware of the significance of the branch of forensic odontology. Practical application of the knowledge of the subject is lacking as there is deficiency of forensic dentistry

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department. Use of forensic odontology along with the other scientific knowledge can be used to impart swift, impartial and adequate justice.

**Keywords:** Forensic Odontology; Forensic Dentist; Forensic Dentistry; Awareness; Identification.

### Introduction

Forensic medicine is the application of medical knowledge for the purposes of law and administration of justice.<sup>1,2</sup> With the advancement of science, there is increased scope of using subspecialties for the purposes of law and justice. Forensic odontology is the branch of forensic medicine which deals with the proper handling, examination and presentation of dental evidence in the best interest of justice.<sup>3</sup> Dr Oscar Amoedo (1863-1945) is regarded as the father of Forensic Dentistry.<sup>4</sup> The first case (1775) of medicolegal identification using dentition is of Dr Joseph Warren identified by Paul Revere. Later, time and again, dentition has been used for identification like in the fire of the Bazaar de la Charite (1897), murder at Tornbridge well (1947), the Luton murder (1943), the Ruxton case (1935), The Acid bath murders (1949) etc.<sup>4</sup> Although the branch of forensic odontology has showed success in many cases, in India it is still in nascent stage. One reason could be that the Medical professionals like MBBS doctors are unaware of the medicolegal utility of this branch and hence do not utilize this branch to its full capacity. The present study was conducted to determine the awareness in medical students regarding the field of forensic odontology.

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#### **Materials and Methods**

The study was done in Department of Forensic Medicine involving students presently studying in 5<sup>th</sup> semester. Verbal informed consent was taken from students. Total 121 students participated in this study. A preformulated standardized questionnaire containing 12 questions was circulated. (Table 1) Questions consisted of multiple choice and Yes/ No responses. The data was analysed using SPSS 16 and Microsoft Excel software.

#### Results

One Hundred Seventeen (96.69%) students correctly answered that Forensic Odontology is branch of forensic that deals with teeth (Chart 1)



Chart 1: Response to question number 1

Table 1: Questionnaire used for the present study and students' responses

Question number	Question	Incorrect Response	Correct Response	
1	Forensic odontology is a. Branch of forensic that deals with insects b. Branch of forensic that deals with teeth c. Branch of forensic that deals with determining the time since death d. Branch of forensic that deals with bones	04 (3.3%)	117 (96.69%)	
2	Is Forensic Dentistry a branch of forensic medicine? Yes/ No	06 (4.9%)	115 (95.04%)	
3	Is Forensic Dentistry useful for identification of person?	117 (96.69%)	04 (3.3%)	
4	What is the most reliable method of identification? a. Fingerprints b. DNA Fingerprinting c. Physical examination d. Blood typing	70 (57.85%)	51 (42.14%)	
5	Can you get DNA from teeth? Yes/ No	22 (18.18%)	99 (81.81%)	
6	Will you preserve a bitten fruit found at a crime scene? Yes/ No	0 (0%)	121 (100%)	
7	Can you identify a person by bite mark? Yes/ No	25 (20.66%)	96 (79.33%)	
8	Can you estimate age from teeth? Yes/ No	1 (0.8%)	120 (99.17%)	
9	Can you determine gender from teeth? Yes/ No	86 (71.07%)	35 (28.92%)	
10	In a burnt/ charred body, what will be better preserved? a. Bone b. fingerprint c. teeth d. Internal organs	17 (14.04%)	104 (85.95%)	
11	Do you have forensic dentistry department in your institute? Yes/ No	Incorrect response	Correct response	Don't know
		25 (20.66%)	95 (78.51%)	1 (0.8%)
12	Is the evidence of forensic dentistry legally accepted in court of law? Yes/ No	13 (10.74%)	108 (89.25%)	

20

0

115 (95.04%) students were correct in saying that Forensic Dentistry is a branch of Forensic Medicine (Chart 2).



Chart 2: Response to question number 2

Only 04 (3.3%) students correctly mentioned that Forensic Dentistry is useful for identification of person (Chart 3).

#### Is Forensic Dentistry useful for identification of person? Yes/No



#### Question number 3

Chart 3: Response to question number 3

Fingerprints are the most reliable method of identification. This was correctly answered by 51 (42.14%) students. (Chart 4)



Chart 4: Response to question number 4



99 (81.81%) students were correct in stating that

answering that bitten fruit found at a crime scene should be preserved (Chart 6). Will you preserve a bitten fruit found at a crime

All the students (121 {100%}) were correct in

Question number 5

Correct response

Chart 5: Response to question number 5



Chart 6: Response to question number 6

Ninety-six (79.33%) students knew that a person can be identified by bite mark (Chart 7).



Chart 7: Response to question number 7

incorrect response

57

One Hundred twenty (99.17%) students correctly stated that age can be estimated from teeth (Chart 8).



Chart 8: Response to question number 8

Only 35 (28.92%) students knew that gender could be identified from teeth (Chart 9).





One Hundred-four (85.95%) students knew that teeth can be preserved in a burnt/ charred body (Chart 10).



Chart 10: Response to question number 10

Twenty-five (20.66%) students incorrectly answered that there was Forensic Dentistry

department in the institute while one student (0.8%) did not know (Chart 11).



Chart 11: Response to question number 11

One Hundred-eight (89.25%) students were aware that the evidence of forensic dentistry is legally acceptable in court (Chart 12).



Chart 12: Response to question number 12

#### Discussion

Forensic Odontology is an integral part of Forensic Medicine.<sup>5,6</sup> Some authors have even subclassified the field as Forensic-odonto-toxicology.<sup>7,8</sup> Forensic Odontology has been used in cases like examining sexual assault, child trauma, identification of unidentified bodies<sup>9</sup>, identification in mass disaster, crime scene investigation<sup>10</sup> etc. With the advancement in knowledge and use of allied disciplines, justice and law will be served better. The awareness of medical students regarding the utility of forensic odontology is important so that the knowledge may be used to its fullest extent in the administration of justice.

In a study conducted by *Kumaraswamy* et al.<sup>11</sup>, 87% (172) participants knew the meaning of forensic odontology and 99% (192) participants knew that forensic odontology is a part of forensic medicine as against 96.69% (117) and 95.04% (115) respectively, in the present study. This shows that participants are aware of the field of forensic odontology and its relation with forensic medicine.

Indian medical graduates are taught forensic odontology while they are studying forensic medicine in their second year. Presently there has been a change in medical regulations wherein forensic medicine will now be taught in both second as well as third year. Although in the subject, Identification is extensively taught, only 3.3% (4) students knew that teeth can be used for identification. This shows a greater need to emphasize the role of identification by the medical teachers. In a study done by Al azri et al.12 in the dentists practicing in Australia, 94% (361) participants were aware that teeth can be used for personal identification. 42.14% (51) students correctly answered that the most reliable method of identification are the fingerprints. This is in contrast to study done by Preethi et al.<sup>13</sup> where 38% dental practitioners were not aware of the most reliable method of identification.

In the present study 81.81% students knew that DNA can be obtained from teeth whereas in the studies done by Sahni et al.14 95% participants, Kumaraswami et al, 63% participants, Al azri et al.<sup>12</sup> 63.3% participants and Almutairi et al.<sup>15</sup> 64.2% dentistswere aware that teeth are a source of DNA material. Once DNA material can be recovered, positive identification of person becomes very easy. However, in the present study only 28.92% students could correlate that gender could be identified from teeth which is in concordance with the studies conducted by Kumaraswamy et al. (41%) and Almutairi et al. (23.1%). In the study conducted by Preethi et al.<sup>13</sup>, 60% participants were aware that age and gender can be determined from teeth in mass disasters.

In the present study 85.95% students knew that teeth can be preserved in a burnt/ charred body. This is useful in identifying individuals in cases of mass disasters when identification by other physical appearances and methods may not be of much use.<sup>16</sup> In the study done by Preethi et al.<sup>13</sup>, 42% dental practitioners were not aware as to how the age and gender can be determined from the victims of mass disaster. Our results were comparable with the study done by Al azri et al., where 94.8% participants were aware that identification from teeth is possible in victims of mass disaster.

All the students [121 (100%)] were correct in answering that bitten fruit found at a crime scene should be preserved. Bitten fruit is preserved to collect saliva (for DNA) and for recovering bite mark. Though the formation of bite marks depends on a number of factors, like dental characteristics, force applied, area of bite, covered or exposed, struggle by victim etc, it is still a useful method of identification. In the present study, 96 (79.33%) students knew that a person can be identified by bite mark. This is in accordance with the study done by Preethi et al.<sup>13</sup> where about 18% of the dental practitioners did not know the significance of bite mark patterns of the teeth. In a study done by Rathod et al.<sup>17</sup>, 30% dentists did not know the significance of bite mark patterns of the teeth.

The eruption of teeth and the degeneration with age are important methods of age determination. Age determination in children less than 14 years is best done by teeth. In the studies by Kumaraswamy et al., 76% (147), Al azri et al. 78.9% (303) participantsAlmutairi et al.<sup>15</sup>, 88.9% (320) knew that age can be determined from teeth while in the present study, 99.17% (120) students were aware of the fact.

Presently our hospital does not have a department that is dedicated to Forensic odontology. The forensic work is handled by the department of forensic medicine in association with department of dentistry. 20.66% (25) students incorrectly answered that there was Forensic Dentistry department in the institute while one student (0.8%) did not know.

In the present study, 89.25% (108) students were aware that the evidence of forensic dentistry is legally acceptable in court. This is in contrast to the study done by Preethi et al.<sup>13</sup> and Rathod et al.<sup>17</sup>, where 93% and 85% dental practitioners respectively, did not have any formal training in collecting, evaluating and presenting dental evidence and 30% and 75% respectively, were not aware that they could testify as an expert witness in the court of law.

### Conclusion

The present study showed that the medical students are aware of the branch of forensic odontology and its significance. Hence, unawareness of the medical professionals regarding the role of forensic odontology is not the reason for underutilization of the subject. Problem is that there are very few hospitals which have a forensic dentistry department and forensic dentists. As a result, when required, the practical application of the subject become difficult. There is an under-utilization of the knowledge of this subject in practice. The hospital administration should endeavour to develop forensic dentistry department under the aegis of the forensic medicine department. This department should be actively involved in all medicolegal work of hospital including casualty and one stop crisis centres. Hospital protocols in cases of mass disasters should include forensic dentists as a part of response team.

With the novel methods being used for committing crime, it is required for the law enforcers to keep abreast with the recent scientific developments and to use all possible methods in the interest of imparting swift, impartial and adequate justice. Use of forensic odontology along with the other scientific knowledge can go a long way to achieve this objective.

#### **Conflict of Interest:** None

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## Perceptions of Students Regarding Structured Oral Examination in Forensic Medicine

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#### Abstract

*Background:* Oral viva examination is one of the assessment tools which are commonly used for formative as well as summative examination. Structured oral examination can be helpful to overcome bias of traditional oral examination.

*Materials and Methods:* All 2<sup>nd</sup> MBBS students (Fifth semester) of GMERS Medical College, Valsad, Gujarat were subjected to structured oral examination in Forensic Medicine after obtaining their informed written consent and their perceptions regarding structured oral examination were obtained via pre-tested and pre-validated Likert scale type questionnaire (1 to 3, 1 – Don't Agree, 2-Not Sure, 3 – Agree) regarding usefulness of structured oral examination in Forensic Medicine. Study was undertaken after obtaining ethical approval from the Institutional Ethical Committee. Data obtained were analyzed via median score and tabulated.

*Results:* Total 138 students of 2<sup>nd</sup> MBBS (Fifth semester) were subjected to structured oral examination in Forensic Medicine subject followed by their feedback on structured oral examination via pre-tested and pre-validated Likert scale type questionnaire. Frequency and median score of various parameters of feedback given by students were calculated. Out of 138 participants, 84 were male and 54 were female. There was no statistically significant difference between perceptions of male and female participants.

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*Conclusion:* Structured oral examination in Forensic Medicine can become a better assessment tool for both formative and summative examination and with some changes as per the blueprinting and examination pattern it will be positively acceptable to the students.

**Key words:** Forensic Medicine; Structured oral examination; Students' perceptions.

#### Introduction

Oral viva examination is one of the assessment tools which is commonly used for formative as well as summative examination. Traditional oral examination begins with question asked by examiner followed by its answer by students orally. It gives opportunity for examiner to interact with students in face to face manner for short time. Oral examinations are attractive because of their high face validity, their flexibility and the possibility that they measure aspects of clinical competence.<sup>1</sup> They are used for their flexibility and potential for testing higher cognitive skills.<sup>2</sup>

Orals viva gives an opportunity to the students to explore topics, give them a chance to interact one on one with examiners and get enthusiastic about learning.<sup>3,4</sup> There are some challenges routinely present in the traditional viva examinations. Threating atmosphere during traditional oral examination is often hamper dialogue between students and examiner. Subjective bias and facial encounter may intimidate students. Questions may vary from examiner to examiner and many times fail to complete entire syllabus. It is usually restricted to recall type of questions and difficult to achieve higher domains. Number of questions

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asked, difficulty index of questions, time for viva are usually show inter student variation. Above all collectively affect score of the students.

#### Materials and Methods

All 2<sup>nd</sup> MBBS students of GMERS Medical College, Valsad, Gujarat were subjected to structured oral examination in subject of Forensic Medicine after obtaining their informed written consent and their perceptions regarding structured oral examination were obtained via pre-tested and pre-validated<sup>5-17</sup> Likertscale type questionnaire (1 to 3, 1 – Don't Agree, 2-Not Sure, 3 – Agree) regarding usefulness of structured oral examination in Forensic Medicine. Study was undertaken after obtaining ethical approval from the Institutional Ethical Committee. Data obtained were analyzed via median score and tabulated.

#### Results

Total 138 students of 2<sup>nd</sup> MBBS (Fifth semester) were subjected to structured oral examination in subject of Forensic Medicine followed by their feedback on their experience regarding structured oral examination via pre-tested and pre-validated Likert scale type questionnaire (1 to 3, 1 – Don't Agree, 2-Not Sure, 3 – Agree). Frequency and median score of various parameters of feedback given by students were calculated as per Table 1. Out of 138 participants, 84 were male and 54 were female. There was no statistically significant difference between perceptions of male and female participants.

**Table 1:** Perceptions of students regarding structured oral examination (Likert scale: 1 to 3, 1 – Don't Agree, 2-Not Sure, 3 – Agree).

Sr. No.	Perceptions of students	Median score
1	Structured oral examination encourages me to pay more attention in subject.	2
2	Structured oral examination requires detail study of practical aspect.	3
3	Structured oral examination is a good form of examination and learning tool.	2
4	Structured oral examination covers important topics and relevant with objectives of syllabus.	3
5	Structured oral examination is fair and unbiased system of evaluation.	3
6	Structured oral examination provides clarity of question.	3

Sr. No.	Perceptions of students	Median score
7	Structured oral examination depends upon individual's luck.	1
8	Structured oral examination is more uniform and objective in nature as it eliminate teacher's or student's liking of particular topic.	3
9	Oral structured examination provide wide coverage of syllabus.	3
10	I prefer oral structured examination as part of my internal and university evaluation method.	3

#### Discussion

Holloway, et al. demonstrated that there is an inverse relationship between performance and anxiety of students in the oral viva examinations.18 A significant error or injustice in oral performance ratings is due to the tendency for some evaluators to be soft and others to be strict in their ratings because of lack of uniformity. Correcting for such errors would change the pass/fail decisions of the examinees and results in bias.<sup>19</sup> Marks given to candidates during viva by diverse examiners indicate low reliability between ratings and agreement between panel of examiners is often deprived.<sup>20</sup> All these problems may be overcome by replacing the traditional viva examination by structured oral examination (SOE). This can be done by pre deciding the syllabus to be covered in examination with proper distribution of topics as per must know - nice to know - desirable to know area, competencies to be measured and preparing a blueprint/checklist of questions to be asked with answer keys in the viva in stipulated time period. Although the implementation process is hard, but once it is in place, it can become an efficient assessment tool for future.<sup>21</sup>

The structured oral examination format allows the teachers to exam the students on all five cognitive domains of Bloom's taxonomy i.e. knowledge, comprehension, application, analysis, synthesis and evaluation.<sup>22,23</sup> Reliability of the viva examination is often questioned but according to Sharmila Torke, et al., rational reliability has been established with structured, standardized orals.1 Their study also revealed that there was not much correlation between performance of the students in theory and in viva. Another Indian study done in Anatomy subject showed that students liked the structured viva over the traditional viva exam as it minimized the luck factor of questions being asked and reduced examiner bias.24 Although there are examples of organizations restructuring their oral examinations to a structured oral

examination format, recent research describing the students' response to SOE has been limited especially compared to Objective Structured Clinical Examination (OSCE) formats.<sup>25</sup> These are multi-stationed clinical examinations which are effective in testing students' ability to integrate the knowledge, skills and attitudes acquired during their pre-clinical and clinical training and experiences.<sup>23</sup>

Forensic Medicine is the subject with medical and legal terminology, one of the challenges was whether it would be possible to structure the viva. For many of them structured oral examination required detail study of subject, wide coverage of syllabus, uniform and objective in nature, provide clarity of question, cover important and relative topic, unbiased examination and must be part of internal and university examination. Structured oral examination is a morale booster and anxiety reducing experience. Students were more comfortable with structured oral examination as they knew that all of them will be assessed by same set of questions. They felt that it reduced the luck factor and made the assessment fairer. Personal biases were also minimized. We feel that, though the ground work in preparing the checklists is extensive, once done, the structured viva can be implemented successfully.

### Conclusion

Structured oral examination in Forensic Medicine can become a better assessment tool for both formative and summative examination and with some changes as per the blueprinting and examination pattern it will be positively acceptable to the students.

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## Medicolegal Autopsy and Post-Mortem Examination in Female Victims of Crime: When and Why

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#### Abstract

In Medicolegal Autopsies, Post-Mortem Reports (PMR) are documents prepared by a Registered Medical practitioner (RMP), pertaining to injury, sexual offence, suspected poisoning or unexplained death. To perform a medico-legal autopsy, consent from the relatives of the deceased is not required. This review article deals with the purpose of the inquest and roles of the medico-legal autopsy in young female victims of crime.

**Keywords:** Inquest; Medicolegal Autopsy; Sexual assault; Abortion, etc.

#### Introduction

The term 'Autopsy' originates from ancient 'Autopsia' which is derived from 'Autos' i.e. 'Oneself' and 'Opsis' i.e. 'to see for oneself'. An autopsy is frequently done in cases of sudden death where a doctor is not able to give a death certificate or when death is believed due to an unnatural cause.

PMR contains all the facts, observed by the doctor and his opinion drawn therefrom. Doctor's opinion must be based upon the clinical observations made by him/her, and not on hearsay evidence. All deaths due to unnatural causes and deaths that are believed to be due to natural causes but where

certain deaths that come up for inquests. In these situations the authority which conducts the inquest will order a doctor to prepare a PMR in medicolegal autopsy. Section 174 and 176 Code of Criminal Procedure (Cr.P.C.) mention the concept of a medico-legal autopsy during the investigations of a sudden, suspicious, unnatural death. The objective of medicolegal post-mortem examination is to establish the identity of a body, when not known;

to ascertain the time since death and the cause of death; and whether the death was natural or unnatural and if unnatural, whether it was homicidal, suicidal or accidental. In case of new born female infants, the question of live birth, dead born, still-birth and viability assume importance and should be determined.

the medical cause of death is not certain or known are subjected to an inquest. The objective of an

inquest is to ascertain facts pertaining to the death.

This is achieved by inquiry and at the conclusion

of the inquest a verdict is arrived as to whether the

death was due to a natural, accidental, suicidal or a

homicidal cause. A PMR may become necessary in

Purpose of postmortem examination in a particular case of unnatural or suspicious death is to find out the following-

- To know the exact cause of death.
- To find out the circumstances of death
- To find out the postmortem interval.
- In case of the unidentified dead body, to establish the identity of the deceased or to help to do so.

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- The period for which the deceased survived after sustaining injuries or exposure to the poison.
- To know the nature or the manner of death, whether natural, suicide or homicide.
- Type of weapon or the poison used.
- Whether one or more than one person was involved, in case of homicide.
- Whether any natural disease process contributed in any way, to cause the death.
- Whether any other offence was related with the death e.g. rape.
- Is the injury, which has caused death, expected to cause death in ordinary course of nature.
- Whether the dead body has been displaced from the original place of disposal.
- To know whether more than one method or weapon were used or if more than one person were involved in the crime.
- Whether the deceased received any treatment before death.
- Whether there is anything on or with the dead body which may help identification of the assailant
- In case of death due to assault, the relative positions of the victim and the assailant.

# Medicolegal issues are resolved by Postmortem Examination

Forensic Experts are well aware of minor trauma sometimes leading to death either immediately or shortly after. Careful examination of such cases may reveal some other underlying conditions, such as an existing disease or a vascular abnormality that had contributed to or aggravated the death. A punch on the front of the chest may kill a person who is suffering from advanced coronary artery disease, and this can only be established by a postmortem examination. It is a wellestablished fact that alcohol and drugs have not only contributed to all types of accidents but even to death. A body lying on a rail tract or a highway with injuries does not necessarily mean that the victim had died of an accident. A body found burnt inside a building does not always mean that the death was due to bums." The following example illustrates the need for a postmortem examination in road accidents. A private bus crashed into a tree in the night. The occupants consisted of the driver, conductor and a few passengers. The conductor

died as a result of the accident while the others survived. At autopsy, the distribution and pattern of injuries found on the conductor suggested that he was actually driving the vehicle, and without a seat belt as well. In addition he had alcohol in his blood, which was above the legal limit. On the other hand, the injuries found on the driver who survived were that of an unrestrained front seat passenger. It became evident that the actual person who drove the bus at the time of the accident was the conductor. A cover up story had been made by interested parties because the conductor, who actually drove the bus, not only did not possess a driving license but had consumed alcohol. These facts when made known would naturally interfere with the insurance payment. The fact that a seat belt was not used also result in reduced insurance payment as it could be considered as contributory negligence.

# List of Reasons for Medicolegal autopsies in young females

- Autopsy of Sexual assault victims- adults and children.
- Autopsy of Burn victims.
- Death during delivery.
- Perinatal deaths.
- Death on table during gynaecological surgeries.
- Death during abortion.
- Autopsy in Poisoned females with suspected murder.
- Dowry deaths Death of Recently married females within 7 years of marriage.
- Autopsy in death of females due to negligence.

## Rules of Medicolegal Autopsy in India:

- Written order from the Police Officer.
- Day time.
- In the Hospital Where the dead body lies.
- Identity of the deceased to be established.
- The great cavities opened (Cranial, Thoracic and Abdominal).
- Writing post mortem report on the spot.

# Postmortem is done in every Burn Case victim to find out:

a) To find out the actual cause of death.

- (b) To find out the time passed since death to corroborate the day of crime.
- (c) To identity of the deceased, in cases where it is unknown unclaimed (Nitish Katara murder case – blunt injury head by hammer – RTA – Burn- can't identify).
- (d) To find out the Burn injury on body before death / after death.
- (e) To collect relevant information to assist the investigating Officers to arrive at a conclusion whether death is accidental, suicidal or homicidal.
- (f) In case of infants born in burned pregnant, whether it is live born / still born / dead born and if live born the period of survival and the cause of death.
- (g) To collect evidence- pieces of vital organs and samples of blood and body fluids and foreign bodies- Gunshot bullets- to establish the weapon of crime.
- (h) To opine as to whether medical attendance following burn injury was given or not (Kennedy phenomenon) –In VIP cases, eg., John F Kennedy's murder and Indira Gandhi's murder- suturing and repair of wound vanished the track of gunshot wound – but still culprit was found guilty.
- (i) To ascertain the period of survival following receipt of Burn injury.
- (j) To find out the time passed since death since last meal (poisoned before burn).
- (k) Whether the position of the dead body was changed or dragged after death.
- To opine as to the place and circumstances of death – basing on detection of modified forms of putrefaction.
- (m) In presence of multiple injuries what was the number of assailants (Nirbhaya case of delhi).
- (n) To connect the accused with the offence (Priyadarshini Mattu Murder case).
- (o) To collect samples for chemical analysis, histological exam.
- (p) To opine as to whether medical attendance following injury was beneficial or deleterious, thus causing death due to medical negligence.

Case report of Cremation (without postmortem) in sudden death of young married female.

Burned – Cremation of married female after killing by poisoning by her husband (in demand

of dowry), Husband took deceased to Doctor, who declared her brought dead but didn't informed police and handed over body without postmortem. Later parents of victim filed FIR and made doctor as culprit in helping the accused husband in disposing the dead body of victim. Doctor was arrested and imprisonment for 3 years for helping accused in destruction of evidence by burning the deceased without Postmortem.

#### Medical records in Burn Case

Medical records are acceptable as per Section 3 of the Indian Evidence Act, 1872 amended in 1961 in a court of law. These are considered useful evidence by the courts as it is accepted that documentation of facts during the course of treatment of a patient. The patient or their legal heirs can ask for copies of the treatment records that have to be provided within 72 hours.

#### How Long Medicl Records should be Preserved?

Under the provisions of the Limitation Act, 1963 and Section 24A of the Consumer Protection Act 1986, which dictates the time within which a complaint has to be filed, it is advisable to maintain records for 2 years for outpatient records and 3 years for inpatient and surgical cases (Medical Council of India Regulations 2002 guidelines).

Medico-legal cases should be maintained until the final disposal of the case even though only a complaint or notice is received.

Case Report of Self-inflicted Burn to blame her Husband: Plastic surgeon's court evidence

An 18 year old woman filed a complaint at the city magistrate's court at lucknow that she was burnt by her husband with a pair of tongs, in demand of dowry. As per Plastic surgeon's opinion on prescription, She had several small marks of superficial burns causing redness & vesication on the wrist, forearms, legs & thighs. Some of these have the shape of the knob of the tongs. During the court trial, it was found that they have been selfinflicted, in as much as they are approachable by the woman herself. It was found that she had inflicted the burns to strengthen her case for divorce from her husband, as she was in love with her boyfriend.

Incendiary Warfare involves the technique of firebombing which is designed to damage the target, generally an urban area, through the use of fire, caused by incendiary chemicals (Napalm, white phosphorus, thermite) which catches fire on exposure to air, thus its intentional pre-planned man-made disaster, simulating fire accident. *Incendiary Warfare:* firebombing terrorism: Successful case of survival by plastic surgery.

The Kim Phuc story: the 10 years old victim was residing with her family in Vietnam, which was attacked by American planes supporting Vietnam war in 1972, dropping incendiary bombs, causing massive fire. The victim was badly burnt and tore off her burning clothes. Her black and white photo of running naked crying on road with Vietnamese soldiers and fire-smoke in background became one of the most haunting images of history of Vietnam war, which later won Pulitzer prize, and led to shut down of American interference and support in war. The victim's burns were so severe that she probably could not survive. After a 14 month Hospital stay and 17 surgical procedures by plastic surgeons at Barsky Hospital Saigon, including skin transplantation, however, she was able to return home alive.13

## Postmortem Burn: a misleading finding in PMR

The absence of the ante-mortem signs of burns on the body of the deceased provides enough evidence for it being a post-mortem burn. Sooth of blackening in trachea suggest inhalational burns of antemortem nature. Reparative processes, such as signs of inflammation (red line), formation of granulation tissue pus and sloughs, will indicate that burn was caused during life. The line of redness being a vital reaction in antemortem burns persists even after death and absent in post- mortem burns. Histopathology and histochemistry can prove the antemortem nature.

# Questions asked to Doctor by Police/lawyer/Judge in court of law in Burn case

- 1. Whether the smell of inflammable material (petrol/ kerosene) was appreciated at the time of arrival in Hospital?
- 2. Whether the burnt clothes were on the body of the victim at the time of admission? If yes, did Doctor preserved the burnt clothes in sealed packet for Forensic science laboratory for identification of inflammable petroleum substance, if any? If not, its comes under destruction of evidence of crime by duty doctor.
- 3. What is the mode of Burn, as per history, examination?
- 4. What are the lesions found due to burning or scalding or corrosives?

- 5. What was the percentage of total body surface area involved with burn?
- 6. Is there any spared area of the body not affected by burn? Eg., Thumbs, fingers, palms, soles. Thumb impression and mark of identification written in MLC are difficult to get in burn cases.
- 7. Was the Burn victim pregnant at the time of incidence? What was the impact of burn on pregnancy, did burn injury resulted in abortion?
- 8. If the burn is an accident at workplace, what is the percentage of permanent disability caused to claim monetary compensation under Employees' Compensation act for death on whether it was in the course of employment or suicidal attempt by the employed person?
- 9. Can this injury be caused by fall on hard and blunt surface? Brush burn.
- 10. Was it Ante-mortem or post-mortem Burn in victim brought dead in emergency?

# Intention of Doctor & its relevance in medicolegal cases

Burns is a three dimensional injury. Burn injuries present challenging problems to the Dermatologist and Plastic Surgeon, as dermatologists use lasers for dermal disorders, thus can cause iatrogenic burns on overexposure, thus requiring plastic surgery care. The principal issue usually is causation, particularly when a distinction is to be made between an accident and a deliberate act. Court of law judges the intention of doctor while deciding the case of medical negligence or wrongful act by doctor. Burn is a double edged sword in which intention of doctor is differentiated by the law during investigation.

In view of the increasing number of dowry deaths, guidelines have been laid down by the Government of India for examination of such cases, and the law in respect thereof has been suitably amended. The Indian Penal Code (I.P.C.), Criminal Procedure Code (Cr.P.C.) and Indian Evidence Act (I.E.A.) are amended as per the criminal law (Second Amendment) Act, 1983 and was approved by President of India to deal effectively with cases of dowry deaths and also the cases of cruelty to married women by their in laws.

#### Dowry death and legal protection of women in India; All D's for easy recall

Domestic Violence by Burn on married women and legal protection of women in India.

D-Domestic Violence (DV) Protection Act 2005.

D-Dowry Prohibition Act, 1961.

D- Deceased's - Sati (Prevention) Act, 1987- Sati means the act of burning or burying alive any widow with the body of her Deceased husband, irrespective of whether such burning is claimed to be voluntary on the part of widow.

D-Dowry Death – 304B IPC- Non-bailable offence – within 7 years of marriage– 7 years punishmentkilling by in-laws and simulating it accident - D-Dry heat fame burn while cooking in kitchen stove of kerosene.

D- Domestic cruelty: 498A IPC: physical by burn / chemical torture by acid burn.

*Case Law on IPC Section 304A:* Accidental death due to negligence while cooking (unintentional). When questioned, the deceased has reported to her that she got injured due to bursting of stove while she was cooking. Doctor had conducted the postmortem, and he did not find any blisters in mouth of the deceased. Police officer deposed that investigation did not disclose that the accused had harassed or ill-treated the deceased prior to her death. Citation: Venkatesan Vs Rani, 2013 (8) Cri

LJ 4208 (SC);208 2013(10) Scale 442: AIR 2013 SC 3320 (SC).

*IPC Section 304 - B* deals with dowry death. When the death of a married woman is caused by any burns or bodily injury or occurs under abnormal or suspicious circumstances within seven years of her marriage duration and it is clearly shown that soon before her death she was subjected to cruelty or harassment or torture by her husband or any relative of her husband or in laws for, or in connection with, any demand for dowry, such death shall be called as "dowry death", and such husband or relative or in law s deemed to have caused her death. Whoever commits dowry death shall be punished with imprisonment for a term minimum of seven years which may extend to imprisonment for life.

*IPC Section 498 – A:* deals with husband or relative of husband of the subjecting her to cruelty

Whoever being the husband or the relative of the husband or in law of a woman, subjects such woman to cruelty or harassment or torture shall be punished with imprisonment for a term which may extend up to three years and shall also liable to pay fine. The cruelty can be either mental or physical torture which drives the women to commit suicide or to cause serious injury, or danger to life or health.

Postmortem re-examination or second autopsy of a dead body at times may be required under



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certain circumstances before cremation or after exhumation. The interpretation of the findings of a second autopsy, performed on a previously autopsied body, is not an easy task for the autopsy surgeon due to various artifacts and alterations resulting from the first autopsy and it is usually demanded or ordered under public cry or political overtones.

Recent infamous case law, which was solved by meticulous documentation by the duty doctor during MLR and PMR writing.

*Nirbhaya case:* Landmark case of MLR and Autopsy of Sexual assault victim, which brought Criminal law amendment in laws related with gangrape.

*Case facts:* in 2012, A young paramedic student was gangraped in a moving bus and physically mauled grievously, and in inspite of best of care, she succumbed to the fatal injuries 13 days later in Singapore, where autopsy was done.

MLR findings by gynaecologist at Safdarjung Hospital, Delhi - Assault history and related events were told by the victim herself. Blunt trauma abdomen with sexual assault with complete perineal tear and hemoperitoneum with small and large bowel injury noted. She had suffered a perineal tear, a tag of vagina 6 cms in length was hanging outside the introitus, there was profuse bleeding from vagina and in the posterior vaginal wall there was a tear of about 7 to 8 cms, rectal tear of about 4 to 5 cms communicating with the vaginal tear was also visible on local examination. Tears in the vagina, rectum and bleeding per vaginum noted. Various bite marks have been observed on her face, lips, jaw, near ear, on the right and left breasts, left upper arm, right lower limb, right upper limb. The patient was immediately referred to the OT for complete perineal repair.

*Surgical notes:* Duodenum, jejunum and ileum were contused, jejunum and ileum were of doubtful viability. Large bowel contused, bruised and of doubtful viability, sigmoid colon and rectum were lacerated at many places linearly, mucosa was detached completely, and portion of around 10 cm was prolapsing through the perineal wound; retroperitoneal hematoma present, rectovaginal septum was completely torn. Samples taken of outer and inner clothings; dust and grease present in hairs, nail clippings, breast swab form bite marks, swab from saliva, combing of pubic hair, matted public hair, cervical swabs, washings from vagina, vaginal cultures, rectal swab, oral swab, blood samples sent for FSL.

Dying declaration were recorded thrice during ICU stay, by judicial magistrate after taking fitness for statement from ICU consultant.

*PM findings by Singapore gynaecologist:* Multiple abrasions and Bruises were noted in inner thigh (groin), right lower thigh, left thigh lateral, left lower anterior, genital; further abrasions and bruise on all parts of the body.

Cause of death Unnatural death after Sepsis with multiple organ failure following multiple injuries.

*Defense:* Patient was not fit for making the statement, injuries mentioned in the MLC and the PM report can generate severe pain, and without the administration of morphine a patient cannot bear such pain. Patient had endotracheal tube in larynx and trachea and was on ventilator and hence could not speak. None of the statements given by the prosecutrix can be treated as dying declarations since the prosecutrix was never administered oath, does not bear the signature of the victim and contains only her thumb impression and hence her dying declarations are not admissible in evidence. As mentioned in PM report, Patient died due sepsis, which may be due to unhygienic conditions in the govt Hospital.

Court decision: Analysis of the medical evidence of MLR and PM findings clearly show, beyond any reasonable doubt, that the injuries sustained by the prosecutrix were extremely severe and would cause death in the ordinary course of nature, and that death ensued on account of her injuries and not due to any other cause, as alleged, such as unhygienic conditions in the hospital. Since the victim was shivering and was cold on account of the loss of blood due to violent trauma, so instead of taking her signature, doctor asked the victim to give her thumb impression for consent, and its accepted as her dying declaration. Since ICU doctor specifically states that injection morphine was not given to the patient, i.e. on the day on which her statement was recorded, which was verified by ICU recovery chart.It is also relevant to note at this juncture that the evidence of the PM doctors has been recorded through video conferencing from Singapore.<sup>3</sup>

## Purpose of Autopsy

PM examination must be thorough, complete, examining all the body parts from front to back, dissecting all the body cavities for the purpose of diagnosis of cause of death and duration of time since death, to corroborate and substantiate the evidences of the eye witnesses as and when required.

#### Perinatal deaths

Questions answered by Autopsy findings:

Q. Whether there was any negligence while conducting delivery?

Q. Whether death of the deceased was due to negligence of doctor?

Case law on autopsy proving negligence resulting in Perinatal death.

*Facts:* Full term pregnant patient with obstructed labor, attempt by vacuum extractor failed. Doctor conducted forceps delivery and a still born baby was delivered. Immediately after the delivery the patient had profuse bleeding due to fatal injury to uterus. The patient died within five days inspite of treatment.

*Allegations:* After delivery, the doctor should have initially assessed the cause of cervical tear and possibility of rupture of uterus. The patient had pain, distension of abdomen, tachypnoea and tachycardia for 5 days i.e till her death.

*PM exam findings:* Abdominal cavity contained 2.5 litres of fluid blood and 500 gm. of blood clots (dark red colour). Rupture of uterus 15 X 10 cm, obliquely placed involving full thickness including peritoneum on the posterior surface of the lower segment of uterus, communicating at its lower part with the injury. Its edges were thinned out with ragged appearances. The ruptured area was seen covered with blood clots, dark red in color. Multiple infected superficial lacerations over an area involving the right labia minora. Sutures infected lacerated wound 4 cm long obliquely placed on the right posterior surface of the cervix. Air passages pale and contained illegible frothy fluid.

Cause of death-death was due to complications following rupture of gravid uterus.

*Defence:* Doctors contended that, patient died because of numerous complications which was mostly due to the irresponsible acts and omissions on the part of the lady and her husband who did not care for anemia.

*Decision:* On the basis of evidence and the Post mortem report the court held gynaecologist and hospital for deficiency in service as they have failed to diagnose cause of profuse bleeding earlier and their treatment fell below the standard of medical practice and not taken reasonable care during conducting delivery causing the death of the patient, so doctors are directed to pay Rs.1,61,000/-. This is a deficiency in service resulted in medical negligence for which doctor are liable for the loss of two lives, mental agony and psychological trauma, so doctors to pay punitive cost of Rs.1,00,000 to deceased patient's family.<sup>4</sup>

*Discussion:* Court observed- it appears that, the doctor applied the forceps negligently, due to which the cervix pulled by traction leading to extension of cervical tear up to the fundus of uterus i.e. rupture of uterus. The PM report confirms the antemortem injuries as rupture of uterus and tears in birth canal.

# Do's and Don'ts in Medicolegal Autopsyto avoid legal punishment

- PMR should be prepared by RMP only (PMR RMP) mirror reflection.
- Never issue death certificate without PM in suspected foul play- Always intimate the police for unnatural death noticed – Not informing police- to screen offender (S.201 IPC – 7 years jail).
- Never manipulate with PM findings- its punishable (S. 197 IPC = 3 years jail).
- Never make false entries in PM- fabrication of evidence (S. 191 IPC = 7 years jail).

#### $PMR \leq RMP$

Mnemonic for easy recall: (PMR - RMP) mirror reflection of words. PMR should be prepared by RMP only. Post mortem Reporting prepared by registered Medical prectitioner only.

Fig. 2:

The mirror does not reverse images from left to right, it reverses them from front to back relative to the front of the mirror.

Doctor punished for manipulating Post-Mortem report.  $^{\scriptscriptstyle 5}$ 

Police arrested victim for illegal Prostitution-Date occurred due to custodial torture- Doctor doing PM, manipulated the findings for simulating natural death- Doctor found guilty and punished 7 years imprisonment.

"This is a case of custodial death and it is seen from the records that the discrepancies found between the 1<sup>st</sup> and 2<sup>nd</sup> post-mortem reports, in the considered opinion of this court, are the basis for the prosecution case to make it fit for consideration. There cannot be much difference between two postmortem report unless manipulation is made in any one of the post-mortem reports."

### Tips for Handling PMR documents

- Never share PM report with anyone online on social media (Whatsapp/facebook/ Telegram) - it a confidential legal documentcan't be issued/shared under Right to information.
- PMR should be kept in safe custody- if PMR lost/stolen – destruction of evidence (S. 204 IPC = 3 years jail).
- No overwriting in PMR, if any word corrected, it should be initialled by signature of doctor on the original and carbon copies too.

### Discussion

The medico legal work these days like modern day life is very much complicated. Disputing a scientifically correct but unfavorable report has become a part and parcel of the medico legal culture. Trend to get the medico legal results hurriedly in a desired fashion that too authoritatively, is as common as it is to reject an unfavorable opinion. The medico-social issues related to medico-legal performance include:

*Risky:* Medico legal work at times is very difficult and risky because there are more probabilities of one's being disputed, criticized and challenged by many on many occasions for many reasons.

*Controversy:* The medico legal work is highly controversial. Both the aggrieved and the opposite party seem to be keen to interpret the medical observations to their benefit and interests and mismatching of the medico-legal opinions with the desires and expectations of the people is therefore not uncommon with emergence of many types of disagreements and disputes.

*Delicate:* Medico legal work is very delicate because if an innocent is involved unnecessarily or a crime goes unnoticed due to faulty application of the medical knowledge would mean different to different persons. It will irk all kinds of people including police, judiciary and the departmental peers.

*Public outcry:* Political workers and social activists are often up in arms in the so called cases of police torture, hospital or dowry related deaths especially when the medical opinion is different and contrary to the populous opinion and the doctor's failure to act in their favor brought a charge that the doctor for his ulterior motives had worked in collision. Administrative hypocrisy and juggleries: The legal presumption is that the hospital and the district administrators of health department who are senior to those doing medico legal work by virtue of their age in the department are superior for all practical purposes. This sense of superiority seems to be on the basis of seniority of service and not the specialization and the experience in a particular line. Problems may arise when they either respond inadequately or do not respond in a manner, as they should while giving opinions.

## Conclusion

PMR is confidential legal document. Don't rely on just your visual memory neither in writing PMR reports, nor in giving court evidence - always review your PMR before answering any legal queries. Save our career as doctors by proving accused's crime by timely meticulous Medical documentation of burn during PMR after death, and better to inform police in critically ill burned victims for dying declaration in ante-mortem stage only. In current scenario of medicolegal litigation against doctors, courts are giving hefty amounts in Crores in medical negligence but gives meagre amounts in thousands to victims of crime as per IPC. Eg.; a victim of acid burn will get fixed amount for covering treatment expenses from State Government, but if acid attack victim patient files negligence suit against doctor, who has treated his/her best facility, but scar will remain on face, and consumer court will find fault in medical documentation of consent or records and award hefty amounts to be paid by doctor to victim. Burn victims goes for out of court settlement with accused by taking money, and than files medical negligence case against doctor to claim compensation for alleged negligence in reporting crime, or for permanent damages due to injury. If the doctor reports crime by proper documentation and works for the law, doctor can safeguard his career and his reputation during false allegations and accusations of malpractice.

### Conflict of Interest: Nil

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# Post Anesthesia Clumping of Cauda Equine Nerve Roots after Hip Replacement Surgery - Allegation of Medical Negligence: A Case Report and Review

## Arvind Kumar<sup>1</sup>, Suman Badhal<sup>2</sup>, Rishabh Kumar Singh<sup>3</sup>, Rishi Solanki<sup>4</sup>, Mahesh Kumar<sup>5</sup>, <sup>6</sup>Pankaj Keswani

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#### Abstract:

Total hip and knee arthroplasty (TKA and THA) have been quoted to be some of the most successful operations and performed in an increasing number of patients every year around the world to reduce pain and improve function. Also, postoperative activity levels are disappointingly low in many patients, and around 20% of patients are socially isolated following surgery.<sup>1,2</sup> Additionally, some of the patients report chronic pain after THA and TKA, respectively. Given the negative physical and psychological consequences of these factors on outcomes such as all-cause mortality, return to work, and leisure activities, there is a significant rehabilitation challenge for this population. The post-surgery patient's sufferings may lead to allegations of medical negligence. Proper communication, rehabilitation strategy may be beneficial for the good outcome. Here we are presenting a case report and review of literature in relation to a case of a 47 years old lady who filed a complaint at National Human Rights Commission in which it was alleged that due to negligence and wrong treatment/operation by the doctorsat a tertiary care hospital, she became handicapped as she lost function of her both lower limbs.

**Keywords:** Arthroplasty; Cauda Equine Nerve Roots; Chronic pain.

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#### Introduction

Today total hip replacement (total hip arthroplasty, THA) is one of the most successful surgical procedures in the field of orthopaedic and trauma surgery. To patients with osteoarthritis of the hip, it offers significant pain relief, improved quality of life and increase mobility, in both the medium and long term3.Yet complications after total hip replacement can be very challenging for both the patient and the surgeon. Complication rates after primary hip arthroplasty range from 2% to 10%, including4: aseptic loosening (36.5%), infection (15.3%), THA dislocation (17.7%).

Cauda equina syndrome (CES) is infrequent and may be associated with spinal/epidural anesthesia (including bupivacaine, lidocaine, ropivacaine, and tetracaine). Several etiologies have been proposed for CES, including direct or indirect neural trauma, inadvertent dural puncture, infection, and/or increased ischemia to the cord attributed to the lithotomy position5,6.

#### **Case Report**

The patient filed a complaint of medical negligence in her treatment for Total Hip Replacement Surgery. In her complain she mentioned that she was first operated by an orthopaedics consultant for left hip replacement and discharged after 5 days. She was apparently alright for a period of five months and during her visits to her endocrinologist she was advised not to undergo hip replacement of other hip due to her health condition. She was suffering from hypothyroidism, Diabetes and Hypertension and was on regular medications for the same.But the orthopaedics consultant differed in opinion and asked her to get admitted in the hospital for the procedure. On subsequent day she was shifted to operation theatre where spinal anaesthesia was given and THA was performed. The procedure was uneventful. After few hours, she was asked to move fingers and toes, but she could not move toes of her right foot. Post-op MRI did not show any evidence of compression of nerve in hip joint. Meanwhile, the patient got an MRI Scan from another tertiary care govt hospital which revealed diffuse posterior bulge at L3/4 and L4/5.Follow-up scan showed degenerative disc changes with diffuse disc bulge with clumping of Cauda equine nerve roots-likely post spinal (epidural) anaesthesia changes.Now after the failure of the operation, the doctor informed her that it happened due to entry of anaesthetist's needle in third space. She further alleged that the procedure of THA of her right hip was not done by a specialist orthopaedic surgeon (because the surgeon who previously operated her for THA on right hip went on leave, for a period of 07 days, after scheduling the surgery) but by junior doctors.

Following her complains a medical board was constituted which included five orthopaedics experts and they made the following observations.

Pre-Anaesthetic Check-up Record was complete. The patient was seen on 5 occasions before declaring her fit for surgery. The patient was having co-morbid condition like diabetes (6-8 years), hypothyroidism (4 years) and hypertension. Anesthesia and progress report were complete. The patient was managed by multi-disciplinary approach by multiple specialists. The patient had high trust level in the proficiency of the treating doctor. She knew about the surgical protocol. As soon as it appeared, standard protocols for management were followed.As monoplegia was persistent, prosthetic support was provided towards rehabilitation with continued support from physio-therapy. There was no negligence on the part of treating doctors. The patient was operated by orthopaedics consultant and not the junior doctors, as alleged in her complain. The orthopaedics consultant also submitted that the patient had requested for providing videography of the operation in CD format, for which there was no provision available at the govt hospital. He had to proceed for 7 days leave following an injury to his right knee after operating the patient.

### Discussion

Today total hip replacement (total hip arthroplasty, THA) is one of the most successful surgical procedures in the field of orthopaedic and trauma surgery. To patients with osteoarthritis of the hip, it offers significant pain relief, improved quality of life and increase mobility, in both the medium and long term.<sup>3</sup> Yet complications after total hip replacement can be very challenging for both the patient and the surgeon. Complication rates after primary hip arthroplasty range from 2% to 10%, including<sup>4</sup>: aseptic loosening (36.5%), infection (15.3%), THA dislocation (17.7%).

Cauda equina syndrome (CES) is infrequent and may be associated with spinal/epidural anesthesia (including bupivacaine, lidocaine, ropivacaine, and tetracaine). Several etiologies have been proposed for CES, including direct or indirect neural trauma, inadvertent dural puncture, infection, and/or increased ischemia to the cord attributed to the lithotomy position.5,6 Few studies have implicated pre-existing lumbar pathology as playing an integral role in the development of CES following spinal or epidural anesthesia.7,8,9 Lumbosacral adhesive arachnoiditis resulting in CES may be attributed to the following: agents injected into the subarachnoid space, infection in the subarachnoid space, space occupying lesions such as neurofibroma, subarachnoid haemorrhage, vertebral trauma, or after spinal surgeries.<sup>10</sup>

A multi-institutional study by Erlenwein et al.<sup>11</sup> which included 125 patients of elective total hip replacement surgery, reported that about 26% to 58% patients still had chronic persistent pain post six months of surgery.

A review study by L D Buirs et al.<sup>12</sup> reported that high body mass index (BMI), high age (>60), co-morbidities have negative association with functional outcomes after THA. They also found a weak association with educational level and vitamin-D deficiency and there was no association with socio-economic status and gender.

Although post-operative mortality is improving with technical advancements, a large study by Thomas Partridge et al.<sup>13</sup> from NHS data conducted over a period of ten years involving 540,623 cases of THR found lower respiratory tract infection to be the complication most commonly associated with death following joint replacement. Death is a rare complication of hip arthroplasty. The in-hospital mortality rate following this surgery ranges from 0.16% to 0.52% in the United States.<sup>14</sup> The patient was 47 years old. She presented with problem (damaged) in hip joint for which she was operated in both hip joints one by one by a qualified and experienced orthopaedics consultant at tertiary care centre. She had multiple systemic co morbidities like diabetes (6–8 years), hypothyroidism (4 years) and hypertension. She suffered monoplegia post 2<sup>nd</sup> surgery which is a known possible rare complication post-hip replacement surgery. The possibility of her present morbidity due to progressive deteriorating nature of the other co-morbid conditions cannot be ruled out.

The provision of definitive care while following standard care with multi-disciplinary approach at tertiary care centre and provision of care after the appearance of subsequent problems by providing prosthetic and physiotherapy support is not suggestive of inadequate patient care. The enquiry report and the statements were substantiating each other.

A two Judges Bench of Supreme Court of India in Kusum Sharma case has also laid down guidelines to govern cases of medical negligence. It was stated that negligence can't be attributed to a doctor so long as he performs his duties with reasonable skill and competence. Merely because the doctor chooses one course of action in preference to the other one available, he would not be liable if the course of action chosen by him was acceptable to the medical profession. The medical professional is often called upon to adopt a procedure which involves higher elements of risk, but which he honestly believes as providing greater chances of failure. Just because a professional looking to the gravity of illness has taken higher element of risk to redeem the patient out of his/her suffering which did not yield the desired result may not amount to negligence.<sup>15</sup>

## Conclusion

Physicians should be alert to the rare complication of CES that may arise following spinal or epidural anaesthesia. Special attention should be paid to the patients who have undergone previous surgical intervention. Prompt identification of the precise aetiology of complications and their timely treatment that may curtail or ameliorate the devastating consequences. Financial requirements related to operation must be clarified in advance prior to the surgery, since it may enhance restlessness among the patient who is going to be operated.

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