

Study of gross mucosal findings of stomach in cases of fatal poisoning- An autopsy study

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ABSTRACT:

Background & Objectives: Poisoning is most commonly encountered cause of death in medico legal autopsies. Diagnosis of poisoning is based on post-mortem examination and chemical analysis of viscera. Chemical analysis of viscera by FSL is time consuming process and sometimes it cannot detect poison. Present study can be helpful there to make diagnosis of poison from gross mucosal findings in stomach.

Methods: Present study was conducted on randomly selected 150 cases of poisoning from total autopsies performed in year 2012 at department of forensic medicine, PDU govt. medical college, Rajkot. To study gross mucosal findings of stomach, it was divided into three parts namely cardiac end, body-fundus and pylorus. Gross mucosal findings like pale, congestion, haemorrhage, erosion, flatten rugae, edema, colour changes were noted.

Results: Haemorrhage and congestion of mucosa were found most commonly, irrespective of type of poison and site of stomach affected. Pylorus and body fundus of stomach were more affected in all cases of poison except ALP poison where cardiac end was more affected.

Interpretation & Conclusions: On the basis of the gross findings of stomach mucosa, combining with other data (history, clinical findings) diagnosis of poisoning can be made but to confirm the nature of poison chemical analysis is must.

Keywords: Poisoning, Autopsy, Stomach mucosa, Chemical analysis, FSL, Pesticide

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2394-6776.2015.00007.7

INTRODUCTION

Poison is a substance (solid, liquid, or gaseous), which if introduced in the living body, or brought into contact with any part thereof, will produce ill-health or death, by its constitutional or local effects or both.¹ Poisoning is the commonest method adopted in India to commit suicide.² and 4.6% of accidental deaths were of poisoning in 2014.³(NCRB) Pesticide poisoning is an important cause of morbidity and mortality in many countries in the world. It has been estimated that 95% of fatal pesticide poisonings occur in developing countries like India.

Sometimes in cases of death due to poisoning poison is not found grossly in stomach on autopsy, and poison also cannot be detected by chemical analysis. In such cases, the opinion is either furnished on the basis of treatment papers and history or the cases have to be considered as negative autopsy. Sometimes diagnosis of poison is also not clear in treatment papers but general treatment of poison is given. In such

cases gross findings in stomach mucosa might be of immense help to correlate with history and treatment papers, and making the probable diagnosis of poison.

Further if provisional diagnosis of particular kind of poisoning can be made from gross findings of stomach mucosa, it can be mentioned in FSL requisition. This helps FSL to analyse the suspected poison first and thus furnish opinion at the earliest. It can narrow down the waiting period. Keeping these facts in view, it was considered worthwhile to study gross findings in stomach in cases of fatal poisoning at P.D.U. Medical College and Hospital, Rajkot.

MATERIAL & METHODS

Present study was conducted from 1st January, 2012 to 31st December, 2012 at department of forensic medicine, PDU govt. medical college, Rajkot. Total 150 cases of poisoning were selected randomly for study from total autopsies performed.

Cases were selected from suspected cases of poisoning based on relevant history and post-mortem examination, and afterwards confirmed by chemical analysis reports of viscera. All autopsies were done by routine autopsy procedure with routine autopsy instruments. Findings of external and internal examination were noted down as per post-mortem examination protocol with special consideration of findings of poisoning. After opening of thoracic and abdominal cavity, Stomach was dissected. Gross

examination stomach was done and findings were noted, related to-

- 1) Mucosa appearance – findings like pale, congestion, haemorrhage, erosion, flatten rugae, edema, colour changes were noted.
- 2) Site involvement of Stomach – Cardiac end, Body and Pylorus

Stomach and its contents, Piece of small intestine and its contents, pieces of liver, pieces of spleen, pieces of each kidney and blood were collected and preserved in saturated solution of common salt and in cases of suspected corrosive poisoning denatured spirit is used as preservative and sent for chemical analysis to regional forensic science laboratory.

OBSERVATIONS

This is evident from above table that out of total 150 cases of poisoning, 55(36.66%) cases were of OP poisoning, 20(13.33%) cases were of OC poisoning, 45(30%) cases were of ALP poisoning, 6(4%) cases were of CO poisoning, 12(8%) cases were of snakebite, 8(5.33%) cases were of HCL poisoning, 4(2.66%) cases were of H₂SO₄ poisoning. This is evident from above table that, irrespective of poison, haemorrhage in body of stomach was found in maximum numbers of cases (43.33%) followed by haemorrhage in pylorus of stomach (36.66%) followed by congestion in body of stomach (30.66%), and flatten rugae in cardiac end of stomach and pale mucosa in whole stomach were found only in 3.33% cases. In case of OP poisoning, prominent changes were found in body and pylorus part of stomach where congestion and haemorrhage were found in maximum numbers of cases, and least changes were found in cardiac end of stomach.

In case of OC poisoning, prominent changes were found in body and pylorus part of stomach where haemorrhage was found in maximum numbers of cases, and least changes were found in cardiac end of stomach. In case of ALP poisoning, prominent changes were found in body and cardiac part of stomach where haemorrhage was found in maximum numbers of cases, and least changes were found in cardiac end of stomach. In case of CO poisoning changes were found in whole stomach where congestion was found in maximum numbers of cases. In case of snakebite, changes were found in whole stomach where haemorrhage was found in maximum numbers of cases. In case of HCL poisoning, prominent changes were found in body and pylorus part of stomach where haemorrhage was found in maximum numbers of cases, and least changes were found in cardiac end of stomach. In case of H₂SO₄ poisoning, changes were found in whole stomach where congestion and haemorrhage were found in

maximum numbers of cases. In all cases of HCL and H₂SO₄ poisoning colour change was found.

This is evident from above table that, none of the case of poisoning, irrespective of poison, was found in which mucosa of stomach is not affected.

Table: Gross Mucosal Findings of Stomach in Cases of Fatal Poisoning According to Site of Stomach

GROSS FINDINGS	STOMACH SITE	POISONS							TOTAL No of cases (%)
		OP No of cases (%)	OC No of cases (%)	ALP No of cases (%)	CO No of cases (%)	SB No of cases (%)	HCL No of cases (%)	H ₂ SO ₄ No of cases (%)	
PALE	Cardiac	-	-	-	-	5(41.66)	-	-	5(3.33)
	Body	-	-	-	-	5(41.66)	-	-	5(3.33)
	Pylorus	-	-	-	-	5(41.66)	-	-	5(3.33)
CONGESTION	Cardiac	6(10.90)	2(10)	12(26.66)	6(100)	-	4(50)	3(75)	33(22)
	Body	16(29.09)	5(25)	12(26.66)	6(100)	-	4(50)	3(75)	46(30.66)
	Pylorus	17(30.90)	5(25)	5(11.11)	6(100)	-	4(50)	3(75)	40(26.66)
HEMORRHAGE	Cardiac	2(3.63)	4(20)	20(44.44)	4(66.66)	7(58.33)	2(25)	1(25)	40(26.66)
	Body	16(29.09)	9(45)	18(40)	6(100)	7(58.33)	6(75)	3(75)	65(43.33)
	Pylorus	17(30.90)	10(50)	7(15.55)	4(66.66)	7(58.33)	7(87.5)	3(75)	55(36.66)
EROSION	Cardiac	4(7.27)	2(10)	6(13.33)	2(33.33)	-	3(37.5)	2(50)	19(12.66)
	Body	13(23.63)	4(20)	6(13.33)	4(66.66)	-	3(37.5)	2(50)	32(21.33)
	Pylorus	14(25.45)	4(20)	4(8.88)	4(66.66)	-	3(37.5)	2(50)	31(20.66)
FLATTEN RUGAE	Cardiac	3(5.45)	1(5)	1(2.22)	-	-	-	-	5(3.33)
	Body	9(16.36)	3(15)	1(2.22)	-	-	1(12.5)	-	14(9.33)
	Pylorus	9(16.36)	3(15)	-	-	-	1(12.5)	-	13(8.66)
EDEMA	Cardiac	-	-	7(15.55)	3(50)	-	2(25)	2(50)	14(9.33)
	Body	-	-	7(15.55)	3(50)	-	3(37.5)	3(75)	16(10.66)
	Pylorus	-	-	3(6.66)	4(66.66)	-	3(37.5)	3(75)	13(8.66)
COLOUR CHANGES	Cardiac	-	-	-	-	-	8(100)	4(100)	12(8)
	Body	-	-	-	-	-	8(100)	4(100)	12(8)
	Pylorus	-	-	-	-	-	8(100)	4(100)	12(8)
NORMAL	Cardiac	40(72.72)	11(55)	-	-	-	-	-	51(34)
	Body	1(1.81)	-	2(4.44)	-	-	-	-	3(2)
	Pylorus	-	-	26(57.77)	-	-	-	-	26(17.33)
TOTAL		55	20	45	6	12	8	4	150

DISCUSSION

Poisoning cases account for a considerable proportion of all the autopsies conducted at medico legal departments of all hospitals. Diagnosis of poison in such cases depends on post mortem examination and chemical analysis of viscera at FSL. For detection of particular poison FSL have to conduct numerous tests for vast list of suspected poisons, which is time consuming activity. This delays the exact diagnosis of poison which affects the legal inquiries and increase social burdens of relatives of deceased like delay in insurance claims. To solve this problem, Present study was conducted to find out the role of gross findings of stomach mucosa in making provisional diagnosis of particular kind of poisoning which can be mentioned in FSL requisition. This helps FSL to analyse the suspected poison first and thus furnish opinion at the earliest.

OP, OC and ALP poisons were most commonly used. This can be explained by that, these all three poisons are agriculture poisons (pesticides). In country like India having agriculture based economy pesticides are easily available. Organophosphates (OP) was the most commonly used poison, because of its wide use in Agriculture. The results were consistent with the studies done by Siddapur et al⁴, Singh et al⁵ Sanjay et al⁶, Vinay et al⁷ and Gupta et al⁸. Trends of the poisons seem to be a function of need and availability of specific substances⁹.

Stomach was affected in all poison cases. This can be explained by that, stomach acts as reservoir in digestive tract, so contact period of poison with stomach is more. So stomach was affected more severely in all cases of poisons. Table shows gross findings of fatal poison cases in various sites of stomach. As shown in table stomach was divided in three parts: cardiac, body-fundus and pylorus. Body and pylorus were predominately affected in most of these cases, which can be explained by the fact that fluid pathway from oesophagus occurs usually along lesser curvature to the pylorus. Initial exposure of the pylorus to poison causes severe spasm due to irritation, which promotes injury at this site.¹ Stomach was uniformly affected in poisons which were not ingested by oral route like CO and snakebite. In ALP poisoning cases, cardiac and body- fundal parts of stomach were more affected, which can be explained by the fact that when ALP comes in contact with moisture phosphine gas is formed, chemical reaction is accelerated by the presence of gastric acid in stomach and gas affects the cardiac and body-fundus of stomach.

In present study, stomach was divided in three parts wise cardiac end, body-fundus and pylorus for the purpose of study of gross mucosal appearance in case of fatal poisoning while siddapur et al⁴ studied gross stomach mucosal appearance of stomach irrespective of site involvement. In present study, in cases of OP poisoning most common findings were

haemorrhage and congestion which were comparable with siddapur et al⁴. In cases of OC poisoning most common findings was haemorrhage which was comparable with siddapur et al⁴. In cases of ALP poisoning most common findings was haemorrhage which was comparable with siddapur et al⁴. In cases of snakebite most common findings was haemorrhage which was comparable with siddapur et al⁴.

However, there are numerous factors that determine the gross mucosal findings of stomach in a particular fatal poisoning case. These are- the poison (its quantity, quality, diluent), biological factors, poison ingested with food or on empty stomach, treatment intervention, post-mortem interval.¹ With all these factors affecting, it's quite difficult to predict with a certainty about the gross mucosal findings of stomach in a particular fatal poison or vice-versa (i.e. to predict the type of poison based on gross mucosal findings of stomach), as the findings are not consistent with a type of poison, and generally, the findings are seen in combinations. In the present day scenario, the poisons available are less concentrated. Hence typical features mentioned in text books are not often seen. If poison suspected is mentioned in requisition to FSL, it shall help in early analysis and also avoids blind testing and wastage of chemicals.

CONCLUSION

In all case of poisoning, OP poisoning is found in maximum number of cases followed by ALP poisoning followed by OC poisoning. Thus poisoning due to Agriculture Poisons (Pesticides) is most common. Mucosa of Stomach is affected in all cases of poisoning. In all cases of poisoning, irrespective of type of poison, in stomach on gross examination, haemorrhage is observed in maximum number of cases followed by congestion and erosion respectively. Haemorrhage in body of stomach is found in maximum numbers of cases followed by haemorrhage in pylorus of stomach and congestion in body of stomach respectively. In stomach, in Aluminium phosphide poisoning cardiac end is affected in most cases followed by body-fundus and pylorus respectively, while in cases of all other poisoning, body-fundus is affected in most cases followed by pylorus and cardiac end respectively.

It's quite difficult to predict with a certainty about the gross mucosal findings of stomach in a particular fatal poison or vice-versa (i.e. to predict the type of poison based on gross mucosal findings of stomach). So it is evident from the study that, on the basis of the gross findings of stomach mucosa, combining with other data (history, clinical findings) diagnosis of poisoning can be made but to confirm the nature of poison chemical analysis is must.

Abbreviations:

OP- organophosphates, OC- organochlorines, ALP- aluminium phosphide, CO- carbon monoxide, SB- snakebite, HCL- hydrochloric acid, H₂SO₄ – sulphuric acid, FSL- forensic science laboratory.

Acknowledgement: None

Conflict of interest: None

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