

Frequency and Causes of Sudden Death in Surgical Practice

M I IQBAL K RAFIQ M AHMED Y MOHAMMAD Y RAFI S AKTAR A M CHAUDHRY

Department of General Surgery, Mayo Hospital Lahore.

Correspondence to Dr. Mohammad Imran Iqbal

A cross sectional observational study was carried out in the Department of General Surgery Mayo Hospital, Lahore during 1999-2001. Main objective of the study was to identify the frequency & causes of sudden death in the surgical practice & to classify patients who are likely candidates for this fatal outcome. A total of 5189 patients were admitted in the ward during this time. Among them 78.1% were admitted from emergency and 26.98% from the outpatient department with age ranges between 15->65 and male to female ratio of 51.3%: 38.63%. A total of 3870 patients, who fulfill the criteria were included in the study. Among them 125 mortalities occurred in two years time & only 22 cases were labeled as sudden deaths, out of them 19 were admitted through emergency and only 3 were from the outpatient department. In the study sudden death was labeled as any death; occurring within 24hr of in surgical patients who are stable pre or postoperatively on the basis of haemodynamics, clinical evaluation & biochemical investigation with or without the probable cause of death suggested by the medical history. The frequency of sudden death among total admission (3870) was 0.56% and among total mortalities was 17.64%. Expected causes in the labeled sudden death cases were Myocardial infarction (27.27%), Pulmonary embolism (18.8%), Multi system organ failure (18.8%), Adult respiratory distress syndrome (9.09%), Aspiration pneumonitis (9.09%), Cardiac arrhythmias due to acute renal failure (4.54%), Ruptured pseudo aneurysm (4.54%), Acute drug reaction (4.54%) and Halothane toxicity (4.54%).

Key words: Sudden death, elective, emergency.

There was a significant number of patients who were stable pre or postoperatively on the basis of clinical evaluation, haemodynamics & biochemical investigations but a sudden deterioration was noted in the general condition of the patients with abnormality of vital signs or one or more of derangements i.e. serum electrolyte, ECG, renal & hepatic profile was noted leading to death without giving the opportunity to detect early and promptly the cause of this deterioration.

The purpose of the study was to identify the frequency & causes of sudden death on surgical floor and by using available facilities, classify patients who were likely candidates for such fatal outcome.

The causes of these deaths in the literature are pulmonary embolism¹⁻⁴, Acute myocardial infarction^{5,6,7}, septicemia^{8,9}, pneumonia¹⁰, ARDS^{2,11,12}, CVA², Acute renal failure^{13,14}, multiple organ failure^{15,16} and sedatives & drug reactions¹⁷.

Material & methods

This cross sectional observational study was carried out in the North Surgical Ward Mayo Hospital, Lahore during 1999 to 2001. In the study all patients with polytrauma or undergoing major emergency surgical procedures for intestinal obstruction, gastrointestinal perforations due to any cause, major amputations and high risk surgical patients having associated medical problems like hypertension, diabetes mellitus, chronic renal failure and respiratory illnesses were included in the study & managed in the ICU.

The patients undergone major elective surgical procedures like thyroidectomy, cholecystectomy, and

surgery for malignant diseases were also included.

Patients who were admitted in general ward for elective surgery & were supposed to be stable haemodynamically but died without any morbid intimation were also labeled as sudden death.

Patients with minor emergency surgery such as appendectomy or the procedures done under local anaesthesia were not included in the study.

In the literature sudden death is defined as "Any death occurring within 24hr of onset of symptoms in a person with or without the probable cause of death suggested by the medical history."¹

In the study we followed the criteria to define sudden death as " Any death occurring within twenty four hours after the start of deterioration of the condition, in patients; who were stable pre or post operatively on the basis of clinical evaluation, haemodynamics & biochemical investigation, with or without the probable cause of death suggested by the medical history."

All the patients who were admitted in the ICU, a detailed review of history and clinical examination was carried out, regular recording of pulse, blood pressure, central venous pressure, monitoring of intake output, urine sugar chart, with fluid & electrolyte balance & oxygen administration to patients where required.

Arterial blood gases, blood sugar levels, serum electrolytes, renal profile, liver function tests, cardiac enzymes, ECG, X-ray chest and USG were carried out on the onset of deterioration and before expiry to identify the cause of sudden death. All the record of these cases were collected & were discussed in mortality conferences & the labeled sudden death cases underwent autopsy where

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possible to confirm the cause of their death.

Results

A total of 5189 patients were admitted in the ward during two years time, among them, 3789(73.1%) from the emergency and 1400(26.98%) from out patient department (fig-1)

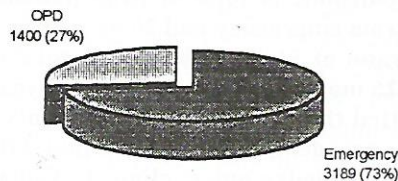


Fig-1 No of Patients admitted

Of these admitted cases 61.3% were males and 38.67% were females with age ranges between 15->65 years (Fig-2). Most of the patients were between 36-65 years of age. Among these 3870 (74.58%) patients were included the study as they fulfilled the criteria.

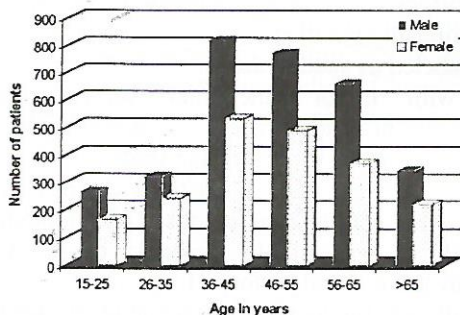


Fig-2 Age & Sex distribution among total admission

A total of 1652 (31.8%) cases were managed in the ICU. Among them 571(34.56%) were those who underwent major elective surgical procedure & 1081(65.43%) patients were of emergency group. In ICU admitted patients 1610 (82.47%) were having associated major or minor medical problem. (Table-1). 42 patients were having no associated medical problem.

Table-1 Patients admitted in ICU with associated medical problem

Disease	n=	%age
Diabetic mellitus	638	39.62
Chronic obstructive airway disease	530	32.91
Ischaemic heart disease	156	9.68
Hepatitis B/C positive	110	6.83
Coagulation abnormalities (coagulopathy, obst. Jaundice)	110	6.83
Uraemic (chronic renal failure)	66	4.09
Total	1610	100

Among 125 deaths in 3870 patients, which were included, 101(80.8%) died in ICU and 24(19.2%) in the ward, 22 (17.64%) cases were labeled as sudden deaths and 11(50%) underwent autopsy. The expected causes in these labeled sudden death cases & autopsy results are shown in Table 2.

Table-2 Expected cause & Autopsy results in Sudden death cases with mode of admission

Expected cause	n=	Mode of admission	Cases underwent autopsy	Autopsy Results
Myocardial Infarction	06	3 E 3OPD	02	+2
Pulmonary embolism	04	E	04	+2, -2
Multi system organ failure	04	E	03	+1, *1, +1
Adult respiratory distress syndrome	02	E	00	00
Aspiration pneumonia	02	E	01	+1
Cardiac arrhythmias due to ARF	01	E	01	+1
Ruptured pseudo aneurysm	01	E	00	00
Acute drug reaction	01	E	00	00
Halothane toxicity	01	E	00	00

+ Cause same as suspected before hand, - Cause was not confirmed, +- Inconclusive autopsies, * Cause other than suspected, E Emergency, OPD Outpatient department

The frequency of sudden death among total admission which were included was 0.56% & among total mortalities was 17.64% as shown in fig-3

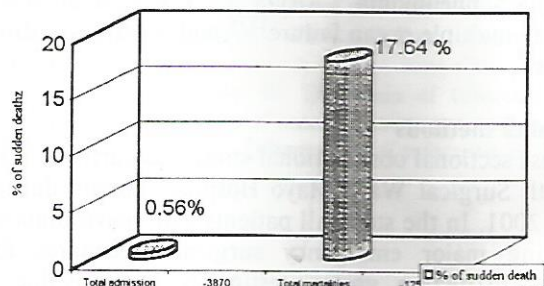


Fig-3 Frequency of sudden death among total admission & total mortalities

Discussion

In our study out of 3870 patients, 125 deaths occurred in two years time and 22 were labeled as sudden deaths. Six

(27.27%) died due to myocardial infarction. Only two cases underwent autopsy & cause confirmed, while in the others suspicion was made on ECG & Cardiac enzymes. This figure is low as compared to that of 47.8% of sudden unexpected death with myocardial infarction reported by Yamaguchi J et al¹ Four (18.8%) deaths among them were due to pulmonary embolism, two of them having suspicion of pulmonary embolism on clinical grounds as well as on ECG, and X-ray chest. But due to lack of investigative facilities we were not able to confirm them before expiry and they were confirmed at autopsy, while two remained inconclusive at autopsy. This figure is comparatively equal to stated by Yamaguchi J et al, Ishister WH et al, Kerska Z et al^{1,2,3}. Rest of 12 cases, four (18.1%) died due to multi-system organ failure; of these, three underwent autopsy and the cause was confirmed in only one, one remained inconclusive and one having cause other than suspected i.e. pulmonary embolism.

Two patients developed ARDS and deteriorated to death. Although they were not autopsied; but suspicion was made after collaborating with anesthetist and ICU specialists on clinical and biochemical grounds Two deaths (9.09%) were due to aspiration pneumonitis; one was confirmed at autopsy while other remained un-autopsied. One patient died due to arrhythmias caused by severe hyperkalemia; due to acute renal failure, waiting for dialysis and the diagnosis was delayed due to laboratory error. One died due to severe drug reaction in the general ward. One patient died due to rupture of infective pseudo aneurysm of femoral artery in the ward. These kind of deaths were also reported by Dupont H et al¹⁸ also reported such kinds of deaths. On old patient died due to halothane toxicity as he developed acute fulminant hepatic failure in early postoperative period leading to death. In the study we have seen that maximum no of deaths were in patients admitted through emergency and a detailed history and clinical examination were lacking about their associated medical problem and moreover these patient were having poor reserves that were underestimated. Although autopsy is really necessary for the confirmation of these kinds of deaths, but in our setup, the cause; which was labeled before hand, were most of the times same as confirmed at autopsy

Conclusion

These deaths can be prevented if a detailed evaluation of associated medical problem was done before admission and taking necessary steps for this. It also shows that a significant number of deaths caused either by a lack of investigative and treatment facilities round the clock and relatively little cooperation between different departments or by human error. Probably much has to be done to improve the quality of care and to prevent sudden unexpected deaths in the surgical setup

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