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RESEARCH ARTICLE

TO STUDY THE INCIDENCE OF SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) OUTCOME IN PATIENTS UNDERGOING ELECTIVE OR EMERGENCY SURGERIES

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Systemic Inflammatory Response Syndrome, Multi Organ Dysfunction Syndrome (MODS), Multi Organ Failure (MOF)

Abstract

Background: Systemic inflammatory response syndrome is a simple bed side tool to assess the severity of the patient's disease process which gives the approximate idea about the outcome of the surgical patients. Mortality rate increased progressively as the severity of systemic inflammatory response increased.This study investigated the Incidence of Systemic inflammatory response syndrome (SIRS) outcome in patients undergoing elective or emergency surgeries.

Objectives: To study the Incidence of Systemic inflammatory response syndrome (SIRS) outcome in patients undergoing elective or emergency surgeries

Methods: This was a prospective study conducted over a period of 2 years at GMC Amritsar. The total of 50 patients undergoing surgical procedures was studied. They were followed up till date of termination with daily SIRS monitoring, development of MODS and MOF.Statistical analysis was based on simple percentages among related variables.

Results: Overall incidence of SIRS was 74%. Incidence of SIRS was more in patients undergoing emergency surgery than the patient who underwent elective surgery (43.47%). The difference was statistically significant. ($p<0.05$). Average SIRS score was higher in emergency surgery group than elective surgery group.

Conclusion: SIRS is key pathogenic factor in postoperative morbidity which gives the approximate idea about the outcome of the surgical patients.

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Introduction:-

Despite continuous advances in anaesthesia, surgery and perioperative care, major surgery is associated with undesirable sequelae such as pain, cardiopulmonary, infective and thromboembolic complications, cerebral dysfunction, nausea and gastro-intestinal paralysis, fatigue and prolonged convalescence. Clearly, such morbidity may be related to the level of anaesthetic and surgical skill, but complications may occur regardless of skill and no single technique or drug regimen has been shown to eliminate postoperative morbidity and mortality. The key pathogenic factor in postoperative morbidity, excluding failures of surgical and anaesthetic techniques, is the surgical stress response with subsequent increased demands on organ function. This phenomenon is also called systemic inflammatory response syndrome[1]

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Systemic inflammatory response syndrome is defined as two or more of the following conditions:

1. Temperature greater than 38º C or less than 36º C;
2. Heart rate greater than 90 beats/min;
3. Respiratory rate greater than 20 breaths/ min or PaCO2 less than 32 torr;
4. White blood cell (WBC) greater than 12,000/µl or less than 4000/µl or greater than 10% immature (band) forms.[2]

The SIRS includes two general phrases-An acute pro inflammatory state resulting from innate immune system recognition of ligands and An anti- inflammatory phase that may serve to modulate pro inflammatory phase.Under normal conditions, these coordinated responses direct a return to homeostasis.[3]

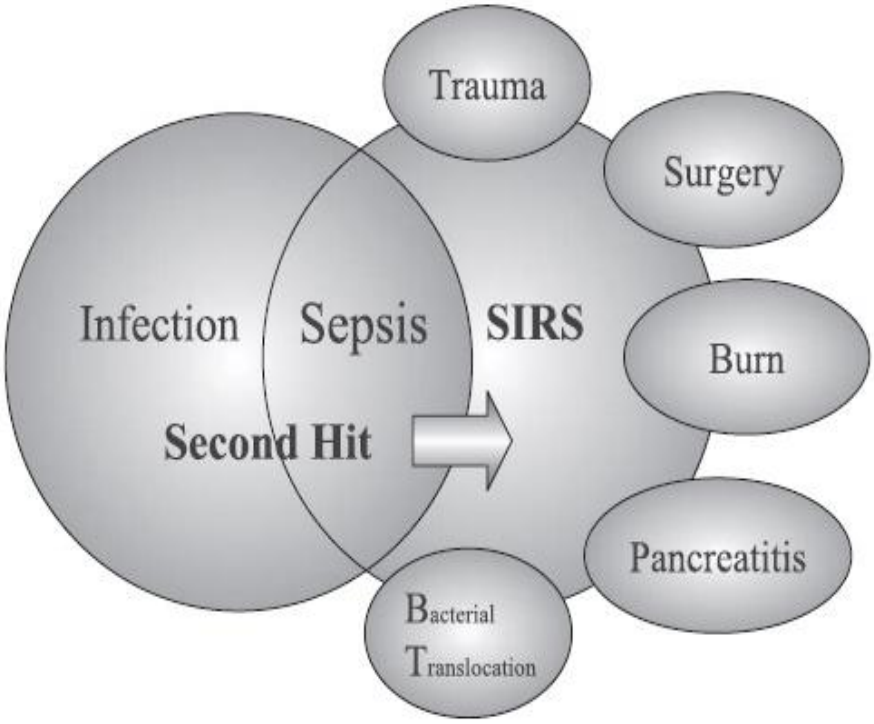

Fig 1:- The interrelationship between SIRS, sepsis, and infection.

SIRS leads to Multiorgan dysfunction could be a consequence of inconvenient clinical course of SIRS; the dysfunction is mostly related to the kidneys, liver, lungs, central nervous system and heart[4].Vasodilatation, Increasedvascular permeability, Endothelial damage with expression of cell adhesion molecules and small thrombi in microcirculation - disseminated intravascular coagulation, Production of reactive oxygen species by neutrophils, Production of proteases by neutrophils, Production of NO by inductive NO synthase – refractoriness in vasodilatation.[5]Resuscitation should be started as soon as the syndrome is recognised. Goal of initial resuscitation should be to maintain central venous pressure of 8-12 mmHg, mean arterial pressure of ≥65mmHg, urine output ≥0.5mL/Kg/Hour and central venous oxygen saturation ≥70%. Intravenous fluids, packed red blood cells and dobutamine infusion can be used for resuscitation. Intravenous antibiotics should be started within first hour of recognition of severe sepsis. Crystalloids and colloids should be used to correct hypovolemia.Intravenous corticosteroids (Hydrocortisone 200-300 mg/day, for 7 days in three or four divided doses) are recommended in patients with septic shock who, despite adequate fluid replacement, require vasopressor therapy to maintain blood pressure. Recombinant human activated protein C (rhAPC) is recommended in patients at high risk of death.[6]

Aims and Objectives:-

1. To study the incidence of Systemic inflammatory response syndrome outcome in 50 patients undergoing elective or emergency surgeries in Surgical Unit of Guru Nanak Dev Hospital, Amritsar.
2. Incidence of factors causing mortality and its relation with SIRS.
3. Average SIRS score in emergency and elective surgery

Material and methods:-

This was a prospective study conducted over a period of 2 years. The total of 50 patients undergoing surgical procedures were studied. They were followed up till date of termination with daily SIRS monitoring, development of MODS and MOF. Risk factors of MOF were addressed.

Criteria for SIRS was kept as: Two or more of the following variables[2]

1. Pulse rate (PR): >90beats/min
2. Respiratory Rate (RR):>20 breaths/min or a Pa CO_2 level <32mm of Hg
3. Temperature: >38º C or <36º C
4. Total Leucocyte count (TLC): >12,000/µl or <4,000/µl or >10% bands.

The SIRS scores were calculated daily and maximum score were recorded. The SIRS score assigns 1 point for each parameter (temperature, white blood cell count, heart rate, and respiratory rate), so that a maximum of 4 points can be accrued. A maximal SIRS score was calculated by summing the individual worst value in each of the 4 parameters. Thus, a patient might have a maximal SIRS score of 4, even if the patient had scored 1 point in each different parameter at different points in the ICU admission. Pulse rate, Respiratory rate, temperature were recorded daily manually. TLC was done. Type of operation, type of anaesthesia, untoward incident during surgery and duration of surgery recorded. Co-morbid condition, Focus of sepsis was looked for and ventilator support was considered as a positive SIRS criteria for respiration.

Results:-

Incidence of sirs in elective and emergency surgery:

Type of Surgery	Total No. of Patients	No. of Patients with SIRS	No. of Patients without SIRS
Elective	23	10	13
Emergency	27	27	0
Total	50	37	13

Table 1 showing incidence of systemic inflammatory response syndrome in elective and emergency surgery. **SIRS developed in 37 patients (74%).**All the patients in emergency surgery group had SIRS at some point of time during hospital stay. 10 patients (43.47%) from elective surgery group developed SIRS. Incidence of SIRS was more in patients undergoing emergency surgery than the patient who underwent elective surgery. The difference was statistically significant. ($p<0.05$).

Average sirs score in emergency and elective surgery:

Average SIRS Score	No. of Patients in Emergency Surgery	No. of Patients in Elective Surgery	Total
0-1	10	20	30
1-2	13	2	15
2-3	1	0	1
3-4	3	1	4
Total	27	23	50

Table 2 showing average SIRS score in emergency and elective surgery. Most of the patients in emergency surgery group were having mean SIRS score in 1-2 range and most of patients undergoing elective surgery were having mean SIRS score in 0-1 range group. Average SIRS score was more in emergency surgery group than in elective surgery group.

Incidence of mortality:

Diagnosis	Incidence of Mortality
Overall Mortality	10%
SIRS	13.51%
Sepsis	45.45%
Severe Sepsis	83.33%
MODS	100%

Table 3 showing incidence of mortality. Overall mortality in our study was 10%. Rate of mortality in patients who developed systemic inflammatory response syndrome was 13.51%. Mortality rate increased to 45.45% in patients who developed sepsis. In case of patients with severe sepsis mortality rate was as high as 83.33%. The patients who

developed multi organ dysfunction were having mortality rate of 100%. Mortality increased progressively from SIRS, sepsis, severe sepsis, MODS respectively.

Discussion:-

In our study SIRS developed in 37 patients (74%). Similar observations were made in study conducted by Rangel-Frausto et al[7]who found that 85.7% patients in surgical intensive care units (SICU) had systemic inflammatory response syndrome.

Overall mortality in our study was 10%. Rate of mortality in patients who developed systemic inflammatory response syndrome was 13.51%. Mortality rate increased to 45.45% in patients who developed sepsis. In case of patients with severe sepsis mortality rate was as high as 83.33%. The patients who developed multi organ dysfunction were having mortality rate of 100%. Mortality increased progressively from SIRS, sepsis, severe sepsis, MODS respectively. Pittet et al[8] had made similar observations with 83 patients (49%) having sepsis; among them 28 developed severe sepsis. Rangel-Frausto et al[7]had seen that among patients with SIRS, 649 (26%) developed sepsis, 467 (18%) developed severe sepsis, and 110 (4%) developed septic shock and, Therewere also stepwise increases in mortality rates in the hierarchy from SIRS, sepsis, severe sepsis, and septic shock: 7%, 16%, 20%, and 46%, respectively.

Summary and Conclusion:-

27 (54%) patients were operated as emergency surgical procedure and 23 (46%) patients were operated as elective surgical procedure.Overall incidence of SIRS was 74%.Patients undergoing emergency surgery were having higher incidence of SIRS than the patients undergoing elective surgery. Any particular importance could not be attributed to any of the SIRS criteria individually.SIRS criteria is a simple, easy to do bed side/laboratory. SIRS is an important response to surgical trauma with high mortality and morbidity.Mortality, duration of hospital, Multiorgan dysfunction and ICU stayincreased significantly in the patients having SIRS.When SIRS is present always look for focus of infection like wound, urinary tract infections, lungs etc.SIRS therefore assumes importance, because when it is present, it alerts to look for septic foci or second hit.

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