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RESEARCH ARTICLE

ATLS –A SYSTEMATIC REVIEW

Gaurav Mittal, Abhishek Rathi and Dipika Raghaw.

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Abstract

Management of the multiply injured patient requires a co-ordinated multi-disciplinary approach in order to optimize patient's outcome. A working knowledge of the sort of problems these patients encounter is therefore vital to ensure that life-threatening injuries are recognized and treated in a timely pattern and that more minor associated injuries are not omitted. This article outlines the management of polytraumatized patients using the Advanced Trauma Life Support (ATLS) principles and highlights the areas of specific involvement of the engaged medical team.Advanced Trauma Life Support is generally regarded as the gold standard and is founded on a number of well-known principles, but strict adherence to protocols may have its drawbacks when facial trauma co-exists. These can arise in the presence of either major or minor facial injuries, and oral and maxillofacial surgeons need to be aware of the potential problems.

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Introduction:-

The ATLS provides the essential information and skills for doctors to identify and treat life-threatening and potentially life-threatening injuries under the extreme pressures associated with the care of these patients in the fast-paced environment and anxiety of trauma room. The ATLS is applicable to clinicians in a variety of clinical situations Injury is an increasingly significant health problem throughout the world. Every day, 16 000 people die from injuries, and for every person who dies, several thousand more are injured, many of them with permanent sequelae[1]. Injury accounts for 16% of the global burden of disease[1]. Management of the multiply injured patient requires a co-ordinated multi-disciplinary approach in order to optimize patients' outcome.The Advanced Trauma Life Support (ATLS) is a safe and reliable method for the immediate treatment of injured patients and the basic knowledge is necessary toassess a patient's condition rapidly and accurately; resuscitate and stabilize patients according to priority; determine whether a patient's needs exceed a facility's resources and/or a doctor's capabilities ; arrange appropriately for a patient's interhospital or intrahospital transfer to (what, who, when, and how) ensure that optimal care is provided and that the level of care does not deteriorate at any point during the evaluation, resuscitation, or transfer processes.

Review of literature:-

Esposito TJ et al assessed Advanced Trauma Life Support (ATLS) training status of general surgeons and medical staff andits perceived utility, and its relation to clinical trauma practice[2].*Gwinnutt CL et al*in 1996 studiedfamily tragedy that happened 20 years ago which lead to the emergence of ATLS [3].Various authors also stated that uncontrolled hemorrhagic shock is a significant factor in death of severe multiple trauma patients[4, 5].Many authors

Corresponding Author:- Gaurav Mittal.

alsostudied thatadvanced Trauma Life Support (ATLS) is a concept for rapid initial assessment and primary management of an injured patient[6, 7].

Emergence:-
The delivery of trauma care before 1980 was at best inconsistent. A tragedy occurred in February 1976 that changed trauma care in the "Golden hour" for injured patients in the United States and in much of the rest of the world[8]. Satisfactory outcomes for injured patients are strongly influenced by the initial care delivered, particularly so-called ''golden hour'' which includes rapid assessment and management of their injuries following admission to the hospital emergency department[9]. A new approach to the provision of care for individuals who suffer major, life-threatening injury premiered in 1978, the year of the first ATLS course. However, today the ATLS method is accepted as a standard for the "golden hour" of trauma care by many who provide care for the injured, whether the patient is treated in an isolated rural area or a state-of the-art trauma center.

Initial assessment and management:-
According to Elitsa G. Deliverska et alin the setting of a major trauma unit, the management of seriously injured patients involves the coordinated approach of a multidisciplinary team with simultaneous assessment and treatment of a variety of life-threatening conditions[10]. The treatment of seriously injured patients requires the rapid assessment of injuries and institution of life-preserving therapy. Because timing is crucial, a systematic approach that can be rapidly and accurately applied is essential. This approach is termed the "initial assessment" and includes the following elements:

a) Preparation
b) Triage
c) Primary survey (ABCDEs)
d) Resuscitation,
e) Adjuncts to primary survey and resuscitation
f) Consideration of the need for patient transfer
g) Secondary survey
h) Adjuncts to the secondary survey
i) Continued postresuscitation monitoring and reevaluation,
j) Definitive care

Airway and ventilation:-
Alexander R, Hodgson P et al mentioned that theinadequate delivery of oxygenated blood to the brain and other vital structures is the quickest killer of injured patients[11]. Prevention of hypoxemia requires a protected, unobstructed airway and adequate ventilation, which take priority over management of all other conditions. An airway must be secured, oxygen delivered, and ventilatory support provided. Supplemental oxygen must be administered toall trauma patients. Airway patency and adequacy of ventilation must beassessed quickly and accurately. Pulse oximetry and end-tidal CO_2 measurement are essential. If problems are identified or suspected, measures should be instituted immediately to improve oxygenation and reduce the risk of further ventilatory compromise. These measures include airway maintenance techniques, definitive airway measures (including surgical airway), and methods of providing supplemental ventilation.

Shock:-
Shock is defined as an abnormality of the circulatory system that results in inadequate organ perfusion and tissue oxygenation[12] .The first step in the initial management of shock in trauma patients is to recognize its presence.The second step in the initial management of shock is to identify the probable cause of the shock state. The management of shock is initial resuscitation, heamodynamic support and adjunctive therapy.According to Yin Wen et alevaluated uncontrolled hemorrhagic shock is a significant factors in death of severe multiple trauma patients. The strategy for management of trauma patients should center upon permissive hypotension and early hemostatic resuscitation[5] .

Thoracic trauma:-
Ball CG, Kirkpatrick AW et al studied that thoracic trauma is a significant cause of mortality. Many patients with thoracic trauma die after reaching the hospital; however, many of these deaths could be prevented with prompt diagnosis and treatment[13]. The initial assessment and treatment of patients with thoracic trauma consists of the

primary survey, resuscitation of vital functions, detailed secondary survey, and definitive care. Because hypoxia is the most serious aspect of chest injury, the goal of early intervention is to prevent and correct hypoxia. . Injuries that are an immediate threat to life are treated as quickly and simply as is possible. Tension pneumothorax may be managed initially by rapidly inserting alarge-caliber needle into the second intercostal space in the midclavicular line of the affected hemithorax.Massive hemothorax is initially managed by the simultaneous restoration of blood volume and decompression of the chest cavity.Cardiac tamponademost commonly results from penetratingInjuries.It is indicated by the presence of the classic diagnostic Beck's triad: venous pressure elevation, decline in arterial pressure, and muffled heart tones[14]. Rib fractures are a common injury that can affect 350,000 people each year and they can lead to respiratory complications prolonged hospitalizations, pain, disability, nosocomial pneumonia, and increased morbidity[15].

Abdominal and pelvic trauma:-

Evaluation of the abdomen and pelvis is a challenging component of the initial assessment of injured patients. The assessment of circulation during the primary survey includes early evaluation of the possibility of hemorrhage in the abdomen and pelvis in any patient who has sustained blunt trauma. Unrecognized abdominal and pelvic injury continues to be a cause of preventable death after truncal trauma. Rupture of a hollow viscus, bleeding from asolid organ, and bleeding from the bony pelvis may notbe easily recognized, and patient assessment is oftencompromised by alcohol intoxication, use of illicitdrugs, injury to the brain or spinal cord, and injuryto adjacent structures such as the ribs and spine.Significant blood loss can be present in the abdominal cavity without any dramatic change in appearance or dimensions and without obvious signs of peritoneal irritation[16]. Rachael C Fisher et al suggested that laparosocopy may be an option for equivocal findings, however the combination of advancing imaging techniques and accuracy of reporting suggest operative management could be reserved for haemodynamically unstable and radiologically proven injuries[17].

Head trauma:-

Head injuries are among the most common types of trauma encountered in emergency departments. Many patients with severe brain injuries die before reaching a hospital, with almost 90% of prehospital trauma-related deaths involving brain injury. About 75% of patients with brain injuries who receive medical attention can be categorized as having minor injuries, 15% as moderate, and 10% as severe[18].Management of patient with head injury include categorization according to GCS scoring, initial management followed by diagnosis,secondary management and then disposition. Elevation of intracranial pressure (ICP) can reduce cerebral perfusion and cause or exacerbate ischemia and the normal ICP in the resting state is approximately 10 mmHg. Pressures greater than 20 mmHg, particularly if sustained and refractory to treatment are associated with poor outcomes[19].

Spine and spinal cord trauma:-

Spine injury, with or without neurologic deficits, must always be considered in patients with multiple injuries. Approximately 5% of patients with brain injury have an associated spinal injury, whereas 25% of patients with spinal injury have at least a mild brain injury[20]. Approximately 55% of spinal injuries occur in the cervical region, 15% in the thoracic region, 15% at the thoracolumbar junction, and 15% in the lumbosacral area. Approximately 10%of patients with a cervical spine fracture have a second, noncontiguous vertebral column fracture[21].

According to Marion DW et al patients who are awake, alert, sober, and neurologically normal, and have no neck pain or midline tenderness, or a distracting injury are unlikely candidates for c-spine fractures or instability[22]. In such cases the c-collar is removed followed by palpation of the spine. If there is no significant tenderness, patient is asked to voluntarily move his or her neck from side to side without applying one's force. In case of presence of neck pain and midline tenderness in such patients, a CT scan is usually required which can also be assessed using anteroposterior and Lateral spine views in case of the absence of the former modality. If a patient is unconscious, a craniocervical 2-mm-thick CT scan should be obtained. If this study is negative, magnetic resonance imaging (MRI) is the preferred study of choice for excluding instability[23].

Patients who have an altered level of consciousness or are too young to describe their symptoms should compulsorily undergo multi-detector axial CT from the occiput to T1 with sagittal and coronal reconstructions which can also suffice by lateral, AP, and open-mouth odontoid films[23].

Musculoskeletal trauma:-
Injuries to the musculoskeletal system occur in many patients who sustain blunt trauma; they often appear dramatic, but rarely cause an immediate threat to life or limb. However, musculoskeletal injuries must be assessed and managed properly and appropriately so life and limb are not jeopardized[24].Severe crush injuries cause the release of myoglobin which may precipitate in the renal tubules and result in renal failure[25]. Swelling into an intact musculofascial space may cause an acute compartment syndrome that, if not diagnosed and treated, may lead to lasting impairment and loss of use of the extremity[26]. Fat embolism, an uncommon but highly lethal complication of long-bone fractures, may lead to pulmonary failure and impaired cerebral function.

Thermal injuries:-
Thermal injuries are themajor causes of morbidity and mortality[27,28]. Attention to the basic principles of initial trauma resuscitation and the timely application of simple emergency measures can help to minimize the morbidity and mortality of these injuries. These principles include a high index of suspicion for the presence of airway compromise following smoke inhalation, identification and management of associated mechanical injuries, and maintenance of hemodynamics with volume resuscitation. Clinicians also must take measures to prevent and treat the potential complications of thermal injuries, such as rhabdomyolysis and cardiac dysrhythmias, which can be seen in electrical burns[29].

Pediatric trauma:-
Injury continues to be the most common cause of death and disability in childhood. Each year, more than 10 million children in the United States require emergency department care for the treatment of injuries, representing nearly 1 of every 6 children. Each year more than 10,000 children in the United States die from serious injury. Injury morbidity and mortality surpass all major diseases in children and young adults, making injury the most serious public health and health care problem in this population. Because failure to secure the airway, support breathing, recognize and respond to intra-abdominal and intracranial hemorrhage are known to be the leading causes of unsuccessful resuscitation in severe pediatric trauma[30].According to Kristin BrønnumNystrup et al hemorrhage is a leading cause of death in paediatric trauma patients. Predefined massive transfusion protocols (MTP) have the potential to significantly reduce mortality by treating haemorrhagic shock and coagulopathy, in adhering to the principles of haemostatic resuscitation with rapid administration of balanced ratios of packed red blood cells (RBC), fresh frozen plasma (FFP) and platelets (PLT) [31].

Trauma in pregnancy:-
Connolly et al studied that pregnancy causes major physiologic changes and altered anatomic relationships involving nearlyevery organ system of the body. These changes in structure and function can influence the evaluation of injured pregnant patients by altering the signs and symptoms of injury, the approach and responses to resuscitation, and the results of diagnostic tests. Pregnancy also can affect the patterns and severity of injury[32].For optimal outcome of mother and fetus, clinicians must assess and resuscitate the mother first, and then assess the fetus before conducting a secondary survey of the mother[32].

Discussion:-
ATLS is a method to establish priorities in emergency trauma care. Treatthe greatest threat to life first and indicated treatment must be applied even when a definitive diagnosis is not yet established[33].Helm M et alstated that Advanced Trauma Life Support (ATLS) is a concept for rapid initial assessment and primary management of an injured patient, starting at the time of injury and continuing through initial assessment, lifesaving interventions, re-evaluation, and stabilization,and when needed, transfer to a trauma centre[7].

The main ATLS principles are that the aid giver treats the most dangerous disorder first and does no further damage .Van Vogt ABintroduced the principles of advanced trauma life support (ATLS) in the management of accident victims that has been in progress in the Netherlands since 1995[6]. After assessment and, if necessary, treatment of the airways, the respiration, the circulation and any craniocerebral injury, an exploratory examination is carried out. According to JakobDanker et al the patients were triaged at three different time points at the time of admission to the emergency department,during reassessment,before transfer to another department or discharge[34]. All data was entered in a database and this helped in creating an algorithm how many patients were admitted and discharged[34]. A survey of1300 general surgeons about trauma training, ATLS status, trauma call, and confidence in clinical trauma care abilities was done by various authors[2]. Response rate was 61%. Respondents most commonly (67%) felt they learned a great deal about trauma care in residency training; 13% responded similarly regarding ATLS. Course participation

within 4 years of the survey was reported by 33% of respondents[2]. Compliance of the protocols established also decided the efficacy on the basis of presence of a trauma team leader andit demonstrated that TTL involvement during resuscitations was associated with improved adherence to ATLS protocols, and increased efficiency (compared to non TTL involvement) to diagnostic imaging[35].

The term damage control surgery was coined by Rotondo and Schwab in 1993 and demonstrated the survival benefit with it and provided a model for its application.Presently, for its original application it has altered an almost uniformly lethal event to one that in which majority now survives[36].ShafizadehS stated that a standard operating procedure (SOP) exactly regulates the approach to trauma patients and determines the responsibilities of the involved faculties. An SOP moreover incorporates the organizational structure in the treatment of trauma patients as well as the necessary technical equipment and staff requirements[37].

The use of helicopter emergency medical services (HEMS) for the transportation and treatment of trauma patients was emphasized bySamuel M Galvagno[38] .The purported beneficial effects of HEMS compared to ground emergency medical services is likely to be some combination of speed, crew expertise, and the fact that HEMS is part of an organized trauma system[38]. Ken Johnson et al conducted a study in which thirty one anesthesiologists and recovery room nurses compared the Life Support for trauma and transport(LSTAT) with conventional monitors while managing four simulated critical events[39]. The time required to reach a diagnosis and treatment was recorded for each simulation. Nursing staff reported that the LSTAT provided adequate equipment to care for the patients monitored during recovery from surgery and were able to detect critical changes in vital signs in a timely manner[39].

Conclusion:-

The concept behind the advanced trauma life support has remained simple. Historically, the approach to treating injured patients, ,was the same as that for patients with a previously undiagnosed medical condition: an extensive history including past medical history, a physical examination starting at the top of the head and progressing down the body, the development of a differential diagnosis, and a list of adjuncts to confirm the diagnosis. The result was the development of the ABCDE approach to the evaluation and treatment of injured patients. These concepts are also in keeping with the observation that the care of injured patients in many circumstances is a team effort, allowing medical personnel with special skills and expertise to provide care simultaneously with surgical leadership of the process. The advanced trauma life support provides an easily remembered approach to the evaluation and treatment of injured patients for any doctor, irrespective of practice specialty, even under the stress, anxiety, and intensity that accompanies the resuscitation process.It is important for all healthcare professionals including oral and maxillofacial surgeons to undergo advanced trauma life support training as it provides essential information and skills to identify and treat life threatening injuries under extreme pressures associated with care of these patients.

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