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The Intraoperative use of Prophylactic Steroids Therapy on Postoperative Cough for Heavy Smoker Patient Under Elective Extra Thoracic Surgery

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Abstract. *Introduction: Anesthesia is a complex pharmacological Response induced by a chemically heterogeneous class of Drugs, the so-called general anesthetics Every year, tens of Millions of patients are exposed to general anesthetics Drugs that remove the most precious human attribute Consciousness. By allowing for prolonged invasive Procedures, general anesthesia is one of the foremost Achievements of modern medical science However, there Is no objective or widely accepted definition of general Anesthesia. Aim of the study: The aim of study uses of prophylactic nebulized steroids therapy on postoperative cough in a heavy smoker patient under elective extra thoracic surgery. Results: The data was analyzed using the statistical program IBM SPSS Statistic 28 the results attached below were obtained based on the following hypotheses and aim of this study (The aim of study use of prophylactic steroids therapy on postoperative cough for heavy smoker patient under elective extra thoracic surgery). Discussion: In this study, it was attempted to determine the effect of steroids therapy on post-operative cough in patients smoking. And there was high-significant data for each drug group. From this data we note that from study questionnaire the use of nebulizer pulmicort which is making less side effect on patients from than using systemic dexamethasone to patients. and be better drug used for patient who have chronic disease such as (hypertension, diabetic mellitus, problem in respiratory system and complication. Conclusion: from all results in this study, we can conclude that there is a significant effect on shortness of breath and high significant data variable effect on cough according to data research.*

Keyword: *General anesthesia, Postoperative.*

1. INTRODUCTION: (GENERAL ANESTHESIA)

Anesthesia is a complex pharmacological Response induced by a chemically heterogeneous class of Drugs, the so-called general anesthetics Every year, tens of Millions of patients are exposed to general anesthetics Drugs that remove the most precious human attribute Consciousness. By allowing for prolonged invasive Procedures, general anesthesia is one of the foremost Achievements of modern medical science However, there Is no objective or widely accepted definition of general Anesthesia. The actions of general anesthetics depend on.

The concentrations reached, and include amnesia, Excitation, analgesia, hypnosis, and hyperreflexia at low Concentrations, and deep sedation, muscle relaxation, and Reduced motor and autonomic responses to noxious stimuli At higher concentrations For more than a century, two concepts the unitary Hypothesis and the Meyer-Overton rule, have dominated Although most general anesthetics strongly Depress neuronal activity In the thalamocortical system at Hypnotic concentrations, this is not necessarily the most

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Important mechanism of anesthesia induced loss of Consciousness. For example, ketamine produces Anesthesia without reducing cortical metabolism, glutamate as is the case with prefatal ventricular dysrhythmias such as premature ventricular contractions.

Release, or sensory information flow through the thalamus the potent antinociceptive effects of ketamine on NMDA receptors in the spinal cord and Its inhibition of Acetylcholine release from the pons also contribute to unconsciousness.In vitro studies on isolated cortical networks also indicate that direct anesthetic actions on cortical neurons are involved in the hypnotic. state These investigations demonstrated that the slowing of oscillatory activity in the gamma can be elicited by anesthetics in the absence of effects on subcortical structures, including the thalamus and midbrain.

2. AIM OF THE STUDY

The aim of study use of prophylactic nebulized steroids therapy on postoperative cough for heavy smoker patient under elective extra thoracic surgery

3. LITERATURE REVIEW

Endotracheal tube (ETT)

Endotracheal tube (ETT) intubation is one of the most important procedures performed by emergency physicians. Improper placement of the ETT, that is either too shallow or too deep, can lead to serious complications. It has been shown that in a patient whose right mainstem brochus was intubated, the incidence of hypoventilation, pneumothorax and atelectasis was increased (1-3). The proper position of the ETT is commonly confirmed by the auscultation of bilateral breath sounds. However, Brunel et al reported that 60% of intubations into the mainstem bronchus occurred despite the presence of equal breath sounds. Kazuna et al suggested that the fiberoptic bronchoscope (FOB) is more reliable than chest auscultation in confirming endotracheal tube position. The position of ETT depends on the distance from the mouth to the vocal cords and the tracheal length for oral ETT and the distance from the nose to the vocal cords and the tracheal length for nasal ETT. The proper placement of ETT must be placed suffi- ciently below the laryngeal 4 structures to permit ETT cuff inflation and minimize the risk of unexpected extubation or mainstem bronchial intubation with the patient's head movement. Conrardy et al demon- strated flexion and extension of the neck resulted in mean endotracheal tube tip movement of 1.9 cm toward and away from the carina respectively. Therefore, the proximal end of the cuff of the ETT must be placed at least 2 cm below the vocal cords to reduce impinge- ment on the vocal cords when the patient

moves his/her neck. The tip of the ETT should be placed at least 2 cm cephalad to the carina to reduce the risk of mainstem bronchial intubation with the patient's head movement. In the present study, the proper depth of ETT placement was calculated that the tip of the ETT should be placed at 2 cm cephalad to the carina.

Complications of general anesthesia for respiratory

General anesthesia has biological effects on the respiratory system and also results in mechanical and functional changes that enhance those effects. These effects begin with anesthetic induction and can extend into the postoperative period. General anesthesia reduces functional residual capacity, with an immediate and universal development of atelectasis in the dependent regions of the lung through three mechanisms compression of lung tissue, absorption of alveolar air, and impairment of surfactant function. The resulting ventilation perfusion mismatch leads to increased shunt, dead space and hypoxemia. Anesthetics, analgesics and other perioperative drugs affect the central regulation of breathing, changing the neural drive of the upper airway and chest wall muscles and further contributing to PPC. Overall, the intensity and coordination of the activities of several muscle groups and the preservation of biological mechanisms in the lung are the keys to shifting the balance toward recovery rather than severe respiratory complications. Additionally, immunosuppressive effects due to anesthesia and intraoperative transfusion have also been invoked as contributors to poor postoperative outcome is functional disruption of respiratory muscle movements, caused by incisions. The second is the effect of postoperative pain in limiting respiratory motion. The third is the reflex inhibition of the phrenic nerve and other nerves that innervate respiratory muscles, a result of stimulating the viscera by mechanical traction. As a consequence, in the postoperative period, normal respiratory muscle activity procedure duration or amount of blood lost, may by themselves increase the risk of PPC or may interact with the local effects described above. The postoperative immune response is extremely complex and has 6 detrimental procoagulant and immunosuppressive effects. Proinflammatory cytokines, especially tumor necrosis factor α and interleukin-6, are major players because of their roles in the systemic inflammatory response syndrome and multiple organ dysfunction after trauma. Again, immune depression, in this case provoked by the surgical insult, may be invoked as a mediator that increases the risk of postoperative respiratory infection and other complications.

Physiology of smokers

Tobacco smoke consists of more than 4000 particles of Toxic ciliatoxic and carcinogenic properties in gas and Particle phases Nonsmokers exposed to secondhand smoke in their environments are described as passive Smokers. Laryngospasm, bronchospasm aspiration, hypoventilation the risk for anesthesia and hypoxemia is 1.8 times greater in smokers compared to nonsmokers. This rate is 2.3 times higher in younger Smokers and 6.3 times higher in obese smokers. In addition, The risk of developing bronchospasm. are times higher in female smokers than in male smokers Tobacco smoke induces hepatic microsomal enzymes and therefore increases the metabolism of drugs such as Phenytoin, chlorpromazine, fentanyl, theophylline, and Others. While it has been shown that the dose requirements for benzodiazepine increase in smokers, there has been No change reported in lidocaine and corticosteroids Requirements.

Physiology of Cough

Cough is a powerful physiological mechanism that causes the central airways to be cleared of foreign material and Excess secretions. It is characterised by a violent expiration Which provides the high flow rates that are required to Shear away mucus and remove foreign particles from the Larynx, trachea, and large bronchi. Most sensory stimul That cause coughing also increase airway secretion, which is Beneficial as this provides a vehicle for expulsion of Particulate matter Cough is a very common presenting symptom in general Practice and in the chest clinic the prevalence of cough in the population depends on the prevalence of smoking and Other environmental factors and in different populations. The most common [16] Causes of cough are the virus induced acute upper res-Piratory tract infections, when the cough is usually non - Productive and self-limiting. In other patient's cough is Associated with increased mucus production or a chronic respiratory disease such as asthma; in a proportion of patients, however, no such cause is obvious at presentation and cough may persist for many years. When cough is Associated with sputum production, it is likely to be due to the excess secretion in the airway stimulating sensory Nerves. In the absence of abnormal sputum production There is likely to be some other reason for the cough. The Likely explanation would be an increased sensitivity of the Cough reflex, which would lead to the abnormal response of the patient to "natural" inhaled stimuli. In this review We will discuss the physiology of cough, the mechanism of Abnormal cough, the clinical investigation of unexplained Cough.

Management of cough

Management strategies depend on whether the cough is mainly productive or nonproductive. The treatment of Productive cough secondary to conditions such as chronic Obstructive airways disease, cystic fibrosis, and bronchi - Ectasis will depend on manipulation of mucus secretion (except during), which so far does not appear to be possible in man. During exacerbations the increased Cough and mucus production should respond to appro - Priate treatment of the infection and inflammation. The use of cough suppressants in these patients in theory could lead to retention of mucus and deterioration in the patient's Underlying disease. [19] Other conditions, such as carcinoma and Interstitial lung disease, may be less amenable to treatment. Patients who have cough associated with postnasal drip or Oesophageal reflux should respond to treatment of the Underlying cause.

Steroids Prophylactic

Routinely undergo endotracheal intubation to facilitate mechanical ventilation in the intensive care unit and operating room. As these patients recover, respiratory support is gradually reduced until the patient can breathe unaided and the endotracheal tube can be removed. Although extubation is generally uneventful in some patients' mechanical irritation by the endo - tracheal tube Critically ill patients and those undergoing surgery causes substantial laryngeal oedema, despite use of a high volume and low-pressure cuff or laryngeal ultrasound monitoring. Laryngeal oedema is one of the most common complications, can result in stridor and dyspnoea and need for reintubation. Such complications, particularly reintubation, might lead to a prolonged stay in intensive care, additional costs potential morbidity, and mortality. Any intervention that increases the chances of successful extubation is therefore of great interest. To avoid airway complications, patients are often given steroids before extubation. Prophylactic steroids substantially reduce the incidence of stridor after extubation in children and tend to decrease the rate of reintubation and stridor in neonates,6-9 but the findings might not be applicable to adults because of differences in anatomy of the upper airway and the approach to airway management.

Mechanistic Pharmacology and Physiology of Steroids

The anti-inflammatory properties of steroids have been attributed to their inhibitory effects on the action of phospholipase A2, an enzyme critical to the production of inflammatory compounds. Research has shown that steroids are active in affecting gene expression, translation, and enzyme activity. In short, they bring about their physiologic effects through a multitude of biochemical pathways. One such pathway is through their induction of the production of proteins called lipocortins. Glucocorticoids stem the production of inflammatory mediators such as leukotrienes and prostaglandins and effectively halt the inflammatory cascade. As their wide-ranging side effects indicate, glucocorticoids can impact many systems throughout the body. Through negative feedback regulation of the hypothalamic-pituitary-adrenal (HPA) axis exogenous glucocorticoids can directly induce hypopituitarism (Addison disease). Their actions on glucose metabolism can increase insulin resistance in tissues and increase fasting glucose levels. Glucocorticoids can act directly on osteoclasts to affect bone resorption and decrease calcium absorption in the gastrointestinal tract. methemoglobinemia in patients receiving large doses of prilocaine. Prilocaine, the parent compound, does not produce methemoglobinemia, but orthotoluidine, a primary metabolite of prilocaine, does induce the formation of methemoglobin, which is responsible for methemoglobinemia. When methemoglobin blood levels become elevated, clinical signs and symptoms are observed.

Dexamethasone

Dexamethasone is an adrenocortical steroid known as an anti-inflammatory drug. The inhibitory effects of dexamethasone on prostaglandins and enzyme production improve or prevent inflammation. Intravenous administration of dexamethasone along with antibiotics in patients with septic arthritis can have an anti-inflammatory effect and can reduce the rate of injuries and complications, and this severity of the disease.

Dexamethasone is a potent corticosteroid with gluconeogenic, immunosuppressive and anti-inflammatory properties. Dexamethasone is used for treating various inflammatory conditions, lymphomas and for inducing precocious fetal lung maturation in threatened preterm labor. The poor solubility of dexamethasone is circumvented by the formulation of a phosphate ester prodrug, which allows rapid input after parenteral administration. However, an analytical issue associated with the use of DSP is its ex vivo hydrolysis to dexamethasone by plasma enzymes after sample collection. This causes overestimation of dexamethasone concentrations after parenteral administration at early

time points. This artifact produces pharmacokinetic profiles with elevated biexponential character.

Pulmicort nebulizer

Is a medication of the corticosteroid type It is available as an inhaler, nebulization solution, pill, nasal spray, and rectal forms The inhaled form is used in the long-term management of asthma and chronic obstructive pulmonary disease (COPD) The nasal spray is used for allergic rhinitis and nasal polyps. The pills in a delayed release form and rectal forms may be used for inflammatory bowel disease including Crohn's disease, ulcerative colitis, and microscopic colitis.

Nasal budesonide inhalers have been associated with a number of side effects. These include nose irritation or burning, bleeding or sores in the nose, lightheadedness, upset stomach, cough, hoarseness, dry mouth, rash, sore throat, bad taste in mouth, change in mucus, and blurred vision. Other symptoms which should be reported immediately include difficulty in breathing, swelling of the face, white patches in the throat, mouth, or nose, irregular menstrual periods, severe acne, and on rare occasions, behavioral changes (mostly affecting children).

Pharmacology, Budesonide is an agonist of glucocorticoid receptors. Among its effects are:

- Controls the rate of protein synthesis.
- Depresses the migration of polymorphonuclear leukocytes and fibroblasts
- Reverses capillary permeability and lysosomal stabilization at the cellular level to prevent or control inflammation.
- Has a potent glucocorticoid activity and weak mineralocorticoid activity

Pharmacokinetics

- Onset of action: Nebulization: 2–8 days; Inhalation: 24 hours; Nasal: 10 hours
- Peak effect: Nebulization: 4–6 weeks; Inhalation: 1–2 weeks
- Distribution: 2.2-3.9 L/kg
- Protein binding: 85% to 90%
- Metabolism: Hepatic via CYP3A4 to two metabolites: 16 alpha hydroxy prednisolone and 6 beta-hydroxy budesonides; minor activity 13.
- Budesonide is extensively metabolized in the first pass, resulting in a low bioavailability and systemic effects [43].

- Bioavailability: Capsule: 9% to 21%; Nebulization: 6%; Inhalation: 6% to 13%
- Half-life elimination: 2–3.6 hours.
- Time to peak: Capsule: 0.5–10 hours (variable in Crohn's disease); Nebulization: 10–30 minutes; Inhalation: 1–2 hours; Tablet: 7.4-19.2 hours.

Common side effects with the inhaled form include respiratory infections, cough, and headaches. Common side effects with the pills include feeling tired, vomiting, and joint pains. Serious side effects include an increased risk of infection, loss of bone strength, and cataracts. Long-term use of the pill form may cause adrenal insufficiency. Stopping the pills suddenly following long-term use may therefore be dangerous. The inhaled form is generally safe in pregnancy. Budesonide chiefly acts as a glucocorticoid.

4. METHODOLOGY

The clinical evaluation was conducted for 6 weeks at Al-Hussein and Nasiriyah Hospitals General Hospital clinical cases of several patients of different ages were used. The patient was admitted for surgery and after the operation was performed outside the chest. The patient was given some nebulized steroid treatments to reduce cough in the king patients. For such treatments

(Pulmicort, dexamethasone) In smoking patients undergoing extra thoracic surgery It ran from November 2023 to February 5, 2024. Many cases were used the total number of cases is 80 cases at different ages ranging from years and for male smokers only. Patients with all levels of cough were selected because we want to get rid of all types of coughs.

On the morning of surgery. Patients were randomly assigned to one of two groups 1 (dexamethasone) or 2 (Pulmicort). After surgery, the patient was transferred to the recovery room. Group 1 received an intravenous dose of dexamethasone 1 mg, and Group 2 received the same inhaled amount of pulmicort. After Pulmicort is administered via a nebulizer and dexamethasone, it is given intravenously in group (1)

We see that the patient's oxygen saturation in the blood before he was given Spo2 (96%) and after he was given dexamethasone IV, rose until the oxygen saturation in the blood became 99% with some sensitivity in some areas of the body. In group (2)

We see that the patient's oxygen saturation in the blood before he was given Spo2 (95%) and after he was given Pulmicort By device Nebulizer, rose until the oxygen saturation in the blood became 99% Without any sensitivity in any area of the body After we gave the patients the treatments from each group and each group had a method of administering them, the patient was connected to a monitoring.

device to monitor the patients' vital activities, which are Spo2, ECG, temperature, and blood pressure as well. The monitoring included 10 minutes for each patient, after which the patient was removed. In addition, we studied and investigated some research and studies that aimed to investigate and compare both dexamethasone and Pulmicort in the prevention of cough after the operation. We wrote down all the results of these studies, which include 7 studies, and put the results on a table for comparison and viewing of the results in a simpler and better way. We divided the results of these studies into several times to prevent cough, starting from (0-24) h, (0-6) h and (6-24) h. The results shown include both drugs separately.

5. RESULTS

The data was analyzed using the statistical program IBM SPSS Statistic 28 the results attached below were obtained based on the following hypotheses and aim of this study (The aim of study use of prophylactic steroids therapy on postoperative cough for heavy smoker patient under elective extra thoracic surgery).

The null hypothesis

There is no significant difference between intubation and extubation at a significant level above 0.05

M2≠: M1 H0

The alternative hypothesis

There is a significant difference between intubation and extubation at a significant level below 0.05

M2=: M1 H1

To verify the above hypotheses, we conducted a chi-square and test T-test independent samples the results were as follows:

Table (1): descriptive Statistics for data research.

Descriptive Statistics		
	(group1) dexamethasone (n=40)	(group2) Pulmicort (n= 40)
	(Mean + std. deviation)	(Mean + std. deviation)
Age	33.90 + 14.867	31.32 + 13.874

gender	1 + 0	1 + 0
Smoker patients	1 + 0	1 + 0
shortness of breath	1.08 + 0.267	1.01 + 0.151
spo2	98.00 + 1.062	97.85 + 1.122

In the table (1) we shown the descriptive Statistics (mean and std. deviation) for data research (age, gender, smoker patients, cough, shortness of breath and Spo2) where shown 80 cases in the study and age between (17-65) years and Spo2 from (95-100) %.

Table (2): cross-tabulation between cough and shortness of breathing.

cough * shortness of breath Cross tabulation				
		shortness of breath		Total
		no	yes	
Cough	No	36	2	38
	Yes	41	1	42
Total		77	3	80

p. value (0.462 NS)

in the table (2) we note the cross-tabulation between cough and shortness of breathing in this study where a p. value (0.462 NS) non-significant data research.

1. (36) patients without cough and shortness of breath.
2. (2) patients have shortness of breath without cough.
3. (41) patients have cough without shortness of breath.
4. Only one patients have both cough and shortness of breath.

Table (3): statistical analysis for data research (cough).

Group Statistics						
	drug used	N	Mean	Std. Deviation	Std. Error Mean	**p. value**
Cough	dexamethason	40	1.29	0.461	0.072	**< 0.001 HS**
	pulmicort	40	1.77	0.427	0.068	**< 0.001 HS**

In the table (3) we shown the statistical analysis (mean) for data research according to drug used (1.29) (1.77) respectively at p. value for decatron (< 0.001 high Significant statistic) and (< 0.001 high significant statistic).

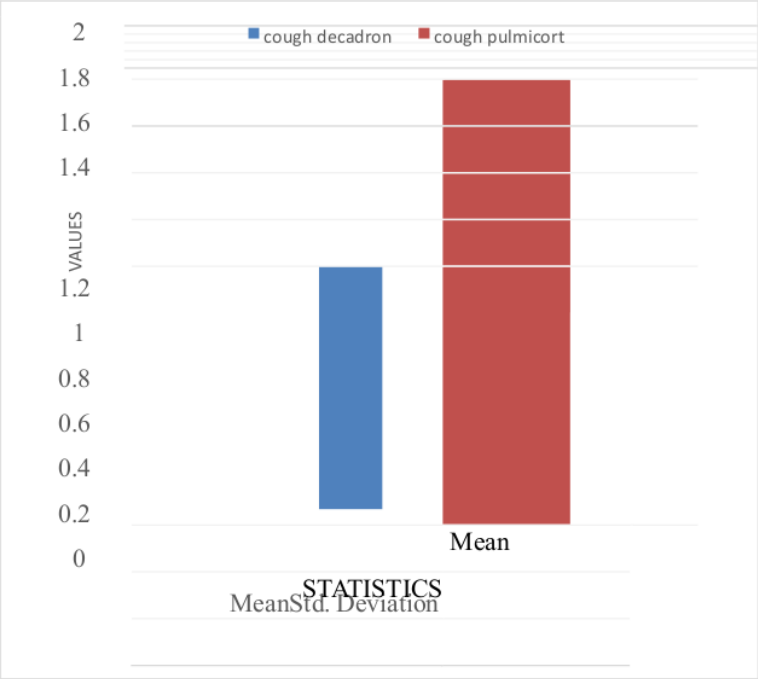

Figure (1): mean and std. deviation for drug on cough.

From the results above, a decision is made to reject the null hypothesis and accept the alternative hypothesis Which proves that there is a high significant statistic with statistical significance for both group (dexamethasone and Pulmicort) in effect of patients on (cough and shortness of breath) and this occur due to the data with the higher average, as shown in the tables above.

6. DISCUSSION

In this study, it was attempted to determine the effect of steroids therapy on postoperative cough in patients smoking. And there was high-significant data for each drug group.

From this data we note that from study questionnaire the use of nebulizer pulmicort which is making less side effect on patients from than using systemic dexamethasone to patients. and be better drug used for patient who have chronic disease such as (hypertension, diabetic mellitus, problem in respiratory system and complication.

In the table (1) we shown the descriptive Statistics (mean, median, mode, std. deviation, mini and maximum) for data research (age and Spo2) where shown 80 cases in the study and age between (17-65) years and Spo2 from (95-100) %.

in the table (2) we note the cross-tabulation between cough and shortness of breathing in this study where a p. value (0.462 NS) non-significant data research.

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In the table (3) we shown the statistical analysis (mean) for data research according to drug used (1.29) (1.77) respectively at p. value for decadron (< 0.001 high Significant statistic) and (< 0.001 high significant statistic).

We used the same dose of dexamethasone in both groups and controlled confounding factors that can affect POST, including type of endotracheal tube, type of cuff and intra cuff pressure, type of operation, and duration of tracheal intubation. In addition, the same analgesics were used in all subjects in both groups, and we confirmed that the severity of postoperative pain and the dose of analgesics used during the study period were not different between the groups, thus excluding.

potential distraction effects. Therefore, the differences in the severity scores of POSTS were attributable only to the difference in the timing of dexamethasone administration.

We used a single 10-mg dose of dexamethasone, which was similar to the doses used in previous studies. Potential side effects of dexamethasone include hyperglycemia, peptic ulcer, increased susceptibility to infection, and electrolyte imbalance. However, the risk of side effects from single-dose steroid therapy seems to be negligible. The incidence of POST in our study was higher than expected.

Despite many improvements in anesthesiology and surgical procedures, major postoperative complications may be occurred.

Sore throat and hoarseness are the most common endotracheal complications during 24 hours after surgery. According to Park et al. study, they demonstrated that prophylactic IV Dexamethasone 0.2 mg/kg significantly reduced the incidence and severity of post-operative sore throat and hoarseness in patients receiving a double lumen tube for one-lung ventilation during thoracic surgery. The results of this study correlate with our findings in which we explained that Dexamethasone can reduce the prevalence and severity of post extubation sore throat and cough.

7. CONCLUSION, RECOMMENDATION and LIMITATION

Conclusion

Nebulized steroid had better effect other systemic steroid in reducing post op pulmonary complications. from all results in this study, we can conclude that there is a significant effect on shortness of breath and high significant data variable effect on cough according to data research.

Recommendation

We recommended to use pulmicort than using dexamethasone and we recommended it for our researcher to do.

1- To do research in different interventions in preventing opioid-induced cough.
2- Use any type of steroid drug in smoker patients.
3- Do research in another area and time same to this research to compare between us.
4- Making research about comparison of two drug as a steroid.
5- Doing research about the effect of steroid on hemodynamic.

Limitation

1- short period.
2- single study centre.
3- uncooperative patients.

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