

Review Article

Review of Ayurvedic Sangyanasha and comparative study of Injection Ketamine and Injection Etomidate as an intravenous induction agent

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ABSTRACT:

Ayurveda is an ancient global science. There are so many references of various surgeries for various diseases in different ancient classics of Ayurveda. Acharya Sushruta is considered as the “Father of Surgery” in Ayurvedic sciences. During the period of Acharya Sushruta it is considered that surgery in our country was on its peak; as there are so many references are present in Ayurvedic classical texts for performing various surgeries.

Acharya Sushruta was very cautious regarding anaesthesia before surgical procedures. For reducing the painful surgical stimulus as well as for keeping patients calm and reducing their anxiety some preoperative preparations of the patients are mentioned in Sushruta Samhita. Also there are some references regarding anaesthetic potential of few Ayurvedic drugs in ancient classical texts. Here we are going to review the references of Sangyanasha in Ayurvedic science in ancient period and also going to study their effectivity in preoperative period.

Also we are going to do the comparative study of the intravenous induction effect of injection ketamine and injection etomidate. And also we are going to study the comparative study of pharmacodynamic, pharmacokinetics, mechanism of action and effects & side effects of both of these injections.

KEY WORDS: Induction, Receptor, Non-barbiturate, Laryngospasm, Intracranial tension, Analgesic.

INTRODUCTION:

Ayurveda is an ancient global science. There are so many references of various Shalyakarma's for various Vyadhi's in different ancient classics of Ayurveda. Acharya Sushruta is considered as the “Father of Surgery” in Ayurvedic sciences. During the period of Acharya Sushruta, surgery was on its peak; as there are so many references are present in Ayurvedic classical texts for performing various surgeries.

Also in that period, Acharya Sushruta was very cautious regarding Sangyanasha i.e. anaesthesia before surgical procedures. For reducing the painful surgical stimulus as well as for keeping patients calm and reducing their anxiety some preoperative preparations of the patients regarding their diet and

also for anaesthesia some specific management had been mentioned in Sushruta Samhita.

Objectives :

To review the Ayurvedic references regarding anaesthesia in ancient period of Sushrutacharya and review their effectivity to conduct surgical procedure successfully by reducing anxiety of the patients and also by diminishing painful surgical stimulus during procedure.

Also here we are going to consider comparatively the effects of Injection Ketamine and Injection Etomidate as an intravenous induction agent.

This study is particularly the comprehensive review of the clinical uses, pharmacology, pharmacokinetics, pharmacodynamics, mechanism of action and side effects of injection ketamine versus injection etomidate as an intravenous induction agent.

प्राकशस्त्रकर्मणां चेष्टां भोजयेत् आतुरं भिषक ।

मद्यपं पाययेन्मद्यं तीक्ष्णं यो वेदनासहः ॥

सु. सू.१७/११

As mentioned in above reference, light diet is given to the patient before surgery; which prevent patient from shock during procedure. Also Alcohol is used to reduce the sensation of painful surgical stimulus during procedure.

Also there are references regarding few Drugs like “Bhanga” in Bhawprakasha which have anaesthetic potential and can be use for producing amnesia during procedure.

भंगा कफहारी तिक्ता ग्राहिणी पाचनी लघुः ।

तीक्ष्णोष्ण पित्तला मोहमद वाग्वन्हि वर्धिनी ॥

भाप्रकाश

There is also a reference regarding “Sangyavaha Nadi” in which it is mentioned that because of influence of Tamo Gunatmaka Ahara and Vihara, Sangyavaha Nadi's get vitiated ; which leads to loss of consciousness of that particular person which makes loss of sensation of that person for any stimuli. This quality of some Tamo Gunatmak drugs is particularly useful for producing amnesia for temporary period by adjusting their dosages and produce unconsciousness for that particular period of surgery.

संज्ञावहासु नाडीषु पिहिता स्वनिलादिभिः ।

तमोऽभ्युपैति सहसा सुखदुःखव्यपोहकृत ॥

सु.उ. ४६/६

All these references shows Ancient Ayurvedic Acharya's are very cautious regarding preoperative preparation of the patients and intraoperative anaesthetic management in order to reduce their anxiety and reduce the sensation of painful stimuli during surgical procedures.

Now while looking towards the ideal intravenous induction agent, we can observe that, both of these Injection ketamine and injection etomidate are non-barbiturates. Injection ketamine can be used as induction agent in certain situation as a sole anesthetic agent generally for minor surgeries. While

injection etomidate is a unique drug used for induction of General Anesthesia and sedation. Etomidate is most cardiovascular stable agent among all intravenous anesthetic agents.

History of drugs

Inj. Ketamine was introduced commercially in 1970 with manufacturer's description as a general anesthetic rapidly acting non barbiturate. Ketamine was synthesized by stevens in 1962 and first used in humans by Domino and Corssen in 1965.

1st report on Inj. Etomidate was published in 1965 as one of several dozen arylalkyl imidazole-5-carboxylate esters synthesized by Janssen Pharmaceutical. Etomidate chemically is an imidazole derivative. It acts through GABA. Etomidate is a unique drug used for induction of General Anesthesia & sedation.

Mechanism of Action :

Injection Ketamine is phencyclidine derivative it contains preservative benzethonium chloride whereas injection etomidate is an imidazole derivative and it act's through GABA.

Injection Ketamine is acidic (PH is 3.5 to 5.5) and is highly lipid soluble anesthetic agent. While injection etomidate is highly fat soluble anesthetic agent and characterized by a large central volume of distribution 4.5 lit/kg and a very large peripheral volume of distribution 74.9 lit/kg.

Pharamacokinetics :

Ketamine is highly lipid soluble and undergoes rapid breakdown and redistribution to peripheral tissues whereas in healthy patient etomidate is approximately 75% protein bind and it is highly fat soluble.

Ketamine is metabolized extensively in the liver by N-demethylation and ring hydroxylation pathways. Whereas the fast, intermediate and slow declines in plasma etomidate are thought to correspond to respectively, distribution into highly perfused tissue redistribution into peripheral tissues and terminal metabolism hepatic esterase hydrolysis drag to a carboxylic acid and ethanol.

Ketamine is excreted in urine and faces whereas carboxylate metabolite is excreted mostly in urine & lesser degree in bile.

Pharmacodynamics :

Ketamine stimulates the cardiovascular system, resulting in an increase in heart rate, blood pressure and increase in cardiac output. Whereas etomidate is considered as a most cardiovascular stable agent among all IV agents. At typical anesthetic induction does produces minimal heart rate and blood pressure changes.

Ketamine increase salivation and muscle tone while in injection etomidate induction there is no histamine release and salivation and very rare allergic reaction.

Injection ketamine is very good analgesic agent also produces airway relaxation by acting on various receptor and inflammatory cascades and bronchial smooth muscles while etomidate doesn't have analgesic property & have highest incidence of nausea and vomiting among all intravenous anesthetics.

Inj. Etomidate does not inhibit myocardial function so intravenous anesthetic of choice for patients with cardiac diseases. Whereas injection ketamine increases myocardial oxygen demand so contraindicated in ischemic heart disease.

Inj. Ketamine raised intracranial pressure markedly so contraindicated in head injury while inj. Etomidate is considered as neuroprotective and cause minimal raise in intracranial pressure & tension.

OBSERVATION :

Here we can observe that in ancient period anesthetic management before any surgical procedure was considered as very important procedure in terms of reducing painful surgical stimulus during procedure and keeping patient calm and relax during procedure which makes patient mentally hopeful and patients can face the situation with positive mind set.

Here we also observe the references regarding anaesthetic potential of few Ayurvedic drugs which proves that anaesthesia techniques were strictly adopted before any surgical procedures in ancient period in terms of improving patients positive approach towards surgery. Also here we observe few reference in ancient period regarding vitiation of Sangyavaha Nadis due to vitiated Doshas which produces symptoms of amnesia.

Regarding comparative study of both intravenous injections we can observe that, Ketamine causes

increase in pharyngeal and respiratory secretions which can cause laryngospasm while etomidate doesn't cause salivation.

Inj. Etomidate have highest incidence of nausea and vomiting among all intravenous anesthetics. Whereas induction of injection ketamine is pleasant.

Inj. Ketamine have very high incidence of hallucinations and emergence reaction which is not pleasant to patient attendants & other patients. Whereas injection etomidate doesn't have this incidences and very rare allergic reactions.

Inj. Ketamine can increase intracranial tension & pressure markedly also increases myocardial oxygen demand, heart rate & blood pressure. Whereas inj. Etomidate does not inhibit myocardial function & causes minimal heart rate & blood pressure changes.

Inj. Etomidate doesn't have analgesic property where as inj. Ketamine is very good analgesic agent.

RESULTS :

As mentioned in ancient Ayurvedic classics, few Ayurvedic drugs like Bhanga have anaesthetic potential and can be use for producing amnesia during procedure by adjusting their dosages and removing poisonous contents.

Also here we can understand that intake of alcohol was very useful in ancient period before any surgical procedures for reducing sensation of the painful surgical stimulus during procedure; and also light diet before procedure can prevent patient from shock.

Regarding comparative study of both intravenous anaesthetic drug we can understand that, both methods of intravenous induction of inj. Ketamine and inj. Etomidate are effective in maintaining hemodynamic stability as per the type of the patient selected for the intravenous induction as per their ages, systemic stability & previous histories of particular disorders.

Patient with cardiac tamponade and constrictive pericarditis ketamine provides excellent anesthetic induction & maintenance while considering induction with inj. Etomidate nausea & vomiting incident is highest among all IV anesthetics.

Also inj. Ketamine is very useful for rapid sequence induction in hemodynamically compromised patient.

DISCUSSION :

As mentioned in ancient Ayurvedic classics, in the period of Sushrutacharya, surgery as well as preoperative preparation of the patients regarding their diet and anaesthesia techniques had lots of importance. Ancient Acharya's was very keen about improving patients quality of life.

Various preparations are mentioned in ancient Ayurvedic classics regarding anaesthesia techniques for reducing painful surgical stimulus during procedure. Also preoperative diet management and mentally and physically preparation of the patients had very importance in that period.

Regarding comparative study of Injection ketamine and injection etomidate we can see that injection Etomidate have highest incidence of nausea and vomiting among all intravenous anesthetics. Whereas induction of injection ketamine is pleasant

Injection Ketamine can increase intracranial tension & pressure markedly also increases myocardial oxygen demand, heart rate & blood pressure. Whereas inj. Etomidate does not inhibit myocardial function & causes minimal heart rate & blood pressure

Injection ketamine is very good analgesic agent also produces airway relaxation by acting on various receptor and inflammatory cascades and bronchial smooth muscles while etomidate doesn't have analgesic property & have highest incidence of nausea and vomiting among all intravenous anesthetics.

Injection Ketamine causes increase in pharyngeal and respiratory secretions which can cause laryngospasm while etomidate doesn't cause salivation.

CONCLUSION :

In ancient period at the time of Acharya Sushruta, surgical science was on its peak and also ancient acharya's was very keen about premedication's and preoperative anaesthetic management of the patients to make them calm and relax during surgical procedures by reducing painful surgical stimulus during procedure with the help of alcohol intake and light diet.

Here we can understand that intake of alcohol was very useful in that period for reducing the sensation of painful surgical stimulus during procedure; while light diet before procedure can prevent patient from

shock. Also few Ayurvedic drugs having anaesthetic potential are also mentioned in some Ayurvedic classics like Bhangha which is also very useful for producing amnesia by adjusting their dosages and removing impurities.

While considering comparative study of Injection ketamine and injection etomidate, From above observations we can conclude that ketamine is a safe and valuable alternative of etomidate for endotracheal intubation in critically ill patient with sepsis.

Also from above observations we understand that, inj. Etomidate doesn't have analgesic property while inj. Ketamine is very good analgesic agent.

But while considering patients of ischemic heart disease inj. Ketamine induced increase in myocardial oxygen demand can be life threatening so etomidate should be preferred in such cases as etomidate is considered as a safest intravenous anaesthetic drug for cardiac patients.

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