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UPDATED TOTAL INTRAVENOUS ANAESTHESIA (T.I.V.A.)

ESSAY

By

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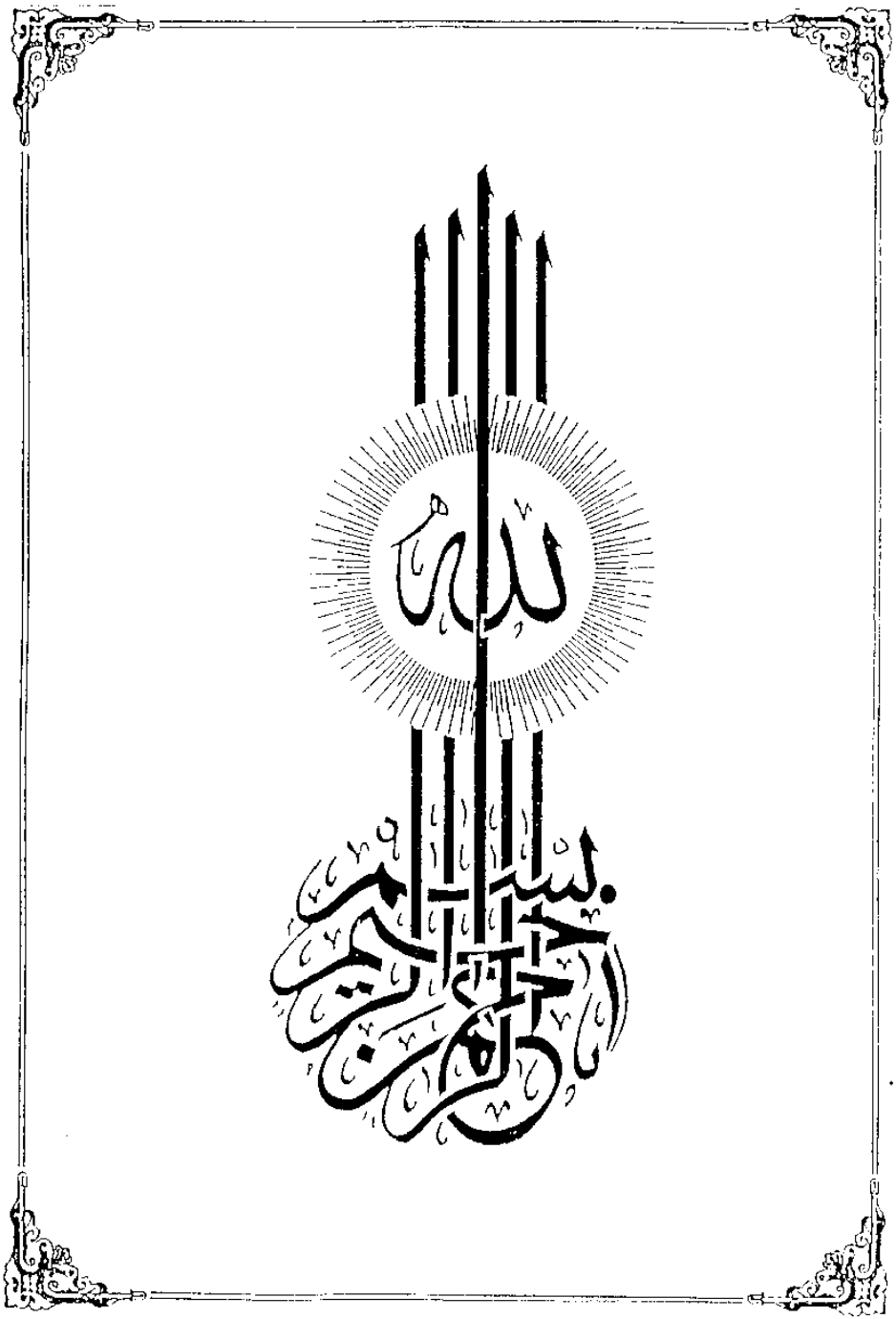

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TO..
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INTRODUCTION

Inhalational agents have remained the routine choice for maintenance of anaesthesia. However, concern has been expressed over pollution of the operating environment. It has also appeared that inhalational agents can have toxic effects for the patients on repeated or prolonged exposures. Furthermore, total intravenous anaesthesia (TIVA) proved to have its advantages in certain operations and in patients with certain medical problems.

Propofol is the best intravenous anaesthetic for TIVA. Others that can be used are methohexitone, ketamine and midazolam. The use of etomidate is controversial. Alfentanyl, sufentanyl and fentanyl are the best opioids. Atracurium and vercuronium are the best muscle relaxants, while mivacurium is claimed to have an important role.

Many factors govern the pharmacokinetics of intravenous infusion of drugs. These factors must be understood in order to plan suitable dosage regimens. Infusion equipment vary from the gravity controllers or pump systems to the recent introduction of computer assisted continuous infusion.

Close monitoring during TIVA aims at the maintenance of adequate depth of anaesthesia as

well as the prevention and detection of the possible complications that may occur.

HISTORY OF TOTAL INTRAVENOUS ANAESTHESIA (T.I.V.A)

The development of TIVA to reach its present state depended upon advances in pharmacology and technology ***(Fragen., 1992)***.

The objectives of anaesthesia administration (intravenous or inhalational) is to rapidly obtain and maintain anaesthesia and provide rapid recovery following termination of administration ***(Glass et al.,*** 1990). The use of intravenous anaesthesia for these purposes has been limited by the lack of a suitable drug. With the introduction of sodium thiopentone in 1934. intravenous induction was popularized . However, thiopentone is not suitable for the maintenance of anaesthesia, especially for long procedures ***(Glass et al., 1990)***. During the last thirty five years, numerous intravenous anaesthetics have been introduced such as methohexitone in 1957, ketamine in 1966, etomidate in 1973 and propofol in 1977, as well as hypnotics such as diazepam in 1966 and midazolam in 1978, and also analgesics such as fentanyl in 1959, sufentanyl in 1979 and alfentanyl in 1980 . The aim was to produce drugs with rapid clearance from the plasma and short half-life. These changes in the pharmacokinetics of the available drugs have

allowed them to be utilized, not only for induction, but also for maintenance of anaesthesia *(Glass et al., 1990)*. The introduction of propofol to clinical anaesthesia is the special event that provoked an interest in TIVA. All previously available intravenous anaesthesia were likely to result in prolonged drowsiness *(Fragen., 1992)*.

The advances in pharmacology were accompanied by advances in methods and equipment of intravenous drug administration *(Morgan., 1987)*. The first syringe was developed in 1853 by Alexander Wood *(Morgan., 1987)*. Repeated injections of incremental doses were used to maintain anaesthesia for many years since 1934 . However, the introduction of drugs with suitable pharmacokinetic profiles encouraged the use of continuos infusion. This required a method for accurate administration of known volumes over prolonged periods of time . The first method of continuos infusion was to administer the drug, usually in a dilute form, using an ordinary infusion set incorporating a pediatric burette, and controlling the infusion rate manually *(Morgan., 1987)*.

The introduction of the infusion pumps was a considerable advance . But, particularly important

was the development of the syringe pump, which allowed administration of a small volume over a prolonged period of time ***(Glass et al., 1990)***.

The latest technologic development in intravenous anaesthesia has been the introduction of "computer assisted continuos infusion" (CACI) by Schwilden in 1981 ***(Glass et al., 1990)***. In this technique, a computer controlled infusion pump is used to infuse the drugs. This pump is driven by the published pharmacokinetics of the various drugs. This technique can be used to attain the desired plasma levels of the drugs ***(Glass et al., 1990)***.

TIVA is gaining popularity due to the advances that developed it ***(Fragen., 1992)***. The best drugs available for TIVA are : the hypnotic propofol, the opiates alfentanyl and sufentanyl and the muscle relaxants atracurium and vecuronium. When the muscle relaxant mivacurium is approved by the Food and Drug Administration (FDA), it will have a shorter duration of action and a more rapid recovery than any other nondepolarizing muscle relaxant ***(Fragen ., 1992)***.