Original Research Paper

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TOTAL INTRAVENOUS ANAESTHESIA FOR INTRA-OPERATIVE NEUROPHYSIOLOGICAL MONITORING PRESERVING CRANIAL NERVES DURING CEREBELLOPONTINE ANGLE TUMOUR DISSECTION-A CASE REPORT.

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ABSTRACT

OBJECTIVE: Effect of Total Intravenous Anaesthesia(TIVA) on neurophysiological monitoring , preserving cranial nerves during cerebellopontine angle tumour dissection.

CASE REPORT: A 50 year old male patient presented with unilateral hearing loss, tinnitus, generalized weakness, right sided facial hypesthesia and tongue deviation for the last two months.Intubation was done with loading dose of inj rocuronium 0.6mg/kg. Anaesthesia was maintained with infusion propofol @ 100µg/kg/min and inj fentanyl 1µg/kg keeping BIS within 40 to 60 and TOF < 0.7. Computerized electrodes are connected to frontalis,orbicularis oculi and oris, mentalis, masseter, trapezius, tongue and abductor pollis brevis muscle corresponding to cranial nerves VII,III,XI,XII and median nerve for neurophysiological monitoring integrating cortical sensory evoked potential(SSEP) and Transcranial motor evoked potential(TcMEP).

OBSERVATIONS: Propofol induction produced amplitude depression in cortical SSEPs with rapid recovery after termination of infusion.With electrical or magnetic elicited MEPs it had demonstrated a depressant effect on response amplitude,consistent with cortical effect.Although propofol did not appear to enhance cortical response ,rapid metabolism allows rapid adjustment of the depth of anaesthesia and effects on evoked potential.Fentanyl produced minimal changes in spinal and sucortical SSEP recordings and some depression of amplitude and an increase of latency in the cortical response.Myogenic response from MEPs with electrical and magnetic stimulation showed only mild amplitude decreases and latency increased with the opiods.

CONCLUSION: TIVA has minimal effect on SSEP and TcMEP thus facilitating smooth intraoperative neurophysiological monitoring,however the critical component of teamwork underlies the entire process

KEYWORDS : Neurophysiological Monitoring,SSEP,TIVA and TcMEP

INTRODUCTION

Intraoperative neurophysiological monitoring(INM) has been utilized in an attempt to minimize neurological damage during surgery, to identify important neural structures in the operative field, and thus to avoid and/or limit significant postoperative impairments[1].The modalities used were Transcranial motor evoked potential(TcMEP), Somatosensory evoked potential(SSEP) and electroencephalography (EEG).Currently, one of the most commonly used anesthetic regimens for INM is Total intravenous anaesthesia, with a combination of propofol and opioids having minimal effect on evoked potential compared to other anaesthetic agents[2].

CASE REPORT

A 50 year old male patient presented with right sided unilateral hearing loss, tinnitus, generalized weakness of lower limbs, right sided facial hypaesthesia and left sided tongue deviation for the last two months ,diagnosed with cerebello pontine angle tumour involving cranial nerves V, VII, VIII and XII.

ANAESTHETIC MANAGEMENT

Preoxygenation was done for three minutes. Premedication was done Inj Glycopyrrolate 0.01mg/kg, Inj Fentanyl 1µg/kg and Inj Ketorolac 1mg/kg.Induction was done with Propofol 2mg/kg and muscle paralysis was achieved with loading dose of inj Rocuronium 0.6mg/kg.Maintaince of anaesthesia was achieved with Inf Propofol 50- 150µg/kg/min @ 30ml/hr and Inf Fentanyl 1µg/kg/hr @0.5ml/hrPatient's airway was secured with 8.0mm flexometallic ET tube and confirmed the same by five point chest auscultation. Transcranial motor evoked potential(TcMEP) of cranial nerves V,VII,XI, and XII were assessed through attachment of computerized electrodes to corresponding muscles named-masseter,frontalis,b orbicularis oculi and oris,mentalis,trapezius and intrinsic muscle of tongue.

OBSERVATIONS

TOF was assessed by median nerve somatosensory evoked potential through attachment of computerized electrodes to abductor pollicis brevis muscle and maintained below 0.7 throughout the procedure.Bispectral index(BIS) was assessed from EEG spectra and maintained between 40 to 60 throughout the procedure.To maintain a steady level of anaesthesia any adjustments should be gradual. Neurophysiology monitoring includes two channels of EEG which will indicate if the patient is “too deep” by the presence of a “burst suppression” EEG pattern. Conversely if the is “too light” the monitoring can be adversely affected by too much spurious muscle artifact as the patient tenses up.

Table- Intraoperative Haemodynamic parameters

TIME	MAP (mm of Hg)	PR (per min)	SPO2(%)	ETCO2 (mm of Hg)	Temperature(°c)
0-Min	88	95	100	36	36.7
15-Min	89	97	99	37	37.2
30-Min	92	96	100	38	36.6
45-Min	85	90	99	35	36.6
60-Min	87	89	99	40	36.5
75-Min	85	88	99	39	36.4
90-Min	90	96	98	41	36.3
105-Min	93	93	99	36	36.7
120-Min	91	86	98	35	36.4

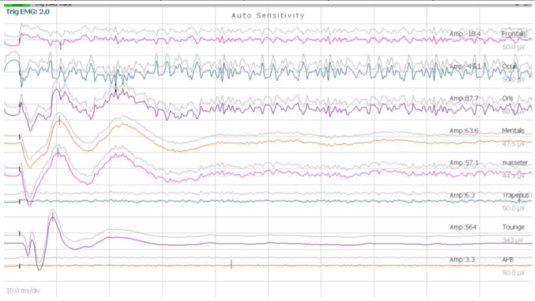
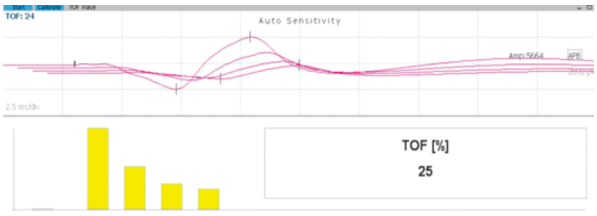
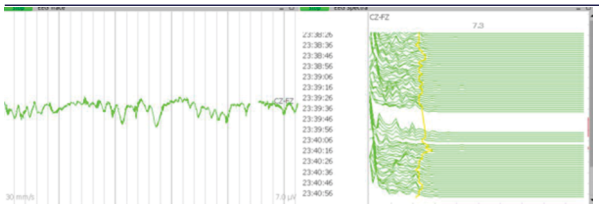


Fig A: Intraoperaive evoked potential of mentalis(CN-VII),Masseter(CN-V) and Intrinsic tongue muscle(CN-XII)



FigB: Intraoperative TOF count.



FigC:Assessing awareness through BIS calculated from EEG spectra.

DISCUSSION

Inhalational and intravenous anesthetic agents have effects on neural synaptic and axonal functional activities, the anesthetic effect on any given response will depend on the pathway affected and the mechanism of action of the anesthetic agent(i.e., direct inhibition or indirect effects based on changes in the balance of inhibitory or excitatory inputs)[3].In general, responses that are more highly dependent on synaptic function will have more marked reductions in amplitude and increases in latency as a result of the synaptic effects of inhalational anesthetic agents and similar effects at higher doses of intravenous agents. Hence, recording cortical somatosensory evoked potentials and myogenic MEPs requires critical anesthetic choices for INM[4].

Propofol, which is thought to act on GABA receptors,causes a decreased amplitude in cortical SSEPs and MEPs at high concentrations, is rapidly metabolized and can be easily titrated to levels that enable MEP generation because of rapid metabolism[4].

Opioids preserve SSEPs and MEPs at high doses. This allows for very good analgesia.They cause a dose dependent decrease in amplitude and increased latency. Even at high doses (60 μg/kg), the use of fentanyl results in reproducible SSEPs, making it an ideal agent during INM[5].
Volatile agents and nitrous oxide decreases amplitude and increases latency of evoke potential whereas muscle relaxants abolish TcMEP and SSEP,therefore avoided during INM[5].

MAP was maintained above 60 mm of hg,hypothermia was avoided and adequate ventilation was provided to prevent raise in intracranial pressure,thus maintaining evoked potential[5].

CONCLUSION

Compared to other anaesthetic agents propofol and opiods have minimal effect on MEP and SSEP ,thus making TIVA an ideal modlity for INM. Although the choice and management of anesthesia is important to the success of IOM, the critical component of teamwork among surgeons,anaeathesists and neurophysiological monitoring team underlies the entire process.

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