

# Index of consciousness monitoring is possible with placement of electrodes in the occipital region

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Monitoring the depth of anaesthesia reduces the risk of intra-operative awareness as well as the anaesthetic requirements.<sup>[1-3]</sup> Thus, it improves the quality of anaesthesia leading to a faster and better recovery.<sup>[3,4]</sup> Various modalities are available for monitoring the depth of anaesthesia such as bispectral index (BIS), entropy, cerebral state index (CSI) and index of consciousness (IoC). We routinely use IoC monitor in our hospital, which is a symbolic dynamic evaluation of a continuous processed electroencephalography (EEG). The IoC is a scale ranging from 0 to 99, where adequate anaesthesia is indicated by a value in the range of 40–60. Its manufacturer advocates placement of three silver chloride electrodes, a red and a yellow on the forehead of patient and a green one on the zygomatic bone. Surgeries involving the forehead and face do not allow access for IoC electrodes placement. We tried utility of this monitoring by placing the electrodes on occipital region so as to propose an alternate site for electrode placement. We selected two follow-up patients of frontotempoparietal decompressive craniectomy, posted for cranioplasty under general anaesthesia. The electrodes of an IoC-view monitor (Morpheus Medical, Barcelona, Spain) were placed in occipital region. The red electrode was attached 1-2 cm just below the inion, yellow electrode one inch lateral to the red and the green electrode just above the mastoid process [Figure 1]. The baseline IoC value of both the patients was 99. Both patients underwent endotracheal anaesthesia after standard induction with intravenous propofol and fentanyl followed by rocuronium to facilitate intubation. Anaesthesia was maintained with isoflurane, N<sub>2</sub>O and O<sub>2</sub> in the ratio 1:2. The IoC values, were kept in between 40 and 60 during the maintenance of anaesthesia.

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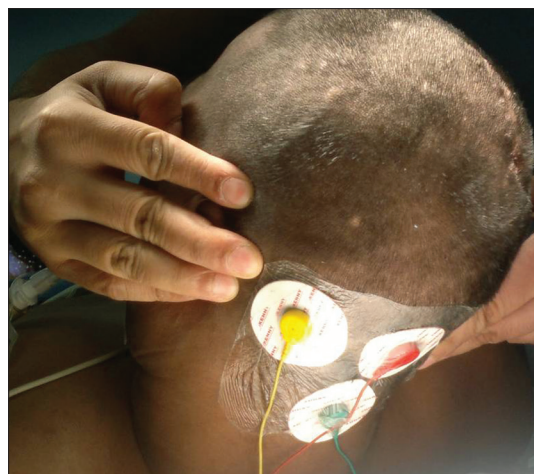


Figure 1: Placement of occipital montages of IoC monitor

The IoC is the most recent EEG-based monitor studied and validated to assess depth of anaesthesia.<sup>[5]</sup> It has been claimed to be better than the traditionally used BIS with a shorter delay time, cost effectiveness, user friendly and higher index stability. Its unique assessment includes spectral ratios, symbolic dynamic evaluation of EEG and EEG suppression ratio (ESR), which provides better suppression of electromyography (EMG). Koch and co-workers showed dominant frontal localisation of EEG.<sup>[6]</sup> Similarly other studies proved EEG to be a topographic dependent variable and advocated frontal placement of electrodes.<sup>[7,8]</sup> However, none of those studies compared frontal and occipital montage. Shirhaishi *et al.* compared these two montages and found strong correlation between them using BIS monitor.<sup>[9]</sup>

To conclude, electrode placement in occipital area was found to be useful for IoC monitoring with an appropriate indication regarding the depth of anaesthesia. However, a well designed, randomised study comparing IoC with other monitors of depth of anaesthesia and electrodes placed in alternate positions, would probably help validating of this alternative site (occipital montage) for placement of IoC electrodes.

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