Perioperative Medicine

1167

Patient State Index versus Bispectral Index in cirrhotic patients and non-cirrhotics undergoing hepatic resection: A controlled randomized study

Anaesthesia,depth, Anaesthetic techniques,inhalation, Equipment,monitors

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Background and Goal of Study:Patient State Index (PSI) and Bispectral Index (BIS) monitor anaesthesia depth with different algorithms. Primary goal is to test their agreement in two groups: Healthy volunteers undergoing right hepatotomy for live donor liver transplantation and liver cirrhotic patients undergoing major liver resection. Secondarily their sevoflurane (Sevo) consumption and tolerance to electrocautery interferences.

Methods:Local Ethics Committee approval and Pan Africa Clinical Trial Registry (PACTR201601001446303). PSI (Masimo, Irvine, USA) (Target depth: 25-50) or BIS (Aspect, Newton, USA) (Target depth: 40-60). Both forehead sensors were applied simultaneously. Anaethesist when monitoring PSI were blinded to BIS and vice versa. 4 subgroups: Cirrhotic (PSI) (n=15), Cirrhotic (BIS) (n=15), Non-cirrhotic (PSI) (n=15) and Non-cirrhotic (BIS) (n=15).

PSI, BIS, end-tidal (ET) Sevo concentration (%) monitored perioperative.

Results:65 adults (5 excluded). Comparable age cirrhotics, PSI (56.0 [53.0-57.0]) vs. BIS (56.0 [50.0-60.0]), p=0.935 and in non-cirrhotics, (30.0 [26.0-42.0]) vs.BIS (28.0 [24.0-39.0]), p=0.461 with same operation times in cirrhotics, p=0.106, and in non-cirrhotics, p=0.25.

An excellent degree of reliability between PSI and BIS at all measuring points: Overall (804 pairs), Intra-class correlation (ICC) =0.92, 95% CI (0.91-0.93), P<0.001. In cirrhotic groups alone (ICC =0.93, 95% CI (0.91-0.94), p<0.001); and in non-cirrhotics (ICC= 0.92, 95% CI (0.90-0.93, p<0.001. Bland and Altman analysis showed an overall mean bias difference of 2.19 and 95% confidence (1.40-2.98), p<0.0001. (n=804 pairs). A moderate degree of correlation between PSI and BIS was observed (Kendall's tau b = 0.604, p<0.001. (n= 804 pairs). Both PSI and BIS negatively correlated with ET Sevo in all patients (Kendall's tau b = -0.463, p=0.000) and (Kendall's tau b = - 0.520, p=0.000) respectively. PSI guided Sevo consumption (ml) was not different from BIS in cirrhotics (65.67±31.60 vs. 68.47±27.63, p=0.983) and non-cirrhotics (41.13±37.45 vs. 47.27±34.80, p=0.338), respectively. PSI least affected by electrocautery vs. BIS (p=<0.001).

Conclusion:Agreement between PSI and BIS during surgery is excellent among patients with healthy or cirrhotic livers. Both can be used to monitor trends of anaesthesia depth changes and equally consumed similar sevoflurane volumes. However PSI allowed for continous monitoring without interruptions from elctrocautary.