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Arterial blood pressure monitoring during neuro radiological procedure: a prospective, monocentric, observational study

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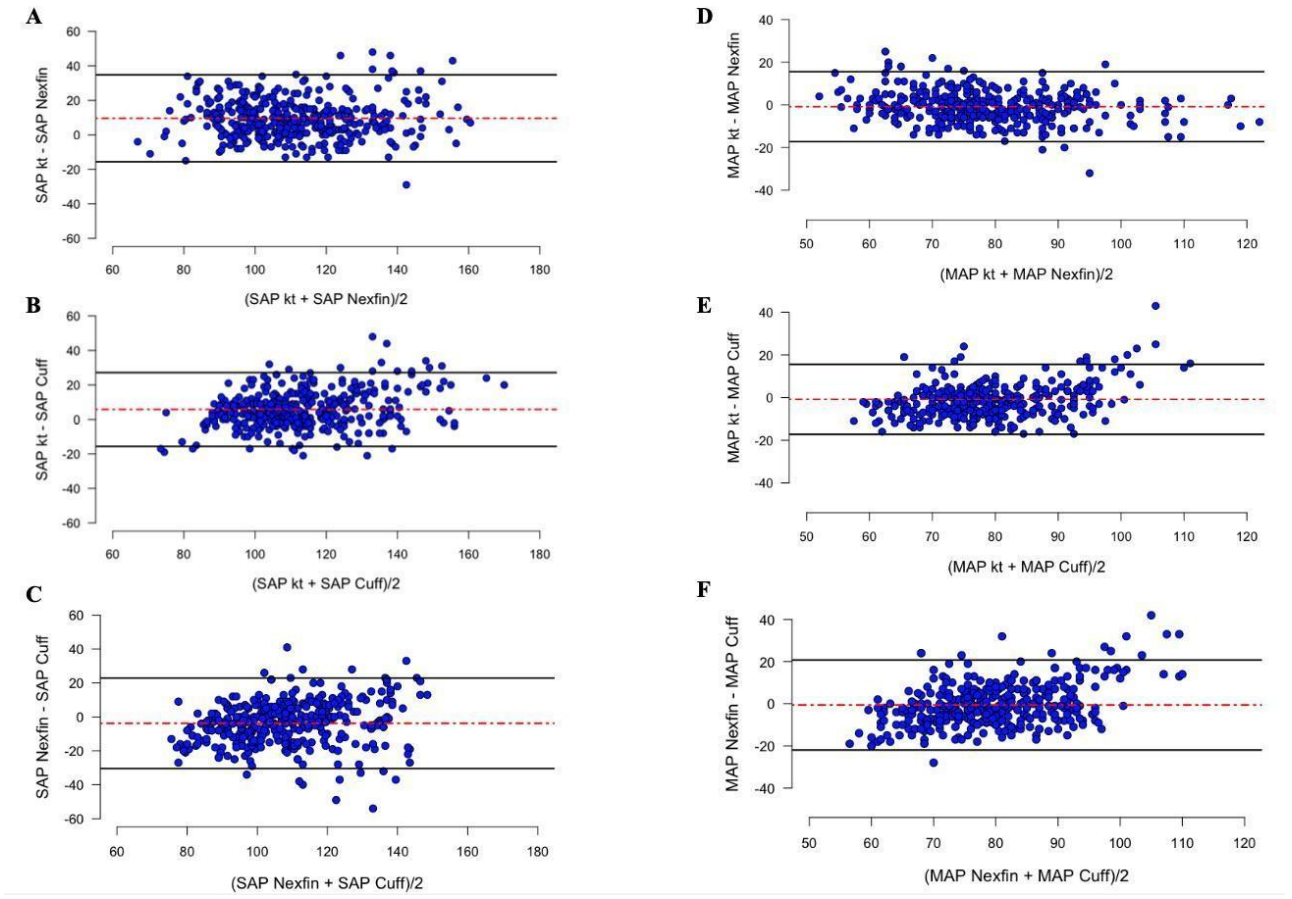
Position du problème et objectif(s) de l'étude:
In perioperative setting, Arterial Blood Pressure (ABP) measurement with invasive method remains the gold standard. Non-invasive devices with finger cuff are increasingly used, but their accuracy needed further evaluation. We propose to evaluate the accuracy and clinical concordance of ABP measurements provided by two non-invasive devices (the Clearsight® device and intermittent Arm Cuff), compared to those provided by an arterial catheter during elective or emergent neuro radiological procedure

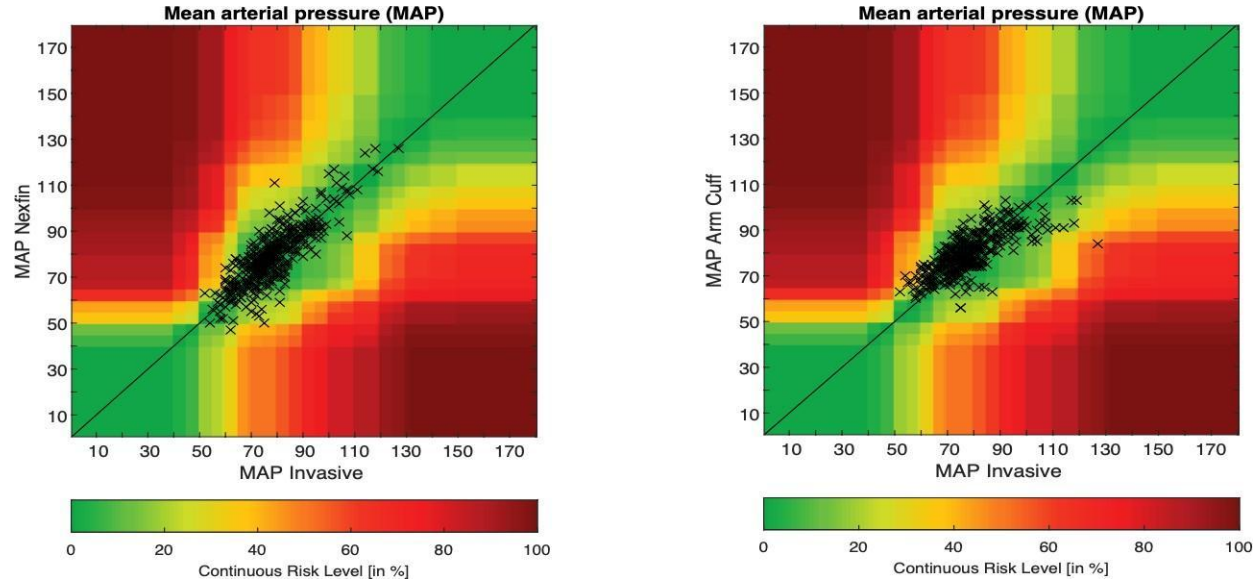
Matériel et méthodes:
This is a prospective, observational, single-centre study conducted in the Department of Anaesthesiology and Surgical intensive care unit at Brest University Hospital Centre. All adult patients who needed an elective or emergent neuro radiological procedure were eligible. The study protocol was registered on clinicaltrial.gov (registration number: NCT05283824, date of registration: 17th march 2022). The study was approved by the Ethics Committee of Est I in January 2022 (approval number: 2021-A02255-36).
During neuroradiological procedure, ABP was measured with the three devices: arterial catheter, Arm Cuff and ClearSight.

To assess the agreement between each device, we performed a Bland-Altman analysis. We defined a priori the rules to evaluate the accuracy and precision of measures according the ANSI/AAMI/ISO 2019 guidelines. We also measured the concordance rate and evaluated clinical concordance with an error grid analysis methodology.

Résultats & Discussion:
Fifty patients were included in the study. We recorded 380 different paired of ABP measurement. A significant relationship was found between invasive measures and the ClearSight for SAP ($r2 = 0.78$, $p < 0.001$) and MAP ($r2 = 0.80$, $p < 0.001$). Bias and limits of agreement were respectively, 9.6 mmHg (-15.6 to 34.8 mmHg) and -0.8 mmHg (-17.2 to 15.6 mmHg), for SAP and MAP. We found a significant relationship for SAP ($r2 = 0.82$, $p < 0.001$) and MAP ($r2 = 0.74$, $p < 0.001$) with Arm Cuff. Bias and limits of agreement were respectively, 5.8 mmHg (-30.4 to 22.9 mmHg) and -1.4 mmHg (-17.3 to 14.4 mmHg), for SAP and MAP. Compared to the ABP changes with the invasive method, the four-quadrant plot analysis showed a concordance rate of 92% and 70% respectively for the ABP changes measured with Nexfin and Arm Cuff. In error grid analysis, 99% of non-invasive ABP measures obtained with ClearSight and Arm Cuff were located risk zone A ('no risk') and risk zone B ('low' risk).

Conclusion:
The main findings of the current observational study are: (i) Neither Nexfin, nor intermittent Arm Cuff are interchangeable devices compare to arterial catheter for ABP measurement if AAMI criteria are considered (ii) During an elective or emergent neuro radiological procedure, our error grid analysis showed that about 99% of non- invasive ABP measures obtained with Nexfin and intermittent Arm Cuff were located risk zone A ('no risk') and risk zone B ('low' risk). Even if non-invasive devices are not interchangeable with invasive devices, therapeutic consequences during a neuro radiological procedure might be anecdotal if non-invasive measures replace invasive one.





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