

# Effect of a machine learning-derived early warning system for intraoperative hypotension vs standard care on depth and duration of intraoperative hypotension during elective non cardiac surgery



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## Design

Randomized controlled trial

## Objective

To assess the effects of a machine learning-derived early warning system (the hypotension predictive index or HPI) on the depth and duration of intraoperative hypotension during elective non cardiac surgery.

## Methods

68 patients (median age 64 yrs) undergoing high-risk elective non-cardiac surgery (mainly oncologic abdominal) were randomized to belong either to a control group (standard of care) or an HPI group. In the HPI group, a predefined hemodynamic protocol was recommended (figure) with an observer in the room. Primary endpoint was the time weighted average (TWA) below 65 mmHg for mean arterial pressure, a variable that takes into account both the depth and duration of intraoperative hypotension.

## Main findings

Sixty patients completed the trial, 29 from the control group and 31 patients from the HPI group. Cumulative doses of vasopressors and fluid did not differ between groups, but hemodynamic interventions were quicker in the HPI group. The TWA was significantly lower in the HPI group (0.10 vs 0.44 mmHg). The median duration of hypotension significantly decreased from 33 minutes to 8 minutes, or from 10% to 3% of the surgery time.

## Comments

This is the second study showing that HPI is useful to decrease the depth and duration of intraoperative hypotensive events. The effect on TWA was not associated with changes in postoperative outcome variables (complications, readmissions, mortality). However, the study was small, and it was not the primary endpoint. In the HPI group, the observer in the operating room contributed to quicker hemodynamic interventions (53 vs 87 s). Although the surgery was long (median 5 h) and all patients had a radial catheter, the use of goal directed fluid therapy (GDFT) was not allowed. Therefore, future and larger studies are needed to clarify whether HPI could help to decrease postoperative morbidity in real life conditions (no observer) and when GDFT guidelines are followed.



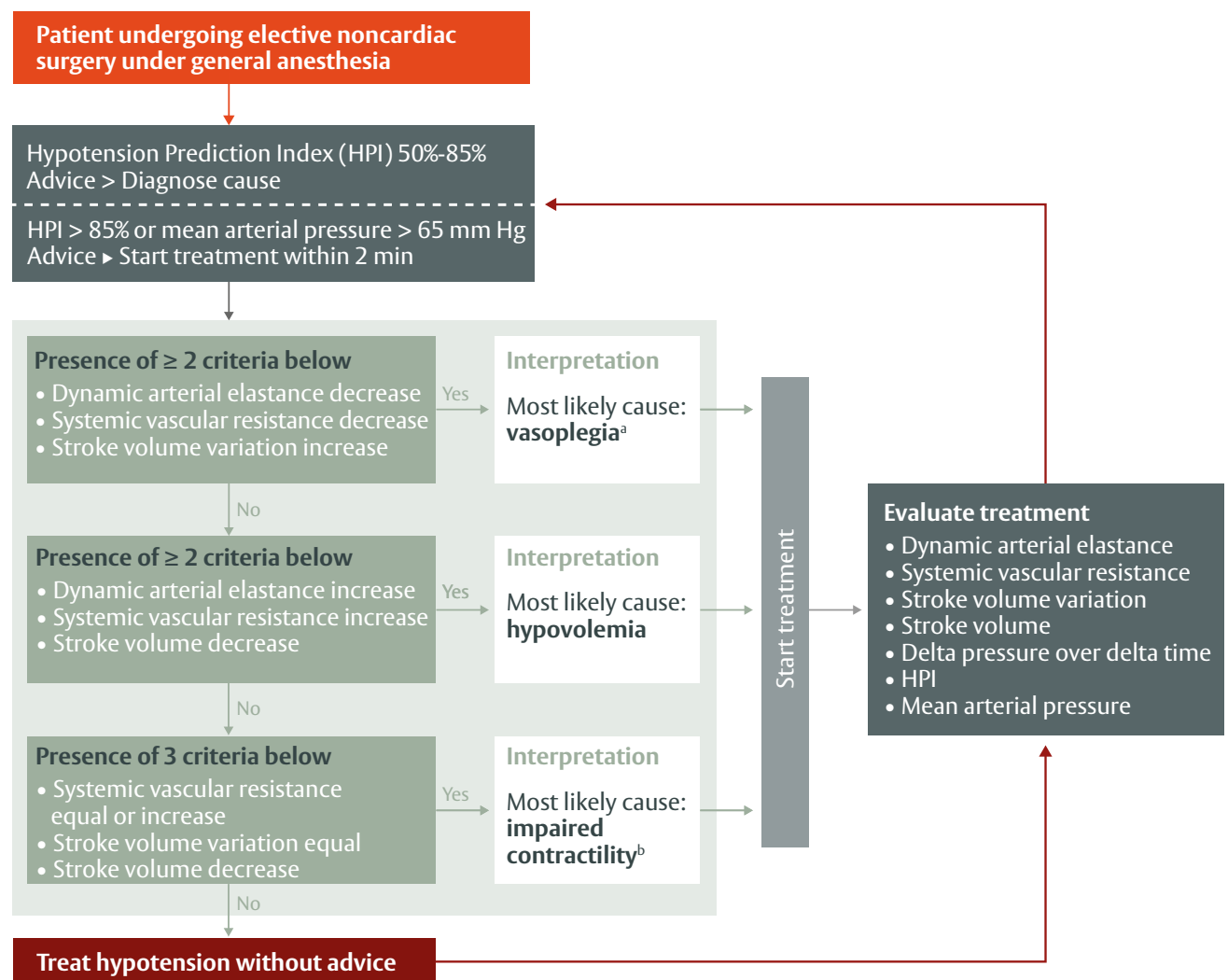
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## Conclusion

The machine learning-derived early warning system (HPI) was useful to decrease the depth and duration of intraoperative hypotension during high-risk elective abdominal surgery.

## Figure

Hemodynamic diagnostic guidance and hemodynamic protocol in the HPI group.



<sup>a</sup>Vasoplegia indicates decreased systemic vascular resistance.

<sup>b</sup>Impaired left ventricular contractility.

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