Ultrasound-guided Interscalene Brachial Plexus Block evaluated by Infrared Thermography and Distal Skin Temperature

Asghar S, MD*, Bjerringgaard LS, MD*, Lundstrøm LH, MD*, PhD, Lund J, MD**, Jenstrup MT, MD**, Lange KHW, MD*, DMSc
*Department of Anaesthesiology, Nordsjællands Hospital - Hillerød - a part of Copenhagen University Hospital
**Alethea Hamlet Hospital, Department of Anaesthesiology, Copenhagen, Denmark

Background
Sympathetic block causes vasodilatation and increase in distal skin temperature (Ts)1-3. An increase in distal Ts could therefore serve as an objective method to evaluate block success. However, the detailed thermographic pattern after brachial plexus block is unknown. In the present study we investigated the thermographic response in the upper limb after an interscalene brachial plexus block (IBPB).

Methods
We performed an ultrasound (US)-guided IBPB in 46 patients scheduled for shoulder surgery. Using the contra-lateral hand as control we obtained infrared thermographic images of both hands before blocking and during the following 30 minutes. From pilot studies we had observed several different thermographic patterns on the hand and forearm after IBPB. We therefore defined areas of interest on the hands and fingertips according to figure 1 and analysed mean Ts of each area.

Results
44 blocks were successful and 2 were failures. We uncovered 4 distinct thermographic patterns of a successful IBPB (figure 2). All successfully blocked hands demonstrated a rapid, substantial and highly significant increase in Ts of the 1st finger. In 4 patients the increase in Ts was restricted to the 1st finger; 11 patients demonstrated increased Ts of the 1st and 2nd finger; 5 patients had increased Ts of the 1st, 2nd and 5th finger and in the remaining 24 patients Ts increased in all parts of the hand. In contrast, Ts decreased in all parts of the hand in the failed blocks and in all contra-lateral measurements.

To analyse Ts changes distally in the fingertips we plotted the time course of the Spot, Ts measurements in all 46 blocked hands and contra-lateral hands (figure 3). The increase in Spot1, Ts was substantial and fast, reaching 1.4 +/- 1.7°C after 2 minutes (P<0.0001), 3.0 +/- 2.8°C after 5 minutes (P<0.0001) and 5.0 +/- 3.7°C after 10 minutes (P<0.0001).

Conclusion
Successful IBPB resulted in 4 different thermographic patterns in the hand. Ts always increased in the 1st finger and distal Ts was statistically significant already after 2 minutes. These results should be used in future studies investigating distal Ts of the 1st finger in predicting IBPB success.

References: