Regional anesthesia and ultrasound-guidance

Among various techniques of regional anesthesia, peripheral nerve blocks (PNB) consist in anesthetizing only one single limb or one specific anatomical area. A huge body of scientific evidence now demonstrates that PNBs are of major interest during perioperative patient care in many surgical specialties. As a matter of fact, PNBs are even frequently superior to general anesthesia. The most important benefits of PNBs are found in outpatient surgery (1), in orthopedic surgery (2), but also in improving the overall quality of postoperative analgesia (3), at rest but especially during mobilization (i.e. long lasting blocks, perineural catheters).

However, the PNB techniques require expertise and technical skills, since it is necessary to inject the local anesthetic in close vicinity of nerve trunks or nerve roots in order to interrupt the nerve impulses.

The overall safety of these techniques requires mastering all potential complications, which, although exceptional, can be major when they occur (i.e. nerve lesion, seizure, cardiac arrest, to name only the most serious). These complications may be caused either by a mechanical trauma (nerve damage by the needle), or by toxicity of the administered local anesthetic (all local anesthetics show neurological toxicity, and some also cardiac toxicity). To summarize, safety in regional anesthesia requires the ability to avoid injecting local anesthetic intraneurally as well as intravascularly, and in reducing the injected doses.

Historically speaking, PNBs were initially performed using a blind technique (seeking paresthesias), then more recently using nerve stimulation, and since now a decade by using ultrasound guidance (USG).

Ultrasound-guided regional anesthesia (USGRA) has allowed reaching the safety standards and reducing complications as never before (4). When using US-guidance the anesthesiologist is able to identify the various anatomical structures and thus adapt the procedure to inter-individual anatomy. Furthermore, US-guidance allows real-time needle guidance and assessment of local anesthetic spread around neural structures. Visualizing the spread of local anesthetic allows a rapid and early diagnosis of intravascular or intraneural injection too. There is now also scientific evidence that US-guidance decreases the number of vascular punctures, as well as reduces the injected volumes of local anesthetics, while increasing the overall success rate of PNBs. Moreover, USGRA improves the patient comfort (5).

Ultrasoundography is now part of the everyday tools for the anesthesiologist. This bedside technology is useful not only for regional anesthesia, but also for placing peripheral and central venous access with a reduced risk of complications, for bedside assessment of gastric emptiness before the induction of a general anesthesia, or for an early assessment of severe trauma patients (i.e. FAST protocols) (6). Ultrasoundography is also a major tool in intensive care units (i.e. cardiac and thoracic ultrasonography). Putting all this together, it is no longer possible to imagine working as an anesthesiologist without having an immediate access to bedside high quality ultrasonography.

Ultrasound devices designed for the operating theatre must provide high quality of images, as well as the usual US modes (i.e. B, PW, CFM, ...), and at least two probes (linear high frequency and convex low frequency), but in a small and compact size with sufficient battery life, enabling the ultrasound systems to be mobile, lightweight, and easily usable in the operating theatre environment.

Nowadays, several devices of this kind are on the market from different companies. Among these, the French company ECM Echo Control Medical manufactures high quality portable ultrasound imaging systems meeting the necessary technical specifications and European manufacturing standards. The ECM devices also have an excellent cost/quality ratio. Indeed, to meet the increasing needs for ultrasound in the operating theatres, the devices must still provide efficient and high quality images, but their cost should remain affordable to be compatible with the budget for equipment. The ECM Exago and Exagyn systems live up to these challenges and moreover follow the latest evolutions of the ultrasound market with regular updates adapted to the needs of the anesthesiologists.

References


