

Foetal fascial planes: an anatomic study with a focus on ultrasound-guided interfascial nerve blocks in newborns

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BACKGROUND Ultrasound-guided nerve blocks performed within fascial planes have been described in adult subjects. This approach has been evidenced to be efficient and present lesser complications than the non-ultrasound-guided approach and/or intramuscular approaches. Also, in children ultrasound-guided blocks have been implemented. Deep fascia has been evidenced in foetal development as soon as 21-23 weeks of development and therefore musculoskeletal fascial planes are formed by the time of birth. Our aim is to establish dye diffusion patterns and anatomical safety parameters of ultrasound-guided interfascial injections in the perinatal period.

METHODS A foetus (30 weeks of development) was examined bilaterally by ultrasound and the target anatomical structures were identified. Ultrasound-guided interfascial dye injections were performed within the fascial planes between: trapezius and rhomboideus muscles, trapezius and the supraspinatus muscles, thoracolumbar fascia and erector spinae muscle, fascia lata and the vastus lateralis muscle, deep fascia of the forearm and the flexor digitorum superficialis muscle. After, the foetus left side was processed by dissection and the right side by transverse sectioning to corroborate dye spread pattern.

RESULTS All anatomical structures were correctly identified. Ultrasound dye diffusion pattern was fusiform during injection, in all regions, creating a virtual space. After injection ultrasound examination showed some dye diffusion in between muscle fascicles, through the perimysium. Upon dissection, fascia was translucent and difficult to observe without magnification but coloured dye enabled to distinguish it. Dye was mostly located within the interfascial planes analysed and it could be almost totally removed with a scalpel without damaging the muscles. Also, some dye was found within the muscle perimysium in some regions. When studying the samples with magnification, no muscle damage was observed.

CONCLUSION The interfascial approach in the regions studied are feasible and anatomically safe. Ultrasound dye diffusion pattern was fusiform during injection and dye mostly remained within the interfascial plane. Therefore neural structures within the interfascial planes described are embedded with dye. These results are similar to those previously described in adult specimens.