

Equine cervical ultrasonography

A final thesis

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Equine cervical ultrasonography

Part 1: Ultrasonographic description of the equine cervical anatomy

Part 2: High degree of accuracy of ultrasound-guided intraarticular injection of cervical facet joints in horses – *A cadaveric study*

Equine cervical ultrasonography

Advantages

Soft tissue

Bone surfaces / joint

Dynamic

Guided procedures

High sensitivity (Schwarz et al., 1999)

Disadvantages

Only bone surface – not the vertebral canal

Low specificity (Schwarz et al., 1999)

Part 1: Ultrasonographic description of the equine cervical anatomy

Aim:

Ultrasonographic description of the cervical anatomy from C2 to T1

Materials and method

Structures included

- facet joints

- vertebrae

- paravertebral structures

Structures not included

- atlanto-occipital and atlanto-axial articulations

- nuchal ligament

- structures ventral to jugular groove

Materials and method

Ultrasonography

B&K Medical Ultrasound System 3535

Transducer: 7.5 MHz, straight linear array

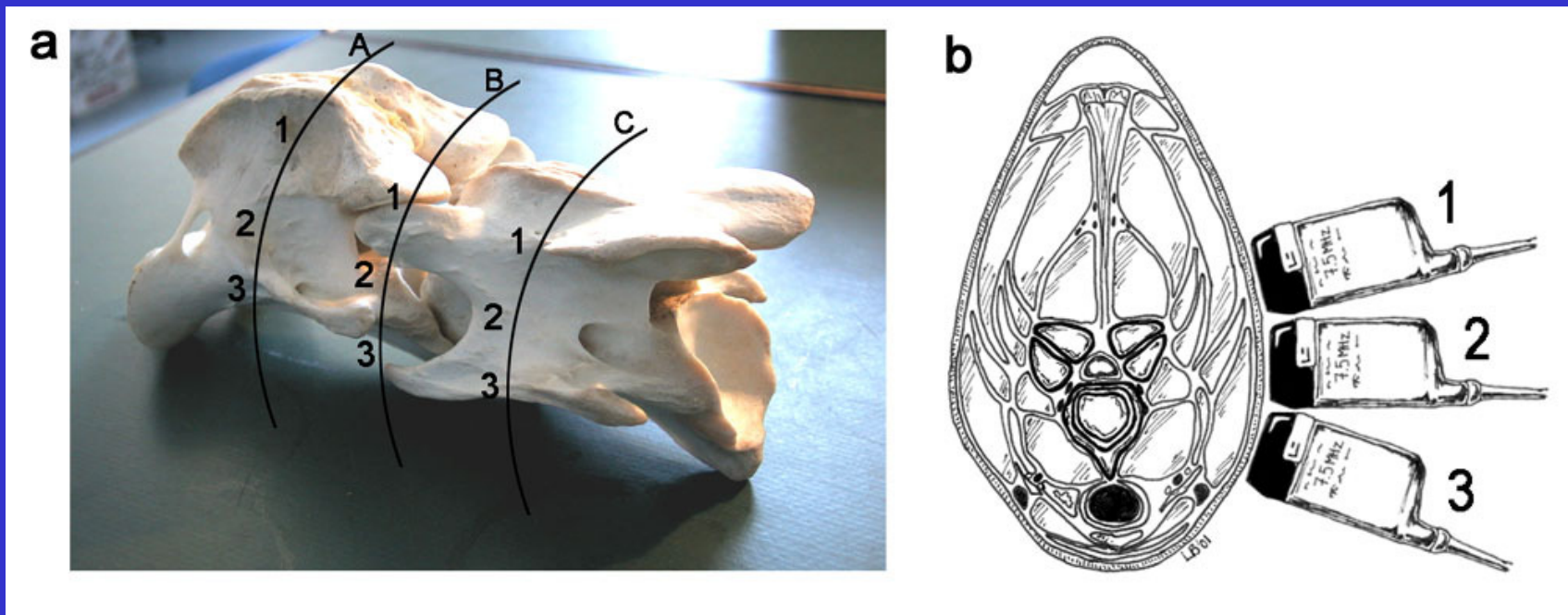
8 clinical normal horses

Three locations around

facet joint

mid-vertebrae

Materials and method



Materials and method

Ultrasonography

B&K Medical Ultrasound System 3535

Transducer: 7.5 MHz, straight linear array

8 clinical normal horses

Three locations around

facet joint

mid-vertebrae

Frozen cross-sections

Dissection

Results

Facet joint

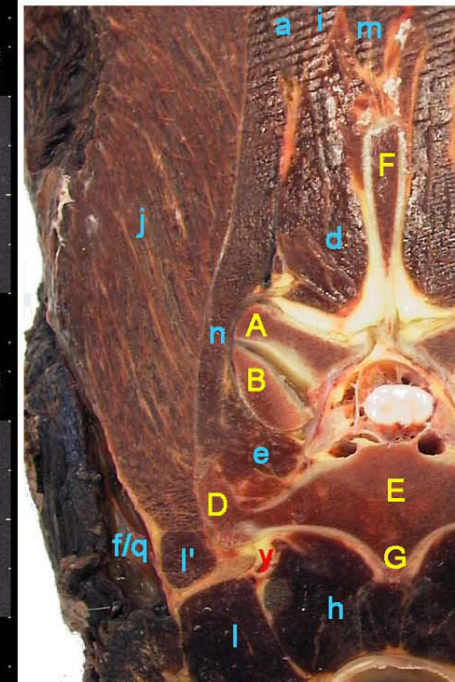
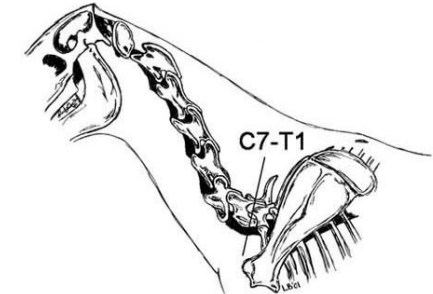
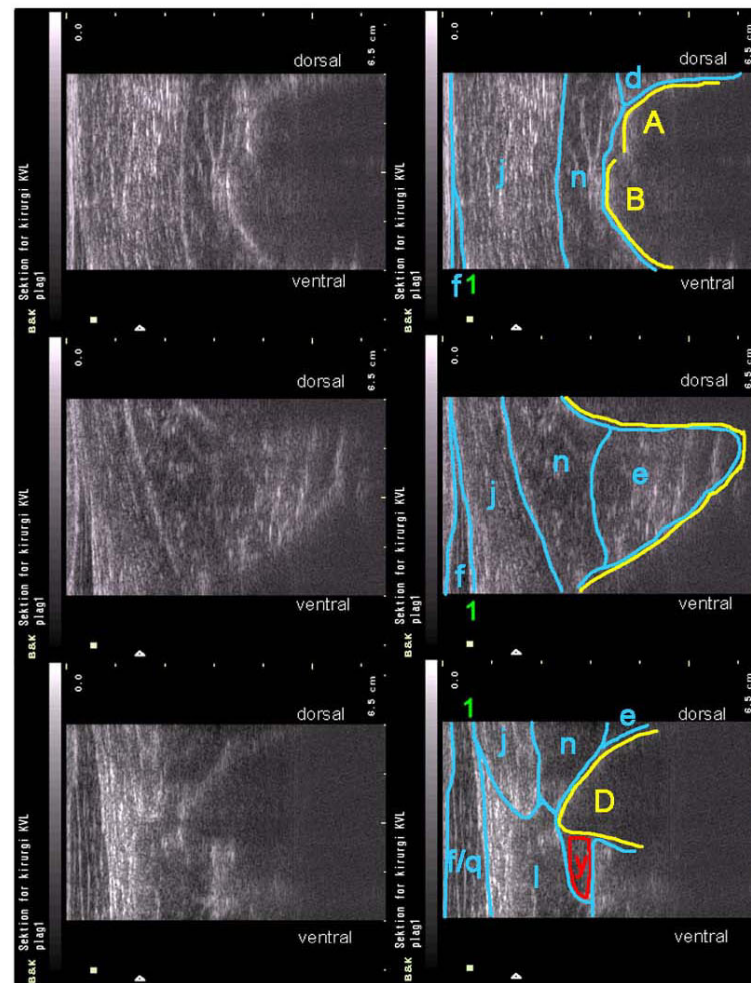
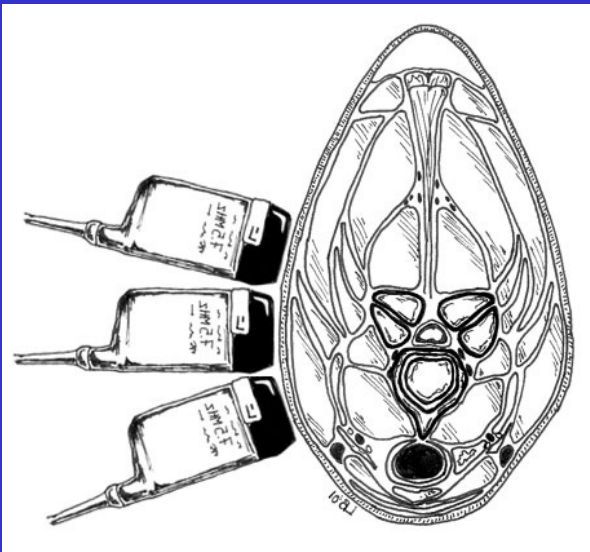


Fig 13: Identifiable structures on ultrasound images and anatomical cross section at the level of C7-T1. Muscles: *M. splenius* (a), *mm. multifidii cervicii* (d), *mm. intertransversarii cervicii* (e), *m. brachiocephalicus* (f), *m. longus colli* (h), *m. semispinalis capitis* (i), *m. serratus ventralis cervicis* (j), *m. scalenus ventralis* (l), *m. scalenus medius* (l'), *m. spinalis cervicis* (m), *m. longissimus cervicis* (n), *m. omotransversarius* (q). Vertebral: *Processus articularis caudalis* (A), *processus articularis cranialis* (B), *processus transversus* (D), *corpus vertebra* (E), *processus spinosus* (F), *crista ventralis* (G). Misc.: *Fascia cervicalis* (1), *rami from vertebral vessels* (y)

Mid-vertebrae

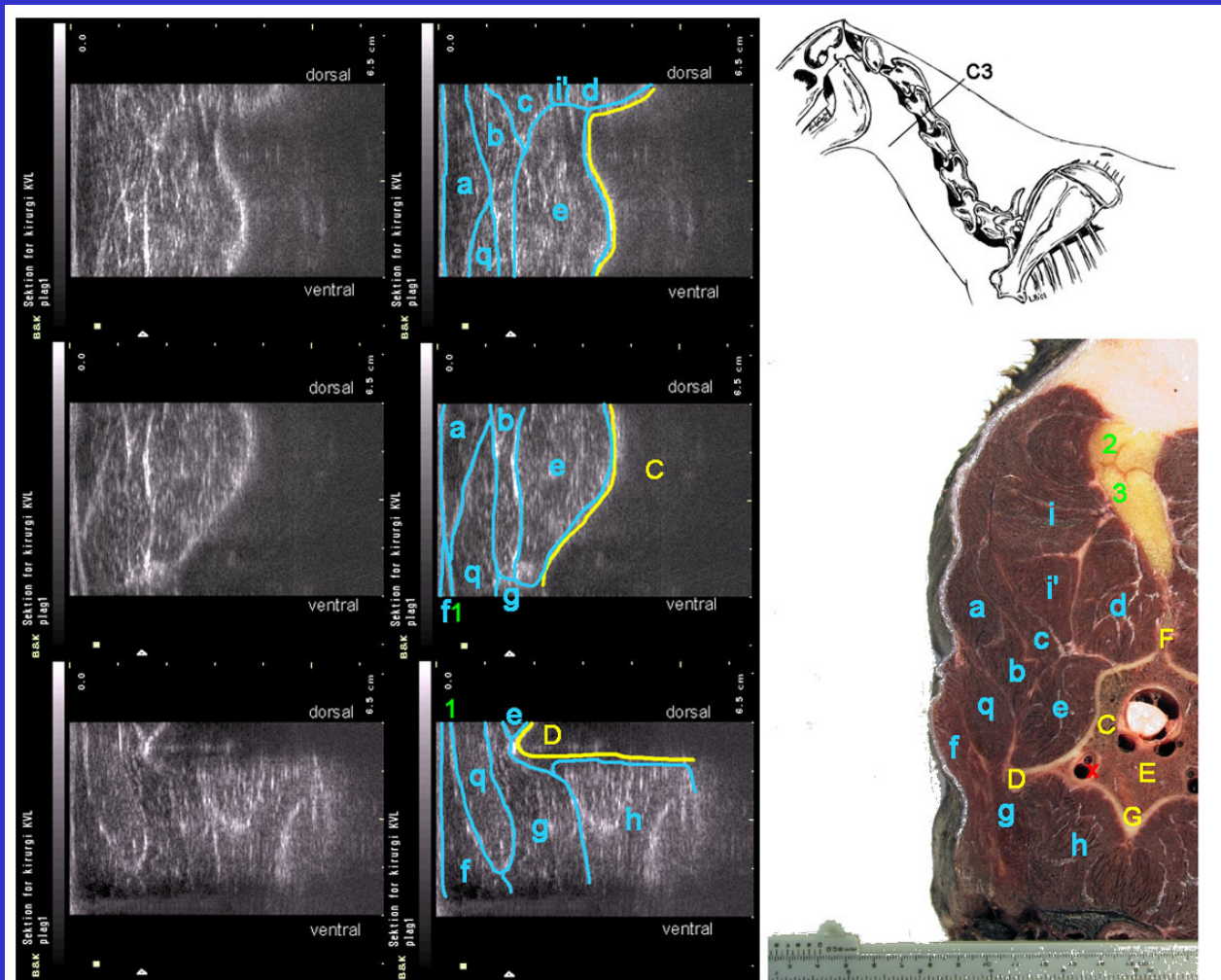


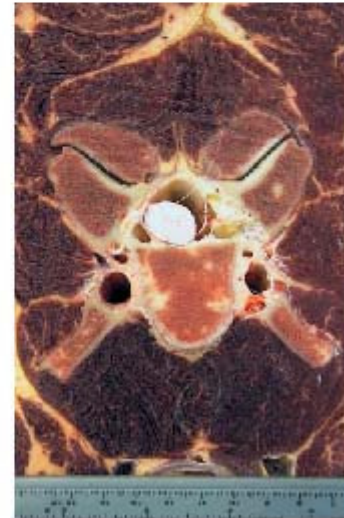
Fig 5: Identifiable structures on ultrasound images and anatomical cross section at the level of C3. Muscles: *M. splenius* (a), *m. longissimus atlantis* (b), *m. longissimus capitis* (c), *mm. multifidii cervicii* (d), *mm. intertransversarii cervicii* (e), *m. brachiocephalicus* (f), *m. longus capitis* (g), *m. longus colli* (h), *m. semispinalis capitis* (i/i'), *m. omotransversarius* (q). Vertebral: Arcus vertebrae (C), processus transversus (D), corpus vertebra (E), processus spinosus (F), crista ventralis (G). Misc.: Fascia cervicalis (1'), funiculus nuchae (2), laminae nuchae (3), a. et v. vertebralis (x)

Variation on cross-sections

Facet C3-4

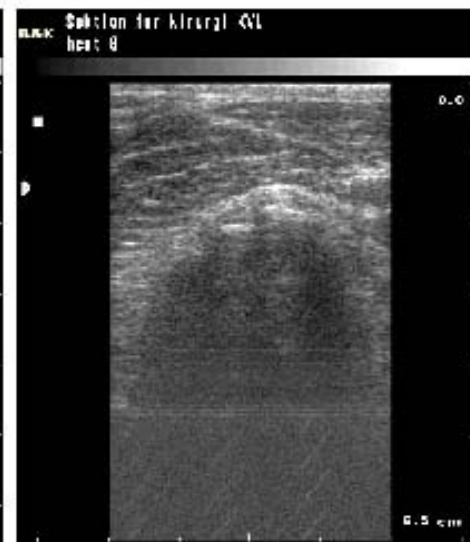


Facet C4-5



Ultrasonographic variation

Facet C3-4



Part 2: High degree of accuracy of ultrasound-guided intraarticular injection of cervical facet joints in horses – *A cadaveric study*

Aim:

Investigate the possibility and accuracy of ultrasound-guided cervical intraarticular facet joint injection

Investigate different factors influence on the result

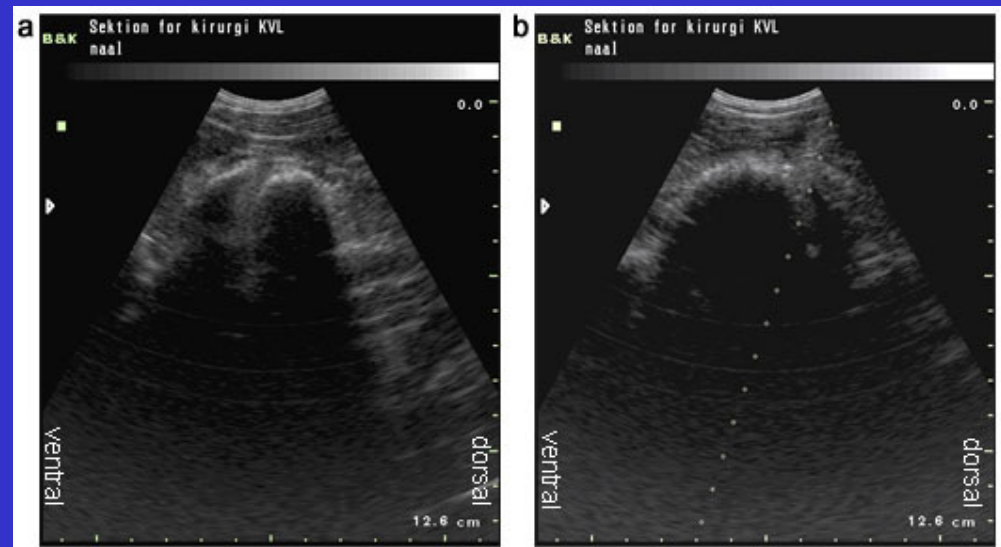
Materials and method

Transducer: 5 MHz, curved linear array

Insertion of the needle

lateral to the transducer without needle-guide attachment

dorsal to the transducer with needle-guide attachment



Materials and method

Transducer: 5 MHz, curved linear array

Insertion of the needle

lateral to the transducer without needle-guide attachment

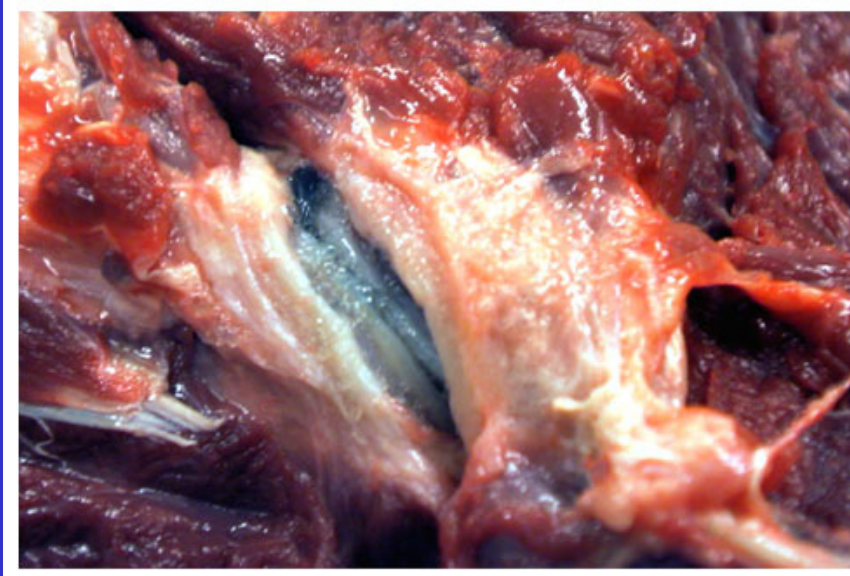
dorsal to the transducer with needle-guide attachment

Injectate

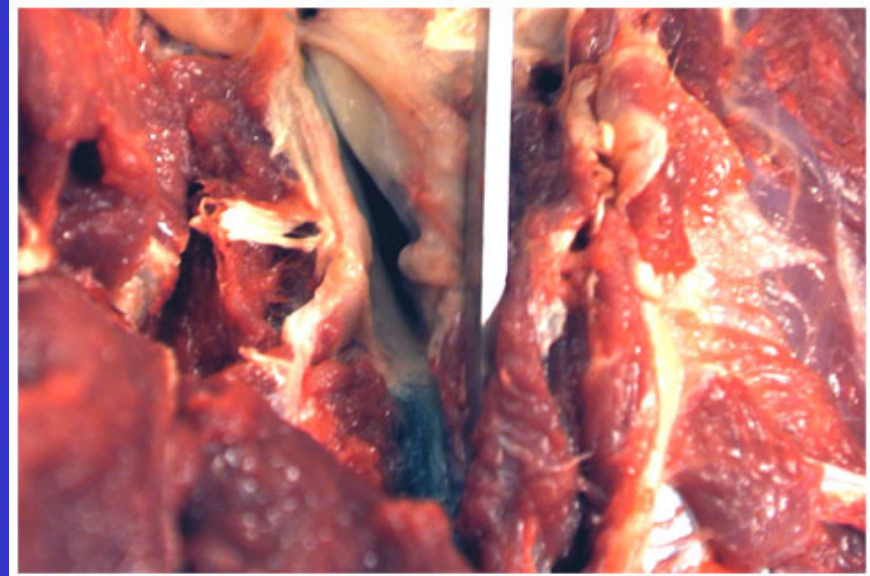
0.25% bromophenol blue dye, 4% agarose

Dissection

Dissection



Intraarticular injection



Intracapsular injection

Materials and method

Transducer: 5 MHz, curved linear array

Insertion of the needle

lateral to the transducer without needle-guide attachment

dorsal to the transducer with needle-guide attachment

Injectate

0.25% bromophenol blue dye, 4% agarose

Dissection

Logistic regression

Results

Intraarticular injections - 72% (95% CI: 66%-77%)

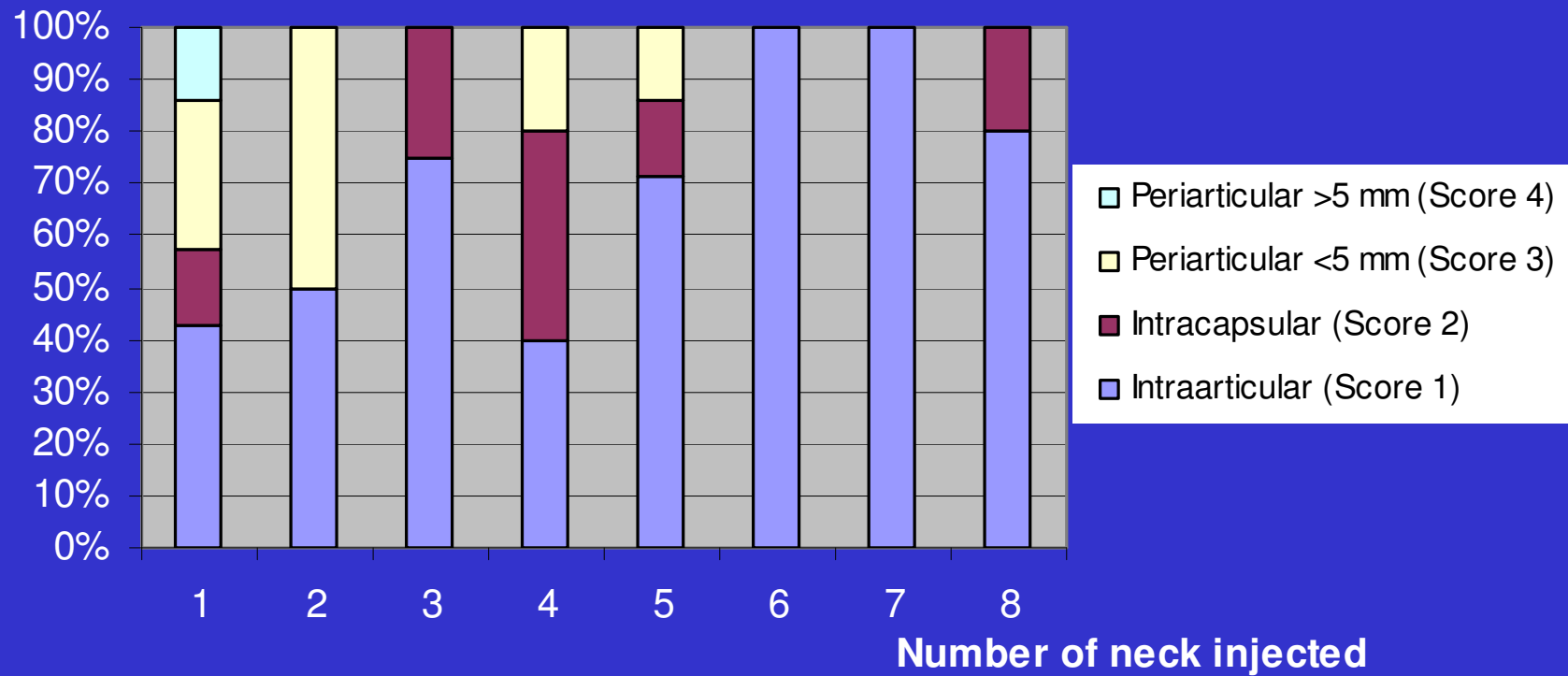
Intracapsular injections - 17% (95% CI: 12%-21%)

Periarticular injections - 11%

All (except 1) <1 mm from joint capsule

Results

Percent



Results

No significant effect of

operator (P=0.57)

facet (P=0.08)

needle guide-attachment (P=0.88)

Significant effect of

number injection (P=0.01)

92% intraarticular in the last 25 injections

(last 3 necks)

Conclusion

Possible by ultrasonography to perform intraarticular facet joint injections in cervical facet joints

Achieved precision of 72% intraarticular injections and in total 98% within 1 mm of the joint capsule

Marked improvement in the success rate of intraarticular injection as degree of operator experience increased

Perspectives

Adjustment of method

Projection parallel with joint space

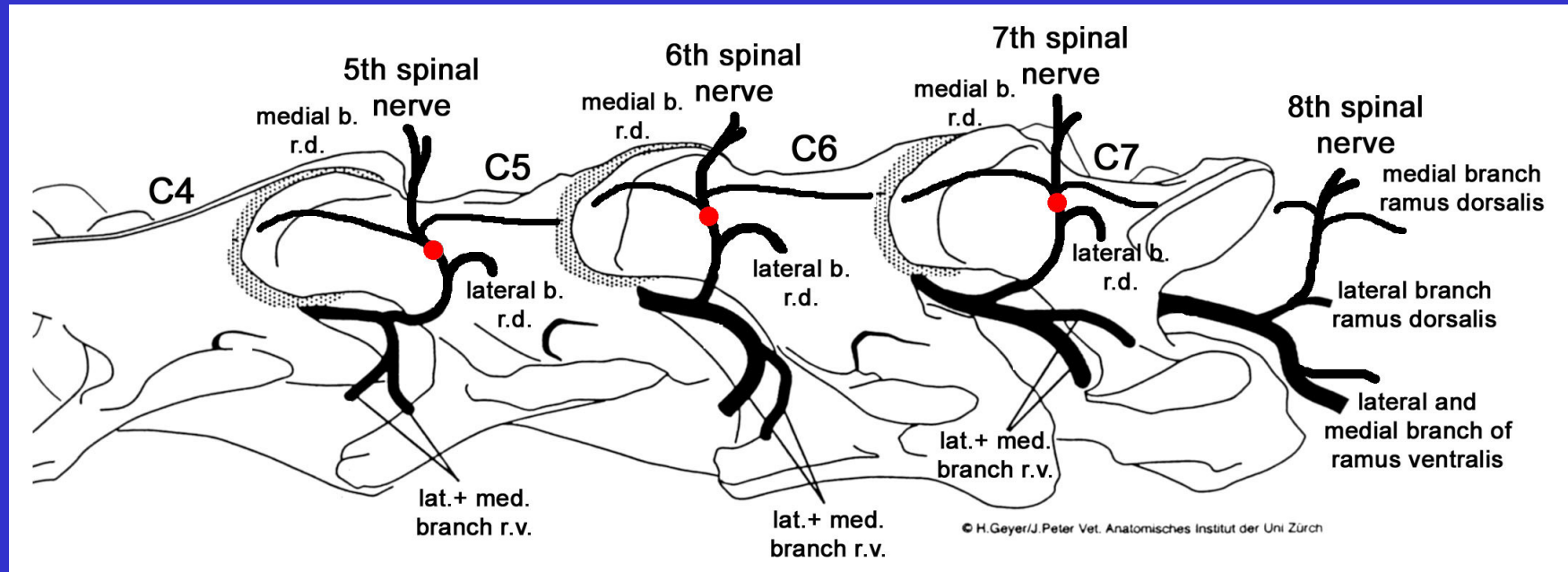
Diffusion (sensitivity, specificity)

Effect of intracapsular injections

Effect of periarticular injections

Medial branch block

Medial branch block



Modificeret fra Geyer og Peter (2001)