



**VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE**



**1. LÉKAŘSKÁ
FAKULTA**
Univerzita Karlova

Invazivní komplikace při neuroaxiální bloádě

Pavλίna Nosková
KARIM VFN a 1. LF UK Praha





Poma et al. *J Anesth Analg Crit Care* (2023) 3:42
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ORIGINAL ARTICLE

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Analgesia and Critical Care

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Complications of unintentional dural puncture during labour epidural analgesia: a 10-year retrospective observational study

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Incidence 1,5%

UDP-related complications during labour	N (%)
Total spinal anaesthesia	1 (1)
Extended motor block (Bromage = 3)	3 (3)
Partial motor block (Bromage = 1/2)	5 (5.1)
Hypotension	4 (4.1)
Inadequate or failed analgesia	14 (14.4)
Foetal heart rate abnormalities secondary to maternal issues	2 (2)
Second unintentional dural puncture	2 (2)
Conversion to general anaesthesia for caesarean section	5/15 ^a (33)

^a 15 = number of caesarean sections

UDP-related complications during postpartum	N (%)
Subdural hematoma	0
Cerebral venous sinus thrombosis	0
PRES	1 (0.9) ^a
PDPH	52 (53.6%)
Neurological symptoms	13 (13.4)
Neurological consultant	14 (14.4)
Intracranial hypotension on neuroimaging	8 (8.2)
Hospital stay > 96 h	80 (82.5)

^a Preeclamptic patient



Další pokus o epidurální punkci při perforaci ?

Riziko opětovné
perforace

Riziko průsaku LA
subarachnoidálně

NE

ANO

V individuálních
případech

Zvážit i ponechání
katétru
subarachnoidálně





Katétr epidurálně i subarachnoidálně

Individuální případy



CAVE pečlivé označení



Katétr intrathékálně při perforaci dura mater?





Intrathékální katétr při perforaci dura mater

Anaesthesia 2024, 79, 1348–1368

doi:10.1111/anae.16434

Guidelines

Intrathecal catheter placement after inadvertent dural puncture in the obstetric population: management for labour and operative delivery. Guidelines from the Obstetric Anaesthetists' Association

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Vliv na rozvoj PDPH a nutnost BP

Griffiths et al. | Management for labour and operative delivery

Anaesthesia 2024, 79, 1348–1368

Table 1 Summary of systematic reviews and meta-analyses evaluating the role of intrathecal catheters in preventing postdural puncture headache (PDPH) and epidural blood patch (EBP) after observed inadvertent dural puncture.

Author	Number of studies included in review or meta-analysis	Findings
Apfel [82]	6 (5 full papers, 1 abstract)	No reduction in incidence of PDPH or need for EBP in patients who had received an intrathecal catheter
Heesen [80]	9 (6 full papers, 3 abstracts)	No difference in PDPH rates but reduced requirement for EBP
Heesen [2]	13 (12 full papers, 1 abstract)	Relative risk (RR) in PDPH 0.82 (95%CI 0.71–0.95); RR in EBP 0.62 (95%CI 0.49–0.79) Finding negated by trial sequential analysis, which suggested insufficient data to exclude a type 1 error of statistical analysis
Deng [83]	13	Intrathecal catheter significantly reduced the incidence of PDPH (pooled RR 0.82, 95%CI 0.70–0.97, $p = 0.018$) and requirement for EBP (pooled RR 0.62, 95%CI 0.44–0.86, $p = 0.004$)
Creazzola [84]	16	Intrathecal catheter significantly reduced incidence of PDPH compared with epidural catheter replacement (pooled RR 0.81, 95%CI 0.72–0.91, $p < 0.001$)





Praktické využití katétru intrathékálně

Periporodní analgézie

Spinální anestézie k akutní SC



Periporodní analgésie

Není vliv na poporodní adaptaci novorozence

Úvodní bolus (lit. zdroje)

- A) 1-2,5 mg (objem 1-2,5 ml)
0,1-0,25% bupivakain
+ Fe 12,5-25 µg
nebo SF 1-5 µg
- B) 1,25-2,5 mg bupivakain
+ 2-7 µg SF
- Max Fe 15 a SF 2,5 µg

Vedení analgésie (lit. zdroje)

- Bolusy (lépe pumpa), a 1-1,5h
1-5 ml 0,1 nebo 0,125% bupi
+ Fe 2 µg/ml
- Kontinuálně:
0,04-0,125% bupivakain
+ SF 1 µg/ml nebo
Fe 1,5-5 µg/ml, R:1-4 ml/h
- PCA málo dat

Guidelines

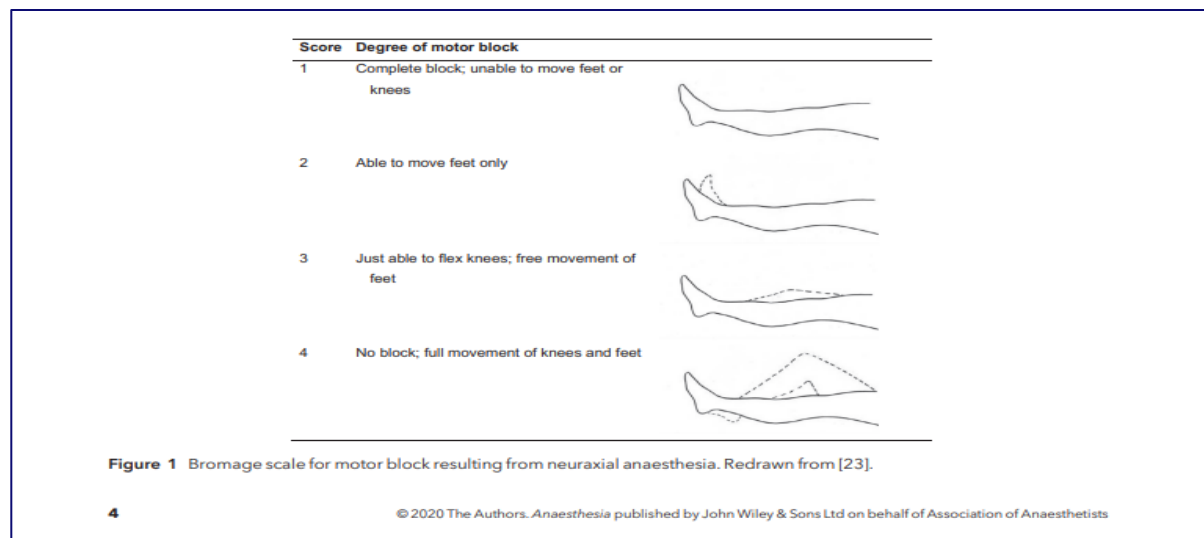
- For initiation of labour analgesia via an intrathecal catheter, an initial bolus of 2.5 mg bupivacaine (or equivalent) may be used, with the addition of up to 15 µg fentanyl (or equivalent) (moderate level of certainty).

- For maintenance of labour analgesia via an intrathecal catheter, bupivacaine 0.1–0.125% (or equivalent) with 2–2.5 µg.ml⁻¹ fentanyl (or equivalent) are suitable solutions (moderate level of certainty).
- Low-dose local anaesthetic solutions for maintenance of labour analgesia via an intrathecal catheter may be given either as intermittent boluses (up to 2.5 mg) by an anaesthetist, or as a continuous infusion (1–3 ml.h⁻¹) (low level of certainty).



Monitorace během analgézie

- TK matky a 5 min po dobu 15 min po první dávce a každém bolusu
- Kardiotokografie kontinuálně
- Senzorická a motorická blokáda a 1 hod





Spinální anestézie k SC

Guidelines

- Intrathecal long-acting opioid (300 µg diamorphine or 100 µg preservative-free morphine) may be given in addition to local anaesthetic for top-up for caesarean delivery (high level of certainty).
- Intrathecal top-ups of local anaesthetic for caesarean delivery should be given incrementally, with each bolus limited to 2.5 mg bupivacaine (or equivalent) (Grade I, low level of certainty).

- Individual intrathecal top-ups should ideally be given no more frequently than every 3 min with assessment of the block before each dose (Grade I, low level of certainty).

- Při ASC zvážit při titraci kratší intervaly dle risk x benefit

Jak to dělám já

- Standardní dávka
0,5% bupivakain heavy 2,5-3 ml
+ 0,1 ml morfin
- Dle výšky zavedení katétru
mírná antiTrendelenburgova poloha



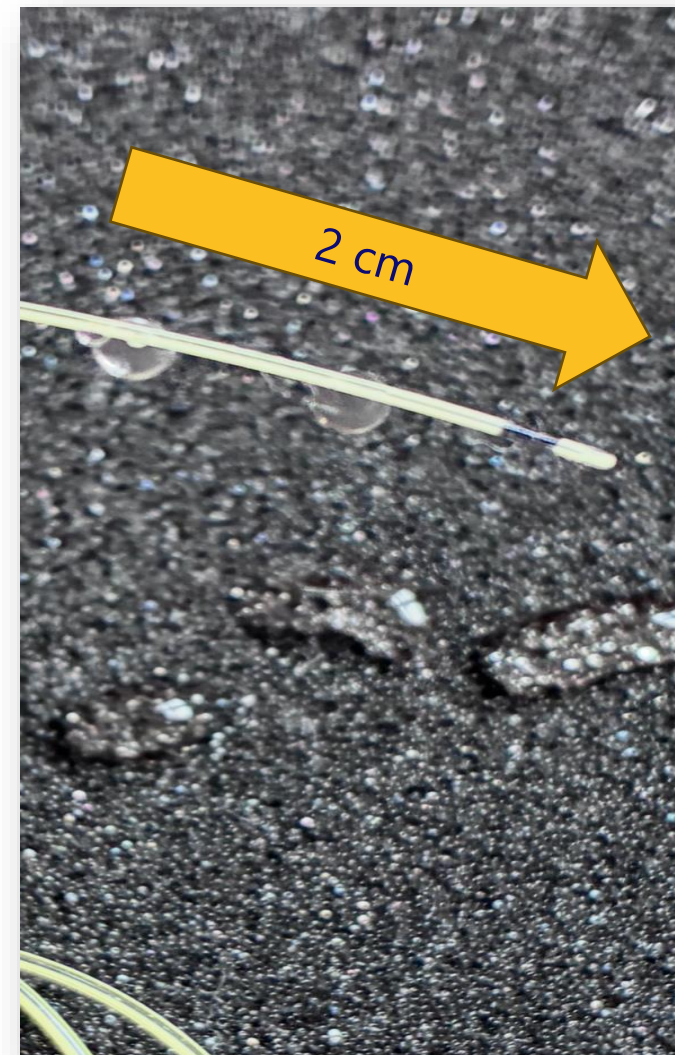
Jak hluboko ?

Evidence from randomised studies on the optimal length of catheter insertion for labour analgesia is lacking. The position of an intrathecal catheter deliberately placed for long-term drug administration is usually checked fluoroscopically, which is impractical in labour. Studies using intentionally placed narrow-gauge spinal catheters and epidural catheters sited after inadvertent dural puncture have reported placing 2–4 cm of catheter into the subarachnoid space [36–38]. Extrapolation from studies on catheters placed in the epidural space suggest that shorter lengths are more likely to result in catheter dislodgement. Insertion of longer lengths of catheter may increase the risk of paraesthesia, but whether this is likely to result in neurological complications is unknown.

- The ideal length of catheter insertion is not known, although most publications report advancement of 2–4 cm into the subarachnoid space (low level of certainty).

2 až 4 cm

Nad 4 cm se zvyšuje riziko parestezií





Mrtvý prostor

Consideration of the dead space of the intrathecal catheter and filter

Anaesthetists must account for the dead space of the intrathecal catheter and filter (usually between 0.5 ml and 1 ml) when giving top-ups in labour [6, 34, 71] or for operative delivery. When administering the first dose through an intrathecal catheter in labour, the dead space of the catheter and filter may contain saline if this has been used for priming. This has implications for how much of the initial dose is delivered into the subarachnoid space. A further top-up of up to 2.5 mg bupivacaine (or equivalent) may be required to establish satisfactory labour analgesia if the first dose is only partially effective.

- Anaesthetists should account for the dead space of the intrathecal catheter and filter when administering top-ups in labour or for operative delivery (Grade B, low level of certainty).



1. dávka může mít jen parciální efekt
Význam při testování katétru



Kdy odstranit katétr?

Anaesthesia

Peri-operative medicine, critical care and pain



Association
of Anaesthetists

Review Article

Intrathecal catheter use after accidental dural puncture in obstetric patients: literature review and clinical management recommendations

S. Orbach-Zinger , A. Jadon, D. N. Lucas, A. T. Sia, L. C. Tsen, M. Van de Velde, M. Heesen

First published: 21 January 2021 | <https://doi.org/10.1111/anae.15390>



Max 24 hod, spinální top-up anestezie k SC
periporodní analgezie, nejasnost ve výskytu PDPH, studie

Guidelines

- 14** Intrathecal catheters should be removed at the earliest opportunity following delivery to reduce the risk of accidental overdose and infectious complications (Grade B, low level of certainty).



Nepoznaná perforace dura mater - 1/3 případů

- Nutná vždy kontrola anesteziologem 5-10 min po zavedení EDA
- Negativní aspirace z katétru není 100% jistota k vyloučení perforace
- **Riziko průsaku epidurální dávky do subarachnoidálního prostoru**
- **Neadekvátní rozsah anestezie po bolusovém podání**
- Symptomatický postup

CAVE obtížné punkce a druhý anesteziolog

CAVE top-up anestezie k ASC



Spinální anestézie a PDPH



CAVE opakované pokusy při SAB



Postpunkční syndrom v praxi

Practice Guideline > Reg Anesth Pain Med. 2024 Jul 8;49(7):471-501.

doi: 10.1136/rapm-2023-104817.

Evidence-based clinical practice guidelines on postdural puncture headache: a consensus report from a multisociety international working group

Vishal Uppal¹, Robin Russell², Rakesh V Sondekoppam³, Jessica Ansari⁴, Zafeer Baber⁵,
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Peter G Kranz¹¹, Lisa Leffert¹², Grace Lim^{13 14}, Clara Lobo¹⁵, Dominique Nuala Lucas¹⁶,
Eleni Moka¹⁷, Stephen E Rodriguez¹⁸, Herman Sehmbi¹⁹, Manuel C Vallejo²⁰, Thomas Volk²¹,
Samer Narouze^{22 23}

Evidence-based clinical practice guidelines on the risk, prevention, and diagnosis of postdural puncture headaches (PDPH)

Methods

- A Multi-society international working group developed 10 review questions relevant to PDPH
- Following a literature search via MEDLINE (Ovid), recommendations were graded using US Preventative Task Force definitions

Risk Factors for PDPH

- Younger adults
- Female sex
- Cutting needles
- Wider-gauge needles

Diagnosis

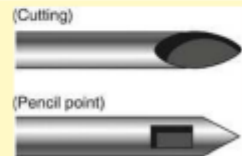
Suspect PDPH if:

- Headache and/or neurological symptoms (e.g. stiff neck, subjective hearing symptoms) develop within 5 days of a neuraxial procedure
- Symptoms often improve when lying down

Prevention

To reduce the risk of PDPH:

- Wherever possible, use non-cutting spinal needles for lumbar puncture in all populations
- If cutting needles, use a narrower gauge



1. Uppal V, Russell R, Sondekoppam RV, et al. Evidence-based clinical practice guidelines on postdural puncture headache: a consensus report from a multisociety international working group. *Regional Anesthesia & Pain Medicine*. 15 August 2023. doi: 10.1136/rapm-2023-104817



Evidence-based clinical practice guidelines on the risk, prevention, and diagnosis of postdural puncture headaches (PDPH)

Treatment

- Regular multimodal analgesia, including acetaminophen and NSAIDs
- Caffeine in the first 24h of symptoms

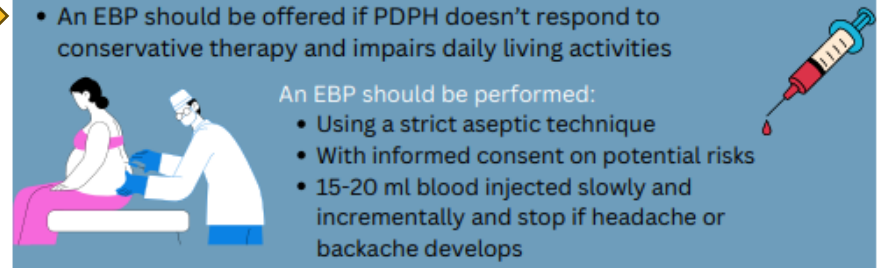


Epidural Blood Patch (EBP)

- An EBP should be offered if PDPH doesn't respond to conservative therapy and impairs daily living activities

An EBP should be performed:

- Using a strict aseptic technique
- With informed consent on potential risks
- 15-20 ml blood injected slowly and incrementally and stop if headache or backache develops



Procedural Interventions

- Evidence does not support routine use of sphenopalatine ganglion blocks
- Greater occipital nerve block can help in certain cases of PDPH.* However, headaches may return, requiring an EBP

*PDPH following lumbar puncture with narrow gauge spinal needle (22 G or smaller)



Complications & Follow-up

- Inform the patient about PDPH sequelae and contact information
- Arrange appropriate follow-up until the headache resolves



- Inform primary care and other physicians about management
- Refer to appropriate specialist and neuroimaging if worsening headache, new neurological symptoms/deficits or change in headache



1. Uppal V, Russell R, Sondekoppam RV, et al. Evidence-based clinical practice guidelines on postdural puncture headache: a consensus report from a multisociety international working group. *Regional Anesthesia & Pain Medicine*. 15 August 2023. doi: 10.1136/rapm-2023-104817



Figure 2



Neurologické komplikace – rizikové faktory

Yentis et al. | Neurological monitoring associated with obstetric neuraxial block

Anaesthesia 2020

Table 1 Risk factors for development of epidural haematoma or abscess. They may be present before neuraxial block or develop after epidural/spinal instrumentation (including catheter removal).

Increased risk of haematoma	Coagulopathy including thrombocytopenia; anticoagulant drugs Abnormal vasculature/vessel fragility. Possibly ^a multiple attempts at neuraxial block with bleeding.
Increased risk of abscess	Immune suppression or deficiency. Sepsis. Possibly ^a prolonged insertion/siting of block/compromise of sterility.
Increased risk of delayed diagnosis	Prolonged immobility for surgical/other reasons, preventing detection of weakness. Language/communication difficulties. Busy unit; multiple changes of staff with reduced/poor continuity ± handover
Increased risk from lesion	Pre-existing spinal pathology for example, spinal stenosis.

^an.b. anecdotal; no evidence base.

Do 8-12 hod
nutná
dekomprese

CAVE
komplikace
jazyková bariéra



Hodnocení motorické blokády po SC

odeznívání RA

Monitorace
4 hodiny
po SC

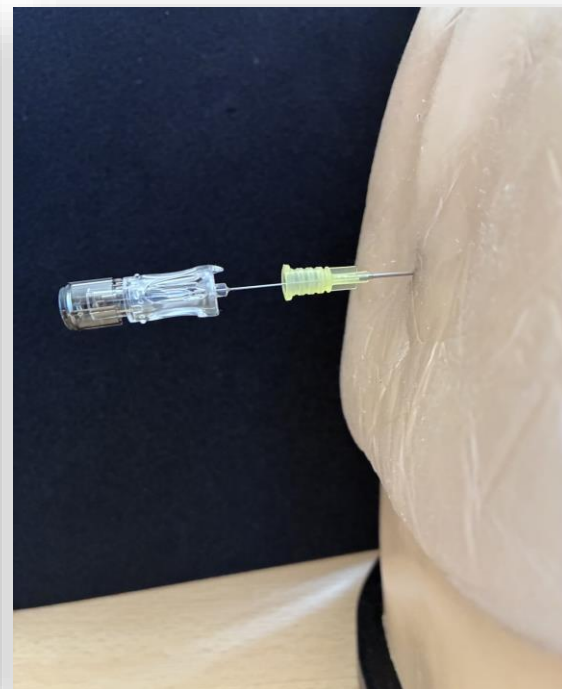
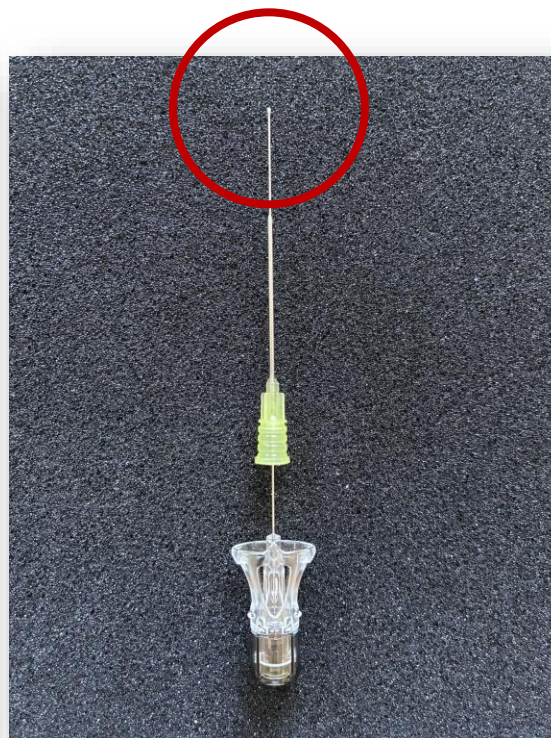
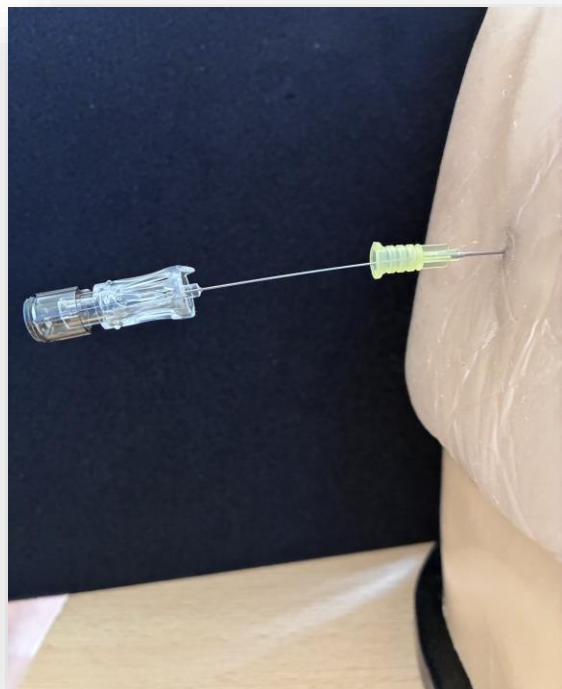
Score	Degree of motor block	
1	Complete block; unable to move feet or knees	
2	Able to move feet only	
3	Just able to flex knees; free movement of feet	
4	No block; full movement of knees and feet	

Figure 1 Bromage scale for motor block resulting from neuraxial anaesthesia. Redrawn from [23].

nástup RA



Riziko porušení celistvosti jehly



CAVE změny polohy vodící jehly při opakovaných pokusech



Zlomená jehla – kazuistika I

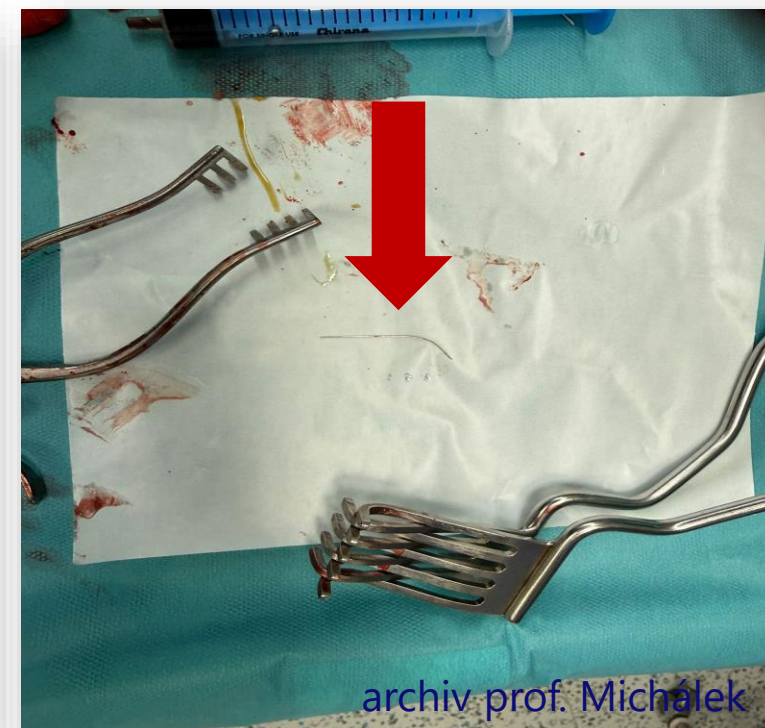
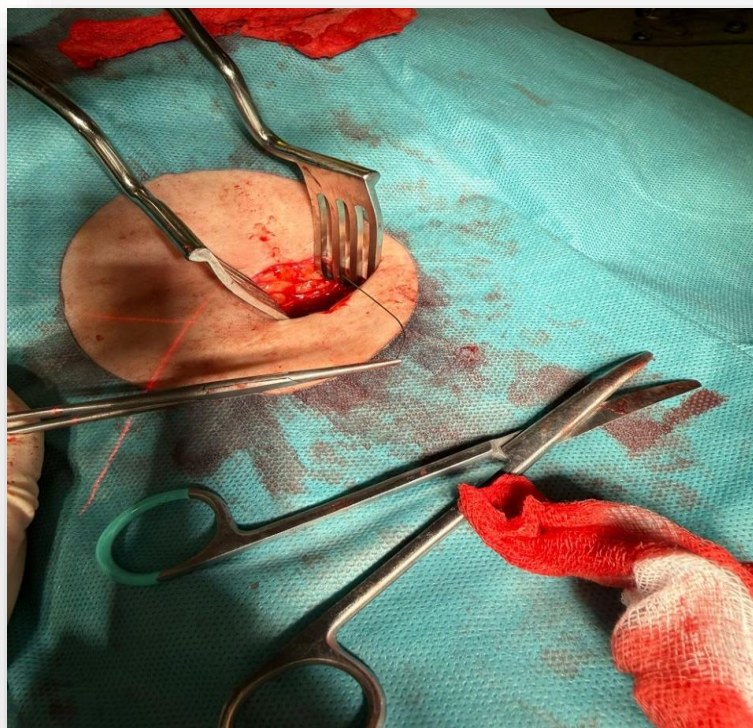


V paravertebrálním svalstvu vlevo v úr. L2-3 je šikmo uložena cca 40 mm dlouhá zalomená část spinální jehly. Její ventrální konec je uložený 4 mm dorzálně od levého oblouku L2, neproniká do kanálu páteřního.

ASC, obtížná punkce (použity 2 jehly), obezita



Zlomená jehla- kazuistika II



Chirurgická extrakce jehly intervenčním algeziologem



Závěr

- Využití intrathékálního katétru při perforaci
- Omezit opakované pokusy při punkci
- Monitorace blokády
- Pečlivá dokumentace při komplikaci
- Poučení při dimisi: „red flags“
- Kontakty na zařízení při dimisi





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Děkuji za pozornost

