

Znieczulenie regionalne w chirurgii ambulatoryjnej



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Chirurgia ambulatoryjna - terminologia

Definicja	Ramy czasowe
ambulatoryjny (<i>ambulatory</i>)	godziny pracy zespołu, wypis w tym samym dniu – bez pobytu nocnego; optymalnie w jednej sesji popołudniowej lub popołudniowej
jednodniowy? (<i>extended recovery</i>)	do 23 godzin; stara definicja z USA (firmy ubezpieczeniowe zaliczały taki pobyt jeszcze do trybu ambulatoryjnego)
krótkoterminowy (<i>short stay</i>)	24-72 godziny

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Plan postępowania pooperacyjnego w chirurgii ambulatoryjnej

0 TO ½ HR AFTER SURGERY	½ TO 1 HR AFTER SURGERY	1 TO 1½ HR AFTER SURGERY	2 HR AFTER SURGERY
	Ambulate with assistance	Ambulate	Discharge per wheelchair only if necessary (RNs discretion to discharge ambulatory)
<ol style="list-style-type: none"> 1. VS q 15 × 2 2. Surgical assessment 3. Follow MD orders 	<ol style="list-style-type: none"> 1. VS q 30 × 2 2. Surgical assessment 	VS every 30 min–1 hour	Discharge vital signs Surgical assessment
	Reinforce discharge instructions	Give adult or pediatric anesthesia discharge instructions. Provide written home instructions. Provide home supplies if needed. Review instructions with significant other if present.	

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Zalety znieczulenia regionalnego w chirurgii ambulatoryjnej

- skuteczna analgezyja bez/lub z minimalną sedacją i bez/lub z minimalnymi zaburzeniami poznawczymi
 - skrócenie pobytu w sali pooperacyjnej lub pominięcie pobytu w sali pooperacyjnej (*fast track*)
 - umożliwienie wcześniejszego wypisu do domu
- przedłużona analgezyja pooperacyjna (PNB)
- mniejsza częstość pooperacyjnych nudności i wymiotów

Wady znieczulenia regionalnego w chirurgii ambulatoryjnej

- dodatkowy czas potrzebny do wykonania znieczulenia
- przedłużona blokada regionalna
 - opóźniona zdolność do chodzenia
 - pooperacyjne zatrzymanie moczu
- możliwość wystąpienia silnego bólu w domu po ustąpieniu blokady, niedostatecznie kontrolowanego zleconymi lekami

Pain as a Factor Complicating Recovery and Discharge After Ambulatory Surgery

Anesth Analg 2002;95:627-34

D. Janet Pavlin, MD*, C. Chen, PharmD†, D. A. Penaloza, BS*, Nayak L. Polissar, PhD‡, and F. Peter Buckley, MB, FRCA*

Overall, this study provides basic information regarding the severity of pain after ambulatory surgery, the dose of analgesics required to control pain, and the significance of pain as a determinant of recovery duration, and it delineates factors that contribute to variability in these outcomes. The data demonstrate that NSAIDs and local anesthetic techniques reduce post-operative pain, use of opioids, and opioid-related side effects. The data also suggest that at least in women,

Early but No Long-term Benefit of Regional Compared with General Anesthesia for Ambulatory Hand Surgery

Colin J. L. McCartney, M.B.Ch.B., F.C.A.R.C.S.I., F.R.C.P.C.,* Richard Brull, M.D., F.R.C.P.C,† Vincent W. S. Chan, M.D., F.R.C.P.C.,‡ Joel Katz, Ph.D.,§ Sherif Abbas, M.D.,|| Brent Graham, M.D., F.R.C.S.C.,# Hugo Nova, M.D.,|| Regan Rawson, R.N.,** Dimitri J. Anastakis, M.D., F.R.C.S.C., F.A.C.S.,†† Herbert von Schroeder, M.D., F.R.C.S.C.#

Conclusions: Despite significant reduction in pain before discharge from the hospital after ambulatory hand surgery, single-shot axillary brachial plexus block does not reduce pain at home on postoperative day 1 or up to 14 days after surgery when compared with GA. However, RA does provide other significant early benefits, including reduction in nausea and faster discharge from the hospital.

A Comparison of Regional Versus General Anesthesia for Ambulatory Anesthesia: A Meta-Analysis of Randomized Controlled Trials

Anesth Analg 2005;101:1634–42

Spencer S. Liu, MD*, Wyndam M. Strodbeck, MD*, Jeffrey M. Richman, MD†,
Christopher L. Wu, MD†

cluded in the meta-analysis. Both central neuraxial block and peripheral nerve block were associated with increased induction time, reduced pain scores, and decreased need for postanesthesia care unit analgesics.

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Table 3. Effects of Central Neuraxial Block Versus General Anesthesia on Ambulatory Surgical Patients

Outcome	n	Number of trials	Central neuraxial block* (mean)	General anesthesia* (mean)	OR or WMD** (95% confidence interval)	P value
Anesthesia induction time (min)	384	7	17.8	7.8	8.1 (4.1 to 12.1)	0.0001
PACU time (min)	476	10	56.1	51.9	0.42 (−7.1 to 7.9)	0.91
VAS in PACU (mm)	563	7	12.7	24.4	−9 (−15.5 to −2.6)	0.006
Nausea	637	12	5%	14.7%	0.40 (0.15 to 1.06)	0.06
Phase 1 bypass	218	4	30.8%	13.5%	5.4 (0.6 to 53.6)	0.15
Need for postoperative analgesics	716	11	31%	56%	0.32 (0.18 to 0.57)	0.0001
Time until discharge from ASU (min)	839	14	190	153	34.6 (13 to 56.1)	0.002
Excellent patient satisfaction	709	11	81%	78%	1.5 (0.8–23.1)	0.45

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Anesth Analg 2005;101:1634-42

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Table 4. Effects of Peripheral Nerve Block Versus General Anesthesia on Ambulatory Surgical Patients

Outcome	n	Number of trials	Peripheral nerve block* (mean)	General anesthesia* (mean)	OR or WMD** (95% confidence interval)	P value
Anesthesia induction time (min)	329	6	19.6	8.8	8.1 (2.6 to 13.7)	0.0001
PACU time (min)	308	6	45.2	72	-24.3 (-36.3 to -12)	0.0001
VAS in PACU (mm)	359	7	9.6	35.8	-24.5 (-35.7 to -13.3)	0.0001
Nausea	319	6	6.8%	30%	0.17 (0.08 to 0.33)	0.0001
Phase 1 bypass	329	6	81%	315	14.3 (7.5 to 27.4)	0.0001
Need for postoperative analgesics	259	6	6.2%	42.3%	0.11 (0.03 to 0.43)	0.001
Time until discharge from ASU (min)	328	6	133.3	159.1	-29.7 (-75.3 to 15.8)	0.2
Excellent patient satisfaction	158	4	88%	72%	4.7 (1.8 to 12)	0.001

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Anesth Analg 2005;101:1634–42

In conclusion, this meta-analysis associated several potential advantages for RA versus GA for ambulatory anesthesia. Curiously, none of the benefits were associated with decreased ASU time and use of CNB is associated with a 35-minute delay until patient discharge from the ASU. As all included RCTs were relatively small (26 to 162 subjects), we hope this investigation stimulates further large RCTs examining RA blocks that incorporate optimal fast-tracking pathways, multimodal analgesia, efficient patient discharge criteria, and postoperative follow-up.

EDITORIAL

Is Regional Anesthesia Really Better than General Anesthesia?

Admir Hadzic, MD

Anesth Analg 2005;101:1631–3

Future research must be directed at standardizing the practice of PNBs and regional anesthesia at large, objective documentation and injection procedure monitoring, and designing quality clinical outcome studies to help clinicians determine best-practice protocols in scenarios where regional anesthesia has been shown to make a clear difference when compared with other, more widely used anesthesia techniques. If

Should regional anaesthesia be used for day case surgery?

British Journal of Hospital Medicine, July 2011, Vol 72, No 7

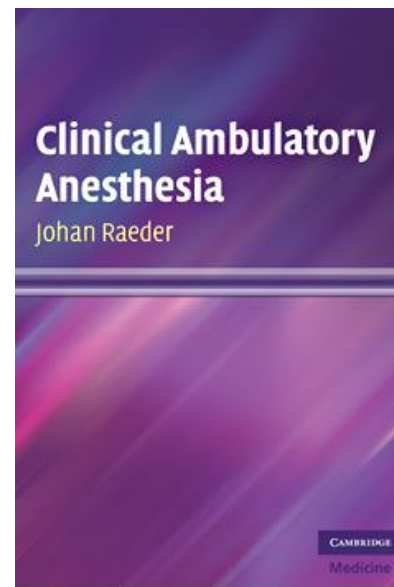
General anaesthesia is likely to remain the predominant technique for most cases, but there is certainly a strong case for increasing the use of regional anaesthesia in the setting of day case surgery. [BJHM](#)

Znieczulenie miejscowe i/lub regionalne

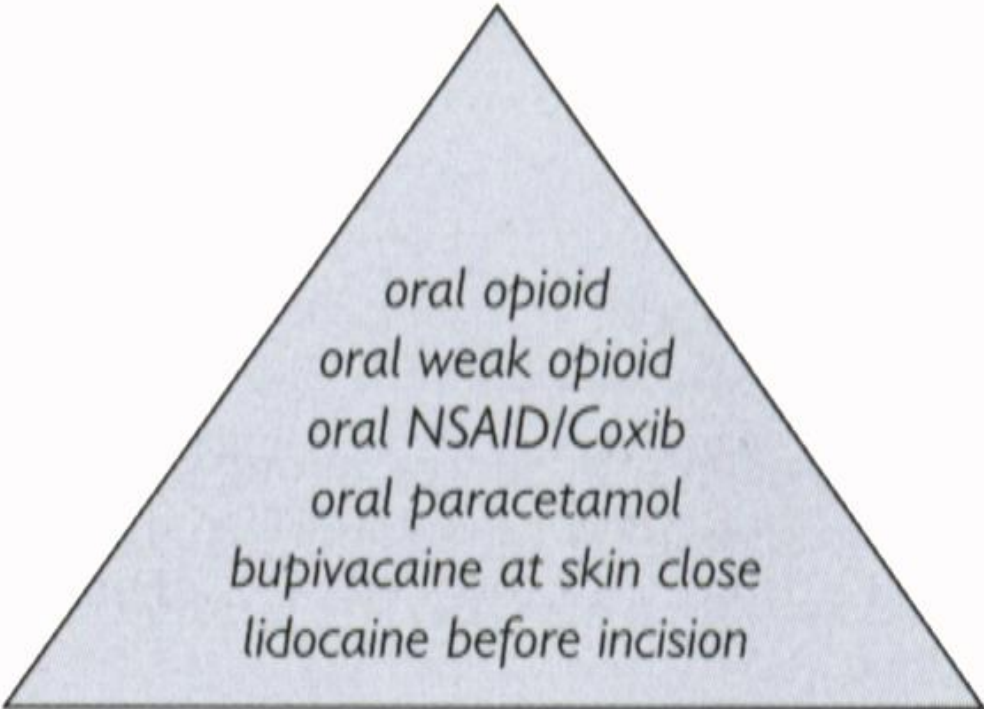
- jako uzupełnienie znieczulenia ogólnego
- w połączeniu z sedacją
- samodzielna technika znieczulenia

Znieczulenie miejscowe i/lub regionalne jako uzupełnienie znieczulenia ogólnego

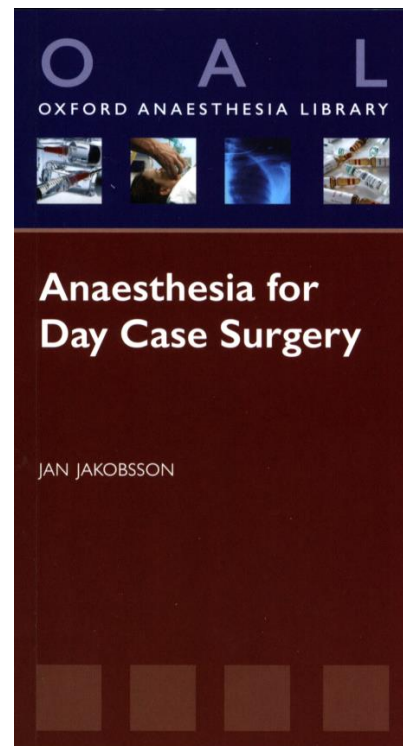
The very simple but also current and correct answer to this question is that **ALL surgical procedures should receive optimal local anesthesia infiltration**, independently of whether the local anesthesia technique is the only anesthetic, the major anesthetic (i.e., together with some sedation), an important peroperative adjuvant, or an important component of post-operative analgesic strategy. The surgeon may use local anesthesia **before the start** of surgery or **during surgery** as they cut into new structures. Often a rapid-acting drug, such as lidocaine, is used for this purpose. In these cases it may be advisable to supplement with long-acting local anesthetics **at the end** of the procedure in order to optimize postoperative analgesia.



Znieczulenie miejscowe i/lub regionalne jako uzupełnienie znieczulenia ogólnego



*oral opioid
oral weak opioid
oral NSAID/Coxib
oral paracetamol
bupivacaine at skin close
lidocaine before incision*



Znieczulenie nerwów obwodowych i splotów nerwowych

- w chirurgii ambulatoryjnej – takie jak w szpitalu
- zastosowanie USG
 - szybszy początek i dłuższy czas działania
 - zmniejszona objętość LZM
 - niższa częstość występowania powikłań
 - większy odsetek skutecznych blokad
- cewniki okołonерwowe

Perineural Catheter Analgesia as a Routine Method After Ambulatory Surgery—Effective But Unrealistic

Narinder Rawal, MD, PhD

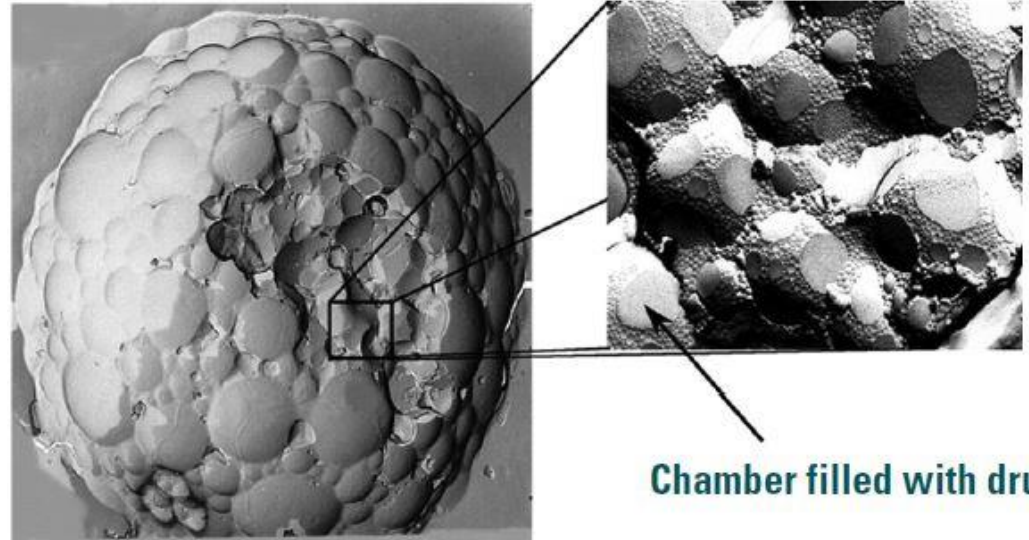
(Reg Anesth Pain Med 2012;37: 72–78)

though comparative studies are lacking. Perineural techniques are highly effective but are technically challenging and require labor-intensive and expensive home care that can be provided only in specialized centers. Disappointing past experience with implementation of perineural catheter techniques in inpatients suggests that it is unrealistic to expect their routine use in most ambulatory centers. Surgical-site catheter technique is a simpler, safer, and less expensive alternative and therefore more likely to gain widespread use. Only controlled comparisons can show

Bupiwakaina liposomalna

EXPAREL[®]
(bupivacaine liposome injectable suspension)

- roztw. 1,3% (20 ml = 266 mg odp. 300 mg bupiwakainy HCl)
- działanie do 72 godzin
- do znieczulenia nasiękowego



Proliposomalna ropiwakaina

A Novel Proliposomal Ropivacaine Oil: Pharmacokinetic–Pharmacodynamic Studies After Subcutaneous Administration in Pigs

Elyad M. Davidson, MD,* Simon Haroutounian, PhD,† Leonid Kagan, PhD,‡
Michael Naveh, Dr. Med Vet,§ Arnon Aharon, MD,|| and Yehuda Ginosar, BSc, MBBS*

CONCLUSIONS: Proliposomal ropivacaine exerted prolonged anesthesia with delayed elimination, typical for liposomal drugs. The advantage of this novel proliposomal ropivacaine is its ease of preparation and its extended shelf-stability (>2 years) at room temperature. (Anesth Analg 2016;122:1663–72)

Proliposomal Ropivacaine Oil: Pharmacokinetic and Pharmacodynamic Data After Subcutaneous Administration in Volunteers

Yehuda Ginosar, BSc, MBBS,* Simon Haroutounian, PhD,† Leonid Kagan, PhD,‡
Michael Naveh, Dr. Med Vet,§ Arnon Aharon, MD,|| and Elyad M. Davidson, MD*

CONCLUSIONS: The prolonged pharmacodynamic effect of proliposomal ropivacaine, together with its delayed elimination and prolonged redistribution to plasma, is compatible to depot-related slow-release and similar to the performance of other liposomal local anesthetics. The advantage of the proliposomal oil is its ease of preparation and its extended shelf-stability at room temperature. (Anesth Analg 2016;122:1673–80)

Wypis do domu ze znieczuloną kończyną

- ryzyko uszkodzenia kończyny z powodu braku czucia (ucisk, uderzenie, oparzenie, odleżyna,...), upadku i urazu
- konieczność edukacji chorych jeszcze w okresie przedoperacyjnym i **szczegółowa pisemna** instrukcja w okresie pooperacyjnym
- kończyna dolna: chory musi zademonstrować sprawne poruszanie się o kulach

Brachial Plexus Anesthesia for Outpatient Surgical Procedures on an Upper Extremity

WILLIAM J. DAVIS, M.D., ROBERT L. LENNON, D.O., DENISE J. WEDEL, M.D.,
Department of Anesthesiology

Mayo Clin Proc 66:470-473, 1991

Of the 459 patients dismissed on the day of the operation, 361 still had some degree of sensory blockade. These patients received appropriate

Ambulatory Discharge After Long-Acting Peripheral Nerve Blockade: 2382 Blocks with Ropivacaine

Stephen M. Klein, MD, Karen C. Nielsen, MD, Roy A. Greengrass, MD, FRCP,
David S. Warner, MD, Alikei Martin, RN, and Susan M. Steele, MD

Anesth Analg 2002;94:65-70

tionnaire. There were 2382 blocks placed: 1119 upper extremity blocks and 1263 lower extremity blocks. Effi-

Block	Percent contacted by telephone	Persistent Numbness	Persistent Weakness	Inability to Move	Immobilized
24-h follow-up					
Interscalene (<i>n</i> = 733)	66	53	47	38	13
Supraclavicular (<i>n</i> = 193)	63	12	9	6	5
Axillary (<i>n</i> = 193)	65	18	5	6	4
Lumbar Plexus (<i>n</i> = 338)	69	24	18	22	35
Femoral (<i>n</i> = 263)	71	12	10	15	12
Sciatic (<i>n</i> = 662)	70	39	30	40	31
7-day follow-up					
Interscalene (<i>n</i> = 733)	62	1	1	0	—
Supraclavicular (<i>n</i> = 193)	48	2	0	3	—
Axillary (<i>n</i> = 193)	65	2	1	1	—
Lumbar Plexus (<i>n</i> = 338)	56	2	2	1	—
Femoral (<i>n</i> = 263)	60	2	2	1	—
Sciatic (<i>n</i> = 662)	59	3	4	2	—

Znieczulenie podpajęczynówkowe

- zalety
 - szybkie
 - pewne
 - silne
 - niska dawka LZM
- wady:
 - opóźniony powrót zdolności do chodzenia
 - pooperacyjne zatrzymanie moczu
 - popunkcyjne bóle głowy

Comparación de dos agujas de calibre 27G para anestesia raquídea. Estudio sobre 1.555 pacientes

R. de Diego Fernández*, M.L. Tisner Madrid*, P. Cabrerizo Torrente*, T. Sanjoaquín Mur**
Servicio de Anestesiología y Reanimación. Hospital General Universitario Gregorio Marañón. Madrid.

748 chorych – 0,53%

Comparison of 27-gauge (0.41-mm) Whitacre and Quincke spinal needles with respect to post-dural puncture headache and non-dural puncture headache

Acta Anaesthesiol Scand 2004; 48: 474-479

U. SANTANEN, P. RAUTOMA, H. LUURILA, O. ERKOLA and P. PERE
Department of Anaesthesia and Intensive Care Medicine, Helsinki University Hospital, Helsinki, Finland

270 chorych – 0,37%

Zapobieganie pooperacyjnemu zatrzymaniu moczu

- objętość moczu w pęcherzu > 400 ml: jednorazowe cewnikowanie
- stosowanie krótko działających LZM
- opróżnienie pęcherza przed znieczuleniem
- ograniczenie objętości podawanych płynów 6-8 ml/kg
- adekwatna analgezja pooperacyjna



BladderScan[®]
Bladder Volume Instruments

Prilokaina 2% hiperbaryczna (Prilotekal)

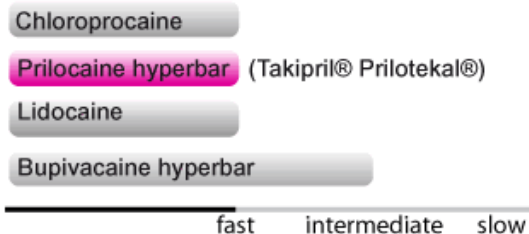


By means of the excipient glucose, the density of Prilotekal is 1.026 g/g at 20°C, equivalent to 1.021 g/g at 37°C.

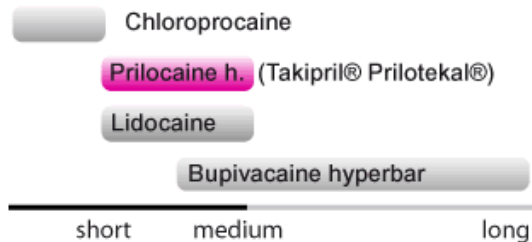


Dlaczego prilokaina ma być lepsza?

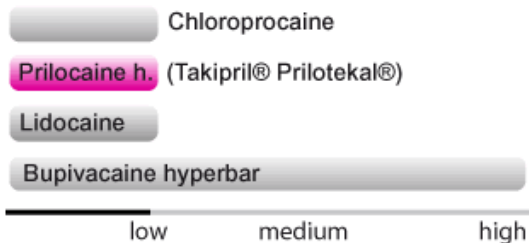
On-set time



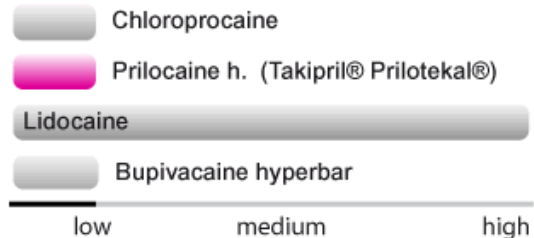
Duration of action



Urinary Retention



Neurotoxicity



Zalecane dawkowanie wg ChPL

<i>Extension of sensory blockade required T10</i>	<i>ml</i>	<i>mg</i>	<i>Average duration of action (minutes)</i>
	2-3	40-60	Approx. 100-130

As a general guideline, the maximum recommended dose is 80 mg of prilocaine hydrochloride (= 4 ml Prilotekal).

Paediatrics

Prilotekal must not be used in children and adolescents.

A Prospective, Double-Blinded, Randomized, Clinical Trial Comparing the Efficacy of 40 Mg and 60 Mg Hyperbaric 2% Prilocaine Versus 60 Mg Plain 2% Prilocaine for Intrathecal Anesthesia in Ambulatory Surgery

Claudio Camponovo, MD,* Andrea Fanelli, MD,† Daniela Ghisi, MD,† Daniela Cristina, MD,* and Guido Fanelli, MD†

CONCLUSIONS: Spinal anesthesia with 60 mg or 40 mg of 2% hyperbaric prilocaine is comparable to 60 mg of 2% plain prilocaine in terms of onset of sensory block at T10. The hyperbaric solution showed faster times to motor block onset and shorter duration of surgical block, suggesting its superiority for the ambulatory setting. (Anesth Analg 2010;111:568–72)

Table 2. Efficacy Variables (Minutes) per Treatment: Onset of Motor Block (T_{mb}), Time to Maximum Level of Sensory Block (T_{sbMAX}), to Unassisted Ambulation Defined as Bromage's Score = 0 ($T_{mb=0}$), to End of Anesthesia Defined as Resolution of Sensory Block (T_{ea}), Time to Void (T_{uv}), and Time to Eligibility for Home Discharge (T_{hd})

	T_{mb}	T_{sbMAX}	$T_{mb=0}$	T_{ea}	T_{uv}	T_{hd}
Group hyperbaric 60	8 ± 3 ^a	18 ± 13 ^a	118 ± 37 ^a	132 ± 34 ^a	218 ± 56 ^a	256 ± 85
Group hyperbaric 40	8 ± 5 ^b	15 ± 7 ^b	92 ± 36 ^b	10 ± 35 ^b	195 ± 60 ^b	208 ± 68 ^b
Group plain 60	12 ± 5	25 ± 18	157 ± 41	163 ± 42	277 ± 85	299 ± 101

Values are mean ± SD.

^a Hyperbaric₆₀ versus plain₆₀, level of significance: T_{mb} ($p = 0.0091$), T_{sbMAX} ($p = 0.0297$), $T_{mb=0}$ ($p = 0.0004$), T_{ea} ($p = 0.0029$), T_{uv} ($p = 0.0013$).

^b Hyperbaric₄₀ versus plain₆₀, level of significance: T_{mb} ($p = 0.0097$), T_{sbMAX} ($p = 0.0183$), $T_{mb=0}$ ($p < 0.0001$), T_{ea} ($p = 0.0002$), T_{uv} ($p = 0.0002$), T_{hd} ($p = 0.0004$).

Urinary retention after spinal anaesthesia with hyperbaric prilocaine 2% in an ambulatory setting

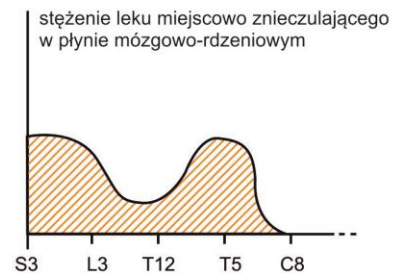
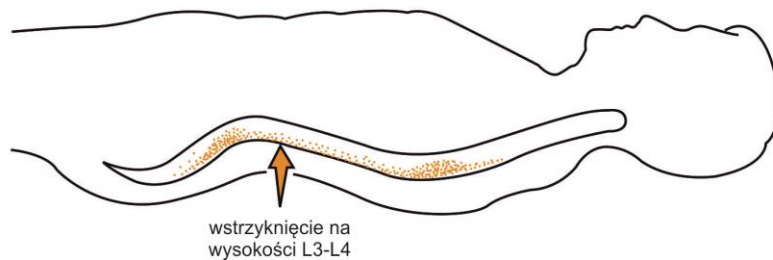
J. Kreutziger^{1*}, B. Frankenberger², T. J. Luger¹, S. Richard³ and S. Zbinden⁴

Conclusions. After spinal anaesthesia with hyperbaric prilocaine 2% (60 mg) for ambulatory lower limb surgery, 23% of patients required postoperative urinary catheterization. Postoperative bladder ultrasound and early catheterization are essential to avoid bladder distension and facilitate discharge in patients after intrathecal prilocaine 2% administration in ambulatory surgery.

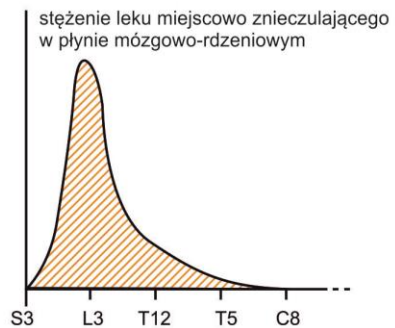
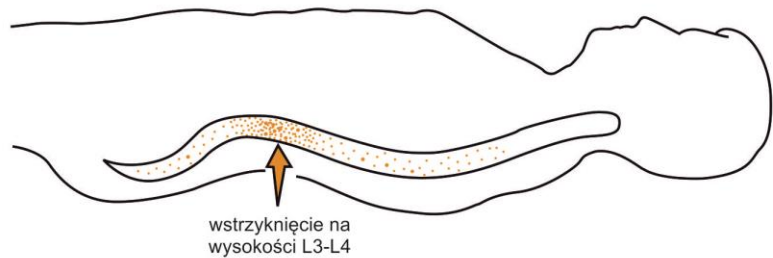
Is 23% the real incidence of urinary retention after intrathecal 2% hyperbaric prilocaine in the ambulatory setting?

Andrea Fanelli, Daniela Ghisi, and Giorgio Danelli
Anaesthesia Department, Ospedale di Cremona, Cremona, Italy

Roztwór hiperbaryczny



Roztwór izobaryczny



Dosage finding for low-dose spinal anaesthesia using hyperbaric prilocaine in patients undergoing perianal outpatient surgery

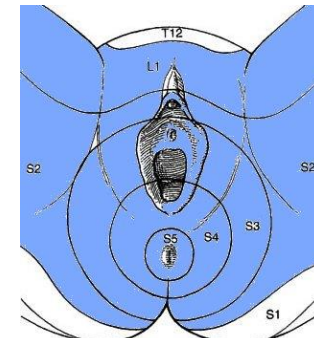
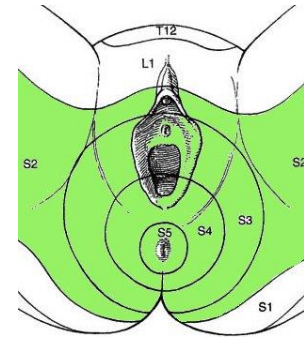
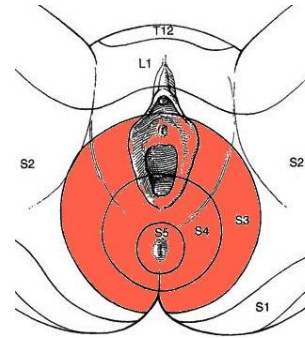
Acta Anaesthesiol Scand 2013; 57: 249–256

V. GEBHARDT¹, A. HEROLD², C. WEISS³, A. SAMAKAS¹ and M. D. SCHMITTNER¹

¹Department of Anaesthesiology and Surgical Intensive Care Medicine, University Medical Centre Mannheim, Mannheim, Germany,

²Centre of Colo-proctology, Mannheim, Germany and ³Department of Medical Statistics, University Medical Centre Mannheim, Mannheim, Germany

Zakres blokady czuciowej



Injected volume (ml)

0.5

1.0

1.5

**Number of anaesthetized dermatoms
(median and range)**

3 (1-6)

4 (2-6)

5 (3-7)

Dosage finding for low-dose spinal anaesthesia using hyperbaric prilocaine in patients undergoing perianal outpatient surgery

Acta Anaesthesiol Scand 2013; 57: 249–256

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Conclusion: Hyperbaric prilocaine 20 mg/ml can be applied in dosages of 10, 20 and 30 mg for SPA in perianal surgery. Because of sufficient analgesia, missing motor block and shorter recovery times, 10 mg of hyperbaric prilocaine 20 mg/ml can be recommended for perianal outpatient surgery.

Chloroprokaina 1% izobaryczna (Ampres)



Ampres

10 mg/ml

Chloroprokainy chlorowodorek

50 mg/5 ml

roztwór do wstrzykiwań
Wyłącznie do podania dooponowego

1 ml roztworu do wstrzykiwań zawiera
10 mg chloroprokainy chlorowodorku.
1 ampulka z 5 ml roztworu zawiera
50 mg chloroprokainy chlorowodorku, kwas solny 1N, sodu
chloridek, woda do wstrzykiwań. Dalsze informacje, patrz ulotka.



10 x 5 ml ampulka

LOT
EXP



Zalecane dawkowanie wg ChPL

	<i>ml</i>	<i>mg</i>	<i>Średni czas trwania działania (minuty)</i>
<i>Stopień wymaganej blokady czuciowej T10</i>	4	40	80
	5	50	100

Maksymalna zalecana dawka to 50 mg (=5ml) chloroprokainy chlorowodoru.

Intrathecal 2-Chloroprocaine for Lower Limb Outpatient Surgery: A Prospective, Randomized, Double-Blind, Clinical Evaluation

(Anesth Analg 2006;103:234-8)

In conclusion, 40 to 50 mg of plain chloroprocaine 1% provided adequate spinal anesthesia for lower limb outpatient procedures lasting 45 to 60 min. Reducing the dose of 2-chloroprocaine to 30 mg resulted in a spinal block of insufficient duration and had no advantages in terms of home discharge time.

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	Chlor-30 (<i>n</i> = 14)	Chlor-40 (<i>n</i> = 15)	Chlor-50 (<i>n</i> = 15)	<i>P</i> value
Spinal block resolution (min)	60 (41-98)	85 (46-141)*	97 (60-169)*	0.001
Toe proprioceptive sensation (min)	70 (41-123)	90 (55-150)	97 (65-196)*	0.026
Unassisted ambulation (min)	85 (45-198)	180 (72-281)*	185 (90-355)*	0.003
Spontaneous voiding (min)	182 (120-267)	198 (123-271)	203 (102-394)	0.155
Home discharge (min)	182 (120-267)	198 (123-271)	203 (102-394)	0.155

Spinal Anesthesia with Lidocaine or Preservative-Free 2-Chlorprocaine for Outpatient Knee Arthroscopy: A Prospective, Randomized, Double-Blind Comparison

(Anesth Analg 2007;104:959-64)

In conclusion, intrathecal injection of 50 mg of preservative-free 2-chloroprocaine 1% produced a faster onset spinal block for outpatient knee arthroscopy, with quicker recovery of sensory/motor function and unassisted ambulation, and a lower incidence of TNS than the same dose of 1% lidocaine.

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Chloroprocaine vs. articaïne as spinal anaesthetics for day-case knee arthroscopy

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factory by the patients. In both groups, anaesthesia lasted about 1 h, which is suitable for day-case knee arthroscopy. Recovery, however, was significantly faster after chloroprocaine 40 mg. The data add to earlier results that TNSs seem to be uncommon after spinal articaïne and chloroprocaine.



Dziękuję za uwagę