ILAR
Institut Lorrain d'Anesthésie-Réanimation

CHRU NANCY

Quelle place pour l'IPACK ?

Dr Pascal BOULLAND

CENTRE CHIRURGICAL ÉMILE GALLÉ

IPACK?

Infiltration between **P**opliteal **A**rtery and **C**apsule of the **K**nee

Infiltration postérieure supra-condylienne du genou sous échographie

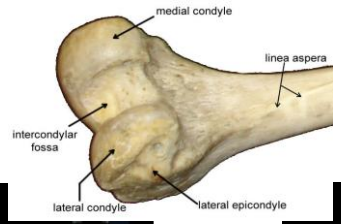
Sanjay Sinha
Anesthesiologist, St. Francis Hospital and Medical Center

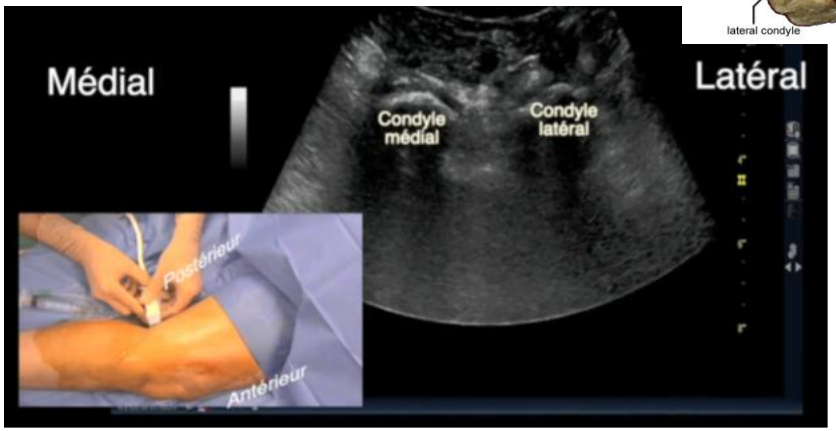
American Society of Regional Anesthesia and Pain Medicine

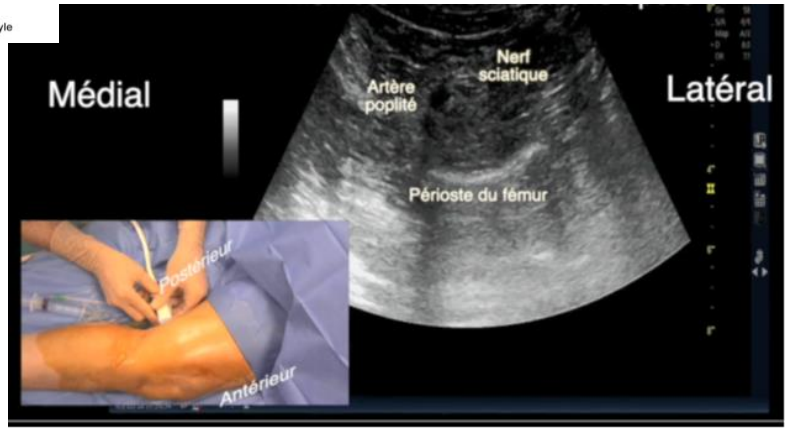
Sinha S, Abrams J, Sivasenthil S, Freitas D, D'Alessio J, Barnett J, Weller R, Lewis C. Use of Ultrasound Guided Popliteal Fossa Infiltration to Control Pain after Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study. Presented at the American Society of Regional Anesthesia (ASRA) Meeting , March 15-18, 2012 in San Diego; Abstract P 52

Sanjay Sinha
Anesthesiologist, St. Francis Hospital and Medical Center

How I do it: Infiltration between Popliteal Artery and Capsule of Knee (iPACK)







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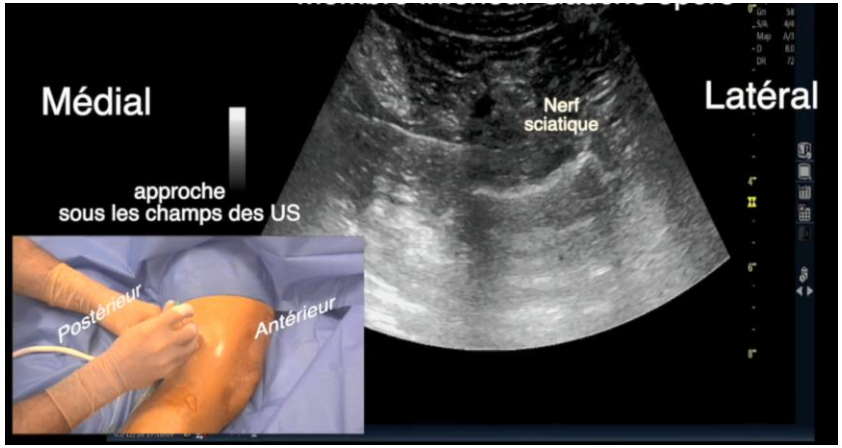
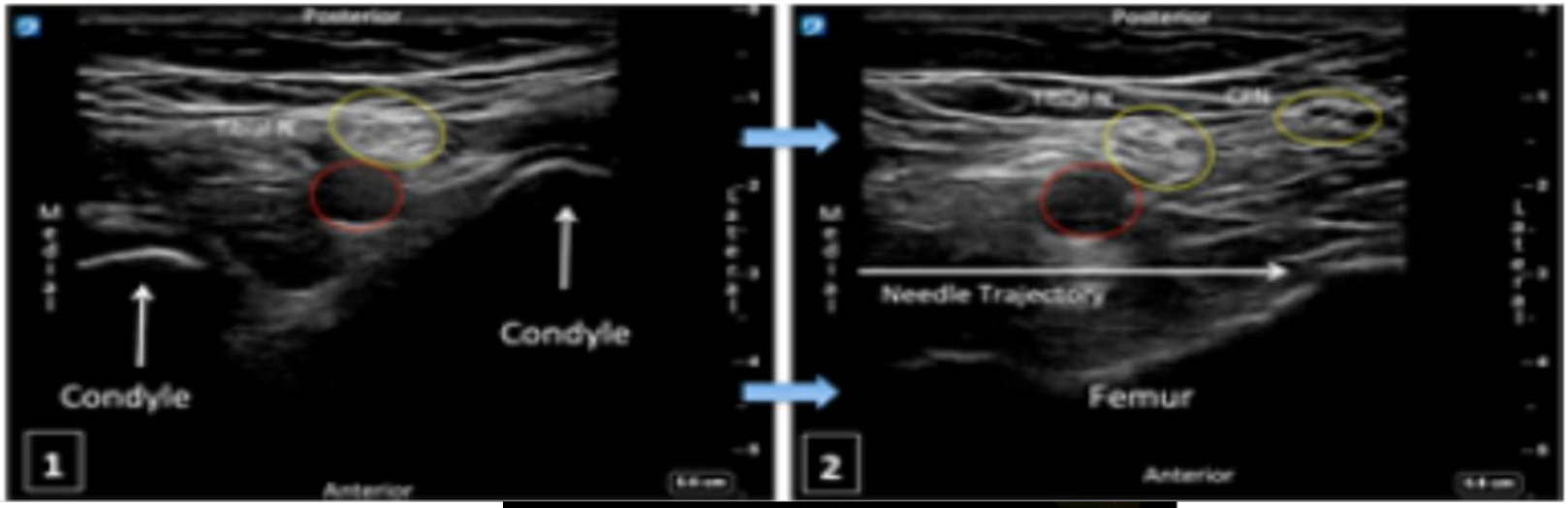
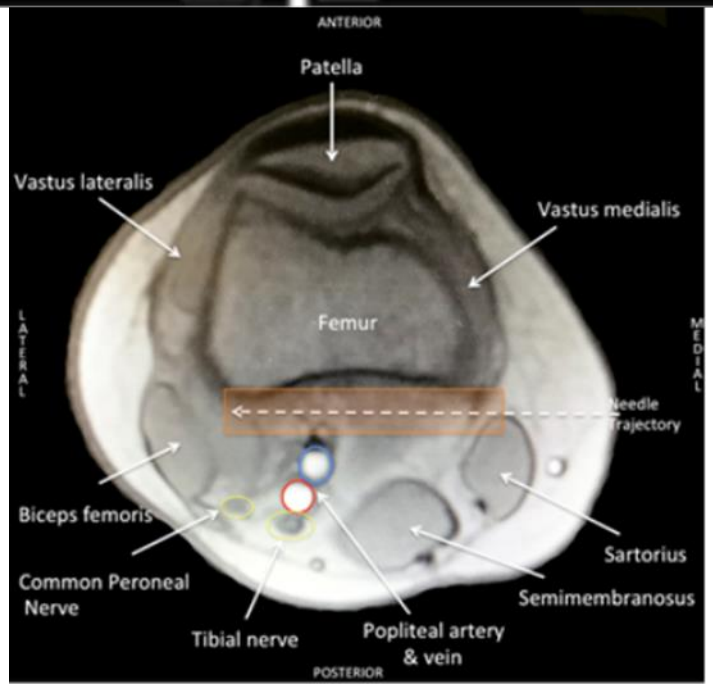
How I do it: Infiltration between Popliteal Artery and Capsule of Knee (iPACK)




Sanjay Sinha
Anesthesiologist, St. Francis Hospital and Medical Center

How I do it: Infiltration between Popliteal Artery and Capsule of Knee (iPACK)





Quelle place pour l'IPACK?

un engouement depuis peu…

Ochsner Journal 17:233–238, 2017

Novel Regional Techniques for Total Knee Arthroplasty Promote Reduced Hospital Length of Stay: An Analysis of 106 Patients

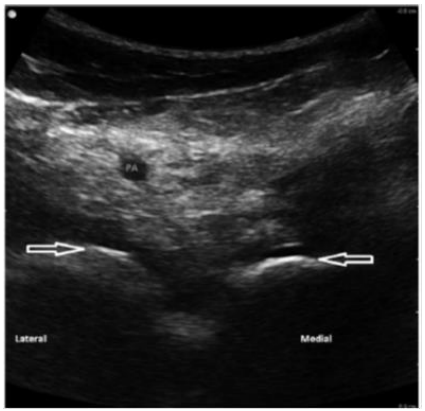
Salman Thobhani, MD,[1] Lauren Scalercio, MD,[1] Clint E. Elliott, MD,[1,2] Bobby D. Nossaman, MD,[1,2] Leslie C. Thomas, MD,[1] Dane Yuratich, MD,[1] Kim Bland, MD,[1] Kristie Osteen, MD,[1,2] Matthew E. Patterson, MD[1,2]

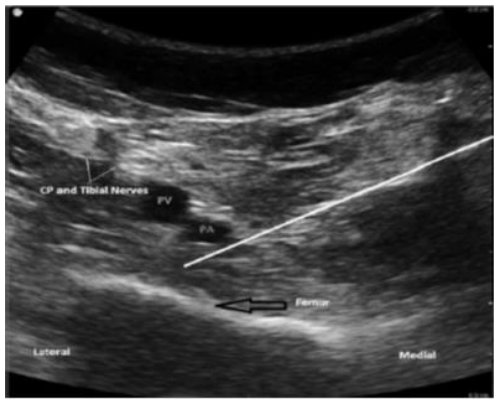
[1]Department of Anesthesiology, Ochsner Clinic Foundation, New Orleans, LA [2]The University of Queensland School of Medicine, Ochsner Clinical School, New Orleans, LA

Table 5. Day of Discharge Following Primary Unilateral Total Knee Arthroplasty (n=106)

Postoperative Time Point	FNC n=61	FNC + IPACK n=23	ACB + IPACK n=22	*P* Value
POD 1	0 (0)	0 (0)	2 (9)	
POD 2	24 (39)	7 (30)	14 (73)	
POD 3	25 (80)	12 (83)	6 (100)	0.0024
POD 4	9 (95)	4 (100)		
POD 5	3 (100)			

ACB, adductor canal block; FNC, femoral nerve catheter block; IPACK, infiltration between the popliteal artery and capsule of the knee block; POD, postoperative day.





Quelle place pour l'IPACK?

L'arthroplastie du genou

RRAA
Réhabilitation Rapide Améliorée Après Chirurgie

>100000 par an
enjeu de réhabilitation…

HAS
HAUTE AUTORITÉ DE SANTÉ

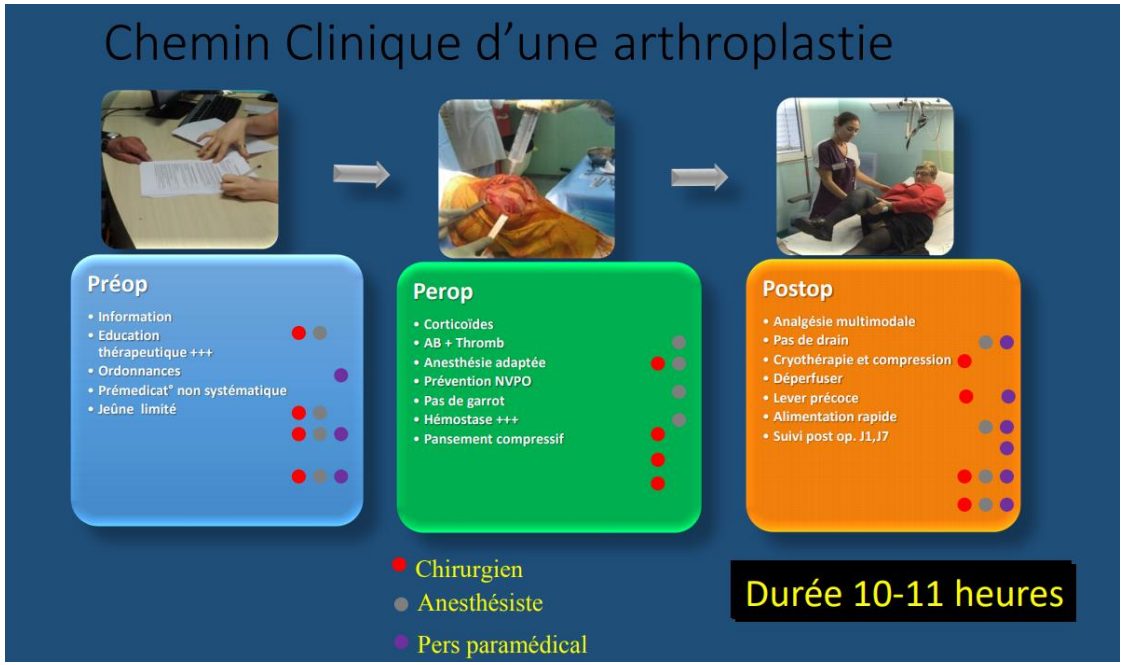
RAPPORT D'ORIENTATION

Programmes de récupération améliorée après chirurgie (RAAC) : état des lieux et perspectives

Juin 2016

Quelle place pour l'IPACK?

L'arthroplastie du genou … et ses enjeux modernes



ARS Grand Est

Développement de la Réhabilitation Améliorée Après Chirurgie (RAAC)

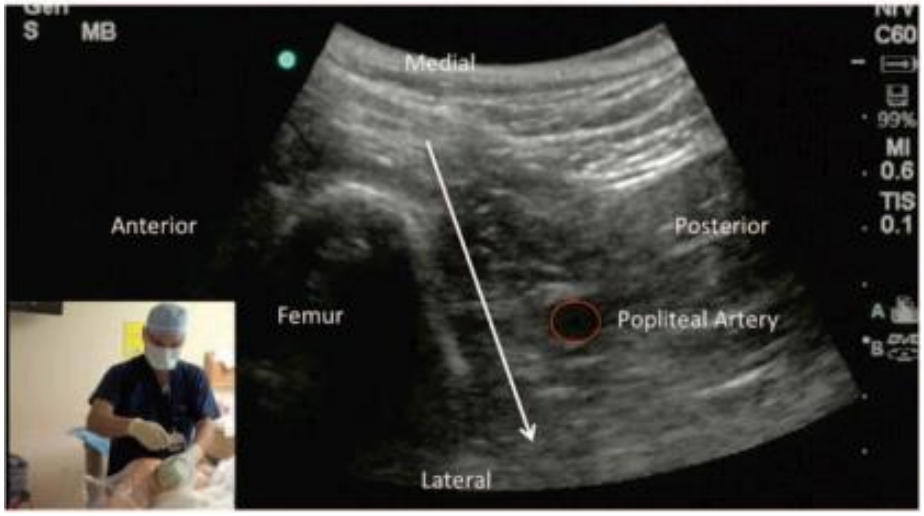
CURRENT OPINION

New blocks for the same old joints

Sanjay K. Sinha[a] *and Shivani Suter*[b]

Volume 31 • Number 5 • October 2018

- iPACK block can control posterior knee pain after total knee replacement without causing foot-drop.



Femoral Nerve Block With Selective Tibial Nerve Block Provides Effective Analgesia Without Foot Drop After Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study

Sanjay K. Sinha, MB, BS,* Jonathan H. Abrams, MD,* Sivasenthil Arumugam, MB, BS,* John D'Alessio, MD,* David G. Freitas, MD,* John T. Barnett, MD,* and Robert S. Weller, MD†

CONCLUSIONS: Tibial nerve block performed in the popliteal fossa in close proximity to the popliteal crease avoided complete peroneal motor block and provided similar postoperative analgesia compared to sciatic nerve block when combined with femoral nerve block for patients undergoing total knee arthroplasty. (Anesth Analg 2012;115:202–6)

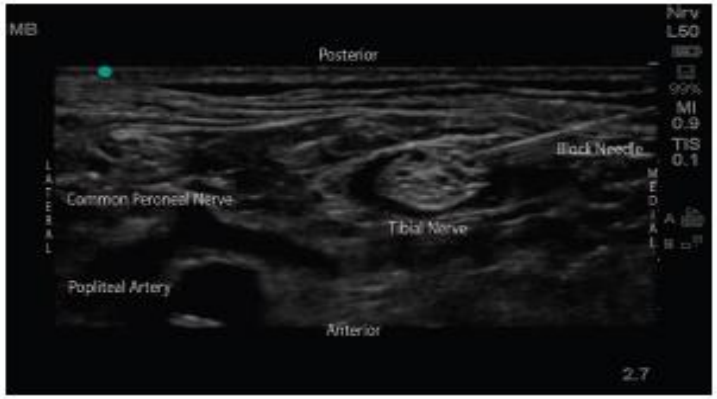


Figure 1. Sonogram showing tibial nerve surrounded by local anesthetic solution.

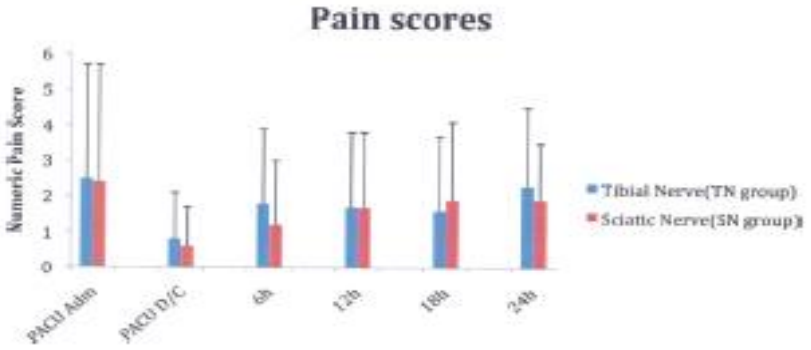
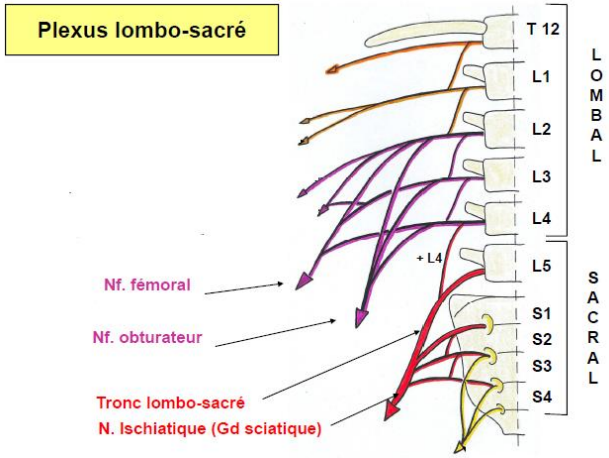
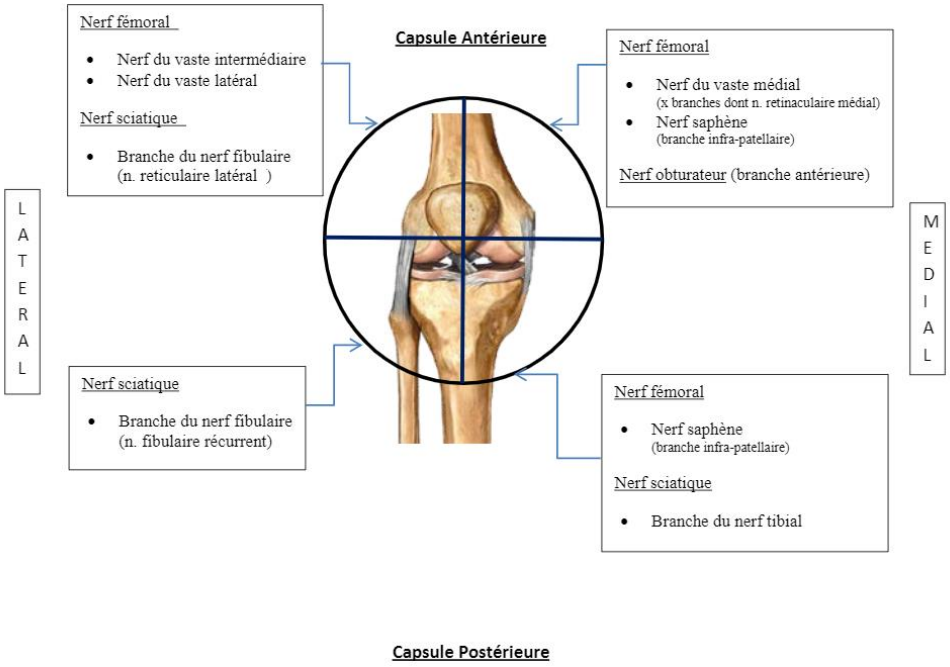


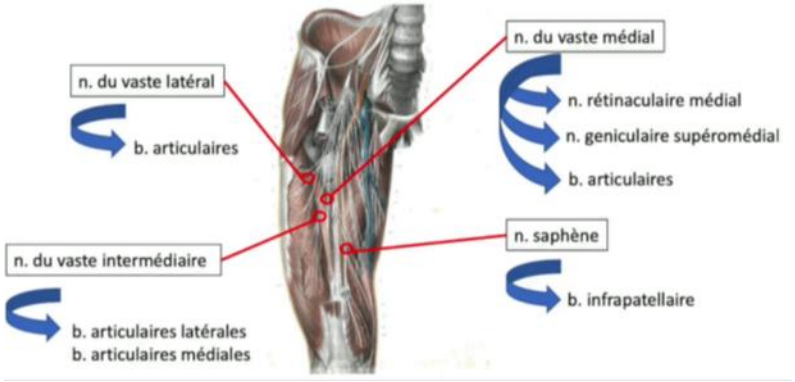
Figure 4. Verbal numeric pain score reported by patients on admission (Adm) and discharge (D/C) from the postanesthesia care unit (PACU) and at 6, 12, 18, and 24 h after discharge from the PACU. Data expressed as mean (columns) and SD (whiskers). Numeric pain score 0 to 10 (0 = no pain, 10 = worst pain). (No statistically significant differences between groups using a Bonferroni corrected 2-sided α level of 0.008).

Quelle place pour l'IPACK?

Une place dans une région anatomique complexe... aux frontières de deux plexus







branche antérieure

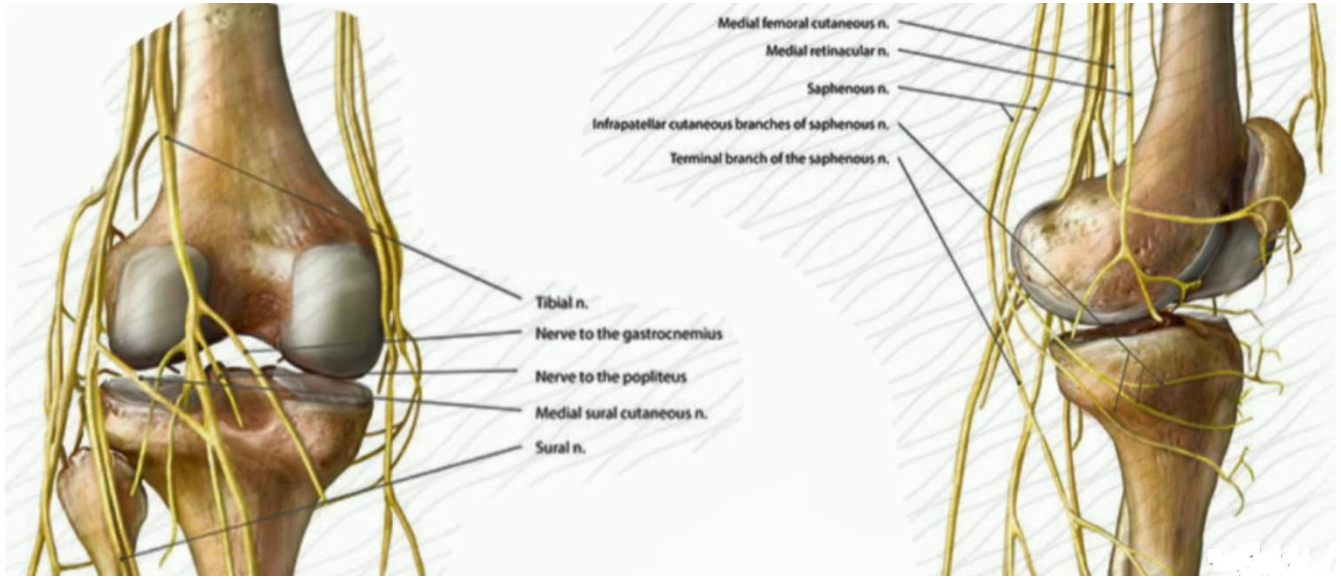
Innervation cutanée variable de la face intérieure de la cuisse et du genou

Anastomoses avec n. saphène = plexus subsartorial

branche postérieure

branches géniculaires face post. de la capsule

Anastomoses avec b. tibiales et sciatiques = plexus poplité

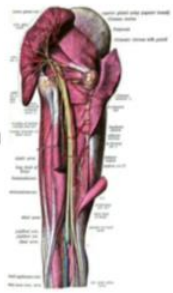


Face médiale

n. tibial

n. géniculaires post.

n. géniculaires inf. médial



n. fibulaire commun

n. géniculaire lat. récurrent

n. géniculaire sup. latéral

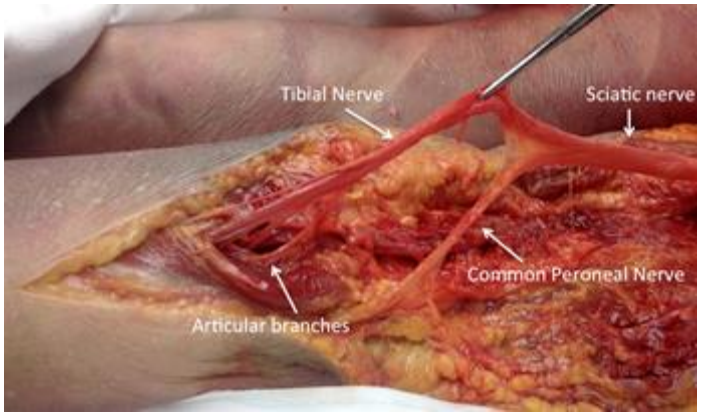
n. rétinaculaire latéral

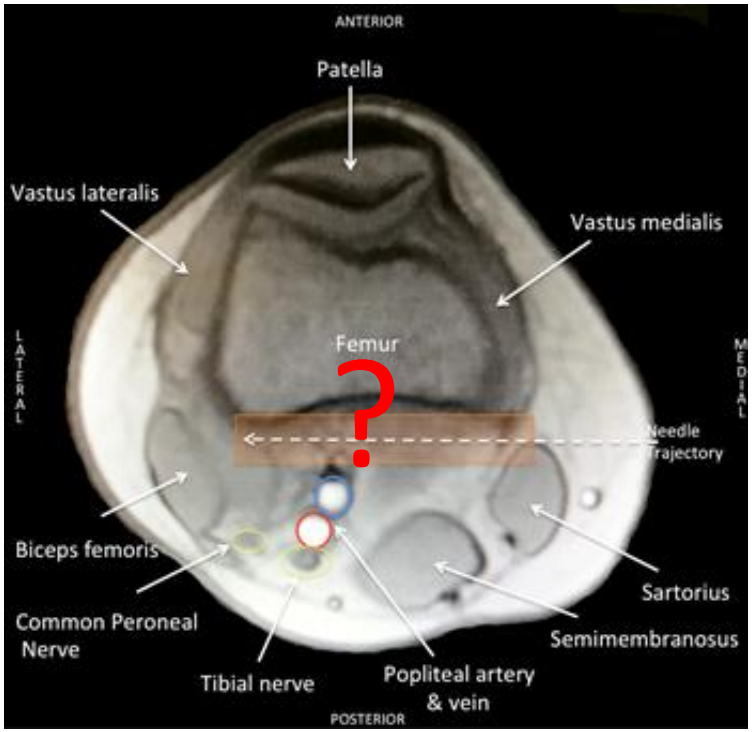
n. géniculaire inf. latéral

Face latérale

Quelle place pour l'IPACK?

Une place dans une région anatomique complexe... qui se précise





Interspace between Popliteal Artery and posterior Capsule of the Knee (IPACK) Injectate Spread:

A Cadaver Study

Adam D. Niesen, MD, David J. Harris, MD, Christopher S. Johnson, MD, David E. Stoike, DO, Hugh M. Smith, MD, PhD, Adam K. Jacob, MD, Adam W. Amundson, MD, Wojciech Pawlina, MD, David P. Martin, MD, PhD

J Ultrasound Med 2018; 00:1–5

Table 1. IPACK Injection Data

Specimen	Side	Site, cm	M/L, cm	P/D, cm	Sciatic	Tibial	CPN	MGA	Articular
1	Right	3.5	7.0	7.5	No	No	No	Yes	No
2	Right	3.5	6.0	9.5	No	No	No	Yes	No
3	Left	4.0	5.5	7.5	No	No	No	Yes	No
4	Right	3.0	6.0	5.0	No	No	?	Yes	No
5	Left	2.9	6.0	12.5	No	No	No	Yes	No
6	Left	3.0	5.0	15.0	No	Yes	No	Yes	No
7	Right	2.8	6.0	9.5	No	No	No	Yes	No
8	Left	2.8	6.5	11.5	No	Yes	?	Yes	No
9	Right	2.0	7.0	13.0	No	Yes	?	Yes	No
10	Right	2.8	NA	NA	No	No	No	No	Yes
Mean		3.0	6.1	10.1					
SD		0.5	0.7	3.2					

Articular indicates intra-articular injection; CPN, spread to the common peroneal nerve; MGA, spread to the middle genicular artery; M/L, medial-lateral spread; NA, not applicable; P/D, proximal-distal spread; Sciatic, spread to the proximal sciatic nerve; Site, distance proximal to the popliteal crease of the injection site; and Tibial, spread to the tibial nerve.

Figure 1. Sonogram showing the IPACK injection location and needle trajectory.

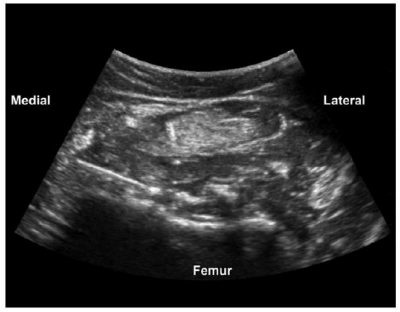
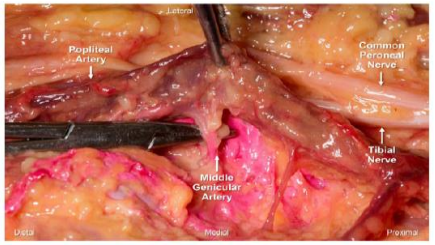


Figure 2. Cadaveric dissection showing latex involving tibial nerve branches and near the common peroneal nerve.



Evaluation of the iPACK block injectate spread: a cadaveric study

John Tran,[1] Laura Giron Arango,[2] Philip Peng,[3] Sanjay Kumar Sinha,[4] Anne Agur,[1] Vincent Chan[2]

Tran J, *et al*. *Reg Anesth Pain Med* 2019;**0**:1–6.

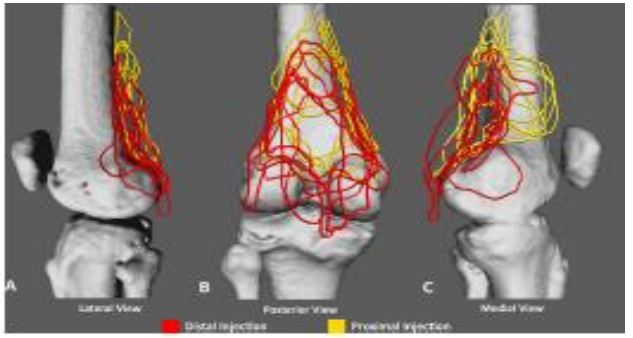


Figure 4 Dye distribution map of the proximal and distal infiltration of the interspace between the popliteal artery and capsule of the knee (iPACK) injection. (A) Lateral spread. (B) Posterior spread. (C) Medial spread.

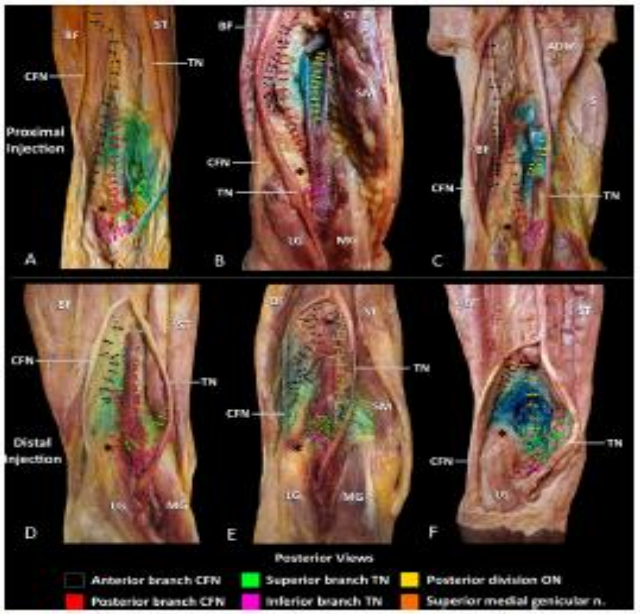


Figure 5 Posterior dye spread in the popliteal fossa following proximal and distal infiltration of the interspace between the popliteal artery and capsule of the knee (iPACK) injections. (A–C) Proximal iPACK injection. (D–F) Distal iPACK injection. Asterisk (black) denotes lateral femoral condyle. ADM, adductor magnus muscle; BF, biceps femoris muscle; CFN, main trunk of common fibular nerve; LG, lateral head of gastrocnemius muscle; MG, medial head of gastrocnemius muscle; ON, obturator nerve; S, sartorius muscle; SM, semimembranosus muscle; ST, semitendinosus muscle; TN, main trunk of tibial nerve.

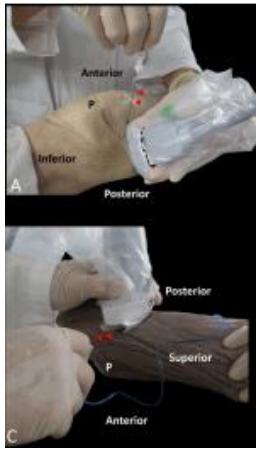


Table 2 Comparison of articular nerve staining between iPACK injection techniques

	Proximal injection		Distal injection	
Articular branches of knee joint	**Identified**	**Stained**	**Identified**	**Stained**
	n/7 SP	n (%)	n/7 SP	n (%)
Posterior capsule				
Superior branch tibial nerve	4/7	3/4 (75)	7/7	6/7 (85)
Inferior branch tibial nerve	7/7	2/7 (29)	7/7	3/7 (42)
Posterior branch CFN	4/7	2/4 (50)	5/7	4/5 (80)
Genicular branch PON	7/7	7/7 (100)	7/7	7/7 (100)
		14/22 (64)		20/26 (77)
Anterolateral capsule				
Anterior branch CFN	7/7	5/7 (71)	7/7	7/7 (100)
Lateral branch NVI	7/7	0/7 (0)	7/7	0/7 (0)
Nerve to vastus lateralis	7/7	0/7 (0)	7/7	0/7 (0)
Superior lateral genicular nerve	7/7	5/7 (71)	7/7	7/7 (100)
		10/28 (40)		14/28 (50)
Anteromedial capsule				
Nerve to vastus medialis	7/7	0/7 (0)	7/7	0/7 (0)
Medial branch NVI	7/7	5/7 (71)	7/7	0/7 (0)
Superior medial genicular nerve	7/7	7/7 (100)	7/7	4/7 (57)
Saphenous nerve*	7/7	3/7 (43)	7/7	4/7 (57)
		15/28 (54)		8/28 (29)

*Indicates main trunk staining.
CFN, common fibular nerve; NVI, nerve to vastus intermedius; PON, posterior division of obturator nerve; SP, specimen; IPACK, infiltration of the interspace between the popliteal artery and capsule of the knee.

Original article

Anatomical study of the innervation of posterior knee joint capsule: implication for image-guided intervention

John Tran,[1] Philip W H Peng,[2] Michael Gofeld,[2] Vincent Chan,[2] Anne M R Agur[1]

. *Reg Anesth Pain Med* 2019;**44**:234–238.

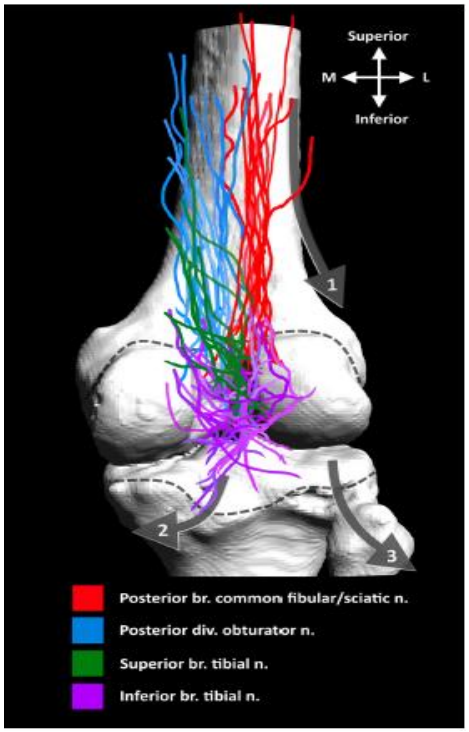


Table 1 Previous cadaveric studies of the innervation of posterior knee joint capsule

	Tibial nerve		Posterior division obturator nerve		Anterior division obturator nerve
	Presence	Origin	Presence	Origin/course	Presence
Gardner[8] 1948 (n=11)	11/11	A. Tibial portion of sciatic nerve B. Popliteal fossa	9/11	ns/through adductor magnus	1/11*
Kennedy et al[9] 1982 (n=15)	✓	A. Above knee joint B. Popliteal fossa	✓	ns/with femoral artery into popliteal fossa	x
Horner and Dellon[10] 1994 (n=45)	✓	A. 10–25 cm above joint line	✓	Hunter's canal/adductor hiatus	x
Orduña Valls et al[16] 2017 (n=25)	✓	A. Popliteal fossa	✓	Mid-femoral/through adductor magnus	x
Runge et al[18] 2017 (n=10)	10/10	ns	10/10	ns/adductor magnus, hiatus and canal	x

Conclusions Frequency map of the course and distribution of the articular branches and their relationship to anatomical landmarks form an anatomical basis for peripheral nerve block approaches that provide analgesia to the posterior knee joint capsule.

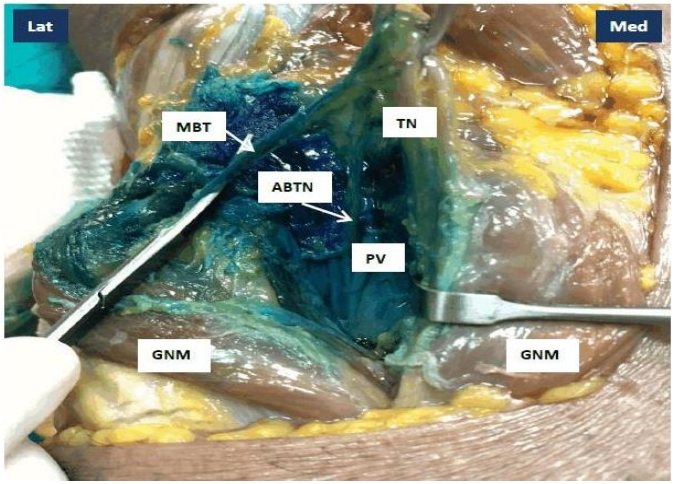
Figure 3 Frequency map of the innervation of the posterior knee joint, posterior view. Arrows indicate course of (1) superior lateral genicular nerve and anterior branch of common fibular nerve/sciatic nerve; (2) inferior medial genicular nerve; (3) recurrent fibular nerve. Dashed line: attachment of knee joint capsule. Reprinted with permission from Philip Peng educational series.

kja KOREAN JOURNAL of ANESTHESIOLOGY

Published online April 30, 2019.

Optimal location of local anesthetic injection into the interspace between the popliteal artery and posterior capsule of the knee (iPACK) for posterior knee pain after total knee arthroplasty: an anatomical and clinical study

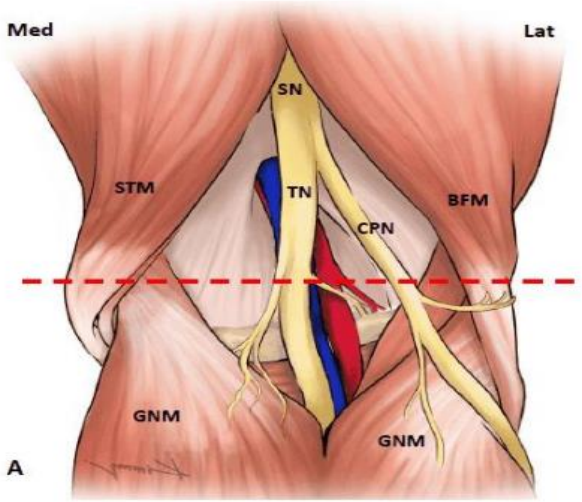
Wirinaree Kampitak[1], Tanvaa Tansatit[2], Aree Tanavalee[3], Srihatach Ngarmukos[3]

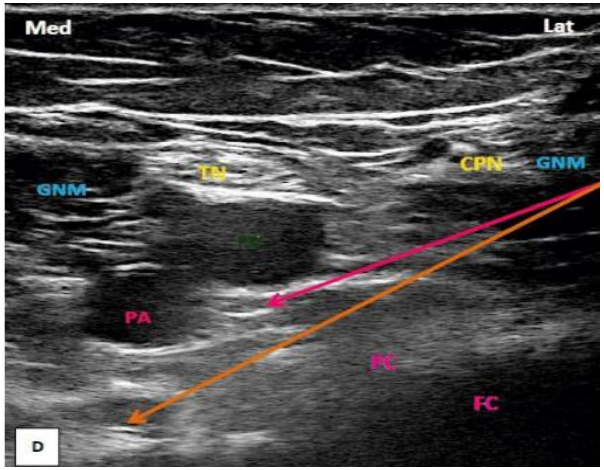


-ABTN: articular branch of the tibial nerve?

-bloc plexus poplité?

-étude anatomique sur 30 cadavres et clinique sur 15 patients





Quelle place pour l'IPACK?

une place qui s'établit…

HSSJ
DOI 10.1007/s11420-018-9652-2

HSS Journal®

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OPIOID PRESCRIBING AND PAIN MANAGEMENT / REVIEW ARTICLE

Regional and Multimodal Analgesia to Reduce Opioid Use After Total Joint Arthroplasty: A Narrative Review

Ellen M. Soffin, MD, PhD · Christopher L. Wu, MD

9 November 2018

Pre-operative

- Education & expectation-setting for anticipated pain trajectory, time course of and role of opioids in recovery (starts in the surgeon's office, reinforced during pre-surgical optimization phase by anesthesiologist, internist, and pain management specialist)
- Oral pre-emptive analgesia on the day of surgery: acetaminophen 1000 mg, gabapentin 300 mg (holding area)

Intra-operative

- Neuraxial anesthesia (spinal, or combined spinal-epidural)
- **KNEE**: Peripheral nerve blocks placed: ACB (20 mL 0.25% bupivacaine with 2 mg preservative free dexamethasone), IPACK (10 mL 0.25% bupivacaine) ± surgeon administered LIA
- **HIP**: surgeon administered LIA (20–30 mL 0.5% bupivacaine)
- Sedation: Up to 2 mg midazolam; propofol infusion (50-100 $\mu g.kg.min^{-1}$)
- Multimodal analgesia: ketamine infusion (0.1-0.3 $mg.kg^{-1}$) ketorolac 15 or 30 mg during skin closure (dose adjusted for patient risk factors)
- PONV prophylaxis: ondansetron (4 mg), dexamethasone (4 mg)

Post-operative

- Ongoing multimodal analgesia: regularly scheduled acetaminophen (1000 mg every 6 hours), NSAID (ketorolac 15 or 30 mg every 8 hours, and then oral NSAID, ex: meloxicam 7.5 or 15 mg daily), gabapentin (300-600 mg every 8 hours); dextromethorphan 30-60 mg every 8 hours.
- **KNEE**: oxycodone 5/10/15 mg for mild/moderate/severe pain, PRN
- **HIP**: tramadol 50-100 mg for moderate/severe pain, PRN
- Discharge prescriptions for opioid medications according to standardized, service-specific guidelines [88]
- Ongoing education and reinforcement regarding the role and duration of opioid therapy in recovery

Addition of Infiltration Between the Popliteal Artery and the Capsule of the Posterior Knee and Adductor Canal Block to Periarticular Injection Enhances Postoperative Pain Control in Total Knee Arthroplasty: A Randomized Controlled Trial

David H. Kim, MD,* Jonathan C. Beathe, MD,* Yi Lin, MD, PhD,* Jacques T. YaDeau, MD, PhD,* Daniel B. Maalouf, MD, MPH,* Enrique Goytizolo, MD,* Christopher Garnett, BS,* Amar S. Ranawat, MD,† Edwin P. Su, MD,† David J. Mayman, MD,† and Stavros G. Memtsoudis, MD, PhD*

CONCLUSIONS: The addition of IPACK and ACB to PAI significantly improves analgesia and reduces opioid consumption after total knee arthroplasty compared to PAI alone. This study strongly supports IPACK and ACB use within a multimodal analgesic pathway. (Anesth Analg

Table 4. Physical Therapy Ambulation Distance (Feet)

	PAI		IPACK/ACB mPAI		Difference in Means (95% CI)	P
	n	Mean ± SD	n	Mean ± SD		
POD 0	43	23.2 ± 26.1	42	25.7 ± 28.8	2 (−9 to 14)	.713
POD 1 visit 1	42	81.1 ± 61	43	87.7 ± 46.2	7 (−16 to 29)	.570
POD 1 visit 2	32	112 ± 38.7	34	116.7 ± 51.7	6 (−15 to 28)	.576
POD 2 visit 1	31	106.5 ± 51.8	29	119.5 ± 59.9	12 (−16 to 40)	.397

Distance walked in feet

Table 3. Opioid Use: Opioid Consumption and Rescue Analgesia

	PAI		IPACK/ACB mPAI		Difference in Means (95% CI)	P
Opioid Consumption (mg OME)	n	Mean ± SD	n	Mean ± SD		
Total opioid consumption						
PACU	43	27.7 ± 21.7	43	14.9 ± 19.4	−12.9 (−21.7 to −4.0)	.005
0–24 h	43	69.1 ± 79.9	43	40.6 ± 32.1	−28.5 (−53.9, −3.1)	.028
24–48 h	31	60.4 ± 50	31	65.7 ± 35.6	−2.3 (−21, 16.5)	.812
IV opioid consumption (rescue analgesia, NRS >7)						
PACU	43	8.9 ± 10	43	1.9 ± 4.4	−7 (−10.3 to −3.7)	<.001
0–24 h	43	8.9 ± 10	43	1.9 ± 4.4	−7 (−10.2 to −3.8)	<.001
24–48 h	31	0 ± 0	31	0.2 ± 1.3	0.1 (−0.3 to 0.6)	.534
	PAI		IPACK/ACB mPAI			
Rescue Analgesia	n	Count (%)	n	Count (%)	Odds Ratio (95% CI)	P
IV opioids (rescue analgesia)[a]						
0–24 h	43	23 (53.3)	43	8 (18.6)	0.20 (0.08–0.53)	.001
24–48 h	31	0 (0)	31	1 (3.2)	N/A	N/A
IV PCA ordered (salvage therapy)[b]						
0–24 h	35	8 (18.6)	42	1 (2.3)	0.10 (0.01–0.87)	.037
24–48 h	28	3 (9.7)	31	0 (0)	N/A	N/A

Abbreviations: ACB, adductor canal block; CI, confidence interval; IPACK, infiltration between the popliteal artery and capsule of the posterior knee; IV, intravenous; mPAI, modified periarticular injection; N/A, not applicable; NRS, numeric rating scale; OME, oral morphine equivalent; PACU, postanesthesia care unit; PAI, periarticular injection; PCA, patient-controlled analgesia; SD, standard deviation.

Comparison of adductor canal block and IPACK block (interspace between the popliteal artery and the capsule of the posterior knee) with adductor canal block alone after total knee arthroplasty: a prospective control trial on pain and knee function in immediate postoperative period

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Received: 7 February 2018 / Accepted: 25 April 2018

Table 2 The comparison of postoperative VAS scores and distance walked between both the groups

Variable	Adductor canal block + IPACK (Group 1, $n=60$)	Adductor canal (Group 2, $n=60$)	P value
VAS 8 h PO	1.4333 ± 0.6474	2.9167 ± 0.64550	< 0.001
VAS POD 1	2.05 ± 0.4323	3.1833 ± 0.72467	< 0.001
VAS POD 2	2.55 ± 0.7274	3.4500 ± 0.67460	< 0.001
ROM (°)	71.8333 ± 9.52	62.2500 ± 8.25	< 0.001
Distance walked day 3 (no. of steps)	8.51 ± 1.85	7.1333 ± 1.434	< 0.001

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KJA
Korean Journal of Anesthesiology

Clinical Research Article
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Implementation of the IPACK (Infiltration between the Popliteal Artery and Capsule of the Knee) block into a multimodal analgesic pathway for total knee replacement

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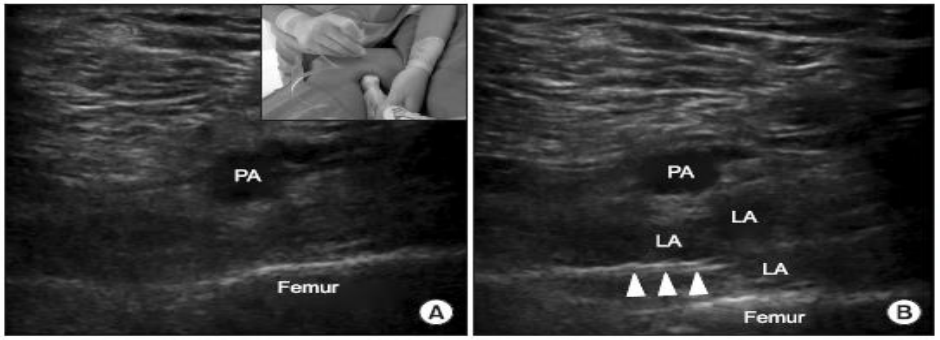


Fig. 1. Ultrasound images demonstrating relevant sono-anatomy for the Infiltration between the Popliteal Artery and Capsule of the Knee (IPACK) before (A) and after (B) local anesthetic injection; PA: popliteal artery, LA: local anesthetic. Arrows indicate the distal end of the needle.

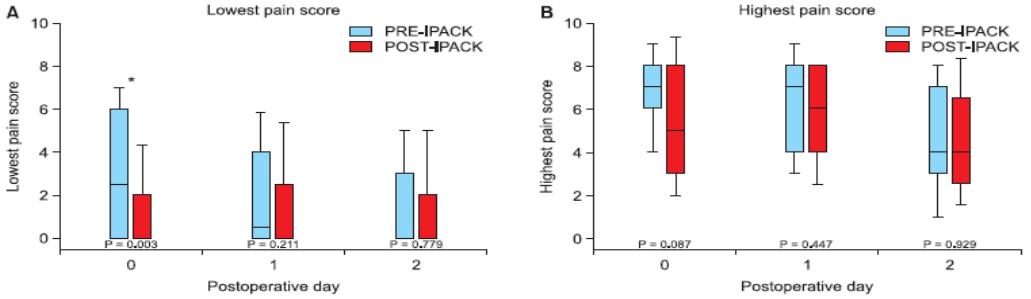


Fig. 2. Lowest (A) and highest (B) pain scores reported by patients in the PRE- and POST-IPACK groups on postoperative days 0, 1, and 2 using a numeric rating scale. IPACK: Infiltration between the Popliteal Artery and Capsule of the Knee. *P < 0.05.

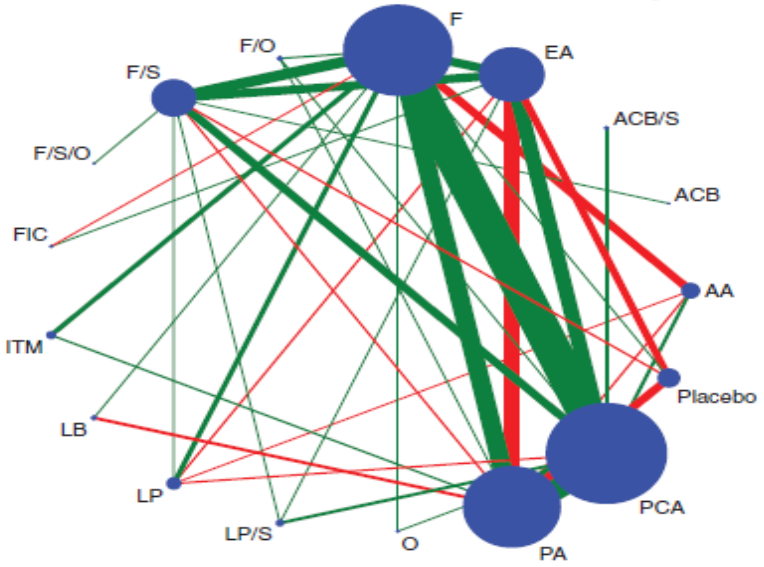
Quelle place pour l'IPACK?

Une place à réfléchir dans une stratégie globale de prise en charge

Pain Management Modalities after Total Knee Arthroplasty

A Network Meta-analysis of 170 Randomized Controlled Trials

Abdullah Sulieman Terkawi, M.D., Dimitris Mavridis, Ph.D., Daniel I. Sessler, M.D., Megan S. Nunemaker, M.S.L.S., Khaled S. Doais, M.D., Rayan Sulieman Terkawi, M.D., Yazzed Sulieman Terkawi, M.S., Maria Petropoulou, M.Sc., Edward C. Nemergut, M.D.



Conclusions: Blocking multiple nerves was preferable to blocking any single nerve, periarticular infiltration, or epidural analgesia. The combination of femoral and sciatic nerve block appears to be the overall best approach. Rehabilitation parameters remain markedly understudied. (ANESTHESIOLOGY 2017; 126:00-00)

Peripheral Nerve Blocks vs Periarticular Injections in Total Knee Arthroplasty.

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Mark J Spangehl, MD; Spangehl.mark@mayo.edu – corresponding author

Table 1. Ingredients of Peri-Articular Injections by Author

Author	50 – 74.9 kg	75 – 99.9 kg	100 – 125 kg	Volume
Weight Based Administration of Anesthetic				
Amundson [44]	Ropivacaine 200mg Epinephrine 100 mcg Ketorolac 30mg	Ropivacaine 300 mg Epinephrine 200 mcg Ketorolac 30 mg	Ropivacaine 400 mg Epinephrine 300 mcg Ketorolac 30 mg	120 ml
Spangehl [43]	Ropivacaine 200mg Epinephrine 100 mcg Ketorolac 30mg Morphine Sulphate 5 mg	Ropivacaine 300 mg Epinephrine 200 mcg Ketorolac 30 mg Morphine Sulphate 5mg	Ropivacaine 400 mg Epinephrine 300 mcg Ketorolac 30 mg Morphine Sulphate 5 mg	120 ml
Non-Weight based or not specified				
Wall [46]	Levobupivacaine hydrochloride 0.25%, 150mg Epinephrine 0.25 mg Ketorolac 30 mg Morphine Sulphate 10 mg			150ml
[X]Ranawat [84]	0.5% Bupivacaine 200-400 mg Morphine 8mg Epinephrine 300 ug Methylprednisolone 40 mg Cefuroxime 750 mg Normal saline			Not specified
Fan [45]	Ropivacaine 100 mg Morphine 10 mg Diprospan (5 mg betamethasone dipropionate and 2 mg betamethasone sodium phosphate)			50 ml
Busch [7]	Ropivacaine 400 mg Ketorolac 30 mg Epimorphine 5 mg Epinephrine 0.6 mg			100 ml
Lombardi [85]	*Deep:* Bupivacaine 0.25% 125 mg Epinephrine 0.25 mg *Intra-articular following Closure:* Bupivacaine 0.25% 75 mg Morphine 10 mg Epinephrine 0.15 mg			Not specified
Youm [86]	0.75% Ropivacaine 300 mg Morphine 7.5 mg Epinephrine 0.3 mg Methyl Prednisolone 40 mg Ketorolac 30 mg Cefoxitin 500 mg			50 ml
[X]Yadeau [87]	*Deep* 0.5% Bupivicaine 150 mg Epinephrine 0.3 mg Morphine 8 mg Methylprednisolon 40 mg Cefazolin 500 mg *Superficial* 0.25% Bupivacaine 100 mg			54 ml + 40 ml

[X]Clonidine transdermal patch also applied intra-operatively (100 ug/24 hours)

The Journal of Arthroplasty

2 August 2018

HAS
HAUTE AUTORITÉ DE SANTÉ

Coopération entre anesthésistes-réanimateurs et chirurgiens

Cher(e) collègue,

Vous êtes médecin anesthésiste-réanimateur ou chirurgien, quel que soit votre secteur d'activité, le respect des points-clés suivants a été identifié comme important pour mieux travailler ensemble et donc améliorer la sécurité de vos patients.

Les points-clés pour une pratique en équipe efficace

Contents lists available at ScienceDirect

The Knee

Continuous adductor canal blockade facilitates increased home discharge and decreased opioid consumption after total knee arthroplasty☆

Mitchell R. Klement [a,b,*], W. Michael Bullock [c], Brian T. Nickel [a], Alexander J. Lampley [a], Thorsten M. Seyler [a], Cynthia L. Green [d], Samuel S. Wellman [a], Michael P. Bolognesi [a], Stuart A. Grant [b]

Conclusions: We recommend ACC + iPACK with a multimodal oral analgesic protocol as the primary postoperative analgesia in enhanced recovery TKA protocols. This resulted in an easier recovery with fewer complications.
Level of evidence: Level III.

Table 3
Comparison of primary and secondary outcome measures across the two postoperative primary analgesic groups.

	Overall	Group 1 FNB + LB-PAI	Group 2 ACC + iPACK	p-Value
Patients (n)	264	146	118	
Primary outcome measures				
LOS, days	2.2 (2.0, 3.1)	3.0 (2.2, 3.2)	2.0 (1.9, 2.9)	**<0.001**
Discharge destination				**0.002**
Home with HHPT, %	27.7	31.5	22.9	
Home with OPPT, %	45.5	36.3	56.8	
Inpatient rehab, %	1.5	0.7	2.5	
SNF, %	25.4	31.5	17.8	
Opioid consumption 24 h postoperatively, IVME[a]	30.0 (15.3, 46.6)	44.1 (27.5, 56.7)	20.0 (10.0, 30.0)	**<0.001**
Secondary outcome measures				
Pain scores[b]				
PACU	3.1 ± 2.7	3.1 ± 2.8	3.1 ± 2.6	0.685
PM POD 0	4.2 ± 2.3	4.5 ± 2.4	3.8 ± 2.1	**0.009**
AM POD 1	4.3 ± 2.2	4.8 ± 2.2	3.7 ± 2.0	**<0.001**
Ambulation, ft.				
POD 0	0 (0, 2)	0 (0, 1)	0 (0, 8)	**0.001**
POD 1	64 (15, 180)	34 (6, 100)	115 (50, 250)	**<0.001**
POD 2	100 (40, 200)	100 (25, 200)	120 (60, 200)[c]	0.064
Complication				
Adverse events[d], %	3.4	5.5	0.8	**0.045**
MUA, %	3.8	6.2	0.8	**0.026**
Infection, %	1.1	0.0	2.5	0.088
Reoperation, %	0.8	1.4	0.0	0.504

Results presented as percentage, mean ± standard deviation, or median (25th, 75th percentiles). FNB = single shot femoral nerve block; LB-PAI = liposomal bupivacaine periarticular injection; ACC = adductor canal catheter; iPACK = ultrasound guided infiltration of the interspace between the popliteal artery and capsule of the knee; LOS = length of stay; SNF = skilled nursing facility; HHPT = home health physical therapy; OPPT = outpatient physical therapy.

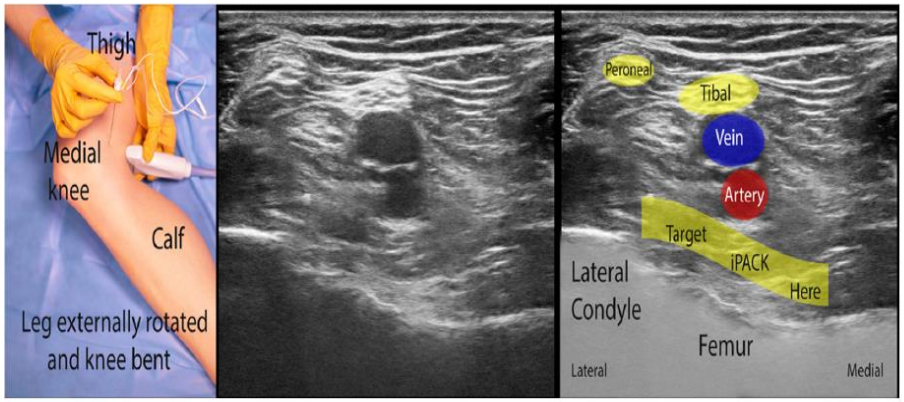


Figure 1. Placement of ultrasound guided infiltration of the interspace between the popliteal artery and capsule of the knee (iPACK) block. From left to right: placement of leg in preoperative holding after spinal has been placed. Operative knee is flexed and leg is externally rotated; Image from the transducer as placed in panel 1; image from the transducer with important structures labeled and target for placement of the needle.

THE BONE & JOINT JOURNAL EST. 1948

■ KNEE

A prospective randomized open-label study of single injection *versus* continuous adductor canal block for postoperative analgesia after total knee arthroplasty

N. M. Elkassabany,
L. F. Cai,

Table IV. Physical therapy outcomes

Measure	Median (interquartile range)			p-value*
	Single-shot	24-hour	48-hour	
Postoperative day 1				
First attempt distance, ft	25 (20 to 50)	30 (20 to 75)	35 (25 to 75)	0.05
Cumulative ambulation distance, ft	60 (30 to 75)	70 (30 to 90)	70 (74.5 to 100)	0.07
Postoperative day 2				
First attempt distance, ft	100 (37.5 to 150)	100 (25 to 200)	150 (50 to 200)	0.19
Cumulative ambulation distance, ft	155 (62.5 to 240)	150 (70 to 240)	200 (90 to 270)	0.46
Tinetti scale score				
Postoperative day 1	14 (7 to 19)	13 (7 to 19)	15 (11 to 19)	0.36
Postoperative day 2	18.5 (11 to 21)	19 (15 to 22)	19.5 (14 to 22)	0.53
TUG in 24 hrs, secs	46 (29 to 66); 9 missing values	51 (29 to 84); 11 missing values	55 (35 to 83); 11 missing values	0.5
TUG in 48 hrs, secs	30 (24 to 47); 8 missing values	27 (20 to 38); 9 missing values	31 (24 to 44); 3 missing values	0.6

*Kruskal–Wallis test
TUG, time to up and go

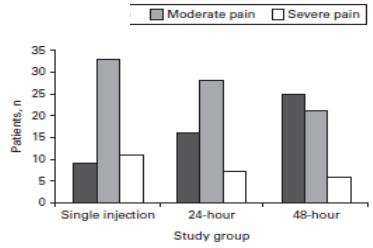


Fig. 2

Graph showing the distribution of patients with severe, moderate, and

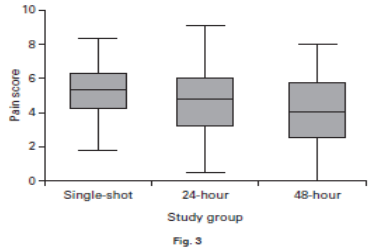


Fig. 3

Graph showing the mean pain scores 48 hours after surgery.

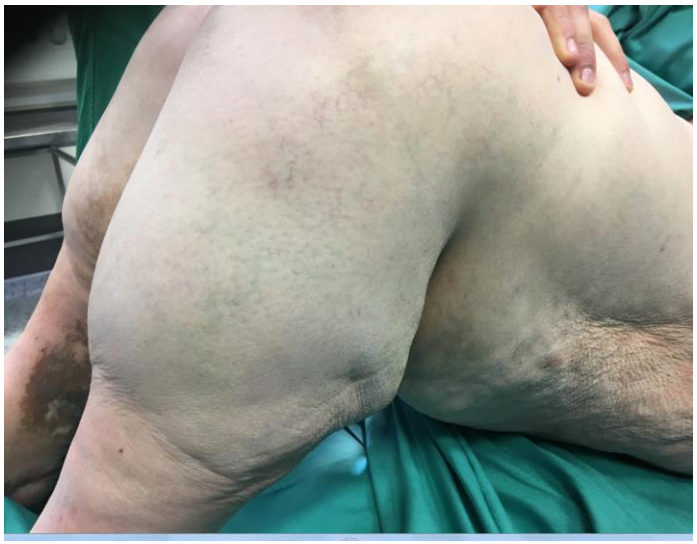
Conclusion

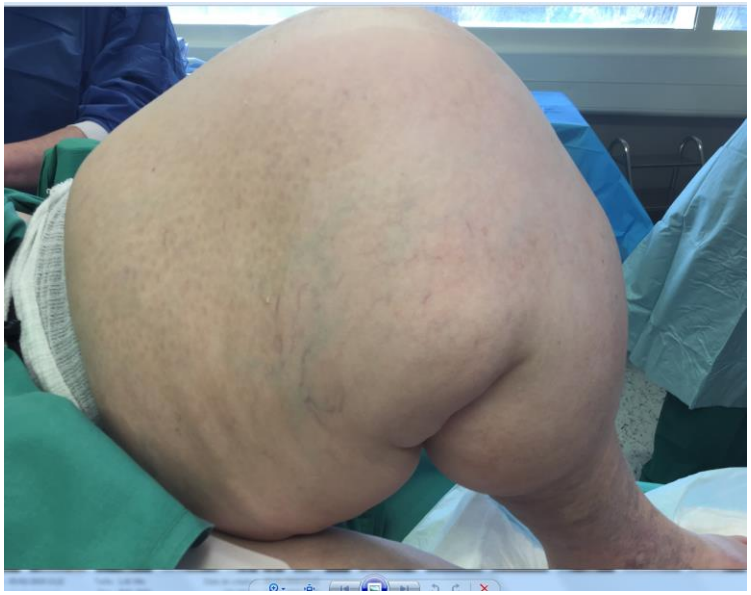
There was no clear benefit of the 24-hour or 48-hour infusions over the single-shot ACB for the primary endpoint of the study. Otherwise, there were marginal benefits for keeping the indwelling catheter for 48 hours in terms of reducing the number of patients with moderate pain and improving the quality of pain management. However, all three groups had similar opioid usage, length of hospital stay, and functional outcomes. Further studies with larger sample sizes are needed to confirm these findings.

Cite this article: ***Bone Joint J*** **2019;101-B:340–347.**

Quelle place pour l'IPACK?

Une place qui a ses limites… le chirurgien reprend la main





Quelle place pour l'IPACK en conclusion?

-Infiltration supra-condylienne postérieure du genou échoguidée
-remplace ou complète l'infiltration chirurgicale dans la chirurgie prothétique du genou
-efficace douleurs postérieures épargnant les fibres motrices
-place dans une stratégie de prise en charge … à réfléchir et à évaluer…

Patient Chambre :

Chirurgien : ☐ SIRVEAUX ☐ ROCHE ☐ GALOIS ☐ MAINARD ☐ AISENE ☐ BAUER ☐ HEMMER ☐ HOUFANI ☐ JULLION ☐ PAROT ☐ WALBRON	
Intervention	☐ PTG ☐ PUC ☐ PTG bilatérale ☐ Dépose-repose PTG : ☐ PTG de reconstruction ☐ septique
Terrain patient	☐ antidepresseurs ou BZD ☐ opioïdes au long cours ☐ fibromyalgie/ SDRC - algoneurodystrophie ☐ hyperalgésie préopératoire ☐ obésité (IMC : ……)
DN4 préopératoire	Score à …../10
Type d'anesthésie	☐ AG ☐ Rachianesthésie
Antalgiques en peropératoire	☐ paracétamol ☐ néfopam ☐ tramadol ☐ profénid ☐ dexaméthasone ☐ kétamine ☐ morphine ☐ catapressan
Infiltration chirurgicale	☐ Oui ☐ Non Concentration Volume Localisation 1ère articulaire 1ère articulaire Postérieure Antérieure Compartiment latéral Médications : ALX Exacyl Profénid CTC Adrénaline
Garrot ?	☐ Oui ☐ Non
Redon ?	☐ Oui ☐ Non Nombre :
Antalgiques en SSPI	☐ paracétamol ☐ néfopam ☐ tramadol ☐ profénid ☐ dexaméthasone ☐ kétamine ☐ morphine →dose totale : … mg ☐ Catapressan
Hospitalisation	☐ USC ☐ Secteur

ALR	Heure : … H	
• Opérateur AR	☐ junior : ☐ senior :	☐ accompagné
• Difficultés	☐ oui (détails :) ☐ non réalisable ☐ non	
• Réalisation	☐ Préopératoire ☐ Post-opératoire	
• Type	☐ bloc canal des adducteurs ☐ IPACK ☐ bloc fémoral d'emblée ☐ bloc fémoral en complément	→ volume : … → volume : … → volume : … → volume : …
• Anesthésiques locaux	☐ ropivacaïne 2 mg/ml ☐ ropivacaïne 3,75 mg/ml ☐ ropivacaïne 5 mg/ml ☐ ropivacaïne 7,5 mg/ml	
• Adjuvants	☐ clonidine ☐ dexaméthasone	→ dose : … ug → dose : … mg
• Cathéter périnerveux	☐ Oui ☐ Non ☐ site fémoral ☐ site canal des adducteurs ☐ préopératoire ☐ post-opératoire ☐ d'emblée ☐ en complément	
• APD	☐ Oui ☐ Non	
• RA morphine	☐ Oui ☐ Non	
Confort post-opératoire		
Analgésie au repos : • Avant sortie SSPI • Au cours de la 1e nuit • A J+1 • A J+2	ENS : … / 10 ENS maximale : …../10 ENS : … /10 ENS : … /10	
Retrait du pansement compressif Retrait du / des redon(s)	Date et heure Date et heure	
• Levée du bloc • Consommation totale de morphine J+1 • Consommation totale de morphine J+2	Date : …/…/… Heure : … H ….Mg ….Mg	
Kinésithérapie		
• Date 1e mobilisation	Date : …/…/… Heure : … H	

• **Objectif J0 :**		
lever	☐ Oui	☐ Non
Contraction iso du quad	☐ Oui	☐ Non
Autonomie des transferts	☐ Oui	☐ Non
• **Objectif > J1**		
Extension/flexion simple	☐ Oui	☐ Non
Flexion >90°	☐ Oui	☐ Non
Passage au point 0°	☐ Oui	☐ Non
Extension 0°	☐ Oui	☐ Non
Contraction concentrique quad contre pesanteur (>3/5 Daniels)	☐ Oui	☐ Non
Autonomie des transferts	☐ Oui	☐ Non
Marche avec CA ou déambulateur	☐ Oui	☐ Non
Escaliers	☐ Oui	☐ Non
• **Sortie**		
Date de sortie	☐ Oui	☐ Non
ENS	☐ Oui	☐ Non
DN4	☐ Oui	☐ Non

HAS
HAUTE AUTORITÉ DE SANTÉ

RECOMMANDATIONS PROFESSIONNELLES

Critères de suivi en rééducation et d'orientation en ambulatoire ou en SSR

Après arthroplastie totale du genou

ARGUMENTAIRE

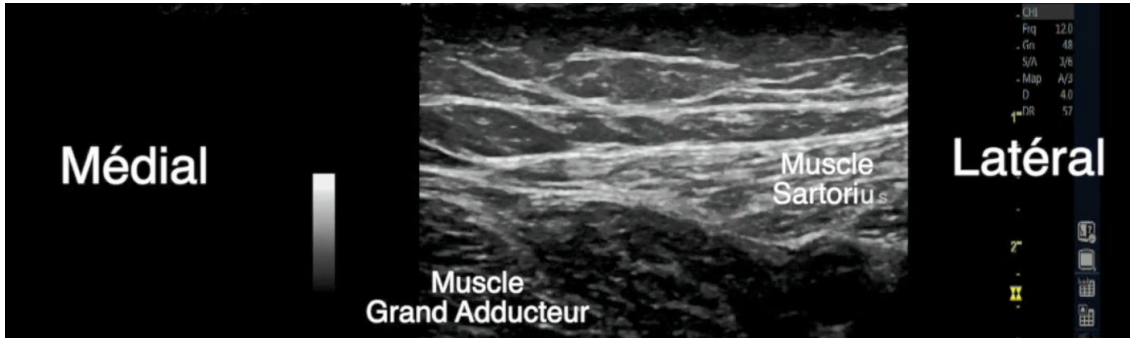
Janvier 2008

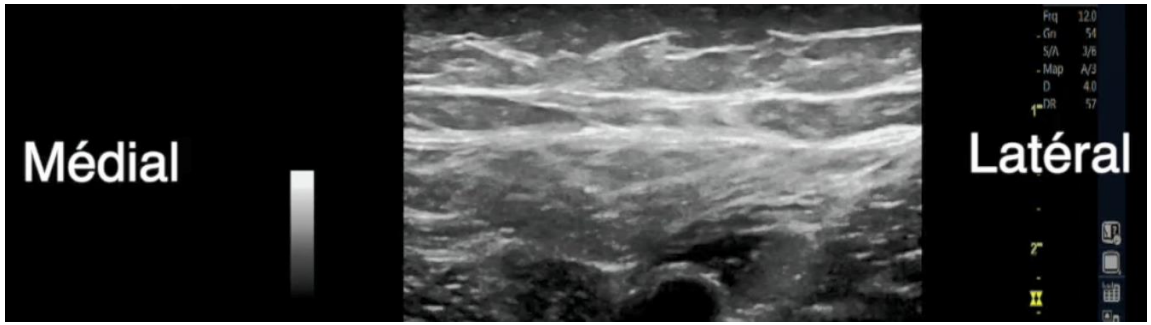

1
2
3
Needle
Insertion

Medial
1
Anterior
Posterior
Femur
Lateral

Medial
2
Anterior
Posterior
Femur
Lateral

Needle
trajectory
Medial
3
Anterior
Posterior
Femur

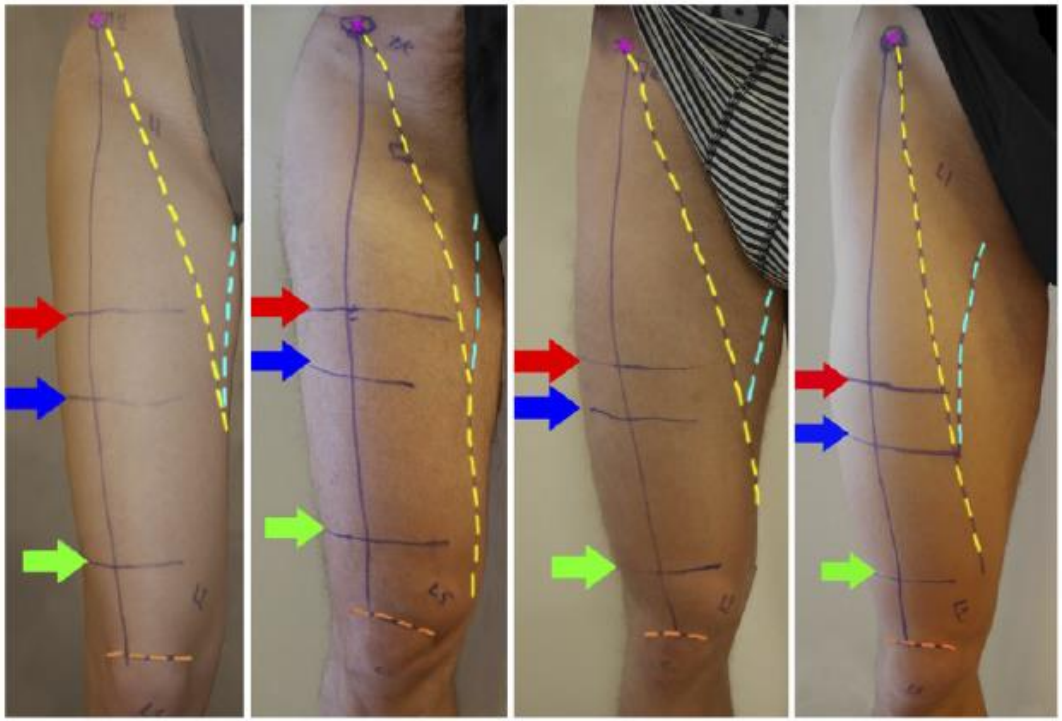

Médial
Muscle
Sartorius
Latéral
Muscle
Grand Adducteur


Médial
Latéral

Reg Anesth Pain Med. 2017 Mar; 42(2): 241–245.

Defining the Location of the Adductor Canal Using Ultrasound

Wan Yi Wong, MMed, MBBS,* Siska Bjørn, MS,† Jennie Maria Christin Strid, MD,† Jens Børglum, MD, PhD,‡ and Thomas Fichtner Bendtsen, MD, PhD†



The figure shows the thighs of 4 volunteers. The midpoint of the thigh (red arrow) is defined as half the distance between the ASIS (pink asterisk) and the base of patella (orange stippled line) corresponding to the ultrasound images in Figure 1A. The proximal end of the AC (blue arrow) is defined by the intersection of the medial border of the sartorius muscle (yellow stippled line) and the medial border of the adductor longus muscle (cyan stippled line) corresponding to the ultrasound images in Figure 1B. The distal end of the AC is defined as the adductor hiatus (green arrow) corresponding to the ultrasound images in Figure 1C.