ALR pédiatrique sous sédation

Dr N. MOSBAH
CHU Sétif

- L’ALR connaît, en chirurgie pédiatrique, un développement qui ne se dément pas depuis une vingtaine d’années.
- En pratique, 90 % des blocs chez l’enfant sont réalisés sous anesthésie générale légère.

Pourquoi AG-ALR?

Pourquoi associer l'ALR à l'AG?

- La période péri-anesthésique est marquée par une anxiété importante et un stress significatif, plus particulièrement au moment de la séparation avec les parents.
- Anxiété + Incompréhension = Absence de collaboration

Pourquoi associer l'ALR à l'AG?

- L'AG permet d'obtenir une immobilité et un relâchement qui autorisent à réaliser l'ALR en toute sécurité et en évitant d'effrayer l'enfant.
- En peropératoire, l'AG permet d'assurer un niveau de stabilité physique et émotionnelle compatible avec la réalisation de l'acte chirurgical

- L’anesthésie générale peut à l’occasion introduire un facteur de morbidité supplémentaire:

La morbi-mortalité peropératoire est principalement liée à l'âge

- L'incidence des arrêts cardiaques per-anesthésiques est 10 fois plus élevée chez les enfants de moins de 01 an que chez les enfants de plus de 1 an.

Conférences d'actualisation SFAR 2005

La morbi-mortalité peropératoire est principalement liée à l'âge

Deux grandes causes d'arrêts cardiaques sont retrouvées chez le jeune enfant dans ces séries :

- les complications respiratoires,
- les complications cardiovasculaires,

Complications cardiaques de l'AG pédiatrique

La mortalité globale liée aux arrêts cardiaques est de 26%.

I. Murat et al. / AFAR…. 28 (2009)

Complications respiratoires de l'AG pédiatrique

- L'incidence du laryngo-spasme chez l'enfant de 0 à 9 ans était de 17,4 ‰, soit 2 fois plus élevée que dans la population globale étudiée (8,7 ‰).

Olsson GL. Laryngospasm during anaesthesia. A computer-aided incidence study in 136,929 patients. Acta Anaesthesiol Scand

Dangers théoriques d'une ALR sous AG

L'AG masque d'éventuels signes précoces de complications d'ALR:

- Absence des signes subjectifs de toxicité neurologiques.
- Absence de douleur témoignant d'une injection intra-neural.

Pourquoi pas une Sédation-ALR?

Définition Sédation

« Technique pendant la quelle l'utilisation d'une ou plusieurs drogues produit un état de dépression du système nerveux central permettant d'effectuer la procédure thérapeutique ou diagnostique ».

James E. Colletti. Pediatric Procedural Sedation and Analgesia. Pediatr Clin N Am 53 (2006) 279–292

Objectifs de la sédation

- L'académie américaine de pédiatrie (AAP) a défini les objectifs de la sédation chez l'enfant comme suit :

➢ Minimiser l'inconfort et la douleur,

➢ contrôler l'anxiété,

➢ Réduire le traumatisme psychologique de l'enfant,

Objectifs de la sédation

- Contrôler le comportement et les mouvements de l'enfant pendant l'acte opératoire.

- Assurer une bonne amnésie.

BJA Advance Access published April 12, 2010

British Journal of Anaesthesia Page 1 of 5
doi:10.1093/bja/aeq082

BJA

Caudal anaesthesia under sedation: a prospective analysis of 512 infants and children

L. Brenner, S. C. Kettner, P. Marhofer, D. Latzke, H. Willschke, O. Kimberger, D. Adelmann and A.-M. Machata*

Department of Anaesthesia, General Intensive Care and Pain Control, Medical University of Vienna, General Hospital, Waehringer Guertel 18-20, A-1090 Vienna, Austria

Conclusions. Caudal anaesthesia under sedation is associated with high success rates and a low incidence of adverse events, but requires careful and anticipatory perioperative management.

Br J Anaesth 2010

The Journal of Urology

Volume 185, Issue 2, February 2011, Pages 654–657

Pediatric Urology

Meatotomy Using Local Anesthesia and Sedation or General Anesthesia With or Without Penile Block in Children: A Prospective Randomized Study

David Ben-Meir[a], Pinhas M. Livne[a], Elad Feigin[c], Ranit Djerassi[b], Rachel Efrat[b]

Show more

Conclusions

Meatotomy performed using local anesthesia and sedation has an equally good outcome to meatotomy performed using general anesthesia with or without penile block.

Journal of Pediatric Surgery 49 (2014) 1304–1307

Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedsurg

Caudal anesthesia with sedation for inguinal hernia repair in high risk neonates☆

Eric Balent [a], Mary Edwards [a,*], Michael Lustik [b], Paul Martin [a]

[a] Department of Surgery, Tripler Army Medical Center, Tripler Army Medical Center, HI
[b] Department of Clinical Investigation, Tripler Army Medical Center, Tripler Army Medical Center, HI

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ABSTRACT

Background/Purpose: The use of caudal anesthesia with sedation (CAS) has theoretical benefits over general anesthesia (GA) in high risk neonates undergoing inguinal hernia repair. This benefit has not been established in clinical studies. We compare outcomes of these two approaches at a single institution.
Methods: A retrospective review was performed of all neonates and preterm infants undergoing inguinal hernia over an 8 year period.
Results: Of 71 infants meeting inclusion criteria, 50 underwent repair with caudal block and systemic sedation, and 21 with general anesthesia. Minor incidents of respiratory depression requiring non invasive interventions were common in the first 24 h post operatively (24% for CAS, 14% with GA), 4% of patients receiving CAS had a respiratory complication which prolonged their hospital stay beyond 24 h post operation. Both required conversion to general anesthesia. Statistically significant differences between the two groups were lacking in terms of preoperative risk and post operative outcome.
Conclusions: CAS is a safe, effective anesthetic option for high risk neonates undergoing inguinal hernia repair. Patients requiring conversion to GA from CAS may be at increased risk for complications. Large, randomized trials are needed to determine any benefit over GA.

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Sédation hors bloc

- Pratique très largement acceptée et utilisée.
- Activité en pleine croissance
- 20% des actes
- Actes diagnostics et thérapeutiques

Sédation hors bloc

- Cathétérisme cardiaque 3,1%
- gastroscopie 5,8%
- Chirurgie plastique 6,4%
- Bronchoscopie 14,3%
- IRM 16,3%
- Oncologie 17,4%
- TDM 20,6%

Gozal D, J Pédiatr 2004: 1996-20028760 procédures hors bloc- 5554 enfants

Quel agent sédatif utilisé?

- Tous les agents utilisés en AG peuvent être utilisés en sédation pédiatrique.

Agents peu utilisés

- Hydrate de chloral: orale ou rectale, délai action 45 min, ½ vie élimination enfant 4 mois à 12 ans :9h, encore utilisé quand AG non réalisable, 50 – 75 mg/kg (effet mutagène et cancerigène chez l'animal +++, CI en administration chronique)
- Thiopenthal: voie rectale, 25 mg/kg,délai 12 min, 11% désaturation .

Glasier CM; Rectal thiopental sodium for sédation of pédiatric patients, Am J Neuroradiol 1995)

- Kétamine: voie rectale 10mg/kg mais réveil prolongé (Ambulatoire ?), IV: 0,5mg/kg.
- Propofol: courte durée action, effet anti-émétisant

-Anesthésies itératives en ventilation spontanée

-Dose charge 2mg/kg, pas de mouvement dans 50% (3mg/kg/h) 100% (6mg/kg/h)

A Randomized, Controlled Trial of IV Versus IM Ketamine for Sedation of Pediatric Patients Receiving Emergency Department Orthopedic Procedures

Mark G. Roback, MD
Joe E. Wathen, MD
Todd MacKenzie, PhD
Lalit Bajaj, MD, MPH

From the Department of Pediatrics, Section of Emergency Medicine, University of Colorado School of Medicine, The Children's Hospital, Denver, CO (Roback, Wathen, Bajaj); and the Department of Medicine, Dartmouth Medical School, Hanover, NH (MacKenzie).

Conclusion: In this study of pediatric sedation for orthopedic procedures, we found that ketamine 4 mg/kg IM was more effective than 1 mg/kg IV but demonstrated significantly longer recovery times and more vomiting. [Ann Emerg Med. 2006;48:605-612.]

Ketamine-Propofol Combination (Ketofol) Versus Propofol Alone for Emergency Department Procedural Sedation and Analgesia: A Randomized Double-Blind Trial

Gary Andolfatto, MD, Riyad B. Abu-Laban, MD, MHSc, Peter J. Zed, BSc(Pharm), PharmD, Sean M. Staniforth, MD, Sherry Stackhouse, BSN, Susanne Moadebi, PharmD, BCPS, Elaine Willman, MD

From the Department of Emergency Medicine (Andolfatto, Abu-Laban, Staniforth), and Faculty of Pharmaceutical Sciences (Zed, Moadebi), and Department of Pathology (Willman), University of British Columbia, Vancouver, British Columbia, Canada; Emergency Department, Lions Gate Hospital, North Vancouver, British Columbia, Canada (Andolfatto, Staniforth, Moadebi, Stackhouse); VCHRI Center for Clinical Epidemiology & Evaluation, Emergency Department, Vancouver General Hospital, Vancouver, British Columbia, Canada (Abu-Laban).

Conclusion: Ketofol for ED procedural sedation does not result in a reduced incidence of adverse respiratory events compared with propofol alone. Induction time, efficacy, and sedation time were similar; however, sedation depth appeared to be more consistent with ketofol. [Ann Emerg Med. 2012;59:504-512.]

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Official Publication of the Brazilian Society of Anesthesiology
www.sba.com.br

SCIENTIFIC ARTICLE

Ketamine–propofol sedation in circumcision

Handan Gulec*, Saziye Sahin, Esra Ozayar, Semih Degerli, Fatma Bercin, Osman Ozdemir

Kecioren Training Hospital, Ankara, Turkey

Received 23 January 2014; accepted 10 March 2014

Conclusion: propofol-ketamine (Ketofol) provided better sedation quality and hemodynamy than ketamine alone in pediatric circumcision operations. We did not observe significant complications during sedation in these two groups. Therefore, ketofol appears to be an effective and safe sedation method for circumcision operation.

DEXMEDETOMIDINE

- Agoniste très sélectif (1 300 fois plus que la clonidine) des récepteurs α2-adrénergiques qui possède des propriétés hypnotiques et analgésiques.

- En perfusion continue à raison de 0,1 à 0,7 µg/kg/h.
- Elle réduit de façon significative les besoins en hypnotiques (midazolam et propofol) et en morphine pendant les 24 premières heures postopératoire

Journal of Clinical Anesthesia (2010) **22**, 538–545

ELSEVIER

Journal of Clinical Anesthesia

Original contribution

Dexmedetomidine and ketamine for sedation during spinal anesthesia in children

Janette D. McVey MD (Resident)[a], Joseph D. Tobias MD (Professor)[b,*]

[a]*Department of Anesthesiology, University of Missouri, Columbia, MO 65212, USA*
[b]*Department of Anesthesiology and Pediatrics, Nationwide Children's Hospital and the Ohio State University, Columbus, OH 43205, USA*

Received 24 April 2009; revised 23 February 2010; accepted 5 March 2010

Conclusion: A combination of ketamine and dexmedetomidine provides effective sedation during spinal anesthesia in infants and children, with limited effects on cardiovascular and ventilatory function.

Egyptian Journal of Anaesthesia (2014) 30, 21–26

Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

www.elsevier.com/locate/egja
www.sciencedirect.com

Research Article

Dexmedetomidine versus propofol for sedation during gastrointestinal endoscopy in pediatric patients

Ashraf S. Hasanin [a,*], Ahmad M. Sira [b]

[a] Department of Anesthesia & ICU, National Liver Institute, Menoufia University, Egypt
[b] Department of Pediatric Hepatology, National Liver Institute, Menoufia University, Egypt

Conclusion: Dexmedetomidine sedation during GIE provides more respiratory safety and HR stability presenting itself as a suitable alternative agent especially for the relatively longer procedures.

Dans notre travail

Cet halogéné a démontré ses qualités :

- Rapidité de l'induction et du réveil.
- Excellente tolérance respiratoire hémodynamique.
- faible risque de toxicité hépatique et rénale.

- En circuit fermé, le coût de l'anesthésie au sévoflurane est proche de celui de l'anesthésie à l'isoflurane et ***moindre que celui d'une anesthésie intraveineuse au propofol***.

Monitorage de l'ALR-Sédation

Buts du monitorage

- Eviter le surdosage en hypnotiques qui expose à des effets secondaires.
- Eviter le sous-dosage qui expose à un réveil peropératoire qui peut être à l'origine d'une mémorisation.

Awareness During Anesthesia in Children: A Prospective Cohort Study

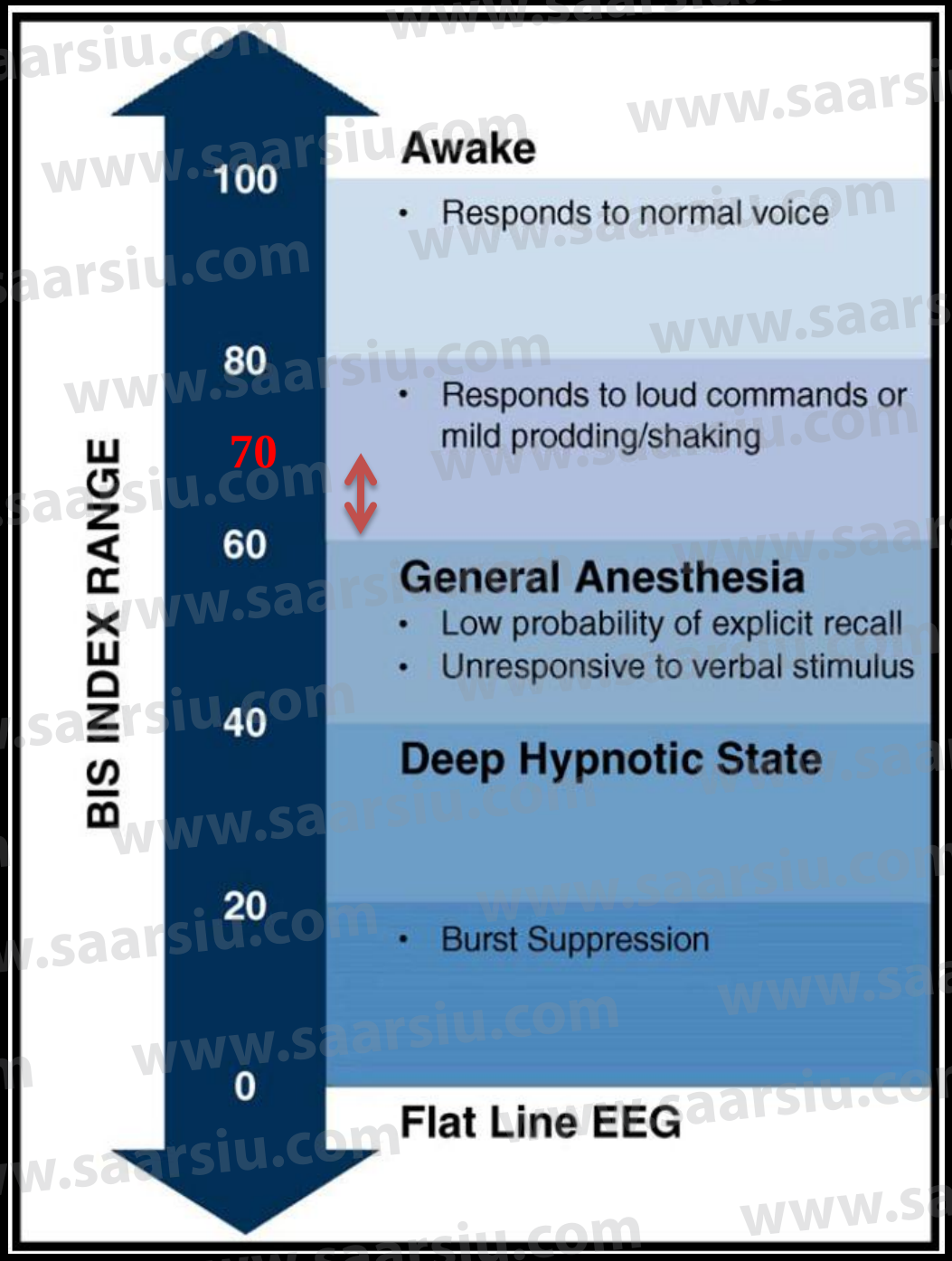
Andrew J. Davidson, MBBS, GradDipEpiBiostats, FANZCA*†, Grace H. Huang, BMedSci*, Caroline Czarnecki, BMedSci*, Margaret A. Gibson, BN, RN*, Stephanie A. Stewart, BN, RN*, Kris Jamsen, BSc, PGDip(Stats)‡, and Robyn Stargatt, PhD, MAPS§

*Department of Anaesthesia and Pain Management, The Royal Children's Hospital, Parkville, Victoria, Australia; †Department of Pharmacology, University of Melbourne, Melbourne, Victoria, Australia; ‡Clinical Epidemiology and Biostatistics Unit, The Royal Children's Hospital, Parkville, Victoria, Australia; and §Department of Psychology, The Royal Children's Hospital, Parkville, Victoria, Australia

(Anesth Analg 2005;100:653–61)

- Davidson et coll. , dans une étude de cohorte, ont rapporté une incidence de 0,8% de mémorisation, soit une incidence supérieure à celle de la population adulte générale (0,1-0,2%).

Dans notre travail


BIS INDEX RANGE
100
80
70
60
40
20
0
Awake
• Responds to normal voice
• Responds to loud commands or mild prodding/shaking
General Anesthesia
• Low probability of explicit recall
• Unresponsive to verbal stimulus
Deep Hypnotic State
• Burst Suppression
Flat Line EEG

Bispectral Index Monitoring Quantifies Depth of Sedation During Emergency Department Procedural Sedation and Analgesia in Children

Dewesh Agrawal, MD
Henry A. Feldman, PhD
Baruch Krauss, MD, EdM
Mark L. Waltzman, MD

From the Division of Emergency Medicine (Agrawal, Krauss, Waltzman) and Clinical Research Program (Feldman), Children's Hospital Boston and Harvard Medical School, Boston, MA.

Dr. Agrawal is currently affiliated with Children's National Medical Center, Washington, DC.

Conclusion: Bispectral index monitoring correlated with clinical sedation scores and may serve as a useful, objective adjunct in quantifying depth of nondissociative procedural sedation and analgesia in children.

[*Ann Emerg Med.* 2004;43:247-255.]

British Journal of Anaesthesia 95 (5): 674–9 (2005)
doi:10.1093/bja/aei247 Advance Access publication September 23, 2005

BJA

PAEDIATRIC ANAESTHESIA

Performance of entropy and Bispectral Index as measures of anaesthesia effect in children of different ages†

A. J. Davidson[1 2 3]*, G. H. Huang[3], C. S. Rebmann[1] and C. Ellery[3]

Conclusions. For both entropy and BIS the measure of anaesthetic effect was significantly different for children aged <1 yr compared with older children. There was no difference in performance of entropy and BIS. Both should be used cautiously in small children.

Validation of the Bispectral Index Monitor During Conscious and Deep Sedation in Children

Nicole Brown McDermott, MD, Tamitha VanSickle, MD, Dominika Motas, MD, and Robert H. Friesen, MD

Department of Anesthesiology, The Children's Hospital and the University of Colorado School of Medicine, Denver, Colorado

In this study, we tested the validity of the bispectral index (BIS) monitor during conscious and deep sedation of children by comparing it with the University of Michigan Sedation Scale (UMSS), a validated observational pediatric sedation scale. Eighty-six children <12 yr of age were enrolled in this observational study. The subjects underwent conscious or deep sedation administered by non-anesthesiologists for diagnostic or therapeutic procedures in four departments in a children's hospital. Sedation medications varied among departments and were not controlled by the study protocol. An independent observer derived a UMSS score at 10-min intervals for 1 h during sedation; personnel administering sedation medications and performing the procedures were blinded to the BIS and UMSS scores. Significant correlation between BIS scores and UMSS scores was found ($r = -0.704$, $P < 0.0001$), including in subjects <6 mo of age ($n = 6$) ($r = -0.761$, $P < 0.001$). Poor correlation was found when ketamine or an oral combination of chloral hydrate, hydroxyzine, and meperidine were used for sedation. We conclude that BIS correlates well with UMSS scores and may be a valid measure of conscious and deep sedation in children.

(Anesth Analg 2003;97:39–43)

Validation of the Bispectral Index Monitor for Measuring the Depth of Sedation in Children

Senthilkumar Sadhasivam, MD, Arjunan Ganesh, MBBS, Amy Robison, BA, Robin Kaye, MD, and Mehernoor F. Watcha, MD

Departments of Anesthesiology and Radiology, The Children's Hospital of Philadelphia, University of Pennsylvania, Philadelphia, Pennsylvania

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< 0.001). We conclude that the BIS monitor is a quantitative, nondisruptive and easy to use depth of sedation monitor in children.

(Anesth Analg 2006;102:383–8)

American Journal of Emergency Medicine 33 (2015) 25–30

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Original Contribution

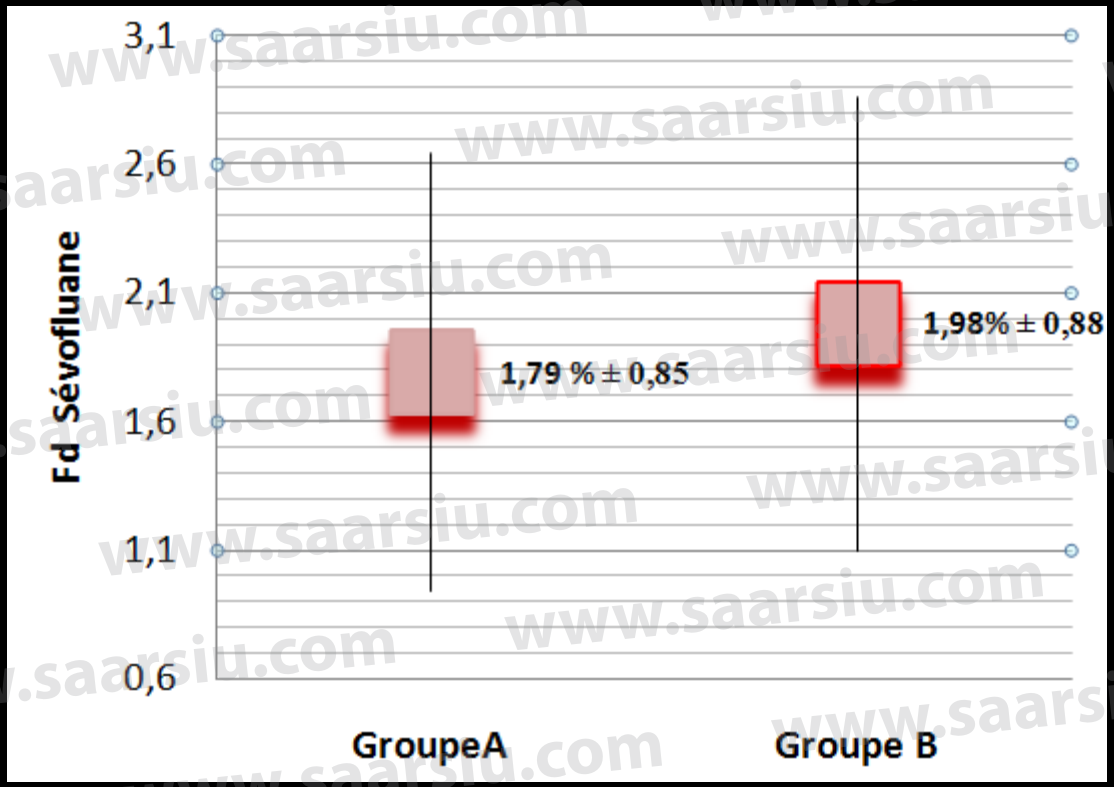
A randomized controlled trial of capnography during sedation in a pediatric emergency setting☆,☆☆,★

Melissa L. Langhan, MD, MHS [a,*], Veronika Shabanova, MPH [b], Fang-Yong Li, MPH, MS [b], Steven L. Bernstein, MD [c], Eugene D. Shapiro, MD [a,d]

[a] Department of Pediatrics, Yale University School of Medicine, New Haven, CT
[b] Yale School of Public Health, Yale Center for Analytical Sciences, New Haven, CT
[c] Department of Emergency Medicine, Yale University School of Medicine, New Haven, CT
[d] School of Medicine and Department of Investigative Medicine, Graduate School of Arts and Sciences, Yale University School of Medicine, New Haven, CT

Conclusion: Hypoventilation is common during sedation of pediatric emergency department patients. This can be difficult to detect by current monitoring methods other than capnography. Providers with access to capnography provided fewer but more timely interventions for hypoventilation. This led to fewer episodes of hypoventilation and of oxygen desaturation.

Besoins en Sévoflurane



Besoins en Sévoflurane

Annales Françaises d'Anesthésie et de Réanimation 31 (2012) 29–33

ELSEVIER MASSON

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Article original

Bloc caudal associé à une anesthésie au masque facial (sévoflurane) chez le nourrisson à haut risque d'apnée : étude observationnelle

Caudal block and light sevoflurane mask anesthesia in high-risk infants: An audit of 98 cases

D. Lacrosse [a,*], T. Pirotte [b], F. Veyckemans [b]

Concentration moyenne inspirée en sévoflurane.

	T ($n=36$)	P ($n=24$)	GP ($n=29$)	TGP ($n=9$)
Concentration moyenne inspirée en sévoflurane (%)	2,8	2,5	2,4	2,3

T : enfant à terme ; P : prématuré ; GP : grand prématuré ; TGP : très grand prématuré.

Besoins en Sévoflurane

Annales Françaises d'Anesthésie et de Réanimation 31 (2012) 29–33

ELSEVIER MASSON

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Caudal block and light sevoflurane mask anesthesia in high-risk infants: An audit of 98 cases

D. Lacrosse [a,*], T. Pirotte [b], F. Veyckemans [b]

	D. Lacrosse	N. MOSBAH	Taux de réduction
Concentration moyenne inspirée en Sévoflurane (%)	2,8%	1,79%	63,92%

Does Monitoring Bispectral Index or Spectral Entropy Reduce Sevoflurane Use?

Isabelle Aimé, MD
Nicolas Verroust, MD
Cécile Masson-Lefoll, MD
Guillaume Taylor, MD
Pierre-Antoine Laloë, MD
Ngai Liu, MD
Marc Fischler, MD

A decrease in volatile anesthetic consumption has been demonstrated using bispectral index (BIS), whereas data concerning spectral entropy are lacking. One hundred and forty adult patients scheduled for surgical procedures lasting more than 1 h were prospectively randomized to receive an anesthetic controlled either by BIS or by spectral entropy or solely by clinical variables. Anesthesia was induced with propofol and sufentanil. Sufentanil was infused continuously thereafter. Sevoflurane was administered in 1 L/min O_2/N_2O. The sevoflurane concentration was adjusted according to conventional clinical variables in the standard practice group, whereas the 40–60 interval was applied for the BIS and spectral entropy-guided groups. The sevoflurane vaporizer was weighed before and after anesthesia, and consumption was calculated. Groups were comparable for demographic data except for weight (heavier in the spectral entropy-guided group, $P < 0.05$). Compared with standard practice, patients with BIS or spectral entropy monitoring required 29% less sevoflurane (normalized sevoflurane consumption to the weights of the patients and to the durations of anesthesia; both $P < 0.03$) and a similar sufentanil dose. An unintended improvement in the standard practice group (positive bias) was observed. In conclusion, BIS and spectral entropy monitoring have the same sparing effect of sevoflurane.

(Anesth Analg 2006;103:1469–77)

Ventilation spontanée ou assistée?

Ventilation assistée

- Ventilation préférentielle des zones à compliance élevée au dépend des autres.
- Distorsion des couches superficielles du surfactant.
- Pression positive intra-thoracique:

  -diminution de retour veineux

  -diminution de la fraction d'éjection du VD

  -diminution de la circulation pulmonaire

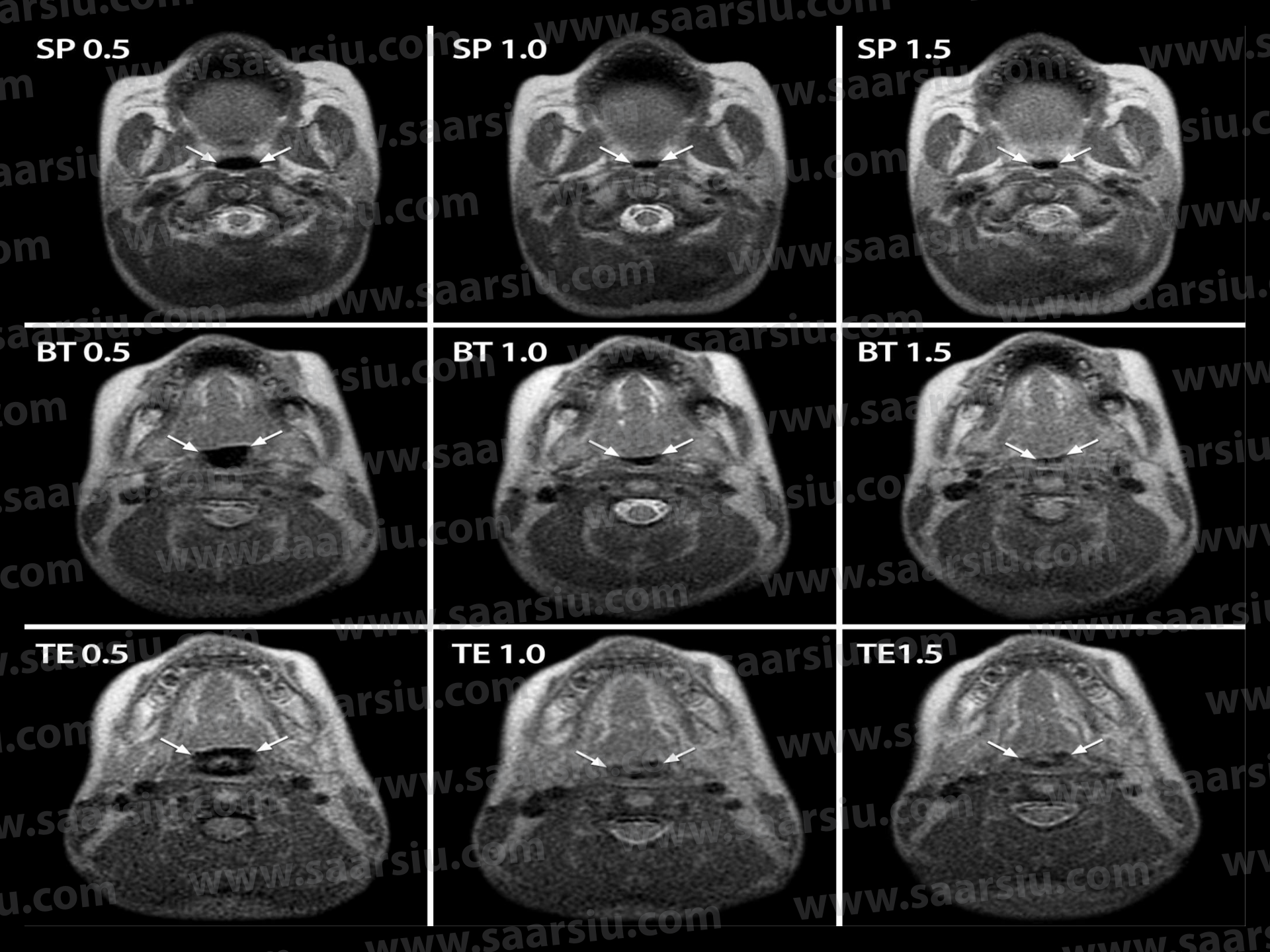
La ventilation spontanée

- Facilite la distribution des gaz dans les poumons.
- Maintenir le jeu diaphragmatique.
- Pression négative inspiratoire

  -Facilite le retour veineux

VS + Aide inspiratoire

- Limite la dépression ventilatoire
- Accélère l'induction
- Limite le risque d'obstruction des voies AS.


SP 0.5
SP 1.0
SP 1.5
BT 0.5
BT 1.0
BT 1.5
TE 0.5
TE 1.0
TE1.5

Quel dispositif respiratoire faut il mettre?

Masque faciale

- Espace mort
- Travail respiratoire
- Étanchéité
- Protection des voies aériennes
- Peu de stimulation

Masque laryngé

- Étanchéité
- Protection des voies aériennes sup

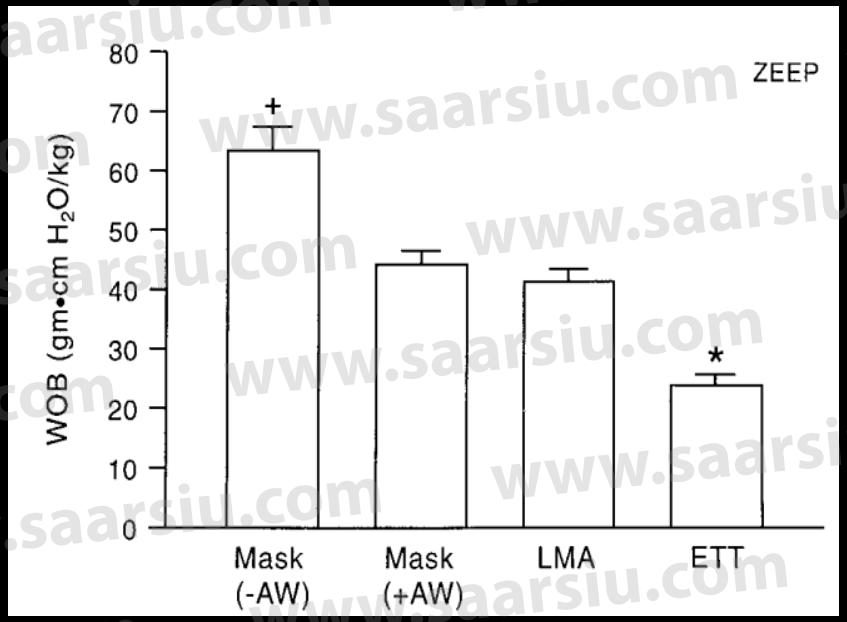
Sonde d’intubation

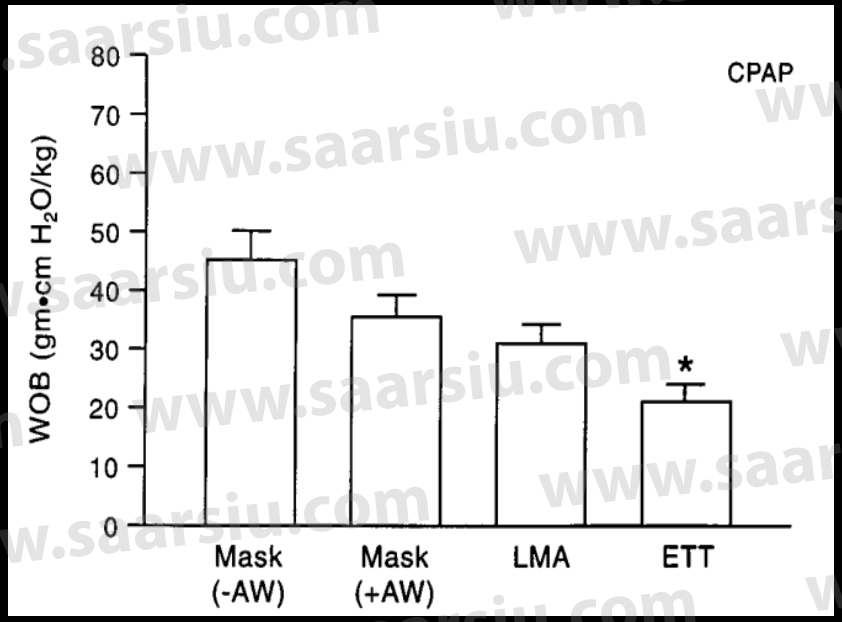
- Stimulations réflexes laryngés et trachéaux.
- Niveau d’anesthésie plus profond

Work of Breathing During Spontaneous Ventilation in Anesthetized Children: A Comparative Study Among the Face Mask, Laryngeal Mask Airway and Endotracheal Tube

Ilan Keidan, MD*, Gavin F. Fine, MB, BCh*, Tetsuro Kagawa, MD*, Francis X. Schneck, MD†, and Etsuro K. Motoyama, MD*‡

Departments of *Anesthesiology, †Urology, and ‡Pediatrics, University of Pittsburgh School of Medicine & Children's Hospital of Pittsburgh, Pittsburgh, Pennsylvania





Notre protocole

1. L'induction Fraction délivrée (Fd) de Sévoflurane à 6%.

2. Les yeux centrés= Fd Sévoflurane = 4%

3. Prise d'un abord veineux

4. Mise en Décubitus latéral

5. Réalisation de la technique ALR

Conclusion

- La sédation, inhalée ou IV, associée à une ALR chez l’enfant, est une technique sure et efficace.
- Les ingrédients d’une sédation pour une ALR pédiatrique réussie, sont une bonne connaissance des recommandations et un travail d’équipe bien orchestré.

Merci